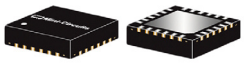
*MMIC Surface Mount*

# Wideband Double Balanced Mixer-Amplifier MDA4-752H+

Level 0 (LO Power 0dBm) 2200-7500 MHz

## The Big Deal

- High L-I Isolation, 61 dB
- Low LO Power, 0 dBm
- Small Size, 4 x 4 x 1mm



CASE STYLE: DG1847

## Product Overview

MDA4-752H+ is a multi-chip module incorporating a mixer (InGap HBT), LO amplifer (InGap HBT) and IF amplifier (E-PHEMT) dice in as single package. It has flat conversion gain over a broad frequency range and with high IP3. In addition, the MDA4-752H+ has good input and output return loss over a broad frequency range without the need for external matching components. It is packaged in a tiny 4x4 mm MCLP package.

## Key Features

| Feature | Advantages |
|---|---|
| Wide Bandwidth 2.2 to 7.5 GHz | Useful in wideband systems or in several narrowband systems, reducing inventory. |
| Wide IF Bandwidth 0.03 to 1.6 GHz | Usable in first (high IF-860 MHz) and second (low IF-70 MHz) down converter applications. |
| Conversion Gain, 4 to 9 dB | Incorporate low noise IF amplifier to enable positive conversion gain, minimizing the need for external amplifier circuits. |
| Low LO Power operation | Through the integration of a LO amplifier, the MDA4-752H+ can operate down to -3 dBm making this module very versitile as a receiver building block. |
| High LO-IF and RF-IF isolation<br>50 – 65 dB over 4 to 7.5 GHz | When used in suggested application circuit, provides outstanding isolation, minimizing the need for further filtering. |
| 4 mm x 4 mm, 24 lead MCLP Package | Integrates Mixer, LO Amplifier and IF Amplifier into one package reducing PCB size. MCLP package has low inductance, repeatable transitions, and excellent thermal contact to PCB |

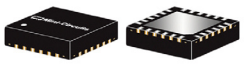
*MMIC Surface Mount*

# Wideband Double Balanced Mixer-Amplifier MDA4-752H+

## Level 0 (LO Power 0dBm) 2200-7500 MHz

### Product Features

- Wide bandwidth 2200 to 7500 MHz
- High L-I Isolation, 61 dB typ. at 4 GHz
- Operates with low LO power, 0 dBm
- Small Size 4 mm x 4mm x 1mm
- Aqueous washable



CASE STYLE: DG1847

***+RoHS Compliant***

*The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications*

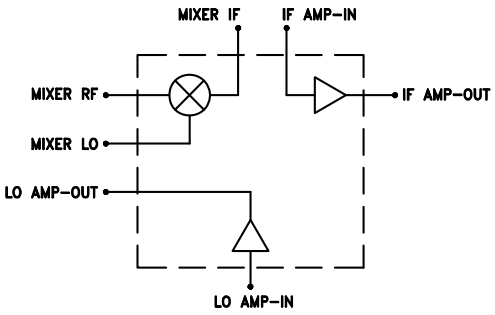
### Typical Applications

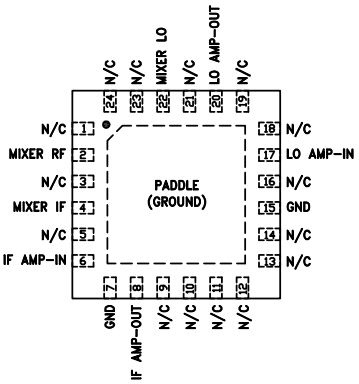
- Satellite down converters
- Defense radar & communication
- VSAT
- Aeronautical

### General Description

MDA4-752H+ is a multi-chip module incorporating a mixer (InGap HBT), LO amplifer (InGap HBT) and IF amplifier (E-PHEMT) dice in as single package. It has flat conversion gain over a broad frequency range and with high IP3. In addition, the MDA4-752H+ has good input and output return loss over a broad frequency range without the need for external matching components. It is packaged in a tiny 4x4 mm MCLP package.

### *simplified schematic and bonding pad despcription*




| Function | Pad Number | Description |
|---|---|---|
| Mixer-RF | 2 | RF input to mixer |
| Mixer-LO | 22 | LO input to mixer |
| Mixer-IF | 4 | IF output from mixer |
| LO AMP-IN | 17 | LO Amplifier input |
| LO AMP-OUT | 20 | LO Amplifier output & DC-IN |
| IF AMP-IN | 6 | IF Amplifier input |
| IF AMP-OUT | 8 | IF Amplifier output & DC-IN |
| GND | 7, Paddle | Connect to Ground |
| NC | 1, 3,5,9-16,18,19,21,23,24 | No connection, not used, ground externally |

## Electrical Specifications[1,2] at 25°C, unless noted

| Parameter | Condition (GHz) | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| RF Frequency Range | | 2.2 | | 7.5 | GHz |
| LO Frequency Range | | 2.2 | | 7.5 | GHz |
| IF Frequency Range | | 0.03 | | 1.6 | GHz |
| LO Power | | | 0 | | dBm |
| Conversion Gain (at IF=30 MHz) | 2.2 | — | 7.6 | — | dB |
| | 3.0 | — | 9.7 | — | |
| | 4.0 | 8.1 | 9.1 | 10.4 | |
| | 5.0 | — | 7.6 | — | |
| | 6.0 | — | 7.3 | — | |
| | 7.5 | — | 4.2 | — | |
| LO-RF Isolation | 2.2 | — | 23 | — | dB |
| | 3.0 | — | 20 | — | |
| | 4.0 | 24 | 31 | — | |
| | 5.0 | — | 25 | — | |
| | 6.0 | — | 21 | — | |
| | 7.5 | — | 23 | — | |
| LO-IF Isolation | 2.2 | — | 19 | — | dB |
| | 3.0 | — | 35 | — | |
| | 4.0 | 53 | 61 | — | |
| | 5.0 | — | 64 | — | |
| | 6.0 | — | 59 | — | |
| | 7.5 | — | 60 | — | |
| RF-IF Isolation | 2.2 | | 7 | | dB |
| | 3.0 | | 25 | | |
| | 4.0 | | 51 | | |
| | 5.0 | | 65 | | |
| | 6.0 | | 57 | | |
| | 7.5 | | 54 | | |
| Input at 1dB Compression | 2-2 - 7.5 | | 9 | | dBm |
| Input IP3 | 2.2 | | 16 | | dBm |
| | 3.0 | | 15 | | |
| | 4.0 | | 15 | | |
| | 5.0 | | 16 | | |
| | 6.0 | | 16 | | |
| | 7.5 | | 19 | | |
| Noise Figure | 2.3 | | 8.6 | | dB |
| | 3.0 | | 9.6 | | |
| | 4.0 | | 9.9 | | |
| Thermal Resistance (junction-to-ground lead) | | | 39 | | °C/W |
| DC Voltage | | | 5 | | V |
| DC Current | | | 141 | 169 | mA |

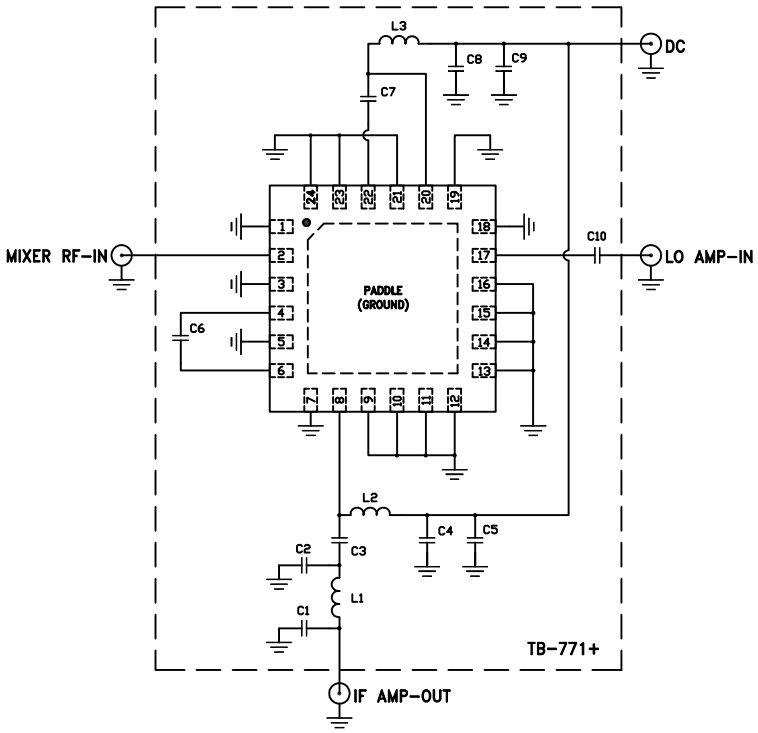
(1) Measured on Mini-Circuits Characterization test board TB-771+ as down converter. See Characterization Test Circuit Figure 1
(2) Thermal Resistance= (Temperature rise of the dive hot spot above ground lead ÷ Total power dissipation)

## Absolute Maximum Ratings[3]

| Parameter | | Ratings |
|---|---|---|
| Operating Temperature | | -40°C to 85°C |
| Storage Temperature | | -65°C to 150°C |
| Mixer | RF-IN | 21 dBm |
| | LO-IN | 21 dBm |
| | IF Current | 30 mA |
| IF Amplifier - IN | | +23 dBm (5 minutes max.)<br>+17 dBm (continuous) |
| LO Amplifier - IN | | +24 dBm |
| Power Dissipation | | |
| LO Amplifier | | 0.725W |
| IF Amplifier | | 0.47W |
| DC voltable | | 5.5V |

3. Permanent damage may occur if any of these limits are exceeded.
Electrical maximum ratings are not intended for continuous normal operation.

