

Product Overview

The AG201-63G is a general-purpose buffer amplifier that offers high dynamic range operation in a low-cost surface mount package. At 900 MHz, the AG201-63G provides typical 11 dB of gain, +19 dBm OIP3 and +6.5 dBm P1dB. This device combines dependable performance with consistent quality to maintain MTTF values exceeding 1000 years at mounting temperatures of +85°C. The device is housed in a lead-free/Green/RoHS-compliant SOT-363 industry standards SMT package.

The AG201-63G consists of a Darlington-pair amplifier using the high reliability InGap/GaAs HBT process technology and only requires DC-blocking capacitors, a bias resistor, and an inductive RF choke for operation.

This broadband MMIC amplifier can be directly applied to various current and next generation wireless technologies such as GPRS, GSM, CDMA, and WCDMA. In addition, The AG201-63G will work for other various applications within the DC to 6 GHz frequency range such as CATV and WiMAX.

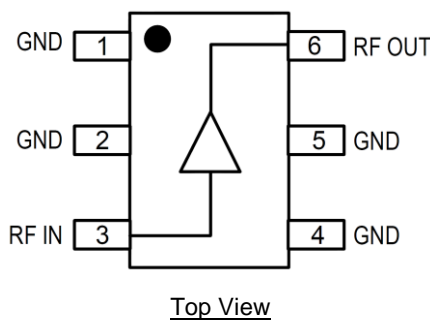


SoT-636 Package

Key Features

- DC – 6000 MHz
- 11 dB Gain at 900 MHz
- +6.5 dBm P1dB at 900 MHz
- +19 dBm OIP3 at 900 MHz
- Single Voltage Supply
- Internal Matched to 50 Ω
- Robust 1000V ESD, Class 1C
- Lead-free / Green / RoHS Compliant SoT-636 Package

Functional Block Diagram



Pin Configuration

| Pin No. | Function |
|------------|-----------|
| 3 | RF Input |
| 6 | RF Output |
| 1, 2, 4, 5 | Ground |

Applications

- Mobile Infrastructure
- CATV / FTTH
- WLAN / ISM
- RFID
- WiMAX / WiBro

Ordering Information

| Part No. | Description |
|--------------|-------------------------------|
| AG201-63G | 3,000 pieces on a 7" reel |
| AG201-63 PCB | 700–2400 MHz Evaluation Board |

Absolute Maximum Ratings

| Parameter | Rating |
|-----------------------------|----------------|
| Storage Temperature | -55 to +125 °C |
| Operational Temperature | -55 to +105 °C |
| Device DC Voltage | +4.5 V |
| RF Input Power (continuous) | +10 dBm |

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability.

Recommended Operating Conditions

| Parameter | Min | Typ | Max | Units |
|---------------------------------|-----|-----|------|-------|
| Device Voltage (V_{DEVICE}) | | +4 | | V |
| Device Current (I_{CC}) | | 20 | | mA |
| T_{CASE} | -40 | | +105 | °C |
| T_j for $>10^6$ hours MTTF | | | +177 | °C |

Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions.

Electrical Specifications

| Parameter | Conditions ⁽¹⁾ | Min | Typ | Max | Units |
|-----------------------------------|---|-----|-------|------|-------|
| Operational Frequency Range | | DC | | 6000 | MHz |
| Test Frequency | | | 900 | | MHz |
| Gain | | | 11.3 | | dB |
| Input Return Loss | | | 25 | | dB |
| Output Return Loss | | | 16 | | dB |
| Output P1dB | | | +6.5 | | dBm |
| Output IP3 | $P_{out} = -10$ dBm/tone, $\Delta f = 10$ MHz | | +19.1 | | dBm |
| Output IP2 | | | +27 | | dBm |
| Noise Figure | | | 4.4 | | dB |
| Test Frequency | | | 1900 | | MHz |
| Gain | | 10 | 11 | 12 | dB |
| Output P1dB | | | +5.8 | | dBm |
| Output IP3 | $P_{out} = -10$ dBm/tone, $\Delta f = 10$ MHz | | +18.5 | | dBm |
| Device Voltage | | | +4 | | V |
| Device Current | | | 20 | | mA |
| Thermal Resistance, θ_{jc} | Junction to case | | | 410 | °C/W |

Notes:

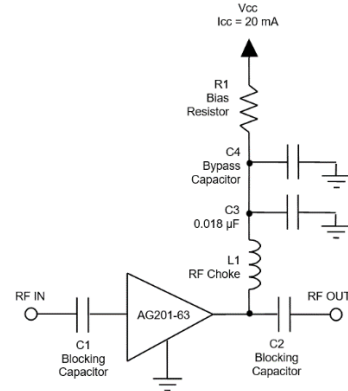
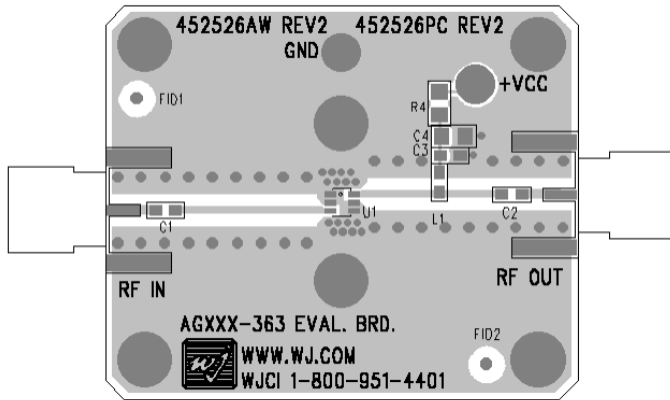
1. Test conditions unless otherwise noted: Supply Voltage = +5.0 V, $R_{BIAS} = 49.9 \Omega$, Temp = +25 °C, 50 Ω system.

S-Parameters

| Freq (GHz) | S11 (dB) | S11 (ang) | S21 (dB) | S21 (ang) | S12 (dB) | S12 (ang) | S22 (dB) | S22 (ang) |
|------------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|
| 50 | -33.36 | -6.60 | 11.22 | 178.53 | -16.01 | 1.78 | -16.22 | -2.50 |
| 250 | -34.27 | 26.40 | 11.19 | 172.86 | -16.41 | 0.49 | -16.31 | -4.04 |
| 500 | -33.08 | 106.48 | 11.19 | 165.72 | -16.39 | -3.56 | -18.46 | -10.33 |
| 750 | -29.63 | 86.10 | 11.15 | 158.59 | -16.32 | -5.87 | -18.71 | -19.75 |
| 1000 | -26.66 | 74.33 | 11.07 | 151.65 | -16.67 | -10.07 | -19.20 | -28.63 |
| 1250 | -24.09 | 69.64 | 11.04 | 144.43 | -16.23 | -10.28 | -19.49 | -42.62 |
| 1500 | -22.36 | 64.19 | 10.96 | 137.42 | -16.24 | -11.70 | -19.55 | -55.66 |
| 1750 | -20.94 | 60.32 | 10.88 | 130.39 | -16.37 | -13.92 | -19.24 | -69.54 |
| 2000 | -19.57 | 56.83 | 10.77 | 123.52 | -16.33 | -14.76 | -19.04 | -82.66 |
| 2250 | -16.29 | 43.02 | 10.61 | 116.95 | -16.37 | -17.48 | -15.52 | -85.89 |
| 2500 | -16.47 | 38.44 | 10.54 | 112.28 | -16.76 | -23.47 | -16.44 | -94.20 |
| 2750 | -16.81 | 41.05 | 10.48 | 105.22 | -16.16 | -23.54 | -17.38 | -103.52 |
| 3000 | -17.52 | 42.18 | 10.38 | 98.63 | -16.10 | -23.33 | -19.06 | -113.34 |
| 3250 | -18.18 | 45.78 | 10.31 | 92.38 | -16.25 | -24.50 | -21.18 | -127.55 |
| 3500 | -18.21 | 48.49 | 10.24 | 85.82 | -16.21 | -26.42 | -23.63 | -155.61 |
| 3750 | -18.11 | 50.97 | 10.08 | 79.13 | -15.99 | -29.08 | -23.62 | 163.87 |
| 4000 | -17.38 | 54.83 | 9.98 | 72.24 | -16.06 | -32.03 | -21.23 | 140.39 |
| 4250 | -16.85 | 56.42 | 9.83 | 65.64 | -15.97 | -34.05 | -18.49 | 125.84 |
| 4500 | -16.39 | 56.13 | 9.67 | 59.19 | -15.80 | -36.44 | -16.69 | 120.27 |
| 4750 | -16.25 | 53.66 | 9.51 | 52.37 | -15.80 | -38.98 | -15.54 | 116.28 |
| 5000 | -16.06 | 51.28 | 9.39 | 45.85 | -15.85 | -42.28 | -14.43 | 116.89 |
| 5250 | -17.05 | 44.99 | 9.23 | 39.74 | -15.85 | -44.47 | -14.46 | 117.24 |
| 5500 | -18.24 | 33.18 | 9.07 | 33.99 | -15.76 | -45.79 | -14.46 | 117.59 |
| 5750 | -19.96 | 22.01 | 9.03 | 27.96 | -15.43 | -49.07 | -14.85 | 122.56 |
| 6000 | -21.05 | 8.45 | 8.95 | 21.94 | -15.61 | -50.71 | -14.99 | 122.55 |

