

# APPROVAL SHEET

**RFCPL Series – 1608(0603) – RoHS Compliance**

**MULTILAYER CERAMIC COUPLER**

**Halogens Free Product**

**698 ~ 2690 MHz Working Frequency**

**P/N: RFCPL1608070P3T**

\*Contents in this sheet are subject to change without prior notice.

**FEATURES**

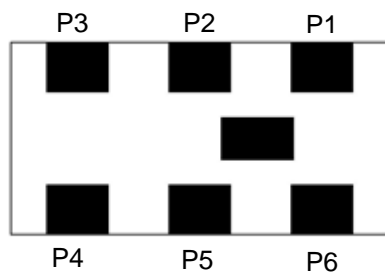
1. Miniature footprint: 1.6X 0.8 X 0.7 mm<sup>3</sup>
2. Low Insertion loss
3. High Isolation
4. LTCC process

**APPLICATIONS**

1. 698 ~ 2690 MHz Working Frequency
2. TDD\_LTE/FDD\_LTE RF applications
3. Bluetooth, Wireless LAN 802.11b/g/ n, HomeRF

**CONSTRUCTION**

Top view



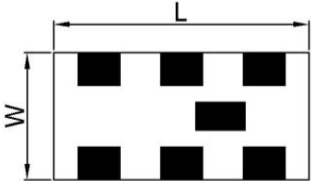
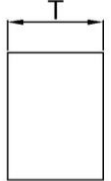
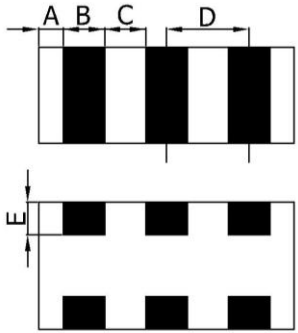
If P1 is input port, the pin is defined as the table.

PIN	Connection	PIN	Connection
1	Input	4	Termination
2	GND	5	GND
3	Output	6	Coupling

If P3 is input port, the pin is defined as the table.

PIN	Connection	PIN	Connection
1	Output	4	Coupling
2	GND	5	GND
3	Input	6	Termination

**DIMENSIONS**

Figure	Symbol	Dimension (mm)
Top view 	L	1.60 ± 0.15
	W	0.80 ± 0.15
Side view 	T	0.70 max.
	A	0.175 ± 0.15
Bottom view 	B	0.25 ± 0.15
	C	0.25 ± 0.15
	D	0.50 ± 0.15
	E	0.20 ± 0.15

**ELECTRICAL CHARACTERISTICS**

RFCPL1608070P3T	Specification
Frequency range	698 ~ 2690 MHz
Insertion Loss at +25 °C	0.20 dB max. (0.07 dB typ.) @ 698 ~ 960 MHz 0.22 dB max. (0.11 dB typ.) @ 1710 ~ 2170 MHz 0.25 dB max. (0.11 dB typ.) @ 2300 ~ 2690 MHz
Insertion Loss at -40°C ~ +85°C	0.30 dB max. @ 698 ~ 960 MHz 0.32 dB max. @ 1710 ~ 2170 MHz 0.35 dB max. @ 2300 ~ 2690 MHz
Coupling in BW	23.0 ~ 27.0 dB @ 698 ~ 915 MHz 21.5 ~ 26.5 dB @ 1710 ~ 2025 MHz 22.5 ~ 27.5 dB @ 2300 ~ 2690 MHz
Isolation	40 dB min. @ 698 ~ 2690 MHz
Directivity in BW	20.0 dB min. @ 698 ~ 2690 MHz
VSWR	1.45 max.
Impedance	50 Ω
Power Capacity	4W max.
Moisture sensitivity levels	MSL is LEVEL 1 (Refer to : IPC/JEDEC J-STD-020)
HBM ESD	Pass 1KV on all pins (Base on AEC-Q200-002)
MM ESD	Pass 200V (Base on EIA/JESD22-A115)