## Characterization and Application Test Circuit




| Component | Size | Value | Units |
|---|---|---|---|
| DUT | | MDA4-752H+ | — |
| L1 | 0402 | 4.7 | nH |
| L2 | 0603 | 390 | nH |
| L3 | 0402 | 36 | nH |
| C1,C2 | 0402 | 3 | pF |
| C3, C6 | 0402 | .01 | µF |
| C4,C7,C8,C10 | 0402 | 100 | pF |
| C5,C9 | 0402 | 0.1 | µF |

Figure 1. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-771+). Conversion Loss, Isolations; L-R, L-I & R-I are measured using R&S ZVA 24 microwave network analyzer.
Input IP3 is measured Agilent MXA N9020A spectrum Analyzer and PSG E8257D Signal Generators.
NF is measured using Agilent's N8975A NF Analyzer

Conditions (Down Converter):
1. Conversion Loss, Isolations (L-R, L-I & R-I): RF= -10 dBm, LO=0 dBm, IF=30 MHz
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, -10 dBm/tone at output.
3. Noise Figure: LO=0 dBm

## Product Marking

| Additional Detailed Technical Information<br>*additional information is available on our dash board. To access this information click here* | |
|---|---|
| **Performance Data** | Data Table |
| | Swept Graphs |
| | S-Parameter (S1P Files) Data Set (.zip file) |
| **Case Style** | DG1847 *Plastic package, exposed paddle, lead finish: matte-tin* |
| **Tape & Reel**<br>**Standard quantities available on reel** | F68<br>*7" reels with 10,20, 50, 100, 200, 500 or 1K devices* |
| **Suggested Layout for PCB Design** | PL-433 |
| **Evaluation Board** | TB-771+ |
| **Environmental Ratings** | ENV08T1 |

## ESD Rating

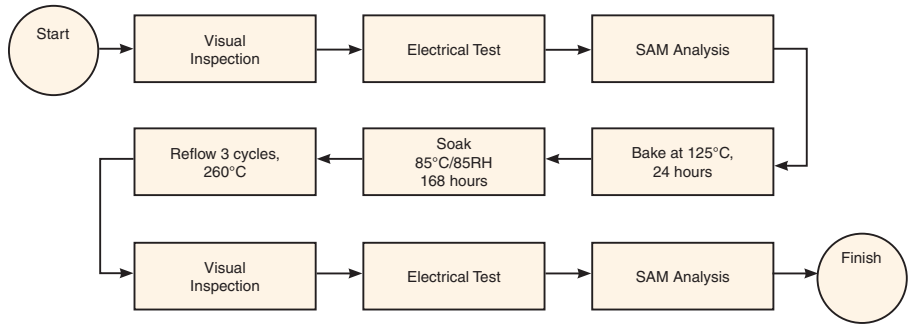
Human Body Model (HBM): Class 1A (250 to 500V) in accordance with ANSI/ESD STM 5.1 - 2001

Machine Model (MM): Class M1 (Pass 25V) in accordance with ANSI/ESD STM5.2-1999

## MSL Rating

Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC J-STD-020D

## MSL Test Flow Chart




### Additional Notes

A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.

B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.

C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp

## *Typical Performance Data*

| RF (IN) (MHz) | LO (MHz) | CONVERSION GAIN IF FIXED @IF(OUT)=30MHz (dB) | | |
|---|---|---|---|---|
| | | @LO (dBm) | | |
| | | -3 | 0 | +3 |
| 1000.1 | 1030.1 | 2.85 | 3.62 | 3.86 |
| 1200.1 | 1230.1 | 3.52 | 3.84 | 4.16 |
| 1420.1 | 1450.1 | 1.41 | 2.60 | 3.19 |
| 1640.1 | 1670.1 | 2.70 | 4.50 | 5.03 |
| 1860.1 | 1890.1 | 5.18 | 6.06 | 6.44 |
| 2080.1 | 2110.1 | 6.59 | 7.30 | 7.53 |
| 2300.1 | 2330.1 | 8.11 | 8.50 | 8.50 |
| 2520.1 | 2550.1 | 8.98 | 9.19 | 9.14 |
| 2740.1 | 2770.1 | 9.63 | 9.77 | 9.70 |
| 2960.1 | 2990.1 | 9.90 | 9.98 | 9.90 |
| 3160.1 | 3190.1 | 10.04 | 10.07 | 9.95 |
| 3380.1 | 3410.1 | 9.93 | 10.10 | 10.03 |
| 3600.1 | 3630.1 | 9.61 | 9.86 | 9.86 |
| 3820.1 | 3850.1 | 9.53 | 9.83 | 9.81 |
| 4040.1 | 4070.1 | 8.82 | 9.52 | 9.61 |
| 4260.1 | 4290.1 | 7.80 | 9.12 | 9.26 |
| 4480.1 | 4510.1 | 6.63 | 8.61 | 8.87 |
| 4700.1 | 4730.1 | 6.12 | 8.33 | 8.64 |
| 4920.1 | 4950.1 | 5.88 | 8.10 | 8.39 |
| 5140.1 | 5170.1 | 5.81 | 7.94 | 8.19 |
| 5340.1 | 5370.1 | 6.13 | 7.91 | 8.15 |
| 5560.1 | 5590.1 | 6.37 | 7.80 | 8.11 |
| 5780.1 | 5810.1 | 6.21 | 7.38 | 7.75 |
| 6000.1 | 6030.1 | 6.87 | 7.79 | 8.06 |
| 6220.1 | 6250.1 | 6.98 | 8.06 | 8.28 |
| 6440.1 | 6470.1 | 6.36 | 7.83 | 8.13 |
| 6660.1 | 6690.1 | 5.29 | 7.31 | 7.76 |
| 6880.1 | 6910.1 | 4.03 | 6.85 | 7.62 |
| 7100.1 | 7130.1 | 3.47 | 6.53 | 7.46 |
| 7320.1 | 7350.1 | 2.97 | 5.87 | 6.84 |
| 7520.1 | 7550.1 | 1.04 | 4.27 | 5.52 |
| 7740.1 | 7770.1 | -2.42 | 1.91 | 3.84 |
| 7960.1 | 7990.1 | -7.38 | -0.99 | 2.02 |
| 8180.1 | 8210.1 | -14.28 | -5.71 | -0.60 |

| RF (IN) (MHz) | LO (MHz) | IP-3 INPUT (dBm) | | |
|---|---|---|---|---|
| | | @LO (dBm) | | |
| | | -3 | 0 | +3 |
| 1000.1 | 1030.1 | 13.36 | 16.41 | 17.32 |
| 1200.1 | 1230.1 | 16.61 | 22.76 | 21.47 |
| 1420.1 | 1450.1 | 15.71 | 18.05 | 22.21 |
| 1640.1 | 1670.1 | 11.73 | 18.16 | 21.96 |
| 1860.1 | 1890.1 | 13.76 | 17.37 | 19.93 |
| 2080.1 | 2110.1 | 11.19 | 15.16 | 17.68 |
| 2300.1 | 2330.1 | 13.36 | 16.88 | 18.65 |
| 2520.1 | 2550.1 | 14.20 | 16.05 | 17.57 |
| 2740.1 | 2770.1 | 14.79 | 15.90 | 16.99 |
| 2960.1 | 2990.1 | 14.19 | 15.34 | 16.29 |
| 3160.1 | 3190.1 | 14.23 | 15.05 | 15.90 |
| 3380.1 | 3410.1 | 13.11 | 14.26 | 14.95 |
| 3600.1 | 3630.1 | 12.52 | 14.46 | 15.35 |
| 3820.1 | 3850.1 | 14.68 | 16.54 | 17.44 |
| 4040.1 | 4070.1 | 12.45 | 15.07 | 16.11 |
| 4260.1 | 4290.1 | 11.02 | 14.31 | 15.33 |
| 4480.1 | 4510.1 | 10.68 | 13.91 | 14.88 |
| 4700.1 | 4730.1 | 11.02 | 15.25 | 15.73 |
| 4920.1 | 4950.1 | 11.33 | 15.48 | 16.35 |
| 5140.1 | 5170.1 | 11.78 | 16.77 | 16.54 |
| 5340.1 | 5370.1 | 15.03 | 20.49 | 18.62 |
| 5560.1 | 5590.1 | 15.65 | 19.87 | 19.24 |
| 5780.1 | 5810.1 | 14.07 | 16.60 | 17.77 |
| 6000.1 | 6030.1 | 14.59 | 16.80 | 18.26 |
| 6220.1 | 6250.1 | 17.28 | 18.91 | 19.87 |
| 6440.1 | 6470.1 | 19.40 | 19.90 | 20.39 |
| 6660.1 | 6690.1 | 16.84 | 19.37 | 20.32 |
| 6880.1 | 6910.1 | 13.75 | 18.82 | 18.54 |
| 7100.1 | 7130.1 | 12.88 | 18.95 | 17.74 |
| 7320.1 | 7350.1 | 13.93 | 18.57 | 17.88 |
| 7520.1 | 7550.1 | 13.18 | 21.89 | 19.40 |
| 7740.1 | 7770.1 | 9.97 | 17.29 | 26.43 |
| 7960.1 | 7990.1 | 6.67 | 14.29 | 20.24 |
| 8180.1 | 8210.1 | 3.53 | 9.70 | 20.10 |

| RF (IN) (MHz) | LO (MHz) | COMPRESSION @RF IN=10dBm (dB) | | |
|---|---|---|---|---|
| | | @LO (dBm) | | |
| | | -3 | 0 | +3 |
| 1000.1 | 1030.1 | 0.56 | 0.65 | 0.65 |
| 1200.1 | 1230.1 | 0.67 | 0.61 | 0.69 |
| 1420.1 | 1450.1 | -0.50 | 0.07 | 0.37 |
| 1640.1 | 1670.1 | 0.48 | 1.59 | 1.78 |
| 1860.1 | 1890.1 | 1.98 | 2.35 | 2.37 |
| 2080.1 | 2110.1 | 2.12 | 2.32 | 2.22 |
| 2300.1 | 2330.1 | 2.41 | 2.22 | 1.95 |
| 2520.1 | 2550.1 | 2.54 | 2.20 | 1.89 |
| 2740.1 | 2770.1 | 2.68 | 2.39 | 2.11 |
| 2960.1 | 2990.1 | 2.55 | 2.38 | 2.19 |
| 3160.1 | 3190.1 | 2.50 | 2.35 | 2.17 |
| 3380.1 | 3410.1 | 2.24 | 2.18 | 2.06 |
| 3600.1 | 3630.1 | 1.71 | 1.75 | 1.70 |
| 3820.1 | 3850.1 | 1.49 | 1.46 | 1.41 |
| 4040.1 | 4070.1 | 1.16 | 1.26 | 1.23 |
| 4260.1 | 4290.1 | 0.73 | 1.17 | 1.15 |
| 4480.1 | 4510.1 | 0.09 | 1.01 | 1.03 |
| 4700.1 | 4730.1 | -0.07 | 0.97 | 1.01 |
| 4920.1 | 4950.1 | -0.15 | 0.90 | 0.94 |
| 5140.1 | 5170.1 | -0.14 | 0.86 | 0.86 |
| 5340.1 | 5370.1 | 0.16 | 0.87 | 0.85 |
| 5560.1 | 5590.1 | 0.29 | 0.77 | 0.82 |
| 5780.1 | 5810.1 | 0.24 | 0.59 | 0.69 |
| 6000.1 | 6030.1 | 0.72 | 0.94 | 0.99 |
| 6220.1 | 6250.1 | 0.90 | 1.12 | 1.07 |
| 6440.1 | 6470.1 | 0.78 | 1.15 | 1.05 |
| 6660.1 | 6690.1 | 0.52 | 1.15 | 1.04 |
| 6880.1 | 6910.1 | 0.06 | 1.14 | 1.09 |
| 7100.1 | 7130.1 | 0.21 | 1.35 | 1.25 |
| 7320.1 | 7350.1 | 0.73 | 1.55 | 1.38 |
| 7520.1 | 7550.1 | 0.30 | 1.22 | 1.13 |
| 7740.1 | 7770.1 | -1.39 | 0.46 | 0.78 |
| 7960.1 | 7990.1 | -4.45 | -0.72 | 0.38 |
| 8180.1 | 8210.1 | -9.20 | -3.36 | -0.37 |