Test Conditions: $V_{\text{DEVICE}} = +5 \text{ V}$, $I_{\text{CC}} = 20 \text{ mA (typ.)}$, $\text{Temp.} = +25^\circ\text{C}$, reference plane at device leads

700–2400 MHz Evaluation Board – AG201-63 PCB



Bill of Material – AG201-63 PCB

| Reference Des. | Value | Description | Manuf. | Part Number |
|----------------|----------|---------------------------------------|---------|-------------|
| PCB | | Printed Circuit Board | Qorvo | |
| U1 | | Amplifier, InGaP GaAs HBT | Qorvo | AG201-63G |
| C1, C2 | 56 pF | Capacitor, 56 pF, 5%, 50V, C0G, 0603 | various | |
| C3 | 0.018 µF | Capacitor, 0.018 µF, 50V, X7R, 0603 | | |
| L1 | 39 nH | Inductor, 39 nH, 5%, Wire wound, 0603 | various | |
| R1 | 49.9 Ω | Resistor, 49.9 Ω, 1%, 1/16W, 0603 | various | |

Note: see Component Values table for Optimum performance in specific frequency bands

Component Values for Specific Frequencies and Supply Voltages

| Frequency (MHz) | 50 | 500 | 900 | 1900 | 2200 | 2500 | 3500 |
|-------------------------|---------|---------|--------|-------|-------|-------|-------|
| L1 | 820 nH | 220 nH | 68 nH | 27 nH | 22 nH | 18 nH | 15 nH |
| C1, C2, C4 | .018 µF | 1000 pF | 100 pF | 68 pF | 68 pF | 56 pF | 39 pF |
| V _{SUPPLY} (V) | 5 | 6 | 7 | 8 | 9 | 10 | 12 |
| R1 (Ω) | 50 | 100 | 150 | 200 | 250 | 300 | 400 |
| Component Size | 0603 | 0603 | 0805 | 0805 | 1206 | 1210 | 1210 |

