


# PRODUCT CATALOG

## RF & Microwave Connectors & Cable Assemblies



  
**EMERSON**  
Network Power

**Johnson**  
Connectivity Solutions

**Emerson Network Power Connectivity Solutions** has a wide range of cable assemblies and connectors suited for RF, Microwave and Fiber Optic signal transmission. Connectivity Solutions is a vertically integrated supplier of custom, fixed length and semi-rigid cable assemblies from DC to 50 GHz. Our product lines deliver custom-engineered products and solutions to satisfy the most demanding and complex requirements.

### AIM-Cambridge

Connectivity Solutions



AIM-Cambridge has a universal line of products that offer cost effective, high quality solutions for connectivity. Our connectors are available in BNC, Type N, F Type, RCA, UHF, Mini-UHF, TNC, D-Sub and Modular Plugs for Data/Telecom applications. In addition, we stock a wide variety of cables for A/V, SATV, CATV, computer and LAN applications, as well as a complete line of termination tools and structured cabling products. AIM-Cambridge promises that its product will provide you with unmatched consistency, quality, reliability and ease of use.

### Johnson

Connectivity Solutions



Johnson designs and manufactures an industry leading line of RF coaxial connectors and adapters, which are available in both 50 and 75 ohm versions. Johnson connectors are designed to provide the highest quality data transmission for audio, video and data applications. The Johnson line of products can address frequency ranges from DC to 46GHz and all sizes from Ultra-miniature interfaces (UMC), Micro-miniature, (MCX, MMCX, SMP), Subminiature (SMA, SMB, SMK, kwiQMate™), Medium connectors (Type N connectors) through to large connectors (DIN7/16). The breadth of products available within the Johnson range includes board and cable mount connectors as well as semi-rigid, conformable, and flexible RF coaxial cables.

### Midwest Microwave

Connectivity Solutions



Midwest Microwave manufactures passive coaxial microwave components that are known for their precision performance and high quality that meets the precise requirements of the RF/Microwave industry. Our broad product portfolio includes: Attenuators, Precision Adapters, Terminations, DC Blocks, Power Dividers, Couplers, Equalizers, Phase Shifters, Connectors, Custom Cable Assemblies and Test Cables that are designed and manufactured for both military and commercial applications.

Midwest also offers a wide variety of Qualified Product List (QPL) approved products in the M3933, M39030 and M39012 series, as well as many DESC/DSCC approved models.

### Semflex

Connectivity Solutions



Semflex designs and manufactures low loss, flexible, microwave coaxial cable and custom cable assemblies for the military/aerospace, commercial OEM and test instrumentation markets. Semflex offers cables ranging from DC to 50 GHz, available with ultra low insertion loss, power ratings up to 21 KW, and available with all popular connectors.

### Stratos

Connectivity Solutions



Stratos optical connectivity products is globally recognized as highly reliable, cost-effective, and provides optical connectivity solutions that are virtually immune to dust, mud, oil, water, and other contaminants.

Our expanded beam connectivity products are ideal for harsh environment applications in the broadcast, industrial, petrochemical and military/aerospace markets where high reliability, low maintenance and quick serviceability are critical requirements. Our optical active products are used mainly in military, aerospace and industrial markets where high speed/high reliable performance is mission critical. The active product line includes optical transceivers, optical media converters and custom devices tailored to your application.

### Trompeter

Connectivity Solutions



Trompeter is recognized as a global leader in delivering best in class RF connectivity products. The Trompeter line of patch jacks, RF connectors, cable assemblies, HDTV digital technology and DS3 connectivity solutions is unrivalled. Our mission is to provide products that continually deliver the highest quality signal integrity for the most demanding applications in Telecom, Central Office, Broadcast, Military Aerospace, and Instrumentation markets worldwide. Our extensive line of cost-effective products are rigorously designed and tested to provide the critically engineered solutions necessary to enhance the end-user's overall experience.

### Vitelec

Connectivity Solutions



Vitelec provides a comprehensive range of RF coaxial interconnect products and cable assemblies. The company has a long established reputation for offering quality and innovation with a wide range of both standard and custom designed products for the electronic and communication industries.

# Specifications

## Electrical Specifications

**Impedance:** 50 Ohms

**Frequency Range:**

Connectors .....	0-6 GHz
Dummy loads.....	0-1 GHz

**VSWR (max):** (f = GHz)

	<u>Straight Cable Connectors</u>	<u>Right Angle Cable Connectors</u>
.047 OD .....	1.20	1.14 + .07f
RG-178, RG-316, RG-316 DS .....	1.20	1.25
RG-405 .....	1.15	1.15
Uncabled receptacles, dummy loads .....		N/A

**Working Voltage:**

Connectors .....	170 VRMS at sea level†
Dummy loads.....	N/A

**Dielectric Withstanding Voltage:**

Connectors.....	500 VRMS at sea level†
Dummy loads.....	N/A

**Insulation Resistance:** 1000 megohms min

**Contact Resistance:** (milliohms max)

	<u>Initial</u>	<u>After Environmental</u>
Center contact (straight cabled connectors and uncabled receptacles) .....	5.0	8.0
Center contact (right angle cabled connectors).....	5.0	15.0
Outer contact (all connectors).....	1.0	1.5
Braid to body .....	1.5	N/A

**Corona Level:**

Connectors .....	190 volts min at 70,000 feet†
Dummy loads.....	N/A

**Insertion Loss:** (dB max, tested at 1 GHz)

Straight cabled connectors .....	0.1
Right angle cabled connectors.....	0.2
Uncabled receptacles, dummy loads.....	N/A

**RF Leakage:** (dB min, tested at 2.5 GHz)

Flexible cable .....	-60 dB
RG-405 .....	-70 dB
Dummy loads .....	N/A

**RF High Potential Withstanding Voltage:** (400 VRMS at 4 and 7 MHz)†

**Power Rating (Dummy Load):** 0.5 watt @ +25°C, derated to 0.25 watt @ +125°C

†Avoid user injury due to misapplication. See safety advisory definitions inside front cover.

## Mechanical Specifications

**Engagement Design:** Series MMCX

**Engagement/Disengagement Force:** 8 lbs max axial engagement  
1.4 lbs min axial disengagement

**Contact Retention:** 2.0 lbs min axial force

**Cable Retention:**

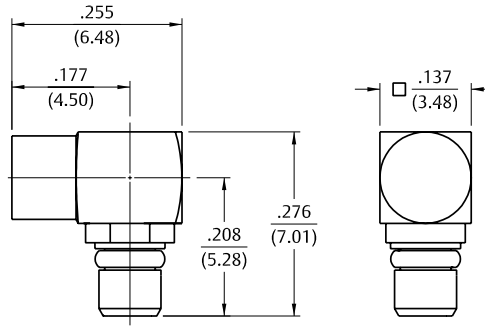
	<u>Axial Force* (lbs)</u>	<u>Torque (oz-in)</u>
.047 flexible .....	3.5	N/A
RG-178 .....	7.0	N/A
RG-316 .....	20.0	N/A
RG-316 DS .....	25.0	N/A
RG-405 .....	30.0	16

\*Or cable breaking strength whichever is less.

**Durability:** ..... 500 cycles min

# Semi-Rigid and Flexible Cable

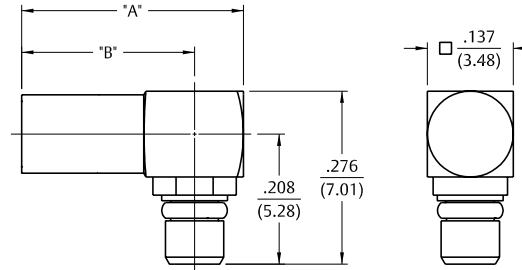
## Right Angle Solder Type Plug – Captivated Contact



Cable Type	Gold Plated
RG-405	135-3693-101

Assembly instructions page 198.

## Right Angle Crimp Type Plug – Captivated Contact



Cable Type	Gold Plated	"A"	"B"	Termination
.047" OD Flexible	135-3436-101	.354 (8.99)	.276 (7.01)	Crimp Insert
RG-178, 196	135-3402-101	.354 (8.99)	.276 (7.01)	Crimp Insert
RG-178, 196	135-3402-111	.412 (10.46)	.334 (8.48)	Crimp Sleeve
RG-316, 188, 161, 174, 179, 187	135-3403-101	.412 (10.46)	.334 (8.48)	Crimp Sleeve
RG-316 DS, 188 DS	135-3404-101	.412 (10.46)	.334 (8.48)	Crimp Sleeve

Assembly instructions page 200 and 201.

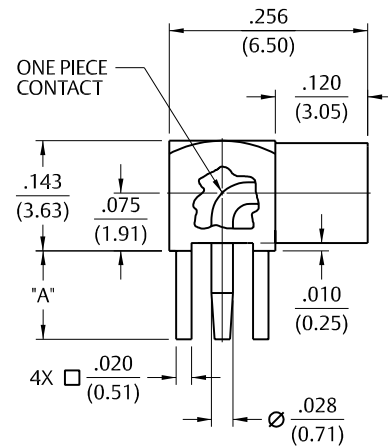
# PC Mount

## Right Angle Jack Receptacle



Gold Plated	"A"
135-3701-301	.115 (2.92)
135-3701-311	.068 (1.73)

Mounting Hole layout figure 12 page 194.

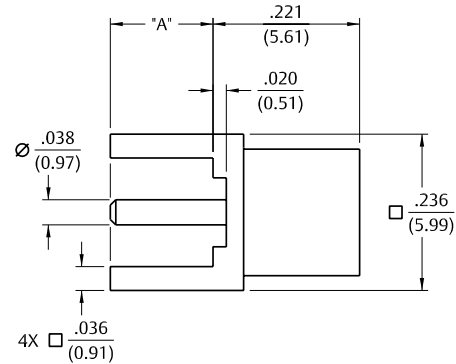


## Straight Jack Receptacle



Gold Plated	"A"
135-3701-201	.115 (2.92)
135-3701-211	.068 (1.73)

Mounting Hole layout figure 12 page 194.

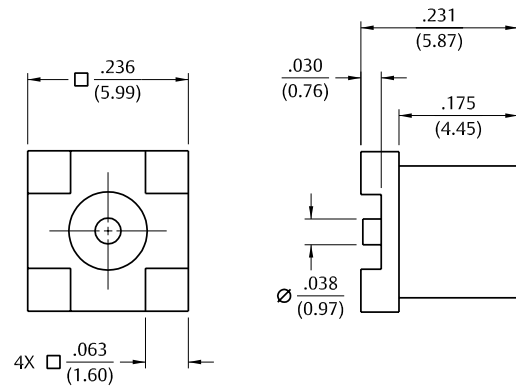


## Straight Surface Mount Jack Receptacle



Gold Plated	Packaging
135-3711-201	Stock
135-3711-202	Tape and Reel, 1500 pcs/reel

Recommended Land Pattern figure 15 page 195.  
Tape and Reel .315 (8.0) component pitch .630 (16.0) wide.



# Non-Magnetic RF Connectors

## Non-Magnetic Connectors

Our line of non-magnetic connectors is one of many successful examples of how Johnson® commercializes the high-end, custom application into the cost-sensitive solution that maintains the original Mil-Spec performance. As MRI and other magnetically sensitive technologies grow and evolve so to must the Johnson connector portfolio. Stronger magnetic fields, demands for better signal-to-noise ratios, custom-sized and modular flex coils for increasingly smaller machines: the RF connectors within the equipment have to bear an increasingly tricky role of delivering higher through-put while creating less interference.

With SMA, SMB, MCX, MMCX and soon SMP interfaces made available in a variety of PC and Cable-Mount designs, we can deliver the imaging performance your customers count on.

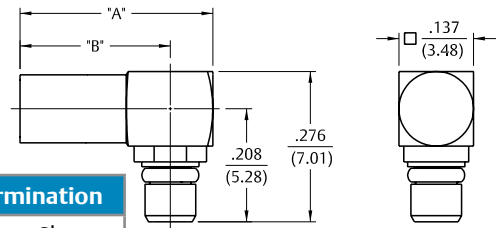
- The materials and finishes of our connectors meet the stringent limits of image and magnetic field distortion in an MR environment.
- The connector electrical performance exceeds the frequency requirements of the Receive/Transmit RF Coils in MR equipment (typically DC-6 GHz).
- The copper alloys of the body, springs and contact parts are designed to provide uniformity and maintain low permeability and magnetic susceptibility.
- Gold finishes are altered to eliminate magnetic barrier layers and provide excellent corrosion resistance and wear characteristics.
- Plugs maintain their electrical and mechanical performances in the environments of high-vibration common with MRI machines.
- A robust connector assembly design allows for a high count of mating cycles.
- As a helpful visual cue the connectors are marked “NM”.



**Emerson Connectivity Solutions Non-Magnetic design capabilities expand beyond the parts and interfaces listed in this catalog. Please contact technical support to discuss the options for manufacturing your customized interconnects.**

# Flexible Cable and PC Mount

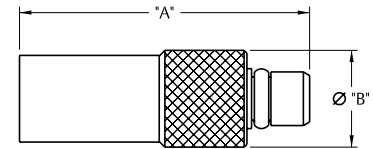
## Right Angle Crimp Type Plug – Captivated Contact



Cable Type	Gold Plated	"A"	"B"	Termination
RG-316, 188, 187, 179, 161, 174	135-9403-101	.412 (10.46)	.334 (8.48)	Crimp Sleeve
RG-178, 196	135-9402-111	.412 (10.46)	.334 (8.48)	Crimp Sleeve
.047 OD Flexible	135-9436-101	.354 (8.99)	.276 (6.98)	Crimp Insert

Assembly instructions page 199 and 200.

## Straight Crimp Type Plug – Solder or Crimp Contact – Captivated Contact



Cable Type	Gold Plated	"A"	"B"	Termination
RG-316, 188, 161, 174	135-9403-001	.509 (12.93)	.173 (4.39)	Crimp Sleeve
RG-178, 196	135-9402-001	.462 (11.73)	.137 (3.48)	Crimp Insert
.047 OD Flexible	135-9436-001	.462 (11.73)	.137 (7.01)	Crimp Insert

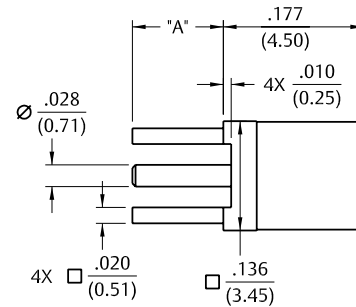
Assembly instructions page 204 and 205.

## Straight Jack Receptacle



Gold Plated	"A"
135-9701-201	.115 (2.92)
135-9701-211	.068 (1.73)

Mounting hole layout figure 12 on page 195.

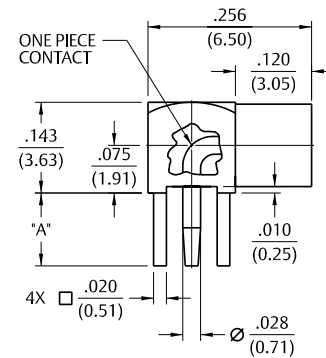


## Right Angle Jack Receptacle



Gold Plated	"A"
135-9701-301	.155 (3.94)
135-9701-311	.068 (1.73)

Mounting hole layout figure 12 on page 195.

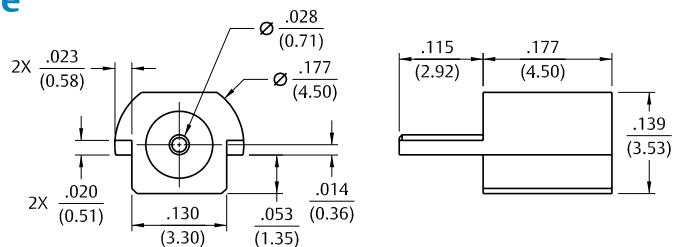


## End Launch Surface Mount Jack Receptacle



Gold Plated	Packaging
135-9711-801	Stock
135-9711-802	Tape and Reel 1000 pcs/reel

Recommended land pattern figure 14 on page 195.  
Tape and Reel .316 (8.0) component pitch .630 (16.0) wide.



# Specifications

## Electrical Specifications

**Impedance:** 50 Ohms

**Frequency Range:**

Connectors.....	0-6 GHz
Dummy loads.....	0-1 GHz

**VSWR:** (max) (f = GHz)

	Straight Cabled Connectors	Right Angle Cabled Connectors
RG-178.....	1.17 + .04f	1.07 + .06f
RG-316 and RG-405.....	1.13 + .04f	1.07 + .04f
Adapters.....		1.13 + .04f
Uncabled receptacles, Dummy loads.....		N/A

**Working Voltage:** (VRMS max)†

	Sea Level	70K Feet
RG-178.....	250	65
RG-316, RG-405, uncabled receptacles, adapters.....	335	85
Dummy loads.....		N/A

**Dielectric Withstanding Voltage:** (VRMS min at sea level)†

RG-178.....	750
RG-316, RG-405, uncabled receptacles, adapters.....	1000
Dummy loads.....	N/A

**Insulation Resistance:** 1,000 megohms min

**Contact Resistance:** (milliohms max)

	Initial	After Environmental
Center contact (straight cabled connectors and uncabled receptacles).....	5.0	8.0
Center contact (right angle cabled connectors, adapters).....	5.0	15.0
Outer contact (all connectors).....	1.0	1.5
Braid to body (gold plated connectors).....	1.0	N/A
Braid to body (nickel plated connectors).....	2.5	N/A

**Corona Level:** (Volts min at 70,000 feet)

RG-178.....	190
RG-316, RG-405 uncabled receptacles, adapters.....	250
Dummy loads.....	N/A

**Insertion Loss:** (dB max tested at 1 GHz)

Straight cabled connectors, adapters.....	0.1 dB
Right angle cabled connectors.....	0.2 dB
Uncabled receptacles, dummy loads.....	N/A

**RF Leakage:** (dB min, tested at 2.5 GHz)

Cable connectors.....	-55 dB
Uncabled receptacles and adapters, dummy load.....	N/A

**RF High Potential Withstanding Voltage:** (VRMS min, tested at 4 and 7 MHz)†

RG-178.....	500
RG-316 and adapters.....	700
RG-405.....	670
Uncabled receptacles.....	600
Dummy loads.....	N/A

**Power Rating (Dummy Load):** 0.5 watt @ +25°C, derated to 0.25 watt @ +125°C

† Avoid user injury due to misapplication. See safety advisory definitions inside front cover.

## Mechanical Specifications

**Engagement Design:** Compatible with CECC 22220, Series MCX

**Engagement Force:** 5.6 lbs max axial force

**Disengagement Force:** 8 lbs max axial force, 1 lb min

**Contact Retention:** 2.3lbs min axial force (captivated contacts) 1 oz-in min torque (uncabled receptacles)

	Axial Force* (lbs)	Torque (oz-in)
RG-178.....	10.0	N/A
RG-316.....	20.0	N/A
RG-316 DS.....	25.0	N/A
RG-405.....	30.0	16

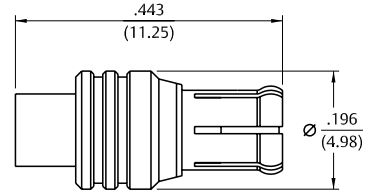
\*Or cable breaking strength whichever is less.

**Durability:**.....500 cycles min



# Semi-Rigid Cable & Flexible Cable

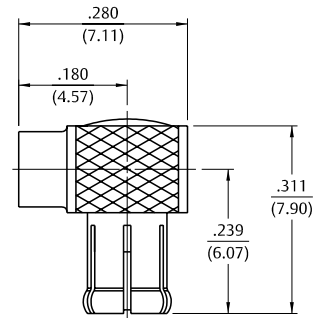
## Straight Solder Type Plug



Cable Type	Gold Plated	Nickel Plated
RG-405	133-3693-001	133-3693-006

Assembly instructions page 206.

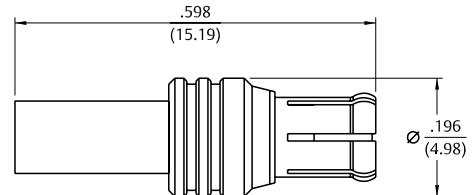
## Right Angle Solder Type Plug – Captivated Contact



Cable Type	Gold Plated	Nickel Plated
RG-405	133-3693-101	133-3693-106

Assembly instructions page 206.

## Straight Crimp Type Plug – Solder or Crimp Contact



Cable Type	Gold Plated	Nickel Plated	Captivated Contact
RG-178, 196	133-3402-001	133-3402-006	No
RG-316, 188, 161, 174	133-3403-001	133-3403-006	Yes
RG-316 DS, 188DS	133-3404-001	133-3404-006	Yes
RG-179, 187	133-3433-001	133-3433-006	Yes

Assembly instructions page 207.

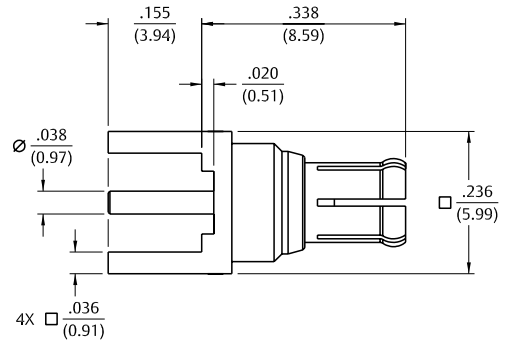
# PC Mount

## Straight Plug Receptacle



Gold Plated	Nickel Plated
133-3801-201	133-3801-206

Mounting hole layout figure 4 page 194.

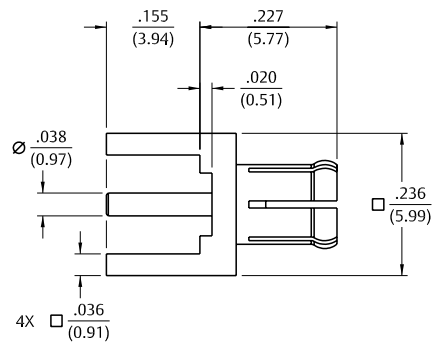


## Straight Plug Receptacle – Low Profile



Gold Plated	Nickel Plated
133-3801-211	133-3801-216

Mounting hole layout figure 4 page 194.



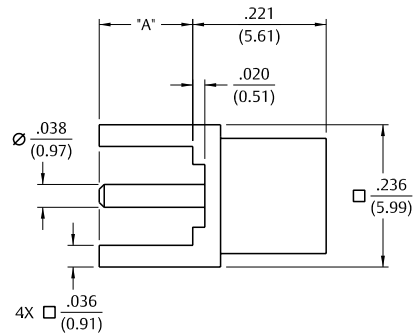
## Straight Jack Receptacle



Gold Plated	Nickel Plated	"A"
133-3701-201	133-3701-206	.155 (3.94)
133-3701-211	133-3701-216	.110 (2.79)
133-3701-221	133-3701-226	.068 (1.73)

Mounting hole layout figure 4 page 194.

Four and six connector ganged receptacles available. See page 190.



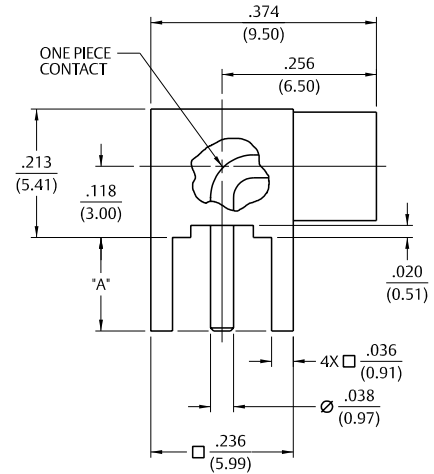
# PC Mount

## Right Angle Jack Receptacle



Gold Plated	Nickel Plated	"A"
133-3701-301	133-3701-306	.155 (3.94)
133-3701-311	133-3701-316	.110 (2.79)
133-3701-321	133-3701-326	.068 (1.73)

Mounting hole layout figure 4 page 194.

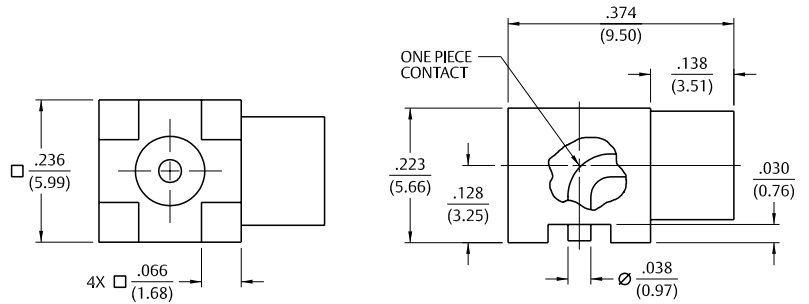


## Right Angle Surface Mount Jack Receptacle



Gold Plated	Packaging
133-3711-301	Stock
133-3711-302	Tape and Reel 750 pcs/reel

Recommended land pattern figure 13 on page 195.  
Tape and Reel .472 (12.0) component pitch .945 (24.0) wide.

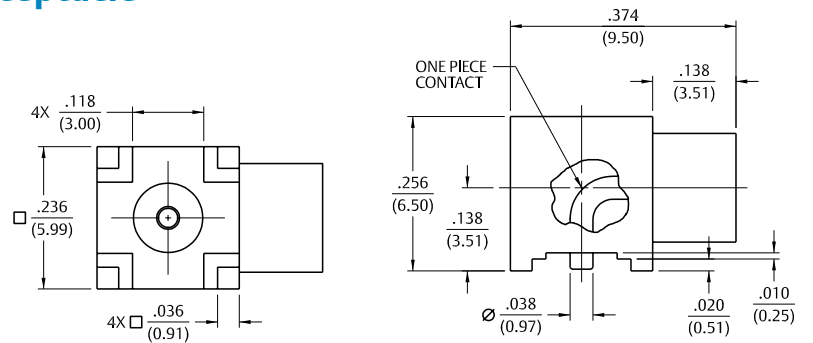


## Right Angle Surface Mount Jack Receptacle



Gold Plated	Packaging
133-3711-311	Stock
133-3711-312	Tape and Reel 750 pcs/reel

Recommended land pattern figure 4 on page 194.  
Tape and Reel .472 (12.0) component pitch .945 (24.0) wide.



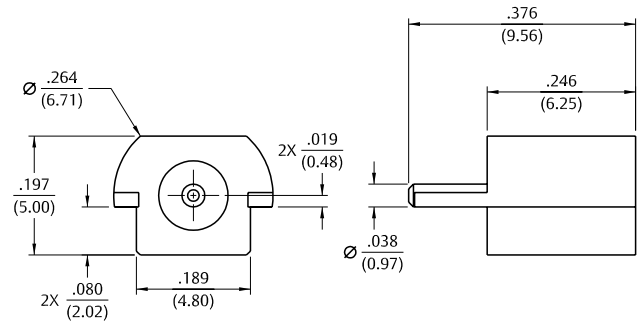
# PC Mount, Bulkhead Mount & Panel Mount

## End Launch Surface Mount Jack Receptacle



Gold Plated	Packaging
133-3711-801	Stock
133-3711-802	Tape and Reel 1000 pcs/reel

Recommended land pattern figure 21 page 195.  
Tape and Reel .472 (12.0) component pitch .945 (24.0) wide

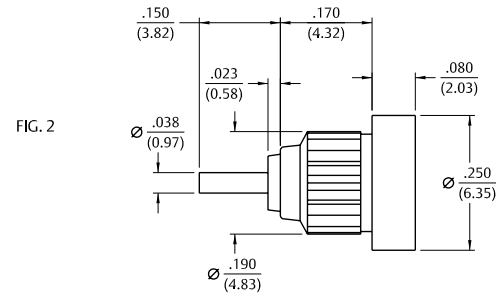
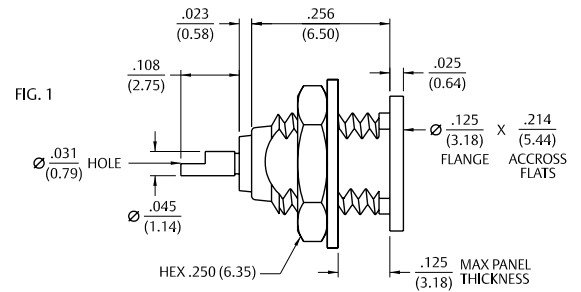


## Front Mount Bulkhead Jack Receptacle



Gold Plated	Nickel Plated	Mounting Style	Fig
133-3701-401	133-3701-406	D Flat Threaded	1
133-3701-411	133-3701-416	Press Fit Knurl	2

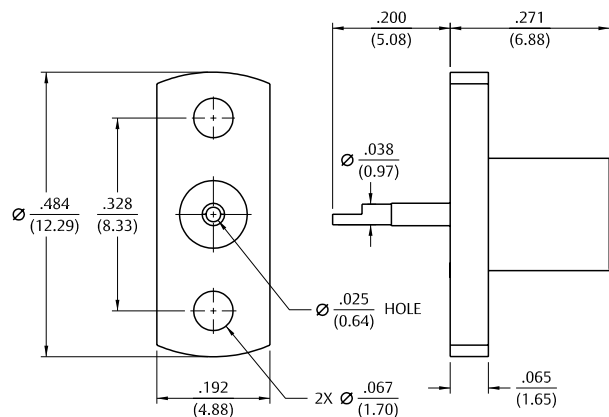
Mounting hole layout for 133-3701-401 figure 5 page 194.  
Mounting hole layout for 133-3701-406 figure 5 page 194.  
Mounting hole layout for 133-3701-411 figure 10 page 194.  
Mounting hole layout for 133-3701-416 figure 10 page 194.



## 2-Hole Flange Mount Jack Receptacle – Flush Dielectric



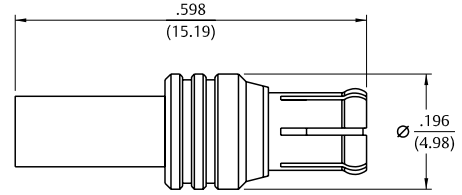
Gold Plated	Nickel Plated
133-3701-601	133-3701-606





# Flexible Cable

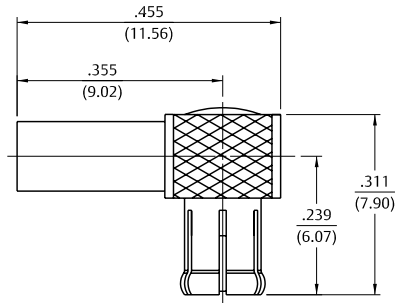
## Straight Crimp Type Plug – Solder or Crimp Contact



Cable Type	Gold Plated	Nickel Plated	Captivated Contact
RG-178, 196	133-5402-001	133-5402-006	No
RG-316, 188, 161, 174	133-5403-001	133-5403-006	Yes
RG-316 DS, 188 DS	133-5404-001	133-5404-006	Yes

Assembly instructions page 207.

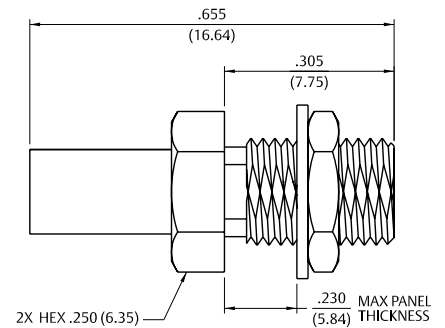
## Right Angle Crimp Type Plug – Captivated Contact



Cable Type	Gold Plated	Nickel Plated
RG-178, 196	133-5402-101	133-5402-106
RG-316, 188, 161, 174	133-5403-101	133-5403-106
RG-316 DS, 188 DS	133-5404-101	133-5404-106

Assembly instructions page 210.

## Straight Crimp Type Bulkhead Jack – Solder or Crimp Contact



Cable Type	Gold Plated	Nickel Plated	Captivated Contact
RG-178, 196	133-5302-401	133-5302-406	No
RG-316, 188, 161, 174	133-5303-401	133-5303-406	Yes
RG-316 DS, 188 DS	133-5304-401	133-5304-406	Yes

Mounting hole layout figure 5 page 194.  
 Assembly instructions page 207.

# Specifications

## Electrical Specifications

**Impedance:** 75 Ohms

**Frequency Range:** ..... 0-6 GHz

**VSWR:** (max) (f=GHz)

	<u>Straight Cabled Connectors</u>	<u>Right Angle Cabled Connectors</u>
RG-179 .....	1.13 + .04f	1.07 + .04f
In-series adapters .....	1.07 + .03f	
Between-series adapters, loads .....	1.05 + .01f	

Uncabled receptacles..... N/A

**Working Voltage:** (VRMS max)† Sea Level      70K Feet

RG-179 .....

	335	85
--	-----	----

Uncabled receptacles, adapters .....

	335	85
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Loads, matching pad..... N/A

**Dielectric Withstanding Voltage:** (VRMS min at sea level)†

RG-179..... 1000

Uncabled receptacles, adapters..... 1000

Loads..... N/A

**Insulation Resistance:** 1,000 megohms min

**Contact Resistance:** (milliohms max)

	<u>Initial</u>	<u>After Environmental</u>
Center contact (straight cabled connectors and uncabled receptacles) .....	5.0	8.0
Center contact (right angle cabled connectors, adapters).....	10.0	15.0
Center contact (loads).....	N/A	
Outer contact.....	1.0	1.5
Braid to body (gold plated connectors).....	1.0	N/A

**Corona Level:** (Volts min at 70,000 feet) †

RG-179..... 250

Uncabled receptacles, adapters..... 250

Loads matching pad..... N/A

**Insertion Loss:** (dB max tested at 1 GHz)

Straight cabled connectors..... 0.1 dB

Right angle cabled connectors..... 0.2 dB

Uncabled receptacles, adapters..... N/A

**RF Leakage:** (dB min, tested at 2.5 GHz)

Cable connectors..... -55 dB typical

Uncabled receptacles, adapters, loads..... N/A

**RF High Potential Withstanding Voltage:** (VRMS min, tested at 4 and 7 MHz)†

Cabled Connectors for RG-179..... 700

Uncabled receptacles, adapters..... 600

Loads..... N/A

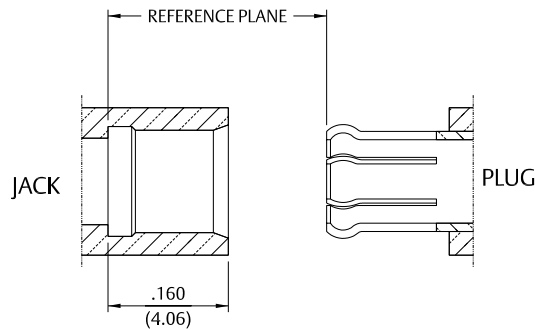
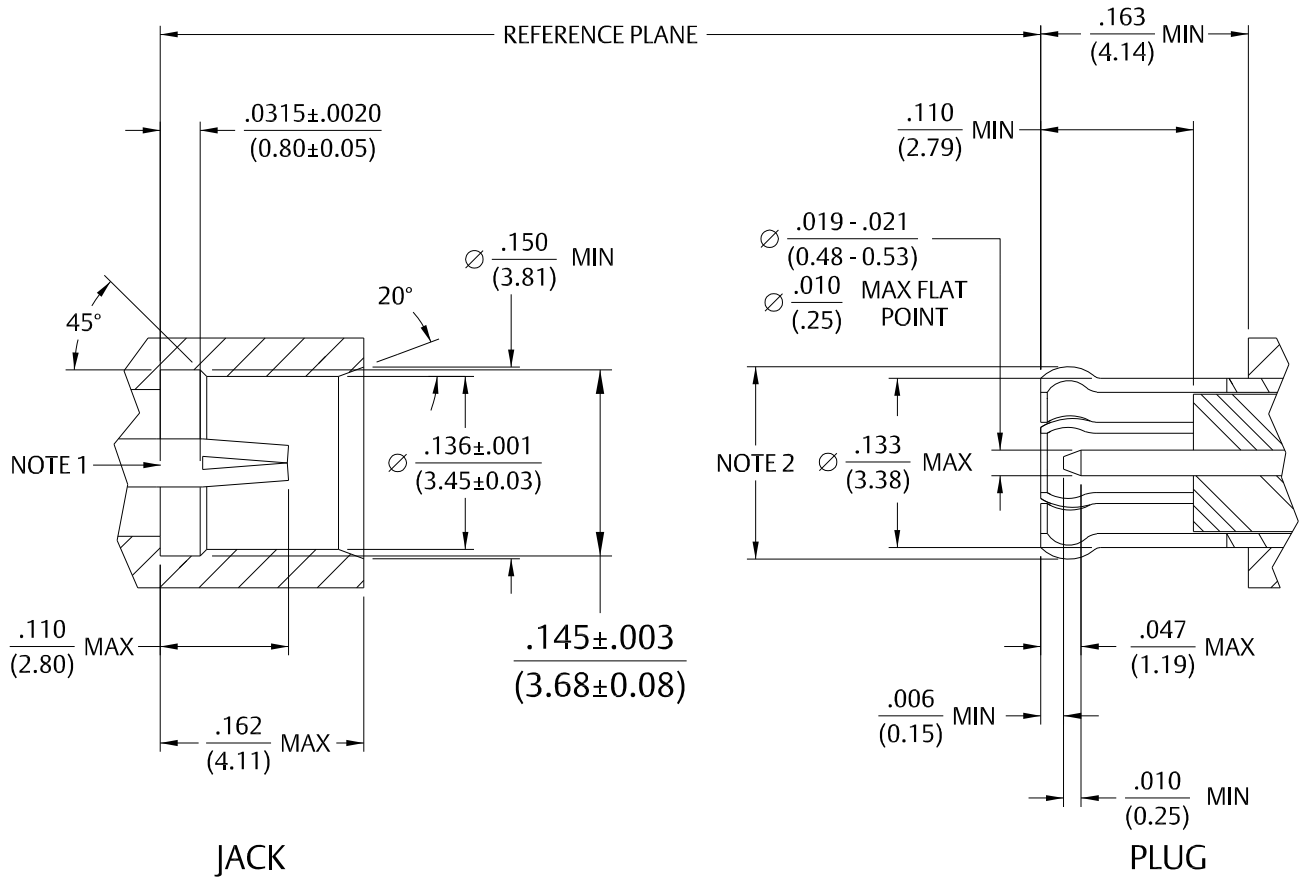
**Power Rating:** (Loads) 1.0 Watt at +25°C, derated linearly to 0.5 Watts at +125°C

† Avoid user injury due to misapplication. See safety advisory definitions inside front cover.

# Specifications

## Mating Engagement for 75 Ohm MCX Series (Intermatable with CECC22220 50 Ohm MCX)

1. ID of contact to meet VSWR mating characteristics and connector durability when mated with a dia. .019-.021 (0.48-0.53) dia. male contact.
2. Must meet the force to engage and disengage when mated with mating part.
3. Interface shall intermate with MCX 50 Ohm interface per CECC 22220.





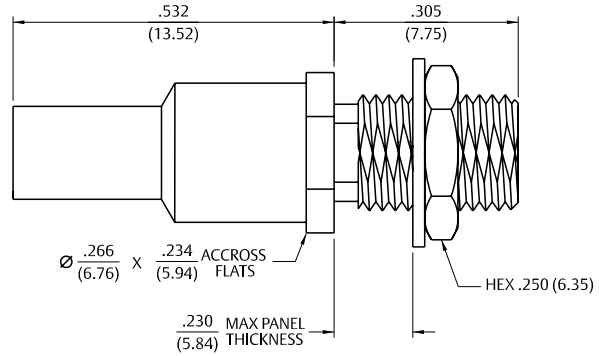
# Flexible Cable & PC Mount

## Straight Crimp Type Bulkhead Jack – Solder or Crimp Captivated Contact



Cable Type	Gold Plated
RG-179	133-8333-401
RG-179 DS	133-8334-401

Assembly instructions page 209.  
Mounting hole layout figure 5 page 194.

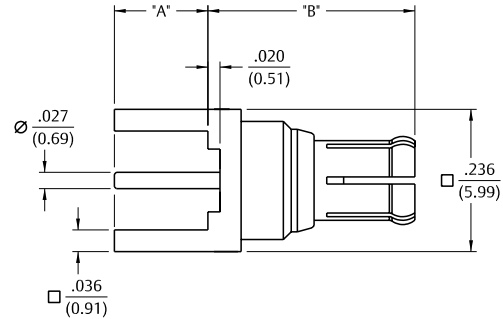


## Straight Plug Receptacle



Gold Plated	"A"	"B"
133-8801-201	.155 (3.80)	.343 (8.71)
133-8801-211	.110 (2.70)	.343 (8.71)
133-8801-221	.155 (3.80)	.510 (12.95)

Mounting hole layout figure 20 page 195.

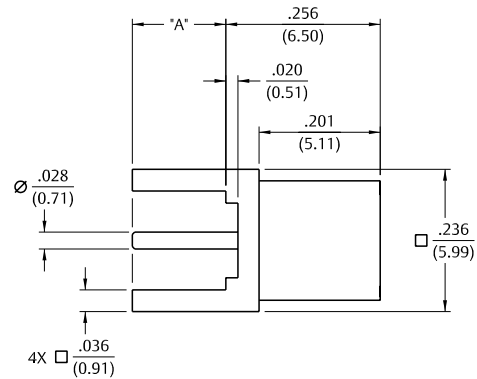


## Straight Jack Receptacle



Gold Plated	"A"
133-8701-201	.155 (3.80)
133-8701-211	.100 (2.54)

Mounting hole layout figure 20 page 195.

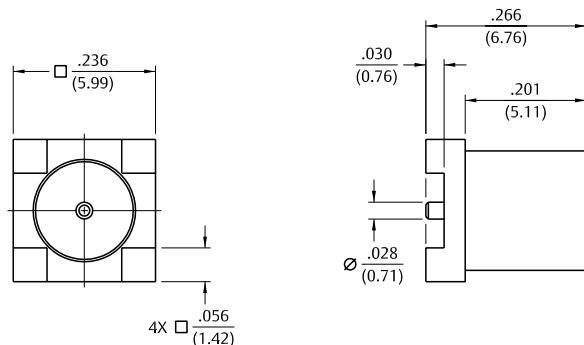


## Surface Mount Jack Receptacle



Gold Plated	Packaging
133-8711-201	Bulk Packs
133-8711-202	Tape and Reel 770 pcs/reel

Mounting hole layout figure 11 page 194.  
Tape and Reel .472 (12.0) component pitch .630 (16.0) wide.



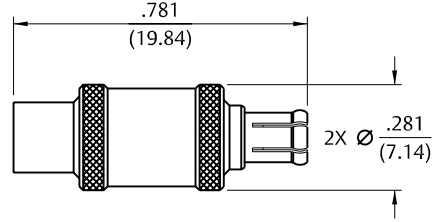
# In-Series Adapters & Between Series Adapters

## Jack to Plug Adapter



Gold Plated

133-8901-821

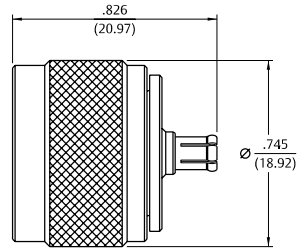


## 75 Ohm Type N Plug to 75 Ohm MCX Plug Adapter



Stainless Steel Passivated

134-1068-001

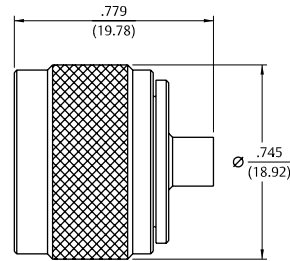


## 75 Ohm Type N Plug to 75 Ohm MCX Jack Adapter



Stainless Steel Passivated

134-1068-011



# Specifications

## Electrical Specifications

**Impedance:** 50 Ohms

**Frequency Range:** .....0-6 GHz

<b>VSWR</b> (max): (f=GHz)	Straight Cabled Connectors	Right Angle Cabled Connectors
RG-316 cable.....	1.13 + .04f	1.07 + .04f
Uncabled receptacles.....		N/A

<b>Working Voltage:</b> (VRMS max)†	<u>Sea Level</u>	<u>70K Feet</u>
RG-316.....	335	85

<b>Dielectric Withstanding Voltage:</b> (VRMS min at sea level)†	
RG-316, uncabled receptacles .....	1000

**Insulation Resistance:** 1,000 megohms min

<b>Contact Resistance:</b> (milliohms max)	<u>Initial</u>	<u>After Environmental</u>
Center contact (straight cabled connectors and uncabled receptacles).....	5.0	8.0
Center contact (right angle cabled connectors).....	5.0	15.0
Outer contact.....	1.0	1.5
Braid to body.....	1.0	N/A

<b>Corona Level:</b> (Volts min at 70,000 feet) †	
RG-316, uncabled receptacles .....	250

<b>Insertion Loss:</b> (dB max tested at 1 GHz)	
Straight cabled connectors .....	0.1 dB
Right angle cabled connectors .....	0.2 dB
Uncabled receptacles .....	N/A

<b>RF Leakage:</b> (dB min, tested at 2.5 GHz)	
Cabled connectors.....	-55 dB
Uncabled receptacles .....	N/A

<b>RF High Potential Withstanding Voltage:</b> (VRMS min tested at 4 and 7 MHz)	
Cabled Connectors .....	700
Uncabled receptacles .....	600

† Avoid user injury due to misapplication. See safety advisory definitions.

## Mechanical Specifications

**Engagement Design:** Compatible with CECC 22220, Series MCX 50 Ohm

**Engagement Force:** 5.6 lbs max axial force

**Disengagement Force:** 8 lbs max axial force, 1 lb min

**Contact Retention:** 2.3 lbs min axial force (captivated contacts) 1 oz-in min torque (uncabled receptacles)

	<u>Axial Force (lbs) *</u>	<u>Torque (oz-in)</u>
RG-316.....	20.0	N/A
RG-316 DS.....	25.0	N/A

\*Or cable breaking strength whichever is less.

**Durability:** .....500 cycles min

## Environmental Specifications

(Meets or Exceeds the Applicable Paragraph of MIL-PRF-39012)

**Temperature Range:** ..... - 65°C to + 165°C

**Thermal Shock:** MIL-STD-202, Method 107, Condition F

**Corrosion:** MIL-STD-202, Method 101, Condition B

**Shock:** MIL-STD-202, Method 213, Condition B

**Vibration:** MIL-STD-202, Method 204, Condition B

**Moisture Resistance:** MIL-STD-202, Method 106

## Material Specifications

(See non-magnetic materials page 10)

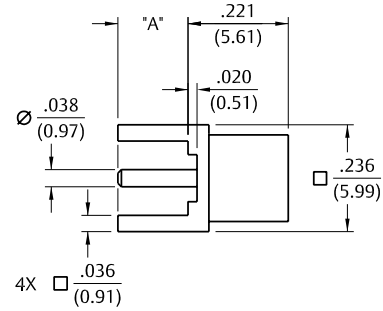
# Non-Magnetic RF Connectors – For PC Mount

## Straight Jack Receptacle



Gold Plated	"A"
133-9701-201	.155 (3.94)
133-9701-211	.110 (2.79)

Mounting hole layout figure 4 page 194.

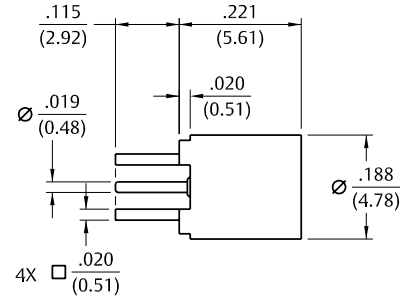


## Straight Jack Receptacle – .100" Layout



Gold Plated
133-9701-231

Mounting hole layout figure 12 page 194.

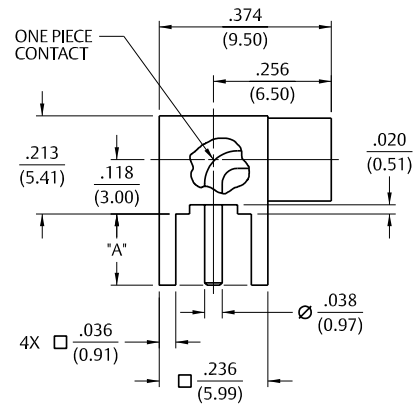


## Right Angle Jack Receptacle



Gold Plated	"A"
133-9701-301	.155 (3.94)
133-9701-311	.110 (2.79)

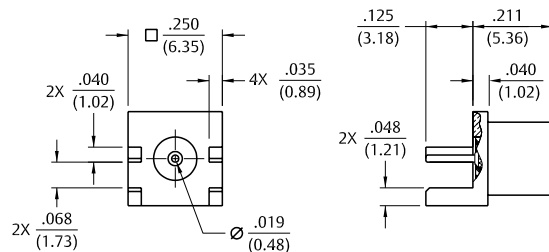
Mounting hole layout figure 4 page 194.



## End Launch Jack Receptacle – Round Contact



Gold Plated	Board Thickness
133-9701-801	.062 (1.57)



# Specifications

## SMK (2.92mm) Connectors

The Johnson line of SMK Connectors provides an excellent solution for demanding applications requiring high frequency transmission. Although similar to the SMA interface, a smaller internal body diameter (2.92mm) and air dielectric provide a higher cutoff frequency and other key advantages:

- Precision manufacturing allows superior electrical performance to 40 GHz
- Female contacts have a unique three-slot construction, which enhances connectivity by creating a more rugged connector while reducing the chance of intermittent connections
- Precise assembly tooling assures excellent, repeatable contact and support bead location on cabled connectors
- Connector mating interface per MIL-STD-348
- Mating interface control provides consistent electrical performance
- Plug connector VSWR is 1.20 Max to 40 GHz and a 12 inch SMK plug to plug cable assembly performs better than 1.35 VSWR to 40 GHz
- Field Replaceable Jacks are teamed with a high quality hermetic seal feed thru for use in sealed circuit modules
- SMK plug interface employs more precise dimensions than an SMA and uses a shorter snub nose male pin such that the connector bodies align before the contacts engage



## Electrical Specifications

**Impedance:** 50 Ohms

**Frequency Range:** 0-40 GHz

**VSWR (max):** (f = GHz)

Semi-Rigid straight cabled connectors and adapters ..... 1.20 max  
 Field replaceable (see typical return loss graph)..... N/A

**Working Voltage:** (VRMS max)

Connectors for Cable Type	Sea Level	70K Feet
RG-405 and field replaceable.....	335	85
RG-402 and adapters.....	500	125

**Dielectric Withstanding Voltage:** (VRMS min at sea level)

RG-405 and field replaceable .....	1000
RG-402 and adapters .....	1500

**Corona Level:** (Volts min at 70,000 feet)

RG-405 and field replaceable.....	250
RG-402 and adapters.....	375

**Insertion Loss:** (dB max)

Adapters .....	0.06 f (GHz), tested at 6 GHz
Straight Semi-Rigid cable connectors .....	0.03 f (GHz), tested at 10 GHz

**Insulation Resistance:** 5000 megohms min

Contact Resistance: (milliohms max)	Initial	After Environmental
Center contact straight cabled connectors .....	3.0*	4.0
Center contact adapters.....	4.0	6.0
Field replaceable connectors .....	6.0	8.0
Outer contact (all connectors).....	2.0	N/A
Body to cable (gold plated connectors).....	0.5	N/A
Body to cable (passivated connectors).....	5.0	N/A

**RF Leakage:** (dB min, tested at 2.5 GHz) ..... -90dB

**RF High Potential Withstanding Voltage:** (VRMS min., tested at 4 and 7 MHz)†

RG-405 and field replaceable.....	670
RG-402 and adapters.....	1000

## Mechanical Specifications

<b>Engagement Design:</b>	MIL-STD-348, Series SMK (2.92mm)
<b>Engagement/Disengagement Force:</b>	2 lb-in max
<b>Mating Torque:</b>	7 to 10 in-lb
<b>Bulkhead Mounting Nut Torque:</b>	15 in-lb
<b>Coupling Proof Torque:</b>	15 in-lb min
<b>Coupling Nut Retention:</b>	60 lbs min
<b>Contact Retention:</b>	6 lbs min axial force (captivated contacts)

Cable Retention:	Axial Force* (lbs)	Torque (in-oz)
RG-405 .....	30	16
RG-402 .....	60	55

\*Or cable breaking strength whichever is less

**Durability:** 500 cycles min

† Avoid user injury due to misapplication. See safety advisory definitions.

# Specifications

## Field Replaceable Application Notes

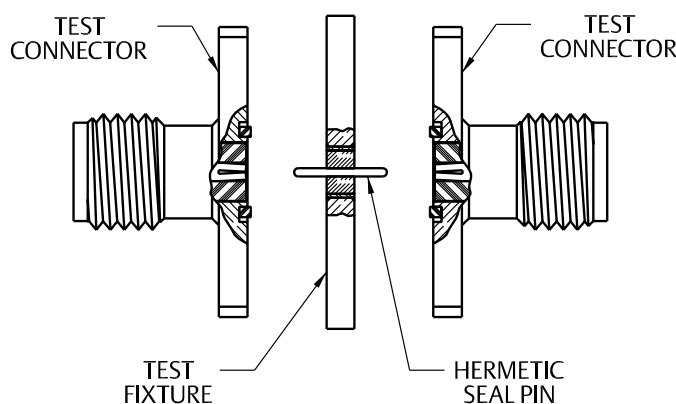
These field replaceable connectors are easy to install and replace. The hermetic seal is mounted into the circuit module wall and the connector can be removed and replaced without destroying the hermeticity of the circuit housing.

The field replaceable connector creates a transition from microstrip circuitry to a coaxial transmission line. The SMK (2.92mm) seal pin diameter is .012 (.030) to minimize the capacitive effects on the circuit trace. For optimum electrical performance, the transition from the hermetic seal to the microstrip trace must be properly compensated which involves adjusting the microstrip trace width to minimize any impedance discontinuities found in the transition area.

The plot shown below is representative of the typical return loss of a Johnson field replaceable SMK connector. To produce the data shown below, a test fixture is created using the Johnson SMK hermetic seal. The fixture consists of a suitably thick spacer plate with the hermetic seal mounted flush to both surfaces. Two connectors are mounted back to back around the fixture and the VSWR of this test assembly is measured. The calculated return loss trace shown is equivalent to the square root of the measured VSWR of the test assembly. Since the connectors tested are of identical design, it can be stated with fair accuracy that the calculated data shown represents the response of a single field replaceable connector and its transition to the hermetic seal.