## *Typical Performance Data*

| IF (OUT) (MHz) | LO (MHz) | CONVERSION GAIN VS. IF FREQUENCY @RF(IN)=4900.1MHz (dB) |
|---|---|---|
| | | @LO (dBm) |
| | | 0 |
| 1760.0 | 3140.1 | 1.15 |
| 1680.0 | 3220.1 | 2.71 |
| 1590.0 | 3310.1 | 3.67 |
| 1500.0 | 3400.1 | 3.75 |
| 1410.0 | 3490.1 | 3.30 |
| 1320.0 | 3580.1 | 2.98 |
| 1230.0 | 3670.1 | 2.92 |
| 1140.0 | 3760.1 | 3.11 |
| 1050.0 | 3850.1 | 3.36 |
| 960.0 | 3940.1 | 3.45 |
| 870.0 | 4030.1 | 3.61 |
| 780.0 | 4120.1 | 3.88 |
| 690.0 | 4210.1 | 4.30 |
| 600.0 | 4300.1 | 4.80 |
| 510.0 | 4390.1 | 5.27 |
| 420.0 | 4480.1 | 5.55 |
| 330.0 | 4570.1 | 5.66 |
| 240.0 | 4660.1 | 5.70 |
| 150.0 | 4750.1 | 5.73 |
| 60.0 | 4840.1 | 6.43 |
| 100.0 | 5000.1 | 5.91 |
| 190.0 | 5090.1 | 5.70 |
| 270.0 | 5170.1 | 5.69 |
| 360.0 | 5260.1 | 5.58 |
| 440.0 | 5340.1 | 5.50 |
| 530.0 | 5430.1 | 5.29 |
| 610.0 | 5510.1 | 4.99 |
| 700.0 | 5600.1 | 4.50 |
| 780.0 | 5680.1 | 4.06 |
| 870.0 | 5770.1 | 3.67 |
| 950.0 | 5850.1 | 3.51 |
| 1040.0 | 5940.1 | 3.36 |
| 1120.0 | 6020.1 | 3.12 |
| 1210.0 | 6110.1 | 3.12 |
| 1290.0 | 6190.1 | 3.21 |
| 1380.0 | 6280.1 | 3.09 |
| 1460.0 | 6360.1 | 2.71 |
| 1550.0 | 6450.1 | 2.20 |
| 1630.0 | 6530.1 | 1.35 |

| IF (OUT) (MHz) | LO (MHz) | CONVERSION GAIN VS. IF FREQUENCY @RF(IN)=2300.1MHz (dB) |
|---|---|---|
| | | @LO (dBm) |
| | | 0 |
| 10.0 | 2310.1 | 6.93 |
| 50.0 | 2350.1 | 7.32 |
| 90.0 | 2390.1 | 6.55 |
| 140.0 | 2440.1 | 6.18 |
| 180.0 | 2480.1 | 6.10 |
| 220.0 | 2520.1 | 6.04 |
| 270.0 | 2570.1 | 6.02 |
| 310.0 | 2610.1 | 5.98 |
| 350.0 | 2650.1 | 5.91 |
| 400.0 | 2700.1 | 5.86 |
| 440.0 | 2740.1 | 5.77 |
| 480.0 | 2780.1 | 5.63 |
| 530.0 | 2830.1 | 5.46 |
| 570.0 | 2870.1 | 5.24 |
| 610.0 | 2910.1 | 5.13 |
| 660.0 | 2960.1 | 4.74 |
| 700.0 | 3000.1 | 4.50 |
| 740.0 | 3040.1 | 4.35 |
| 790.0 | 3090.1 | 4.05 |
| 830.0 | 3130.1 | 4.06 |
| 920.0 | 3220.1 | 4.02 |
| 960.0 | 3260.1 | 3.98 |
| 1000.0 | 3300.1 | 4.02 |
| 1050.0 | 3350.1 | 3.91 |
| 1090.0 | 3390.1 | 3.89 |
| 1130.0 | 3430.1 | 3.90 |
| 1170.0 | 3470.1 | 3.69 |
| 1220.0 | 3520.1 | 3.79 |
| 1260.0 | 3560.1 | 3.66 |
| 1310.0 | 3610.1 | 3.88 |
| 1350.0 | 3650.1 | 3.89 |
| 1390.0 | 3690.1 | 4.11 |
| 1440.0 | 3740.1 | 4.25 |
| 1480.0 | 3780.1 | 4.45 |
| 1520.0 | 3820.1 | 4.48 |
| 1570.0 | 3870.1 | 4.32 |
| 1610.0 | 3910.1 | 3.97 |
| 1650.0 | 3950.1 | 3.37 |
| 1700.0 | 4000.1 | 2.36 |

| IF (OUT) (MHz) | LO (MHz) | CONVERSION GAIN VS. IF FREQUENCY @RF(IN)=7500.1MHz (dB) |
|---|---|---|
| | | @LO (dBm) |
| | | 0 |
| 2000.0 | 5500.1 | -9.19 |
| 1950.0 | 5550.1 | -7.77 |
| 1900.0 | 5600.1 | -6.07 |
| 1850.0 | 5650.1 | -4.38 |
| 1800.0 | 5700.1 | -2.84 |
| 1750.0 | 5750.1 | -1.21 |
| 1700.0 | 5800.1 | -0.02 |
| 1650.0 | 5850.1 | 1.02 |
| 1600.0 | 5900.1 | 1.69 |
| 1550.0 | 5950.1 | 2.17 |
| 1500.0 | 6000.1 | 2.52 |
| 1450.0 | 6050.1 | 2.71 |
| 1400.0 | 6100.1 | 2.93 |
| 1340.0 | 6160.1 | 3.09 |
| 1290.0 | 6210.1 | 3.21 |
| 1240.0 | 6260.1 | 3.18 |
| 1190.0 | 6310.1 | 3.26 |
| 1140.0 | 6360.1 | 3.21 |
| 1090.0 | 6410.1 | 3.16 |
| 1040.0 | 6460.1 | 3.12 |
| 940.0 | 6560.1 | 3.06 |
| 890.0 | 6610.1 | 3.04 |
| 840.0 | 6660.1 | 3.22 |
| 790.0 | 6710.1 | 3.15 |
| 740.0 | 6760.1 | 3.43 |
| 680.0 | 6820.1 | 3.30 |
| 630.0 | 6870.1 | 3.59 |
| 580.0 | 6920.1 | 3.40 |
| 530.0 | 6970.1 | 3.70 |
| 480.0 | 7020.1 | 3.44 |
| 430.0 | 7070.1 | 3.66 |
| 380.0 | 7120.1 | 3.31 |
| 330.0 | 7170.1 | 3.40 |
| 280.0 | 7220.1 | 2.97 |
| 230.0 | 7270.1 | 2.96 |
| 180.0 | 7320.1 | 2.49 |
| 130.0 | 7370.1 | 2.58 |
| 80.0 | 7420.1 | 2.40 |
| 20.0 | 7480.1 | 6.16 |