Typical Performance – AG201-63G

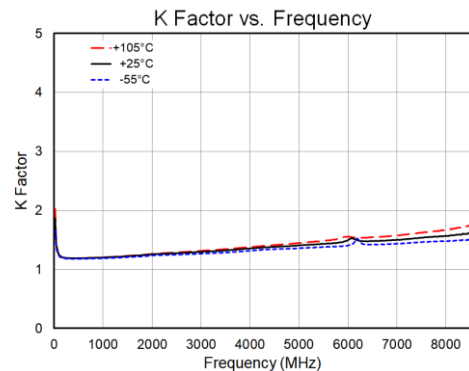
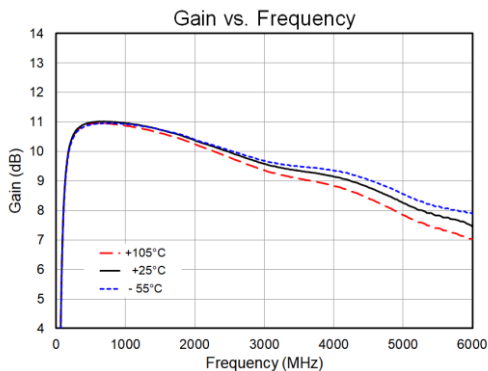
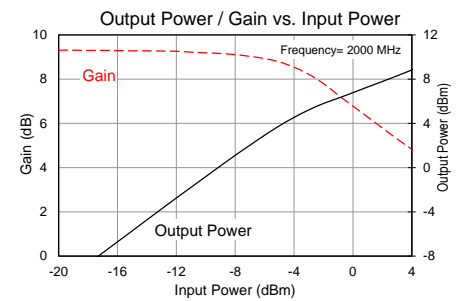
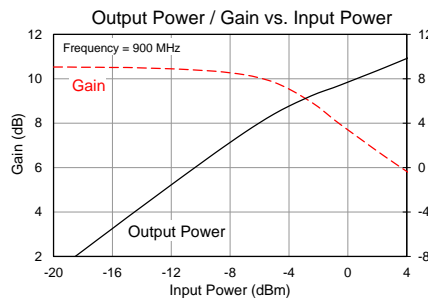
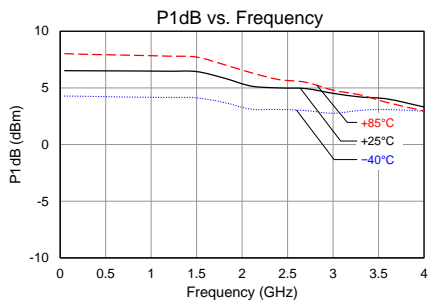
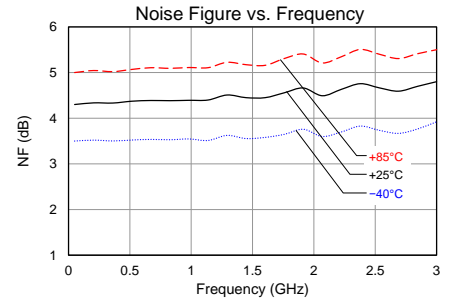
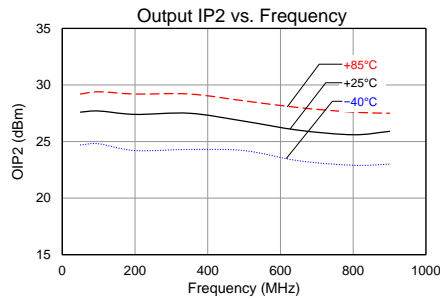
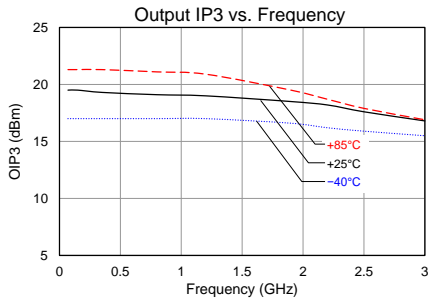
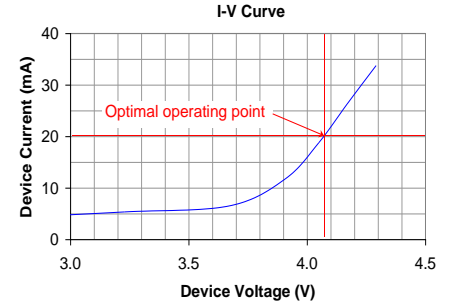
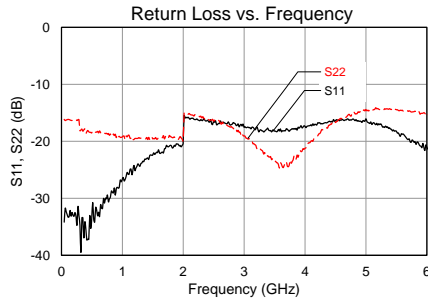
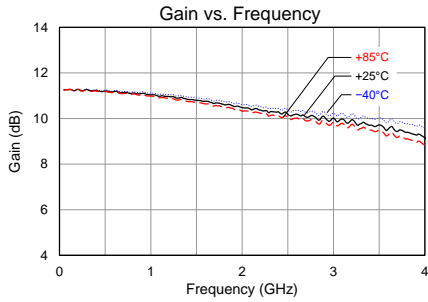
| Parameter | Typical Performance Value ⁽¹⁾ | | | | | | | | Units |
|---------------------|--|-------|-------|-------|-------|-------|------|------|-------|
| | 100 | 500 | 900 | 1900 | 2140 | 2400 | 3500 | 5800 | |
| Frequency | 100 | 500 | 900 | 1900 | 2140 | 2400 | 3500 | 5800 | MHz |
| Gain | 11.4 | 11.4 | 11.3 | 11.0 | 10.9 | 10.8 | 10.4 | 9.2 | dB |
| Input Return Loss | -30 | -30 | -25 | -20 | -15 | -16 | -18 | -20 | dB |
| Output Return Loss | -16 | -16 | -16 | -16 | -16 | -16 | -20 | -14 | dB |
| Output P1dB | +6.5 | +6.5 | +6.5 | +5.8 | +5.1 | +5.0 | +4.1 | | dBm |
| OIP3 ⁽²⁾ | +19.5 | +19.5 | +19.1 | +18.5 | +18.2 | +17.7 | | | dBm |
| Noise Figure | 4.3 | 4.3 | 4.4 | 4.6 | 4.6 | 4.7 | | | dB |