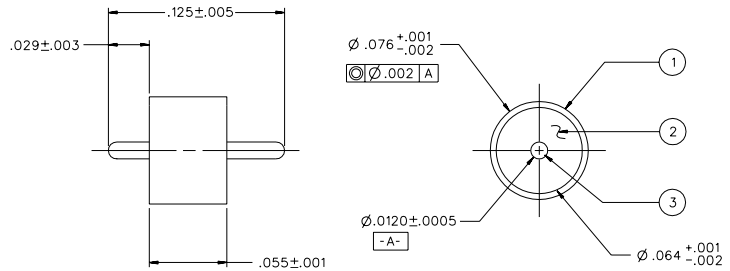
Although we do not publish a VSWR specification for field replaceable connectors, typical connector return loss can be expected to be better than 20 dB through 40 GHz. A VSWR specification is not stated because an industry standard method for testing field replaceable connectors does not exist. The actual performance of the connector is dependent upon the following:

1. For optimum electrical performance, we recommend the use of our standard 142-1000-033 hermetic seal with a pin diameter of  $.0120 \pm .0005$  ( $0.305 \pm 0.013$ ).
2. It is recommended that the hermetic seal be mounted flush with the circuit housing. Tolerance variations between the hermetic seal and machined housing do not always guarantee an optimum transition to the connector. Some manufacturers recommend an additional counterbore in the circuit housing to accommodate a solder washer during installation of the seal. We do not recommend this type of installation because, if the counterbore is not completely filled with solder, electrical discontinuities may be created.
3. The transition between the hermetic seal pin and the microstrip trace will effect electrical performance, as stated above. Several different methods of hermetic seal mounting and seal pin to microstrip trace attachment are used in the industry.



# In-Series Adapters

## Hermetic Seal Feedthru



Part No.	Item 1 – Outer Ring	Item 2 – Insulator	Item 3 – Pin
142-1000-033	Kovar Gold Pl .00005 min over Nickel Pl .00005 min	Glass Corning 7070 Or Equivalent	Kovar Gold Pl .00005 min. over Nickel Pl .00005 min.

**Notes:**

1. The hermetic seal should be mounted as flush as possible with the housing. Excessive recession will create a high impedance air gap between connection and housing which degrades electrical performance.
2. The use of an additional counterbore to accommodate a solder ring for seal mounting is not recommended. A slight chamfer may be used if care is taken to completely fill the area with solder. **Avoid air gaps!**

### Electrical

**Impedance:** 50 Ohms  
**Frequency Range:** DC to 40 GHz  
**VSWR:** Dependent upon application  
**Working Voltage:** 250 VRMS max at sea level  
**Dielectric Withstanding Voltage:** 500 VRMS min at sea level  
**Insulation Resistance:** 5000 Megohm min  
**Insertion Loss:** 0.2 dB max at 40 GHz

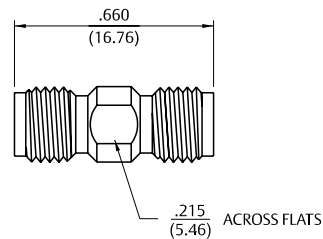
### Environmental

**Hermeticity:**  $1 \times 10^{-8}$  cc/sec at one atmosphere  
**Solderability:** MIL-STD-202, Method 209  
**Operating Temperature:**  $-55^{\circ} \text{C}$  to  $+165^{\circ} \text{C}$

## Jack to Jack In-Series Adapter



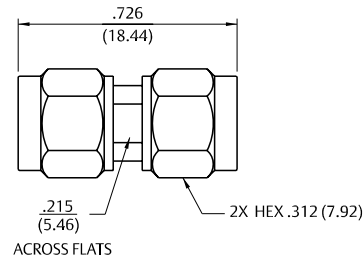
**Gold Plated**  
 145-0901-801



## Plug to Plug In-Series Adapter



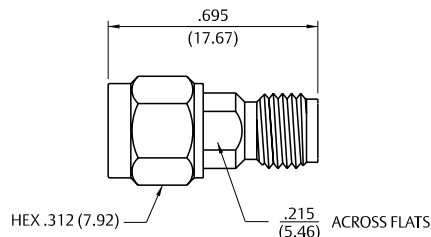
**Gold Plated**  
 145-0901-811



## Plug to Jack In-Series Adapter



**Gold Plated**  
 145-0901-821



# Specifications

## Electrical Ratings

**Impedance:** 50 Ohms

**Frequency Range:**

Dummy loads .....	0-2.00 GHz
Flexible cabled connectors .....	0-12.4 GHz
Uncabled receptacles, Right Angle Semi-Rigid cabled connectors and adapters.....	0-18.0 GHz
Straight Semi-Rigid cabled connectors and field replaceable connectors .....	0-26.5 GHz

**VSWR:** (max) (f = GHz)

	Straight Cabled Connectors	Right Angle Cabled Connectors
RG-178.....	1.20 + .025f	1.20 + .03f
RG-316, LMR-100.....	1.15 + .02f	1.15 + .03f
RG-58, LMR-195.....	1.15 + .01f	1.15 + .02f
RG-142.....	1.15 + .01f	1.15 + .02f
LMR-200, LMR-240 .....	1.10 + .03f	1.10 + .06f
RG-405.....	1.07 + .008f	1.18 + .015f
RG-402 (w/contact).....	1.05 + .008f	1.15 + .015f
RG-402 (w/o contact).....	1.035 + .005f	
Jack-bulkhead jack adapter and plug-plug adapter .....		1.05 + .010f
Jack-jack adapter and plug-jack adapter .....		1.05 + .005f
Uncabled receptacles, dummy loads.....		N/A
Field replaceable (see page 80).....		N/A

**Working Voltage:** (VRMS max)†

	Sea Level	70K Feet
RG-178 .....	170	45
RG-316, LMR-100, 195, 200 .....	250	65
RG-58, RG-142, LMR-240, RG-405, uncabled receptacles, RG-402 w/o contact.....	335	85
RG-402 with contact and adapters.....	500	125
Dummy loads .....		N/A

**Dielectric Withstanding Voltage:** (VRMS min at sea level)†

RG-178.....	500
RG-316, LMR-100, 195, 200 .....	750
RG-58, RG-142, LMR-240, RG-405, field replaceable, uncabled receptacles.....	1000
RG-402 with contact and adapters.....	1500
RG-402 w/o contact, dummy loads.....	N/A

**Insulation Resistance:** 5000 megohms min

**Contact Resistance:** (milliohms max)

	Initial	After Environmental
Center contact (straight cabled connectors and uncabled receptacles) .....	3.0*	4.0*
Center contact (right angle cabled connectors and adapters) .....	4.0	6.0
Field replaceable connectors .....	6.0	8.0
Outer contact (all connectors).....	2.0	N/A
Braid to body (gold plated connectors) .....	0.5	N/A
Braid to body (nickel plated connectors) .....	5.0	N/A

\*N/A where the cable center conductor is used as a contact

**Corona Level:** (Volts min at 70,000 feet)†

RG-178 .....	125
RG-316, LMR-100, 195, 200 .....	190
RG-58, RG-142, LMR-240, RG-405, uncabled receptacles, RG-402 w/o contact.....	250
RG-402 with contact and adapters.....	375
Dummy loads.....	N/A



# Specifications

## Material Specifications

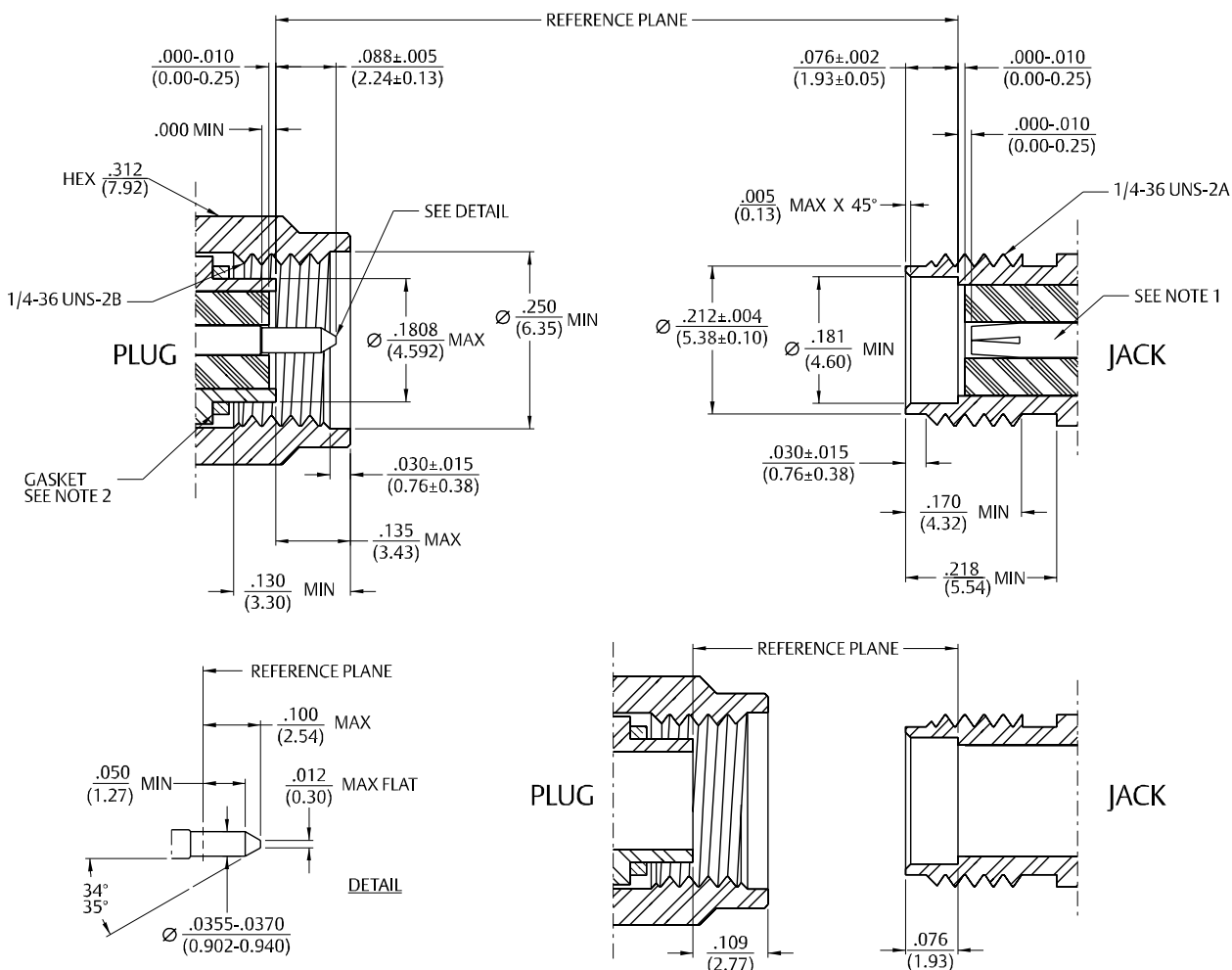
<b>Bodies:</b>	Brass per ASTM B16, gold plated* per MIL-DTL-45204 .00001" min. or nickel plated per SAE-AMS2423
<b>Contacts:</b>	Male - brass per ASTM B16, gold plated per MIL-DTL-45204 .00005" min Female - beryllium copper per ASTM B196, gold plated per MIL-DTL-45204 .00005" min
<b>Nut Retention Spring:</b>	Beryllium copper per ASTM B196, Unplated
<b>Insulators:</b>	PTFE fluorocarbon per ASTM D 1710 and ASTM D 1457 or Tefzel per ASTM D 3159 or PFA 340 per ASTM D 3307
<b>Expansion Caps:</b>	Brass per ASTM B36, gold plated per MIL-DTL-45204 .00001" min. or nickel plated per SAE-AMS2423
<b>Crimp Sleeves:</b>	Copper per ASTM B301 or brass per ASTM B16, gold plated per MIL-DTL-45204 .00001" min or nickel plated per SAE-AMS2423
<b>Mounting Hardware:</b>	Brass (nuts) per ASTM B16 or phosphor bronze (lockwashers), gold plated per MIL-DTL-45204 .00005" min or nickel plated per SAE-AMS2423
<b>Seal Rings:</b>	Silicone rubber per A-A-59588A
<b>EMI Gaskets:</b>	Conductive silicone rubber per MIL-G-83528, Type M

\* All gold plated parts include a .00005" min. nickel underplate barrier layer

## Mating Engagement for SMA Series

### NOTES

1. ID to meet VSWR, contact resistance and insertion withdraw forces when mated with a dia. .0355-.0370 pin.
2. Gasket is not supplied with brass connectors.



# Semi-Rigid Cable

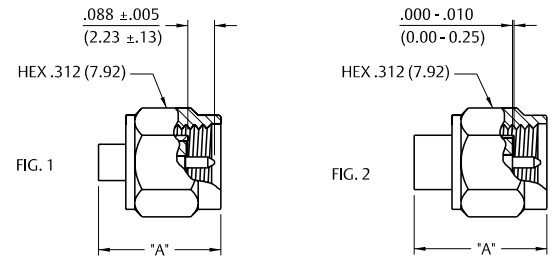
## Straight Solder Type Plug – with Contact, Captive Nut Thin Wall Connector Interface



Cable Type	Gold Plated	Nickel Plated	Fig.	"A"
RG-405	142-0693-001	142-0693-006	1	.405 (10.29)
RG-402	142-0694-001*	142-0694-006*	2	.440 (11.18)

Assembly instructions page 214.

\*Mating torque 8 lb-in max, coupling proof torque 8 lb-in max.



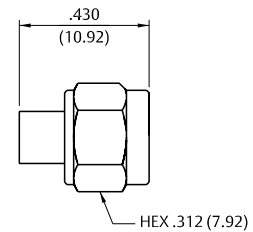
## Straight Solder Type Plug – without Contact, Thread-on Nut



Cable Type	Gold Plated	Nickel Plated
RG-402	142-0694-011	142-0694-016

Assembly instructions page 214.

Center conductor of cable serves as contact.

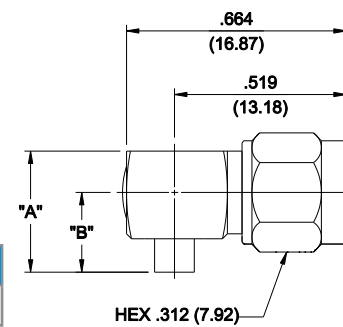


## Right Angle Solder Type Plug (1-piece body)



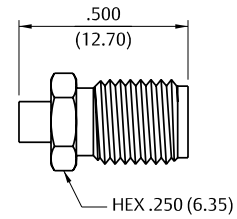
Cable Type	Gold Plated	Nickel Plated	"A"	"B"
RG-405	142-0693-101	142-0693-106	.336 (8.53)	.253 (6.43)
RG-402	142-0694-101	142-0694-106	.462 (11.73)	.306 (7.77)

Assembly instructions page 213.



# Semi-Rigid Cable

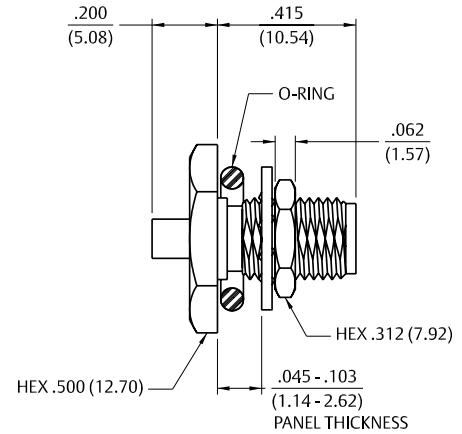
## Straight Solder Type Jack



Cable Type	Gold Plated	Nickel Plated
RG-405	142-0593-001	142-0593-006
RG-402	142-0594-001	142-0594-006

Assembly instructions page 214.

## Straight Solder Type Bulkhead Jack with O-Ring

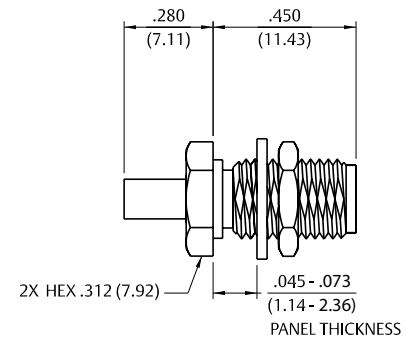


Cable Type	Gold Plated	Nickel Plated
RG-405	142-0593-401	142-0593-406
RG-402	142-0594-401	142-0594-406

Assembly instructions page 214.

Mounting hole layout figure 1 page 194.

## Straight Solder Type Bulkhead Jack



Cable Type	Gold Plated
RG-405	142-0593-411

Assembly instructions page 214.

Mounting hole layout figure 1 page 194.

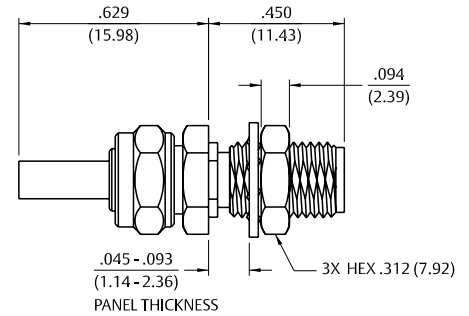
# Flexible Cable

## Straight Crimp Type Bulkhead Jack – Captivated Contact



Cable Type	Gold Plated	Nickel Plated
RG-178, 196	142-0302-401	142-0302-406
RG-161, 174, 188, 316	142-0303-401	142-0303-406
RG-188 DS, RG-316 DS	142-0304-401	142-0304-406
RG-58, 141, 303	142-0307-401	142-0307-406
RG-55, 142, 223, 400	142-0308-401	142-0308-406

Assembly instructions page 225.  
Mounting hole layout figure 1 page 194.

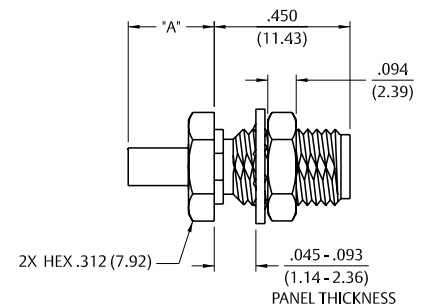


## Straight Crimp Type Bulkhead Jack (3-piece) – Solder or Crimp Captivated Contact



Cable Type	Gold Plated	Nickel Plated	"A"
RG-178, 196	142-0302-431	142-0302-436	.285 (7.24)
RG-161, RG-16, 174, 188, 316, LMR-100 HPF-100 RF-100	142-0303-411	142-0303-416	.385 (9.78)
RG-188 DS, RG-316 DS	142-0304-411	142-0304-416	.385 (9.78)
RG-58, 141, 303, LMR-195, HPF-195, RF-195	142-0307-411	142-0307-416	.385 (9.78)
RG-55, 142, 223, 400	142-0308-411	142-0308-416	.385 (9.78)
RG-179, 187	142-0333-411	142-0333-416	.385 (9.78)
LMR-200, HPF-200, RF-200	142-0339-401	142-0339-406	.545 (13.84)
LMR-240, HPF-240, RF-240	142-0335-401	142-0335-406	.545 (13.84)

Assembly Instructions: RG-178 page 217. LMR 195, 200 and 240, see page 220.  
Other cable groups, see page 219. Mounting hole layout figure 1 page 194.

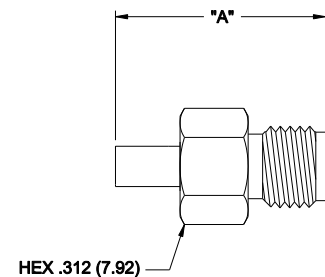


## Straight Crimp Type Jack (3-piece) – Solder or Crimp Captivated Contact



Cable Type	Gold Plated	Nickel Plated	"A"
RG-178, 196	142-0302-011	142-0302-016	.651 (16.54)
RG-161, 174, 188, 316	142-0303-011	142-0303-016	.756 (19.20)
RG-188 DS, RG-316 DS	142-0304-011	142-0304-016	.756 (19.20)
RG-58, 141, 303	142-0307-011	142-0307-016	.756 (19.20)
RG-55, 142, 223, 400	142-0308-011	142-0308-016	.756 (19.20)

Assembly Instructions: RG-178 page 217. LMR 195, 200 and 240, see page 220.  
Other cable groups, see page 219. Mounting hole layout figure 1 page 194.



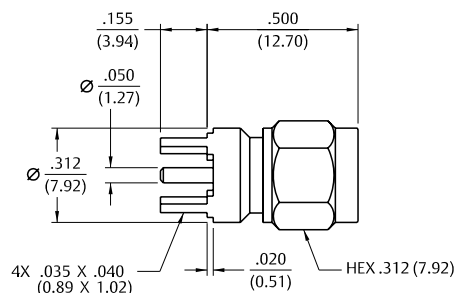
# PC Mount

## Straight Plug Receptacle



Gold Plated	Nickel Plated
142-0801-201	142-0801-206

Mounting hole layout figure 2 page 194.

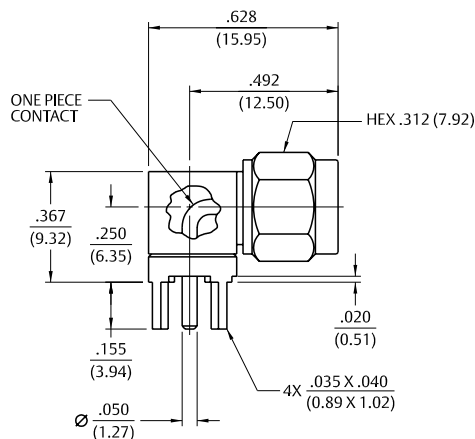


## Right Angle Plug Receptacle



Gold Plated	Nickel Plated
142-0801-301	142-0801-306

Mounting hole layout figure 2 page 194.

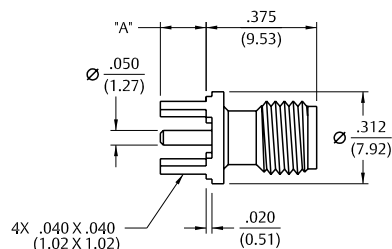


## Straight Jack Receptacle



Gold Plated	Nickel Plated	"A"
142-0701-201	142-0701-206	.155 (3.94)
142-0701-231	142-0701-236	.110 (2.79)

Mounting hole layout figure 2 page 194.

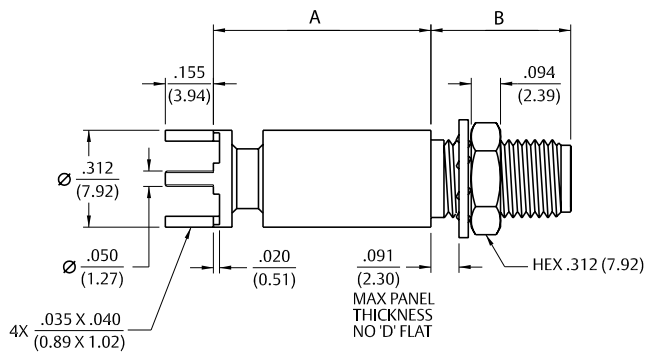


## Straight Bulkhead Jack Receptacle



Gold Plated	Nickel Plated	"A"	"B"
142-0701-421	142-0701-426	.700 (17.78)	.450 (11.43)
142-0701-491	142-0701-496	.065 (1.65)	.755 (19.18)

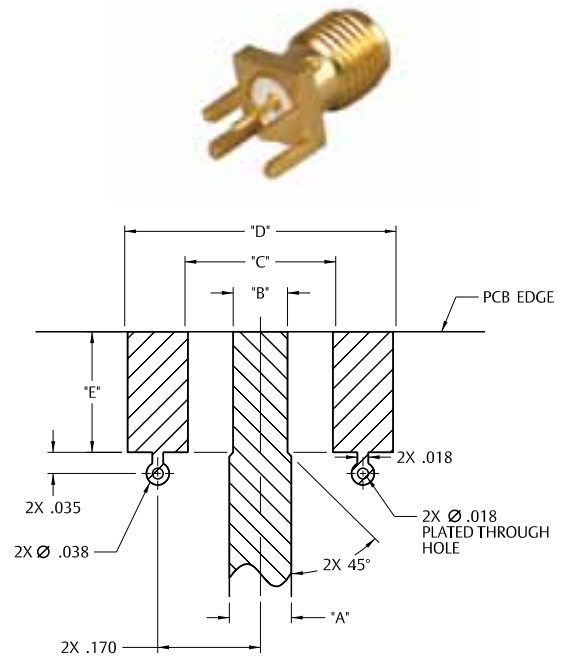
Mounting hole layout figure 2 page 194.



## PC Mount

The **End Launch** connector is attached to the circuit board by inserting the board edge between the legs and soldering the legs and center conductor to pads on the board. For optimum high frequency performance, the connector to circuit board transition must be adjusted for low VSWR. To compensate for the transition from coax to microstrip, trace widths “A” and “B” must be adjusted based on circuit board thickness. When properly adjusted, this technique yields a low VSWR over a wide bandwidth.

The tabulated dimensions “A”, “B”, “C”, “D”, and “E” were determined experimentally to achieve low VSWR (typically less than 1.5 up to 18 GHz). The circuit board used connectors for these tests was double-sided FR 4 with 1 oz. copper on both sides. The copper was left on the bottom of the board to create a ground plane for the 50 Ohm microstrip structure. While not all inclusive, these dimensions are given as reference information for selected SMA End Launch connectors. Further adjustments may be necessary depending upon the application. All dimensions are in inches.

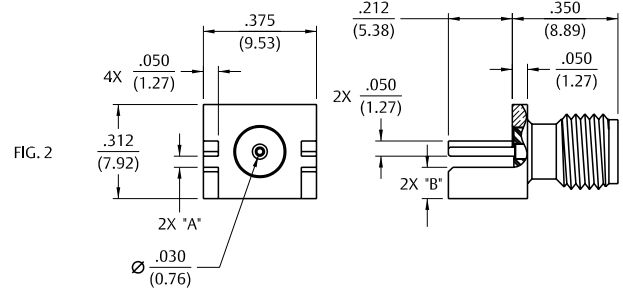
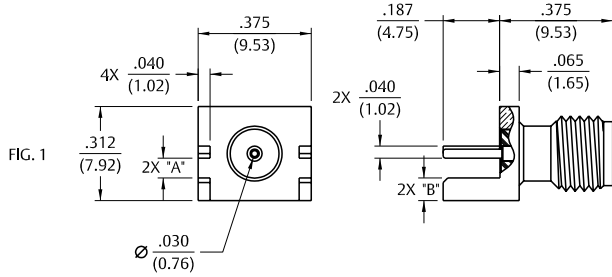


Part No.	Base Width	Board Thickness	“A”	“B”	“C”	“D”	“E”
142-0701-801/806	.375	.062	.103	.090	.250	.440	.200
142-0701-851/858	.375	.062	.103	.090	.250	.440	.200
142-0701-871/876	.375	.062	.103	.090	.250	.440	.200
142-0711-821/826	.250	.062	.103	.070	.170	.380	.165
142-0711-871/876	.375	.047	.083	.075	.250	.440	.200
142-0711-881/886	.375	.047	.083	.075	.250	.440	.200
142-0701-881/886	.375	.031	.050	.045	.250	.440	.200

Tabulated Dimensions “A”, “B”, “C”, and “D” are symmetrical about the center line.

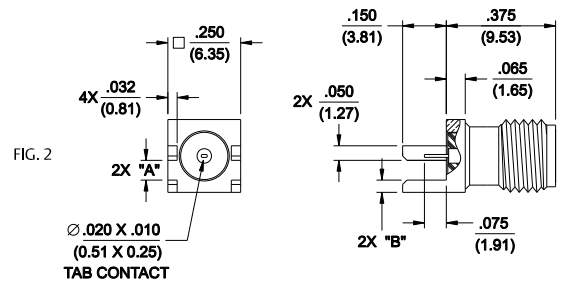
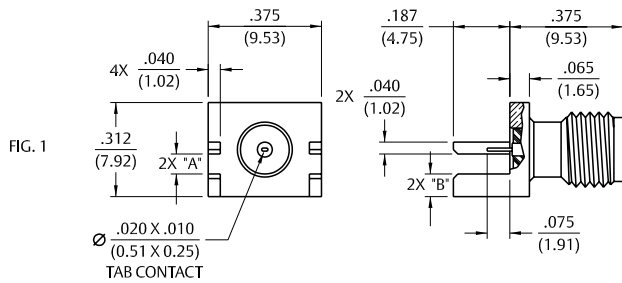
# PC Mount

## End Launch Jack Receptacle – Round Contact



Gold Plated	Nickel Plated	Board Thickness	"A"	"B"	Figure
142-0701-801	142-0701-806	.062 (1.57)	.068 (1.73)	.073 (1.85)	1
142-0701-831	142-0701-836	.042 (1.07)	.048 (1.22)	.093 (2.36)	1
142-0701-881	142-0701-886	.031 (0.79)	.037 (0.94)	.104 (2.64)	2
142-0711-871	142-0711-876	.047 (1.19)	.053 (1.35)	.088 (2.24)	1

## End Launch Jack Receptacle – Tab Contact



Gold Plated	Nickel Plated	Board Thickness	"A"	"B"	Figure
142-0701-851	142-0701-856	.062 (1.57)	.068 (1.73)	.083 (2.11)	1
142-0701-841	142-0701-846	.042 (1.07)	.048 (1.22)	.103 (2.62)	1
142-0711-881	142-0711-886	.047 (1.19)	.053 (1.35)	.098 (2.24)	1
142-0721-811	142-0721-816	.025 (0.64)	.030 (0.76)	.121 (3.07)	1
142-0721-861	142-0721-866	.032 (0.81)	.037 (0.94)	.083 (2.11)	2

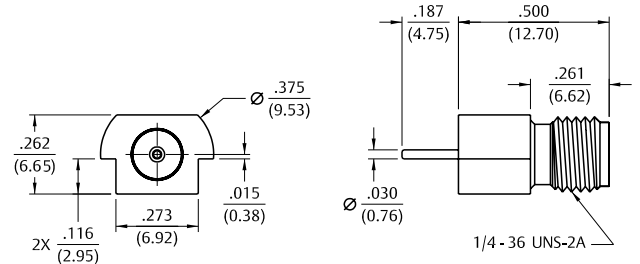
# Bulkhead Mount

## End Launch Jack Receptacle – Surface Mount



Gold Plated	Packaging
142-0721-881	Stock
142-0721-882	Tape and Reel 475 pcs/reel

Recommended land pattern figure 22 page 195.

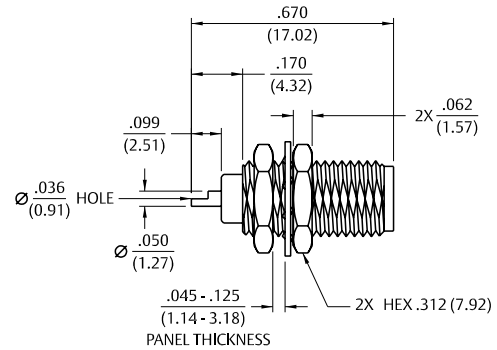


## Front Mount Bulkhead Jack Receptacle



Gold Plated	Nickel Plated
142-0701-411	142-0701-416

Mounting hole layout figure 1 page 194.

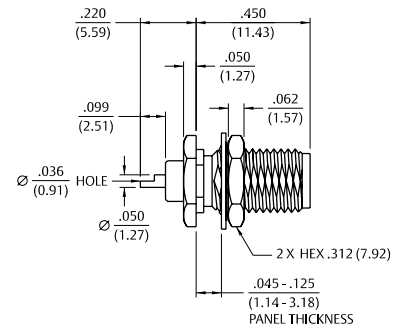


## Rear Mount Bulkhead Jack Receptacle



Gold Plated	Nickel Plated
142-0701-401	142-0701-406

Mounting hole layout figure 1 page 194.

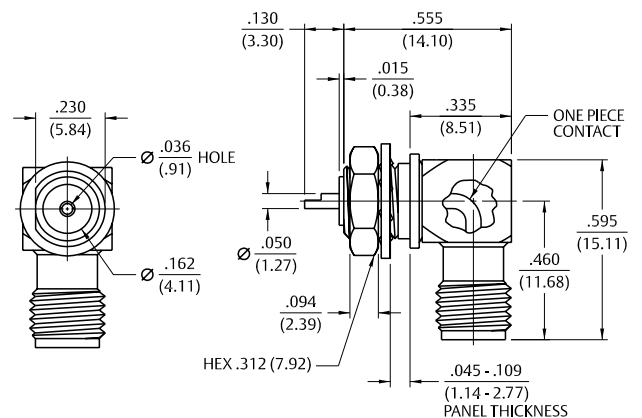


## Right Angle Bulkhead Mount Jack Receptacle



Gold Plated	Nickel Plated
142-0701-531	142-0701-536

Mounting hole layout figure 1 page 194.





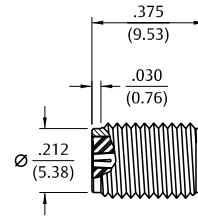
# Spark Plugs

## Jack Receptacle – Thread Mount Field Replaceable



Gold Plated	Nickel Plated	Accepts Pin Size
142-1731-001	142-1731-006	.020 (0.51)
142-1731-011	142-1731-016	.036 (0.91)

Mounting hole layout figure 19 page 195.



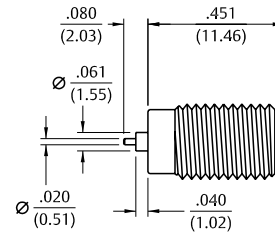
## Jack Receptacle – Thread Mount Extended Dielectric (Non-Hermetic)



Gold Plated	Nickel Plated
142-1731-021	142-1731-026

Mounting hole layout for 142-1731-021 figure 19 page 195.

Mounting hole layout for 142-1731-026 figure 18 page 195.



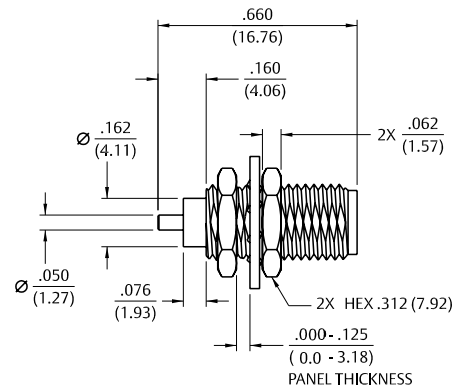
## Jack Receptacle – Thread Mount with Hardware Extended Dielectric Bulkhead



Gold Plated	Nickel Plated
142-1731-031	142-1731-036

Mounting hole layout for 142-1731-031 figure 18 page 195.

Mounting hole layout for 142-1731-036 figure 1 page 194.



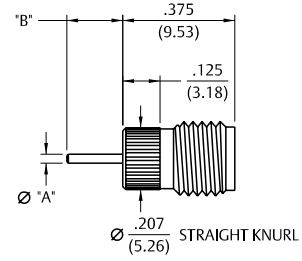
# Spark Plugs

## Jack Receptacle – Knurl Mount\* Round Contact



Gold Plated	Nickel Plated	"A"	"B"
142-1721-011	142-1721-016	.030 (0.76)	.187 (3.18)
142-1721-021	142-1721-026	.050 (1.24)	.190 (4.83)

\* Not intended for use in materials harder than Rockwell B82.  
Mounting hole layout figure 17 page 195.

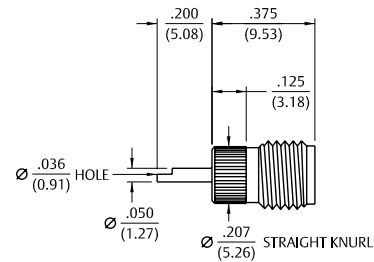


## Jack Receptacle – Knurl Mount\* Solder Cup Contact



Gold Plated	Nickel Plated
142-0701-481	142-0701-486

\* Not intended for use in materials harder than Rockwell B82.  
Mounting hole layout figure 17 page 195.

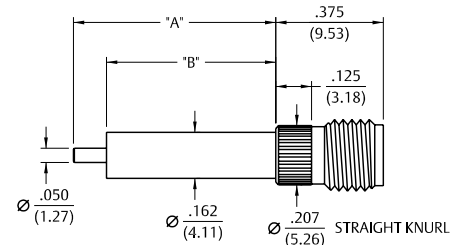


## Jack Receptacle – Knurl Mount\* Extended Dielectric



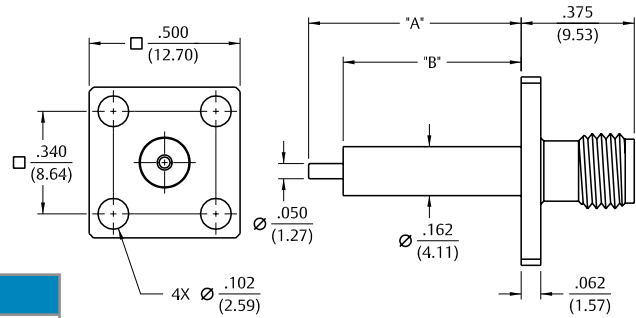
Gold Plated	Nickel Plated	"A"	"B"
142-1721-031	142-1721-036	.190 (4.83)	.095 (2.41)
142-1721-041	142-1721-046	.240 (6.10)	.180 (4.57)
142-1721-051	142-1721-056	.705 (17.91)	.590 (14.99)

\* Not intended for use in materials harder than Rockwell B82.  
Mounting hole layout figure 17 page 195.



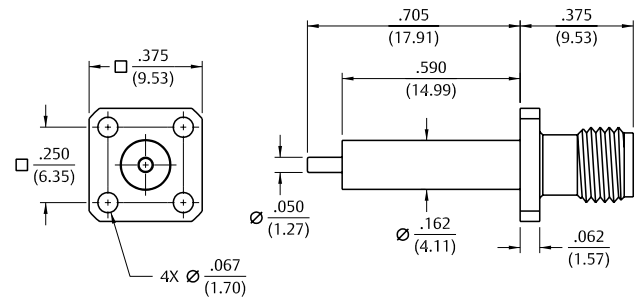
# Panel Mount

## 4-Hole Flange Mount Jack Receptacle – Extended Dielectric



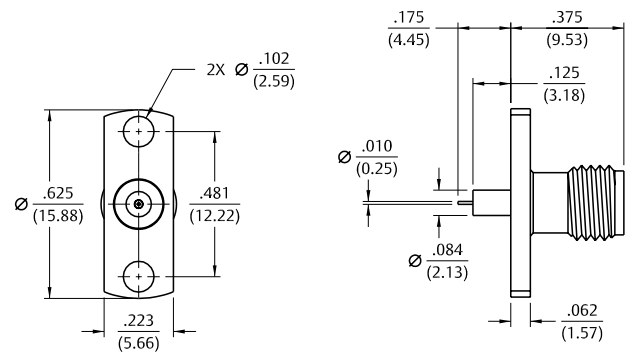
Gold Plated	Nickel Plated	"A"	"B"
142-1701-121	142-1701-126	.705 (17.91)	.590 (14.99)
142-1701-041	142-1701-046	.190 (4.83)	.095 (2.41)

## 4-Hole Flange Mount Jack Receptacle – Extended Dielectric



Gold Plated	Nickel Plated
142-1701-011	142-1701-016

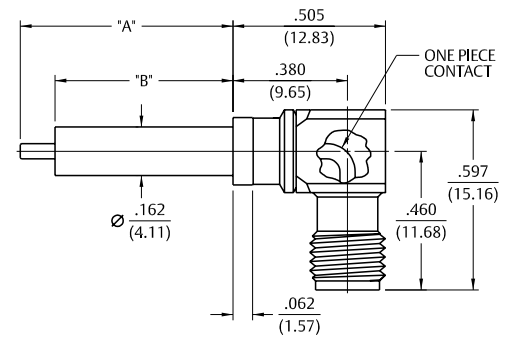
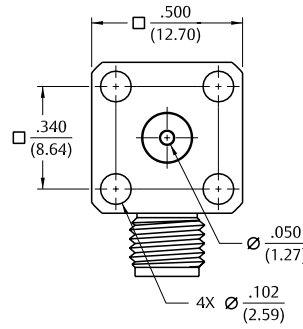
## 2-Hole Flange Mount Jack Receptacle – Extended Dielectric



Gold Plated	Nickel Plated
142-1701-201	142-1701-206

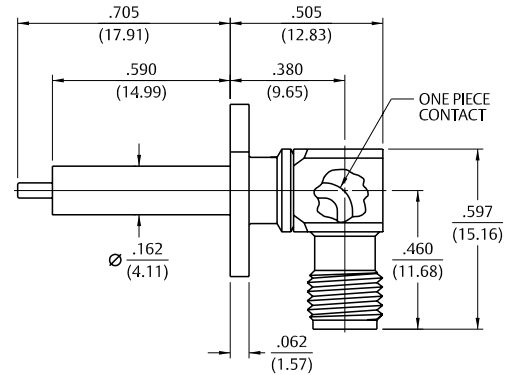
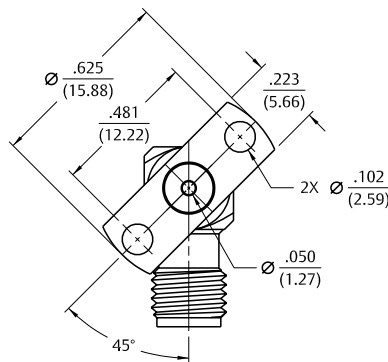
# Panel Mount

## 2-Hole Right Angle Flange Mount Jack Receptacle – Extended Dielectric 90° Orientation



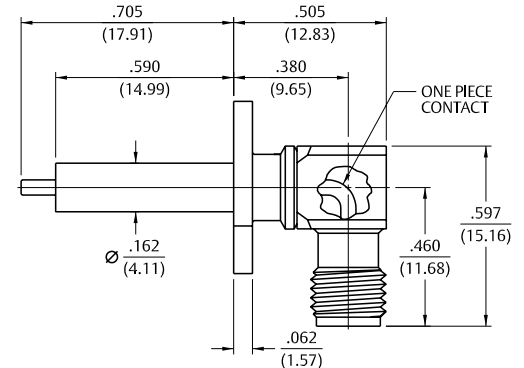
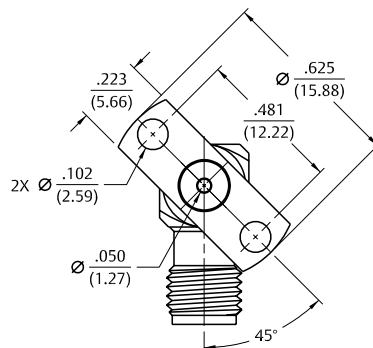
Gold Plated	Nickel Plated	"A"	"B"
142-1711-011	142-1711-016	.705 (17.91)	.590 (14.99)
142-1711-061	142-1711-066	.195 (4.95)	.130 (3.30)

## 2-Hole Right Angle Flange Mount Jack Receptacle – Extended Dielectric +45° Orientation



Gold Plated	Nickel Plated
142-1711-021	142-1711-026

## 2-Hole Right Angle Flange Mount Jack Receptacle – Extended Dielectric -45° Orientation



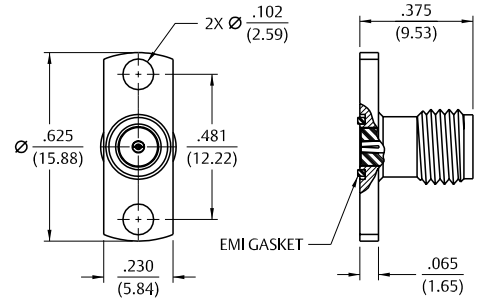
Gold Plated	Nickel Plated
142-1711-031	142-1711-036

# Field Replaceable Panel Mount

## 2-Hole Flange Mount Jack Receptacle – with EMI Gasket



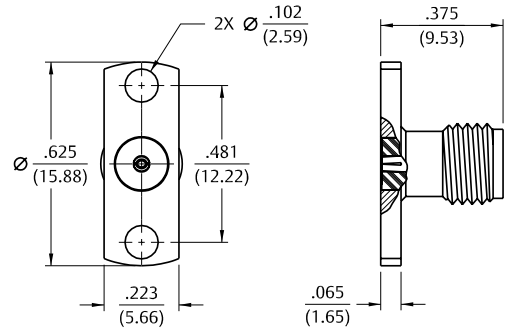
Accepts Pin Size	Gold Plated	Nickel Plated
.012 (0.30)	142-1701-601	142-1701-606
.015 (0.38)	142-1701-611	142-1701-616
.018 (0.46)	142-1701-621	142-1701-626



## 2-Hole Flange Mount Jack Receptacle – without EMI Gasket



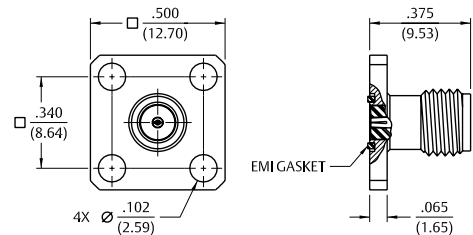
Accepts Pin Size	Gold Plated	Nickel Plated
.020 (0.51)	142-1701-631	142-1701-636
.036 (0.91)	142-1701-641	142-1701-646



## 4-Hole Flange Mount Jack Receptacle – with EMI Gasket

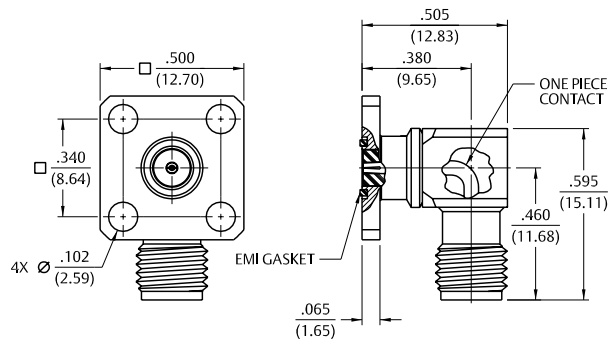


Accepts Pin Size	Gold Plated	Nickel Plated
.012 (0.30)	142-1701-501	142-1701-506
.015 (0.38)	142-1701-511	142-1701-516
.018 (0.46)	142-1701-521	142-1701-526



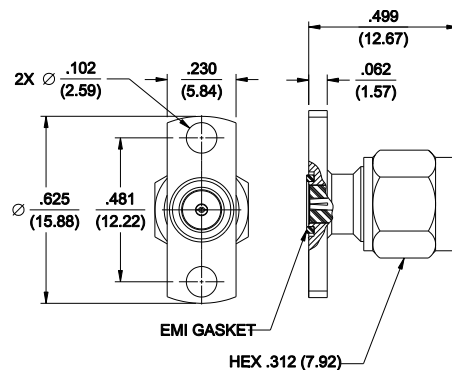
# Field Replaceable Panel Mount

## 4-Hole Right Angle Flange Mount Jack Receptacle – with EMI Gasket



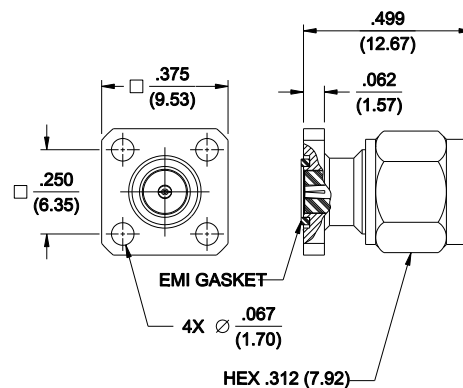
Accepts Pin Size	Gold Plated	Nickel Plated
.015 (0.38)	142-1711-511	142-1711-516
.018 (0.46)	142-1711-521	142-1711-526

## 2-Hole Flange Mount Plug Receptacle – with EMI Gasket



Accepts Pin Size	Gold Plated	Nickel Plated
.012 (0.30)	142-1801-601	142-1801-606
.015 (0.38)	142-1801-611	142-1801-616
.018 (0.46)	142-1801-621	142-1801-626

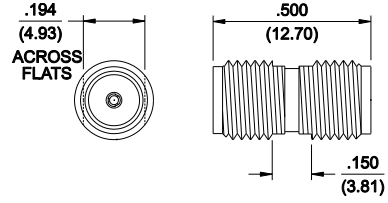
## 4-Hole Flange Mount Plug Receptacle – with EMI Gasket



Accepts Pin Size	Gold Plated	Nickel Plated
.012 (0.30)	142-1801-551	142-1801-556
.015 (0.38)	142-1801-561	142-1801-566
.018 (0.46)	142-1801-571	142-1801-576

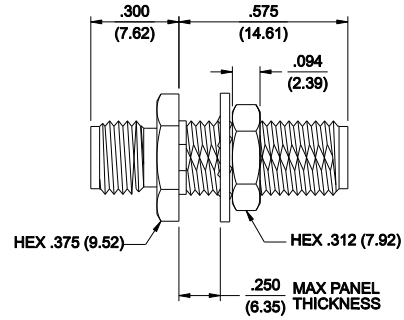
# In-Series Adapters

## Jack to Jack Adapter



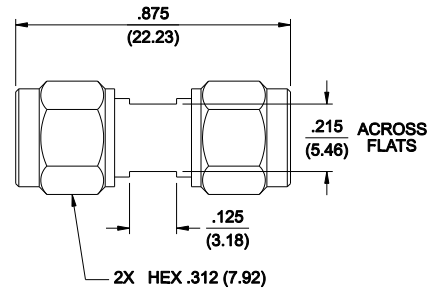
Gold Plated	Nickel Plated
142-0901-801	142-0901-806

## Jack to Bulkhead Jack Adapter



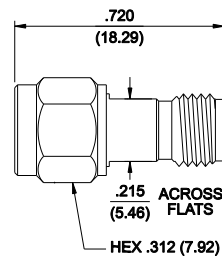
Gold Plated	Nickel Plated
142-0901-401	142-0901-406

## Plug to Plug Adapter



Gold Plated	Nickel Plated
142-0901-811	142-0901-816

## Plug to Jack Adapter



Gold Plated	Nickel Plated
142-0901-821	142-0901-826

# Specifications

## Electrical Specifications

**Impedance:** 50 Ohms

**Frequency Range:**

Flexible cable connectors ..... 0-12.4 GHz

Flexible cable connectors ..... 0-18.0 GHz

**VSWR:** (max) (f = GHz)

	Straight Cabled Connectors	Right Angle Cabled Connectors
RG-316, LMR-100 cable .....	1.15 + .02f	1.15 + .03f
RG-58, LMR-195 cable .....	1.17 + .025f	1.17 + .06f
RG-142 cable .....	1.17 + .02f	1.15 + .03f
LMR-200, LMR-240 cable .....	1.10 + .03f	1.10 + .06f
Uncabled receptacles.....	N/A	

**Working Voltage:** (VRMS max)

	Sea Level	70K Feet
RG-316, LMR-100, 195, 200 .....	250	65
RG-58, RG-142, LMR-240, uncabled receptacles.....	335	85

**Dielectric Withstanding Voltage:** (VRMS min at sea level)

RG-316; LMR-100, 195, 200 ..... 750

RG-58, RG-142, LMR-240, uncabled receptacles..... 1000

**Insulation Resistance:** 5000 megohms min

**Contact Resistance:** (milliohms max)

	Initial	After Environmental
Center contact (straight cabled connectors and uncabled receptacles) .....	3.0	4.0
Center contact (right angle cabled connectors) .....	4.0	6.0
Outer contact (all connectors).....	2.0	N/A
Braid to body (gold plated connectors) .....	0.5	N/A
Braid to body (nickel plated connectors) .....	5.0	N/A

**Corona Level:** (Volts min at 70,000 feet)

RG-316, LMR-100, 195, 200 ..... 190

RG-58, RG-142, LMR-240, uncabled receptacles ..... 250

**Insertion Loss:** (dB max)

Straight flexible cable connectors .....  $0.06\sqrt{f(\text{GHz})}$ , tested at 6 GHz

Right angle flexible cable connectors .....  $0.15\sqrt{f(\text{GHz})}$ , tested at 6 GHz

Low loss flexible straight cable connectors .....  $0.06\sqrt{f(\text{GHz})}$ , tested at 1 GHz

Low loss flexible right angle cable connectors .....  $0.15\sqrt{f(\text{GHz})}$ , tested at 1 GHz

Uncabled receptacles, field replaceable ..... N/A

**RF Leakage:** (dB min, tested at 2.5 GHz)

Flexible cable connectors ..... -60 dB

Uncabled receptacles and adapters ..... N/A

**RF High Potential Withstanding Voltage:**

(VRMS min tested at 4 and 7 MHz)† RG-316; LMR-100, 195, 200..... 500

RG-58, RG-142, LMR-240, uncabled receptacles..... 670

† Avoid user injury due to misapplication. See safety advisory definitions.

## Mechanical Ratings

**Engagement Design:**

Reverse Polarity, Series SMA

**Engagement/Disengagement Force:**

2 lb-in max max

**Mating Torque:**

7 to 10 lb-in

**Bulkhead Mounting Nut Torque:**

15 lb-in

**Coupling Proof Torque:**

15 lb-in min

**Coupling Nut Retention:**

60 lbs min

**Contact Retention:**

6 lbs min axial force (captivated contacts)

4 oz-in min 4 oz-in min

**Cable Retention:**

	Axial Force* (lbs)	Torque (oz-in)
Connectors for RG-316, LMR-100 .....	20	N/A
Connectors for LMR195, 200 .....	30	N/A
Connectors for RG-58, LMR-240 .....	40	N/A
Connectors for RG-142 .....	45	N/A

\*Or cable breaking strength whichever is less.

**Durability:** 500 cycles minimum



# Flexible Cable

## Straight Crimp Type Plug – Solder or Crimp Captivated Contact



Cable Type	Gold Plated	Nickel Plated	"A"
RG-316/U, 188, 174, 161, LMR-100 HPF-100, RF-100	142-4403-001	142-4403-006	.706 (17.93)
RG-316 DS, 188 DS	142-4404-001	142-4404-006	.706 (17.93)
RG-58, 141, 303 LMR-195, HPF-195, RF-195	142-4407-001	142-4407-006	.706 (17.93)
RG-142, 55, 223, 400	142-4408-001	142-4408-006	.706 (17.93)
LMR-200, HPF-200, RF-200	142-4439-001	142-4439-006	.844 (21.44)
LMR-240, HPF-240, RF-240	142-4435-001	142-4435-006	.844 (21.44)

Assembly Instructions: LMR 195, 200 and 240 page 219. All other cables page 220.

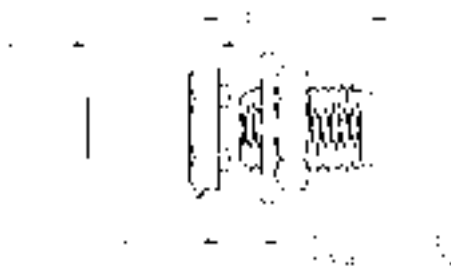
## Right Angle Crimp Type Plug – Captivated Contact



Cable Type	Gold Plated	Nickel Plated	"A"	"B"
RG-316, 188, 174, 161, LMR-100, HPF-100, RF-100	142-4403-101	142-4403-106	.611 (15.52)	.470 (11.94)
RG-316 DS, 188 DS	142-4404-101	142-4404-106	.611 (15.52)	.470 (11.94)
RG-58, 141, 303, LMR-195, HPF-195, RF-195	142-4407-101	142-4407-106	.611 (15.52)	.470 (11.94)
RG-142, 55, 223, 400	142-4408-101	142-4408-106	.611 (15.52)	.470 (11.94)
LMR-200, HPF-200, RF-200	142-4439-101	142-4439-106	.611 (15.52)	.470 (11.94)
LMR-240, HPF-240, RF-240	142-4435-101	142-4435-106	.635 (16.13)	.490 (12.45)

Assembly Instructions: LMR 195, 200 and 240 page 224. All other cables page 229.  
Center conductor of cable serves as contact.