## *Typical Performance Data*

| LO (MHz) | LO-RF ISOLATION (dB) @LO (dBm) | | | LO-IF ISOLATION (dB) @LO (dBm) | | |
|---|---|---|---|---|---|---|
| | -3 | 0 | +3 | -3 | 0 | +3 |
| 1030.1 | 20.73 | 24.16 | 26.52 | 0.60 | 0.59 | 1.17 |
| 1230.1 | 24.00 | 26.93 | 29.33 | 0.46 | 0.45 | 0.97 |
| 1450.1 | 25.03 | 26.76 | 28.01 | 0.72 | 0.71 | 0.95 |
| 1670.1 | 30.60 | 30.62 | 30.14 | 2.56 | 2.56 | 2.66 |
| 1890.1 | 26.69 | 23.65 | 22.66 | 9.15 | 9.15 | 8.88 |
| 2110.1 | 28.43 | 23.68 | 22.07 | 17.32 | 17.32 | 15.93 |
| 2330.1 | 25.21 | 22.53 | 21.70 | 22.81 | 22.80 | 21.66 |
| 2550.1 | 21.78 | 21.23 | 21.64 | 27.48 | 27.48 | 27.46 |
| 2770.1 | 21.26 | 21.20 | 22.32 | 32.33 | 32.32 | 33.10 |
| 2990.1 | 19.33 | 20.45 | 23.05 | 36.57 | 36.58 | 37.83 |
| 3190.1 | 18.90 | 20.13 | 24.05 | 37.91 | 37.89 | 39.71 |
| 3410.1 | 24.73 | 26.60 | 33.93 | 37.84 | 37.83 | 39.91 |
| 3630.1 | 25.68 | 29.11 | 42.93 | 46.42 | 46.42 | 48.79 |
| 3850.1 | 27.21 | 34.43 | 40.04 | 57.84 | 58.01 | 60.80 |
| 4070.1 | 27.38 | 32.09 | 40.86 | 64.72 | 64.32 | 67.01 |
| 4290.1 | 27.88 | 30.24 | 35.23 | 67.85 | 67.35 | 70.42 |
| 4510.1 | 27.48 | 29.80 | 33.52 | 67.30 | 66.39 | 69.34 |
| 4730.1 | 27.45 | 30.55 | 34.87 | 65.88 | 65.67 | 67.86 |
| 4950.1 | 25.18 | 25.96 | 28.29 | 65.06 | 65.39 | 66.91 |
| 5170.1 | 23.11 | 22.98 | 24.20 | 62.25 | 62.00 | 64.15 |
| 5370.1 | 22.34 | 22.59 | 23.70 | 61.10 | 61.43 | 63.58 |
| 5590.1 | 21.09 | 22.06 | 23.57 | 61.58 | 61.41 | 63.92 |
| 5810.1 | 20.01 | 21.41 | 23.22 | 59.82 | 59.69 | 61.77 |
| 6030.1 | 19.40 | 20.85 | 22.66 | 59.05 | 58.95 | 60.95 |
| 6250.1 | 18.68 | 20.04 | 21.78 | 58.06 | 58.16 | 59.84 |
| 6470.1 | 18.35 | 19.62 | 21.27 | 55.55 | 55.59 | 57.35 |
| 6690.1 | 17.88 | 18.86 | 20.42 | 54.00 | 54.12 | 55.37 |
| 6910.1 | 17.89 | 18.73 | 20.16 | 54.56 | 54.71 | 55.75 |
| 7130.1 | 18.50 | 19.41 | 20.81 | 55.37 | 55.11 | 56.36 |
| 7350.1 | 20.41 | 21.21 | 22.47 | 59.37 | 59.35 | 60.52 |
| 7550.1 | 24.13 | 24.21 | 24.55 | 64.31 | 63.14 | 66.29 |
| 7770.1 | 33.38 | 27.73 | 25.42 | 68.83 | 68.76 | 68.94 |
| 7990.1 | 22.89 | 23.00 | 23.19 | 66.91 | 66.15 | 66.53 |
| 8210.1 | 16.30 | 16.84 | 18.08 | 63.43 | 63.74 | 64.11 |

| RF (IN) (MHz) | LO (MHz) | RF-IF ISOLATION (dB) @LO (dBm) | | |
|---|---|---|---|---|
| | | -3 | 0 | +3 |
| 1000.1 | 1030.1 | -2.25 | -1.47 | -0.88 |
| 1200.1 | 1230.1 | -3.00 | -2.05 | -1.37 |
| 1420.1 | 1450.1 | -4.55 | -4.06 | -3.88 |
| 1640.1 | 1670.1 | -4.77 | -4.26 | -4.16 |
| 1860.1 | 1890.1 | -0.03 | 0.07 | -0.10 |
| 2080.1 | 2110.1 | 5.83 | 5.52 | 5.20 |
| 2300.1 | 2330.1 | 10.85 | 10.53 | 10.38 |
| 2520.1 | 2550.1 | 15.96 | 15.74 | 15.65 |
| 2740.1 | 2770.1 | 21.52 | 21.32 | 21.30 |
| 2960.1 | 2990.1 | 26.44 | 26.41 | 26.51 |
| 3160.1 | 3190.1 | 29.05 | 28.98 | 29.03 |
| 3380.1 | 3410.1 | 28.73 | 28.50 | 28.36 |
| 3600.1 | 3630.1 | 34.39 | 33.98 | 33.93 |
| 3820.1 | 3850.1 | 46.19 | 45.48 | 45.35 |
| 4040.1 | 4070.1 | 55.28 | 54.12 | 54.62 |
| 4260.1 | 4290.1 | 59.86 | 60.68 | 60.98 |
| 4480.1 | 4510.1 | 64.70 | 64.06 | 62.79 |
| 4700.1 | 4730.1 | 63.98 | 64.07 | 71.90 |
| 4920.1 | 4950.1 | 69.35 | 66.94 | 67.32 |
| 5140.1 | 5170.1 | 67.10 | 69.81 | 68.35 |
| 5340.1 | 5370.1 | 66.91 | 61.88 | 64.31 |
| 5560.1 | 5590.1 | 60.93 | 63.56 | 64.17 |
| 5780.1 | 5810.1 | 59.00 | 62.41 | 60.04 |
| 6000.1 | 6030.1 | 57.88 | 58.51 | 58.37 |
| 6220.1 | 6250.1 | 53.97 | 56.93 | 55.83 |
| 6440.1 | 6470.1 | 51.14 | 51.57 | 51.71 |
| 6660.1 | 6690.1 | 48.82 | 49.72 | 50.55 |
| 6880.1 | 6910.1 | 49.95 | 50.76 | 50.61 |
| 7100.1 | 7130.1 | 51.31 | 50.66 | 51.51 |
| 7320.1 | 7350.1 | 51.70 | 52.41 | 53.15 |
| 7520.1 | 7550.1 | 52.95 | 52.46 | 54.78 |
| 7740.1 | 7770.1 | 53.94 | 54.52 | 54.41 |
| 7960.1 | 7990.1 | 56.31 | 56.69 | 57.25 |
| 8180.1 | 8210.1 | 58.84 | 56.87 | 57.77 |

## *Typical Performance Data*

| RF (IN) (MHz) | LO (MHz) | RF VSWR (:1) @LO (dBm) | | |
|---|---|---|---|---|
| | | -3 | 0 | +3 |
| 1000.1 | 1030.1 | 6.39 | 6.36 | 6.38 |
| 1200.1 | 1230.1 | 5.94 | 6.17 | 6.26 |
| 1420.1 | 1450.1 | 6.33 | 6.35 | 6.32 |
| 1640.1 | 1670.1 | 4.87 | 4.86 | 4.78 |
| 1860.1 | 1890.1 | 3.96 | 3.86 | 3.73 |
| 2080.1 | 2110.1 | 3.59 | 3.51 | 3.42 |
| 2300.1 | 2330.1 | 2.97 | 3.01 | 3.02 |
| 2520.1 | 2550.1 | 2.41 | 2.49 | 2.56 |
| 2740.1 | 2770.1 | 1.93 | 1.98 | 2.03 |
| 2960.1 | 2990.1 | 1.60 | 1.59 | 1.60 |
| 3160.1 | 3190.1 | 1.49 | 1.49 | 1.48 |
| 3380.1 | 3410.1 | 1.26 | 1.29 | 1.32 |
| 3600.1 | 3630.1 | 1.06 | 1.15 | 1.18 |
| 3820.1 | 3850.1 | 1.14 | 1.12 | 1.15 |
| 4040.1 | 4070.1 | 1.57 | 1.42 | 1.38 |
| 4260.1 | 4290.1 | 2.02 | 1.80 | 1.75 |
| 4480.1 | 4510.1 | 2.45 | 2.11 | 2.03 |
| 4700.1 | 4730.1 | 2.76 | 2.34 | 2.24 |
| 4920.1 | 4950.1 | 2.96 | 2.48 | 2.37 |
| 5140.1 | 5170.1 | 3.12 | 2.63 | 2.50 |
| 5340.1 | 5370.1 | 3.09 | 2.69 | 2.54 |
| 5560.1 | 5590.1 | 3.07 | 2.79 | 2.66 |
| 5780.1 | 5810.1 | 2.96 | 2.75 | 2.66 |
| 6000.1 | 6030.1 | 2.60 | 2.40 | 2.32 |
| 6220.1 | 6250.1 | 2.25 | 2.04 | 1.95 |
| 6440.1 | 6470.1 | 2.00 | 1.80 | 1.71 |
| 6660.1 | 6690.1 | 1.86 | 1.69 | 1.60 |
| 6880.1 | 6910.1 | 2.03 | 1.82 | 1.72 |
| 7100.1 | 7130.1 | 2.34 | 2.08 | 1.96 |
| 7320.1 | 7350.1 | 2.63 | 2.36 | 2.24 |
| 7520.1 | 7550.1 | 2.95 | 2.67 | 2.53 |
| 7740.1 | 7770.1 | 3.26 | 2.96 | 2.78 |
| 7960.1 | 7990.1 | 3.32 | 3.09 | 2.91 |
| 8180.1 | 8210.1 | 2.93 | 2.85 | 2.72 |

| LO (MHz) | LO VSWR (:1) @LO (dBm) | | |
|---|---|---|---|
| | -3 | 0 | +3 |
| 1030.1 | 1.26 | 1.27 | 1.40 |
| 1230.1 | 1.16 | 1.12 | 1.27 |
| 1450.1 | 1.22 | 1.17 | 1.24 |
| 1670.1 | 1.22 | 1.21 | 1.28 |
| 1890.1 | 1.11 | 1.17 | 1.28 |
| 2110.1 | 1.04 | 1.14 | 1.24 |
| 2330.1 | 1.16 | 1.14 | 1.18 |
| 2550.1 | 1.28 | 1.17 | 1.13 |
| 2770.1 | 1.40 | 1.23 | 1.13 |
| 2990.1 | 1.46 | 1.25 | 1.12 |
| 3190.1 | 1.52 | 1.27 | 1.10 |
| 3410.1 | 1.59 | 1.29 | 1.06 |
| 3630.1 | 1.70 | 1.33 | 1.05 |
| 3850.1 | 1.88 | 1.43 | 1.06 |
| 4070.1 | 1.92 | 1.47 | 1.12 |
| 4290.1 | 1.96 | 1.53 | 1.20 |
| 4510.1 | 1.89 | 1.53 | 1.24 |
| 4730.1 | 1.76 | 1.47 | 1.26 |
| 4950.1 | 1.61 | 1.37 | 1.30 |
| 5170.1 | 1.47 | 1.32 | 1.37 |
| 5370.1 | 1.42 | 1.36 | 1.51 |
| 5590.1 | 1.52 | 1.54 | 1.71 |
| 5810.1 | 1.83 | 1.84 | 2.01 |
| 6030.1 | 2.31 | 2.28 | 2.41 |
| 6250.1 | 2.97 | 2.83 | 2.88 |
| 6470.1 | 3.59 | 3.31 | 3.29 |
| 6690.1 | 3.96 | 3.65 | 3.61 |
| 6910.1 | 3.93 | 3.71 | 3.68 |
| 7130.1 | 3.60 | 3.55 | 3.60 |
| 7350.1 | 3.27 | 3.34 | 3.45 |
| 7550.1 | 3.03 | 3.15 | 3.29 |
| 7770.1 | 2.84 | 2.94 | 3.08 |
| 7990.1 | 2.71 | 2.77 | 2.87 |
| 8210.1 | 2.54 | 2.56 | 2.65 |