Notes:

1. Test conditions unless otherwise noted: Supply Voltage = +5V, V_{DEVICE} = +4V, R_{bias} = 49.9 Ω, I_{CC} = 20 mA, Temp. = +25 °C
2. P_{out} = -10 dBm/tone, Δf = 10 MHz

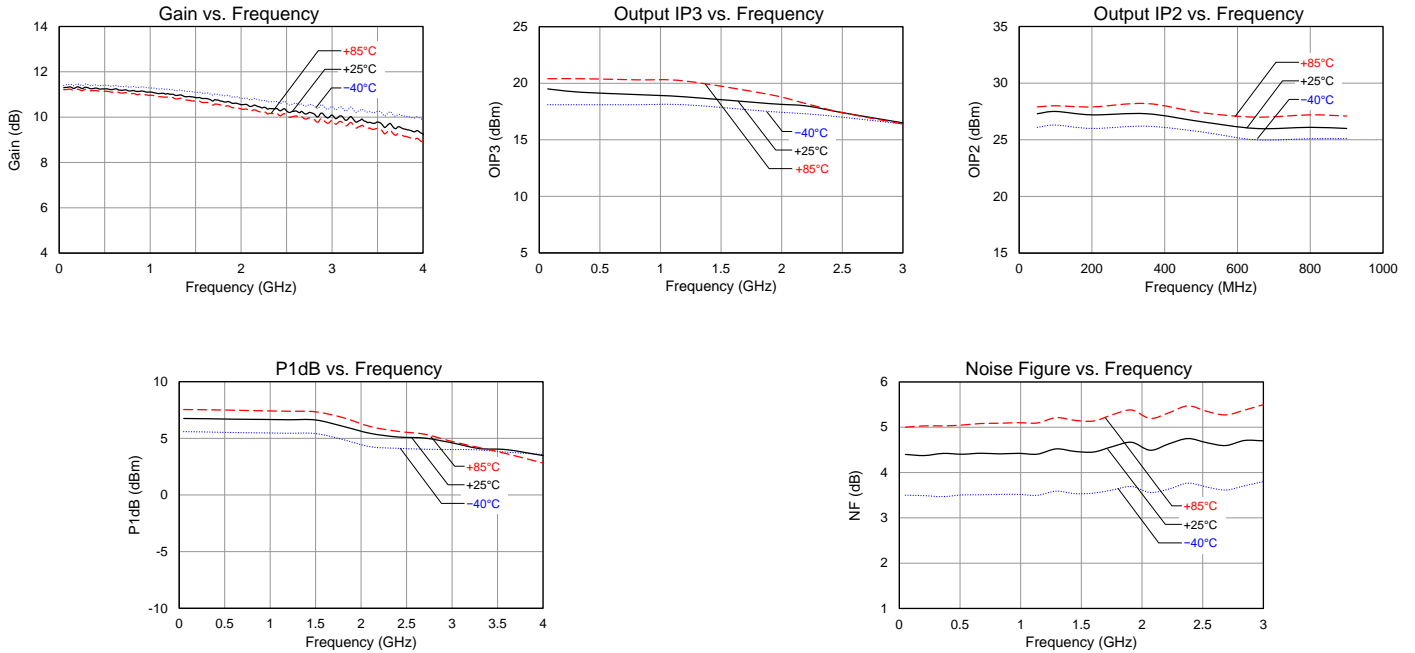
Performance Plots – AG201-63G PCB

Test conditions unless otherwise noted: Supply Voltage = +5 V, I_{CC} = 20 mA, R_{BIAS} = 49.9 Ω, Temp.=+25 °C