## Straight Crimp Type Bulkhead Jack – Captivated Contact



Cable Type	Gold Plated	Nickel Plated
RG-316, 188, 174, 161	142-4303-401	142-4303-406
RG-316 DS, 188 DS	142-4304-401	142-4304-406
RG-58, 141, 303	142-4307-401	142-4307-406
RG-142, 55, 223, 400	142-4308-401	142-4308-406

Assembly instructions page 219.  
Mounting hole layout figure 1 page 194.

# Specifications

## Electrical Specifications

**Impedance:** 50 Ohms

**Frequency Range:**

Flexible cable connectors .....	0-12.4 GHz
Uncabled receptacles .....	0-18.0 GHz

**VSWR:** (max) (f = GHz)

	Straight Cabled Connectors	Right Angle Cabled Connectors
RG-316, LMR-100 cable .....	1.15 + .02f	1.15 + .03f
RG-58, LMR-195 cable .....	1.15 + .01f	1.15 + .02f
RG-142 cable .....	1.15 + .01f	1.15 + .02f
LMR-200, LMR-240 cable .....	1.10 + .03f	1.10 + .06f
Uncabled receptacles.....	N/A	

**Working Voltage:** (VRMS max)

	Sea Level	70K Feet
RG-316; LMR-100, 195, 200 .....	250	65
RG-58, RG-142, LMR-240, uncabled receptacles.....	335	85

**Dielectric Withstanding Voltage:** (VRMS min at sea level)

RG-316; LMR-100, 195, 200 .....	750
RG-58, RG-142, LMR-240, uncabled receptacles.....	1000

**Insulation Resistance:** 5000 megohms min

**Contact Resistance:** (milliohms max)

	Initial	After Environmental
Center contact (straight cabled connectors and uncabled receptacles) .....	3.0	4.0
Center contact (right angle cabled connectors) .....	4.0	6.0
Outer contact (all connectors).....	2.0	N/A
Braid to body (gold plated connectors) .....	0.5	N/A
Braid to body (nickel plated connectors) .....	5.0	N/A

**Corona Level:** (Volts min at 70,000 feet)†

RG-316, LMR-100, 195, 200 .....	190
RG-58, RG-142, LMR-240, uncabled receptacles .....	250

**Insertion Loss:** (dB max)

Straight flexible cable connectors .....	$0.06\sqrt{f}$ (GHz), tested at 6 GHz
Right angle flexible cable connectors .....	$0.15\sqrt{f}$ (GHz), tested at 6 GHz
Low loss flexible straight cable connectors .....	$0.06\sqrt{f}$ (GHz), tested at 1 GHz
Low loss flexible right angle cable connectors.....	$0.15\sqrt{f}$ (GHz), tested at 1 GHz
Uncabled receptacles, field replaceable .....	N/A

**RF Leakage:** (dB min tested at 2.5 GHz)

† Avoid user injury due to misapplication. See safety advisory definitions.

## Mechanical Ratings

**Engagement Design:** Reverse Thread, Series SMA

**Engagement/Disengagement Force:** 2 lb-in max

**Mating Torque:** 7 to 10 lb-in

**Bulkhead Mounting Nut Torque:** 15 lb-in

**Coupling Proof Torque:** 15 lb-in min

**Coupling Nut Retention:** 60 lbs min

**Contact Retention:** 6 lbs. min axial force (captivated contacts)

4 oz-in min torque (uncabled receptacles)

**Cable Retention:**

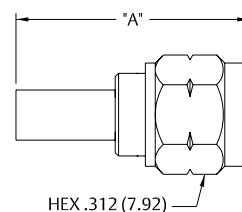
	Axial Force* (lbs)	Torque (oz-in)
RG-316, LMR-100.....	20	N/A
LMR195, 200.....	30	N/A
RG-58, LMR-240.....	40	N/A
RG-142.....	45	N/A

\*Or cable breaking strength whichever is less.

**Durability:** 500 cycles min

# Flexible Cable

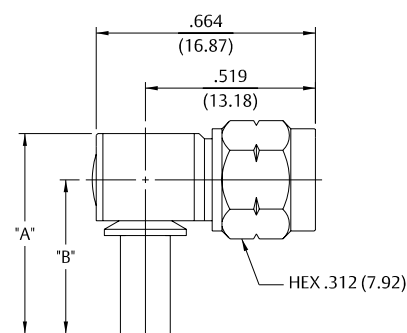
## Straight Crimp Type Plug – Solder or Crimp Captivated Contact



Cable Type	Gold Plated	Nickel Plated	"A"
RG-316, 188, 174, 161, LMR-100 HPF-100 RF-100	142-5403-001	142-5403-006	.706 (17.93)
RG-316 DS, 188 DS,	142-5404-001	142-5404-006	.706 (17.93)
RG-58, 141, 303 LMR-195, HPF-195, RF-195	142-5407-001	142-5407-006	.706 (17.93)
RG-142, 55, 223, 400	142-5408-001	142-5408-006	.706 (17.93)
LMR-200, HPF-200, RF-200	142-5439-001	142-5439-006	.844 (21.44)
LMR-240, HPF-240, RF-240	142-5435-001	142-5435-006	.844 (21.44)

Assembly Instructions: LMR 195, 200 and 240 page 220. All other cables page 219.

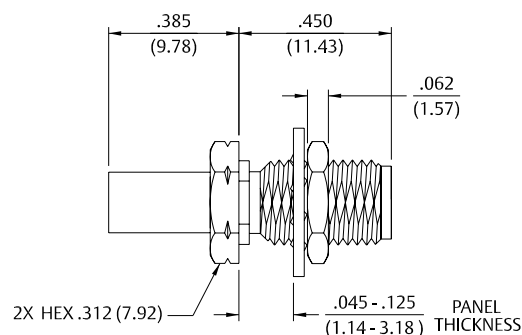
## Right Angle Crimp Type Plug – Captivated Contact



Cable Type	Gold Plated	Nickel Plated	"A"	"B"
RG-316, 188, 174, 161, LMR-100 HPF-100 RF-100	142-5403-101	142-5403-106	.611 (15.52)	.470 (11.94)
RG-316 DS 188 DS	142-5404-101	142-5404-106	.611 (15.52)	.470 (11.94)
RG-58, 141, 303, LMR-195 HPF-195 RF195	142-5407-101	142-5407-106	.611 (15.52)	.470 (11.94)
RG-142, 55, 223, 400	142-5408-101	142-5408-106	.611 (15.52)	.470 (11.94)
LMR-200 HPF-200 RF-200	142-5439-101	142-5439-106	.611 (15.52)	.470 (11.94)
LMR-240 HPF-240 RF-240	142-5435-101	142-5435-106	.635 (16.13)	.490 (12.45)

Assembly instructions: LMR 195, 200 and 240 page 229. All other cables page 224.

## Straight Crimp Type Bulkhead Jack – Solder or Crimp



Cable Type	Gold Plated	Nickel Plated
RG-316, 188, 174, 161	142-5303-401	142-5303-406
RG-316 DS, 188 DS	142-5304-401	142-5304-406
RG-58, 141, 303	142-5307-401	142-5307-406
RG-142, 55, 223, 400	142-5308-401	142-5308-406

Assembly instructions page 219.  
Mounting hole layout figure 1 page 194.

# Specifications

## Electrical Specifications

**Impedance:** 50 Ohms

**Frequency Range:** Flexible cable connectors ..... 0-12.4 GHz  
Uncabled receptacles ..... 0-18.0 GHz

	Straight	
	Cabled Connectors	Right Angle Cabled Connectors
RG-316 cable .....	1.15 + .02f	1.15 + .03f
RG-58 cable .....	1.15 + .01f	1.15 + .02f
Uncabled receptacles.....	N/A	
<b>Working Voltage:</b> (VRMS max)†	<u>Sea Level</u>	<u>70K Feet</u>
RG-316 .....	250	65
RG-58, uncabled receptacles .....	335	85

**Dielectric Withstanding Voltage:** (VRMS min at sea level)†

RG-316 .....	750
RG-58, uncabled receptacles .....	1000

**Insulation Resistance:** 5000 megohms min

**Contact Resistance:** (milliohms max)

	<u>Initial</u>	<u>After Environmental</u>
Center contact (straight cabled connectors, uncabled receptacles).....	3.0	4.0
Center contact (right angle cabled connectors).....	4.0	6.0
Outer contact (all connectors).....	2.0	N/A
Braid to body .....	0.5	N/A

**Corona Level:** (Volts min at 70,000 feet)†

RG-316 190 .....	250
RG-58, uncabled receptacles .....	250

**Insertion Loss:** (dB max)

Straight flexible cable connectors .....	$.06 \sqrt{f(\text{GHz})}$ , tested at 6 GHz
Right angle flexible cable connectors .....	$.15 \sqrt{f(\text{GHz})}$ , tested at 6 GHz
Uncabled receptacles .....	N/A

**RF Leakage:** (dB min tested at 2.5 GHz)

Flexible cable connectors .....	-60 dB
Uncabled receptacles .....	N/A

**RF High Potential Withstanding Voltage:** (VRMS minimum, tested at 4 and 7 MHz)†

RG-316 .....	500
RG-58, uncabled receptacles .....	670

† Avoid user injury due to misapplication. See safety advisory definitions inside front cover.

## Mechanical Specifications

**Engagement Design:** MIL-STD-348, Series SMA

**Engagement/Disengagement Force:** 2 lb-in min max

**Mating Torque:** 7 to 10 lb-in min

**Coupling Proof Torque:** 15 lb-in min

**Coupling Nut Retention:** 60 lbs min

**Contact Retention:** 6 lbs min axial force (captivated contacts)  
4 oz-in min torque (uncabled receptacles)

<b>Cable Retention:</b>	<u>Axial Force*</u> (lbs)	<u>Torque (oz-in)</u>
RG-316 .....	20	N/A
RG-58 .....	40	N/A

\*Or cable breaking strength whichever is less.

**Durability:** 500 cycles min

## Environmental Specifications

(Meets or Exceeds the Applicable Paragraph of MIL-PRF-39012)

**Temperature Range:** - 65°C to + 165°C

**Thermal Shock:** MIL-STD-202, Method 107, Condition B

**Corrosion:** MIL-STD-202, Method 101, Condition B

**Shock:** MIL-STD-202, Method 213, Condition I

**Vibration:** MIL-STD-202, Method 204, Condition D

**Moisture Resistance:** MIL-STD-202, Method 106

## Material Specifications

(See non-magnetic materials page 10)

† Avoid user injury due to misapplication. See safety advisory definitions inside front cover.

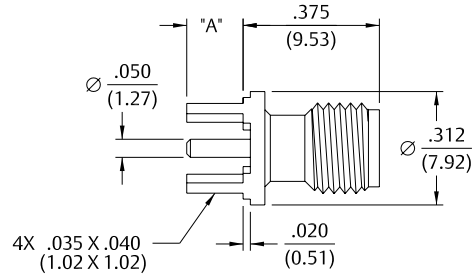
# PC Mount

## Straight Jack Receptacle



Gold Plated	"A"
142-9701-201	.155 (3.94)
142-9701-211	.110 (2.79)

Mounting hole layout figure 3 on page 194.

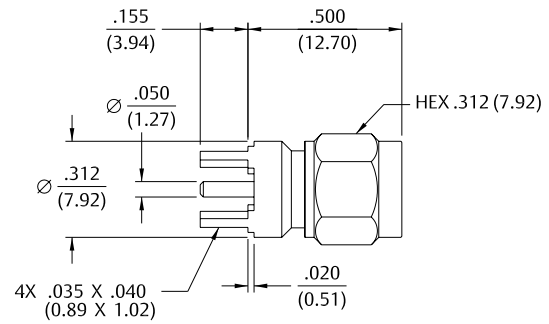


## Straight Plug Receptacle



Gold Plated
142-9801-201

Mounting hole layout figure 3 on page 194.

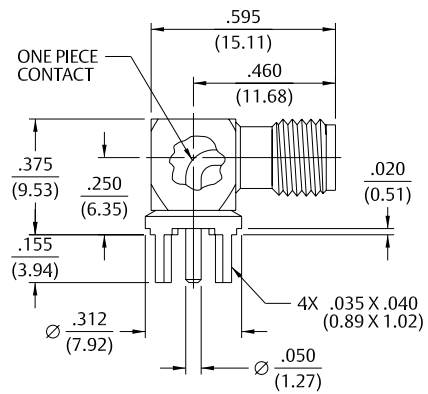


## Right Angle Jack Receptacle



Gold Plated
142-9701-301

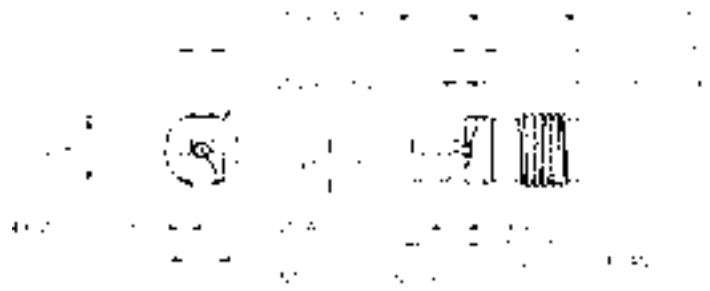
Mounting hole layout figure 3 on page 194.





## PC Mount

### Jack Receptacle – Round Body



Gold Plated	High Frequency Substrate Thickness	"A"	"B"	"C"
142-0761-801	.008 (0.20) - .014 (0.36)	.010 (0.25)	.050 (1.27)	.096 (2.44)
142-0761-821	.014 (0.36) - .020 (0.51)	.015 (0.38)	.067 (1.70)	.113 (2.87)

Assembly instructions page 228.

### Jack Receptacle, Square Body



Gold Plated	High Frequency Substrate Thickness	"A"	"B"	"C"
142-0761-811	.008 (0.20) - .014 (0.36)	.010 (0.25)	.050 (1.27)	.096 (2.44)
142-0761-831	.014 (0.36) - .020 (0.51)	.015 (0.38)	.067 (1.70)	.113 (2.87)

Assembly instructions page 228.

### Jack Receptacle – PC Mount, Round Body with Thick Legs



Gold Plated	High Frequency Substrate Thickness	"A"	"B"	"C"
142-0761-881	.008 (0.20) - .014 (0.36)	.010 (0.25)	.050 (1.27)	.096 (2.44)
142-0771-821	.014 (0.36) - .020 (0.51)	.015 (0.38)	.067 (1.70)	.113 (2.87)

Assembly instructions page 228.

\* Coupling proof torque 8 inch pounds maximum without support wrench.

# Specifications

## Electrical Ratings

**Impedance:** 50 Ohms

**Frequency Range:**

Flexible cable connectors .....	0-12.4 GHz
Uncabled receptacles.....	0-18.0 GHz
Straight Semi-Rigid cable connectors.....	0-26.5 GHz

**VSWR:** (max) (f = GHz)

	Straight Cabled Connectors	Right Angle Cabled Connectors
RG-316, LMR-100 cable .....	1.15+.02f	1.15+.03f
RG-58, LMR-195 cable .....	1.15+.01f	1.15+.02f
RG-142 cable .....	1.15+.01f	1.15+.02f
RG-405 cable (0 - 18 GHz) .....	1.07+.008f	
RG-405 cable (18 - 26.5 GHz) .....	1.35 max	
RG-402 cable (w/contact).....	1.05+.008f	
RG-402 cable (w/o contact).....	1.035+.005f	

**Insertion Loss:** (dB max)

Straight flexible cable connectors .....	$0.06 \sqrt{f \text{ (GHz)}}$ , tested at 6 GHz
Right angle flexible cable connectors .....	$0.15 \sqrt{f \text{ (GHz)}}$ , tested at 6 GHz
Straight Semi-Rigid cable connectors with contact.....	$0.03 \sqrt{f \text{ (GHz)}}$ , tested at 10 GHz
Straight Semi-Rigid cable connectors w/o contact.....	$0.03 \sqrt{f \text{ (GHz)}}$ , tested at 16 GHz
Uncabled receptacles .....	N/A

**Working Voltage:** (VRMS max)

	Sea Level	70K Feet
RG-316, LMR-100, 195 .....	250	65
RG-58, RG-142, RG-405, uncabled receptacles, RG-402 w/o contact.....	335	85
RG-402 with contact.....	500	125

**Dielectric Withstanding Voltage:** (VRMS min at sea level) †

	Sea Level
RG-316, LMR-100, 195 .....	750
RG-58, RG-142, RG-405, uncabled receptacles.....	1000
RG-402 with contact.....	1500
RG-402 w/o contact.....	N/A

**Corona Level:** (Volts min at 70,000 feet)

	70K Feet
RG-316, LMR-100, 195 .....	190
RG-58, RG-142, .086 Semi-Rigid, uncabled receptacles, RG-402 w/o contact.....	250
RG-402 with contact .....	375

**Insulation Resistance:** 5000 Megohms min

	Initial	After Environmental
Contact Resistance: (milliohms max)		
Center contact (straight cabled connectors and uncabled receptacles) .....	3.0*	4.0*
Center contact (right angle cabled connectors) .....	4.0	6.0
Outer contact (all connectors) .....	2.0	N/A
Braid to Body (gold plated bodies).....	0.5	N/A

\*N/A where the cable center conductor is used as a contact

**RF Leakage:** (dB min, tested at 2.5 GHz)

Flexible cable connectors and RG-402 connectors w/o contact .....	-60
RG-405 connectors and RG-402 connectors with contact .....	-90
Uncabled receptacles .....	N/A

**RF High Potential Withstanding Voltage:** (VRMS min, tested at 4 and 7 MHz)

RG-316, LMR-100, 195 .....	500
RG-58, RG-142, RG-405, RG-402 cable w/o contact, Uncabled receptacles .....	670
RG-402 with contact .....	1000

† Avoid user injury due to misapplication. See safety advisory definitions.

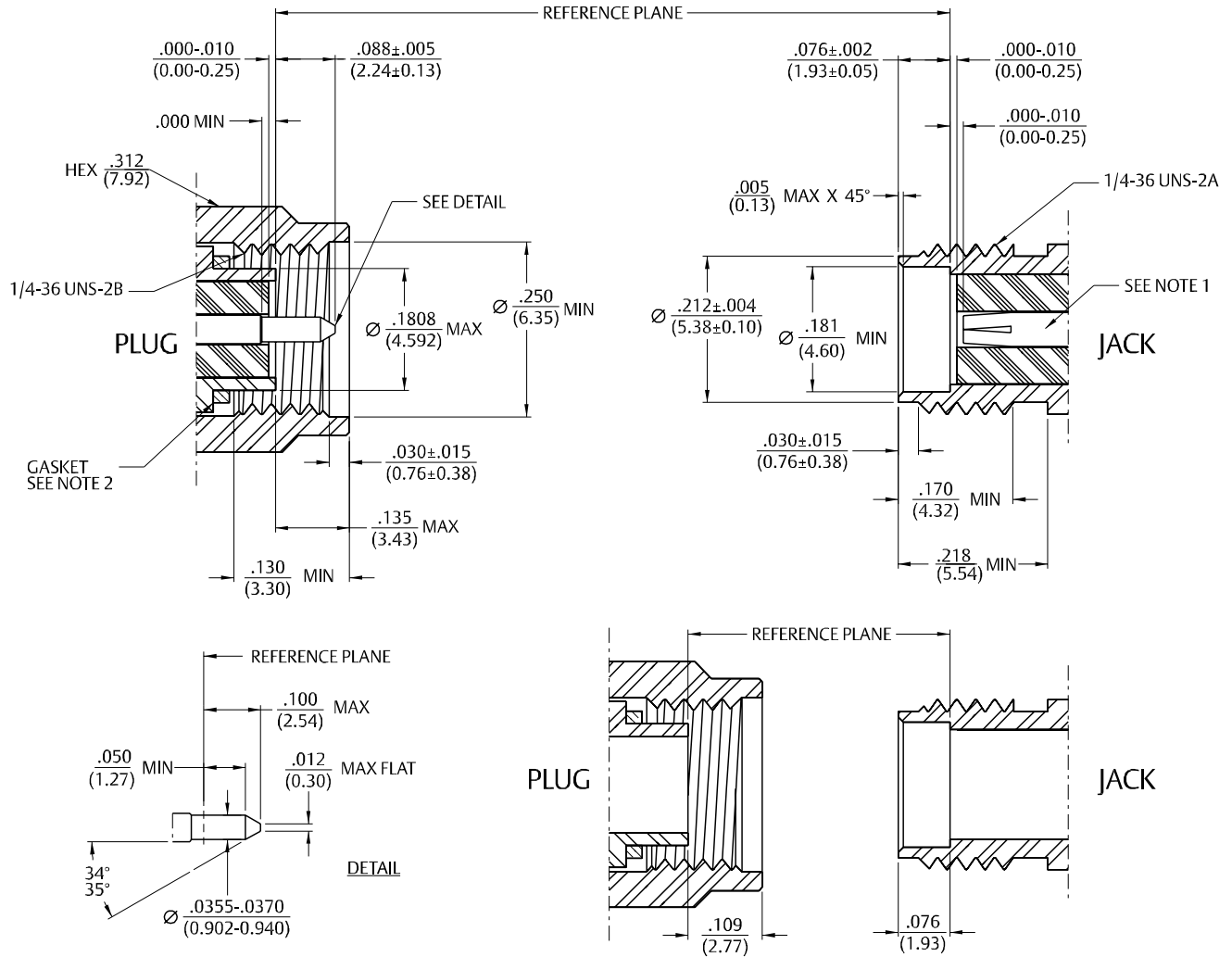


# Specifications

## Mating Engagement for Stainless Steel SMA Series Per MIL-STD-348A

### NOTES

1. ID to meet VSWR, contact resistance and insertion/withdrawal forces when mated with a dia. .0355-.0370 pin.
2. Gasket is not supplied with brass connectors.



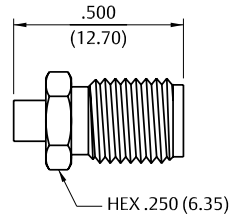
## Semi-Rigid

### Straight Solder Type Jack



Cable Type	Gold Plated Body
RG-405	141-0593-001
RG-402	141-0594-001

Assembly instructions page 214.

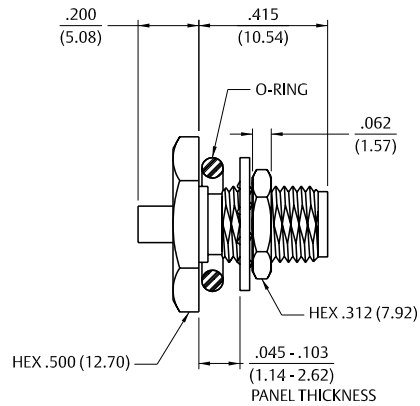


### Straight Solder Type Bulkhead Jack with O-Ring



Cable Type	Gold Plated Body
RG-405	141-0593-401
RG-402	141-0594-401

Assembly instructions page 214.

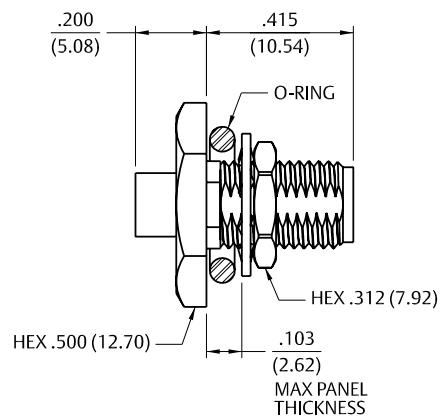


### Straight Solder Type Bulkhead Jack with Captivated Solderless Contact and O-Ring



Cable Type	Gold Plated Body
RG-405	141-0593-421
RG-402	141-0594-421

Assembly instructions page 222.



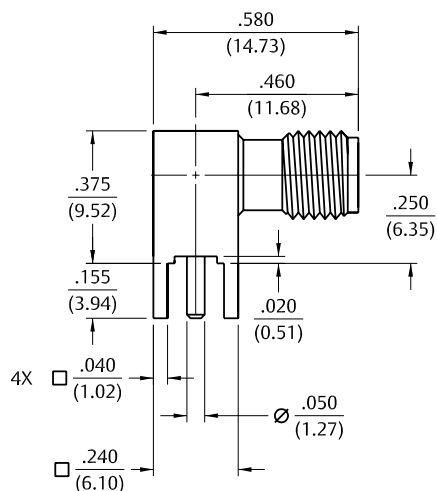
# PC Mount, Bulkhead and Panel Mount

## Right Angle PC Mount Jack Receptacle



Gold Plated

141-0701-301

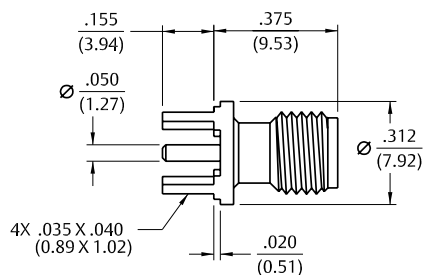


## Straight PC Mount Jack Receptacle



Gold Plated

141-0701-201

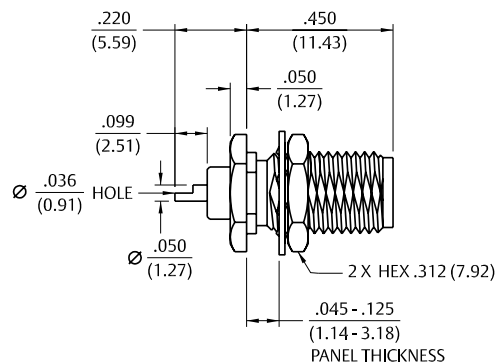


## Rear Mount Bulkhead Jack Receptacle



Passivated

141-0701-402

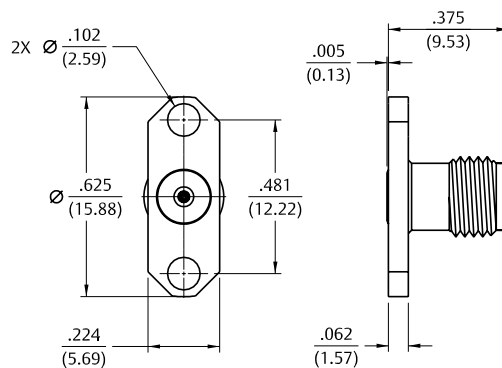


## 2-Hole Flange Mount Jack Receptacle – Flush Dielectric



Passivated

141-0701-602



# Specifications

## Electrical Specifications

<b>Impedance:</b>	50 Ohms		
<b>Frequency Range:</b>	0-6 GHz		
<b>Attenuation Values:</b>	1, 2, 3, 6 and 10 dB Nominal*		
<b>Attenuation Accuracy:</b>			
dB*	0 - 4 GHz	4 - 6 GHz	
1-3	±0.3	±0.5	
4-6	±0.4	±0.5	
7-10	±0.5	±0.5	
<b>VSWR Max:</b>			
dB*	0 - 2.5 GHz	2.5 - 4 GHz	4 - 6 GHz
1-3	1.15 : 1	1.20 : 1	1.25 : 1
4-6	1.15 : 1	1.20 : 1	1.25 : 1
7-10	1.15 : 1	1.25 : 1	1.30 : 1
<b>Average Input Power:</b>	2 W Max @ +25°C		
	Derated Linearly to 0.5W at +125°C		

\*Other values available, please contact Factory

## Mechanical Specifications

**SMA Connectors:** Per MIL-STD-348A

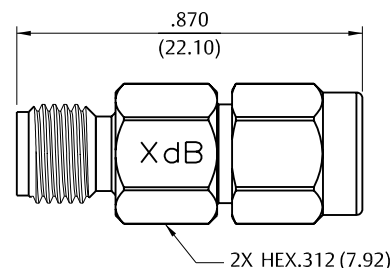
## Environmental Specifications

<b>Temperature Range:</b>	-55°C to +125°C
<b>Thermal Shock:</b>	MIL-STD-202, Method 107, Condition B except +100°C high temperature)
<b>Shock:</b>	MIL-STD-202, Method 213, Condition I
<b>Vibration:</b>	MIL-STD-202, Method 204, Condition D

## Material Specifications

<b>Connector Body:</b>	303 Stainless Steel per ASTM A582, Passivated per MIL-F-14-72 (EL 300)
<b>Coupling Nut:</b>	303 Stainless Steel per ASTM A582, Passivated per MIL-F-14-72 (EL 300)
<b>Retaining Ring:</b>	Beryllium Copper per ASTM B196, Unplated
<b>SMA Plug Gasket:</b>	Silicone Rubber per ZZ-R-765
<b>Male Contact:</b>	Brass per ASTM B16, Gold Plated per MIL-G-45204 (.00003 min)
<b>Female Contact:</b>	Beryllium Copper per ASTM B196, Gold Plated per MIL-G-45204 (.00003 min)
<b>Insulators:</b>	PTFE per ASTM D1710
<b>Attenuator Card:</b>	Alumina per Mil-I-10, RoHS Compliant Terminals

## SMA Fixed Attenuators Commercial Series



Attenuation (dB Nominal)*	Freq. Range	Stainless Steel Passivated
1	(0-6 GHz)	141-3901-801
2	(0-6 GHz)	141-3901-802
3	(0-6 GHz)	141-3901-803
6	(0-6 GHz)	141-3901-806
10	(0-6 GHz)	141-3901-810

\* Standard values shown. Contact factory for other requirements. Inches (millimeters).

# Specifications

## Electrical Specifications

**Impedance:** 50 Ohms

**Frequency Range:**

Connectors..... 0-4 GHz

Dummy loads..... 0-1 GHz

**VSWR:** (max) (f = GHz)

	Straight Cabled Connectors	Right Angle Cabled Connectors
RG-178	1.30 + .04f	1.45 + .06f
RG-316, RG-58, and RG-405	1.25 + .04f	1.35 + .04f
Adapters	1.20 + .04f	

Uncabled receptacles, dummy loads ..... N/A

**Working Voltage:** (VRMS max)†

	Sea Level	70K Feet
RG-178	250	60
RG-316, RG-58, RG-405, uncabled receptacles, adapters	335	85
Dummy loads		N/A

RG-178 ..... 250

RG-316, RG-58, RG-405, uncabled receptacles, adapters ..... 335

Dummy loads ..... N/A

**Dielectric Withstanding Voltage:** (VRMS min at sea level)

RG-316 ..... 750

RG-58, RG-142, uncabled receptacles ..... 1000

Dummy loads ..... N/A

**Corona Level:** (Volts min at 70,000 feet)†

RG-178 ..... 185

RG-316, RG-58, RG-405 ..... 250

Uncabled receptacles, adapters, dummy loads ..... N/A

**Insertion Loss:** (dB max, tested at 1.5 GHz)

Straight cabled connectors ..... 0.30 dB

Right angle cabled connectors ..... 0.60 dB

Uncabled receptacles, adapters, dummy loads ..... N/A

**Insulation Resistance:** 1000 megohms min

**Contact Resistance:** (milliohms max)

	Initial	After Environmental
Center contact (straight cabled connectors and uncabled receptacles)	6.0	8.0
Center contact (right angle cabled connectors and adapters)	12.0	16.0
Outer contact (gold plated connectors)	1.0	1.5
Outer contact (nickel plated connectors)	2.5	3.5
Braid to body (gold plated connectors)	1.0	N/A
Braid to body (nickel plated connectors)	2.5	N/A

Center contact (straight cabled connectors and uncabled receptacles)

Center contact (right angle cabled connectors and adapters)

Outer contact (gold plated connectors)

Outer contact (nickel plated connectors)

Braid to body (gold plated connectors)

Braid to body (nickel plated connectors)

**RF Leakage:** (dB min, tested at 2.5 GHz)

Cabled connectors ..... -55 dB

Uncabled receptacles, adapters, dummy loads ..... N/A

**RF High Potential Withstanding Voltage:**

(VRMS min, tested at 4 and 7 MHz)†

RG-178 ..... 500

RG-316, RG-58 ..... 700

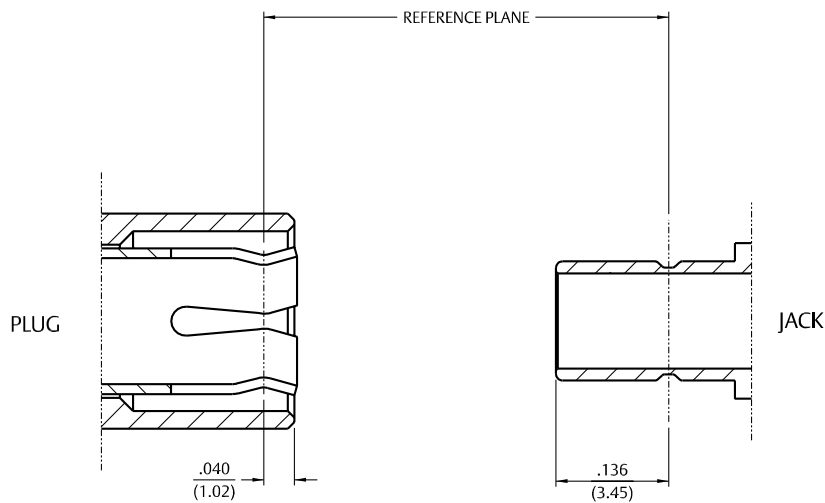
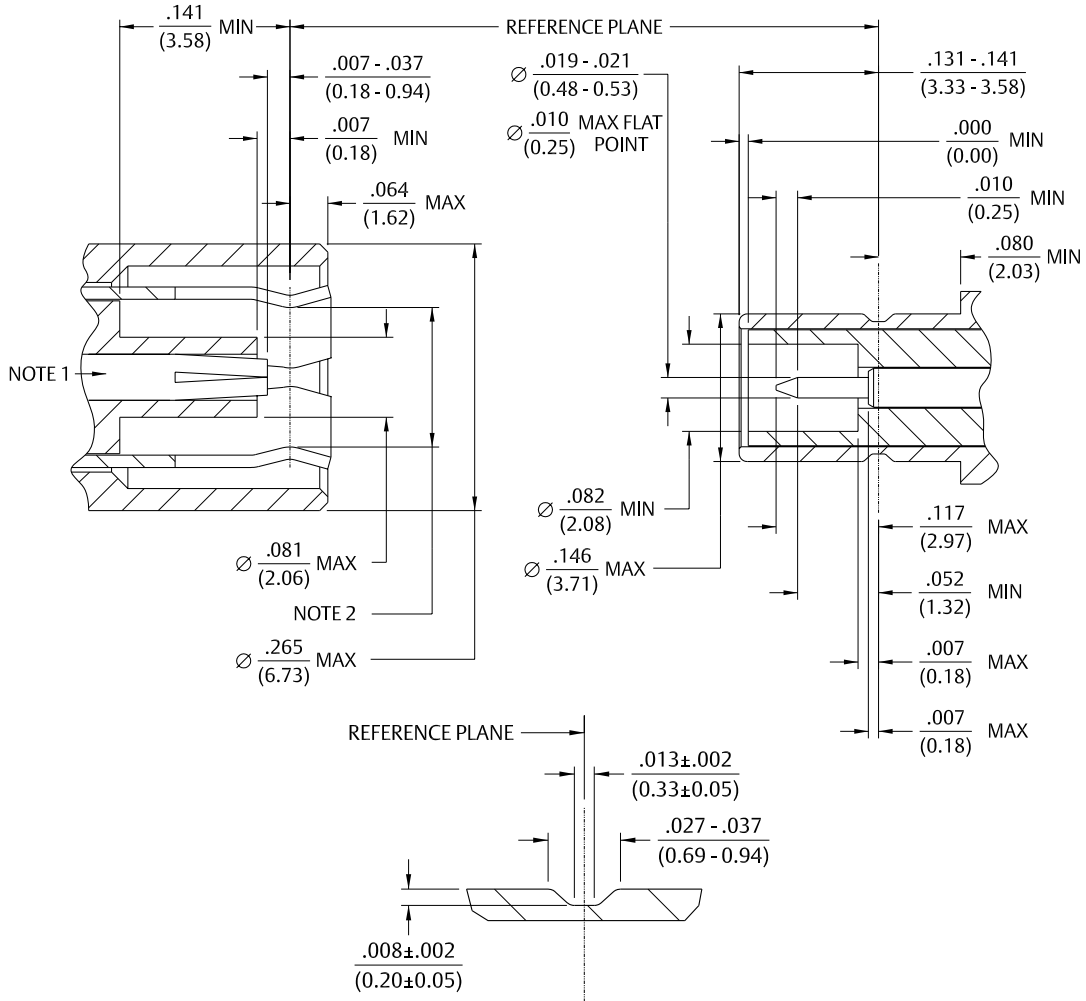
Uncabled receptacles and adapters ..... 600

Dummy loads ..... N/A

**Power Rating (Dummy Load):** 0.5 watt @ +25°C, derated to 0.25 watt @ +125°C

# Specifications

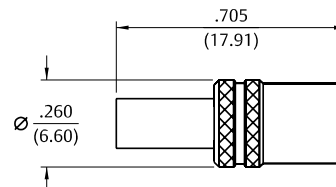
## Mating Engagement for SMB Series



- Notes
1. ID of contact to meet VSWR, mating characteristics and connector durability when mated with a dia  $.019/.021$  (0.48/0.53) male contact.
  2. Must meet the force to engage and disengage when mated with mating part.

## Flexible Cable

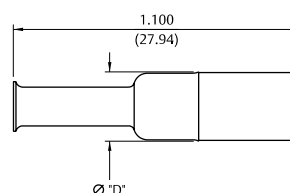
### Straight Crimp Type Plug (3-Piece) – Solder or Crimp Captivated Contact



Cable Type	Gold Plated	Nickel Plated
RG-161, 174, 179, 187, 188, 316	131-3403-021	131-3403-026
RG-316 DS, 188 DS, 179 DS, 187 DS	131-3404-021	131-3404-026
RG-58, 141, 303	131-3407-011	131-3407-016

Assembly instructions page 232.

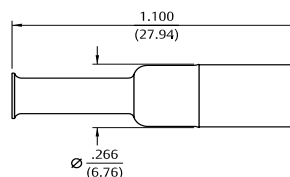
### Straight Solder Type Bulkhead Plug – Solder or Crimp Captivated Contact



Cable Type	Gold Plated	Nickel Plated	Crimp Contact	"D"
RG-178, 196	131-3402-001	131-3402-016	No	.266 (6.76)
RG-161, 174, 179, 187, 188, 316	131-3403-001	131-3403-016	Yes	.266 (6.76)
RG-316 DS, 188 DS, 179 DS, 187 DS	131-3404-001	131-3404-016	Yes	.266 (6.76)
RG-58, 141, 303	131-3407-001	131-3407-006	Yes	.270 (6.86)

Assembly instructions page 237.

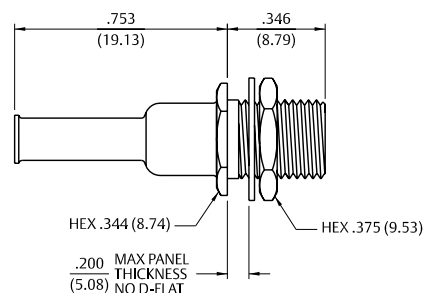
### Straight Crimp Type Plug – Die Cast – Solder or Crimp Captivated Contact



Cable Type	Gold Plated	Nickel Plated
RG-161, 174, 179, 187, 188, 316	131-1403-001	131-1403-016
RG-316 DS, 188 DS, 179 DS, 187 DS	131-1404-001	131-1404-016

Assembly instructions page 237.

### Straight Crimp Type Bulkhead Plug – Solder or Crimp Captivated Contact

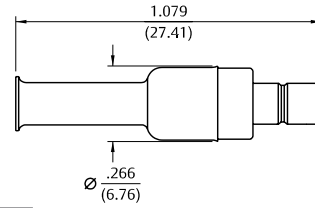


Cable Type	Gold Plated	Nickel Plated
RG-161U, 174, 179, 187, 188, 316	131-3403-401	131-3403-406
RG-316 DS, 188 DS, 179 DS, 187 DS	131-3404-401	131-3404-406

Assembly instructions page 237. Mounting hole dia. .290 (7.05).

# Flexible Cable

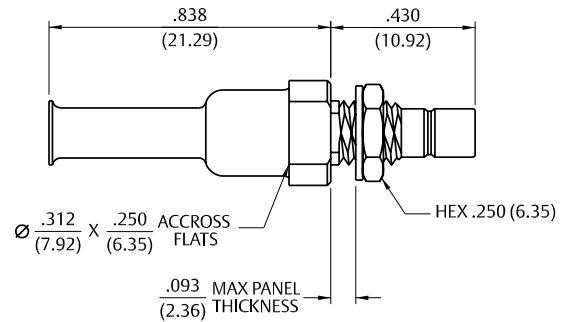
## Straight Crimp Type Jack – Solder or Crimp Captivated Contact



Cable Type	Gold Plated	Nickel Plated	Crimp Contact
RG-178, 196	131-3302-001	131-3302-006	No
RG-161, 174, 179, 187, 188, 316	131-3303-001	131-3303-006	Yes

Assembly instructions page 237.  
Mounting hole layout figure 5 page 194.

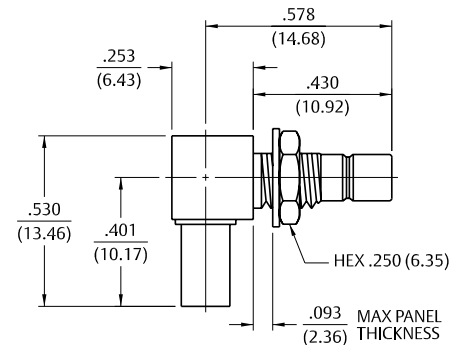
## Straight Crimp Type Bulkhead Jack – Solder or Crimp Captivated Contact



Cable Type	Gold Plated	Nickel Plated
RG-161, 174, 179, 187, 188, 316	131-3303-401	131-3303-406
RG-316 DS, 188 DS, 179 DS, 187 DS	131-3304-401	131-3304-406

Assembly instructions page 237.  
Mounting hole layout figure 5 page 194.

## Right Angle Crimp Type Bulkhead Jack – Captivated Contact



Cable Type	Gold Plated	Nickel Plated
RG-161, 174, 179, 187, 188, 316	131-3303-501	131-3303-506
RG-316 DS, 188 DS, 179 DS, 187 DS	131-3304-501	131-3304-506

Assembly instructions page 238.  
Mounting hole layout figure 5 page 194.



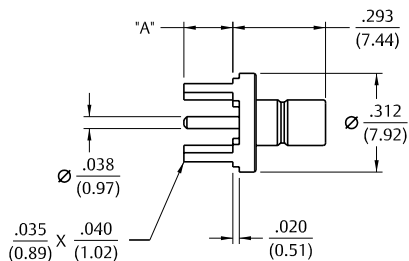
# PC Mount

## Straight Jack Receptacle



Gold Plated	Nickel Plated	"A"
131-3701-201	131-3701-206	.155 (3.94)
131-3701-211	131-3701-216	.110 (2.79)

Mounting hole layout figure 4 page 194.

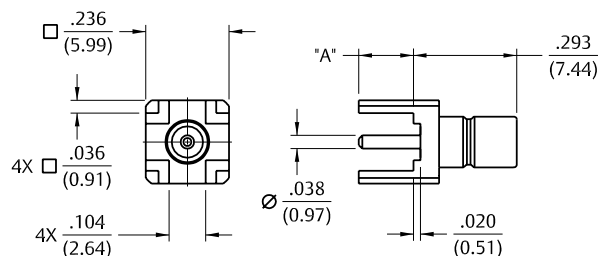


## Straight Jack Receptacle



Gold Plated	Nickel Plated	"A"
131-3701-261	131-3701-266	.155 (3.94)
131-3701-271	131-3701-276	.095 (2.41)

Mounting hole layout figure 4 page 194.

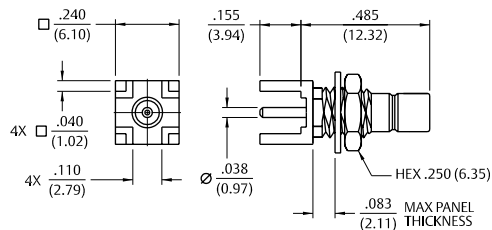


## Straight Bulkhead Jack Receptacle



Gold Plated	Nickel Plated
131-3701-231	131-3701-236

Mounting hole layout figures 4 and 5 page 195.



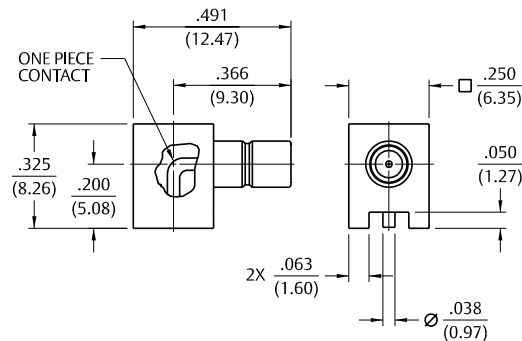
# PC Mount

## Right Angle Surface Mount Jack Receptacle



Gold Plated	Packaging
131-3711-301	Stock
131-3711-302	Tape and Reel, 425 pcs/reel

Mounting hole layout figure 9 page 194.  
Tape and Reel .630 (16.0) component pitch .945 (24.0) wide

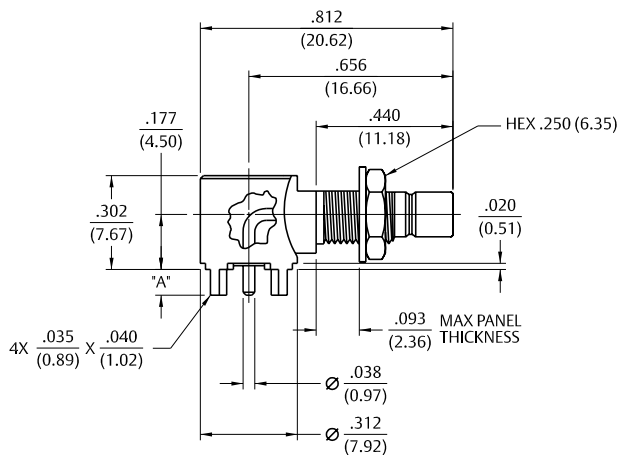


## Right Angle Bulkhead Jack Receptacle



Gold Plated	Nickel Plated	"A"
131-3701-501	131-3701-506	.083 (2.11)
131-3701-511	131-3701-516	.110 (2.79)
131-3701-341	131-3701-346	.155 (3.94)

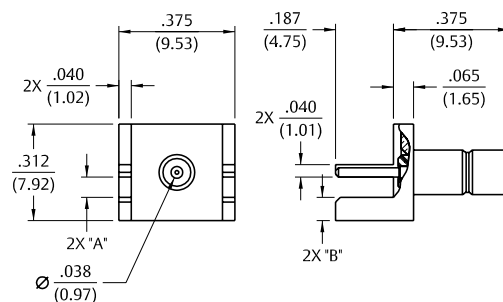
Mounting hole layout figures 4 and 5 page 194.



## End Launch Jack Receptacle – Round Contact



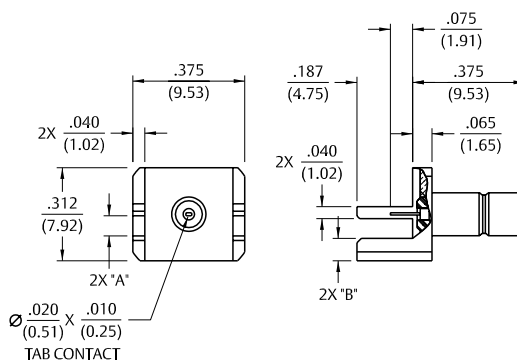
Gold Plated	Nickel Plated	Board Thickness	"A"	"B"
131-3701-801	131-3701-806	.062 (1.57)	.068 (1.73)	.073 (1.85)
131-3701-821	131-3701-826	.042 (1.07)	.048 (1.22)	.093 (2.36)



## End Launch Jack Receptacle – Tab Contact



Gold Plated	Nickel Plated	Board Thickness	"A"	"B"
131-3701-811	131-3701-816	.062 (1.57)	.068 (1.73)	.083 (2.11)
131-3701-831	131-3701-836	.042 (1.07)	.048 (1.22)	.103 (2.62)



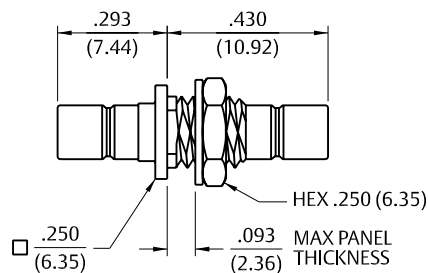
# In-Series Adapters & Terminations

## Jack to Bulkhead Jack Adapter



Gold Plated	Nickel Plated
131-3901-401	131-3901-406

Mounting hole layout figure 5 page 194.

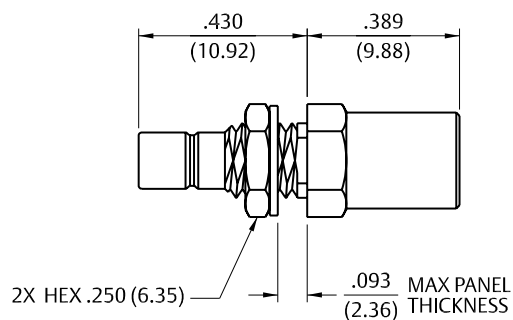


## Plug to Bulkhead Jack Adapter



Gold Plated	Nickel Plated
131-3901-411	131-3901-416

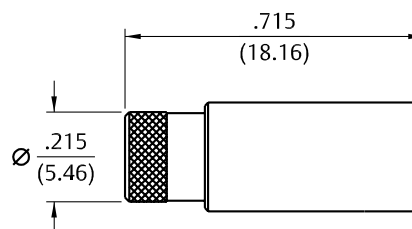
Mounting hole layout figure 5 page 194.



## Plug Dummy Load – 50 Ohm and 75 Ohm



Gold Plated	Nickel Plated	Resistance
131-3801-811	131-3801-816	50 Ohm
131-3801-821	131-3801-826	75 Ohm



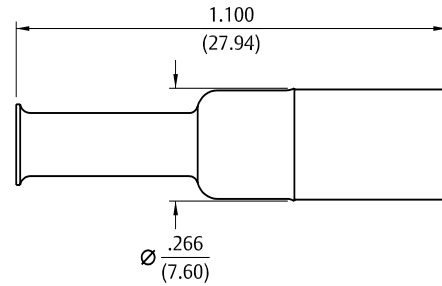
# Flexible Cable

## Straight Crimp Type Plug – Solder or Crimp Captivated Contact



Cable Type	Gold Plated
RG-316, 188, 174, 179, 187	131-9403-001
RG-316 DS, 188 DS, 179 DS, 187 DS	131-9404-001

Assembly instructions page 235.

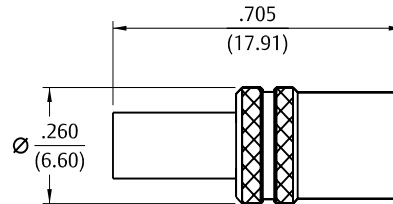


## Straight Crimp Type Plug (3-piece) Solder or Crimp Captivated Contact



Cable Type	Gold Plated
RG-316, 188, 174, 179, 187	131-9403-021
RG-316 DS, 188 DS, 179 DS, 187 DS	131-9404-021

Assembly instructions page 232.

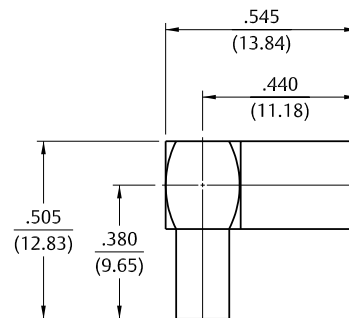


## Right Angle Crimp Type Plug – Captivated Contact



Cable Type	Gold Plated
RG-316, 188, 174, 179, 187	131-9403-101
RG-316 DS, 188 DS, 179 DS, 187 DS	131-9404-101

Assembly instructions page 236.