| IF (OUT) (MHz) | IF VSWR @LO=7530.1MHz (:1) @LO (dBm) | | |
|---|---|---|---|
| | -3 | 0 | +3 |
| 10.1 | 4.26 | 3.88 | 4.00 |
| 110.1 | 4.06 | 4.00 | 3.96 |
| 210.1 | 3.27 | 3.25 | 3.21 |
| 310.1 | 2.78 | 2.78 | 2.73 |
| 410.1 | 3.12 | 3.11 | 3.08 |
| 520.1 | 4.37 | 4.33 | 4.27 |
| 620.1 | 5.48 | 5.44 | 5.38 |
| 720.1 | 5.83 | 5.76 | 5.73 |
| 820.1 | 5.20 | 5.16 | 5.11 |
| 930.1 | 3.80 | 3.78 | 3.75 |
| 1030.1 | 2.47 | 2.47 | 2.46 |
| 1130.1 | 1.55 | 1.55 | 1.55 |
| 1230.1 | 1.32 | 1.32 | 1.33 |
| 1340.1 | 1.71 | 1.70 | 1.71 |
| 1440.1 | 1.83 | 1.83 | 1.82 |
| 1540.1 | 1.45 | 1.45 | 1.45 |
| 1640.1 | 1.29 | 1.30 | 1.30 |
| 1740.1 | 3.33 | 3.33 | 3.34 |
| 1850.1 | 8.87 | 8.86 | 8.85 |
| 1950.1 | 16.45 | 16.44 | 16.38 |
| 2050.1 | 23.90 | 23.90 | 24.01 |
| 2150.1 | 30.01 | 30.07 | 29.86 |
| 2260.1 | 35.27 | 35.42 | 34.95 |
| 2360.1 | 38.29 | 37.69 | 37.69 |
| 2500.1 | 41.28 | 41.06 | 41.41 |
| 2560.1 | 41.55 | 41.26 | 41.54 |
| 2670.1 | 43.66 | 43.96 | 43.95 |
| 2770.1 | 45.40 | 45.68 | 45.14 |
| 2870.1 | 45.86 | 45.42 | 45.37 |
| 2970.1 | 46.34 | 45.99 | 46.13 |
| 3070.1 | 43.25 | 43.30 | 43.17 |
| 3180.1 | 44.42 | 44.35 | 44.49 |
| 3280.1 | 45.56 | 45.99 | 45.94 |
| 3380.1 | 47.08 | 47.08 | 46.82 |

*Harmonics Tables*

| RF HARMONICS ORDER | (-dBm) | (-dBc) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | --- | --- | 62.97 | 76.13 | 56.11 | 59.52 | 65.19 | --- | --- | --- | --- | --- |
| 1 | --- | 75.76 | --- | 99.40 | 103.05 | 70.24 | 97.58 | 92.61 | --- | --- | --- | --- |
| 2 | 116.22 | 104.13 | 103.43 | 62.14 | 106.55 | 101.63 | 101.66 | 98.20 | 94.13 | --- | --- | --- |
| 3 | 115.35 | 99.82 | 104.16 | 104.49 | 70.53 | 104.70 | 102.05 | 102.75 | 97.14 | 95.24 | 93.27 | --- |
| 4 | 109.79 | 98.09 | 100.72 | 103.04 | 103.66 | 106.14 | 102.67 | 104.83 | 101.59 | 99.56 | 95.85 | --- |
| 5 | 110.96 | 97.39 | 97.90 | 102.18 | 103.37 | 102.95 | 101.62 | 104.73 | 103.59 | 98.58 | 97.97 | 95.39 |
| 6 | 107.35 | --- | 94.02 | 98.61 | 102.89 | 103.78 | 103.17 | 99.61 | 103.61 | 103.14 | 101.77 | 98.04 |
| 7 | 107.94 | --- | --- | 96.64 | 96.30 | 102.04 | 103.95 | 102.22 | 97.28 | 102.66 | 103.32 | 98.91 |
| 8 | 108.10 | --- | --- | --- | 98.01 | 98.58 | 100.99 | 102.36 | 104.30 | 101.67 | 102.71 | 103.58 |
| 9 | 108.61 | --- | --- | --- | --- | 96.78 | 98.48 | 103.27 | 102.66 | 104.17 | 102.18 | 102.85 |
| 10 | 105.11 | --- | --- | --- | --- | --- | 96.74 | 97.92 | 102.98 | 105.23 | 104.02 | 108.05 |
| | RF CAL | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

**LO HARMONICS ORDER**

**Test conditions:** **RF IN: 4600.1 MHz; -15 dBm.**
**LO IN: 4630.1 MHz; 0 dBm**
**IF OUT: 30 MHz; -6.58 dBm**

| RF HARMONICS ORDER | (-dBm) | (-dBc) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | --- | --- | 73.01 | 85.89 | 66.05 | 69.14 | 75.99 | --- | --- | --- | --- | --- |
| 1 | --- | 76.23 | --- | 97.03 | 107.77 | 70.35 | 97.11 | 98.56 | --- | --- | --- | --- |
| 2 | 102.04 | 109.87 | 112.49 | 51.33 | 114.12 | 111.83 | 104.19 | 101.15 | 102.49 | --- | --- | --- |
| 3 | 110.23 | 103.44 | 110.51 | 113.48 | 52.05 | 111.14 | 110.91 | 106.31 | 106.34 | 103.12 | 102.33 | --- |
| 4 | 107.47 | 105.95 | 109.60 | 111.57 | 109.83 | 73.91 | 111.38 | 111.84 | 110.72 | 106.67 | 100.83 | --- |
| 5 | 105.63 | 102.63 | 106.87 | 107.33 | 111.42 | 110.20 | 79.84 | 112.41 | 110.97 | 108.80 | 105.73 | 103.15 |
| 6 | 102.94 | --- | 106.84 | 107.49 | 108.02 | 112.01 | 112.72 | 90.84 | 111.77 | 113.29 | 108.12 | 105.73 |
| 7 | 103.85 | --- | --- | 103.29 | 106.15 | 109.99 | 112.08 | 108.75 | 94.49 | 110.83 | 111.10 | 108.65 |
| 8 | 104.68 | --- | --- | --- | 103.68 | 105.93 | 109.26 | 110.69 | 112.10 | 101.11 | 111.84 | 111.24 |
| 9 | 103.58 | --- | --- | --- | --- | 103.97 | 106.13 | 107.59 | 112.47 | 110.71 | 101.05 | 110.06 |
| 10 | 104.42 | --- | --- | --- | --- | --- | 102.45 | 107.06 | 112.35 | 111.62 | 112.62 | 111.85 |
| | RF CAL | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

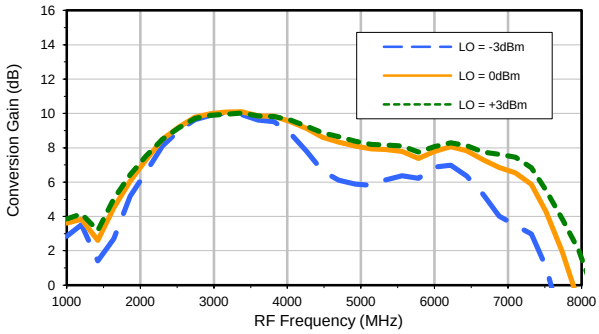
**LO HARMONICS ORDER**

**Test conditions:** **RF IN: 4600.1 MHz; -5 dBm.**
**LO IN: 4630.1 MHz; 0 dBm**
**IF OUT: 30 MHz; 3.27dBm**

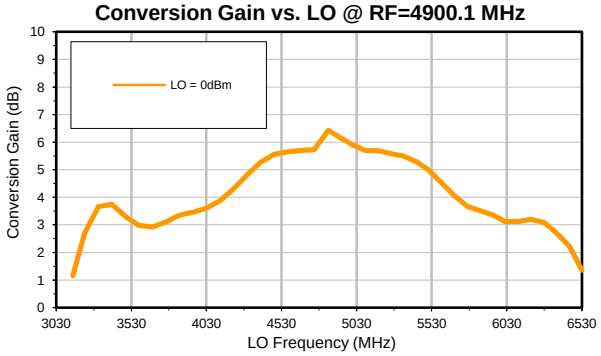
Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT
2. + entry denotes harmonics are in (dBc) above IF OUTPUT
3. RF Cal represents the Harmonics level of the RF Input Signal to the mixer