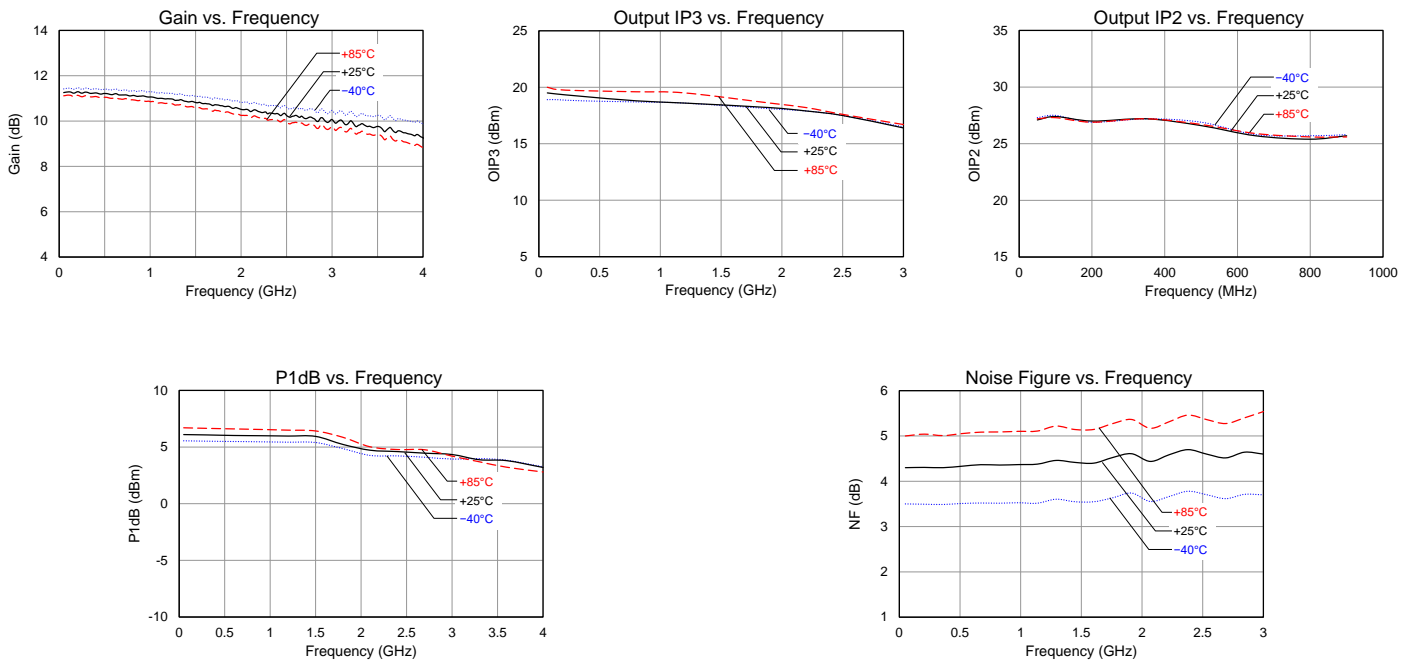
Performance Plots – AG201-63G (Supply Voltage +6V)

Test conditions unless otherwise noted: Supply Voltage = +6V, $I_{CC} = 20$ mA, $R_{BIAS} = 100$ Ω , Temp.=+25 °C

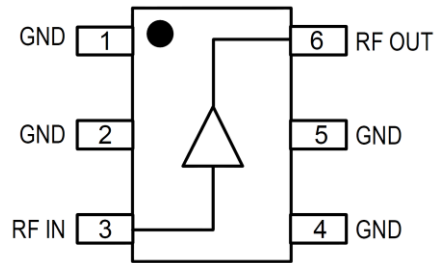


Performance Plots – AG201-63G (Supply Voltage +8V)

Test conditions unless otherwise noted: Supply Voltage = +8V, $I_{CC} = 20$ mA, $R_{BIAS} = 200$ Ω , Temp.=+25 °C