# Specifications

## Electrical Specifications

**Impedance:** 75 Ohms

**Frequency Range:** 0-2 GHz

**VSWR:** (max) (f = GHz)

RG-179, RG-59, Belden 735A:

Straight cabled connectors..... 1.25 + .04f

Right angle cabled connectors ..... 1.35 + .04f

Adapters ..... 1.20 + .04f

Type N Adapters ..... 1.05 + .01f

Precision loads..... 1.05 + .01f

Uncabled receptacles, opens, shorts ..... N/A

**Working Voltage:** (VRMS max) Sea Level 70K Feet

RG-179, RG-59, Belden 735A, uncabled receptacles, adapters..... 335 85

Open, shorts, loads..... N/A N/A

**Dielectric Withstanding Voltage:** (Vrms min at sea level)†

RG-179, RG-59, Belden 735A, uncabled receptacles, adapters ..... 1000

Open, shorts, loads..... N/A

**Insulation Resistance:** 1000 megohms min

**Contact Resistance:** (milliohms max) Initial After Environmental

Center contact (straight cabled connectors, uncabled receptacles, opens, shorts, loads) ..... 6.0 8.0

Center contact (right angle cabled connectors and adapters) ..... 12.0 16.0

Outer contact (gold plated connectors) ..... 1.0 1.5

Outer contact (nickel plated connectors)..... 2.5 3.5

Braid to body (gold plated connectors)..... 1.0 N/A

**Corona Level:** (Volts min at 70,000 ft)†

RG-179, RG-59, Belden 735A ..... 250

Uncabled receptacles, adapters, open, shorts, loads..... N/A

**Insertion Loss:** (dB max, tested at 1.5 GHz)

Straight cabled connectors..... 0.30 dB

Right angle cabled connectors ..... 0.60 dB

Uncabled receptacles, adapters, opens, shorts, loads..... N/A

**RF Leakage:** (dB min tested at 2.0 GHz)

Cabled connectors..... -55 dB

Uncabled receptacles, adapters opens, shorts, loads..... N/A

**RF High Potential Withstanding Voltage:**

(VRMS min, tested at 4 and 7 MHz)†

RG-179, RG-59, Belden 735A..... 700

Uncabled receptacles and adapters..... 600

Opens, shorts, loads ..... N/A

**Power Rating:** (Loads) 1.0 watt at +25°C derated linearly to .5 watt at +125°C

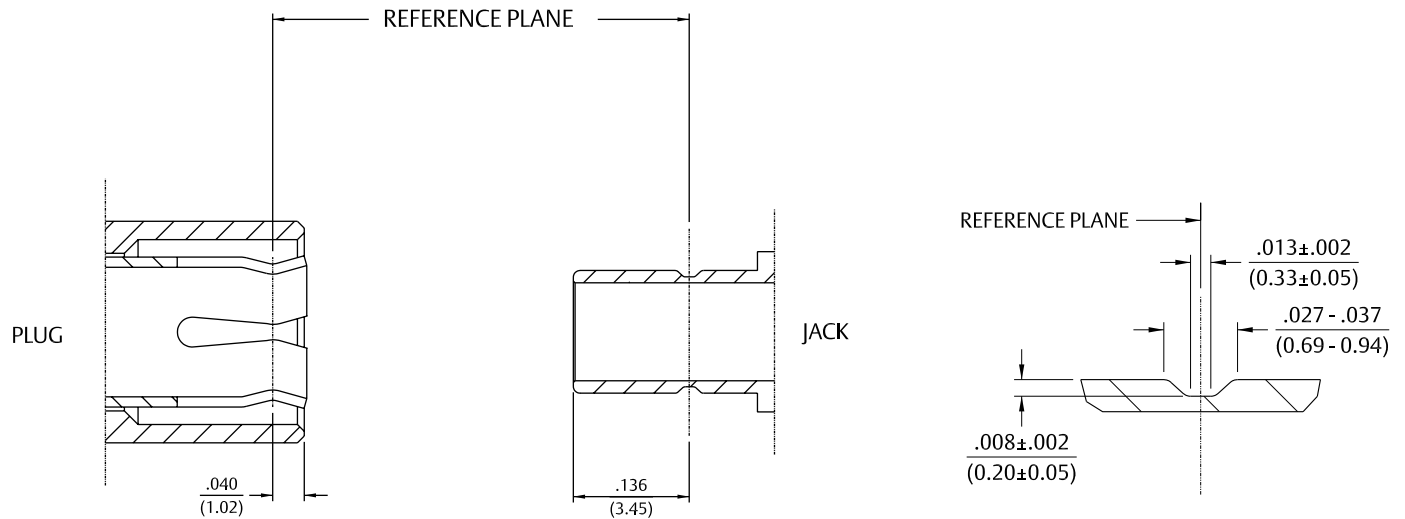
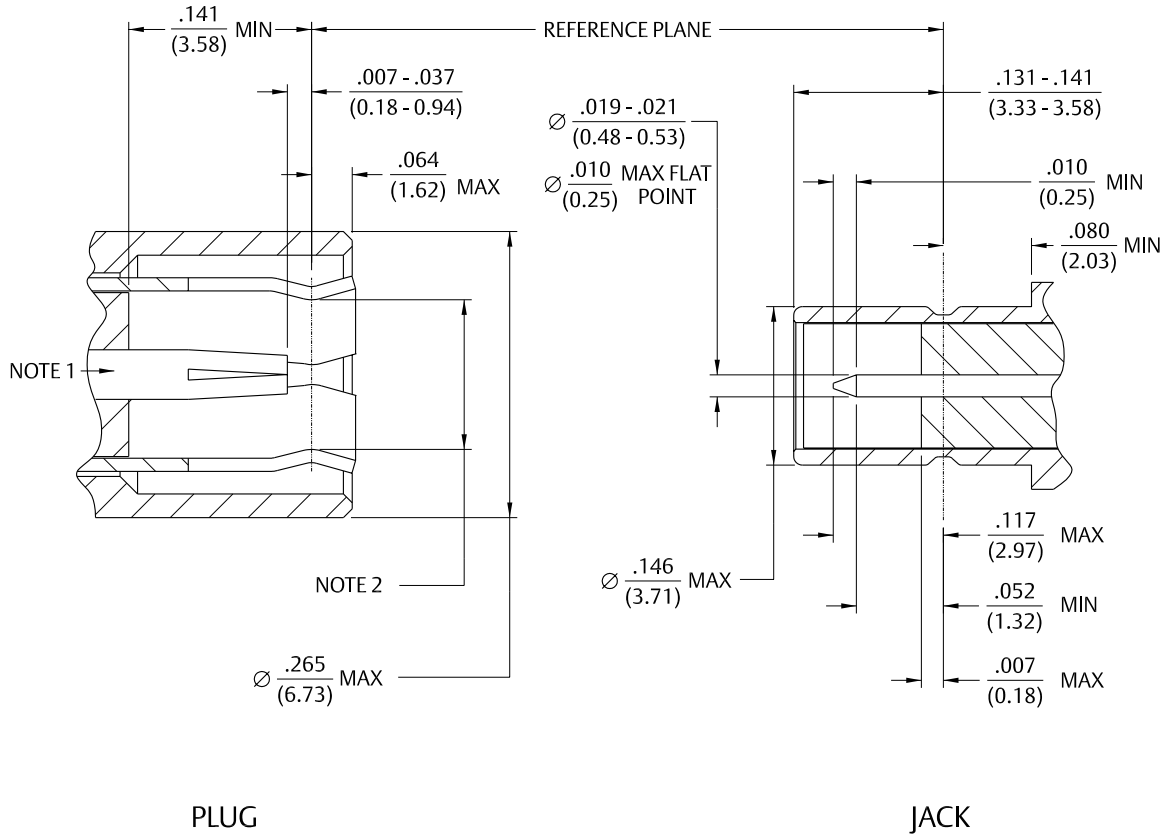
**Electrical Length:** Open ± 1.5° (±5.2° relative to short)

Short ± 1.5° (±5.2° relative to open)

Adapters ±5.2° (N/A for Jack-Bulkhead Jack and N Types)

# Specifications

## Mating Engagement for Mini-75 Ohm SMB Series (Intermutable with Standard 50 Ohm SMB)



- Notes
1. ID of contact to meet VSWR, mating characteristics and connector durability when mated with a dia  $.019/.021$  (0.48/0.53) male contact.
  2. Must meet the force to engage and disengage when mated with mating part.

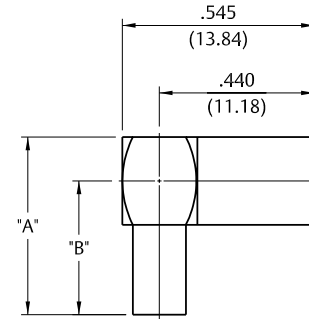
# Flexible Cable

## Right Angle Crimp Type Plug – Captivated Contact



Cable Type	Gold Plated	Nickel Plated	"A"	"B"
RG-179, 187	131-8403-101	131-8403-106	.505 (12.83)	.380 (9.65)
RG-179 DS, RG-187 DS	131-8404-101	131-8404-106	.505 (12.83)	.380 (9.65)
Belden 735A	131-8445-101	131-8445-106	.750 (19.05)	.625 (15.88)

Assembly instructions page 238.

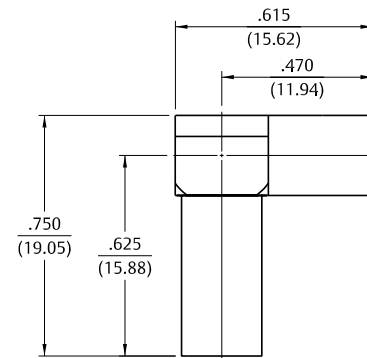


## Right Angle Crimp Type Plug – Captivated Contact



Cable Type	Gold Plated	Nickel Plated
RG-59	131-8409-101	131-8409-106

Assembly instructions page 238.

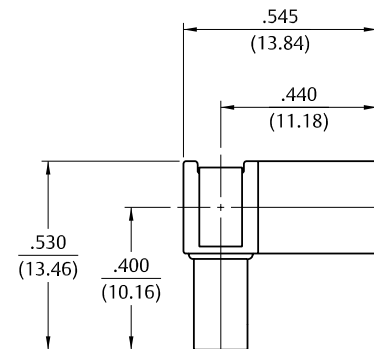


## Right Angle Crimp Type Plug – Captivated Contact – Die Cast



Cable Type	Gold Plated	Nickel Plated
RG-179, 187	131-8403-111	131-8403-116
RG-179 DS, RG-187DS	131-8404-111	131-8404-116

Assembly instructions page 238.



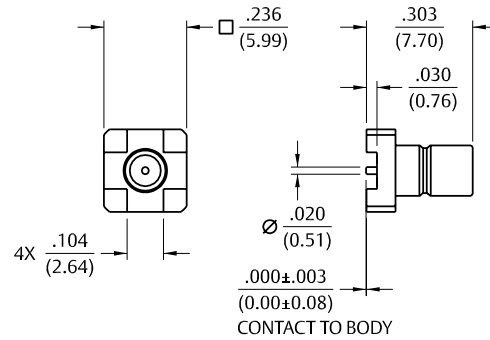
# PC Mount

## Straight Jack Receptacle – Surface Mount



Gold Plated	Packaging
131-8711-201	Stock
131-8711-202	Tape and Reel 750 pcs/reel

Mounting hole layout figure 11 page 194.

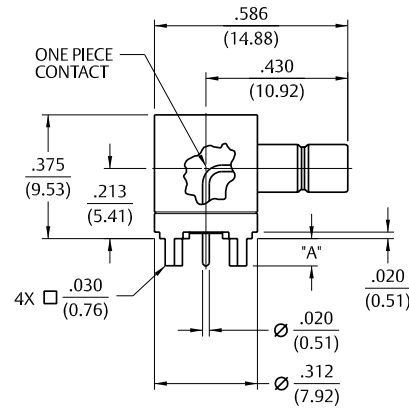


## Right Angle Jack Receptacle



Gold Plated	Nickel Plated	"A"
131-8701-301	131-8701-306	.083
131-8701-311	131-8701-316	.125

Mounting hole layout figure 7 page 194.

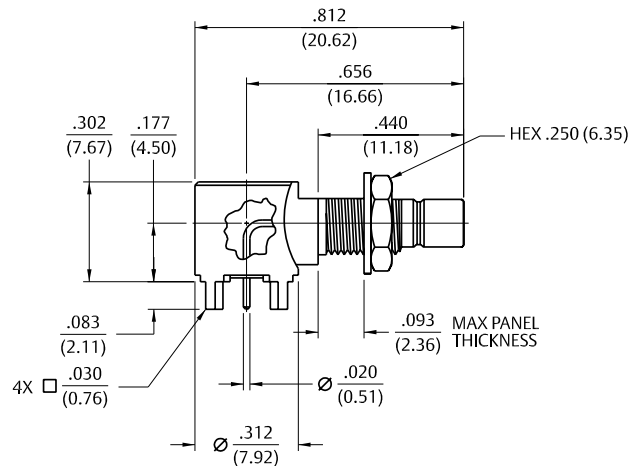


## Right Angle Bulkhead Jack Receptacle



Gold Plated	Nickel Plated
131-8701-501	131-8701-506

Mounting hole layout figures 5 and 7 page 194.





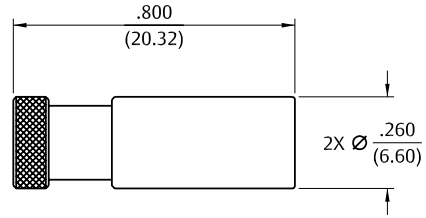
# Terminations

## Plug Precision Load



Gold Plated

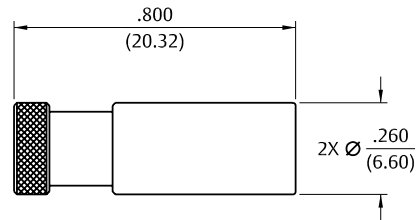
131-8801-801



## Matched Plug Open and Short



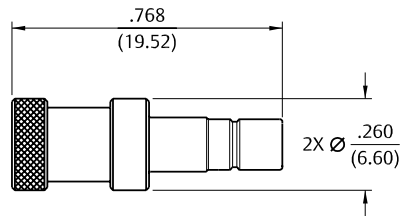
Type	Gold Plated
OPEN	131-8801-821
SHORT	131-8801-811



## Matched Jack Open and Short



Type	Gold Plated
OPEN	131-8701-821
SHORT	131-8701-811



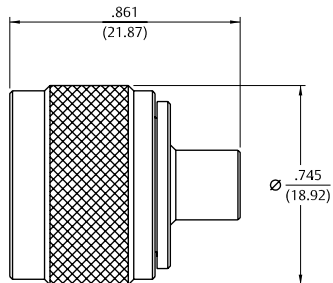
# Between-Series Adapter

## 75 Ohm Type N Plug to Mini-75 Ohm SMB Plug Adapter



Stainless Steel Passivated

134-1069-001

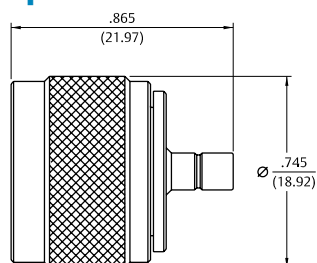


## 75 Ohm Type N Plug to Mini-75 Ohm SMB Jack Adapter



Stainless Steel Passivated

134-1069-011

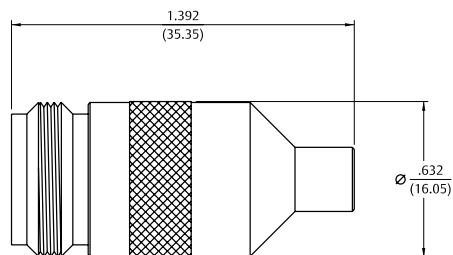


## 75 Ohm Type N Jack to Mini-75 SMB Plug Adapter



Stainless Steel Passivated

134-1069-021

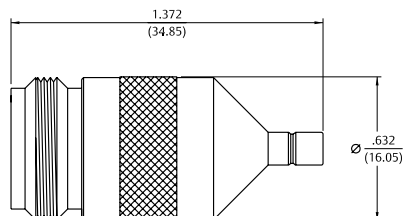


## 75 Ohm Type N Plug to Mini-75 Ohm SMB Jack Adapter



Stainless Steel Passivated

134-1069-031



# Specifications

## Electrical Specifications

**Impedance:** 50 Ohms

**Frequency Range:** ..... 0-10 GHz

**VSWR:** (max) (f = GHz)

	Straight Cabled Connectors	Right Angle Cabled Connectors
RG-178.....	1.25 + .04f	1.40 + .06f
RG-316 and RG-405.....	1.20 + .04f	1.30 + .04f
Uncabled receptacles.....	N/A	

**Working Voltage:** (VRMS max)†

	Sea Level	70K Feet
RG-178.....	.250	.60
RG-316, RG-405 uncabled receptacles.....	.335	.85

**Dielectric Withstanding Voltage:** (VRMS min at sea level)†

RG-178.....	750
RG-316, RG-405 uncabled receptacles.....	1000

**Corona Level:** (Volts min at 70,000 feet)†

RG-178.....	185
RG-316, RG-405.....	250
Uncabled receptacles.....	N/A

**Insertion Loss:** (dB max, tested at 4 GHz)

Straight cabled connectors.....	0.25 dB
Right angle cabled connectors.....	0.50 dB
Uncabled receptacles.....	N/A

**Insulation Resistance:** 1000 megohms min

**Contact Resistance:** (milliohms max)

	Initial	After Environmental
Center contact (straight cabled connectors and uncabled receptacles).....	6.0	8.0
Center contact (right angle cabled connectors).....	12.0	16.0
Outer contact (gold plated connectors).....	1.0	N/A
Outer contact (nickel plated connectors).....	2.5	N/A
Braid to body (gold plated connectors).....	1.0	N/A
Braid to body (nickel plated connectors).....	2.5	N/A

**RF Leakage:** (dB min tested at 2.5 GHz)

Cabled connectors.....	-55 dB
Uncabled receptacles.....	N/A

**RF High Potential Withstanding Voltage:** (VRMS min, tested at 4 and 7 MHz)†

RG-178.....	500
RG-316.....	700
Uncabled receptacles.....	600

## Mechanical Specifications

**Engagement Design:** MIL-STD-348, Series SMC

**Engagement/Disengagement Force:** 16 oz-in max torque

**Mating Torque:** 35 to 50 oz-in

**Coupling Proof Torque:** 100 oz-in min

**Coupling Nut Retention:** 35 lbs min

**Contact Retention:** 4 lbs min axial force (captivated contacts)

1 oz-in min torque (uncabled receptacles)

**Cable Retention:**

	Axial Force* (lbs)	Torque (oz-in)
RG-178.....	10	N/A
RG-316.....	20	N/A
RG-405.....	30	16

\* or cable breaking strength whichever is less

**Durability:** 500 cycles min

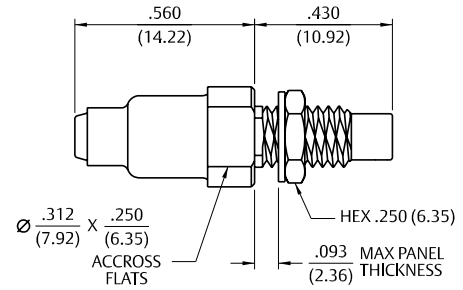
# Semi-Rigid and Flexible Cable

## Straight Solder Type Bulkhead Jack – Captivated Contact



Cable Type	Gold Plated	Nickel Plated
RG-405	131-6593-401	131-6593-406

Assembly instructions page 233.  
Mounting hole layout figure 5 page 194.

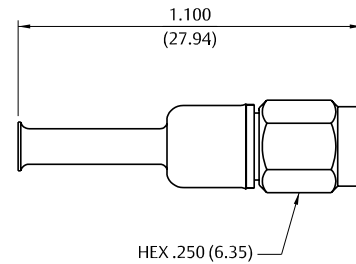


## Straight Crimp Type Plug – Captivated Contact



Cable Type	Gold Plated	Nickel Plated
RG-161, 174, 188, 316	131-6403-001	131-6403-006
RG-316 DS, 188 DS	131-6404-001	131-6404-006
RG-179, 187	131-6433-001	131-6433-006

Assembly instructions page 237.

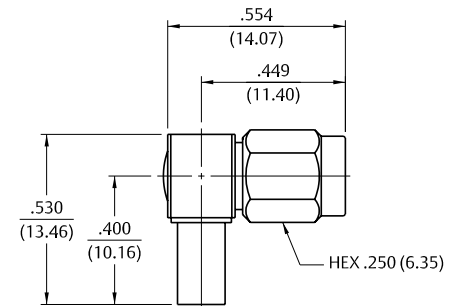


## Right Angle Crimp Type Plug – Captivated Contact



Cable Type	Gold Plated	Nickel Plated
RG-161, 174, 188, 316	131-6403-101	131-6403-106
RG-316 DS, 188 DS	131-6404-101	131-6404-106
RG-179, 187	131-6433-101	131-6433-106

Assembly instructions page 238.

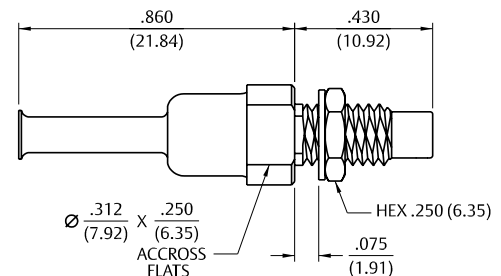


## Straight Crimp Type Bulkhead Jack – Captivated Contact



Cable Type	Gold Plated	Nickel Plated
RG-161, 174, 188, 316	131-6303-401	131-6303-406
RG-316 DS, 188 DS	131-6304-401	131-6304-406
RG-179, 187	131-6333-401	131-6333-406

Assembly instructions page 237.  
Mounting hole layout figure 5 page 194.

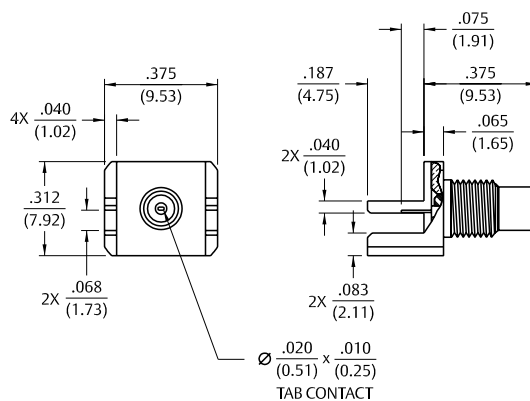


# PC Mount and Bulkhead Mount

## End Launch Jack Receptacle – Tab Contact



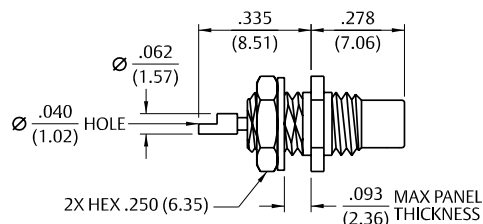
Gold Plated	Nickel Plated	Board Thickness
131-6701-831	131-6701-836	.062 (1.57)



## Front Mount Bulkhead Jack Receptacle



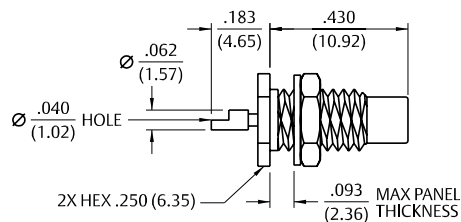
Gold Plated	Nickel Plated
131-6701-411	131-6701-416



## Rear Mount Bulkhead Jack Receptacle



Gold Plated	Nickel Plated
131-6701-401	131-6701-406



Mounting hole layout figure 5 page 194.

# Introduction

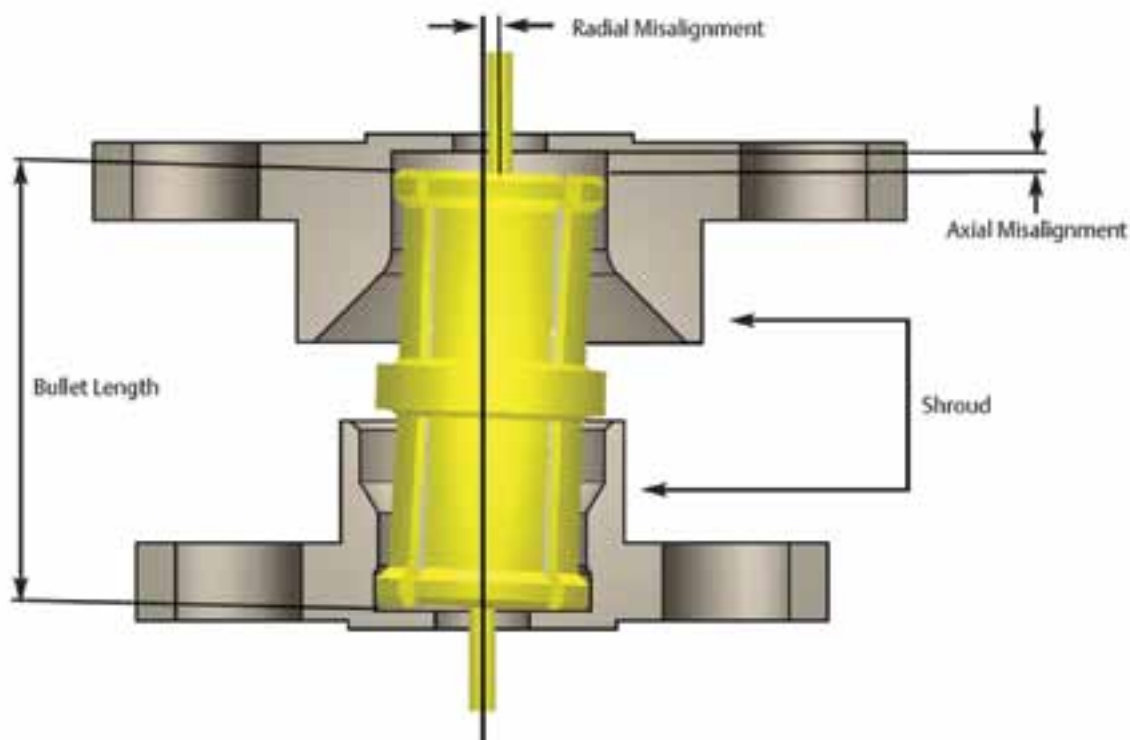
## Description

One of the key benefits of the SMP connector interface is its use in high frequency blind-mate applications. The design of the SMP bullet and shroud system allows for both axial and radial misalignment. The basic system is comprised of an inner “bullet” adapter, and two outer receptacles called “shrouds”. The bullet provides a flexible link between the shroud connections.

In blind-mate applications, one shroud connector will be typically specified as a snap-on interface and the other as a slide-on. This ensures that the bullet adapter remains fixed in the same shroud connector when the connection is disengaged.

The two snap-on interfaces Full Detent (FD) and Limited Detent (LD) each have different engage and disengage coupling forces. The LD is typically selected as the snap-on interface in PCB mount or blind-mate applications, while the FD is mainly used for cabled connections where higher retention forces are required.

The two slide-on interfaces Smooth Bore (SB) and Catcher’s Mitt (CM) allow for reduced connection forces as compared to the snap-on versions. The push-on interface creates a sliding connection that does not physically locate the mating reference planes, allowing for axial and radial misalignment. Both the SB and CM have the same engage/disengage forces; however the CM is typically specified as the shroud configuration in blind-mate applications as its generous lead-in chamfer helps capture and guide the bullet into place.



# Specifications

## Environmental Ratings

(Meets or exceeds the applicable paragraph of MIL-PRF-39012)

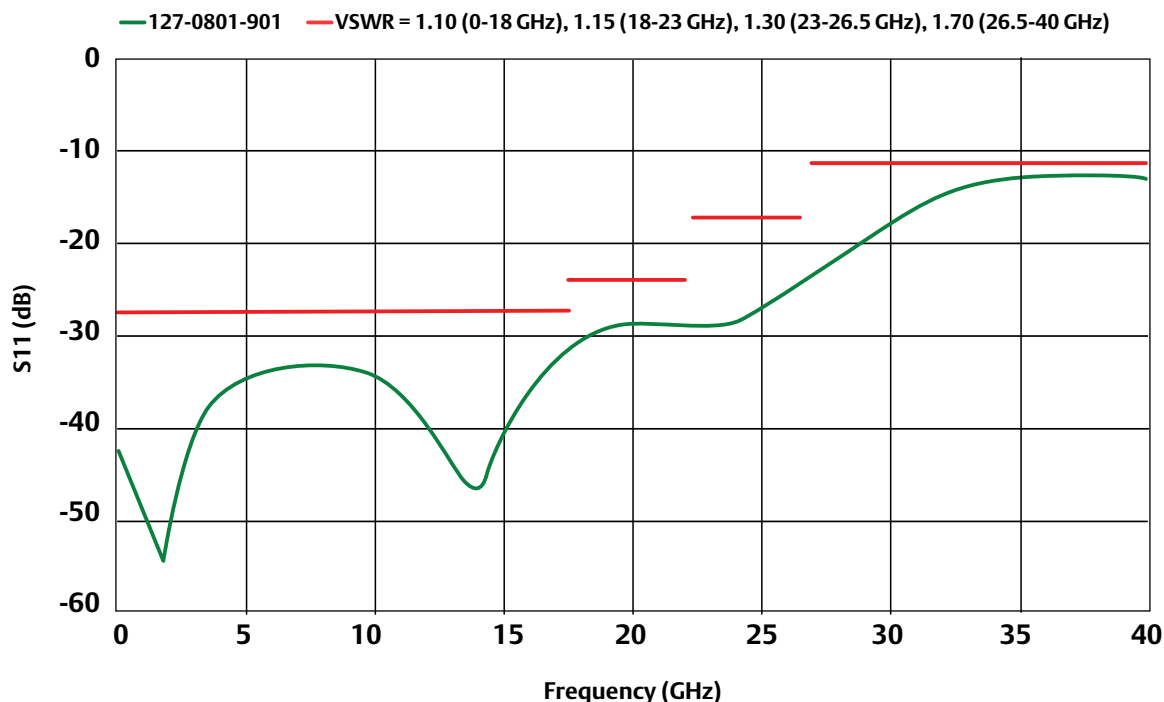
<b>Operating Temperature:</b>	-65°C to +165°C
<b>Thermal Shock:</b>	MIL-STD-202, Method 107, Condition B (except high temp +165°C or max high temp of cable)
<b>Corrosion:</b>	MIL-STD-202, Method 101, Condition B
<b>Shock (specified pulse):</b>	MIL-STD-202, Method 213, Condition I
<b>Vibration:</b>	MIL-STD-202, Method 204, Condition D
<b>Moisture Resistance:</b>	MIL-STD-202, Method 106 (except step 7b omitted)

## Material Specifications

<b>Spring Finger (female) and End Launch (male) Bodies:</b>	Beryllium Copper per ASTM B196, Gold plated* per MIL-DTL-45204 (.00005" min)
<b>Hermetic Seal Bodies (male):</b>	Kovar Alloy per ASTM F15, Gold plated* per MIL-DTL-45204 (.00005" min)
<b>All other Shroud Bodies (male):</b>	Stainless Steel, Type 303, per ASTM A582, Passivated per MIL-DTL-14072 (EL 300)
<b>Connector and Adapter Contacts (male and female):</b>	Beryllium Copper per ASTM B196, Gold plated* per MIL-DTL-45204 (.00005" min)
<b>Hermetic Seal Center Pins:</b>	Kovar Alloy per ASTM F15, Gold plated* per MIL-DTL-45204 (.00005" min)
<b>EMI/Anti-Rock Rings:</b>	Beryllium Copper per ASTM B196, Gold plated* per MIL-DTL-45204 (.00003" min)
<b>PC Mount Legs:</b>	Brass per ASTM B16, Gold plated* per MIL-DTL-45204 (.00003" min)
<b>Connector and Adapter Insulators:</b>	PTFE per ASTM D1710
<b>Hermetic Seal Glass:</b>	Corning 7070

\* All Gold plated parts include a .00005" minimum Nickel barrier layer

### Typical Measured Return Loss Bullet Adapter 127-0901-801



# Semi-Rigid Cable and PC Mount

## Female Straight Cabled, Semi-Rigid

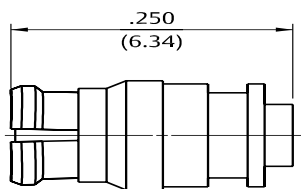


Fig 1

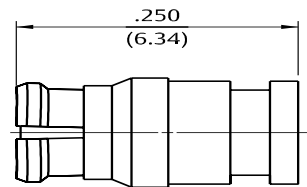
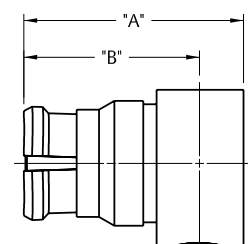
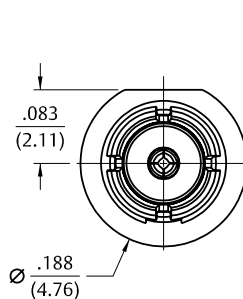


Fig 2

Cable Type	Gold Plated	Figure
M17/151	127-0692-001	1
RG-405	127-0693-001	2

\* Specifications dependant on cable ratings.

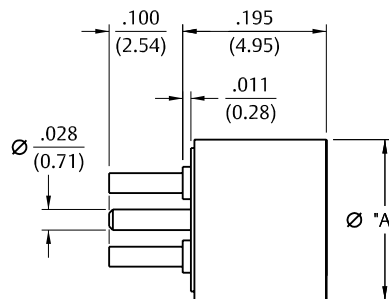
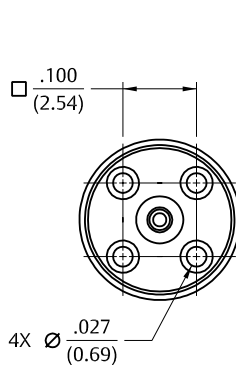
## Right Angle Cabled Female



Cable Type	Gold Plated	"A"	"B"
M17/151	127-0692-101	.248 (6.30)	.197 (5.00)
RG-405	127-0693-101	.271 (6.88)	.209 (5.31)

\* Specifications dependant on cable ratings.

## Straight PC Mount Male Receptacle



Interface	Passivated	"A"
Full Detent	127-0701-201	.218 (5.54)
Limited Detent	127-1701-201	.218 (5.54)
Smooth Bore	127-2701-201	.218 (5.54)
Catcher's Mitt	127-3701-201	.234 (5.94)

Base and legs gold plated brass.

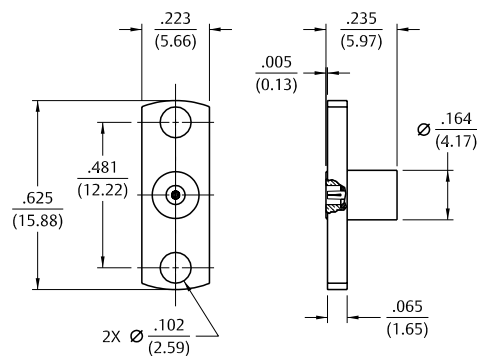


# Panel Mount and Adapters

## 2-Hole Flange Mount Male Field Replaceable



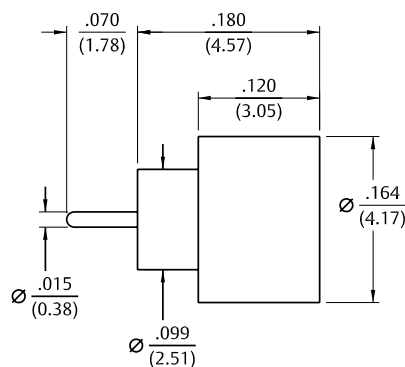
Interface	Passivated	Pin Size
Full Detent	127-0701-612	.012 (.030)
Limited Detent	127-1701-612	.012 (.030)
Smooth Bore	127-2701-612	.012 (.030)



## Hermetic Seal Male



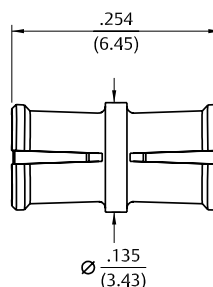
Interface	Gold Plated
Full Detent	127-0711-601
Limited Detent	127-1711-601
Smooth Bore	127-2711-601



## Female to Female Bullet Adapter



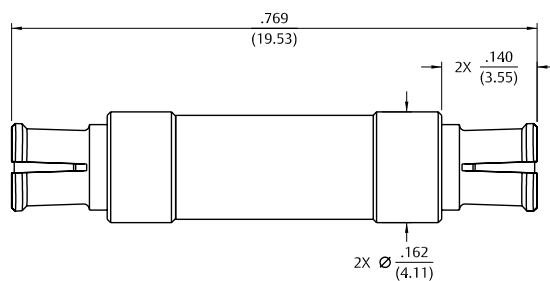
Gold Plated
127-0901-801



## Female to Female Adapter



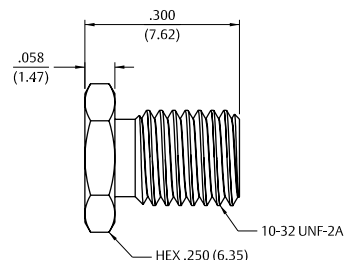
Gold Plated
127-0901-811



## Male to Male Catcher's Mitt Adapter



Interface	Passivated
Full Detent	127-0901-821
Limited Detent	127-1901-821
Smooth Bore	127-2901-821



# Specifications

## Electrical Specifications

**Impedance:** 50 Ohms

**Frequency Range:**

Flexible Cabled Connectors and Receptacles .....	0-11 GHz
Semi-rigid Cabled Connectors and Receptacles .....	0-18 GHz

<b>VSWR:</b> max (f-GHz).....	0-11 GHz
Straight Flexible Cabled Connectors.....	1.30 max

	<u>0-9 GHz</u>	<u>9-11 GHz</u>
Right Angle Flexible Cabled	1.35 max	1.50 max
	<u>0-11 GHz</u>	<u>11-18 GHz</u>
RG-405 Semi-Rigid Plugs.....	1.07+.01f	<1.25 Typical
RG-402 Semi-Rigid Plugs.....	1.05+.01f	<1.25 Typical
RG-401 Semi-Rigid Plugs.....	1.06+.01f	<1.25 Typical
RG-405 Semi-Rigid Jacks .....	1.15+.02f	<1.50 Typical
RG-402 Semi-Rigid Jacks .....	1.10+.02f	<1.50 Typical
RG-401 Semi-Rigid Jacks .....	1.10+.02f	<1.50 Typical

Adapters.....	1.05+.01f
Uncabled Receptacles .....	N/A

<b>Working Voltage:</b> (VRMS max)†	<u>Sea Level</u>	<u>70K Feet</u>
RG-316, 316 DS .....	250	65
RG-58, 142, 405 .....	335	85
RG-402 .....	500	125
RG-213, 214, 401, LMR-400.....	1000	250
Uncabled Receptacles and Adapters .....	1000	250

<b>Dielectric Withstanding Voltage:</b> (VRMS min at sea level)†	
RG-316, 316 DS.....	750
RG-58, 142, 405 .....	1000
RG-402 .....	1500
RG-213, 214, 401, LMR-400.....	2500
Uncabled Receptacles and Adapters.....	2500

**Insulation Resistance:** 5000 Megohms min

**Contact Resistance:** (milliohms max)

Center Contact	<u>Initial</u>	<u>After Environmental</u>
Straight Cabled Connectors (non-captivated).....	1.0	1.5
Straight Cabled Connectors (captivated) .....	2.5	3.0
Right Angle Cabled Connectors .....	2.5	3.0
Uncabled Receptacles and Adapters.....	1.0	1.5
Outer Contact .....	0.2	N/A
Braid to Body (Flexible Cabled Connectors Only) .....	0.05	N/A

**Corona Level:** (Volts min at 70K feet)†

RG-316, 316 DS.....	190
RG-58, 142, 405 .....	250
RG-402 .....	375
RG-213, 214, 401, LMR-400 and Adapters .....	500
Uncabled Receptacles .....	N/A

**Insertion Loss:** (dB max, tested at 9 GHz)

Straight Flexible Cabled Connectors .....	0.15 max
Right Angle Flexible Cabled Connectors.....	0.30
Semi-rigid Cabled Connectors and Adapters .....	$0.05\sqrt{f(\text{GHz})}$
Uncabled Receptacles .....	N/A

**RF Leakage:** (dB min, tested at 2.5 GHz)

Cabled Connectors and Adapters .....	-90
Uncabled Receptacles .....	N/A

**RF High Potential Withstanding Voltage:** (Vrms min, tested at 4 and 7 MHz)†

RG-316, 316 DS .....	500
RG-58, 142, 405 .....	670
RG-402 .....	1000
RG-213, 214, 401, LMR-400 .....	1500
Uncabled Receptacles and Adapters .....	1500

**IMP3:** Typically <-90 dBm (tested per IEC Guidelines using 20W inputs swept over 1930-1990 MHz)

† Avoid user injury due to misapplication. See safety advisory definitions inside front cover.

# Specifications

## Environmental Specifications

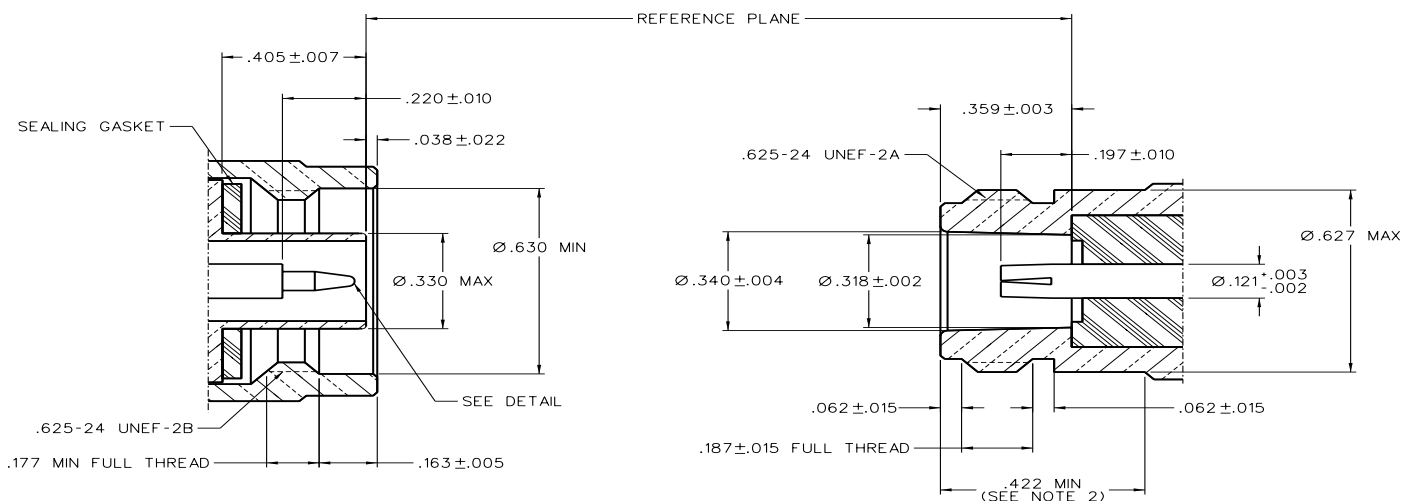
(Meets or Exceeds the Applicable Paragraph of MIL-PRF-39012)

<b>Temperature Range:</b>	-65°C to +165°C
<b>Thermal Shock:</b>	MIL-STD-202, Method 107, Condition B (except +85°C high temperature)
<b>Corrosion:</b>	MIL-STD-202, Method 101, Condition B
<b>Shock:</b>	MIL-STD-202, Method 213, Condition I
<b>Vibration:</b>	MIL-STD-202, Method 204, Condition B
<b>Moisture Resistance:</b>	MIL-STD-202, Method 106

## Material Specifications

<b>Bodies:</b>	Crimp – Brass per ASTM B16, Tri-Alloy (Cu/Sn/Zn) plated (.0001" min) Solder – Brass per ASTM B16, Gold plated* per SAE-AMS2423 (.00001" min) Adapter – Brass per ASTM B16, Tri-Alloy (Cu/Sn/Zn) or Nickel per QQ-N-290 plated (.0001" min)
<b>Contacts:</b>	Male – Brass per ASTM B16, Gold plated* per MIL-G-45204 (.00005" min) Female – Beryllium Copper per ASTM B196, Gold plated* per MIL-DTL-45204 (.00005" min) Adapter – Beryllium Copper per ASTM B196, Gold plated* per MIL-DTL-45204 (.00005" min)
<b>Insulators:</b>	PTFE Fluorocarbon per ASTM D1710 and ASTM D1457
<b>Gaskets:</b>	Silicon Rubber per A-A-59588A
<b>Crimp Sleeves:</b>	Copper per ASTM B301, Tri-Alloy (Cu/Sn/Zn) plated (.0001" min)
<b>End Caps:</b>	Brass per ASTM B16, Tri-Alloy (Cu/Sn/Zn) plated (.0001" min)
<b>Nut Retention Spring (Plugs):</b>	Beryllium Copper per ASTM B196, un-plated
<b>Mounting Nut (Bulkhead Jacks):</b>	Brass per ASTM B16, Nickel plated per SAE-AMS2423 (.0001" min)
<b>Lock Washer (Bulkhead Jacks):</b>	Steel, Zinc plated (.0001" min)

\* All Gold plated parts include a .00005" minimum Nickel under plated barrier layer



### NOTES:

1. THIS INTERFACE SHALL MEET THE GAUGE REQUIREMENTS AS SPECIFIED IN MIL-PRF-39012/1G AND /2G.
2. CLEARANCE FOR MATING CONNECTOR COUPLING NUT.

# Flexible Cable

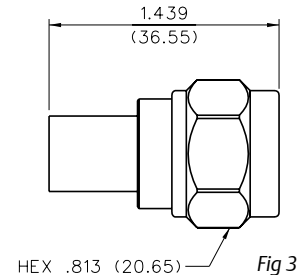
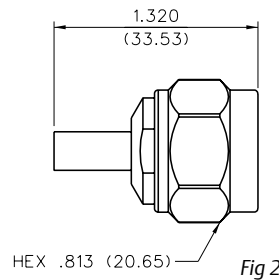
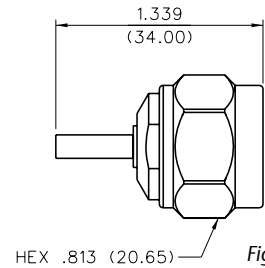
## Straight Crimp Type Plug – Solder or Crimp Contact



Cable Type	Tri-Alloy Plated	Figure
RG-161, 174, 188, 316	138-4403-007	1
RG-188 DS, RG-316 DS	138-4404-007	1
RG-58, 141, 303	138-4407-007	2
RG-55, 142, 223, 400	138-4408-007	2
RG-8, 213	138-4416-007	3
RG-9, 214	138-4418-007	3
LMR-400, BELDEN 9913	138-4449-007	3

Assembly instructions page 242 and 243.

\* Tri-Alloy plated coupling nut



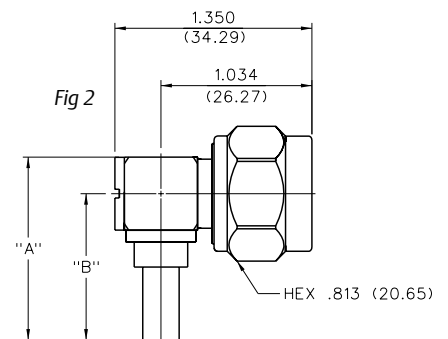
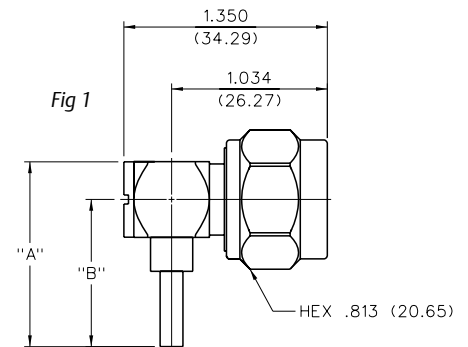
## Right Angle Crimp Type Plug – Captivated Contact



Cable Type	Tri-Alloy Plated	Figure	"A"	"B"
RG-161, 174, 188, 316	138-4403-107	1	1.227 (31.17)	0.977 (24.82)
RG-188 DS, RG-316 DS	138-4404-107	1	1.227 (31.17)	0.977 (24.82)
RG-58, 141, 303	138-4407-107	2	1.253 (31.83)	1.003 (25.48)
RG-55, 142, 223, 400	138-4408-107	2	1.253 (31.83)	1.003 (25.48)
RG-8, 213	138-4416-107	2	1.365 (34.67)	1.115 (28.32)
RG-9, 214	138-4418-107	2	1.365 (34.67)	1.115 (28.32)

Assembly instructions page 244 and 245.

\* Tri-Alloy plated coupling nut



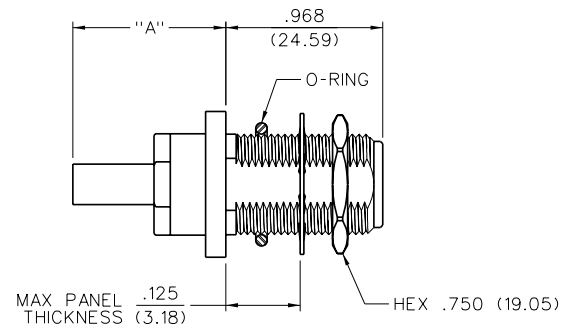
## Straight Crimp Type Bulkhead Jack – Solder or Crimp Contact



Cable Type	Tri-Alloy Plated	"A"
RG-161, 174, 188, 316	138-4303-407	.943 (23.95)
RG-188 DS, RG-316 DS	138-4304-407	.943 (23.95)
RG-58, 141, 303	138-4307-407	.943 (23.95)
RG-55, 142, 223, 400	138-4308-407	.943 (23.95)
RG-8, 213	138-4316-407	.997 (25.32)
RG-9, 214	138-4318-407	.997 (25.32)
LMR-400, BELDEN 9913	138-4349-407	.997 (25.32)

Assembly instructions page 248 and 251.

Mounting hole layout figure 9 page 194.



# In-Series Adapters

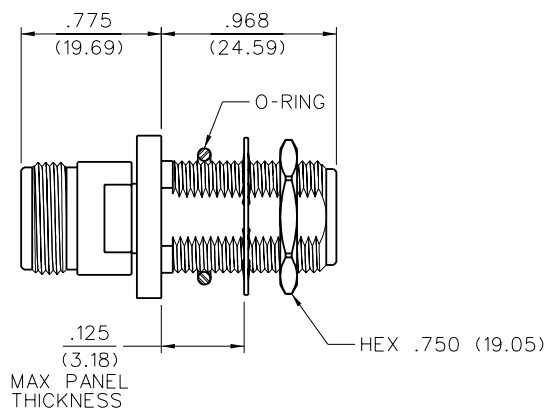
## Jack to Bulkhead Jack Adapter



Tri-Alloy Plated

138-4901-407

Mounting hole layout figure 1 page 194.

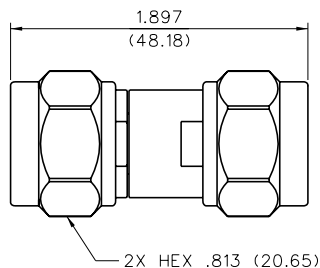


## Plug to Plug Adapter



Tri-Alloy Plated

138-4901-817



# Specifications

## Electrical Specifications

<b>Engagement Design:</b>	Impedance: 29 ohms
<b>Frequency Range:</b>	0 - 2 GHz
<b>Working Voltage:</b>	300 VRMS†
<b>Dielectric Withstanding Voltage:</b>	2000 VDC†
<b>Contact Resistance:</b>	Center Contact: 6 milliohms Outer conductor: 2.5 milliohms

## Mechanical Specifications

<b>Insertion Force:</b>	Inner conductor: 32 oz. max. 2 oz. min. Outer conductor: 48 oz. max. 6 oz. min.
<b>Durability:</b>	250 cycles

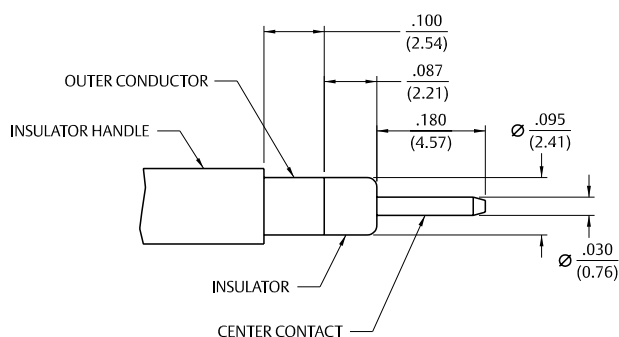
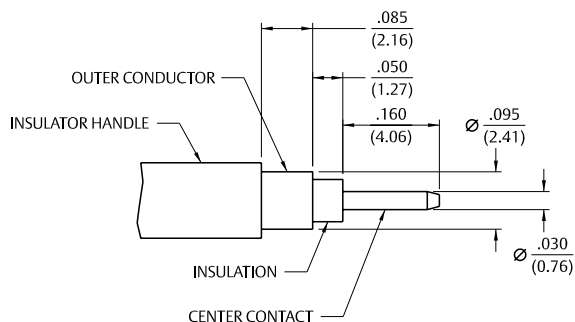
## Environmental Ratings

<b>Temperature Range:</b>	-65° C to + 85° C
<b>Corrosion:</b>	Salt spray, 24 hours
<b>Shock:</b>	Method 213, Test Condition B, MIL-STD-202
<b>Vibration:</b>	Method 204, Test Condition B, MIL-STD-202

## Material Specifications

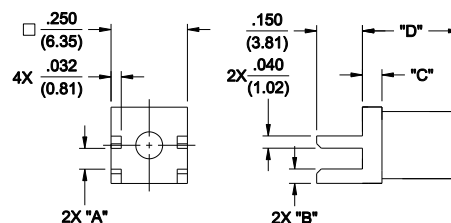
<b>Contact:</b>	Beryllium copper per QQ-C-533/530
<b>Insulator Material:</b>	TFE Fluorocarbon per L-P-403
<b>Finish:</b>	Center Contact and Body: Gold

SHIELDED TEST JACK INTERFACE -  
TYPICAL PROBE TYPE



# Flexible Cable & PC Mount

## Flexible Cable – Straight Crimp Type End Launch



Cable Type	Gold Plated	Board Thickness	"A"	"B"	"C"	"D"
RG-316/U, 188, 174, 161, 179, 187	142-0003-801	0.062 (1.57)	0.068 (1.73)	0.046 (1.02)	0.055 (1.40)	0.310 (7.87)
RG-316 DS, 188 DS, 179 DS, 187 DS	142-0004-801	0.062 (1.57)	0.068 (1.73)	0.046 (1.02)	0.065 (1.65)	0.320 (8.13)
RG-58/U, 141, 303	142-0007-801	0.062 (1.57)	0.068 (1.73)	0.037 (1.65)	0.065 (1.65)	0.320 (8.13)
RG-142/U, 55, 223, 400	142-0008-801	0.062 (1.57)	0.068 (1.73)	0.037 (1.65)	0.065 (1.65)	0.320 (8.13)
RG-178/U, 196	142-0002-811	0.047 (1.19)	0.053 (1.35)	0.065 (1.65)	0.065 (1.65)	0.320 (8.13)
RG-316/U, 188, 174, 161, 179, 187	142-0003-811	0.047 (1.19)	0.053 (1.35)	0.061 (1.55)	0.065 (1.65)	0.320 (8.13)
RG-316 DS, 188 DS, 179 DS, 187 DS	142-0004-811	0.047 (1.19)	0.053 (1.35)	0.061 (1.55)	0.065 (1.65)	0.320 (8.13)
RG-58/U, 141, 303	142-0007-811	0.047 (1.19)	0.053 (1.35)	0.052 (1.32)	0.065 (1.65)	0.320 (8.13)
RG-142/U, 55, 223, 400	142-0008-811	0.047 (1.19)	0.053 (1.35)	0.052 (1.32)	0.065 (1.65)	0.320 (8.13)

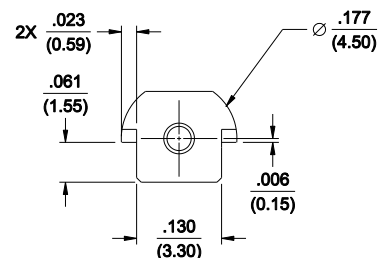
Assembly instructions page 253.

## Flexible Cable – Straight Crimp Type Surface Mount End Launch



Cable Type	Gold Plated
RG-178/U, 196	142-0002-821

Recommended land pattern figure 12 page 194.  
Assembly instructions page 254.