## *Typical Performance Curves*

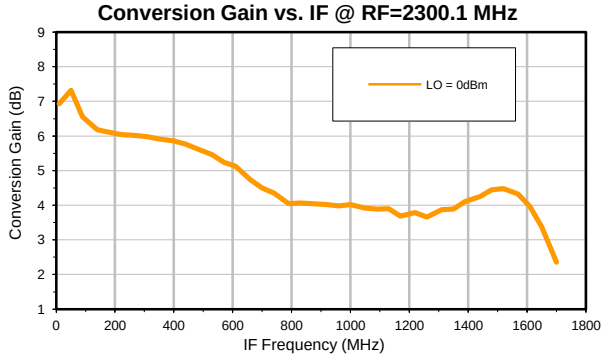
**Conversion Gain @IF=30 MHz**



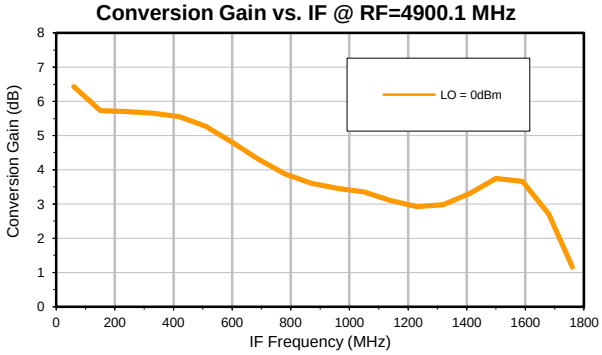

**Conversion Gain vs. LO @ RF=4900.1 MHz**



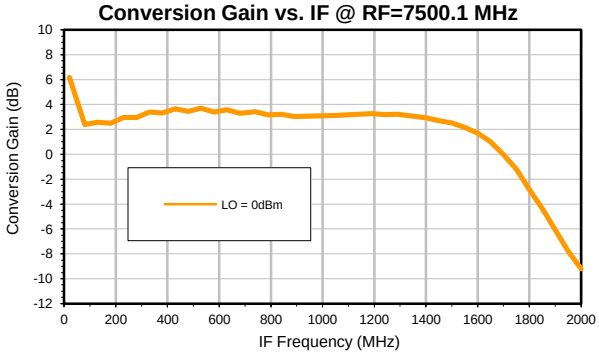

**Conversion Gain vs. IF @ RF=2300.1 MHz**



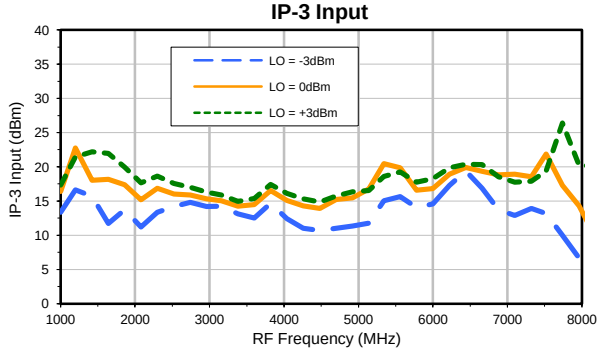

**Conversion Gain vs. IF @ RF=4900.1 MHz**



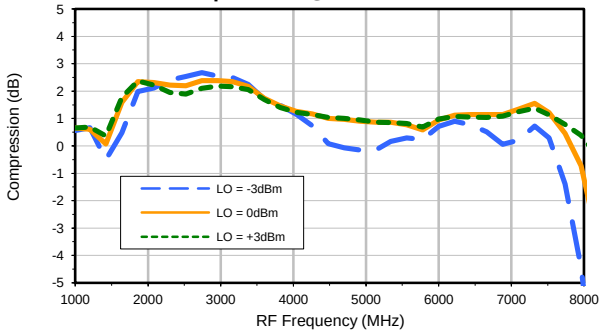

**Conversion Gain vs. IF @ RF=7500.1 MHz**




**IP-3 Input**

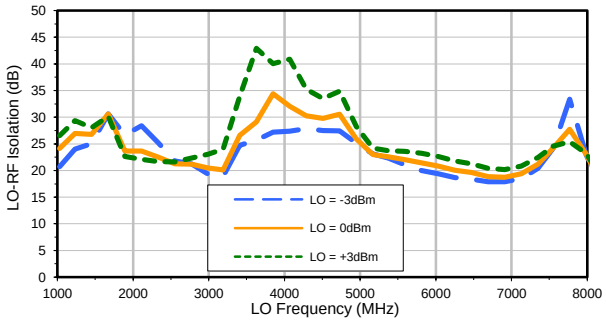



**Compression @RF IN=10 dBm**

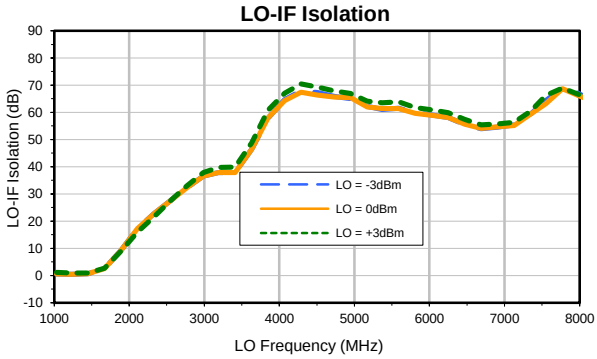


## *Typical Performance Curves*

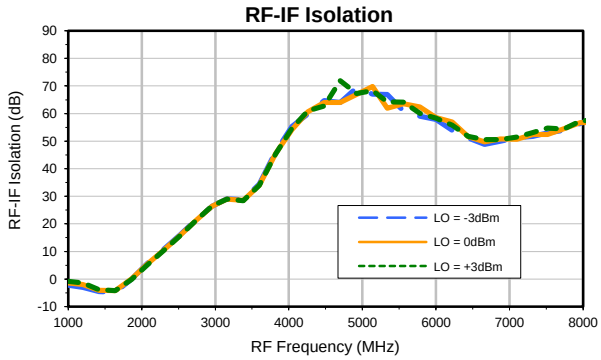
### LO-RF Isolation



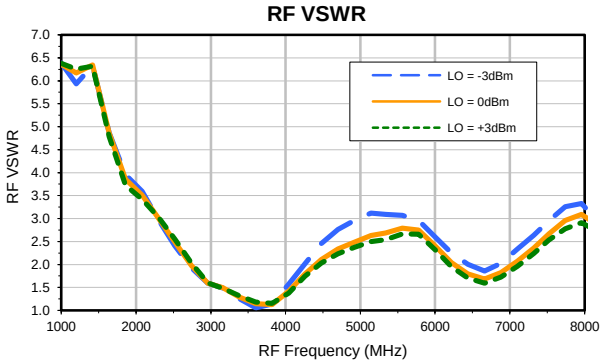

### LO-IF Isolation



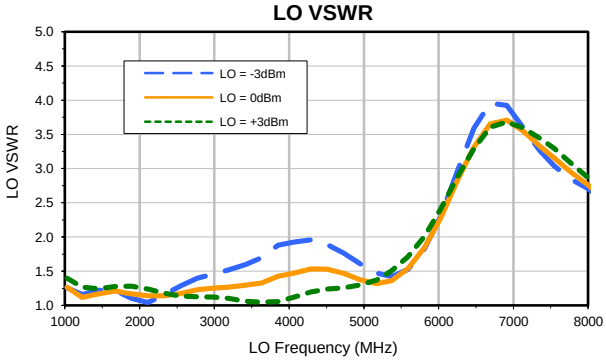

### RF-IF Isolation



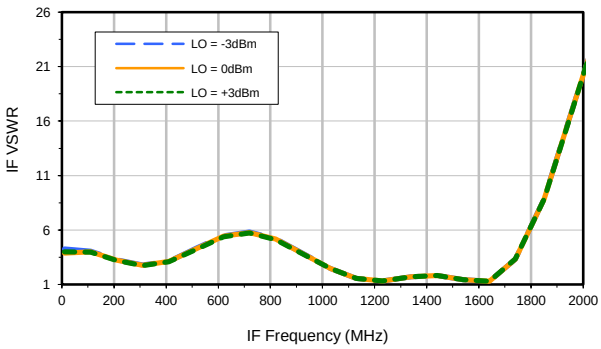

### RF VSWR




### LO VSWR




### IF VSWR



*Harmonics Tables*

| RF HARMONICS ORDER | (-dBm) | (-dBc) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | --- | --- | 62.97 | 76.13 | 56.11 | 59.52 | 65.19 | --- | --- | --- | --- | --- |
| 1 | --- | 75.76 | --- | 99.40 | 103.05 | 70.24 | 97.58 | 92.61 | --- | --- | --- | --- |
| 2 | 116.22 | 104.13 | 103.43 | 62.14 | 106.55 | 101.63 | 101.66 | 98.20 | 94.13 | --- | --- | --- |
| 3 | 115.35 | 99.82 | 104.16 | 104.49 | 70.53 | 104.70 | 102.05 | 102.75 | 97.14 | 95.24 | 93.27 | --- |
| 4 | 109.79 | 98.09 | 100.72 | 103.04 | 103.66 | 106.14 | 102.67 | 104.83 | 101.59 | 99.56 | 95.85 | --- |
| 5 | 110.96 | 97.39 | 97.90 | 102.18 | 103.37 | 102.95 | 101.62 | 104.73 | 103.59 | 98.58 | 97.97 | 95.39 |
| 6 | 107.35 | --- | 94.02 | 98.61 | 102.89 | 103.78 | 103.17 | 99.61 | 103.61 | 103.14 | 101.77 | 98.04 |
| 7 | 107.94 | --- | --- | 96.64 | 96.30 | 102.04 | 103.95 | 102.22 | 97.28 | 102.66 | 103.32 | 98.91 |
| 8 | 108.10 | --- | --- | --- | 98.01 | 98.58 | 100.99 | 102.36 | 104.30 | 101.67 | 102.71 | 103.58 |
| 9 | 108.61 | --- | --- | --- | --- | 96.78 | 98.48 | 103.27 | 102.66 | 104.17 | 102.18 | 102.85 |
| 10 | 105.11 | --- | --- | --- | --- | --- | 96.74 | 97.92 | 102.98 | 105.23 | 104.02 | 108.05 |
| | RF CAL | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

**LO HARMONICS ORDER**

**Test conditions:** **RF IN: 4600.1 MHz; -15 dBm.**
**LO IN: 4630.1 MHz; 0 dBm**
**IF OUT: 30 MHz; -6.58 dBm**

| RF HARMONICS ORDER | (-dBm) | (-dBc) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | --- | --- | 73.01 | 85.89 | 66.05 | 69.14 | 75.99 | --- | --- | --- | --- | --- |
| 1 | --- | 76.23 | --- | 97.03 | 107.77 | 70.35 | 97.11 | 98.56 | --- | --- | --- | --- |
| 2 | 102.04 | 109.87 | 112.49 | 51.33 | 114.12 | 111.83 | 104.19 | 101.15 | 102.49 | --- | --- | --- |
| 3 | 110.23 | 103.44 | 110.51 | 113.48 | 52.05 | 111.14 | 110.91 | 106.31 | 106.34 | 103.12 | 102.33 | --- |
| 4 | 107.47 | 105.95 | 109.60 | 111.57 | 109.83 | 73.91 | 111.38 | 111.84 | 110.72 | 106.67 | 100.83 | --- |
| 5 | 105.63 | 102.63 | 106.87 | 107.33 | 111.42 | 110.20 | 79.84 | 112.41 | 110.97 | 108.80 | 105.73 | 103.15 |
| 6 | 102.94 | --- | 106.84 | 107.49 | 108.02 | 112.01 | 112.72 | 90.84 | 111.77 | 113.29 | 108.12 | 105.73 |
| 7 | 103.85 | --- | --- | 103.29 | 106.15 | 109.99 | 112.08 | 108.75 | 94.49 | 110.83 | 111.10 | 108.65 |
| 8 | 104.68 | --- | --- | --- | 103.68 | 105.93 | 109.26 | 110.69 | 112.10 | 101.11 | 111.84 | 111.24 |
| 9 | 103.58 | --- | --- | --- | --- | 103.97 | 106.13 | 107.59 | 112.47 | 110.71 | 101.05 | 110.06 |
| 10 | 104.42 | --- | --- | --- | --- | --- | 102.45 | 107.06 | 112.35 | 111.62 | 112.62 | 111.85 |
| | RF CAL | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