**Operating & Storage Condition (Component)**

Operation Temperature Range: -40°C ~ +85°C

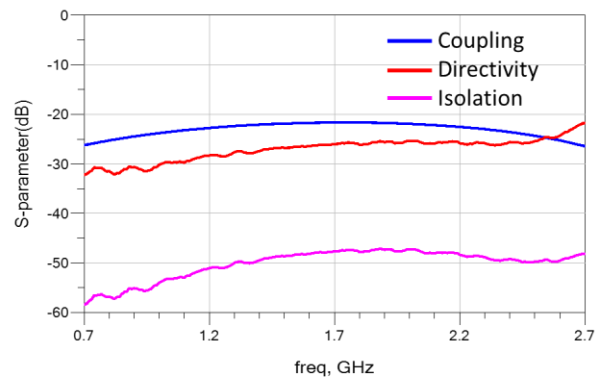
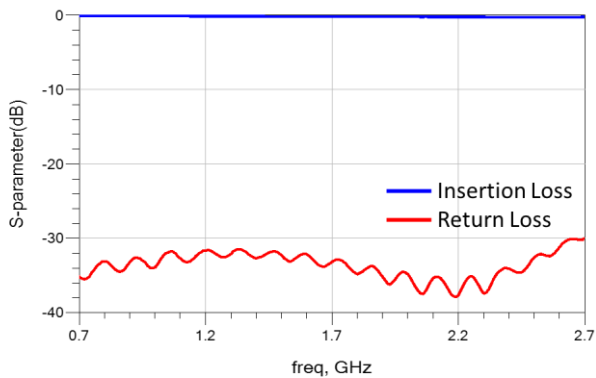
Storage Temperature Range: -40°C ~ +85°C

**Storage Condition before Soldering (Included packaging material)**

Storage Temperature Range: +5 ~ +40 °C

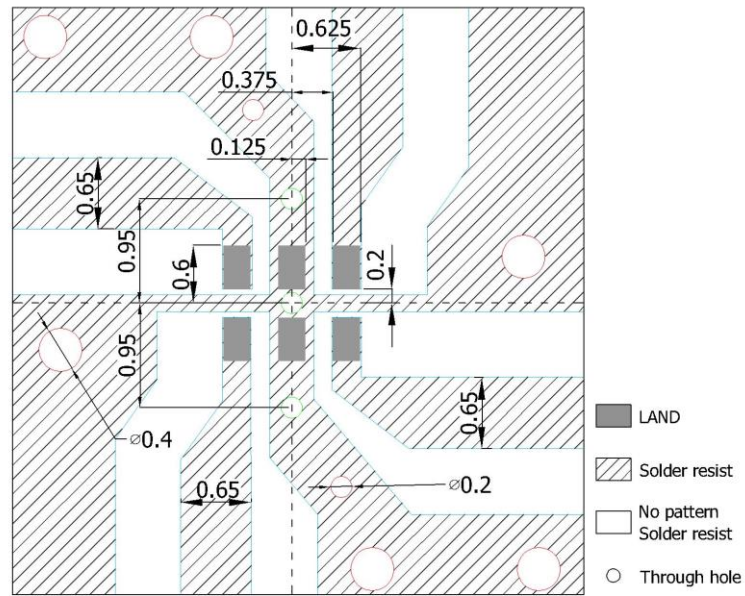
Humidity: 30 to 70% relative humidity

**Typical Electrical Chart**



**LAND PATTERN**

**Figure**



Unit : mm

Line width to be designed to match 50  $\Omega$  characteristic impedance, depending on PCB material and thickness.