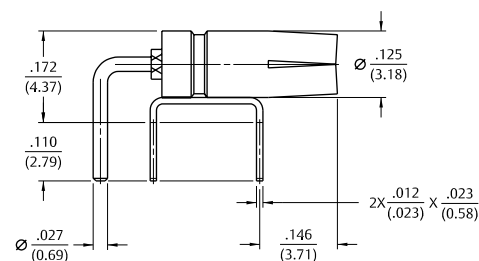
## Horizontal



Gold Plated

129-0701-302

Mounting hole layout figure 15 page 195.



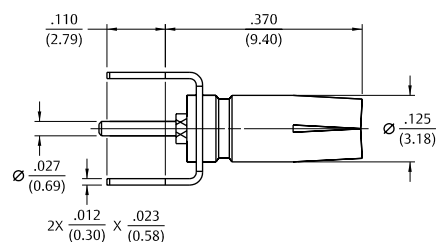
## Vertical



Gold Plated

129-0701-202

Mounting hole layout figure 16 page 195.



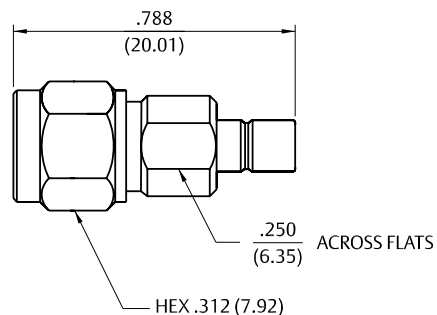
# SMA to SMB

## SMA Plug to SMB Jack Adapter



Gold Plated

134-1012-011

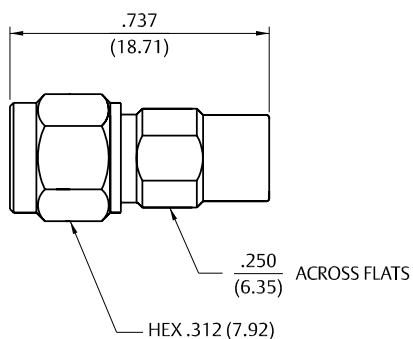


## SMA Plug to SMB Plug Adapter



Gold Plated

134-1012-021

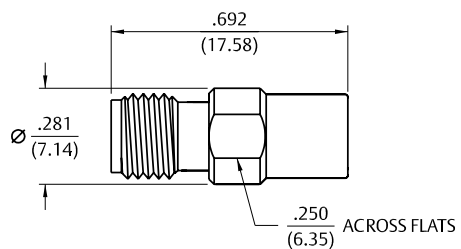


## SMA Jack to SMB Plug Adapter



Gold Plated

134-1012-041





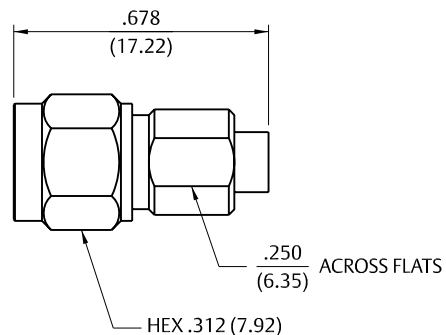
# SMA to MMCX

## SMA Plug to MMCX Jack Adapter



Gold Plated

134-1019-151

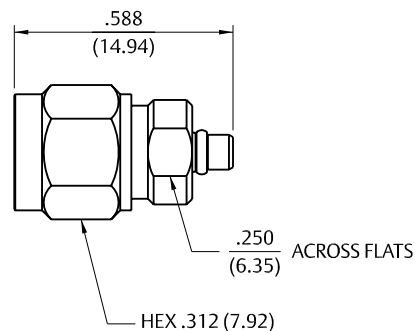


## SMA Plug to MMCX Plug Adapter



Gold Plated

134-1019-161

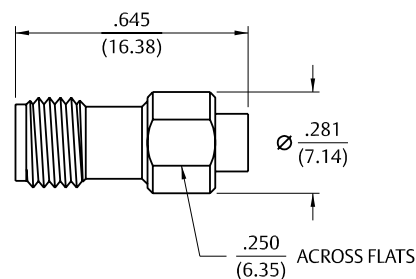


## SMA Jack to MMCX Jack Adapter



Gold Plated

134-1019-171

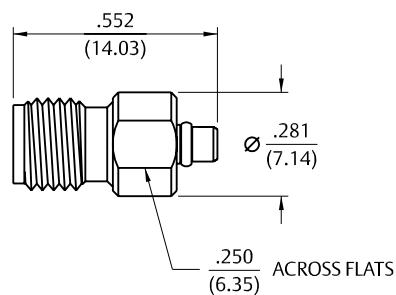


## SMA Jack to MMCX Plug Adapter



Gold Plated

134-1019-181

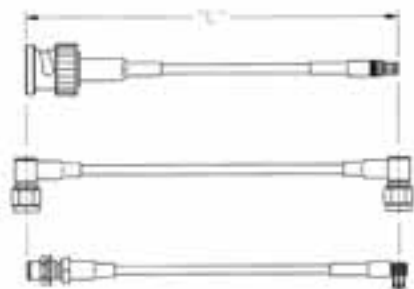


# Specifications

## Electrical Ratings

Electrical ratings of a cable assembly are determined by the limiting connector type and cable size.

Connector	Cable	Connector Impedance (Ohms)	Frequency (GHz)	Dielectric With-standing Voltage (VRMS)	Working Voltage (VRMS)
MMCX	RG-178	50	6	500 Vms	170 Vms
	RG-316	50	6	500 Vms	170 Vms
MCX	RG-178	50	6	750 Vms	250 Vms
	RG-316	50	6	1000 Vms	335 Vms
	RG-316DS	50	6	1000 Vms	335 Vms
MCX 75 Ohm	RG-179	75	6	1000 Vms	335 Vms
	BELDEN 735A	75	6	1000 Vms	335 Vms
SMA	RG-178	50	12.4	500 Vms	170 Vms
	RG-316	50	12.4	750 Vms	250 Vms
	RG-316DS	50	12.4	750 Vms	250 Vms
	RG-58	50	12.4	1000 Vms	335 Vms
	RG-142	50	12.4	1000 Vms	335 Vms
	Hand-Formable .086	50	26.5	1000 Vms	335 Vms
	Hand-Formable .141	50	26.5	1500 Vms	500 Vms
SMB	RG-178	50	4	750 Vms	250 Vms
	RG-316	50	4	1000 Vms	335 Vms
SMB Mini 75 Ohm	RG-179	75	2	1000 Vms	335 Vms
	RG-179DS	75	2	1000 Vms	335 Vms
	BELDEN 735A	75	2	1000 Vms	335 Vms
BNC	RG-58	50	4	1500 Vms	500 Vms
	BELDEN 8218	50	4	1500 Vms	500 Vms
	RG-59	50	4	1500 Vms	500 Vms
	RG-59 PLENUM	50	4	1500 Vms	500 Vms
BNC 75 Ohm	BELDEN 8218	75	3	1500 Vms	500 Vms
	RG-59	75	3	1500 Vms	500 Vms
	BELDEN 8281	75	3	1500 Vms	500 Vms
	COMM SCOPE 735	75	3	1500 Vms	500 Vms
	BELDEN 735A	75	3	1500 Vms	500 Vms
	BELDEN 734A	75	3	1500 Vms	500 Vms
	BELDEN 1694A	75	3	1500 Vms	500 Vms
N	RG-58	50	11	1500 Vms	500 Vms
	RG-142	50	11	1500 Vms	500 Vms
	RG-8	50	11	1500 Vms	500 Vms
	RG-213	50	11	1500 Vms	500 Vms



Emerson Connectivity Solutions cable length applies to the end of straight connectors. The length is applied to the vertical centroid of right angle connectors.

## MCX Straight Plug to MCX Straight Plug



Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0014-006	RG -178	6"	133-3402-021	133-3402-021
415-0014-012	RG -176	12"	133-3402-021	133-3402-021
415-0014-018	RG -178	18"	133-3402-021	133-3402-021
415-0014-024	RG -178	24"	133-3402-021	133-3402-021
415-0014-030	RG -178	30"	133-3402-021	133-3402-021
415-0014-036	RG -178	36"	133-3402-021	133-3402-021
415-0018-006	RG -316	6"	133-3403-001	133-3403-001
415-0018-012	RG -316	12"	133-3403-001	133-3403-001
415-0018-018	RG -316	18"	133-3403-001	133-3403-001

Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0018-024	RG -316	24"	133-3403-001	133-3403-001
415-0018-030	RG -316	30"	133-3403-001	133-3403-001
415-0018-036	RG -316	36"	133-3403-001	133-3403-001
415-0020-006	RG -316	6"	133-3404-001	133-3404-001
415-0020-012	RG-316DS	12"	133-3404-001	133-3404-001
415-0020-018	RG-316DS	18"	133-3404-001	133-3404-001
415-0020-024	RG-316DS	24"	133-3404-001	133-3404-001
415-0020-030	RG-316DS	30"	133-3404-001	133-3404-001
415-0020-036	RG-316DS	36"	133-3404-001	133-3404-001

## MCX Straight Plug to MCX Straight Bulkhead Jack



Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0016-006	RG -316	6"	133-3403-001	133-3303-401
415-0016-012	RG -316	12"	133-3403-001	133-3303-401
415-0016-018	RG -316	18"	133-3403-001	133-3303-401

Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0016-024	RG -316	24"	133-3403-001	133-3303-401
415-0016-030	RG -316	30"	133-3403-001	133-3303-401
415-0016-036	RG -316	36"	133-3403-001	133-3303-401

## MCX Straight Plug to MCX Right Angle Plug



Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0017-006	RG -316	6"	133-3403-001	133-3403-101
415-0017-012	RG -316	12"	133-3403-001	133-3403-101
415-0017-018	RG -316	18"	133-3403-001	133-3403-101

Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0017-024	RG -316	24"	133-3403-001	133-3403-101
415-0017-030	RG -316	30"	133-3403-001	133-3403-101
415-0017-036	RG -316	36"	133-3403-001	133-3403-101

## MCX Right Angle Plug to MCX Right Angle Plug



Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0015-006	RG -178	6"	133-3402-101	133-3402-101
415-0015-012	RG -178	12"	133-3402-101	133-3402-101
415-0015-018	RG -178	18"	133-3402-101	133-3402-101
415-0015-024	RG -178	24"	133-3402-101	133-3402-101
415-0015-030	RG -178	30"	133-3402-101	133-3402-101
415-0015-036	RG -178	36"	133-3402-101	133-3402-101
415-0012-006	RG -316	6"	133-3403-101	133-3403-101

Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0021-006	RG-316DS	6"	133-3404-101	133-3404-101
415-0021-012	RG-316DS	12"	133-3404-101	133-3404-101
415-0021-018	RG-316DS	18"	133-3404-101	133-3404-101
415-0021-024	RG-316DS	24"	133-3404-101	133-3404-101
415-0021-030	RG-316DS	30"	133-3404-101	133-3404-101
415-0021-036	RG-316DS	36"	133-3404-101	133-3404-101



## Hand Formable SMA Straight Plug to SMA Straight Plug

Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0081-003	Hand Formable .086	3"	142-0693-001	142-0693-001
415-0081-004	Hand Formable .086	4"	142-0693-001	142-0693-001
415-0081-005	Hand Formable .086	5"	142-0693-001	142-0693-001
415-0081-006	Hand Formable .086	6"	142-0693-001	142-0693-001
415-0081-007	Hand Formable .086	7"	142-0693-001	142-0693-001

Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0081-008	Hand Formable .086	8"	142-0693-001	142-0693-001
415-0081-012	Hand Formable .086	12"	142-0693-001	142-0693-001
415-0081-018	Hand Formable .086	18"	142-0693-001	142-0693-001
415-0081-024	Hand Formable .086	24"	142-0693-001	142-0693-001



## Hand Formable SMA Straight Plug to SMA Straight Plug

Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0082-003	Hand Formable .141	3"	142-0694-001	142-0694-001
415-0082-004	Hand Formable .141	4"	142-0694-001	142-0694-001
415-0082-005	Hand Formable .141	5"	142-0694-001	142-0694-001
415-0082-006	Hand Formable .141	6"	142-0694-001	142-0694-001
415-0082-007	Hand Formable .141	7"	142-0694-001	142-0694-001

Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0082-008	Hand Formable .141	8"	142-0694-001	142-0694-001
415-0082-012	Hand Formable .141	12"	142-0694-001	142-0694-001
415-0082-018	Hand Formable .141	18"	142-0694-001	142-0694-001
415-0082-024	Hand Formable .141	24"	142-0694-001	142-0694-001



## SMA Straight Plug to SMA Straight Bulkhead Jack

Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0031-006	RG-316	6"	142-0403-011	142-0303 -411
415-0031-012	RG-316	12"	142-0403-011	142-0303 -411
415-0031-018	RG-316	18"	142-0403-011	142-0303 -411
415-0031-024	RG-316	24"	142-0403-011	142-0303 -411
415-0031-036	RG-316	36"	142-0403-011	142-0303 -411
415-0031-048	RG-316	48"	142-0403-011	142-0303 -411
415-0035-006	RG -316 DS	6"	142-0404-011	142-0304-411
415-0035-012	RG -316 DS	12"	142-0404-011	142-0304-411
415-0035-018	RG -316 DS	18"	142-0404-011	142-0304-411
415-0035-024	RG -316 DS	24"	142-0404-011	142-0304-411
415-0035-036	RG -316 DS	36"	142-0404-011	142-0304-411

Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0035-048	RG-316DS	48"	142-0404-011	142-0304-411
415-0040-012	RG -58	12"	142-0407-011	142-0307-411
415-0040-024	RG -58	24"	142-0407-011	142-0307-411
415-0040-036	RG -58	36"	142-0407-011	142-0307-411
415-0040-048	RG -58	48"	142-0407-011	142-0307-411
415-0040-060	RG-58	60"	142-0407-011	142-0307-411
415-0045-012	RG-142	12"	142-0408-011	142-0308-411
415-0045-024	RG-142	24"	142-0408-011	142-0308-411
415-0045-036	RG-142	36"	142-0408-011	142-0308-411
415-0045-048	RG -142	48"	142-0408-011	142-0308-411
415-0045-060	RG-142	60"	142-0408-011	142-0308-411



## SMA Right Angle Plug to SMA Straight Bulkhead Jack

Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0074-006	RG-316	6"	142-0403-101	142-0303-411
415-0074-012	RG-316	12"	142-0403-101	142-0303-411
415-0074-024	RG-316	24"	142-0403-101	142-0303-411
415-0074-036	RG-316	36"	142-0403-101	142-0303-411
415-0074-048	RG-316	48"	142-0403-101	142-0303-411
415-0064-006	RG-316DS	6"	142-0404-101	142-0304-411
415-0064-012	RG-316DS	12"	142-0404-101	142-0304-411
415-0064-024	RG-316DS	24"	142-0404-101	142-0304-411

Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0064-036	RG-316DS	36"	142-0404-101	142-0304-411
415-0064-048	RG-316DS	48"	142-0404-101	142-0304-411
415-0075-006	RG-142	6"	142-0406-101	142-0306-411
415-0075-012	RG-142	12"	142-0406-101	142-0306-411
415-0075-024	RG-142	24"	142-0406-101	142-0306-411
415-0075-036	RG-142	36"	142-0406-101	142-0306-411
415-0075-048	RG-142	48"	142-0406-101	142-0306-411

## Straight SMA Quick-Connect Plug to Straight SMA Quick-Connect Plug



Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0065-006	RG-316	6"	142-1403-001	142-1403-001
415-0065-012	RG-316	12"	142-1403-001	142-1403-001
415-0065-018	RG-316	18"	142-1403-001	142-1403-001
415-0065-024	RG-316	24"	142-1403-001	142-1403-001
415-0065-036	RG-316	36"	142-1403-001	142-1403-001
415-0065-048	RG-316	48"	142-1403-001	142-1403-001

Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0076-012	RG-316DS	12"	142-1404-001	142-1404-001
415-0076-024	RG-316DS	24"	142-1404-001	142-1404-001
415-0076-036	RG-316DS	36"	142-1404-001	142-1404-001
415-0077-012	RG-142	12"	142-1408-001	142-1408-001
415-0077-024	RG-142	24"	142-1408-001	142-1408-001
415-0077-036	RG-142	36"	142-1408-001	142-1408-001

## Straight SMA Quick-Connect Plug to Straight SMA Plug



Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0078-012	RG-316DS	12"	142-1404-001	142-0404-011
415-0078-024	RG-316DS	24"	142-1404-001	142-0404-011
415-0078-036	RG-316DS	36"	142-1404-001	142-0404-011

Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0079-012	RG-142	12"	142-1408-001	142-0408-011
415-0079-024	RG-142	24"	142-1408-001	142-0408-011
415-0079-036	RG-142	36"	142-1408-001	142-0408-011

## SMB Straight Plug to SMB Straight Plug



Part No.	Cable Type	Cable Length	Connector A	Connector B
413-0003-000	RG-316	6"	131-1403-001	131-1403-001
415-0003-012	RG-316	12"	131-1403-001	131-1403-001
415-0003-018	RG-316	18"	131-1403-001	131-1403-001

Part No.	Cable Type	Cable Length	Connector A	Connector B
413-0003-024	RG-316	24"	131-1403-001	131-1403-001
415-0003-030	RG-316	30"	131-1403-001	131-1403-001
415-0003-036	RG-316	36"	131-1403-001	131-1403-001

## SMB Mini-75 Ohm Straight Plug to SMB Mini-75 Ohm Right Angle Plug



Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0009-006	RG -179	6"	131-8403-111	131-8403-111
415-0009-012	RG -179	12"	131-8403-111	131-8403-111
415-0009-018	RG -179	18"	131-8403-111	131-8403-111
415-0009-024	RG -179	24"	131-8403-111	131-8403-111
415-0009-030	RG -179	30"	131-8403-111	131-8403-111
415-0009-036	RG -179	36"	131-8403-111	131-8403-111
415-0011-006	RG-179 DS	6"	131-8404-111	131-8404-111
415-0011-012	RG-179 DS	12"	131-8404-111	131-8404-111
415-0011-018	RG-179 DS	18"	131-8404-111	131-8404-111

Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0011-024	RG-179 DS	24"	131-8404-111	131-8404-111
415-0011-030	RG-179 DS	30"	131-8404-111	131-8404-111
415-0011-036	RG-179 DS	36"	131-8404-111	131-8404-111
415-0013-006	Belden 735A	6"	131-8445-101	131-8445-101
415-0013-012	Belden 735A	12"	131-8445-101	131-8445-101
415-0013-018	Belden 735A	18"	131-8445-101	131-8445-101
415-0013-024	Belden 735A	24"	131-8445-101	131-8445-101
415-0013-030	Belden 735A	30"	131-8445-101	131-8445-101
415-0013-036	Belden 735A	36"	131-8445-101	131-8445-101

## N Straight Plug to N Straight Plug



Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0058-012	RG -58	12"	CPN -1	CPN -1
415-0058-024	RG -58	24"	CPN -1	CPN -1
415-0058-036	RG -58	36"	CPN -1	CPN -1
415-0058-048	RG -58	48"	CPN -1	CPN -1
415-0058-060	RG -58	60"	CPN -1	CPN -1
415-0060-012	RG -142	12"	CPN -142T	CPN -142T
415-0060-024	RG -142	24"	CPN -142T	CPN -142T
415-0060-036	RG -142	36"	CPN -142T	CPN -142T
415-0060-048	RG -142	48"	CPN -142T	CPN -142T
415-0060-060	RG -142	60"	CPN -142T	CPN -142T

Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0062-012	RG-8	12"	CPN -8	CPN -8
415-0062-024	RG-8	24"	CPN -8	CPN -8
415-0062-036	RG-8	36"	CPN -8	CPN -8
415-0062-048	RG-8	48"	CPN -8	CPN -8
415-0062-060	RG-8	60"	CPN -8	CPN -8
415-0063-012	RG -213	12"	CPN -8	CPN -8
415-0063-024	RG -213	24"	CPN -8	CPN -8
415-0063-036	RG -213	36"	CPN -8	CPN -8
415-0063-048	RG -213	48"	CPN -8	CPN -8
415-0063-060	RG -213	60"	CPN -8	CPN -8

## BNC Straight Plug to BNC Straight Plug



Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0054-012	RG -58	12"	CPMC-88-1	CPMC-88-1
415-0054-024	RG -58	24"	CPMC-88-1	CPMC-88-1
415-0054-036	RG -58	36"	CPMC-88-1	CPMC-88-1
415-0054-048	RG -58	48"	CPMC-88-1	CPMC-88-1
415-0054-060	RG -58	60"	CPMC-88-1	CPMC-88-1
415-0057-012	RG-59	12"	CPMC-88-2	CPMC-88-2
415-0057-024	RG-59	24"	CPMC-88-2	CPMC-88-2
415-0057-036	RG-59	36"	CPMC-88-2	CPMC-88-2
415-0057-048	RG-59	48"	CPMC-88-2	CPMC-88-2

Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0056-012+	Belden 8218	12"	CPMC-88-18	CPMC-88-18
415-0056-024+	Belden 8218	24"	CPMC-88-18	CPMC-88-18
415-0056-036+	Belden 8218	36"	CPMC-88-18	CPMC-88-18
415-0056-048+	Belden 8218	48"	CPMC-88-18	CPMC-88-18
415-0056-060+	Belden 8218	60"	CPMC-88-18	CPMC-88-18

+ with Heat Shrink



## kwiQMate™ Straight to Straight

Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0162-006	RG-316DS	6"	146-0404-007	146-0404-007
415-0162-012	RG-316DS	12"	146-0404-007	146-0404-007
415-0162-024	RG-316DS	24"	146-0404-007	146-0404-007
415-0162-036	RG-316DS	36"	146-0404-007	146-0404-007
415-0162-048	RG-316DS	48"	146-0404-007	146-0404-007

Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0163-006	RG-316	6"	146-0403-007	146-0403-007
415-0163-012	RG-316	12"	146-0403-007	146-0403-007
415-0163-024	RG-316	24"	146-0403-007	146-0403-007
415-0163-036	RG-316	36"	146-0403-007	146-0403-007
415-0163-048	RG-316	48"	146-0403-007	146-0403-007



## kwiQMate™ Straight to Right Angle

Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0171-006	RG-316DS	6"	146-0404-007	146-0404-107
415-0171-012	RG-316DS	12"	146-0404-007	146-0404-107
415-0171-024	RG-316DS	24"	146-0404-007	146-0404-107
415-0171-036	RG-316DS	36"	146-0404-007	146-0404-107
415-0171-048	RG-316DS	48"	146-0404-007	146-0404-107

Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0172-006	RG-316	6"	146-0403-007	146-0403-107
415-0172-012	RG-316	12"	146-0403-007	146-0403-107
415-0172-024	RG-316	24"	146-0403-007	146-0403-107
415-0172-036	RG-316	36"	146-0403-007	146-0403-107
415-0172-048	RG-316	48"	146-0403-007	146-0403-107



## kwiQMate™ Right Angle to Right Angle

Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0174-006	RG-316DS	6"	146-0404-107	146-0404-107
415-0174-012	RG-316DS	12"	146-0404-107	146-0404-107
415-0174-024	RG-316DS	24"	146-0404-107	146-0404-107
415-0174-036	RG-316DS	36"	146-0404-107	146-0404-107
415-0174-048	RG-316DS	48"	146-0404-107	146-0404-107

Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0175-006	RG-316	6"	146-0403-107	146-0403-107
415-0175-012	RG-316	12"	146-0403-107	146-0403-107
415-0175-024	RG-316	24"	146-0403-107	146-0403-107
415-0175-036	RG-316	36"	146-0403-107	146-0403-107
415-0175-048	RG-316	48"	146-0403-107	146-0403-107



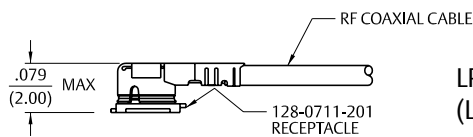
## kwiQMate™ Straight to SMA Straight

Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0165-006	RG-316DS	6"	146-0404-007	142-0404-016
415-0165-012	RG-316DS	12"	146-0404-007	142-0404-016
415-0165-024	RG-316DS	24"	146-0404-007	142-0404-016
415-0165-036	RG-316DS	36"	146-0404-007	142-0404-016
415-0165-048	RG-316DS	48"	146-0404-007	142-0404-016

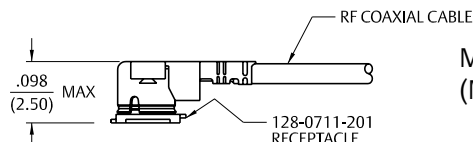
Part No.	Cable Type	Cable Length	Connector A	Connector B
415-0166-006	RG-316	6"	146-0403-007	142-0403-016
415-0166-012	RG-316	12"	146-0403-007	142-0403-016
415-0166-024	RG-316	24"	146-0403-007	142-0403-016
415-0166-036	RG-316	36"	146-0403-007	142-0403-016
415-0166-048	RG-316	48"	146-0403-007	142-0403-016

# Specifications

- Impedance:** 50 Ω (Nominal)
- Temperature Range:** -40°C to +90°C
- Frequency Rating:** 0-6 GHz
- VSWR:** 1.30 max (0-6 GHz)
- Contact Resistance:** 20 m Ω max. (Center)  
20 m Ω max. (Outer, for plug)  
10 m Ω max. (Outer, for receptacle)
- Withstanding Voltage:** 200 V AC
- Insulation Resistance:** 500 M Ω min.
- Durability:** 30 cycles
- Holding Force (min.):** 0.15 N (Female contact)



LP Plug  
(Low Profile Plug)



MP Plug  
(Medium Profile Plug)

## Low Profile UMC Right Angle Cable Plug to UMC Right Angle Cable Plug



Part No.	Teflon Coaxial Cable O.D.	Cable Length	Connector A	Plug Mated Height	Connector B
415-0084-050	0.81 mm	50 mm	UMC LP PLUG	2.0 mm	UMC LP PLUG
415-0084-100	0.81 mm	100 mm	UMC LP PLUG	2.0 mm	UMC LP PLUG
415-0084-150	0.81 mm	150 mm	UMC LP PLUG	2.0 mm	UMC LP PLUG
415-0084-200	0.81 mm	200 mm	UMC LP PLUG	2.0 mm	UMC LP PLUG
415-0084-250	0.81 mm	250 mm	UMC LP PLUG	2.0 mm	UMC LP PLUG
415-0084-300	0.81 mm	300 mm	UMC LP PLUG	2.0 mm	UMC LP PLUG
415-0084-500	0.81 mm	500 mm	UMC LP PLUG	2.0 mm	UMC LP PLUG

## Medium Profile UMC Right Angle Cable Plug to UMC Right Angle Cable Plug



Part No.	Teflon Coaxial Cable O.D.	Cable Length	Connector A	Plug Mated Height	Connector B
415-0085-050	0.81 mm	50 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0085-100	0.81 mm	100 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0085-150	0.81 mm	150 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0085-200	0.81 mm	200 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0085-250	0.81 mm	250 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0085-300	0.81 mm	300 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0085-500	0.81 mm	500 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0086-050	1.13 mm	50 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0086-100	1.13 mm	100 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0086-150	1.13 mm	150 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0086-200	1.13 mm	200 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0086-250	1.13 mm	250 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0086-300	1.13 mm	300 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0086-500	1.13 mm	500 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0087-050	1.32 mm	50 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0087-100	1.32 mm	100 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0087-150	1.32 mm	150 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0087-200	1.32 mm	200 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0087-250	1.32 mm	250 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0087-300	1.32 mm	300 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0087-500	1.32 mm	500 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0088-050	1.37 mm	50 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0088-100	1.37 mm	100 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0088-150	1.37 mm	150 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0088-200	1.37 mm	200 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0088-250	1.37 mm	250 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0088-300	1.37 mm	300 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG
415-0088-500	1.37 mm	500 mm	UMC MP PLUG	2.5 mm	UMC MP PLUG



# SMA Cable Assembly

## UMC Right Angle Cable Plug to SMA Straight Plug



### Low Profile



Part No.	Teflon Coaxial Cable O.D.	Cable Length	Connector A	Plug Mated Height	Connector B
415-0089-150	0.81 mm	150 mm	UMC LP PLUG	2.0 mm	SMA STR. PLUG
415-0089-250	0.81 mm	250 mm	UMC LP PLUG	2.0 mm	SMA STR. PLUG

### Medium Profile



Part No.	Teflon Coaxial Cable O.D.	Cable Length	Connector A	Plug Mated Height	Connector B
415-0090-150	0.81 mm	150 mm	UMC MP PLUG	2.5 mm	SMA STR. PLUG
415-0090-250	0.81 mm	250 mm	UMC MP PLUG	2.5 mm	SMA STR. PLUG
415-0091-150	1.37 mm	150 mm	UMC MP PLUG	2.5 mm	SMA STR. PLUG
415-0091-250	1.37 mm	250 mm	UMC MP PLUG	2.5 mm	SMA STR. PLUG

## UMC Right Angle Cable Plug to SMA Bulkhead Straight Jack



### Low Profile



Part No.	Teflon Coaxial Cable O.D.	Cable Length	Connector A	Plug Mated Height	Connector B
415-0095-150	0.81 mm	150 mm	UMC LP PLUG	2.0 mm	SMA STR BKHD. JACK
415-0095-250	0.81 mm	250 mm	UMC LP PLUG	2.0 mm	SMA STR BKHD. JACK

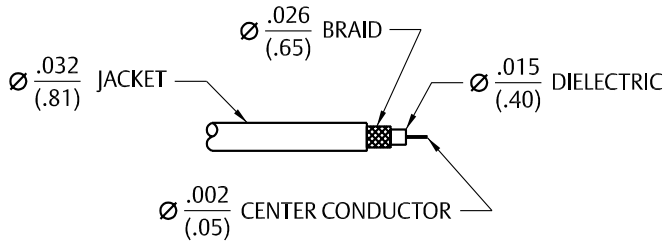
### Medium Profile



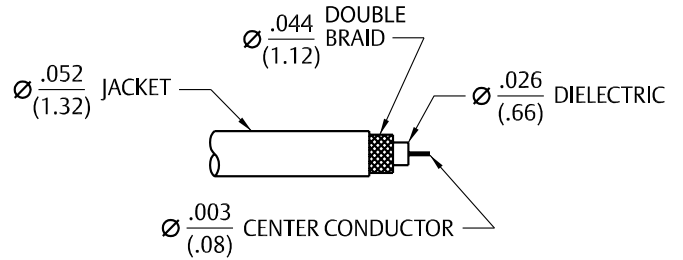
Part No.	Teflon Coaxial Cable O.D.	Cable Length	Connector A	Plug Mated Height	Connector B
415-0096-150	0.81 mm	150 mm	UMC MP PLUG	2.5 mm	SMA STR BKHD. JACK
415-0096-250	0.81 mm	250 mm	UMC MP PLUG	2.5 mm	SMA STR BKHD. JACK
415-0097-150	1.37 mm	150 mm	UMC MP PLUG	2.5 mm	SMA STR BKHD. JACK
415-0097-250	1.37 mm	250 mm	UMC MP PLUG	2.5 mm	SMA STR BKHD. JACK

# Pigtail Cable Assembly

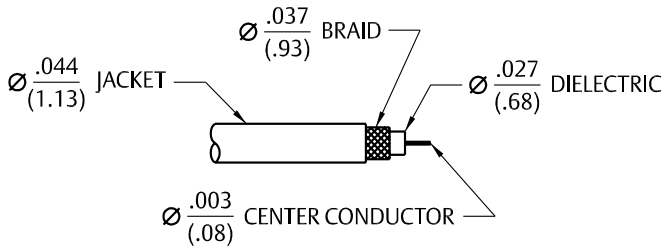
## 0.81 mm Coaxial Cable



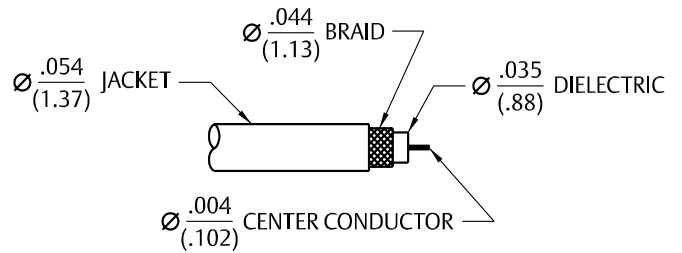
## 1.32 mm Coaxial Cable



## 1.13 mm Coaxial Cable



## 1.37 mm Coaxial Cable



## UMC Right Angle Cable Plug to Bare End

### Low Profile



Part No.	Teflon Coaxial Cable O.D.	Cable Length	Connector A	Plug Mated Height	Connector B
415-0104-150	0.81 mm	150 mm	UMC LP PLUG	2.0 mm	BARE END
415-0104-250	0.81 mm	250 mm	UMC LP PLUG	2.0 mm	BARE END

### Medium Profile



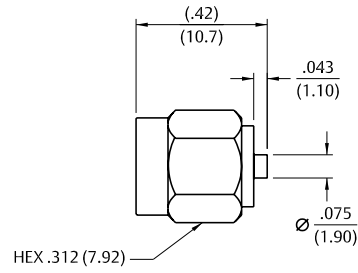
Part No.	Teflon Coaxial Cable O.D.	Cable Length	Connector A	Plug Mated Height	Connector B
415-0105-150	0.81 mm	150 mm	UMC MP PLUG	2.5 mm	BARE END
415-0105-250	0.81 mm	250 mm	UMC MP PLUG	2.5 mm	BARE END
415-0106-150	1.13 mm	150 mm	UMC MP PLUG	2.5 mm	BARE END
415-0106-250	1.13 mm	250 mm	UMC MP PLUG	2.5 mm	BARE END
415-0107-150	1.32 mm	150 mm	UMC MP PLUG	2.5 mm	BARE END
415-0107-250	1.32 mm	250 mm	UMC MP PLUG	2.5 mm	BARE END
415-0108-150	1.37 mm	150 mm	UMC MP PLUG	2.5 mm	BARE END
415-0108-250	1.37 mm	250 mm	UMC MP PLUG	2.5 mm	BARE END

# Pigtail Assembly Adapters

## SMA Conversion Adapter for Mating UMC Plugs (SMA Plug to UMC Jack)



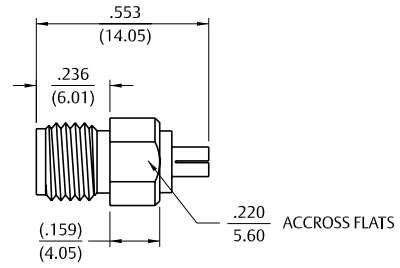
**Part No.**  
134-1019-361



## SMA Conversion Adapter for Surface Mt. Jack Receptacle 128-0711-201 (SMA Jack to UMC Plug)



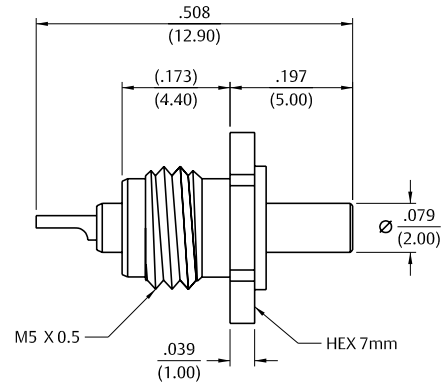
**Part No.**  
134-1019-371



## Inspection Tool for Cable Assembly



**Part No.**  
134-1019-381



## UMC Separation Key



**Part No.**  
128-0000-901

# Specifications

## Electrical Specifications

**Impedance:** 50 Ohms  
**Frequency Range:** 12.4 GHz

**VSWR:** (f = GHz)

	<u>Straight Cable Connectors</u>	<u>Right Angle Cable Connectors</u>
RG-316, RG-316 DS .....	1.15+.02f	1.15+.03f
Uncabled receptacles .....	N/A	

**Working Voltage:** (VRMS max)

	<u>Sea Level</u>	<u>70K Feet</u>
RG-316, RG-316 DS.....	250	65
Uncabled receptacles .....	335	85

**Dielectric Withstanding Voltage:** VRMS min (at sea level)

Connectors for RG-316, RG-316 DS .....	750
Uncabled receptacles .....	1000

**Insulation Resistance:** 5000 Megohms min

**Contact Resistance:** (milliohms max)

	<u>Initial</u>	<u>After Environmental</u>
Center contact (straight cabled connectors and Uncabled receptacles) .....	3.0	4.0
Center contact (right angle cabled connectors).....	4.0	6.0
Outer Contact (all connectors) .....	2.0	N/A
Braid to Body (Tri-Alloy plated bodies).....	3.0	N/A
Braid to Body (gold plated bodies) .....	0.5	N/A

**Corona Level:** (Volts min at 70,000 feet)

Connectors for RG-316, RG-316 DS .....	190
Uncabled receptacles .....	250

**Insertion Loss:** (dB max)

Straight flexible cable connectors .....	0.06	$f\sqrt{\text{GHz}}$ , tested at 6 GHz
Right angle flexible cable connectors.....	0.15	$f\sqrt{\text{GHz}}$ , tested at 6 GHz
Uncabled receptacles .....		N/A

**RF Leakage:** (dB max, tested at 3 GHz)

Cable connectors .....	-80
Uncabled receptacles .....	N/A

**RF High Potential Withstanding Voltage:** (Vrms min, tested at 4 and 7 MHz)

Connectors for RG-316, RG-316 DS .....	500
Uncabled receptacles .....	670

## Mechanical Specifications

**Engagement Design:**

**Durability:** 500 cycles min  
**Engagement/Disengagement Force:** 8 lbs max (5 lbs typical)  
**Coupling Retention Force:** 10 lbs min  
**Contact Retention:** 6 lbs min axial force (captivated contacts)  
 4 oz-in min torque (uncabled receptacles)

**Cable Retention:** (min\*)

	<u>Axial Force (lbs)</u>	<u>Torque (oz-in)</u>
Connectors for RG-316, RG-316 DS .....	20	N/A

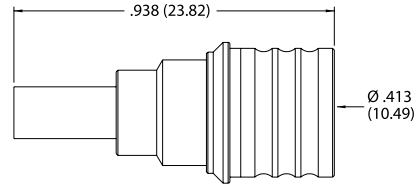
\* Or cable breaking strength, whichever is less

## Straight Crimp Type Plug (3-piece) – Captivated Contact



Cable Type	Tri-Alloy Plated
RG-316	146-0403-007
RG-316 DS	146-0404-007

Assembly instructions page 256.

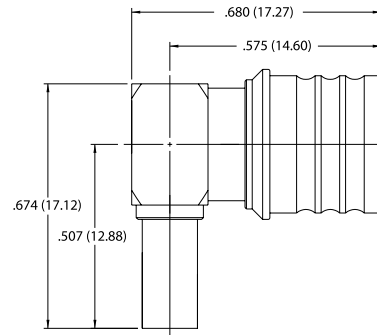


## Right Angle Crimp Type Plug (1-piece body) – Captivated Contact



Cable Type	Tri-Alloy Plated
RG-316	146-0403-107
RG-316 DS	146-0404-107

Assembly instructions page 255.

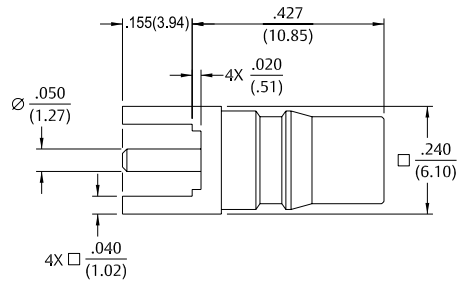


## Straight Jack Receptacle



Gold Plated
146-0701-201

Mounting hole layout figure 2 page 194.

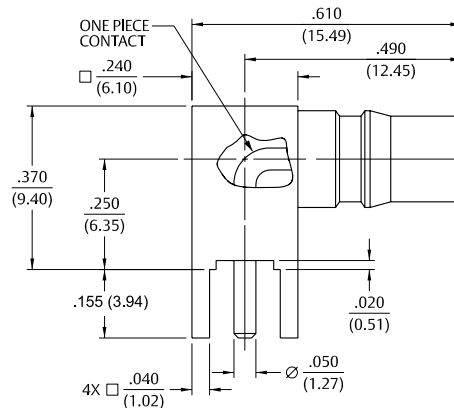


## Right Angle Jack Receptacle



Gold Plated
146-0701-301

Mounting hole layout figure 2 page 194.



# Coaxial Connector Assembly Tools

## Hand Crimp Tool

Precision Astro Tool hand crimping tool makes cable assembly fast and easy. Crimping tool features interchangeable steel dies. Ratchet action of tool controls crimping operation for precise uniform ferrule crimps.



Connector Type	Cable Type	Preferred Die Set	Crimp Dimensions
MCX SMA SMB SMC	RG-178/U RG-196/U	141-0000-901	Hex = .105 (2.67) Width = .325 (8.26)
MCX SMA SMB SMC 75 Ohm SMB	RG-161/U, RG-174/U RG-179/U, RG-187/U RG-188/U, RG-316/U LMR-100	141-0000-902	Hex = .128 (3.25) Width = .400 (10.16)
	RG-188/U, RG316/U RG-179/U, RG-187/U BELDEN 735A	141-0000-905	Hex = .151 (3.83) Width = .400 (10.16)
MCX SMA SMB	RG-58/U RG-141/U RG-303/U RG-55/U RG-142/U RG-223/U RG-400/U LMR-195 LMR-200	141-0000-903	Hex = .213 (5.41) Width = .375 (9.52)
SMA 75 Ohm SMB	LMR-240, RG-59	141-0000-925	Hex = .255 (6.48) Width = .400 (10.16)
N Type	RG-316/U, 316 DS	141-0000-927	Hex = .160 (4.06) Width = .400 (10.16)

\* Economy Hand Crimp Tool also available with four hex sizes in one tool page 187.

## Ordering Information for Crimp Tool

Part No.	Description	ASTRO Tool Part No.
144-0000-900	Frame Only	620175
141-0000-901	Single Hex Die	620932
141-0000-902	Single Hex Die	620419
141-0000-903	Single Hex Die	620676
141-0000-905	Single Hex Die	630055
141-0000-925	Single Hex Die	620938
141-0000-927	Single Hex Die	620297

## Ordering Information for Crimp Tool

Connector Type	Preferred Die Ste	Crimp Style
SMB Cross Hole Style Body 50 Ohm Only	141-0000-911	Double Diamond
Mini 75 Ohm SMB, MCX 75 Ohm Cross Hole Style Body	141-0000-924	Double Diamond

# Coaxial Connector Assembly Tools

## MCX Right Angle Plug Assembly Tool

This quick and easy to use tool will press the end cap onto standard right angle MCX plug connectors. Simply insert the connector and cap into the staking nest and a light squeeze of the handles will swage the cap into place. The jaw tips are shaped to grip a right angle MCX plug body for insertion or disengagement to a mating receptacle. The jaws are hardened steel and the handles are cushioned to minimize stress to the user. For use with all cable groups except RG-58.



Part No.

141-0000-908

## SMA Knurl Mount Assembly Tool

The Knurl Mount SMA Spark Plug Connectors can be pressed into position using this thread-on fixture designed for low volume lab use.



Part No.

140-0000-954

## SMB Plug Removal Tool

Reaches in to disengage SMB connectors in high density packaging applications.



Part No.

140-0000-956

# We Have What You Are Looking For ... and If We Don't, We'll Design and Manufacture It!!!

Emerson Network Power Connectivity Solutions prides itself in meeting our customers' needs by providing them with customized solutions. We have configured our technical staff and equipped our model shop and QA lab to meet the quick-turn demands of new product development. Prototypes, samples, and short-run quantities are delivered expediently and to print. Your new product development life cycle will be greatly enhanced with us as a partner on your design team.

We have an extensive log of special variations of MMCX, MCX, 75 Ohm MCX, SMK, SMA, SMP, SMB, Mini-75 Ohm SMB, SMC, BNC, TNC and N connectors. Special cable sizes, cable assemblies, PC board terminations, adapters, antenna connectors, multi-packs, calibration terminations and hardware products give us a large pool of design experience to assist you with custom development. See page 259 for more information on our custom hardware products.

Our sales representatives will review your product application and initiate the quotation process, and our sales and engineering staff will assist you in defining the performance and cost parameters required by your end product. Providing details such as dimensional limitations, frequency, and VSWR performance to our field sales representative will speed the process.

After you have chosen us as your supplier, we can provide samples and a short run quantity prior to production of your custom product. We look forward to providing your special electronic components in the future.

## We do it all...

**Virtually any RF coaxial connector or RF cable assembly from the engineering, prototyping and tooling stages, to complete production and testing.**



N Jack 75 Ohm to MCX Plug  
75 Ohm Assembly, Adapter



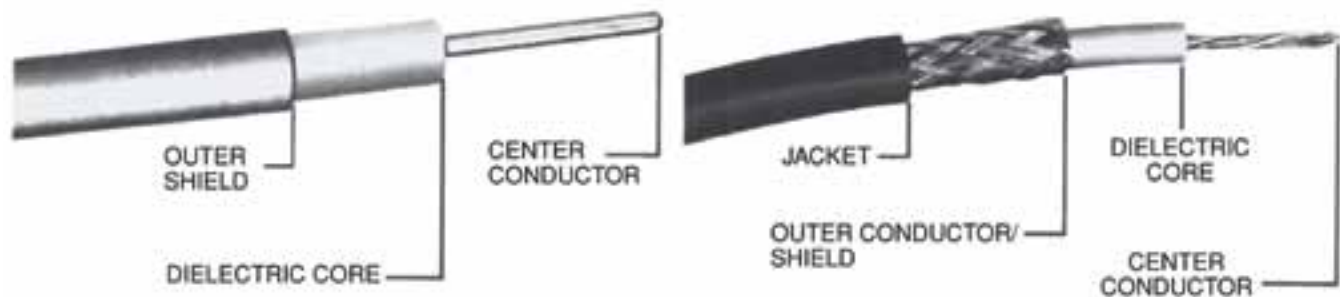
Ganged MCX Right-Angle  
Board Mount



SMB Vertical  
PC Plug



# Cable Information



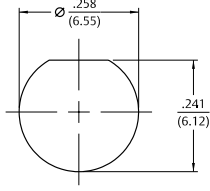
## Semi-Rigid Cable Dimensions

Cable	Center Conductor O.D.	O.D. Dielectric	O.D. Shield	Impedance
RG-405/U	.0201 (0.51)	.0658 (1.67)	.086 (2.18)	50
RG-402/U	.0359 (0.91)	.1175 (2.98)	.141 (3.58)	50

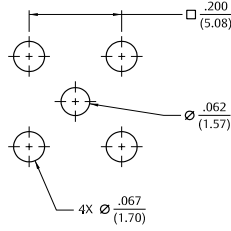
## RF Flexible Cable Dimension

Cable	Center Conductor	O.D. Dielectric	O.D. Shield	O.D. Jacket	Impedance
.047 dia.	.007 (0.19)	.020 (0.52)	.035 (0.90)	.047 (1.20)	50
RG-178B/U	.012 (.030)	.034 (0.86)	.054 (1.37)	.071 (1.80)	50
RG-196A/U	.012 (.030)	.034 (0.86)	.054 (1.37)	.071 (1.80)	50
RG-174/U	.019 (0.48)	.060 (1.52)	.080 (2.03)	.110 (2.79)	50
RG-179B/U	.012 (.030)	.063 (1.60)	.084 (2.13)	.110 (2.79)	75
RG-187A/U	.012 (.030)	.060 (1.52)	.084 (2.13)	.110 (2.79)	75
RG-188A/U	.020 (0.51)	.060 (1.52)	.081 (2.06)	.110 (2.79)	50
RG-316/U	.020 (0.51)	.060 (1.52)	.081 (2.06)	.110 (2.79)	50
RG-316 DS	.020 (0.51)	.060 (1.52)	(DS) .100 (2.54)	.120 (3.05)	50
RG-179 DS	.012 (.030)	.063 (1.60)	(DS) .103 (2.62)	.120 (3.05)	75
RG-187 DS	.012 (.030)	.060 (1.52)	(DS) .100 (2.54)	.120 (3.05)	75
RG-188 DS	.020 (0.51)	.060 (1.52)	(DS) .100 (2.54)	.120 (3.05)	50
RG-141A/U	.039 (0.99)	.116 (2.95)	.146 (3.71)	.190 (4.83)	50
RG-303/U	.039 (0.96)	.116 (2.95)	.146 (3.71)	.190 (4.83)	50
RG-400/U	.038 (0.96)	.116 (2.95)	(DS) .171 (4.34)	.195 (4.85)	50
RG-142B/U	.039 (0.99)	.116 (2.95)	(DS) .171 (4.34)	.195 (4.95)	50
RG-58C/U	.038 (0.96)	.116 (2.95)	.150 (3.81)	.195 (4.95)	50
RG-55B/U	.032 (0.81)	.116 (2.95)	(DS) .176 (4.47)	.206 (5.23)	53.5
RG-223/U	.032 (0.81)	.116 (2.95)	(DS) .176 (4.47)	.206 (5.23)	53.5
LMR-100	.022 (.056)	.062 (1.57)	.085 (2.16)	.105 (2.67)	50
LMR-195	.037 (0.94)	.110 (2.79)	.139 (3.53)	.195 (4.95)	50
LMR-200	.044 (1.12)	.116 (2.95)	.144 (3.66)	.195 (4.95)	50
LMR-240	.056 (1.42)	.150 (3.81)	.178 (4.52)	.240 (6.10)	50
735A	.016 (0.41)	.077 (1.96)	.101 (2.57)	.128 (3.25)	75
RG-59	.0226 (0.57)	.146 (3.71)	.191 (4.85)	.242 (6.15)	75

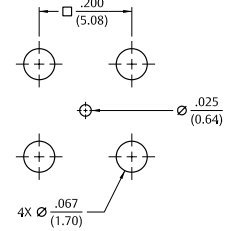
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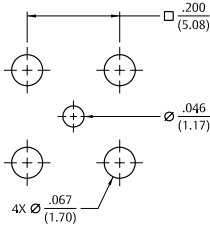
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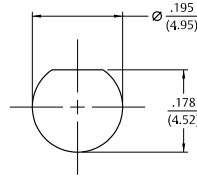
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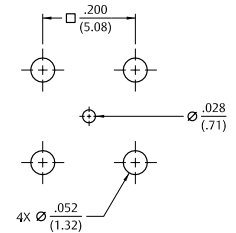
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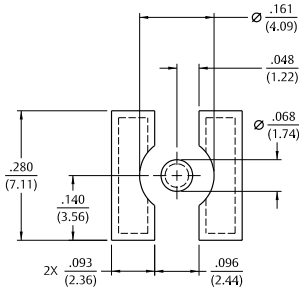
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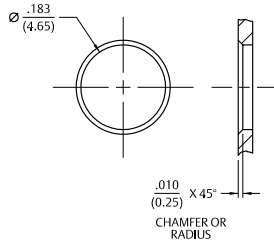
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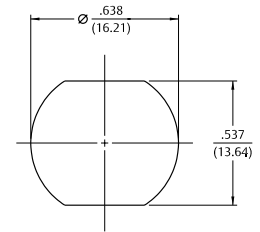
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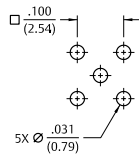
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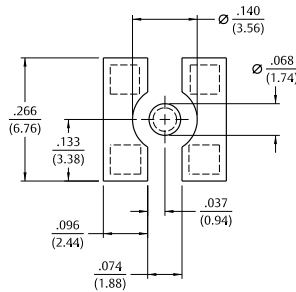
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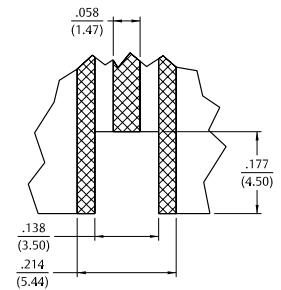
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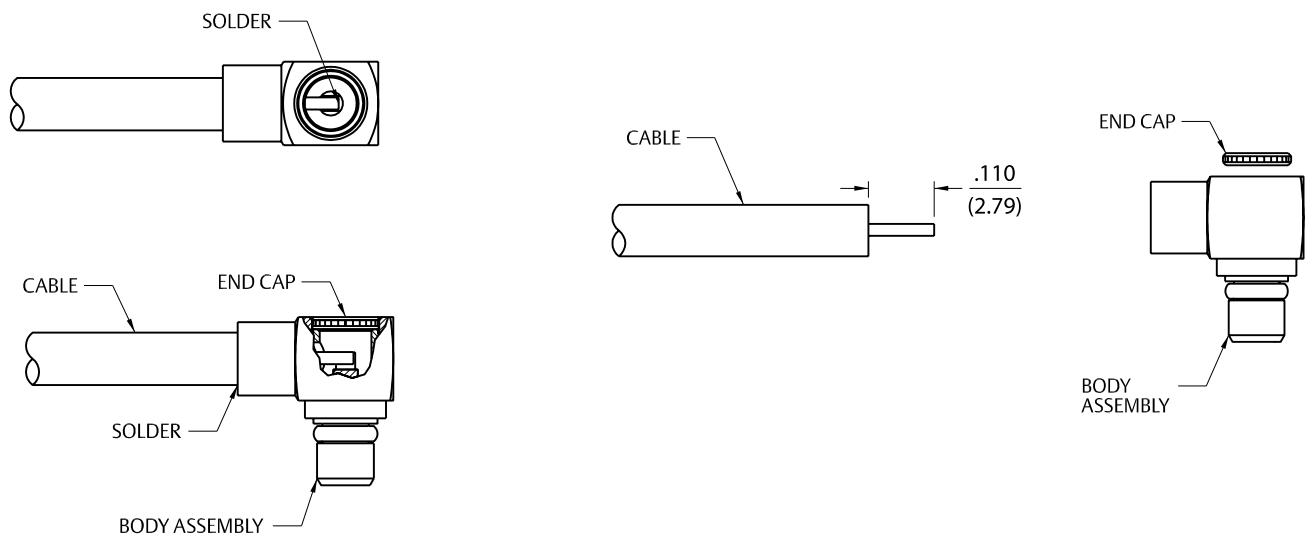
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## MMCX Right Angle Plug for .086 (2.18) Semi-Rigid Cable

1. Identify piece parts. (2 piece parts)
2. Strip cable to dimensions shown. Do not nick center conductor.
3. Insert cable into body making certain that jacket bottoms on the connector body. Fixture cable and assembly to prevent movement during soldering.
4. Solder center conductor to contact as shown. Use a minimum amount of solder for a good joint.
5. Solder body to cable as shown. Use a minimum amount of heat to minimize cable insulation movement.
6. Press end cap into body access port using .156 (3.96) diameter flat punch or Johnson assembly tool 141-0000-910.