Pad Configuration and Description



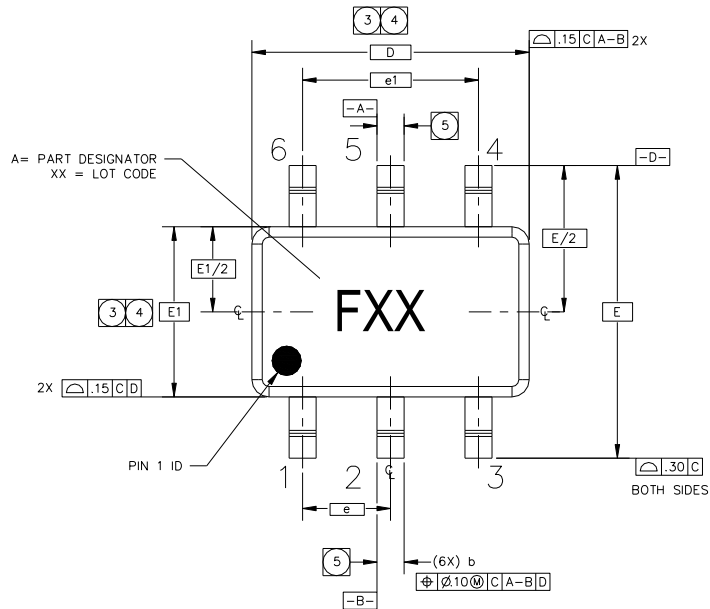
Top View

| Pad No. | Label | Description |
|------------|--------|--|
| 1, 2, 4, 5 | GND | RF/DC ground. Use recommended via pattern to minimize inductance and thermal resistance. See PCB Mounting Pattern for suggested footprint. |
| 3 | RF IN | RF input. External DC Block required. |
| 6 | RF OUT | RF output and V_{DEVICE} . External DC Block and bias voltage required. |

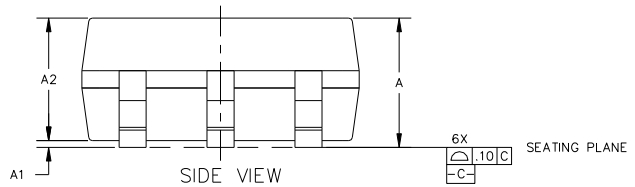
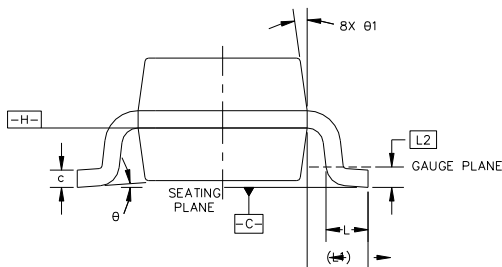
Package Marking and Dimensions

Marking: Part Designator – F
Lot Code – XX

| SYMBOL | MIN | MAX |
|--------|----------------|----------------|
| A | - | 1.10 (.043) |
| A1 | 0 | .10 (.004) |
| A2 | .70 (.028) | 1.00 (.039) |
| D | 2.00 (.079) | BASIC |
| E | 2.10 (.083) | BASIC |
| E1 | 1.25 (.039) | BASIC |
| L | .21 (.008) | .41 (.016) |
| L1 | .42 (.017) | REF |
| L2 | .15 (.006) | BASIC |
| θ | 0° | 8° |
| θ1 | 4° | 12° |
| b | .15 (.006) | .30 (.012) |
| c | .08 (.003) | .22 (.009) |
| e | .65 (.026) | BASIC |
| e1 | 1.30 (.051) | BASIC |



TOP VIEW



SIDE VIEW

NOTES:

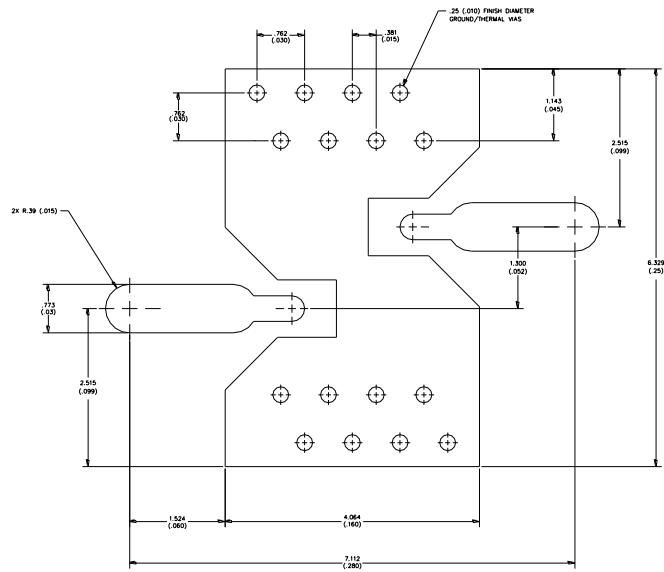
- DIMENSIONS AND TOLERANCING PER ASME Y14.5M-1194. PACKAGE CONFORMS TO JEDEC MO-203, ISSUE B.
- DIMENSIONS ARE IN MILLIMETERS (INCHES).
- DIMENSION D DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.15 mm PER END. DIMENSION E1 DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.15 mm PER SIDE. D AND E1 DIMENSIONS ARE DETERMINED AT DATUM H.
- THE PACKAGE TOP MAY BE SMALLER THAN THE PACKAGE BOTTOM. DIMENSIONS D AND E1 ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND THE BOTTOM OF THE PLASTIC BODY. D AND E1 DIMENSIONS ARE DETERMINED AT DATUM H.

- DATUM A & B TO BE DETERMINED AT DATUM H.
- DIMENSION 'b' DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 mm TOTAL IN EXCESS OF THE "b" DIMENSION AT MAXIMUM MATERIAL CONDITION. THE DAMBAR IS NOT LOCATED ON THE LOWER RADIUS OF THE FOOT. MINIMUM SPACE BETWEEN PROTRUSION AND AN ADJACENT LEAD SHALL NOT BE LESS THAN 0.07 mm.

Notes:

- All dimensions are in millimeters. Angles are in degrees.
- The terminal #1 identifier and terminal numbering conform to JESD 95-1 SPP-012.
- Contact plating: Matte-Tin (Thickness: 7.6 to 20 μm)

PCB Mounting Pattern



Notes:

1. All dimensions are in millimeters. Angles are in degrees.
2. Use 1 oz. copper minimum for top and bottom layer metal. And Make copper metal area as much as possible in inner and outer layers near the part to obtain optimal thermal performance
3. Via holes are required under the backside paddle of this device for proper RF/DC grounding and thermal dissipation. We recommend a 0.35mm (#80/.0135") diameter bit for drilling via holes and a final plated thru diameter of 0.25 mm (0.01").
4. No solder mask on the backside of the PCB in the region where the board contacts the heatsink
5. Mounting screws can be added near the part to fasten the board to a heatsink. To ensure the ground and thermal via holes contact the heatsink

Handling Precautions

| Parameter | Rating | Standard |
|----------------------------------|----------|--------------------------|
| ESD – Human Body Model (HBM) | Class 1C | ESDA / JEDEC JS-001-2012 |
| ESD – Charged Device Model (CDM) | Class C3 | JEDEC JESD22-C101F |
| MSL – Moisture Sensitivity Level | Level 3 | IPC/JEDEC J-STD-020 |



Caution!
ESD-Sensitive Device

Solderability

Compatible with both lead-free (260°C max. reflow temp.) and tin/lead (245°C max. reflow temp.) soldering processes. Solder profiles available upon request.

Contact plating: Matte Tin (*Thickness: 7.6 to 20 μm*)

RoHS Compliance

This part is compliant with 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment) as amended by Directive 2015/863/EU.

This product also has the following attributes:

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A (C₁₅H₁₂Br₄O₂) Free
- PFOS Free
- SVHC Free



Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations:

Web: www.qorvo.com

Tel: 1-844-890-8163

Email: customer.support@qorvo.com

For technical questions and application information:

Email: appsupport@qorvo.com

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[MAAMSS0041TR](#) [MAAM37000-A1G](#) [LTC6430AIUF-15#PBF](#) [SMA70-2](#) [SMA4011](#) [A231](#) [HMC-AUH232](#) [LX5511LQ](#) [LX5511LQ-TR](#)
[HMC7441-SX](#) [HMC-ALH310](#) [XD1001-BD-000V](#) [A4011](#)