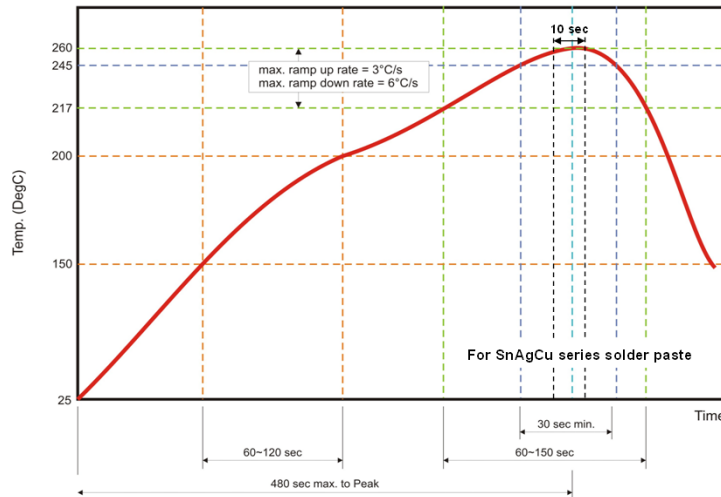
**RELIABILITY TEST**

Test item	Test condition / Test method	Specification
Solderability JIS C 0050-4.6 JESD22-B102D	*Solder bath temperature : $235 \pm 5^{\circ}\text{C}$ *Immersion time : $2 \pm 0.5$ sec Solder : Sn3Ag0.5Cu for lead-free	At least 95% of a surface of each terminal electrode must be covered by fresh solder.
Resistance to soldering heat JIS C 0050-5.4	*Preheating temperature : $120\sim 150^{\circ}\text{C}$ , 1 minute. *Solder temperature : $270\pm 5^{\circ}\text{C}$ *Immersion time : $10\pm 1$ sec Solder : Sn3Ag0.5Cu for lead-free Measurement to be made after keeping at room temperature for $24\pm 2$ hrs	No mechanical damage. Electrical specification shall satisfy the descriptions in electrical characteristics under the operational temperature range within $-40\sim 85^{\circ}\text{C}$ . Loss of metallization on the edges of each electrode shall not exceed 25%.
Drop Test JIS C 0044 Customer's specification.	*Height : 75 cm *Test Surface : Rigid surface of concrete or steel. *Times : 6 surfaces for each units : 2 times for each side.	No mechanical damage. Electrical specification shall satisfy the descriptions in electrical characteristics under the operational temperature range within $-40\sim 85^{\circ}\text{C}$ .
Vibration JIS C 0040	*Frequency : $10\text{Hz}\sim 55\text{Hz}\sim 10\text{Hz}(1\text{min})$ *Total amplitude : 1.5mm *Test times : 6hrs.(Two hrs each in three mutually perpendicular directions)	No mechanical damage. Electrical specification shall satisfy the descriptions in electrical characteristics under the operational temperature range within $-40\sim 85^{\circ}\text{C}$ .
Adhesive Strength of Termination JIS C 0051- 7.4.3	*Pressurizing force : 5N (LGA terminal series) ; $5\text{N}(\leq 0603)$ ; 10N(>0603) *Test time : $10\pm 1$ sec	No remarkable damage or removal of the termination.
Bending test JIS C 0051- 7.4.1	The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm/s per second until the deflection becomes 1mm/s and then pressure shall be maintained for $5\pm 1$ sec. Measurement to be made after keeping at room temperature for $24\pm 2$ hours	No mechanical damage. Electrical specification shall satisfy the descriptions in electrical characteristics under the operational temperature range within $-40\sim 85^{\circ}\text{C}$ .

Temperature cycle JIS C 0025	<ol style="list-style-type: none"> <li>1. 30±3 minutes at -40°C±3°C,</li> <li>2. 10~15 minutes at room temperature,</li> <li>3. 30±3 minutes at +85°C±3°C,</li> <li>4. 10~15 minutes at room temperature,</li> </ol> Total 100 continuous cycles  Measurement to be made after keeping at room temperature for 24±2 hrs	No mechanical damage.  Electrical specification shall satisfy the descriptions in electrical characteristics under the operational temperature range within -40 ~ 85°C.
High temperature JIS C 0021	*Temperature : 85°C±2°C  *Test duration : 1000+24/-0 hours  Measurement to be made after keeping at room temperature for 24±2 hrs	No mechanical damage.  Electrical specification shall satisfy the descriptions in electrical characteristics under the operational temperature range within -40 ~ 85°C.
Humidity (steady conditions) JIS C 0022	*Humidity : 90% to 95% R.H.  *Temperature : 40±2°C  *Time : 1000+24/-0 hrs.  Measurement to be made after keeping at room temperature for 24±2 hrs  ※ 500hrs measuring the first data then 1000hrs data	No mechanical damage.  Electrical specification shall satisfy the descriptions in electrical characteristics under the operational temperature range within -40 ~ 85°C.
Low temperature JIS C 0020	*Temperature : -40°C±2°C  *Test duration : 1000+24/-0 hours  Measurement to be made after keeping at room temperature for 24±2 hrs	No mechanical damage.  Electrical specification shall satisfy the descriptions in electrical characteristics under the operational temperature range within -40 ~ 85°C.

**SOLDERING CONDITION**

Typical examples of soldering processes that provide reliable joints without any damage are given in Fig 2, This product could sustain by reflow process three times, and the temperature below 260°C.