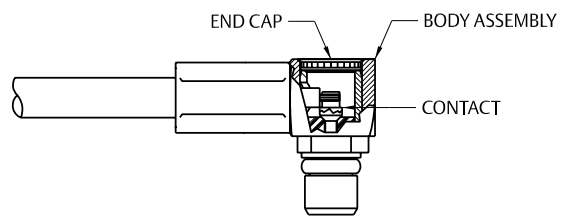
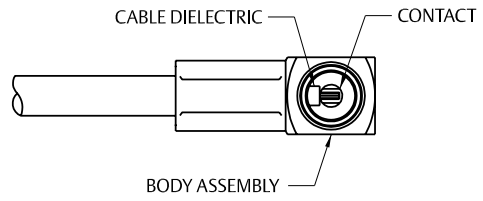
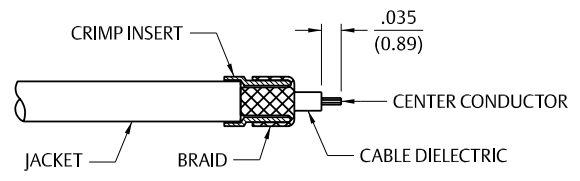
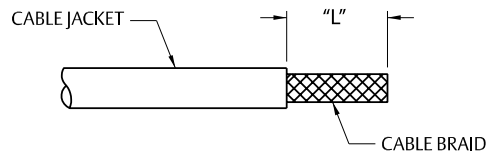
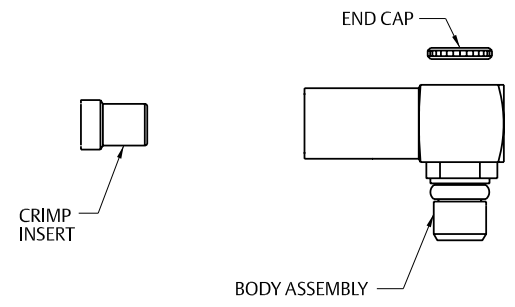
Cable Group	Part No.
RG-405/U (.086 Semi-Rigid)	135-3693-101



## MMCX Right Angle Plug for .047 (1.20) Diameter and RG-178 Size Flexible Cable with Crimp Insert

1. Identify piece parts. (3 piece parts)
2. Strip cable jacket to dimensions shown. Do not nick braid or center conductor during strip operations.
3. Slide crimp insert over braid and against jacket. Fold braid around crimp insert as shown. Strip cable dielectric to dimension shown. Tin center conductor.
4. Slide body assembly over cable and crimp insert, then seat firmly so cable dielectric butts against contact as shown. Crimp body using recommended crimp hex. Maintain forward pressure on cable while crimping.
5. Solder contact to center conductor through rear access port. Use a minimum amount of solder for a full fillet joint.
6. Press end cap into access port using .156 (3.96) diameter flat punch or Johnson assembly tool 141-0000-910.

Cable Group	Part No.	"L"	Crimp Hex
.047 Flexible	135-3436-101	.140 (3.56)	.105 (2.67)
RG-178/U, 196	135-3402-101	.188 (4.78)	.105 (2.67)
.047 Flexible	135-9436-101	.140 (3.56)	.105 (2.67)

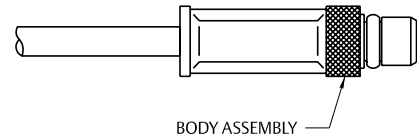
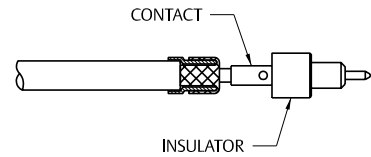
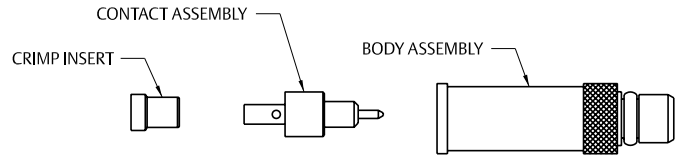
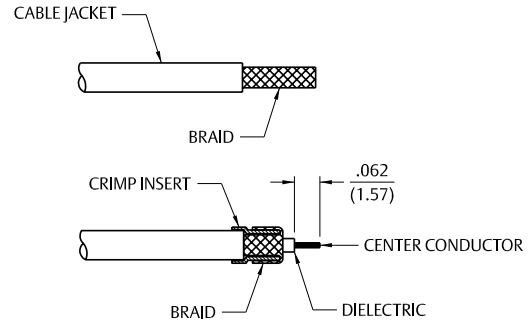


## MMCX Straight Plug for .047 (1.19) Diameter and RG-178 Size Flexible Cable

1. Identify piece parts. (3 piece parts)
2. Strip cable jacket to dimensions shown. Do not nick braid or center conductor during strip operations.
3. Slide crimp insert over braid and against jacket. Fold braid around crimp insert as shown. Strip dielectric to dimension shown. Tin center conductor if contact is to be soldered attached. Do not tin center conductor if contact is to be crimp attached.
4. Assemble contact assembly onto cable as shown.
 

**Solder attachment:** Solder contact to center conductor. Care should be taken that excess solder is not applied.

**Crimp attachment:** Crimp contact to center conductor using Johnson hand tool 140-0000-952 and die set 140-000-953. Crimp location should be centered between and of contact and cross-hole. Crimp attachment to solid center conductor cables is not recommended.
5. Slide body assembly over contact and crimp insert, then seat firmly as shown. Crimp body using recommended crimp die hex. Maintain forward pressure on cable while crimping.



Cable Group	Part No.	Strip Length	Crimp Hex
.047 Flexible	135-3436-001	.135 (3.43)	.105 (2.67) x .250 (6.35) W
RG-178/U, 196	135-3402-001	.184 (4.67)	.105 (2.67) x .250 (6.35) W

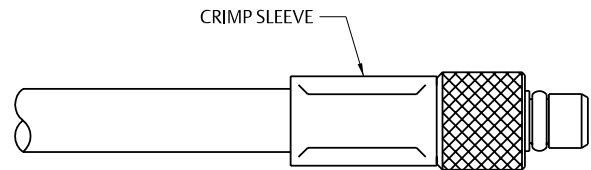
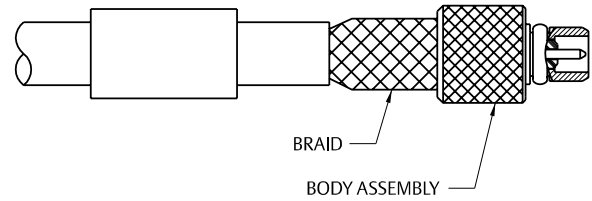
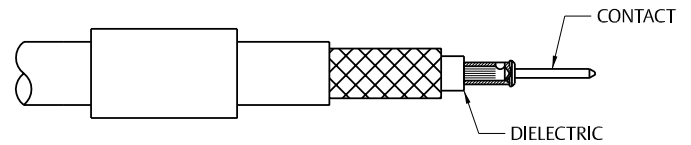
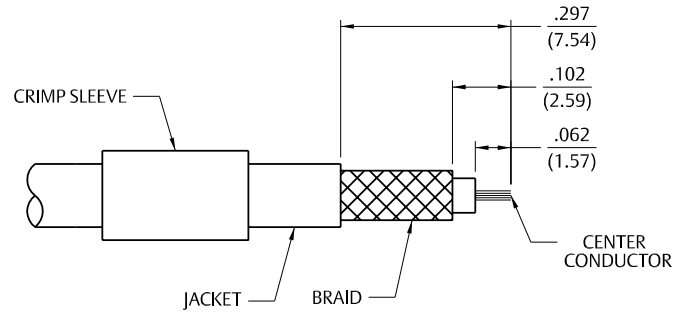
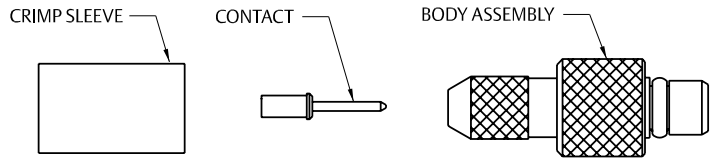
## MMCX Straight Jack for RG-316, RG-316 DS and RG-179 Size Flexible Cable

1. Identify connector parts. (3 piece parts)
2. Strip cable jacket to dimensions shown. Do not nick braid or center conductor during strip operations. Tin center conductor if contact will be solder attached. Do not tin center conductor if contact is to be crimp attached. Slide crimp sleeve onto cable jacket.
3. Assemble contact onto cable.
 

**Solder attachment:** Solder contact to center conductor. Care should be taken that excess solder is not applied.

**Crimp attachment:** Crimp contact to center conductor using Johnson hand tool 140-0000-952 and die set 140-0000-953. Crimp location should be centered between end of contact and cross-hole. Crimp attachment to solid center conductor cables is not recommended.
4. Slide body assembly over contact and under braid, then seat firmly onto contact. The body assembly will “snap” over the contact barb. The cable may have to be held in a soft jawed clamping fixture. Slide crimp sleeve forward and crimp using recommended crimp die hex.

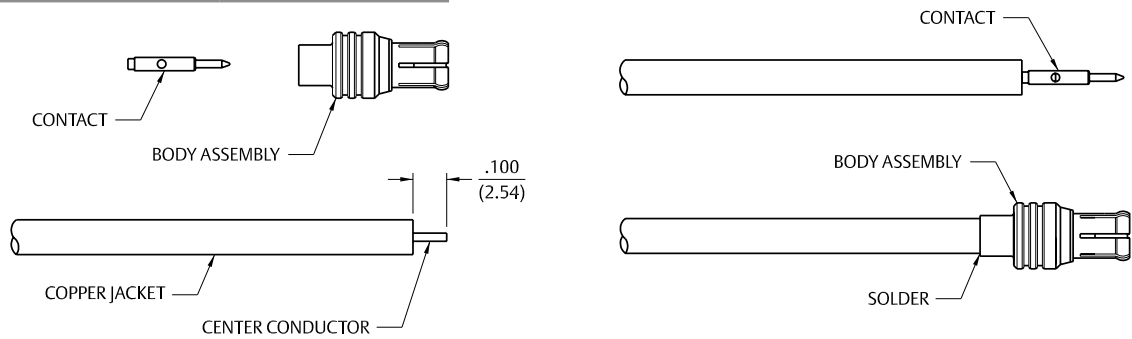
Cable Group	Part No.	Crimp Hex
RG-316/U, 188, 161, 174	135-3303-001	.128 (3.25)
RG-316 DS, 188 DS, 187 DS	135-3304-001	.151 (3.83)
RG-179/U, 187	135-3333-001	.128 (3.25)
RG-316/u, 188, 174	135-9403-001	.128 (3.25)
RG-316 DS, 188 DS	135-9404-001	.151 (3.83)



## MCX Solder Type Straight Plug for Semi-Rigid Cable

1. Identify connector parts. (2 piece parts)
2. Strip cable to dimensions shown. Do not nick center conductor.
3. Place center contact on center conductor making sure contact bottoms against cable insulation. Solder center conductor to center contact through solder hole. Solder must not be allowed to run on outside of contact. Use a minimum amount of solder for a good joint. .020 (0.51) diameter solder is recommended. Trim excess insulation.
4. Insert contact and cable into body assembly making sure cable is bottomed against insulator in body. Solder body to cable. Use a minimum amount of heat to minimize cable insulation movement.

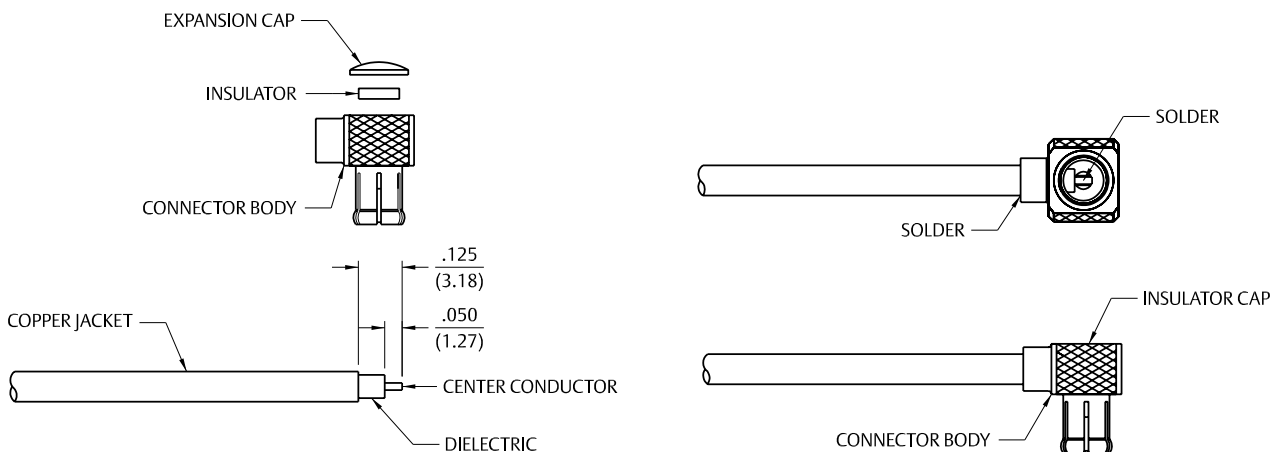
Cable Group	Part No.
RG-405/U (.086 Semi-Rigid)	133-3693-001
	133-3693-006



## MCX Solder Type Right Angle Plug for Semi-Rigid Cable

1. Identify connector parts. (3 piece parts)
2. Strip cable to dimensions shown. Do not nick center conductor.
3. Insert cable into body making sure cable insulation bottoms on center contact. Solder center conductor to contact through the rear access port. Use a minimum amount of solder for a good joint. .020 (0.51) diameter solder is recommended.
4. Solder body to cable. Use a minimum amount of heat to minimize cable insulation movement. Assemble insulator then place expansion cap in access port and seat with a .156 (3.96) diameter punch or hand tool 141-0000-908.

Cable Group	Part No.
RG-405/U (.086 Semi-Rigid)	133-3693-101
	133-3693-106

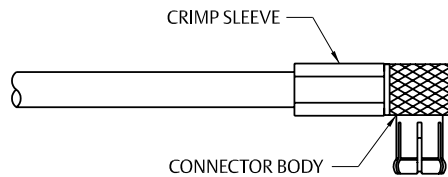
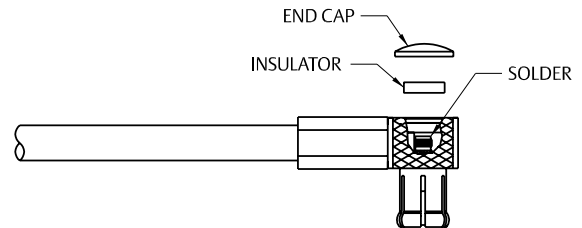
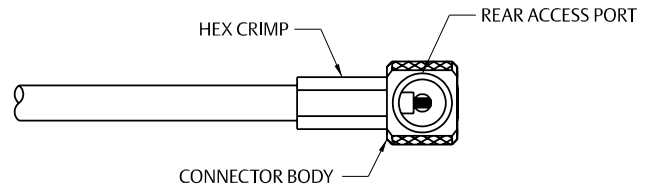
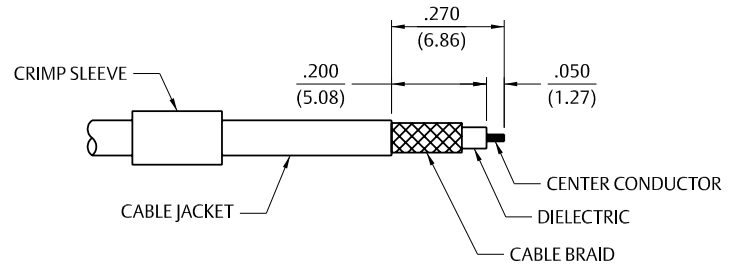
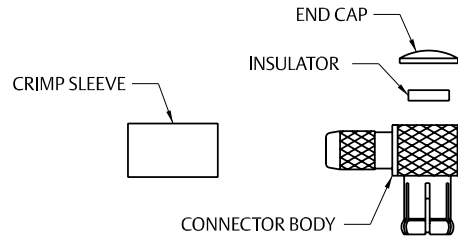




## MCX Crimp Type Right Angle Plugs for Flexible Cable

1. Identify connector parts. (4 piece parts).
2. Strip cable to dimensions shown. Do not nick braid or center conductor. A wire stripper of correct size is recommended for this step. Twist stranded center conductor into tight bundle and tin (optional). Slide crimp sleeve onto cable as shown.
3. Flare braid and slide cable into body making certain that the cable dielectric bottoms against center contact. Solder: Solder center conductor to contact through the side access ports and hole in center contact. Use a minimum amount of solder for a full fillet joint. .015 (0.38) diameter solder is recommended. Crimp: Crimp Contact Attachment Crimp contact using 41-0000-924 dieset in 144-0000-900 tool frame.
4. Arrange braid uniformly around crimp stem. Slide crimp sleeve over braid and access ports. Crimp securely using recommended hex size and crimp tool.

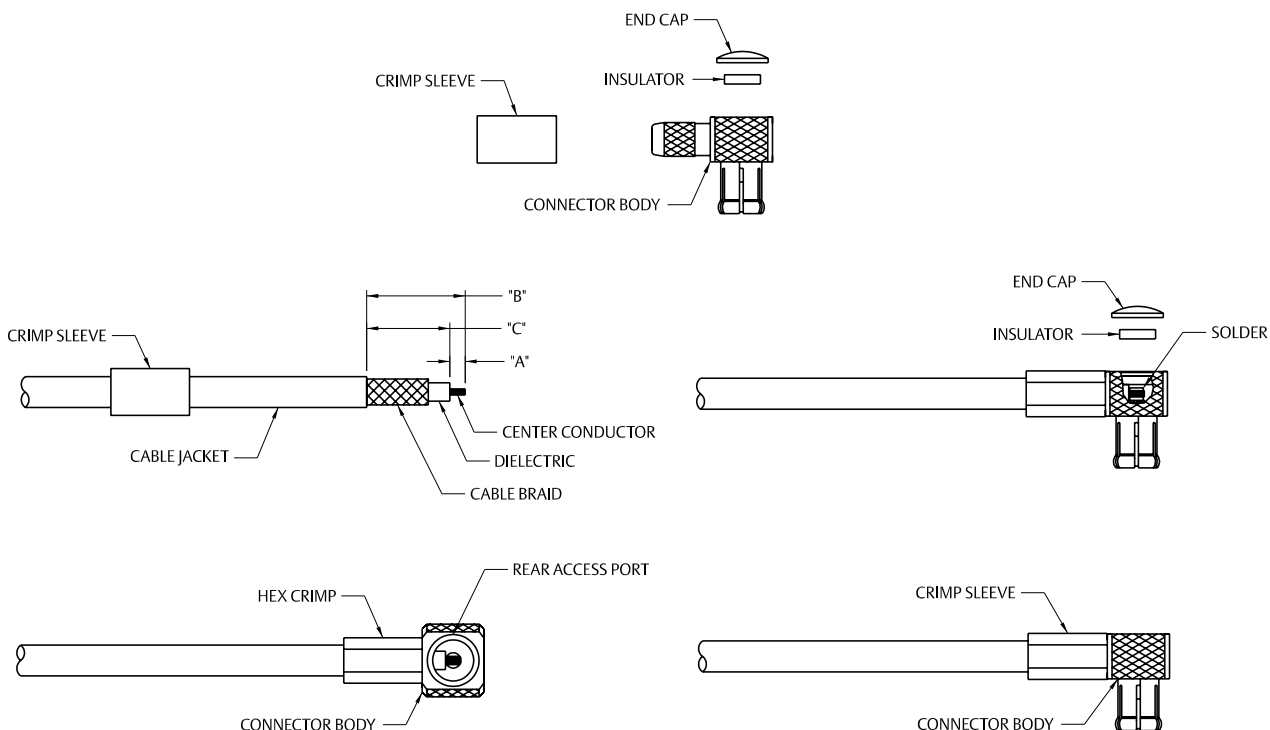
Cable Group	Part No.	Sleeve Hex
RG-316/U, 188, 174	133-9403-101/104	.128 (3.25)
RG-316 DS, 188 DS	133-9404-101	.151 (3.83)
RG-178	133-9402-101	.105 (2.67)



## MCX Crimp Type Right Angle Plugs for Flexible Cable – 50 Ohm

1. Identify connector parts. (4 piece parts except RG-58)
2. Strip cable to dimensions shown. Do not nick braid or center conductor. A wire stripper of correct size is recommended for this step. Twist stranded center conductor into tight bundle and tin (optional). Slide crimp sleeve onto cable shown.
3. Flair braid and slide cable into body making certain that the cable insulation bottoms on center contact. Arrange braid uniformly around crimp stem. Slide crimp sleeve over braid and crimp securely using recommended crimp tool.
4. Solder center conductor to contact through rear access port. Use a minimum amount of solder for a full fillet joint. .020 (0.51) diameter solder is recommended.
5. Assemble insulator, if applicable; then place expansion cap in access port and seat with .156 (3.96) diameter flat punch or MCX hand assembly tool 141-0000-908. Shrink heat shrink tubing over crimp sleeve if applicable.

Cable Group	Part No.	"A"	"B"	"C"	Crimp Hex
RG-178/U, 196	133-3402-101/106	.050 (1.27)	.270 (6.86)	.200 (5.08)	.105 (2.67)
RG-188/U, 316, 161, 174	133-3403-101/106	.050 (1.27)	.270 (6.86)	.200 (5.08)	.128 (3.25)
RG-316 DS, 188 DS	133-3404-101/106	.050 (1.27)	.270 (6.86)	.200 (5.08)	.151 (3.83)
RG-179/U, 187	133-3433-101/106	.050 (1.27)	.270 (6.86)	.200 (5.08)	.128 (3.25)
RG-178/U, 196	133-5402-101/106	.050 (1.27)	.270 (6.86)	.200 (5.08)	.105 (2.67)
RG-188/U, 316, 161, 174	133-5403-101/106	.050 (1.27)	.270 (6.86)	.200 (5.08)	.128 (3.25)
RG-316 DS, 188 DS	133-5404-101/106	.050 (1.27)	.270 (6.86)	.200 (5.08)	.151 (3.83)
RG-58/U, 303, 141	133-3407-101/106	.067 (1.70)	.295 (7.49)	.210 (5.33)	.213 (5.41)

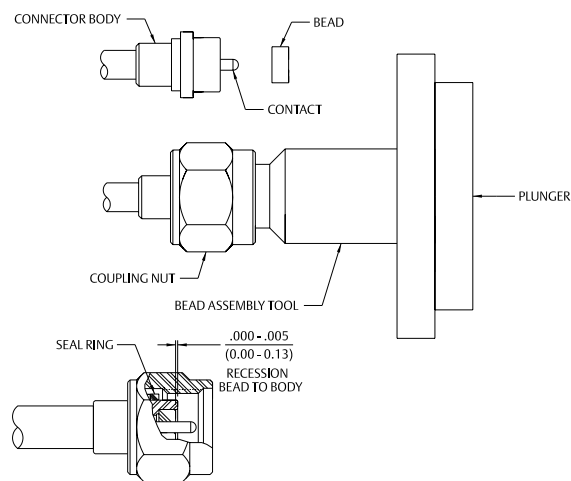
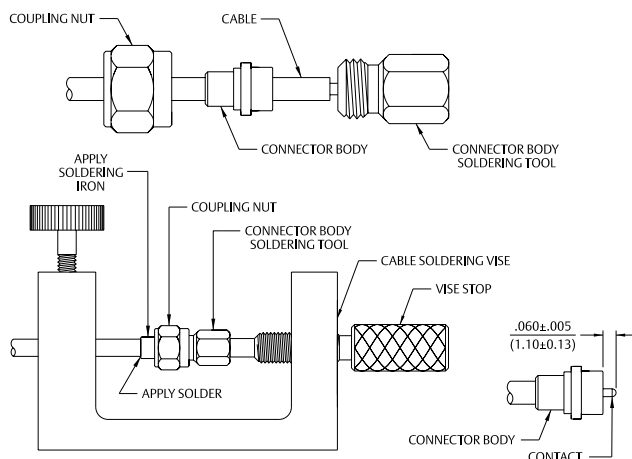
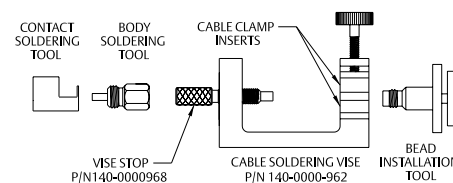
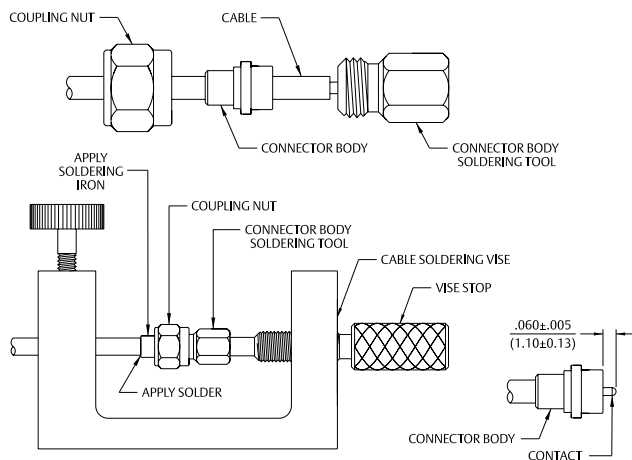
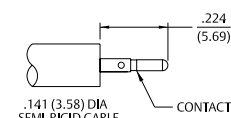
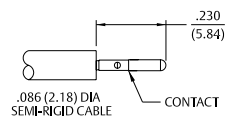
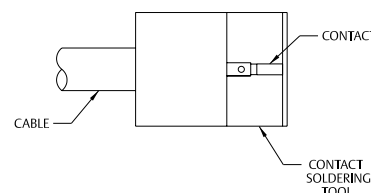
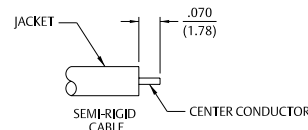


## SMK Solder Type Straight Plugs for Semi-Rigid Cable

1. Identify connector parts (5 piece parts) and tools (5 tools.)
2. Strip cable jacket and dielectric to dimension shown.
3. Place center contact onto center conductor. Slide contact soldering tool onto contact. Clamp the cable contact and tool into cable soldering vise and solder contact to center conductor. High temperature solder, such as 95/5 Sn/Ag is recommended so that contact solder joint remains stable during body soldering operation. Solder paste is recommended for the contact solder joint to minimize excess solder. The assembled contact dimension should be as shown.
4. Remove excess solder from contact with a sharp blade and clean contact. Check for presence of excess solder by sliding body soldering tool over the contact. Remove soldering tool.
5. Place connector nut and body on cable. Place connector body soldering tool over contact and thread the coupling nut and connector body firmly to the tool. Place cable subassembly into cable soldering vise. Clamp cable and soldering tool securely to insure the cable dielectric expansion will not disturb the cable in the vise during soldering. Place hot soldering iron on the connector body sleeve and apply solder from the opposite side. A low temp solder, such as 60/40 Sn/Pb is recommended for the body solder joint. Allow the soldered joint to cool and remove from fixture. Check contact location to the body. The best electrical results are achieved when the contact location is within a tolerance of  $.060 \pm .001$ .
6. Place bead onto neck portion of the tool. Thread Bead Assembly tool firmly into the coupling nut. Push the tool's plunger between your thumb and fingers to assemble the bead. Check bead location. Assemble seal ring onto body.



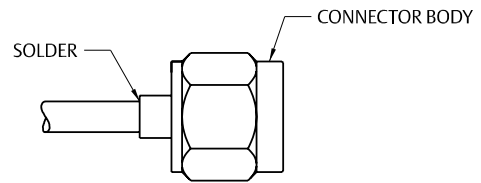
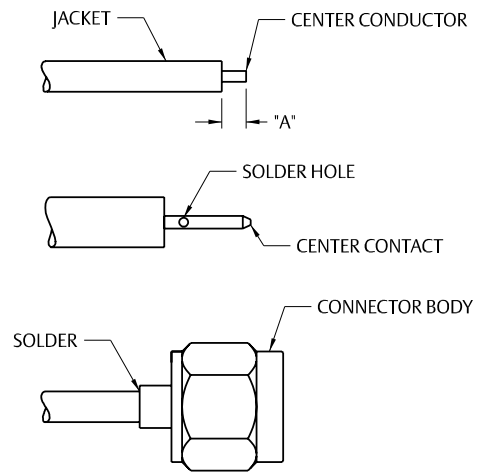
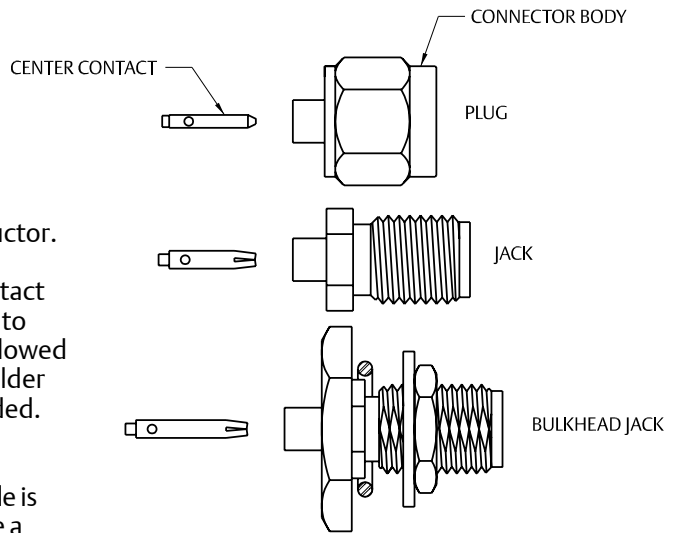
Tool	145-0693-001/002 (for .086 Semi-Rigid)	145-0694-001/02 (for .141 Semi-Rigid)
Semi-Rigid Cable Vise	140-0000-962	140-0000-962
Vise Stop	140-0000-968	140-0000-968
Bead Assy. Tool	140-0000-957	140-0000-957
Contact Soldering Tool	140-0000-960	140-0000-961
Body Soldering Tool	140-0000-958	140-0000-959
Cable Clamp Insert	140-0000-964	140-0000-965



## SMA Solder Type Straight Jacks, Straight Plugs, and Straight Bulkhead Jacks for Semi-Rigid Cable

1. Identify connector parts. (2 piece parts)
2. Strip cable to dimensions shown. Do not nick center conductor.
3. Place center contact on center conductor making sure contact bottoms against cable insulation. Solder center conductor to center contact through solder hole. Solder must not be allowed to run on outside of contact. Use a minimum amount of solder for a good joint. .020 (0.51) diameter solder is recommended. Trim excess insulation.
4. Insert contact and cable into body assembly making sure cable is bottomed against insulator in body. Solder body to cable. Use a minimum amount of heat to minimize cable insulation movement.

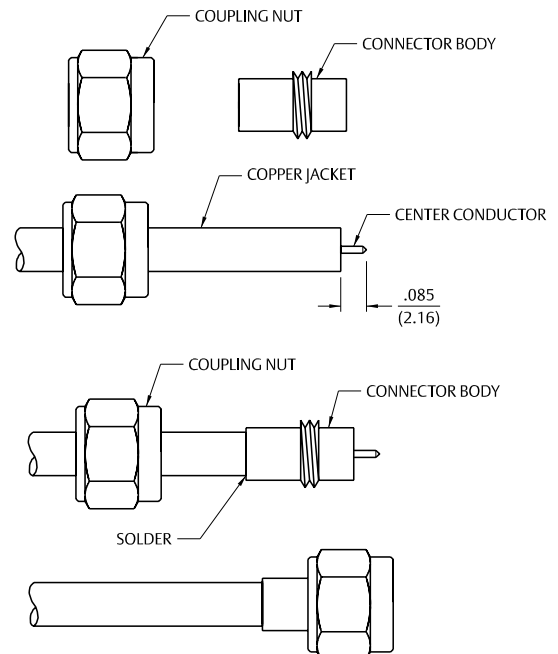
Cable Group	Part No.	"A"
RG-405/U (.086 Semi-Rigid)	141-0593-001	.070 (1.78)
	141-0593-401	.070 (1.78)
	141-0693-002	.070 (1.78)
RG-402/U (.141 Semi-Rigid)	141-0594-001	.085 (2.16)
	141-0594-401	.085 (2.16)
	141-0694-002	.085 (2.16)
RG-405/U (.086 Semi-Rigid)	142-0593-001/006	.070 (1.78)
	142-0593-401/406	.070 (1.78)
	142-0593-411/416	.070 (1.78)
	142-0693-001/006	.070 (1.78)
RG-402/U (.141 Semi-Rigid)	142-0594-001/006	.085 (2.16)
	142-0594-401/406	.085 (2.16)
	142-0694-001/006	.085 (2.16)



## SMA Solder Type Straight Plugs for Semi-Rigid Cable

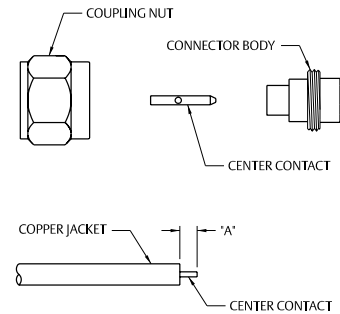
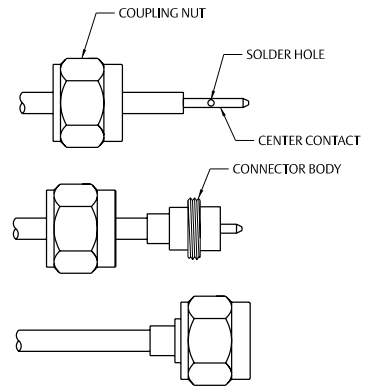
1. Identify connector parts. (2 piece parts)
2. Strip cable to dimensions shown. Do not nick center conductor. Bevel the cable center conductor per contact detail of SMA interface on page 48. Slide coupling nut onto cable as shown.
3. Insert cable into body making sure cable jacket is flush with front of body. Solder body to cable. Use a minimum amount of heat to minimize cable insulation movement. Trim expanded insulation flush with front of body or fixture body and cable during soldering to prevent cable insulation expansion.
4. Thread coupling nut over body.

Cable Group	Part No.
RG-402/U (.141 Semi-Rigid)	142-0694-011
	142-0694-016
	141-0694-012



## SMA Solder Type Straight Plugs for Semi-Rigid Cable

1. Identify connector parts. (3 piece parts)
2. Strip cable to dimensions shown. Do not nick center conductor. Slide coupling nut onto cable as shown.
3. Place center contact on center conductor making sure contact bottoms against cable insulation. Solder center conductor to center contact through solder hole. Solder must not be allowed to run on outside of contact. Use a minimum amount of solder for a good joint. .020 (0.51) diameter solder is recommended. Trim excess insulation.
4. Insert contact and cable into body making sure cable is bottomed against insulator in body. Solder body to cable. Use a minimum amount of heat to minimize cable insulation movement.
5. Thread coupling nut over body

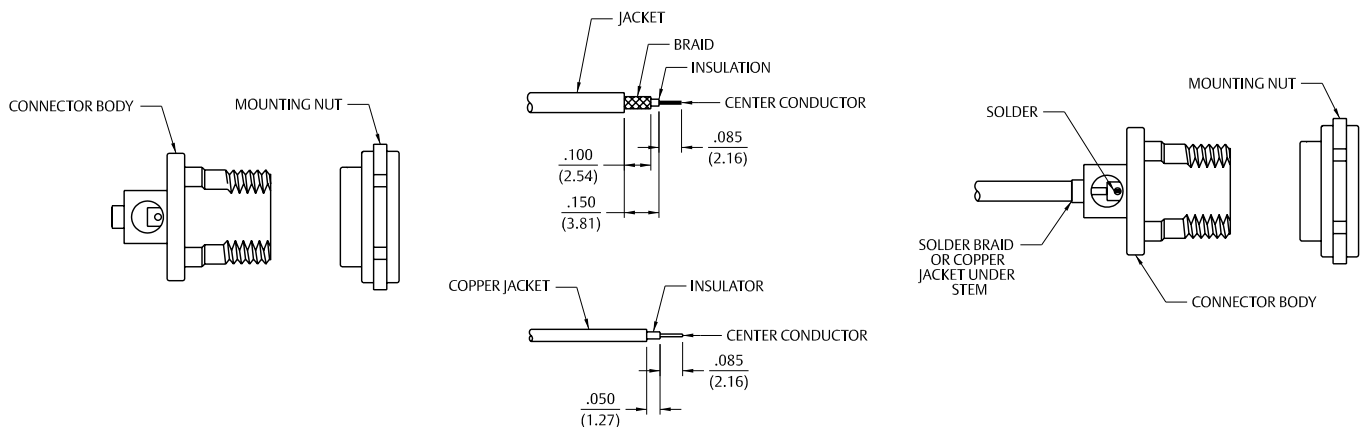


Cable Group	Part No.	"A"
RG-405/U (.086 Semi-Rigid)	142-0693-051	.070 (1.78)
	142-0693-056	.070 (1.78)
RG-402/U (.141 Semi-Rigid)	142-0694-051	.085 (2.16)
	142-0694-056	.085 (2.16)

## SMA Solder Type Antenna Connector Plug for Flexible or Semi-Rigid Cable

1. Identify connector parts. (2 piece parts)
2. Strip cable to dimensions shown. Do not nick center conductor or braid on flexible cable.
3. **Flexible Cable Attachment:** Twist stranded center conductor into tight bundle and tin (optional). Slide cable into body, making sure cable insulation bottoms on center contact and braid fits inside stem. Solder center conductor to contact through the side access ports. Use a minimum amount of solder for a good joint. .020 (0.51) diameter solder is recommended. Solder braid to body. Use a minimum amount of solder to completely join the braid to the body.  
**Semi-Rigid Cable Attachments:** Slide cable into body making certain cable insulation bottoms on center contact. Solder center conductor to contact through the side access ports. Use a minimum amount of solder for a good joint. .020 (0.51) diameter solder is recommended. Solder body to cable jacket. Use a minimum amount of heat to minimize cable insulation movement.

Cable Group	Part No.
RG-178/U, .047 Semi-Rigid	142-0801-421

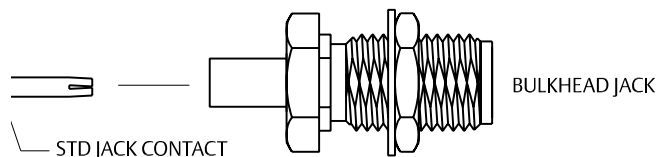
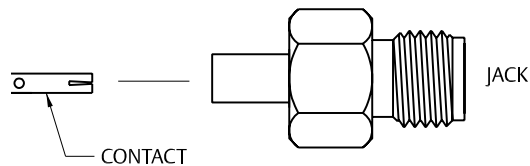
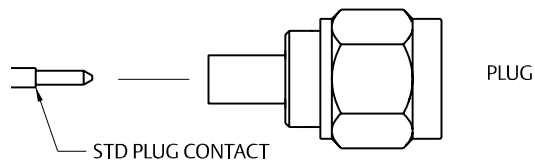
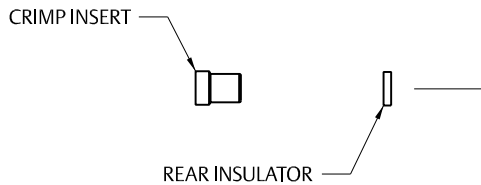
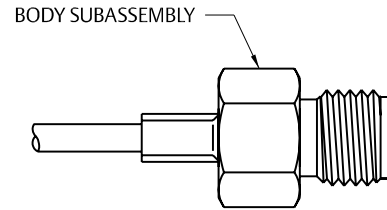
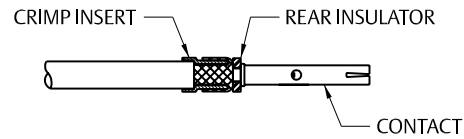
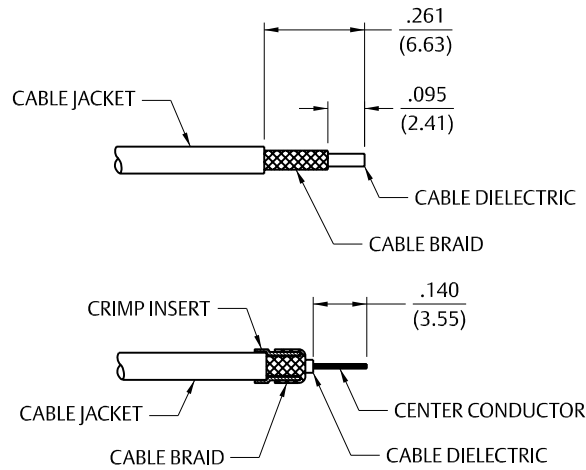


## SMA Type Straight Plugs, Straight Jacks, and Straight Bulkhead Jacks for Flexible Cable – Crimp or Solder Contacts

1. Identify connector parts. (3 piece parts – except bulkhead)
2. Strip cable to dimensions shown. Do not nick braid or center conductor. Tin center conductor if contact will be solder attached. Do not tin center conductor if contact is to be crimp attached. When stripping LMR-100 low loss cable, remove foil back to where cable jacket is stripped. A wire stripper of correct size is recommended for this step. Slide heat shrink (as applicable) and crimp sleeve onto jacket of cable.
3. Assemble contact onto cable as shown.
 

**Solder Attachment:** Solder contact to center conductor through solder hole using .020 (0.51) diameter solder. Use a minimum amount of solder for a good joint.

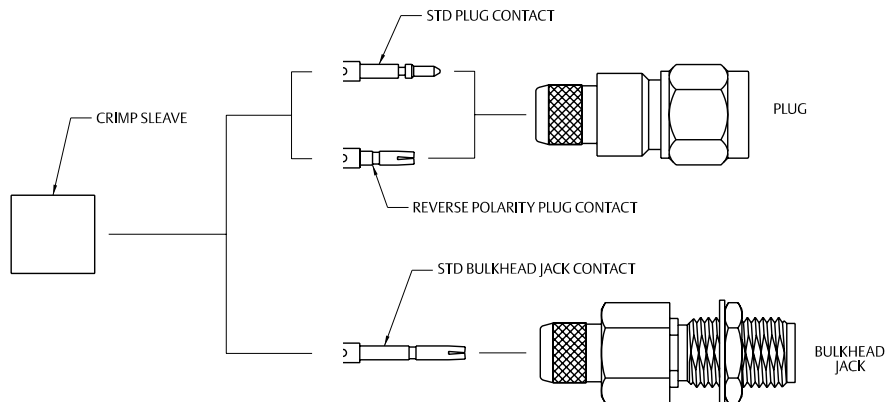
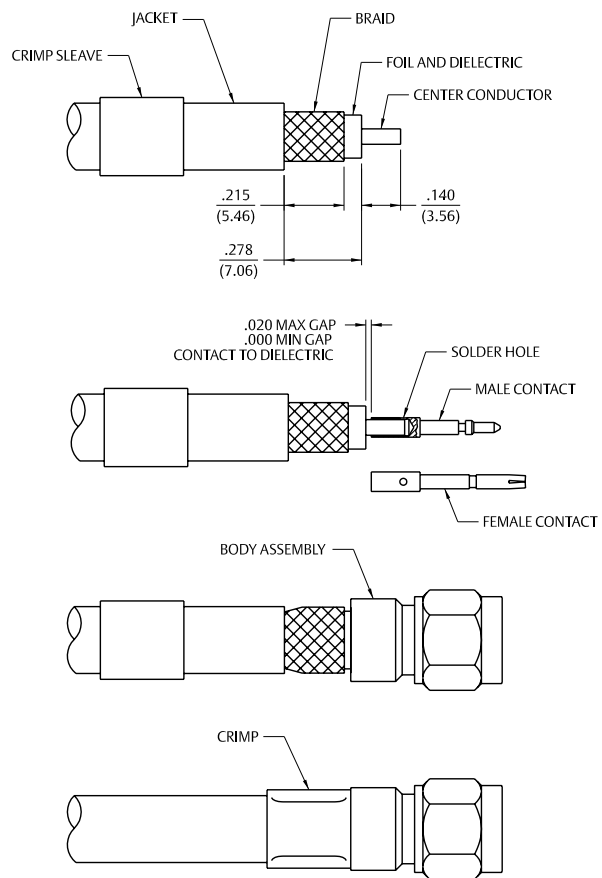
**Crimp Attachment:** Crimp contact to center conductor using Johnson Hand Tool 144-0000-910, setting #2, with positioner 141-0000-907. Crimp location should be centered between end of contact and X-hole. Crimp attachment to solid center conductor cables is not recommended.
4. Flare braid and slide body assembly over contact and under braid. Then seat body assembly firmly onto contact. The cable may have to be held in a clamping fixture. Arrange braid uniformly around crimp stem. Slide crimp sleeve forward and crimp using recommended crimp tool. Slide heat shrink forward and shrink (as applicable).



## Straight SMA Low Loss Diameter .195, .200 and .240 Straight Type Plugs

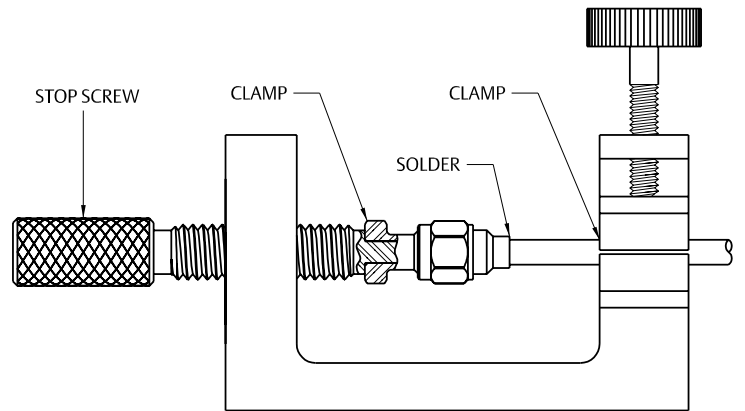
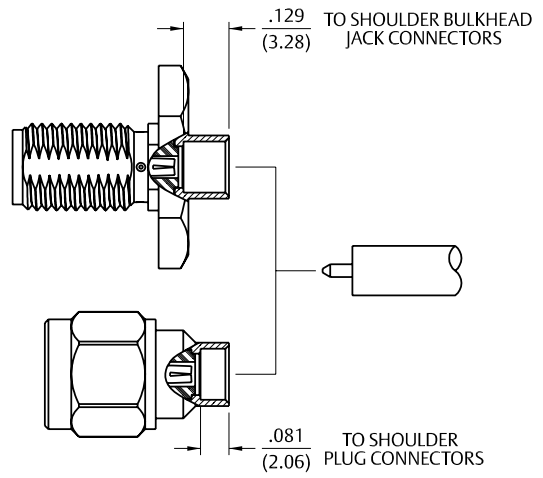
1. Identify connector parts. (3 piece parts – except bulkhead)
2. Strip cable to dimensions shown. Do not nick braid, foil or center conductor. Cut foil flush with dielectric, do not remove foil. Make sure that dielectric is clean and free from all particles. Tin center conductor, keeping solder amount to a minimum. Slide crimp sleeve onto jacket of cable.
3. Assemble contact onto cable as shown. Position contact such that a gap of no more than .020 (0.51) is kept between dielectric and contact. Solder contact to center conductor through solder hole using .020 (0.51) Diameter solder. Use a minimum amount of solder for a good joint. Do not allow contact to move into dielectric during soldering process.
4. Flare braid and slide body assembly over contact, foil and dielectric, then under braid. Seat body assembly firmly onto contact. Arrange braid uniformly around crimp stem. Slide crimp sleeve forward and crimp using Johnson hand crimp tool 141-0000-913 and recommended crimp die hex.

Cable Group	Part No.	Crimp Hex
LMR-195	142-0307-411	.213 (5.41)
	142-0307-416	.213 (5.41)
LMR-240	142-0335-401	.255 (6.48)
	142-0335-406	.255 (6.48)
LMR-200	142-0339-401	.213 (5.41)
	142-0339-406	.213 (5.41)
LMR-195	142-0407-011	.213 (5.41)
	142-0407-016	.213 (5.41)
LMR-240	142-0435-001	.255 (6.48)
	142-0435-006	.255 (6.48)
LMR-200	142-0439-001	.213 (5.41)
	142-0439-006	.213 (5.41)
LMR-240	142-4435-001	.255 (6.48)
	142-4435-006	.255 (6.48)
LMR-200	142-4439-001	.213 (5.41)
	142-4439-006	.213 (5.41)
LMR-195	142-4407-001	.213 (5.41)
	142-4407-006	.213 (5.41)
LMR-240	142-5435-001	.255 (6.48)
	142-5435-006	.255 (6.48)
LMR-200	142-5439-001	.213 (5.41)
	142-5439-006	.213 (5.41)
LMR-195	142-5407-001	.213 (5.41)
	142-5407-006	.213 (5.41)



## SMA Straight Solder Type for Semi-Rigid Cables (cont'd from last page)

Cable Group	Part No.
RG-405/U (.086 Semi-Rigid)	141-0593-421 141-0693-062
RG-402/U (.141 Semi-Rigid)	141-0594-421 141-0694-062





## SMA Crimp Type Right Angle Plugs for Flexible Cable (cont'd from last page)

Cable Group	Part No.	Crimp Hex
RG-316/U, 161, 174, 188; LMR-100	141-0403-102	.128 (3.25)
RG-316 DS, 188 DS	141-0404-112	.151 (3.83)
RG-58/U, 141, 303	141-0407-102	.213 (5.41)
RG-55/U, 142, 223, 400	141-0408-102	.213 (5.41)
RG-178/U, 196	142-0402-101 142-0402-106	.105 (2.67) .105 (2.67)
RG-316/U, 161, 174, 188; LMR-100	142-0403-101 142-0403-106	.128 (3.25) .128 (3.25)
RG-316 DS, 188 DS	142-0404-101 142-0404-106	.151 (3.83) .151 (3.83)
RG-58/U, 141, 303	142-0407-101 142-0407-106	.213 (5.41) .213 (5.41)
RG-55/U, 142, 223, 400	142-0408-101 142-0408-106	.213 (5.41) .213 (5.41)
RG-179/U, 187	142-0433-101 142-0433-106	.128 (3.25) .128 (3.25)
RG-316/U, 161, 174, 188; LMR-100	142-4403-101 142-4403-106	.128 (3.25) .128 (3.25)
RG-316 DS, 188 DS	142-4404-101 142-4404-106	.151 (3.83) .151 (3.83)
RG-58/U, 141, 303	142-4407-101 142-4407-106	.213 (5.41) .213 (5.41)
RG-55/U, 142, 223, 400	142-4408-101 142-4408-106	.213 (5.41) .213 (5.41)
RG-316/U, 161, 174, 188; LMR-100	142-5403-101 142-5403-106	.128 (3.25) .128 (3.25)
RG-316 DS, 188 DS	142-5404-101 142-5404-106	.151 (3.83) .151 (3.83)
RG-58/U, 141, 303	142-5407-101 142-5407-106	.213 (5.41) .213 (5.41)
RG-55/U, 142, 223, 400	142-5408-101 142-5408-106	.213 (5.41) .213 (5.41)
RG-316/U, 188, 174	142-9403-101	.128 (3.25)
RG-316 DS, 188 DS	142-9404-101	.151 (3.83)
RG-58/U, 141	142-9407-101	.213 (5.41)

## SMA High Frequency End Launch Connectors PC Mounting Instructions

High frequency end launch performance is dependent upon proper mounting. The following factors must be controlled for optimum performance:

- The connector should fit tightly against the circuit board edge, avoid gaps.
- The center contact pin must lie parallel and flat against the circuit board, avoid gaps.
- The contact pin should be centered on the circuit board signal trace.
- Use a minimal amount of solder between the contact pin and signal trace. Do not allow excess solder to build up or flow down the trace.
- Clean all excess flux and other residue from the launch area, especially between the trace and ground.

The basic steps required to mount the end launch connector to the circuit board are as follows:

- Fixture 140-0000-973 should be used as an aid during manual soldering. The fixture protects the connector from damage during clamping and also maintains the proper location of the connector's insulator and contact. To use the fixture, thread the coupling nut on the mating end of the connector and hand tighten. This mounting assembly can now be held in a vice or similar clamping device, as shown in Figure 1.
- Position connector on the circuit board, making sure the contact pin is aligned with the center of the signal trace as shown in Figure 2. Make sure that the connector legs and contact pin are held flush against the top of the circuit board, keeping the axis of the connector parallel to the plane of the circuit board, as shown in Figure 3.
- A small amount of Teflon® insulation projects from rear mating plane of the connector, which acts as a seal when soldering the center conductor pin to the trace. Clamp the connector tightly against the edge of the board. This action compresses the insulator seal against the board edge. This effectively creates a barrier between the inner and outer conductors, preventing the bridging of solder.
- While ensuring the connector is held in the correct position, solder the ground legs and/or ground posts to the top and bottom of the board prior to bonding the center pin to the trace.
- Once the connector body is properly grounded to the board, the center contact pin can be bonded to the trace by using a minimal amount of solder as shown in Figure 4. It is important that solder flows along the length of the exposed pin, creating a good electrical and mechanical connection. Remove any excess solder that is not required for a solid joint.
- Clean all flux and other residues from the trace area between the signal side ground legs, as any flux present between the signal trace and ground will affect performance. The completed mounting assembly should look similar to the one shown in Figure 5.