**LO HARMONICS ORDER**

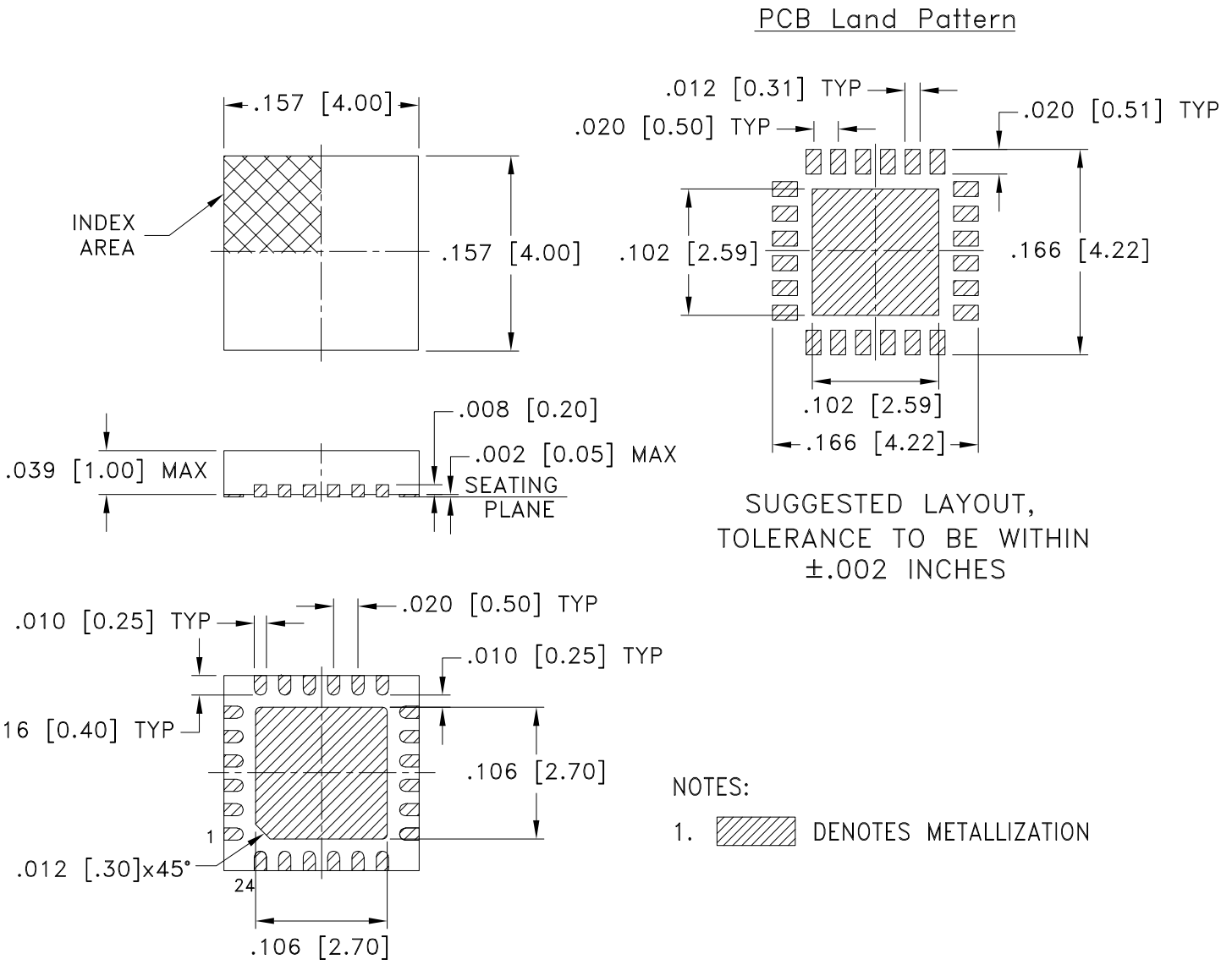
**Test conditions:** **RF IN: 4600.1 MHz; -5 dBm.**
**LO IN: 4630.1 MHz; 0 dBm**
**IF OUT: 30 MHz; 3.27dBm**

Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT
2. + entry denotes harmonics are in (dBc) above IF OUTPUT
3. RF Cal represents the Harmonics level of the RF Input Signal to the mixer

# Case Style DG

## Outline Dimensions

**DG1847**




Weight: .04 grams

Dimensions are in inches [mm]. Tolerances: 2 Pl.±.01; 3 Pl.±.005 Inches

Notes:

1. Case material: Plastic.
2. Termination finish:

For RoHS Case Styles: Tin-Silver alloy plate over Nickel barrier or Matte-Tin or NiPdAu All models, (+) suffix. See model Data sheet.

For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.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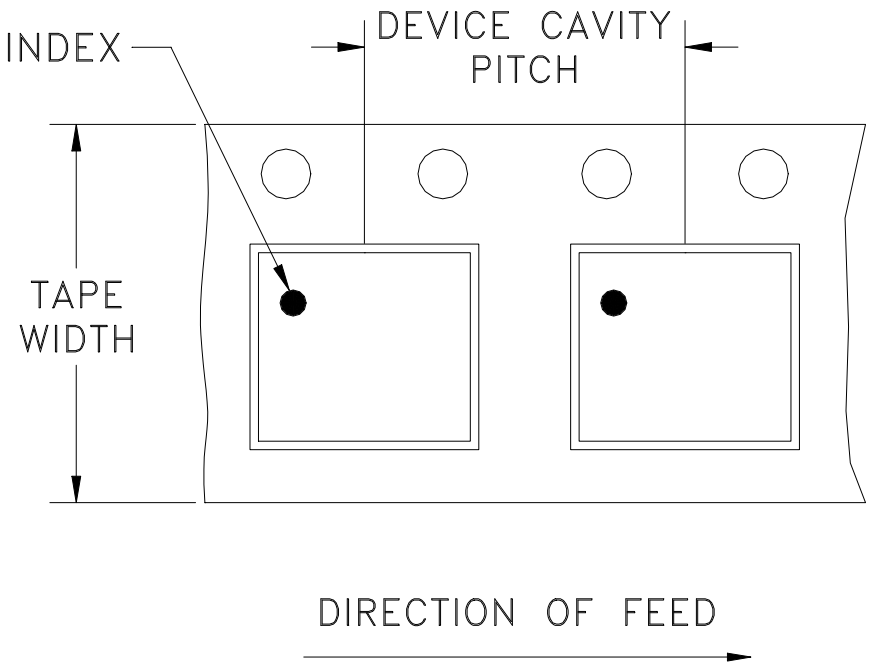
RF/IF MICROWAVE COMPONENTS

# Tape & Reel Packaging TR-F68

DEVICE ORIENTATION IN T&R




| Tape Width, mm | Device Cavity Pitch, mm | Reel Size, inches | Devices per Reel see note | |
|---|---|---|---|---|
| 12 | 8 | 7 | Small quantity standard | 20 |
| | | | | 50 |
| | | | | 100 |
| | | | | 200 |
| | | | | 500 |
| | | 7 | Standard | 1000 |
| | | 13 | Standard | 2000 |
| | | | | 3000 |
| | | | | 4000 |

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

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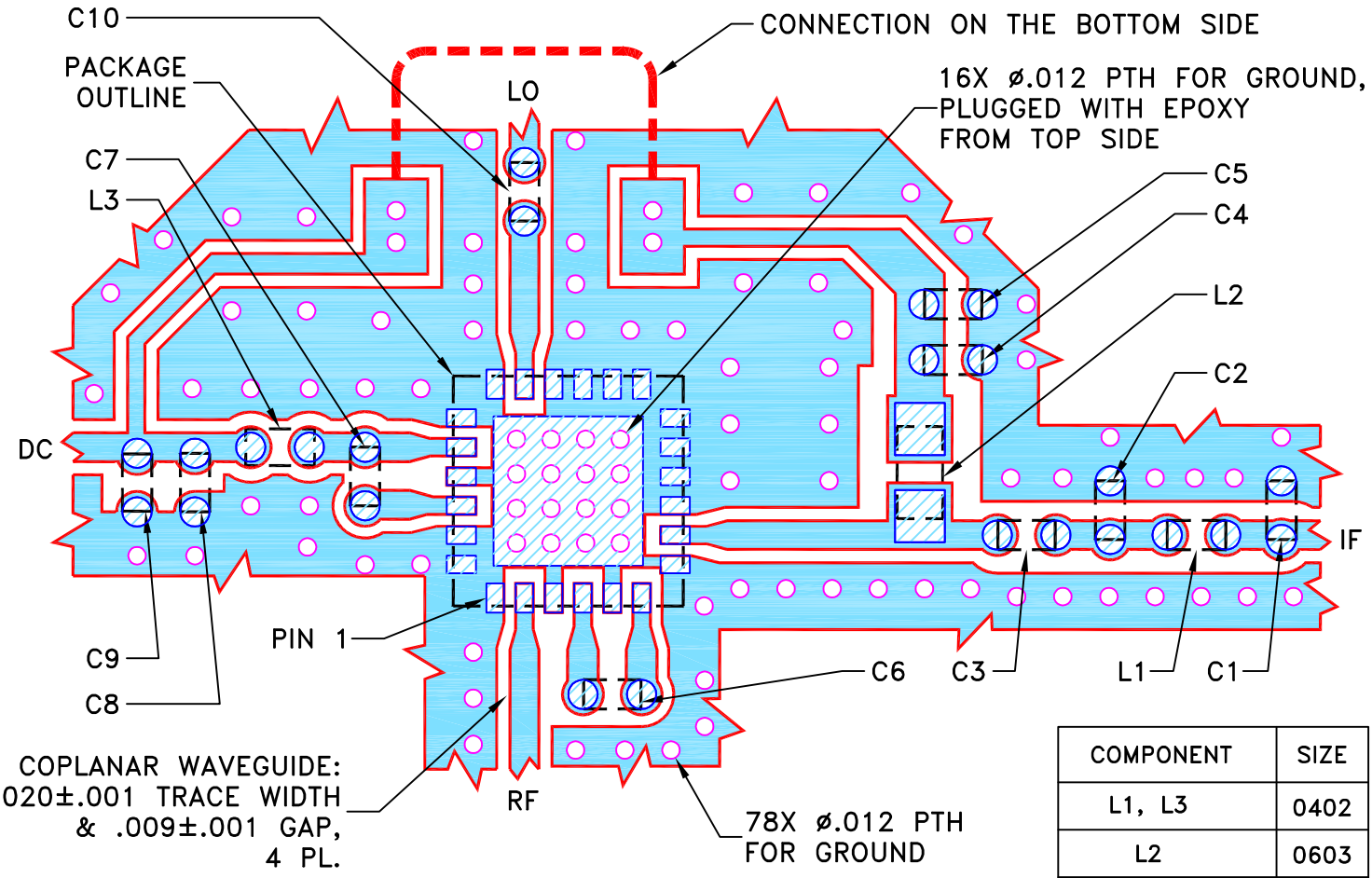
THIRD ANGLE PROJECTION

| REVISIONS | | | | | |
|---|---|---|---|---|---|
| REV | ECN No. | DESCRIPTION | DATE | DR | AUTH |
| OR | M148056 | NEW RELEASE | 09/22/14 | ITG | RS |
| | | | | | |
| | | | | | |
| | | | | | |