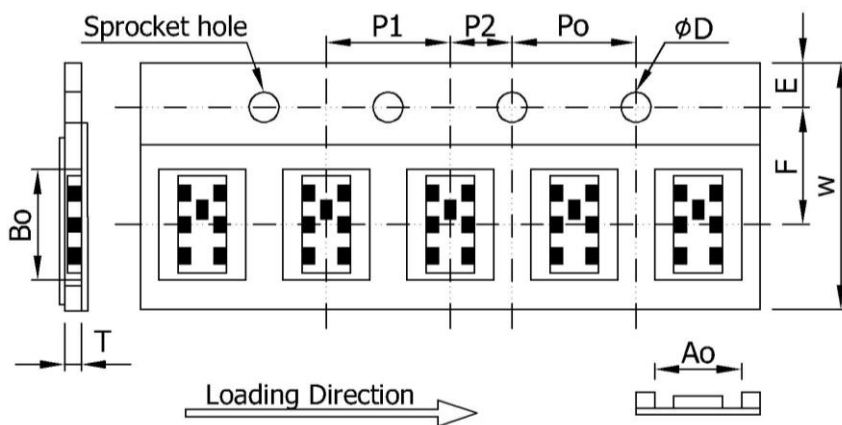
**Fig 2. Infrared soldering profile**

**ORDERING CODE**

<b>RF</b>	<b>CPL</b>	<b>160807</b>	<b>0</b>	<b>P</b>	<b>3</b>	<b>T</b>
<b>Walsin</b> RF device	<b>Product Code</b> Coupler	<b>Dimension code</b> Per 2 digits of Length, Width, Thickness : e.g. : 160807 = Length 16, Width 08, Thickness 07	<b>Unit of dimension</b> 0 : 0.1 mm 1 : 1.0 mm	<b>Application</b> P: GSM850/ GSM 900/ DCS 1800 / PCS 1900 Quad Band+UMTS/WCDMA 2100MHz	<b>Code from Design Code</b>	<b>Packing</b> T: Taping

Minimum Ordering Quantity: 4000 pcs per reel.

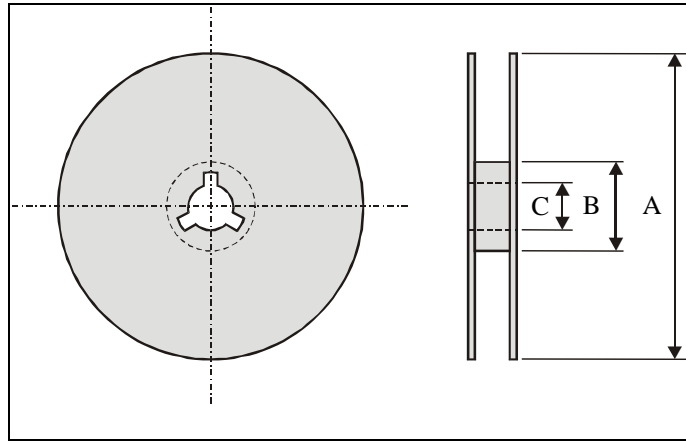
**PACKAGING**



**Paper Tape specifications (unit :mm)**

Index	Ao	Bo	φD	T	W
Dimension (mm)	0.975 ± 0.10	1.76 ± 0.10	1.55 ± 0.05	0.75 ± 0.10	8.00 ± 0.10
Index	E	F	Po	P1	P2
Dimension (mm)	1.75 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.05

## Reel dimensions



Index	A	B	C
Dimension (mm)	Φ178.0	Φ60.0	Φ13.0

Taping Quantity:4000 pieces per 7" reel

## CAUTION OF HANDLING

### Limitation of Applications

Please contact us before using our products for the applications listed below which require especially high reliability for the prevention of defects, which might directly cause damage to the third party's life, body or property.

- (1) Aircraft equipment
- (2) Aerospace equipment
- (3) Undersea equipment
- (4) Medical equipment
- (5) Disaster prevention / crime prevention equipment
- (6) Traffic signal equipment
- (7) Transportation equipment (vehicles, trains, ships, etc.)
- (8) Applications of similar complexity and /or reliability requirements to the applications listed in the above.

### Storage condition

- (1) Products should be used in 6 months from the day of WALSIN outgoing inspection.
- (2) Storage environment condition.
  - Products should be storage in the warehouse on the following conditions.
  - Temperature : +5 to +40℃
  - Humidity : 30 to 70% relative humidity
  - Don't keep products in corrosive gases such as sulfur. Chlorine gas or acid or it may cause oxidization of electrode, resulting in poor solderability.
  - Products should be storage on the palette for the prevention of the influence from humidity, dust and so on.
  - Products should be storage in the warehouse without heat shock, vibration, direct sunlight and so on.
  - Products should be storage under the airtight packaged condition.



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