Figure 1



Figure 2



Figure 3



Figure 4

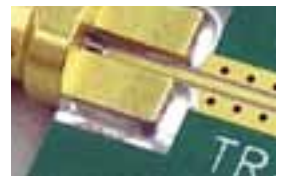


Figure 5

## Reference dimensions for 50 Ohm grounded coplanar waveguide using Rogers Corporation RO4003C™ high frequency substrate laminate\*

Holes	GCPW 50Ω Impedance Reference Dimensions*				Mounting and Via		
Part No.	Substrate Thickness	Conductor Thickness	Trace Width "A"	Ground Gaps "B"	Fig	"C"	"D"
142-0761-801	.0080 (0.203)	.0014 (0.036)	.0155 (0.394)	.0100 (0.254)	1	.066 (1.68)	.096 (2.44)
142-0761-811	.0080 (0.203)	.0014 (0.036)	.0155 (0.394)	.0100 (0.254)	1	.066 (1.68)	.096 (2.44)
142-0761-821	.0160 (0.406)	.0014 (0.036)	.0285 (0.724)	.0100 (0.254)	1	.084 (2.13)	.113 (2.87)
142-0761-831	.0160 (0.406)	.0014 (0.036)	.0285 (0.724)	.0100 (0.254)	1	.084 (2.13)	.113 (2.87)
142-0761-841	.0080 (0.203)	.0014 (0.036)	.0155 (0.394)	.0100 (0.254)	2	.066 (1.68)	
142-0761-851	.0080 (0.203)	.0014 (0.036)	.0155 (0.394)	.0100 (0.254)	2	.066 (1.68)	
142-0761-861	.0160 (0.406)	.0014 (0.036)	.0285 (0.724)	.0100 (0.254)	2	.084 (2.13)	
142-0761-871	.0160 (0.406)	.0014 (0.036)	.0285 (0.724)	.0100 (0.254)	2	.084 (2.13)	
142-0761-881	.0080 (0.203)	.0014 (0.036)	.0155 (0.394)	.0100 (0.254)	1	.066 (1.68)	.096 (2.44)
142-0761-891	.0080 (0.203)	.0014 (0.036)	.0155 (0.394)	.0100 (0.254)	2	.066 (1.68)	
142-0771-821	.0160 (0.406)	.0014 (0.036)	.0285 (0.724)	.0100 (0.254)	1	.084 (2.13)	.113 (2.87)
142-0771-831	.0160 (0.406)	.0014 (0.036)	.0285 (0.724)	.0100 (0.254)	2	.084 (2.13)	

\* These calculated dimensions assume a quasi-static mode of propagation, but dispersion does exist for coplanar waveguide. The characteristic impedance and effective dielectric constant may increase slightly for X-band and higher frequencies, unless very small ground to ground gap spacing is used.

It is assumed the conductors have rectangular cross-sections. The etching process used in circuit board fabrication actually produces trapezoidal shapes. Therefore, the GCPW impedance may increase somewhere between that of a perfect rectangular conductor and a theoretical zero thickness conductor.



Figure 1

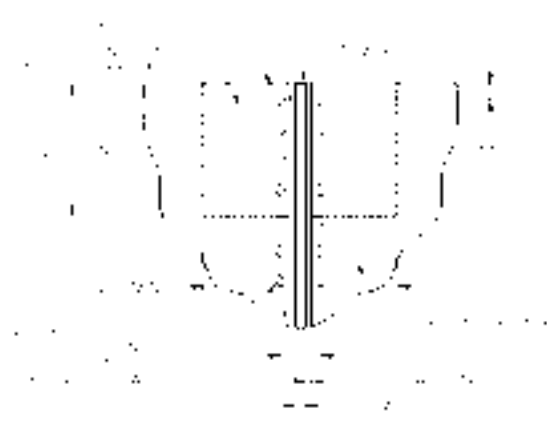
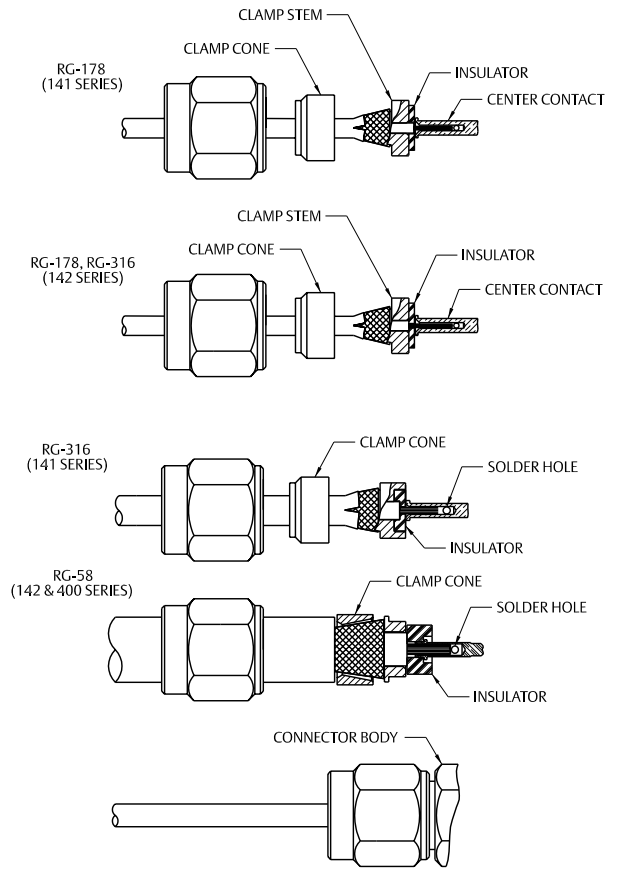


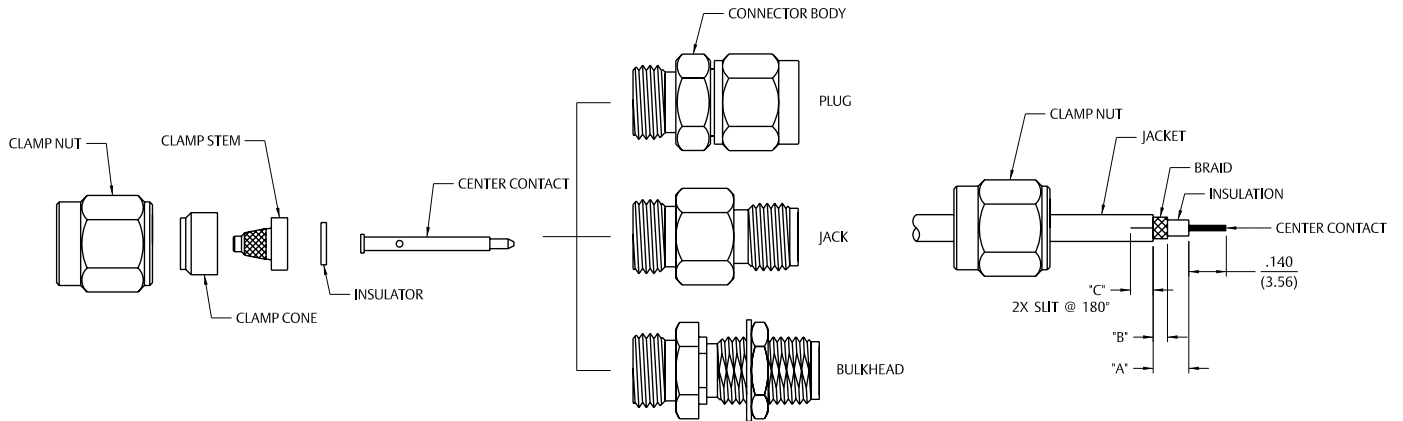
Figure 2

# SMA Clamp Type Straight Plugs, Straight Jacks, and Straight Bulkhead Jacks for Flexible Cable

1. Identify connector parts. (6 piece parts – except bulkhead)
2. Strip cable to dimensions shown. Do not nick braid or center conductor. A wire stripper of correct size is recommended for this step. Twist stranded center conductor into tight bundle and tin (optional). Slide clamp nut and clamp cone onto cable as shown. Clamp cone must be oriented as shown for each size of cable. The RG-58/142 clamp cone slides over braid and against jacket.
3. Flare braid and slide cable into clamp stem. Place rear insulator and center contact over center conductor and position as shown for different cable sizes. Solder center conductor to contact through the solder hole. Solder must not be allowed to gather and run on outside of contact. Use a minimum amount of solder for a good joint. .020 (0.51) diameter solder is recommended.
4. Arrange braid uniformly around clamp stem. Slide center contact assembly into body. Slide clamp nut against clamp cone and braid and tighten to 10 in.-lb. torque.



Cable Group	Part No.	"A"	"B"	"C"
RG-178/U, 196	142-0202-011/016	.133 (3.38)	.053 (1.35)	.085 (2.16)
RG-161/U, 174,188, 316	142-0203-011/016	.133 (3.38)	.053 (1.35)	.085 (2.16)
RG-58/U, 141, 303	142-0207-011/016	.225 (5.72)	.145 (3.68)	NONE
RG-142, 223, 55, 400	142-0207-011/016	.285 (7.24)	.165 (4.19)	NONE
RG-178/U, 196	142-0102-401/406	.133 (3.38)	.053 (1.35)	.085 (2.16)
RG-161/U, 174,188, 316	142-0103-401/406	.133 (3.38)	.053 (1.35)	.085 (2.16)
RG-58/U, 141, 303	142-0107-401/406	.225 (5.72)	.145 (3.68)	NONE
RG-142, 223, 55, 400	142-0107-401/406	.285 (7.24)	.165 (4.19)	NONE

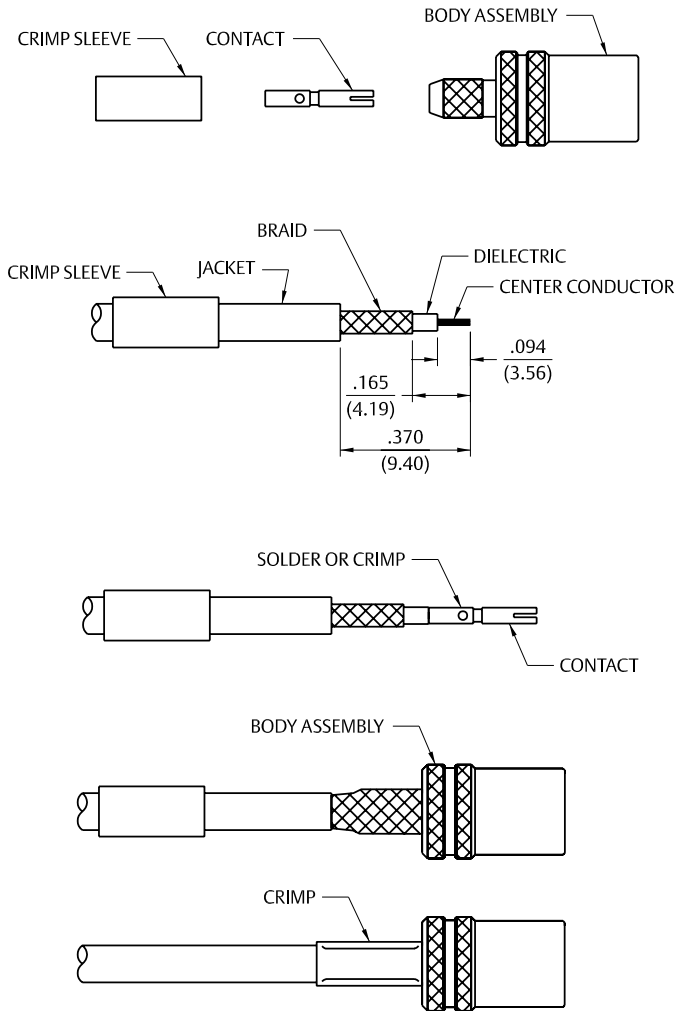


## SMB 3-Piece Straight Plugs

1. Identify connector parts. (3 piece parts): Crimp sleeve, body assembly and contact
2. Strip cable to dimensions shown. Do not nick braid or center conductor. Tin center conductor if contact will be solder attached. Do not tin center conductor if contact is to be crimp attached. Slide heat shrink (as applicable) and crimp sleeve onto jacket of cable.
3. Assemble contact onto cable as shown.
 

**Solder Attachment:** Solder contact to center conductor through solder hole using .015 (0.38) diameter solder. Use a minimum amount of solder for a good joint.

**Crimp Attachment:** A miniature 8 indent crimp tool 140-0000-970 is recommended. Crimp location should be centered between end of contact and X-hole using positioner 140-0000-971. Crimp attachment to solid center conductor cables is not recommended.
4. Flare braid and slide body assembly over contact and under braid. Then seat body assembly firmly onto contact. The cable may have to be held in a clamping fixture. Arrange braid uniformly around crimp stem. Slide crimp sleeve forward and crimp using recommended crimp tool. Slide heat shrink forward and shrink (as applicable).

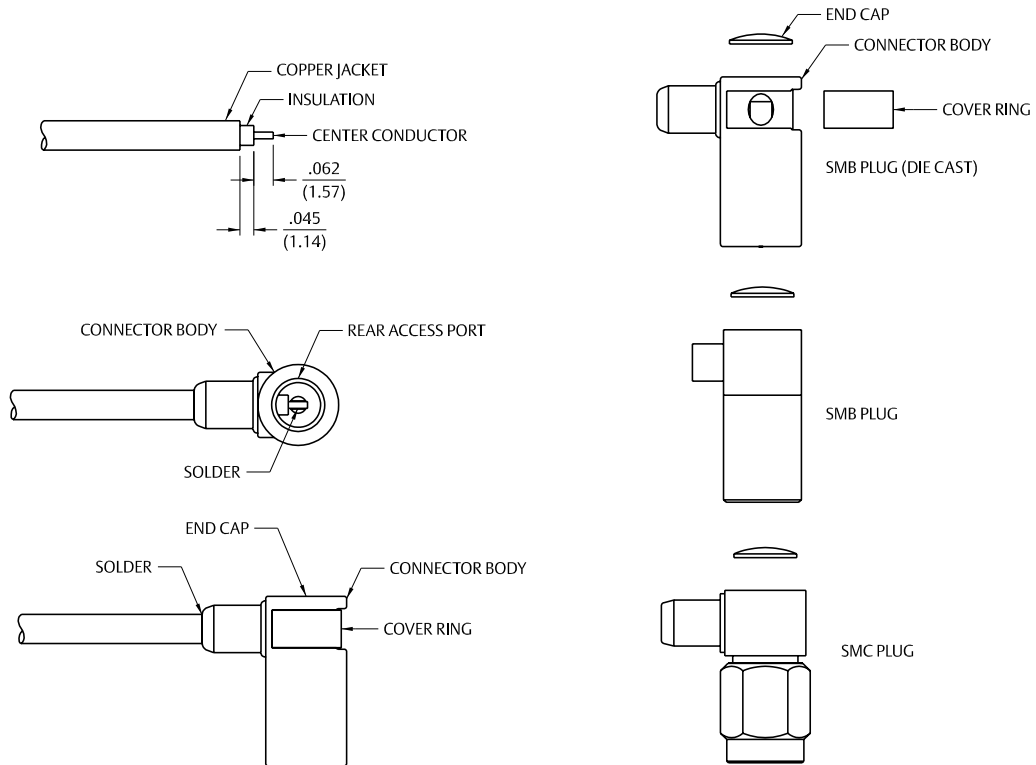


Cable Group	Part No.	Crimp Hex
RG-316/U, 161, 174, 179, 187, 188	131-3403-021/026	.128 (3.25)
RG-316 DS, 188 DS, 179 DS	131-3404-021/026	.151 (3.83)
RG-58/U, 141, 303	131-3407-011/016	.213 (5.41)
RG-179/U, 187	131-8433-001/006	.128 (3.25)
RG-179 DS, 187 DS	131-8434-001/006	.151 (3.83)
Belden 735A	131-8445-011/016	.178 (4.52)
RG-316/U, 188, 174, 179, 187	131-9403-021	.128 (3.25)
RG-316 DS, 188 DS, 179 DS, 187 DS	131-9404-021	.151 (3.83)

## SMB/SMC Solder Type Right Angle Plugs for Semi-Rigid Cable

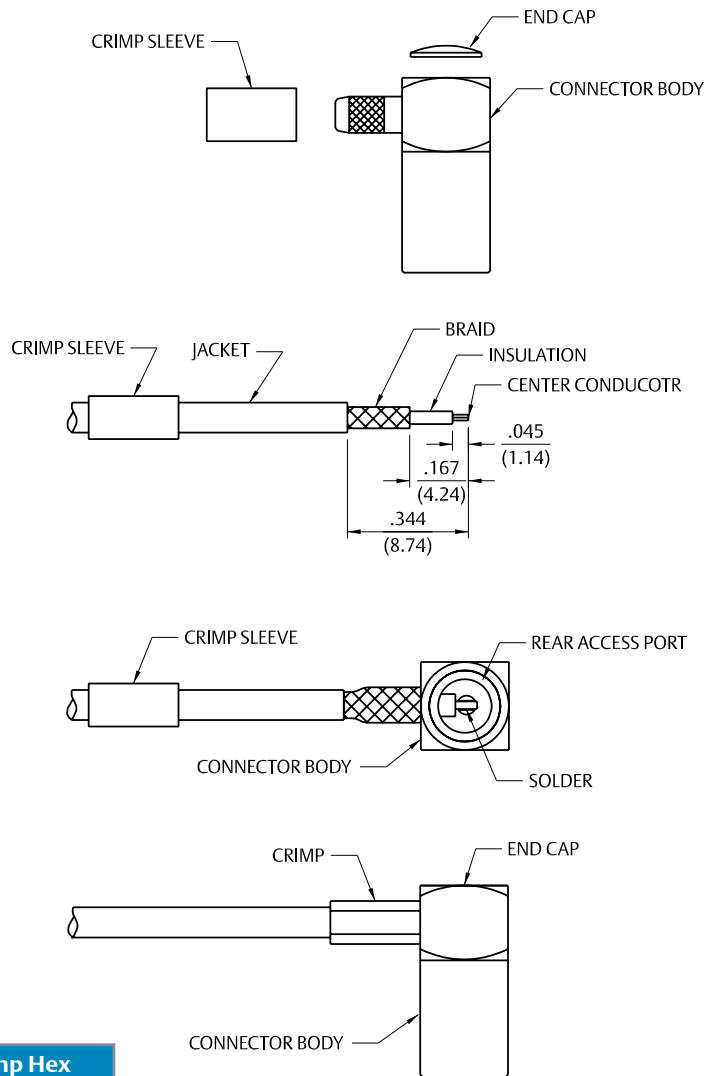
1. Identify connector parts. (2 piece parts – except diecast)
2. Strip cable to dimensions shown. Do not nick center conductor.
3. Insert cable into body making certain that the cable insulation bottoms on center contact. Solder center conductor to contact through the rear and side access ports. Use a minimum amount of solder for a good joint. .020 (0.51) diameter solder is recommended.
4. Solder body to cable. Use a minimum amount of heat to minimize cable insulation movement. Place expansion cap in access port and set with .125 (3.17) diameter punch. Snap cover ring over side access port.

Cable Group	Part No.
RG-405/U (.086 Semi-Rigid)	131-1693-101
	131-1693-116
	131-3693-101
	131-3693-116



## SMB Right Angle Crimp Type Straight Plugs for Flexible Cable

1. Identify connector parts. (3 piece parts: crimp sleeve, body assembly and expansion cap.)
2. Strip cable to dimensions shown. Do not nick braid or center conductor. A wire stripper of correct size is recommended for this step. Twist stranded center conductor into tight bundle and tin (optional). Slide crimp sleeve onto cable as shown.
3. Flare braid and slide cable into body assembly making certain that the cable insulation bottoms on center contact. Arrange braid uniformly around crimp stem of body assembly. Slide crimp sleeve over braid and crimp securely using recommended crimp tool.
4. Solder center conductor to contact through the rear and side access ports. Use a minimum amount of solder for a good joint. .020 (0.51) diameter solder is recommended. Place expansion cap in access port and seat with a .125 (3.17) diameter flat punch. Snap cover ring over side access port.

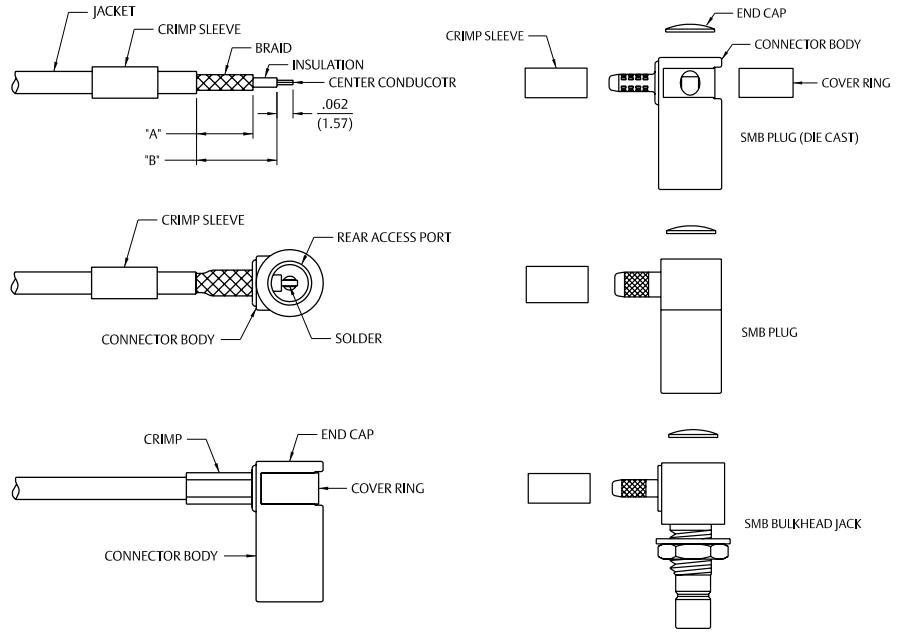


Cable Group	Part No.	Crimp Hex
RG-316/U, 188, 174, 179, 187	131-9403-101 / -116	.128 (3.25)
RG-316 DS, 188 DS, 179 DS, 187 DS	131-9404-101 / -116	.151 (3.83)

## SMB/SMC/Mini-75Ohm SMB Crimp Type Right Angle Plugs and Right Angle Bulkhead Jacks for Flexible Cable

1. Identify connector parts. (4 piece parts: crimp sleeve, body assembly, expansion cap and covering ring. Die cast body only.)
2. Strip cable to dimensions shown. Do not nick braid or center conductor. A wire stripper of correct size is recommended for this step. Twist stranded center conductor into tight bundle and tin (optional). Slide crimp sleeve onto cable as shown.
3. Flare braid and slide cable into body assembly making certain that the cable insulation bottoms on center contact. Arrange braid uniformly around crimp stem of body assembly. Slide crimp sleeve over braid and crimp securely using recommended crimp tool.

4. Solder center conductor to contact through the rear and side access ports. Use a minimum amount of solder for a good joint. .020 (0.51) diameter solder is recommended. Place expansion cap in access port and seat with a .125 (3.17) diameter flat punch. Snap cover ring over side access port if applicable.



Cable Group	Part No.	"A"	"B"	Crimp Hex
RG-178/U, 196	131-1402-101/116	.219 (5.56)	.312 (7.92)	.105 (2.67)
RG-316/U, 161, 174, 179, 187, 188	131-1403-101/116	.219 (5.56)	.312 (7.92)	.128 (3.25)
RG-179 DS, 187 DS, 188 DS, 316 DS	131-1404-101/116	.219 (5.56)	.312 (7.92)	.151 (3.83)
RG-316/U, 161, 174, 179, 187, 188	131-3303-501/506	.219 (5.56)	.312 (7.92)	.128 (3.25)
RG-179 DS, 187 DS, 188 DS, 316 DS	131-3304-501/506	.219 (5.56)	.312 (7.92)	.151 (3.83)
RG-178/U, 196	131-3402-101/116	.177 (4.50)	.289 (7.34)	.105 (2.67)
RG-316/U, 161, 174, 179, 187, 188	131-3403-101/116	.177 (4.50)	.289 (7.34)	.128 (3.25)
RG-179 DS, 187 DS, 188 DS, 316 DS	131-3404-101/116	.177 (4.50)	.289 (7.34)	.151 (3.83)
RG-58/U, 141, 303	131-3407-101/106	.219 (5.56)	.289 (7.34)	.213 (5.41)
RG-316/U, 161, 174, 188	131-6403-101/106	.219 (5.56)	.312 (7.92)	.128 (3.25)
316 DS, 188 DS	131-6404-101/106	.219 (5.56)	.312 (7.92)	.151 (3.83)
RG-179/U, 187	131-6433-101/106	.219 (5.56)	.312 (7.92)	.151 (3.83)
RG-179/U, 187, 316,	131-8403-101/106	.177 (4.50)	.289 (7.34)	.128 (3.25)
161, 174, 188	131-8403-111/116	.219 (5.56)	.312 (7.92)	.128 (3.25)
RG-179 DS, 187 DS	131-8404-101/106	.177 (4.50)	.289 (7.34)	.151 (3.83)
316 DS, 188 DS	131-8404-111/116	.219 (5.56)	.312 (7.92)	.151 (3.83)
RG-59	131-8409-101/106	.219 (5.56)	.289 (7.34)	.255 (6.48)
BELDEN 735A	131-8445-101/106	.177 (4.50)	.289 (7.34)	.178 (4.52)
RG-316/U, 188, 174, 179, 187	131-9403-101/116	.177 (4.50)	.289 (7.34)	.128 (3.25)
RG-316 DS, 188 DS, 179 DS, 187 DS	131-9404-101/116	.177 (4.50)	.289 (7.34)	.151 (3.83)

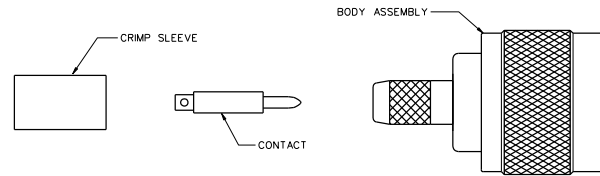


## Type N Straight Crimp Type Plugs for Flexible Cable

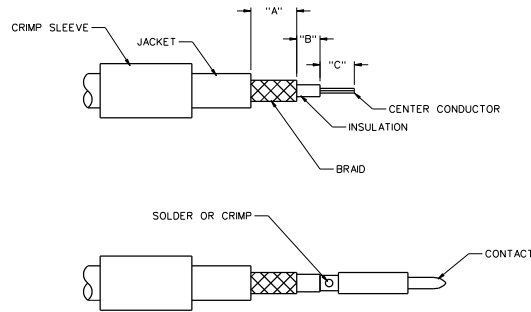
- Identify connector parts. (3 piece parts – except bulkheads)
- Strip cable to dimensions shown. Do not nick braid or center conductor. Tin center conductor if contact will be solder attached. Do not tin center conductor if contact is to be crimp attached. A wire stripper of correct size is recommended for this step. Slide heat shrink (as applicable) and crimp sleeve onto jacket of cable.
- Assemble contact onto cable as shown.
 

**Solder Attachment:** Solder contact to center conductor through hole using a minimum amount of solder for a good joint.

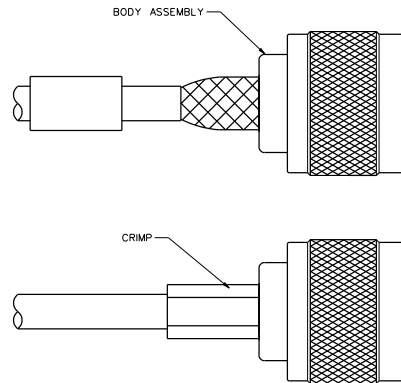
**Crimp Attachment (where applicable):** Crimp contact to center conductor using recommended crimp hex.
- Flare braid and slide body assembly over contact and under braid. Then seat body assembly firmly onto contact. The cable may have to be held in a clamping fixture. Arrange braid uniformly around crimp stem. Slide crimp sleeve forward and crimp using recommended crimp hex. Slide heat shrink forward and shrink (as applicable).



A



B

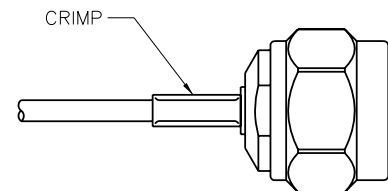
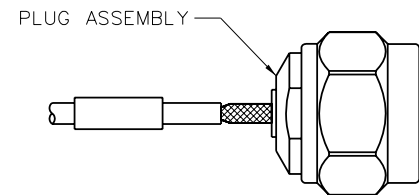
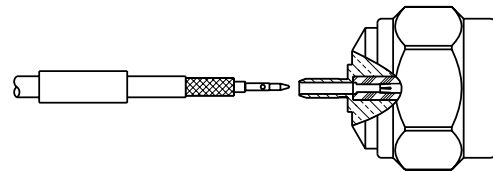
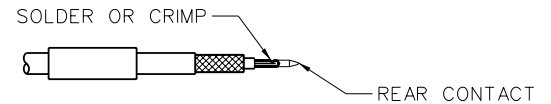
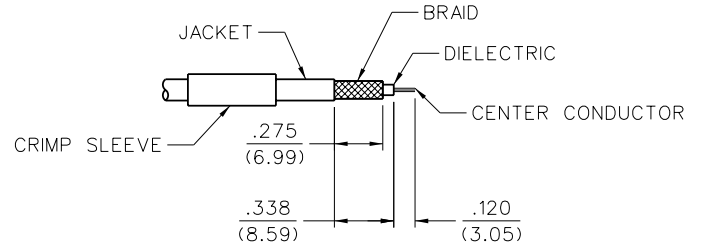
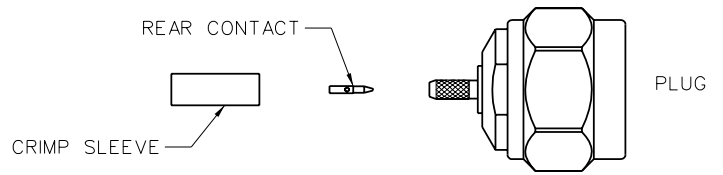


C

Part No.	Cable	Strip Dimensions			Crimp Sleeve Hex	Contact Crimp Hex	Recommended Crimp
		"A"	"B"	"C"			
CPN681	RG-58	.335 (8.50)	.079 (2.00)	.157 (4.00)	.215 (5.46)	.065 (1.65)	24-8858P
CPN6813	RG-142	.335 (8.50)	.079 (2.00)	.157 (4.00)	.215 (5.46)	.065 (1.65)	24-8858P
CPN688	RG-8, 213	.354 (9.00)	.138 (3.50)	.157 (4.00)	.429 (10.90)	.100 (2.54)	24-313
138-4408-007	RG-55/U, 142, 223, 400	.301 (7.65)	.140 (3.56)		.213 (5.41)	.068 (1.73)	.113 (2.87)
138-4449-007	LMR-400, BELDEN 9913	.385 (9.78)	.170 (4.32)		.429 (10.90)	.116 (2.95)	

## Type N Straight Plug Crimp Style for RG-316 and 316DS Flexible Cable

- 1 Identify connector parts. (3 piece parts)
- 2 Strip cable to dimensions shown. Do not nick center conductor. A wire stripper of correct size is recommended for this step. Tin center conductor if contact will be solder attached. Do not tin center conductor if contact will be crimp attached. Slide crimp sleeve onto jacket of cable.
3. Assemble rear contact onto cable as shown  
Rear contact should butt against cable dielectric during attachment.  
**Solder Attachment:** Solder rear contact to center conductor through solder hole using .020 (.051) diameter flux core solder wire. Use a minimum amount of solder for a good joint.  
**Crimp Attachment:** Crimp rear contact to center conductor using Johnson indent hand tool 140-0000-970. Crimp location should be centered between end of rear contact and solder hole using positioning tool 140-0000-971. Crimp attachment to solid center conductor cables is not recommended.
4. Flare braid and slide plug connector assembly over rear contact and under braid. Rear contact must engage fully with internal captivated plug contact. Cable jacket should be located near end of crimp stem when contacts are fully engaged.
5. Arrange braid uniformly around crimp stem. Slide crimp sleeve forward and crimp using Johnson ergonomic hand crimp frame 140-0000-967 with recommended hex size die set. Maintain forward pressure on cable while crimping.

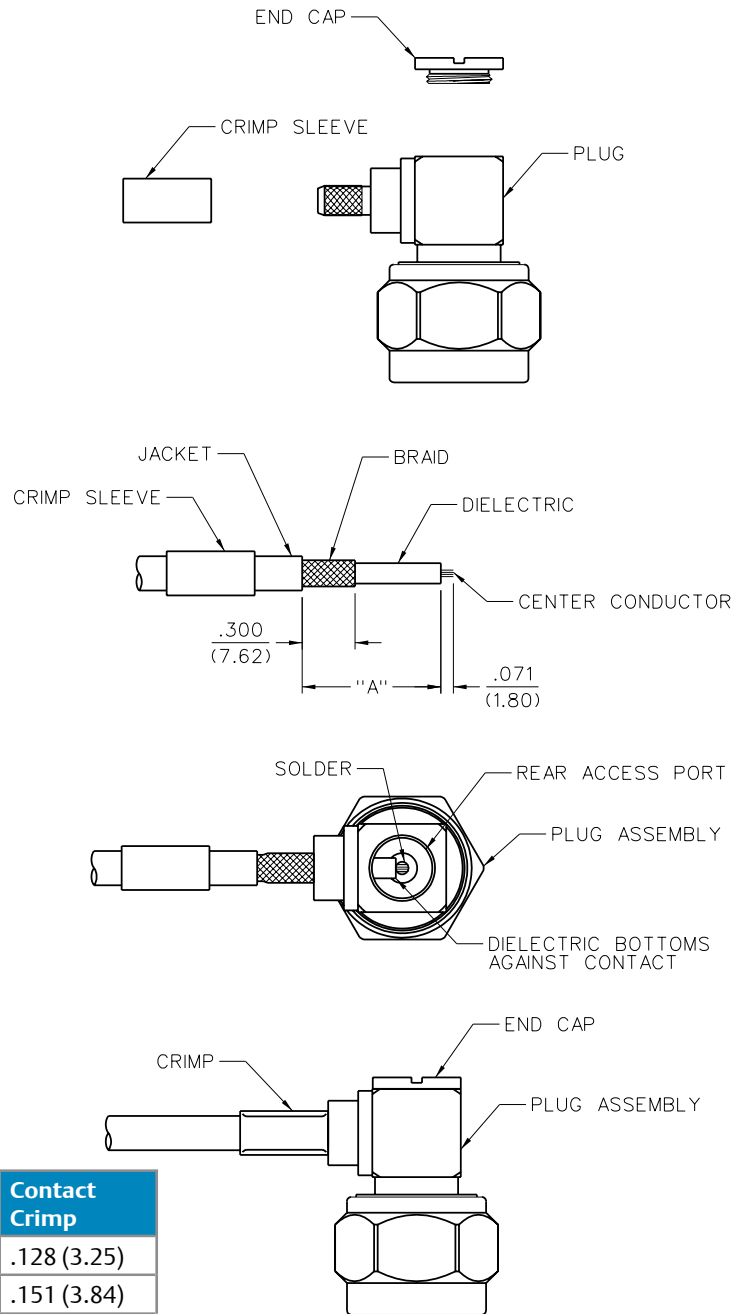


Cable Group	Part No.	Crimp Sleeve Hex Size	Contact Crimp
RG-316/U, 161, 174, 188	138-4403-007	.128 (3.25)	8 INDENT
RG-316 DS, 188 DS	138-4404-007	.151 (3.84)	8 INDENT

	Assembly
Tool	138-4403/4404-007
Crimp Frame	140-0000-967
Die Set	140-0000-990
Contact Tool	140-0000-970
Positioner	140-0000-971

## Type N Right Angle Plug Crimp Style for RG-316, 316DX, 58, and 142 Flexible Cable

1. Identify connector parts. (3 piece parts)
2. Strip cable to dimensions shown. Do not nick center conductor. A wire stripper of correct size is recommended for this step. Twist stranded center conductor into tight bundle and tin (optional). Slide crimp sleeve onto jacket of cable.
3. Flare braid and slide plug connector assembly over cable dielectric and under braid. Make sure cable dielectric bottoms against plug contact as shown. Solder center conductor to contact through rear access port. Use a minimum amount of solder for a full fillet joint.
4. Arrange braid uniformly around crimp stem. Slide crimp sleeve forward and crimp using Johnson ergonomic hand crimp frame 140-0000-967 with recommended hex size die set. Screw end cap into access port.



Cable Group	Part No.	Crimp Sleeve Hex Size	Contact Crimp
RG-316/U, 161, 174, 188	138-4403-107	.755 (19.18)	.128 (3.25)
RG-316 DS, 188 DS	138-4404-107	.755 (19.18)	.151 (3.84)
RG-58/U, 141, 303	138-4407-107	.788 (20.02)	.213 (5.41)
RG-55/U, 142, 223, 400	138-4408-107	.788 (20.02)	.213 (5.41)

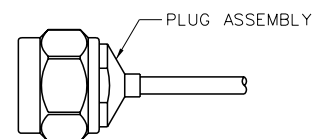
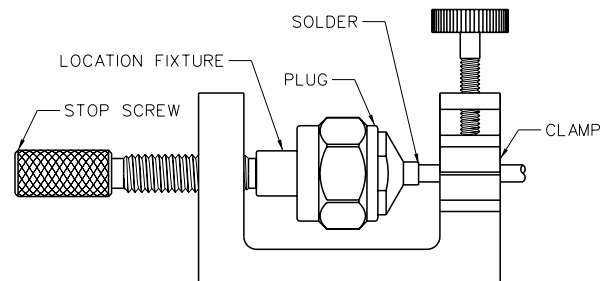
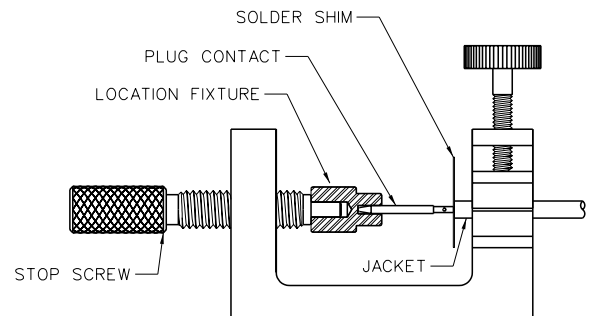
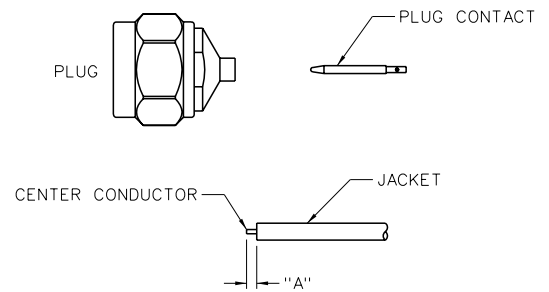
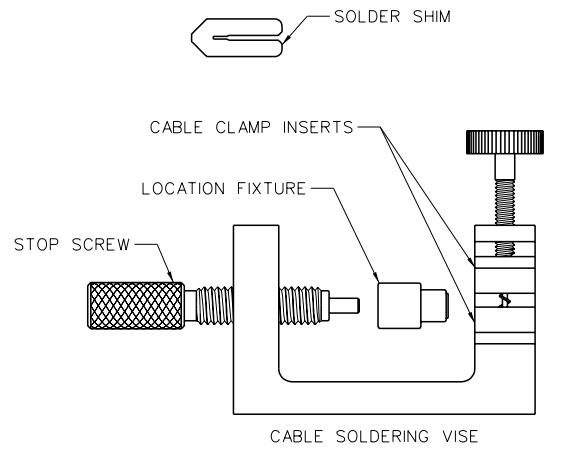
Assembly	
Tool	138-4403/4404/4407/4408-107
Crimp Frame	140-0000-967
Die Set	140-0000-990

## Type N Straight Plug Solder Style for Semi-Rigid Cable

1. Identify connector parts (2 piece parts) and tools (5 piece parts).
2. Strip cable jacket and dielectric to dimension shown. Do not nick center conductor. Clean all debris from cable.
3. Place plug contact onto center conductor, insert appropriate sized solder shim between cable jacket and contact.
4. Insert contact into location fixture and clamp cable in vise. Tighten stop screw until light pressure is applied between contact, solder shim and cable jacket.
5. Solder contact to center conductor through solder hole using .020 (.051) diameter flux core solder wire. Use a minimum amount of solder for a good joint.
6. After solder joint has cooled, loosen stop screw and remove solder shim. Remove cable from vise and remove any excess solder from contact with a sharp blade and clean all debris from contact and cable.
7. Insert contact and cable into plug connector assembly, making sure cable jacket bottoms out against internal shoulder of connector assembly. Insert location fixture into connector assembly and clamp cable in vise. Tighten stop screw until light pressure is applied between connector assembly and cable jacket.
8. Solder connector body to cable jacket, using a minimum amount of solder for a full fillet joint. Allow assembly to cool before removing connector from vise.

Cable Group	Part No.	"A"
RG-405, .086 Semi-Rigid	138-4693-001	.085 (2.16)
RG-402, .141 Semi-Rigid	138-4694-001	.085 (2.16)
RG-401, .250 Semi-Rigid	138-4696-001	.100 (2.54)

Assembly			
Tool	138-4693-001	138-4694-001	138-4696-001
Solder Shim	140-0000-984	140-0000-984	140-0000-985
Location Fixture	140-0000-983	140-0000-983	140-0000-983
Cable Vise	140-0000-962	140-0000-962	140-0000-962
Clamp Inserts	140-0000-964	140-0000-986	

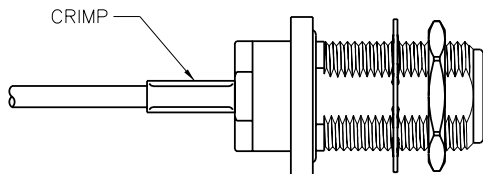
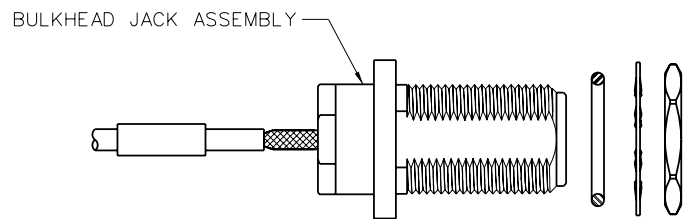
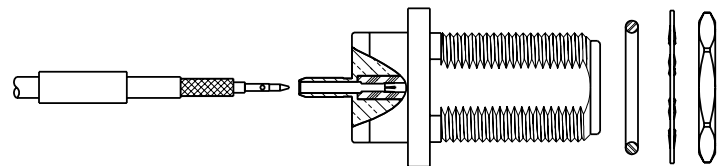
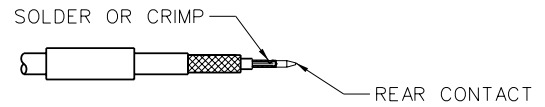
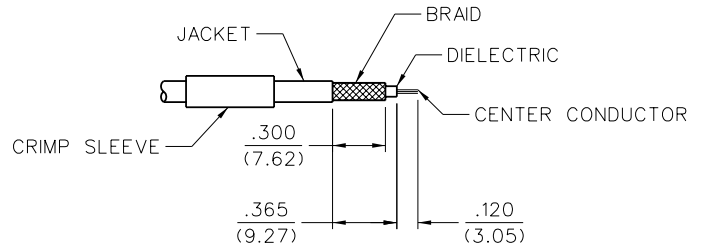
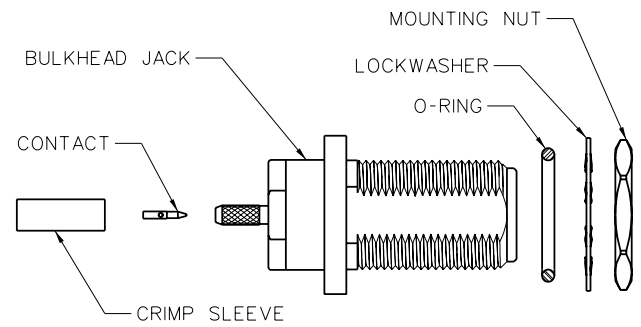


## Type N Bulkhead Jack Crimp Style for RG-316 and 316DS Flexible Cable

1. Identify connector parts. (6 piece parts)
2. Strip cable to dimensions shown. Do not nick center conductor. A wire stripper of correct size is recommended for this step. Tin center conductor if contact will be solder attached. Do not tin center conductor if contact will be crimp attached. Slide crimp sleeve onto jacket of cable.
3. Assemble rear contact onto cable as shown. Rear contact should butt against cable dielectric during attachment.
 

**Solder Attachment:** Solder rear contact to center conductor through solder hole using .020 (.051) diameter flux core solder wire. Use a minimum amount of solder for a good joint.

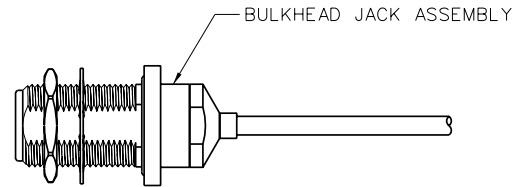
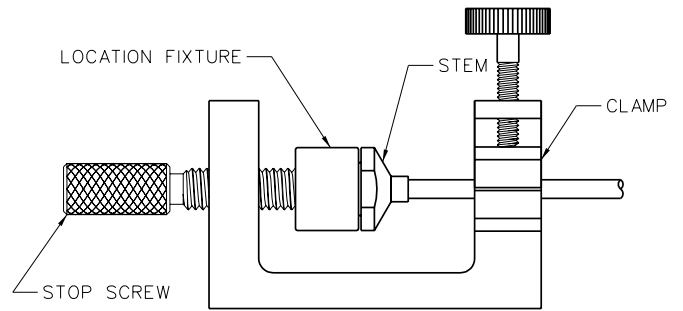
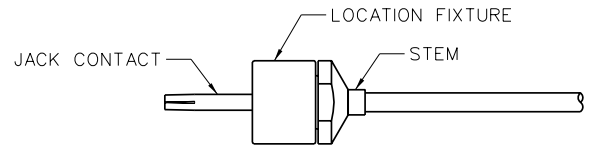
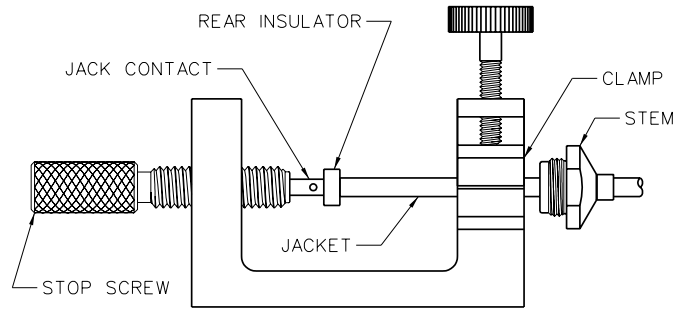
**Crimp Attachment:** Crimp rear contact to center conductor using Johnson indent hand tool 140-0000-970. Crimp location should be centered between end of rear contact and solder hole using positioning tool 140-0000-971. Crimp attachment to solid center conductor cables is not recommended.
4. Flare braid and slide bulkhead jack connector assembly over rear contact and under braid. Rear contact must engage fully with internal captivated jack contact. Cable jacket should be located near end of crimp stem when contacts are fully engaged.
5. Arrange braid uniformly around crimp stem. Slide crimp sleeve forward and crimp using Johnson ergonomic hand crimp frame 140-0000-967 with recommended hex size die set. Maintain forward pressure on cable while crimping.
6. Add gasket, lock washer and mounting nut when installing.



Cable Group	Part No.	Crimp Sleeve Hex Size	Contact Crimp
RG-316/U, 161, 174, 188	138-4303-407	.128 (3.25)	8 INDENT
RG-316 DS, 188 DS	138-4304-407	.151 (3.84)	8 INDENT

	Assembly
Die Set	140-0000-990
Contact Tool	140-0000-970
Positioner	140-0000-971

## Type N Bulkhead Jack Solder Style for Semi-Rigid Cable (cont'd from last page)



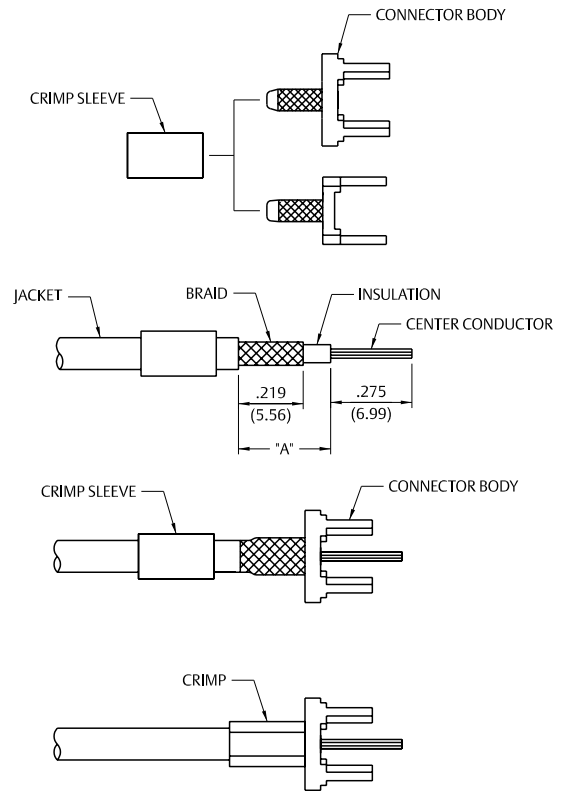
Cable Group	Part No.
RG-405, .086 Semi-Rigid	138-4593-401
RG-402, .141 Semi-Rigid	138-4594-401
RG-401, .250 Semi-Rigid	138-4596-401

Assembly			
Tool	138-4593-401	138-4594-401	138-4596-401
Stop Screw	140-0000-972	140-0000-972	140-0000-972
Cable Vise	140-0000-962	140-0000-962	140-0000-962
Clamp Inserts	140-0000-964	140-0000-965	140-0000-986
Location Fixture	140-0000-987	140-0000-988	140-0000-989

## Crimp Type Straight Cable Termination for Flexible Cable

1. Identify connector parts. (2 piece parts)
2. Strip cable to dimensions shown. Do not nick braid or center conductor. A wire stripper of correct size is recommended for this step. Twist stranded center conductor into tight bundle and tin. Slide crimp sleeve onto cable as shown.
3. Flare braid and slide cable into body making certain that the cable insulation is flush with bottom of connector.
4. Arrange braid uniformly around crimp stem. Slide crimp sleeve over braid and crimp securely using recommended crimp tool.

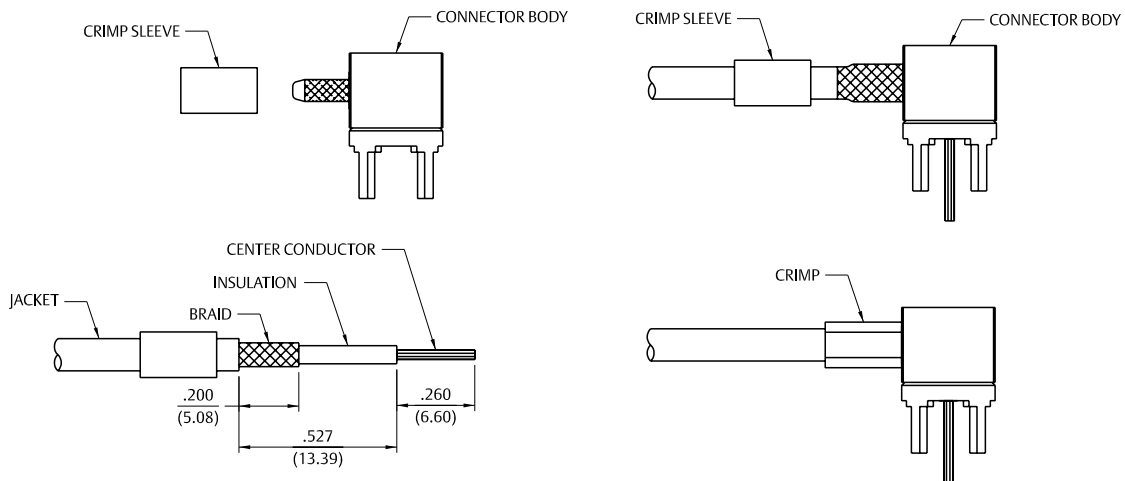
Cable Group	Part No.	"A"	Crimp Hex
RG-178/U, 196	142-0002-221/226	.259 (6.58)	.105 (2.67)
RG-316/U, 161, 174, 179, 187, 188	142-0003-201/206	.312 (7.92)	.128 (3.25)
	142-0003-231/236	.259 (6.58)	.128 (3.25)
	142-0003-241/246	.259 (6.58)	.128 (3.25)
RG-316 DS, 188 DS	142-0004-201/206	.312 (7.92)	.151 (3.83)
	142-0004-211/216	.259 (6.58)	.151 (3.83)
	142-0004-221/226	.259 (6.58)	.151 (3.83)



## Crimp Type Right Angle Cable Termination for Flexible Cable

1. Identify connector parts. (2 piece parts)
2. Strip cable to dimensions shown. Do not nick braid or center conductor. A wire stripper of correct size is recommended for this step. Twist stranded center conductor into tight bundle and tin. Slide crimp sleeve onto cable as shown.
3. Flare braid and slide cable into body making certain that the cable insulation is flush with bottom of connector body.
4. Arrange braid uniformly around crimp stem. Slide crimp sleeve over braid and crimp securely using recommended crimp tool.

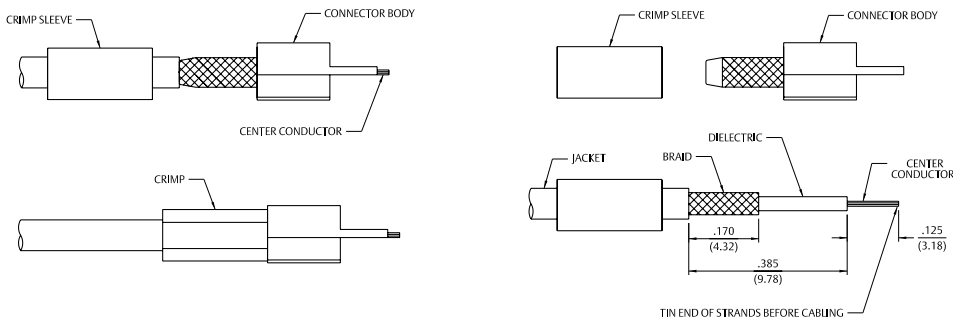
Cable Group	Part No.	Crimp Hex
RG-316/U, 161, 174, 179, 187, 188	142-0003-301/306	.128 (3.25)
RG-316 DS, 188 DS	142-0004-301/306	.151 (3.83)



## Solder Type Straight Cable Termination for End Launch Surface Mount

1. Identify connector parts. (2-piece parts)
2. Strip cable to dimensions shown. Do not nick braid or center conductor. A wire stripper of correct size is recommended for this step. Twist stranded center conductor into tight bundle and tine. Slide crimp sleeve onto cable as shown.
3. Flare braid and slide cable into body making certain that the cable dielectric is flush with the end of the connector body.
4. Arrange braid uniformly around crimp sleeve. Slide crimp sleeve over braid and crimp securely using recommended crimp tool.