# SUGGESTED MOUNTING CONFIGURATION
# FOR DG1847 CASE STYLE, "24MX02" PIN CODE




| COMPONENT | SIZE |
|---|---|
| L1, L3 | 0402 |
| L2 | 0603 |
| C1–C10 | 0402 |

NOTES:

1. TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .010"±.001". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
2. CHIP COMPONENT FOOT PRINTS SHOWN FOR REFERENCE. FOR COMPONENT VALUES REFER TO TB-771+.
3. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE EXCEPT OF THE NECESSARY CONNECTION AS SHOWN ABOVE.

DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

| UNLESS OTHERWISE SPECIFIED | | INITIALS | DATE |
|---|---|---|---|
| DIMENSIONS ARE IN INCHES | DRAWN | ITG | 09/04/14 |
| TOLERANCES ON: | CHECKED | GF | 09/22/14 |
| 2 PL DECIMALS ± | APPROVED | RS | 09/22/14 |
| 3 PL DECIMALS ± .005 | | | |
| ANGLES ± | | | |
| FRACTIONS ± | | | |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ASHEETA1.DWG REV:A DATE:01/12/95

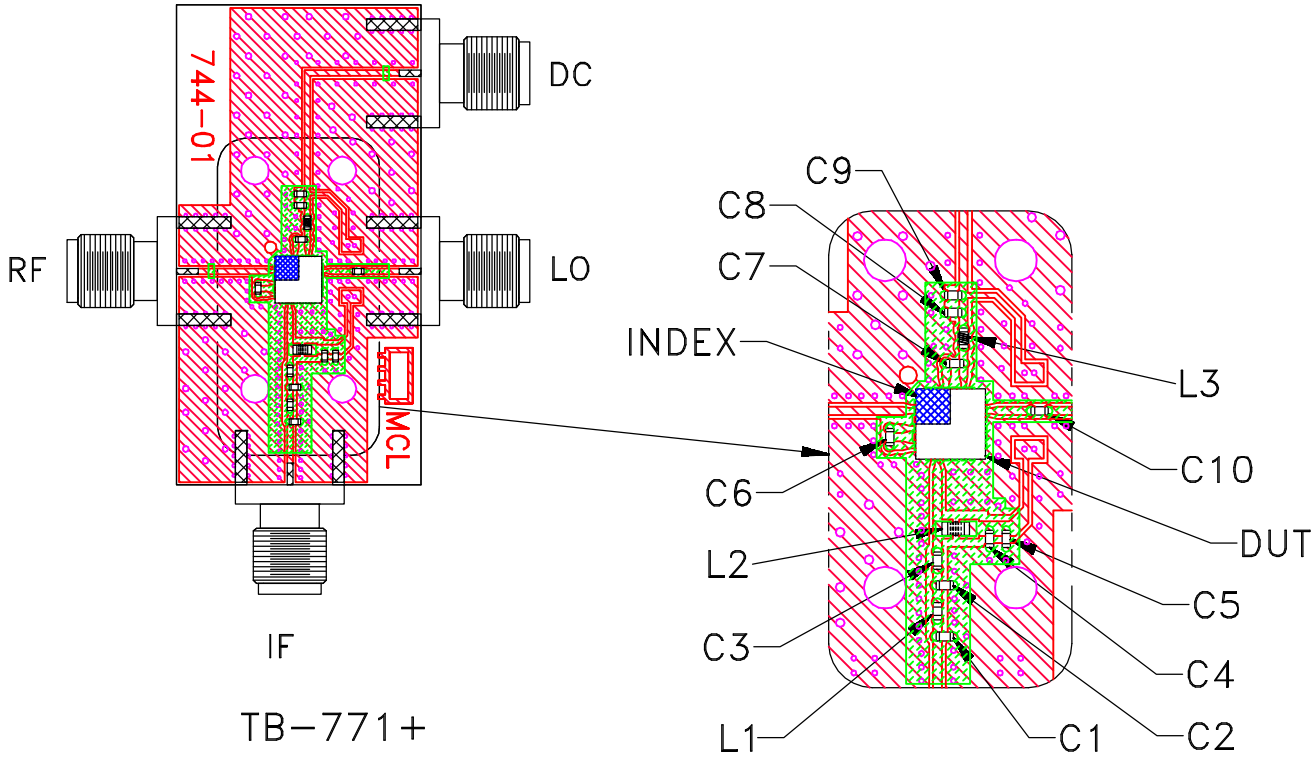

Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235


PL, 24MX02, DG1847, TB-771+

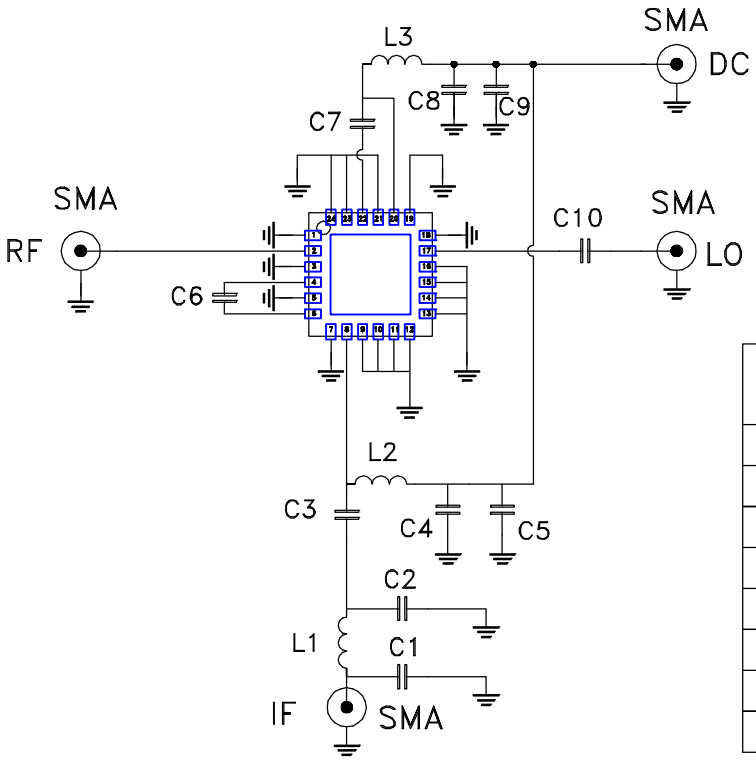
| SIZE | CODE IDENT | DRAWING NO: | REV: |
|---|---|---|---|
| A | 15542 | 98-PL-433 | OR |

| FILE: | SCALE: | SHEET: |
|---|---|---|
| 98PL433 | 8:1 | 1 OF 1 |

# Evaluation Board and Circuit




TB-771+




Schematic Diagram

| COMPONENT | VALUE | SIZE |
|---|---|---|
| DUT | MDA4-752H+ | 4X4 MM |
| L1 | 4.7nH | 0402 |
| L2 | 390nH | 0603 |
| L3 | 36nH | 0402 |
| C1,C2 | 3pF | 0402 |
| C3,C6 | .01uF | 0402 |
| C4,C7,C8,C10 | 100pF | 0402 |
| C5,C9 | 0.1uF | 0402 |

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.010 inch.

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# Environmental Specifications ENV08T1

All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

| Specification | Test/Inspection Condition | Reference/Spec |
|---|---|---|
| Operating Temperature | -40° to 85° C or -45° to 85° C or -55° to 105° C or -40° to 105° C or -40° to 95° C<br>Ambient Environment | Individual Model Data Sheet |
| Storage Temperature | -55° to 100° C or -65° to 150°<br>Ambient Environment | Individual Model Data Sheet |
| HTOL | 1000 hours at 125°C | MIL-STD-883, Method 1005, Condition B |
| Thermal Shock | -55° to 100°C, 100 cycles | MIL-STD-202, Method 107, Condition A-3, except +100°C |
| Mechanical Shock | 1.5Kg, 0.5 ms, 5 shock pulses, Y1 direction only | MIL-STD-883, Method 2002, Condition B, except Y1 direction only |
| Vibration (Variable Frequency) | 50g peak | MIL-STD-883, Method 2007, Condition B |
| Autoclave | 15 psig, 100% RH, 121°C, 96 hours | JESD22-A102, Condition C |
| HAST | 130°C, 85% RH, 96 hours | JESD22-A110 |
| Solderability | 10X Magnification | J-STD-002, Para 4.2.5, Test S, 95% Coverage |
| Solder Reflow Heat | Sn-Pb Eutetic Process: 240°C peak<br>Pb-Free Process: 260°C peak | J-STD-020, Table 4-1, 4-2 and 5-2; Figure 5-1 |
| Moisture Sensitivity: Level 1 | Bake at 125°C for 24 hours<br>Soak at 85°C/85% RH for 168 hours, Reflow 3 cycles at 260°C peak | J-STD-020 |


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All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

| Specification | Test/Inspection Condition | Reference/Spec |
|---|---|---|
| Marking Resistance to Solvents | Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C;<br>distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C | MIL-STD-202, Method 215 |



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