Cable Group	Part No.	Crimp Hex
RG-178/U, 196	142-0002-821	.105 (2.67)



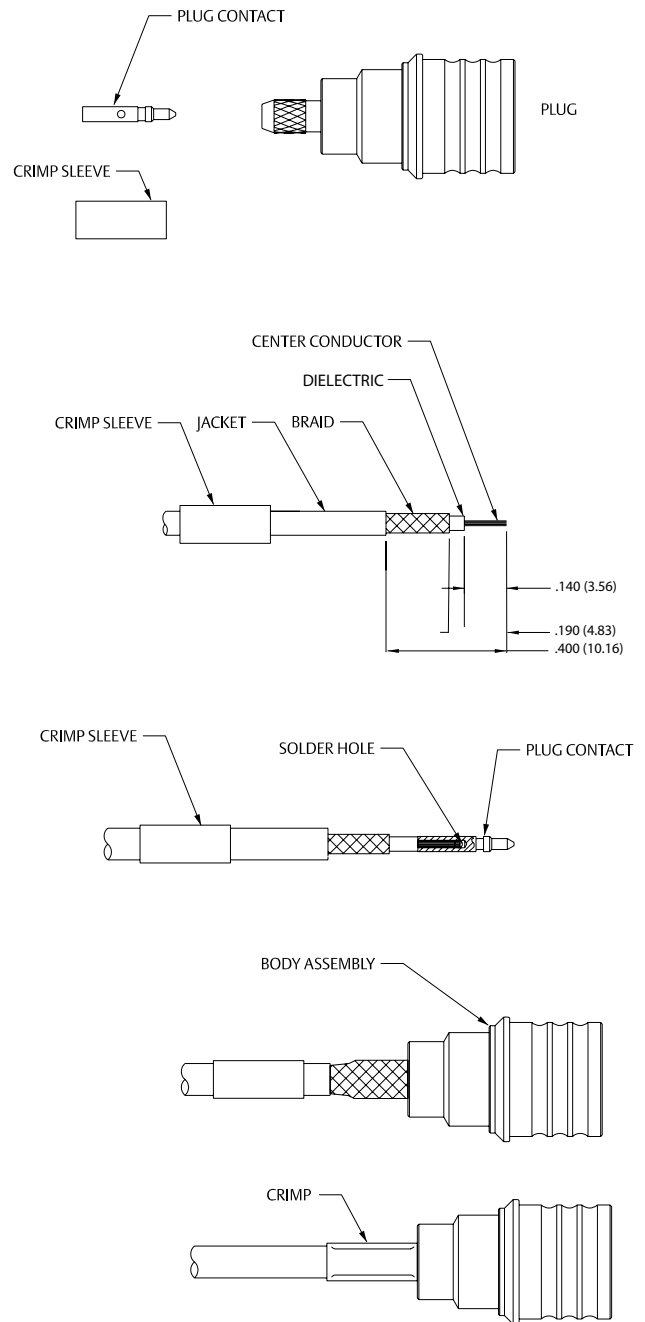


## kwiQMAte™ Straight Plugs for Flexible Cable – Crimp or Solder Contacts

1. Identify connector parts. (3 piece parts)
2. Strip cable to dimensions shown. Do not nick braid or center conductor. Tin center conductor if contact will be solder attached. Do not tin center conductor if contact is to be crimp attached. Slide heat shrink (as applicable) and crimp sleeve onto jacket of cable.
3. Assemble contact onto cable as shown.
 

**Solder Attachment:** Solder contact to center conductor through solder hole using .020 (0.51) diameter solder. Use a minimum amount of solder for a good joint.

**Crimp Attachment:** Crimp contact to center conductor using Johnson® Hand Tool 144-0000-910, setting #2. Crimp location should be centered between end of contact and X-hole. Crimp attachment to solid center conductor cables is not recommended.
4. Flare braid and slide body assembly over contact and under braid. Then seat body assembly firmly onto contact. The cable may have to be held in a clamping fixture. Arrange braid uniformly around crimp stem. Slide crimp sleeve forward and crimp using recommended crimp tool. Slide heat shrink forward and shrink (as applicable).



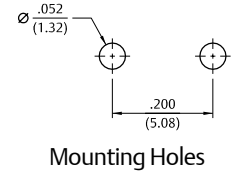
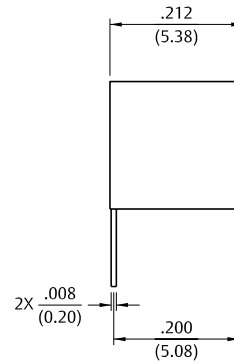
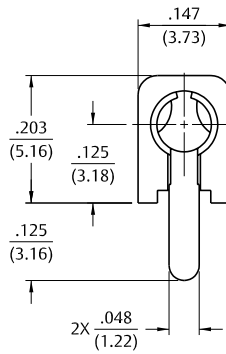
Cable Type	Part No.	Crimp Hex
RG-316	146-0403-007	.128 (3.25)
RG-316 DS	146-0404-007	.151 (3.83)

# Horizontal Test Jacks – For Test Points

## Insulated Miniature



Silver Plating	
Part No.	Color
105-1101-001	White
105-1102-001	Red
105-1103-001	Black
105-1104-001	Green
105-1107-001	Yellow



### SPECIFICATIONS

**Contact:** Copper aluminum alloy\*

**Finish:** Silver

**Body:** Nylon 6/6 per ASTM D4066

### RATINGS

**Current:** 5 amps

**Breakdown Voltage:** 2100 VRMS minimum

**Contact Resistance:** 0.010 ohms maximum

**Adjacent Jack C:** 1 pF maximum at 1 MHz

### For Standard Tip Plug:

**.080 (2.00) Diameter**

### FEATURES

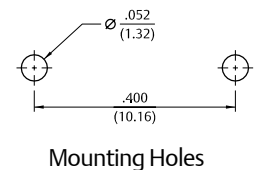
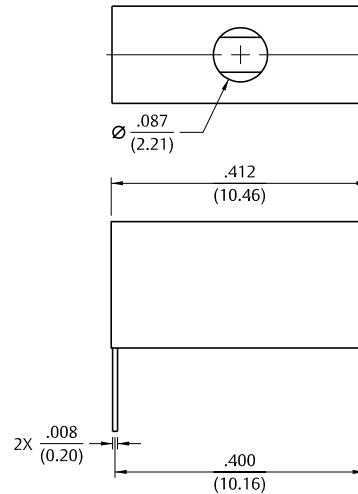
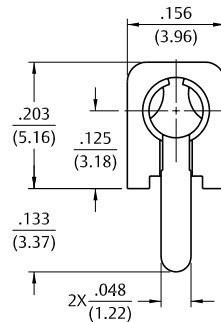
- Contact protected from flux and solder
- Probe access from both ends
- Nylon UL approved for self extinguishing

\*A new material development that, for this application, meets or exceeds beryllium copper.

## Insulated Standard



Silver Plating	
Part No.	Color
105-0751-001	White
105-0752-001	Red
105-0753-001	Black
105-0754-001	Green
105-0756-001	Orange
105-0757-001	Yellow
105-0758-001	Brown
105-0760-001	Blue
105-0762-001	Violet
105-0763-001	Gray



### SPECIFICATIONS

**Contact:** Copper aluminum alloy\*

**Finish:** Silver

**Body:** Nylon 6/6 per ASTM D4066

### RATINGS

**Current:** 5 amps

**Breakdown Voltage:** 2100 VRMS minimum

**Contact Resistance:** Silver: 0.010 ohms maximum

**Adjacent Jack C:** 1 pF maximum at 1 MHz

### For Standard Tip Plug:

**.080 (2.00) Diameter**

### FEATURES

- Contact protected from flux and solder
- Probe access from both ends
- Nylon UL approved for self extinguishing

\*A new material development that, for this application, meets or exceeds beryllium copper.

# Tip Jacks – For Connections to Test Equipment, Power Supplies, and Electronic Instrumentation

## Insulated Metal Clad: Military Type



### Gold Plating Part No. to Mil-Spec. Part No. Cross Reference

Part No.	Color	Mil-C-39024/10
105-0201-200	White	-01
105-0202-200	Red	-02
105-0203-200	Black	-03

### SPECIFICATIONS

**Contact:** Brass per QQ-B-626D with wrap around beryllium copper spring per QQ-C-533

**Finish:** Gold

**Body:** Nylon 6/6 per ASTM D4066

**Threaded Brass Jacket:** Per QQ-B-626D, nickel

**Hardware:** Nickel plated washer and nut (unassembled)

**Panel Thickness:** Up to .218 (5.45)

### RATINGS

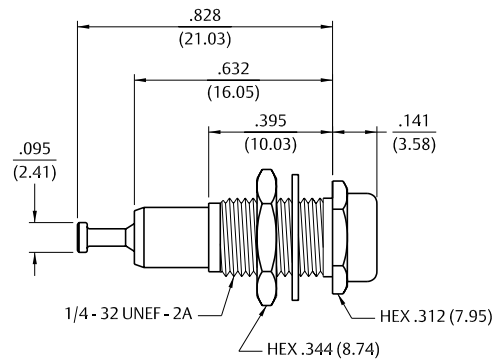
**Current:** 10 amps

**Breakdown Voltage:** 5700 VRMS minimum

**Contact Resistance:** 0.004 ohms maximum

**Contact-To-Panel C:** 2 pF nominal

Manufactured to meet MIL-C-39024/10



**For Standard Tip Plug:  
.080 (2.00) Diameter**

### FEATURES

- Machined contact with turret terminal
- For military or industrial applications
- Closed entry blocks access of probes greater than .085 (2.16)
- Nylon UL approved for self extinguishing

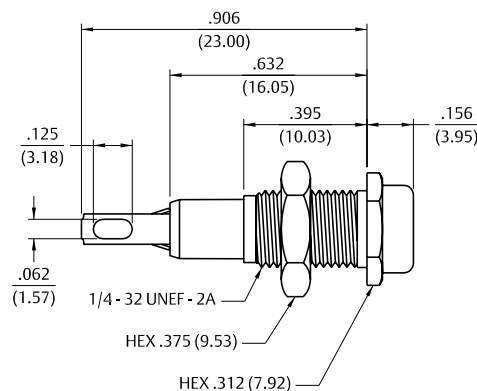
† Avoid user injury due to misapplication. See safety advisory definitions inside front cover.

## Insulated Metal Clad: Standard Type



### Silver Plating

Part No.	Color
105-0251-001	White
105-0252-001	Red
105-0253-001	Black



### SPECIFICATIONS

**Contact:** Phosphor bronze per QQ-B-750

**Finish:** Silver

**Body:** Nylon 6/6 per ASTM D4066

**Panel Thickness:** Up to .281 (7.10)

### RATINGS

**Current:** 10 amps

**Breakdown Voltage:** 5700 VRMS minimum†

**Contact Resistance:** 0.010 ohms maximum

**Contact-To-Panel C:** 2 pF nominal

**For Standard Tip Plug:  
.080 (2.00) Diameter**

### FEATURES

- Formed contact with slotted terminal
- Nylon UL approved for self extinguishing

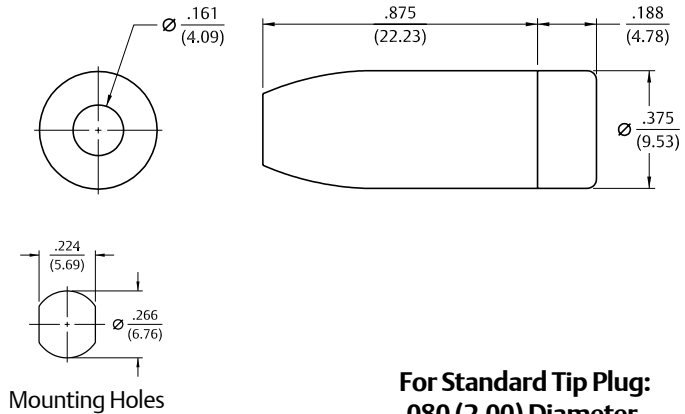
† Avoid user injury due to misapplication. See safety advisory definitions inside front cover.

# Tip Jacks – For Connections to Test Equipment, Power Supplies, and Electronic Instrumentation

## Insulated Metal Clad: Military Type



Silver Plating	
Part No.	Color
105-0701-001	White
105-0702-001	Red
105-0703-001	Black



### SPECIFICATIONS

**Contact:** Brass per QQ-B-626D with wrap around beryllium copper spring per QQ-C-533

**Finish:** Silver

**Body:** Nylon 6/6 per ASTM D4066

**Threaded Brass Jacket:** Per QQ-B-626D, nickel

**Hardware:** Nickel plated washer and nut (unassembled)

**Panel Thickness:** Up to .218 (5.45)

### RATINGS

**Current:** 10 amps

**Breakdown Voltage:** 5700 VRMS minimum

**Contact Resistance:** 0.004 ohms maximum

**Contact-To-Panel C:** 2 pF nominal

Manufactured to meet MIL-C-39024/10

### For Standard Tip Plug: .080 (2.00) Diameter FEATURES

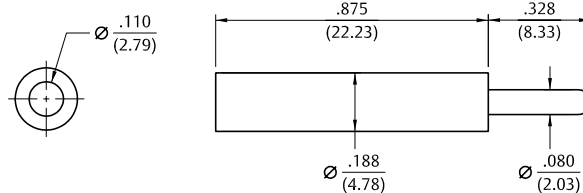
- Machined contact with turret terminal
- For military or industrial applications
- Closed entry blocks access of probes greater than .085 (2.16)
- Nylon UL approved for self extinguishing

† Avoid user injury due to misapplication. See safety advisory definitions inside front cover.

## Insulated Metal Clad: Standard Type



Nickel Plating	
Solder Type Up to 16 Gauge Part No.	Crimp Type 16 Gauge Plating Color
105-0771-001	White
105-0772-001	Red
105-0773-001	Black



### SPECIFICATIONS

**Contact:** Brass per QQ-B-626D

**Finish:** Nickel

**Insulated Handle:** Nylon 6/6 per ASTM D4066

### RATINGS

**Current:** 10 amps

**Breakdown Voltage:** 3500 VRMS minimum†

**Contact Resistance:** 0.010 ohms maximum

### For Standard Tip Plug: .080 (2.00) Diameter FEATURES

- Solder or crimp type connection
- Accepts wire sizes up to 16 gauge
- Nylon UL approved for self extinguishing
- Designed for use with horizontal and vertical test jacks only

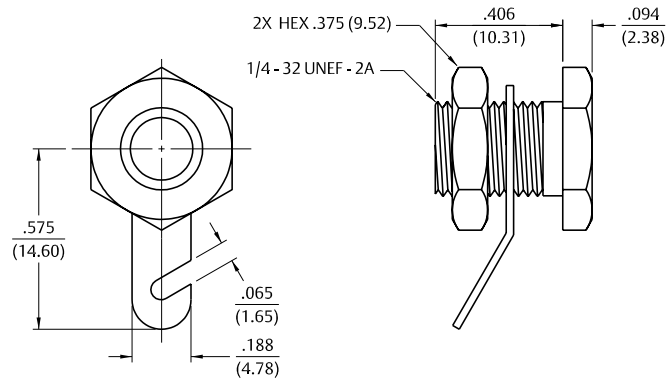
† Avoid user injury due to misapplication. See safety advisory definitions inside front cover.

# Banana Jacks – For Test Equipment and Power Supplies

## Uninsulated Standard Type: Slotted Lug Terminal



Nickel Plating	
Part No.	Color
108-0740-102	Nickel



### SPECIFICATIONS

**Jack Body:** Brass per QQ-B-626D  
**Finish:** Nickel  
**Hardware:** Nickel plated nut; stamped tin plated solder terminal (unassembled)  
**Panel Thickness:** Up to .250 (6.35)

### RATINGS

**Current:** 15 amps  
**Contact Resistance:** 0.010 ohms maximum

### For Standard Banana Plug:

**.175 (4.44) Across Flats**

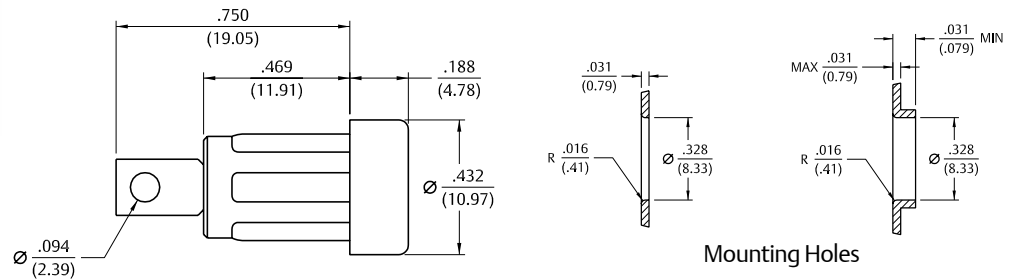
### FEATURES

- Accepts up to 12 gauge wire
- Hex head for faster installation
- For higher current designs

## Insulated Rib-Loc™ Solder Terminal



Bright Tin Plating	
Part No.	Color
108-2301-801	White
108-2302-801	Red
108-2303-801	Black
108-2307-801	Yellow
108-2310-801	Blue



### SPECIFICATIONS

**Contact:** Formed brass per QQ-B-626D  
**Finish:** Bright Tin  
**Body:** Nylon 6/6 per ASTM D4066  
**Panel Thickness:** Up to .250 (6.35)

### RATINGS

**Current:** 15 amps  
**Breakdown Voltage:** 7000 VRMS minimum†  
**Contact Resistance:** 0.010 ohms maximum  
**Contact-To-Panel C:** 2.4 pF nominal

### For Standard Banana Plug:

**.175 (4.44) Across Flats**

### FEATURES

- Requires no mounting hardware
- Accepts up to 16 gauge wire
- Nylon UL approved for self extinguishing

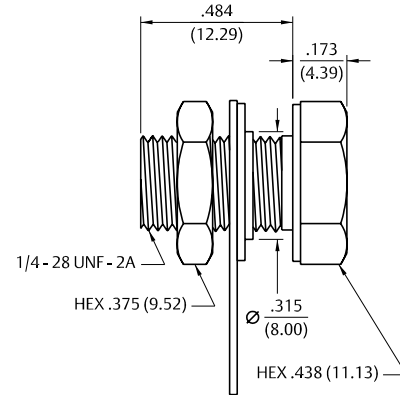
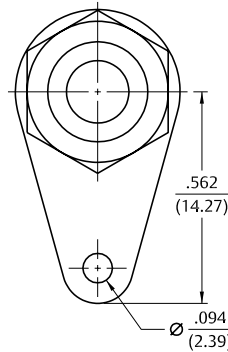
† Avoid user injury due to misapplication. See safety advisory definitions inside front cover.

# Banana Jacks & Plugs – For Test Equipment and Power Supplies

## Insulated Pierced Lug Terminal



Nickel Plating	
Part No.	Color
108-0745-001	Red
108-0745-002	Black



### SPECIFICATIONS

<b>Contact:</b>	Brass per QQ-B-626D
<b>Finish:</b>	Nickel
<b>Hex Head:</b>	Molded phenolic
<b>Hardware:</b>	Nickel plated nut, fiber insulating washer and stamped tin plated solder terminal (unassembled)
<b>Panel Thickness:</b>	Up to .281 (7.15)

### RATINGS

<b>Current:</b>	15 amps
<b>Breakdown Voltage:</b>	1500 VRMS minimum†
<b>Contact Resistance:</b>	0.010 ohms maximum
<b>Contact-To-Panel:</b>	2.4 pF nominal

### For Standard Banana Plug: .175 (4.44) Across Flats FEATURES

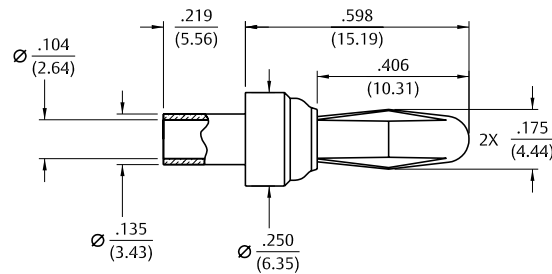
- Withstands extreme temperatures and abuse
- Stamped tin plated solder terminal with hole for up to 12 gauge wire
- Integrally molded hex head for fast installation

† Avoid user injury due to misapplication. See safety advisory definitions inside front cover.

## Uninsulated Rivet Type



Silver Plating	
Part No.	Color
108-0754-001	Silver



### SPECIFICATIONS

<b>Plug Body:</b>	Brass per QQ-B-626D
<b>Plug Spring:</b>	Beryllium copper per QQ-C-533
<b>Finish:</b>	Silver
<b>Panel Thickness:</b>	Up to .156 (4.00)

### RATINGS

<b>Current:</b>	15 amps
<b>Contact Resistance:</b>	0.010 ohms maximum

### For Standard Banana Plug: .166 (4.23) Diameter FEATURES

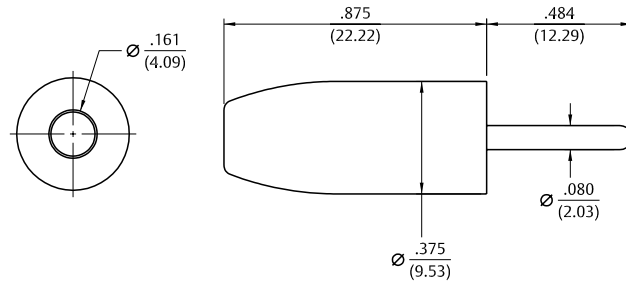
- Shorter spring adapts to standard jack or special size jack
- Ideal for limited space applications

# Banana Plugs – For Test Equipment and Power Supplies

## Insulated Solderless Tapered Handle



Nickel Plating	
Part No.	Color
108-0301-001	White
108-0302-001	Red
108-0303-001	Black
108-0304-001	Green
108-0306-001	Orange
108-0307-001	Yellow
108-0308-001	Brown
108-0310-001	Blue
108-0312-001	Violet
108-0313-001	Gray



### SPECIFICATIONS

**Plug Body:** Brass per QQ-B-626D  
**Plug Spring:** Nickel silver per QQ-C-533  
**Finish:** Nickel  
**Insulated Handle:** Nylon 6/6 per ASTM D4066

**Panel Thickness:** Up to .281 (7.15)

### RATINGS

**Current:** 15 amps  
**Breakdown Voltage:** 3500 VRMS minimum†  
**Contact Resistance:** 0.010 ohms maximum

### For Standard Banana Plug: .166 (4.23) Diameter

#### FEATURES

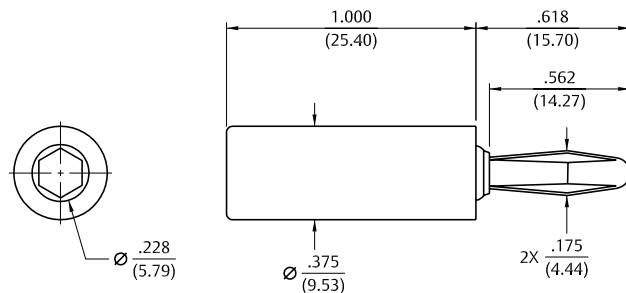
- Fast solderless connection of up to 16 gauge wire
- Recessed plug body to limit shock hazard
- Nylon UL approved for self extinguishing

† Avoid user injury due to misapplication. See safety advisory definitions inside front cover.

## Insulated Side Set Screw Solderless



Nickel Plating	
Part No.	Color
108-1702-101	Red
108-1703-101	Black



### SPECIFICATIONS

**Plug Body:** Brass per QQ-B-626D  
**Plug Spring:** Nickel silver per QQ-C-585  
**Finish:** Nickel  
**Insulated Handle:** Nylon 6/6 per ASTM D4066

### RATINGS

**Current:** 15 amps  
**Breakdown Voltage:** 35 VRMS minimum†

### For Standard Banana Plug: .166 (4.23) Diameter For Low Voltage (50 WVDC) Applications

#### FEATURES

- Fast solderless connection of up to 16 gauge wire
- Set screw for dependable connections with low voltage
- Nylon UL approved for self extinguishing

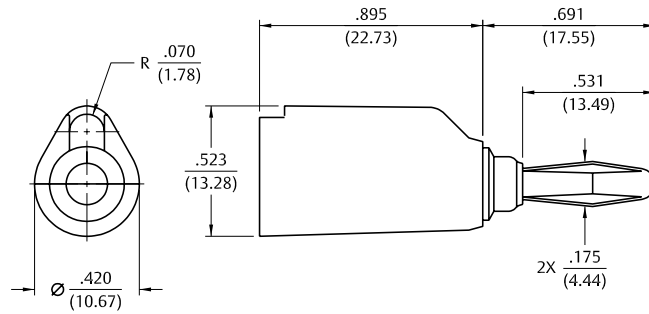
† Avoid user injury due to misapplication. See safety advisory definitions inside front cover.

# Banana Plugs – For Test Equipment and Power Supplies

## Insulated Stacking Single Type



Nickel Plating	
Part No.	Color
108-1081-001	White
108-1082-001	Red
108-1083-001	Black
108-1087-001	Yellow



### SPECIFICATIONS

**Plug Body:** Brass per QQ-B-626D  
**Plug Spring:** Nickel silver per QQ-C-585  
**Finish:** Nickel  
**Insulated Handle:** Nylon 6/6 per ASTM D4066

**Panel Thickness:** Up to .281 (7.15)

### RATINGS

**Current:** 15 amps  
**Breakdown Voltage:** 3500 VRMS minimum†  
**Contact Resistance:** 0.010 ohms maximum

### For Standard Banana Plug:

**.166 (4.23) Diameter**

### FEATURES

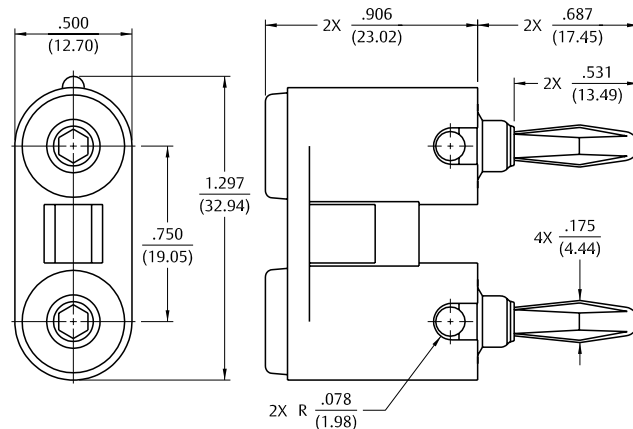
- Wire can be soldered to threaded stud
- Solder stud accepts up to 16 gauge wire
- Nylon UL approved for self extinguishing

† Avoid user injury due to misapplication. See safety advisory definitions inside front cover.

## Insulated Stacking Dual Type



Nickel Plating Set Screw (Accepts Wire Sizes Up To 14 Gauge)	
Part No.	Color
108-0252-001	Red
108-0253-001	Black



### SPECIFICATIONS

**Plug Body:** Brass per QQ-B-626D  
**Plug Spring:** Nickel silver per QQ-C-586  
**Finish:** Nickel  
**Insulated Handle:** Nylon 6/6 per ASTM D4066

### RATINGS

**Current:** 15 amps  
**Breakdown Voltage:** 3500 VRMS minimum†  
**Contact Resistance:** 0.010 ohms maximum

### For Standard Banana Plug:

**.166 (4.23) Diameter**

### FEATURES

- Accepts standard banana plug from rear
- Built-in strain relief for long life
- Nylon UL approved for self extinguishing

† Avoid user injury due to misapplication. See safety advisory definitions inside front cover.

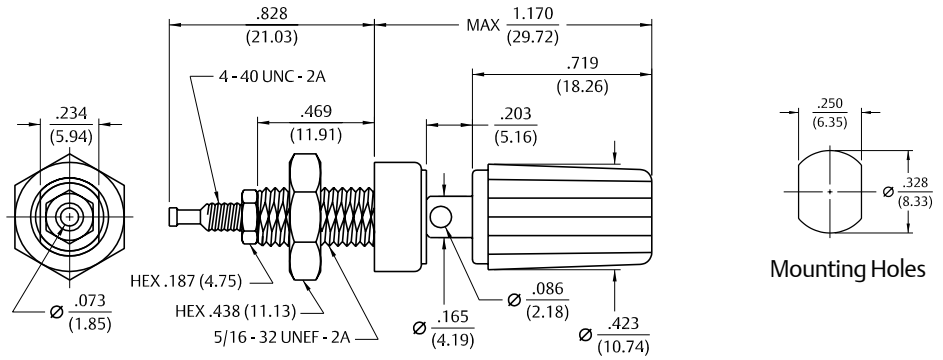


# Binding Posts – For Audio Circuitry and RF Circuitry

## Insulated Standard



Silver Plating	
Part No.	Color
111-0101-001	White
111-0102-001	Red
111-0104-001	Green
111-0103-001	Black
111-0107-001	Yellow
111-0110-001	Blue



### SPECIFICATIONS

**Stud:** Brass per QQ-B-626D

**Finish:** Silver

**Insulating Material:** Nylon 6/6 per ASTM D4066

**Hardware:** Nickel plated nut (unassembled)

**Body Thread Stripping Torque:** 6.0 lb. in. (7.0 kg cm)

**Panel Thickness:** Up to .281 (7.15)

### RATINGS

**Current:** 15 amps

**Contact Resistance:** 0.010 ohms maximum

**Breakdown Voltage:** 5700 VRMS minimum†

**Stud-To-Panel:** 3.3 pF nominal

### For Standard Banana Plug:

**.175 (4.44) Diameter**

### FEATURES

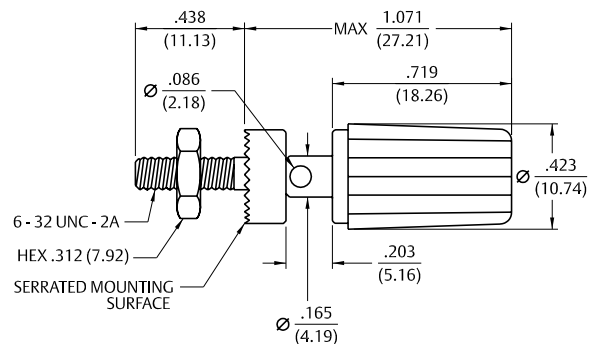
- Turret terminal
- Captive thumb nut
- Insulated body is flatted to prevent turning
- Nylon UL approved for self-extinguishing

† Avoid user injury due to misapplication. See safety advisory definitions inside front cover.

## Insulated Standard With – Thumb Nut – Grounded Type



Nickel Plating	
Part No.	Color
111-0702-001	Red
111-0703-001	Black



### SPECIFICATIONS

**Stud:** Brass per QQ-B-626D

**Finish:** Nickel

**Insulating Material:** Nylon 6/6 per ASTM D4066

**Hardware:** Nickel plated nut (unassembled)

**Panel Thickness:** Up to .313 (7.95)

### RATINGS

**Current:** 15 amps

### For Standard Banana Plug:

**.166 (4.23) Diameter**

### FEATURES

- Accepts standard banana plug from rear
- Built-in strain relief for long life
- Nylon UL approved for self-extinguishing

† Avoid user injury due to misapplication. See safety advisory definitions inside front cover.

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While every precaution has been taken to ensure accuracy and completeness herein, Emerson Network Power Connectivity Solutions assumes no responsibility, and disclaims all liability for damages resulting from use of this information or for any errors or omissions. Specifications subject to change without notice.

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450-900-0631N .....133-3404-006	29 S 201-271 A3 .....133-3693-106	51-053-0000 .....131-1701-371	39PR133-1 .....142-1801-606	2951-6125 .....142-1701-511
451-060-0046H .....133-3701-201	29 S 201-271 D3 .....133-3693-101	51-053-0000 .....131-3701-301	39PR133-2 .....142-1801-616	2951-6146 .....142-1701-511
451-060-0046N .....133-3701-206	29 S 201-301 A3 .....133-3402-106	51-054-0000 .....131-3801-301	39PR133-3 .....142-1801-626	2955-6166 .....142-1801-541
451-061-0040H .....133-3711-201	29 S 201-301 D3 .....133-3402-101	51-062-2210 .....131-3701-801	39PR133-4 .....142-1801-636	2955-6177 .....142-1801-601
451-451-0000H .....133-3901-801	29 S 201-302 A3 .....133-3403-106	51-075-0000 .....131-3901-401	39PR133-5 .....142-1801-646	2955-6178 .....142-1801-531
451-451-0000N .....133-3901-806	29 S 201-302 D3 .....133-3403-101	51-328-3188 .....131-1403-101		2955-6197 .....142-1801-621
451-900-0360H .....133-3302-001	29 S 201-303 A3 .....133-3404-106	51-328-3188 .....131-3403-101	<b>SRI .....EMERSON</b>	2955-6197 .....142-1801-631
451-900-0360N .....133-3302-006	29 S 201-303 D3 .....133-3404-101	51-328-3196 .....131-1402-101	24-000-1041-90 .....145-0694-002	2955-6297 .....142-1801-531
451-900-0630H .....133-3303-001	29 Z 101-102 A3 .....142-0003-236	51-328-3196 .....131-3402-101	24-924-0000-90 .....145-0901-811	2955-6298 .....142-1801-601
451-900-0630N .....133-3303-006	29 Z 101-102 D3 .....142-0003-231	55-607-0369-31 .....142-0694-031	24-925-0000-90 .....145-0901-821	2955-6299 .....142-1801-621
451-900-0631H .....133-3304-001	29 Z 101-103 A3 .....142-0004-216	55-607-2203-31 .....142-0694-001	25-130-1500-90 .....145-0701-602	2955-6299 .....142-1801-631
451-900-0631N .....133-3304-006	29 Z 101-103 D3 .....142-0004-211	55-607-3702-31 .....142-0693-001	25-131-1500-90 .....145-0701-612	2955-6300 .....142-1801-641
451-980-0360H .....133-3302-401		55-607-9073-31 .....142-0694-011	25-925-0000-90 .....145-0901-801	2955-6305 .....142-1801-611
451-980-0360N .....133-3302-406	<b>SEALCTRO .....EMERSON</b>	55-607-9172-31 .....142-0693-001	26-000-1085-90 .....145-0693-002	2955-6333 .....142-1801-611
451-980-0630H .....133-3303-401	50-024-0000 .....131-6403-001	55-607-9173-31 .....142-0694-001		2960-6001 .....142-0701-701
451-980-0630N .....133-3303-406	50-027-0000 .....131-6303-401	55-608-2002-31 .....142-0593-001	<b>SV MICROWAVE .....EMERSON</b>	2960-6025 .....142-1711-001
451-980-0631H .....133-3304-401	50-043-0000 .....131-6701-401	55-608-2003-31 .....142-0594-001	066-15-000 .....142-1000-033	2960-6268 .....142-1711-021
451-980-0631N .....133-3304-406	50-045-0000 .....131-6701-411	55-608-9182-31 .....142-0593-001	2902-6001 .....142-0694-031	2960-6274 .....142-1711-031
452-500-0850H .....133-3693-101	50-051-0000 .....131-6701-201	55-608-9183-31 .....142-0594-001	2902-6005 .....142-0694-001	2960-6613 .....142-1711-531
452-500-0850N .....133-3693-106	50-053-0000 .....131-6701-301	55-610-3702-31 .....142-0593-401	2902-6012 .....142-0694-001	2960-6701 .....142-1711-521
452-900-0360H .....133-3402-101	50-328-3188 .....131-6403-101	55-610-3703-31 .....142-0594-401	2902-6013 .....142-0694-021	2960-6703 .....142-1711-511
452-900-0360N .....133-3402-106	50-607-3141-31 .....142-0207-011	55-610-9172-31 .....142-0594-401	2903-6009 .....142-0403-001	2970-6003 .....142-0701-401
452-900-0630H .....133-3403-101	50-607-3188-31 .....142-0203-011	55-610-9173-31 .....142-0594-401	2906-6002 .....142-0693-001	2975-6001 .....142-0701-411
452-900-0630N .....133-3403-106	50-607-3196-31 .....142-0202-011	55-624-3073-31 .....142-0694-021	2911-6001 .....142-0407-101	2990-6005 .....142-0901-401
452-900-0631H .....133-3404-101	50-610-3188-31 .....142-0103-401		2913-6001 .....142-0403-101	2992-6001 .....142-0901-801
452-900-0631N .....133-3404-106	50-610-3196-31 .....142-0102-401	<b>SIEMENS .....EMERSON</b>	2913-6030 .....142-0402-101	2993-6001 .....142-0901-811
453-060-0046H .....133-3701-301	50-611-3141-31 .....142-0207-101	V23608-A1027-B1 .....135-3701-201	2921-6002 .....142-0593-001	2997-6003 .....142-0901-821
453-060-0046N .....133-3701-306	50-611-3188-31 .....142-0203-101	V23608-A109-B1 .....135-3402-001	2922-6007 .....142-0594-001	SF1503-6103 .....145-0693-002
	50-611-3196-31 .....142-0202-101	V23608-A109-B11 .....135-3436-001	2942-6001 .....142-0594-401	SF1550-6400 .....145-0701-612
<b>ROSENBERGER .....EMERSON</b>	50-622-9141-31 .....142-0407-011	V23608-A1227-B1 .....135-3701-301	2942-6035 .....142-0303-401	SF1552-6002 .....145-0701-602
02-K-521-80053 .....145-0701-002	50-622-9142-31 .....142-0408-011	V23608-A209-B1 .....135-3402-101	2943-6044 .....142-0302-401	SF1590-6000 .....145-0901-801
02-S-121-27153 .....142-0693-002	50-622-9188-31 .....142-0403-011	V23608-A209-B11 .....135-3436-101	2946-6001 .....142-0593-401	SF1593-6000 .....145-0901-811
02-Z-101-000 .....142-1000-033	50-624-9188-31 .....142-0403-001		2947-6003 .....142-0701-531	SF1597-6003 .....145-0901-821
29 K 100-K00 D3 .....133-3901-801	50-627-9188-31 .....142-0303-401	<b>SPECIALTY .....EMERSON</b>	2950-6062 .....142-0701-621	SF2947-6003 .....142-0701-536
29 K 101-101 A3 .....133-3302-006	50-627-9196-31 .....142-0302-401	39JR293-1 .....142-1701-506	2950-6081 .....142-0701-631	SF2950-6135 .....142-1701-196
29 K 101-101 D3 .....133-3302-001	50-628-9141-31 .....142-0407-101	39JR293-2 .....142-1701-516	2950-6135 .....142-1701-191	SF2950-6220 .....142-1701-016
29 K 101-102 A3 .....133-3303-006	50-628-9188-31 .....142-0403-101	39JR293-3 .....142-1701-526	2950-6220 .....142-1701-011	SF2950-6336 .....142-1701-206
29 K 101-102 D3 .....133-3303-001	50-628-9196-31 .....142-0402-101	39JR293-4 .....142-1701-536	2950-6336 .....142-1701-201	SF2950-6619 .....142-1701-506
29 K 101-103 A3 .....133-3304-006	50-643-0000-31 .....142-0701-401	39JR293-5 .....142-1701-546	2950-6619 .....142-1701-501	SF2950-6662 .....142-1701-526
29 K 101-103 D3 .....133-3304-001	50-643-4312-31 .....142-0701-411	39JR294-1 .....142-1701-606	2950-6662 .....142-1701-521	SF2950-6662 .....142-1701-536
29 K 101-400 A3 .....133-3701-206	50-645-4504-31 .....142-0701-631	39JR294-2 .....142-1701-616	2950-6662 .....142-1701-531	SF2950-6720 .....142-1701-606
29 K 101-400 D3 .....133-3701-201	50-645-4526-31 .....142-0701-621	39JR294-3 .....142-1701-626	2950-6720 .....142-1701-601	SF2950-6731 .....142-1701-546
29 K 101-K00 A3 .....133-3901-806	50-651-0000-31 .....142-0701-201	39JR294-4 .....142-1701-636	2950-6731 .....142-1701-541	SF2950-6769 .....142-1701-506
29 K 104-400 A3 .....133-3701-236	50-652-0000-31 .....142-0801-201	39JR294-5 .....142-1701-646	2950-6769 .....142-1701-501	SF2950-6780 .....142-1701-626
29 K 104-400 D3 .....133-3701-231	50-653-0000-31 .....142-0701-301	39JR295-1 .....142-1701-506	2950-6780 .....142-1701-621	SF2950-6780 .....142-1701-636
29 K 203-400 A3 .....133-3701-306	50-654-0000-31 .....142-0801-301	39JR295-2 .....142-1701-516	2950-6780 .....142-1701-631	SF2950-6781 .....142-1701-646



# Competitor Cross Reference

## Ultra Miniature Connectors UMC to U.FL Cross Reference

Emerson	Hirose
128-0711-201	U.FL-R-SMT(10)
415-0084-050	U.FL-2LP(V)-04N1-A-50
415-0084-100	U.FL-2LP(V)-04N1-A-100
415-0084-150	U.FL-2LP(V)-04N1-A-150
415-0084-200	U.FL-2LP(V)-04N1-A-200
415-0084-250	U.FL-2LP(V)-04N1-A-250
415-0084-300	U.FL-2LP(V)-04N1-A-300
415-0084-500	U.FL-2LP(V)-04N1-A-500
415-0085-050	U.FL-2LP-04N2-A-50
415-0085-100	U.FL-2LP-04N2-A-100
415-0085-150	U.FL-2LP-04N2-A-150
415-0085-200	U.FL-2LP-04N2-A-200
415-0085-250	U.FL-2LP-04N2-A-250
415-0085-300	U.FL-2LP-04N2-A-300
415-0085-300	U.FL-2LP-04N2-A-500
415-0086-050	U.FL-2LP-068N2-A-50
415-0086-100	U.FL-2LP-068N2-A-100
415-0086-150	U.FL-2LP-068N2-A-150
415-0086-200	U.FL-2LP-068N2-A-200
415-0086-250	U.FL-2LP-068N2-A-250
415-0086-300	U.FL-2LP-068N2-A-300
415-0086-500	U.FL-2LP-068N2-A-500
415-0087-050	U.FL-2LP-066J2-A-50

Emerson	Hirose
415-0087-100	U.FL-2LP-066J2-A-100
415-0087-150	U.FL-2LP-066J2-A-150
415-0087-200	U.FL-2LP-066J2-A-200
415-0087-250	U.FL-2LP-066J2-A-250
415-0087-300	U.FL-2LP-066J2-A-300
415-0087-500	U.FL-2LP-066J2-A-500
415-0088-050	U.FL-2LP-088K2T-A-50
415-0088-100	U.FL-2LP-088K2T-A-100
415-0088-150	U.FL-2LP-088K2T-A-150
415-0088-200	U.FL-2LP-088K2T-A-200
415-0088-250	U.FL-2LP-088K2T-A-250
415-0088-300	U.FL-2LP-088K2T-A-300
415-0088-500	U.FL-2LP-088K2T-A-500
415-0104-150	U.FL-LP(V)-04N1-A-150
415-0104-250	U.FL-LP(V)-04N1-A-250
415-0105-150	U.FL-LP-04N2-A-150
415-0105-250	U.FL-LP-04N2-A-250
415-0106-150	U.FL-LP-068N2-A-150
415-0106-250	U.FL-LP-068N2-A-250
415-0107-150	U.FL-LP-066J2-A-150
415-0107-250	U.FL-LP-066J2-A-250
415-0108-150	U.FL-LP-088K2T-A-150
415-0108-250	U.FL-LP-088K2T-A-25

# Competitor Cross Reference

## Type N Competitor Cross Reference

Emerson	Radiall	M/A-Com	Amphenol	Tyco/Amp	Telegartner	Rosenberger	Huber-Suhner
138-4303-407	R161311300	3004-7388-10	82-6156			53K507-802N3	
138-4304-407	R161311300					53K507-803N3	
138-4307-407	R161329000	3004-7341-10	82-5378	1-225667-2	J01021A0147	53K507-106N3	24N-50-3-11C
138-4308-407	R161329200	3004-7341-10	82-5373	225363-2	J01021A0148	53K507-108N3	24N-50-3-12C
138-4316-407	R161331000	N15H61H001X99	82-346-RFX	225094-2	J01021A0060	53K501-115N3	24N-50-7-14C
138-4318-407	R161331200	N15H61H004X99		225667-1	J01021A0092	53K501-117N3	24N-50-7-15C
138-4349-407	R161331060		82-6143-1000				
138-4403-007	R161072000	3031-7338-10			J01020A0103	53S107-802N3	
138-4403-107	R161181000		82-6048-1000		J01020A0040		
138-4404-007	R161072000				J01020A0104	53S107-803N3	
138-4404-107	R161181300				J01020A0039		
138-4407-007	R161082000	3031-7358-10	82-5375	1-225661-2	J01010A0108	53S107-106N3	11N-50-3-28C
138-4407-107	R161182000			1-225669-2	J01020A0035	53S205-315N3	16N-50-3-26C
138-4408-007	R161083000	3031-7341-10	82-5370	225699-1	J01020A0113	53S107-108N3	11N-50-3-29C
138-4408-107	R161183000		82-4442	225365-2	J01020A0036	53S205-317N3	16N-50-3-27C
138-4416-007	R161075000	N15A61H001X99	82-340	225661-2	J01020A0107	53S101-115N3	11N-50-7-43C
138-4416-107	R161184000	N15B61H001X99	82-336	225669-2	J01020A0046		16N-50-7-30C
138-4418-007	R161088000	N15A61H004X99	82-332	225661-1	J01020A0110	53S101-115N3	11N-50-7-44C
138-4418-107	R161186000	N15B61H004X99	82-4440-1001	225669-1	J01020A0045		16N-50-7-31C
138-4449-007	R161075060		82-340-1052		J01020A0127	53S101-1N9N3	
138-4593-401	R161335200	3004-7985-00	82-6093-RFX	228658-2	J01021H0087	52K504-271N3	24N-50-2-14
138-4594-401	R161336000	3004-7941-00	82-6097-RFX	228658-1	J01021A0151	53K504-272N3	24N-50-3-14
138-4596-401	R161337200		82-6162		J01021A0109	53K504-273N3	24N-50-5-39C
138-4693-001	R161050300	3001-7985-00		1057094-1			11N-50-2-14
138-4693-011	R161050300	3001-7985-00					11N-50-2-14
138-4694-001	R161051000	3001-7941-00	82-5955-RFX	1057088-1	J01020A0109	53S101-272B1	11N-50-3-13
138-4694-011	R161051000	3001-7941-00	82-5955-RFX		J01020A0109	53S101-272B1	11N-50-3-13
138-4696-001	R161054000		82-6124		J01020A0112	53S101-273B1	11N-50-5-39C
138-4696-011	R161054000		82-6124		J01020A0112	53S101-273B1	11N-50-5-39C
138-4701-407	R161586137	N15M35999X99			J01021A1084	53K505-200N3	
138-4701-607	R161404000	3052-0000-10	82-97	1-1337418-0	J01021A1082	53K401-200N3	23N-50-0-23
138-4901-407	R161730000	N15R07999X99	82-66		J01024A1088	53K501-K00N3	34N-50-0-51
138-4901-807	R161705000	3680-0000-02	82-101	227945-2	J01024A1092	53K101-K00N3	31N-50-0-51
138-4901-817	R161703000	3681-0000-02	82-100	1058661-1	J01024A1094	53K101-S00N3	32N-50-0-51

**Emerson Network Power Connectivity Solutions, Inc.,  
including its subsidiaries Stratos International, Inc., Trompeter Electronics, Inc., and Semflex, Inc.**

## TERMS AND CONDITIONS OF SALE

Emerson Network Power Connectivity Solutions, Inc. is herein referred to as the "Seller" and the customer or person or entity purchasing goods ("Goods") from Seller is referred to as the "Buyer." These Terms and Conditions, any price list or schedule, quotation, acknowledgment or invoice from Seller relevant to the sale of the Goods and all documents incorporated by specific reference herein or therein, constitute the complete and exclusive statement of the terms of the agreement governing the sale of Goods by Seller to Buyer. Buyer's acceptance of the Goods will manifest Buyer's assent to these Terms and Conditions. Seller reserves the right in its sole discretion to refuse orders.

**1. PRICES:** Unless otherwise specified in writing by Seller, the price quoted or specified by Seller for the Goods shall remain in effect for thirty (30) days after the date of Seller's quotation or acknowledgment of Buyer's order for the Goods, whichever occurs first, provided an unconditional authorization from Buyer for the shipment of the Goods is received and accepted by Seller within such time period. If such authorization is not received by Seller within such thirty (30) day period, Seller shall have the right to change the price for the Goods to Seller's price for the Goods at the time of shipment. All prices are exclusive of taxes, transportation and insurance, which are to be borne by Buyer.

**2. TAXES:** Any current or future tax or governmental charge (or increase in same) affecting Seller's costs of production, sale, or delivery or shipment, or which Seller is otherwise required to pay or collect in connection with the sale, purchase, delivery, storage, processing, use or consumption of Goods, shall be for Buyer's account and shall be added to the price.

**3. TERMS OF PAYMENT:** Unless otherwise specified by Seller, terms are net thirty (30) days from date of Seller's invoice in U.S. currency. Seller shall have the right, among other remedies, either to terminate this agreement or to suspend further performance under this and/or other agreements with Buyer in the event Buyer fails to make any payment when due, which other agreements Buyer and Seller hereby amend accordingly. Buyer shall be liable for all expenses, including attorneys' fees, relating to the collection of past due amounts. If any payment owed to Seller is not paid when due, it shall bear interest, at a rate to be determined by Seller, which shall not exceed the maximum rate permitted by law, from the date on which it is due until it is paid. Should Buyer's financial responsibility become unsatisfactory to Seller, cash payments or security satisfactory to Seller may be required by Seller for future deliveries and for the Goods theretofore delivered. If such cash payment or security is not provided, in addition to Seller's other rights and remedies, Seller may discontinue deliveries.

**4. SHIPMENT AND DELIVERY:** While Seller will use all reasonable commercial efforts to maintain the delivery date(s) acknowledged or quoted by Seller, all shipping dates are approximate and not guaranteed. Seller reserves the right to make partial shipments. Seller, at its option, shall not be bound to tender delivery of any Goods for which Buyer has not provided shipping instructions and other required information. If the shipment of the Goods is postponed or delayed by Buyer for any reason, Buyer agrees to reimburse Seller for any and all storage costs and other additional expenses resulting therefrom. Risk of loss and legal title to the Goods shall transfer to Buyer for sales in which the end destination of the Goods is outside of the United States immediately after the Goods have passed beyond the territorial limits of the United States. For all other shipments, risk of loss for damage and responsibility shall pass from Seller to Buyer upon delivery to and receipt by carrier at Seller's shipping point. All shipments are F.O.B. Seller's shipping point. Any claims for shortages or damages suffered in transit are the responsibility of Buyer and shall be submitted by Buyer directly to the carrier.

Shortages or damages must be identified and signed for at the time of delivery. Buyer shall inspect Goods delivered to it by Seller immediately upon receipt, and, any course of dealing to the contrary notwithstanding, failure of Buyer to give Seller notice of any claim within 30 days after receipt of such Goods shall be an unqualified acceptance of such Goods.

**5. LIMITED WARRANTY:** Subject to the limitations of Section 6, Seller warrants that the Goods manufactured by Seller will be free from defects in material and workmanship under normal use and regular service and maintenance for a period of one year from the date of shipment of the Goods by Seller, unless otherwise specified by Seller in writing. **THIS IS THE SOLE AND EXCLUSIVE WARRANTY GIVEN BY SELLER WITH RESPECT TO THE GOODS AND IS IN LIEU OF AND EXCLUDE ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ARISING BY OPERATION OF LAW OR OTHERWISE, INCLUDING WITHOUT LIMITATION, MER-**

**CHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHETHER OR NOT THE PURPOSE OR USE HAS BEEN DISCLOSED TO SELLER IN SPECIFICATIONS, DRAWINGS OR OTHERWISE, AND WHETHER OR NOT SELLER'S PRODUCTS ARE SPECIFICALLY DESIGNED AND/OR MANUFACTURED BY SELLER FOR BUYER'S USE OR PURPOSE.**

This warranty does not extend to any losses or damages due to misuse, accident, abuse, neglect, normal wear and tear, negligence (other than Seller's), unauthorized modification or alteration, use beyond rated capacity, unsuitable power sources or environmental conditions, improper installation, repair, handling, maintenance or application or any other cause not the fault of Seller. To the extent that Buyer or its agents has supplied specifications, information, representation of operating conditions or other data to Seller in the selection or design of the Goods and the preparation of Seller's quotation, and in the event that actual operating conditions or other conditions differ from those represented by Buyer, any warranties or other provisions contained herein which are affected by such conditions shall be null and void.

If within thirty (30) days after Buyer's discovery of any warranty defects within the warranty period, Buyer notifies Seller thereof in writing, Seller shall, at its option and as Buyer's exclusive remedy, repair, correct or replace F.O.B. point of manufacture, or refund the purchase price for, that portion of the Goods found by Seller to be defective. Failure by Buyer to give such written notice within the applicable time period shall be deemed an absolute and unconditional waiver of Buyer's claim for such defects. All costs of dismantling, reinstallation and freight and the time and expense of Seller's personnel and representatives for site travel and diagnosis under this warranty shall be borne by Buyer unless accepted in writing by Seller. Goods repaired or replaced during the warranty period shall be covered by the foregoing warranty for the remainder of the original warranty period or ninety (90) days from the date of shipment, whichever is longer.

Buyer assumes all other responsibility for any loss, damage, or injury to persons or property arising out of, connected with, or resulting from the use of Goods, either alone or in combination with other products/components.

Section 5 applies to any entity or person who may buy, acquire or use the Goods, including any entity or person who obtains the Goods from Buyer, and shall be bound by the limitations therein, including Section 6. Buyer agrees to provide such subsequent transferee conspicuous, written notice of the provisions of Sections 5 and 6.

**6. LIMITATION OF REMEDY AND LIABILITY: THE SOLE AND EXCLUSIVE REMEDY FOR BREACH OF ANY WARRANTY HEREUNDER OTHER THAN THE WARRANTY PROVIDED UNDER SECTION 7 SHALL BE LIMITED TO REPAIR, CORRECTION OR REPLACEMENT, OR REFUND OF THE PURCHASE PRICE UNDER SECTION 5.**

**SELLER SHALL NOT BE LIABLE FOR DAMAGES CAUSED BY DELAY IN PERFORMANCE AND THE REMEDIES SET FORTH IN THIS AGREEMENT ARE EXCLUSIVE. IN NO EVENT, REGARDLESS OF THE FORM OF THE CLAIM OR CAUSE OF ACTION (WHETHER BASED IN CONTRACT, INFRINGEMENT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT OR OTHERWISE), SHALL SELLER'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXCEED THE PRICE PAID BY BUYER FOR THE SPECIFIC GOODS PROVIDED BY SELLER GIVING RISE TO THE CLAIM OR CAUSE OF ACTION. BUYER AGREES THAT IN NO EVENT SHALL SELLER'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXTEND TO INCLUDE INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES.** The term "consequential damages" shall include, but not be limited to, loss of anticipated profits, business interruption, loss of use, revenue, reputation and data, costs incurred, including without limitation, for capital, fuel, power and loss or damage to property or equipment.

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