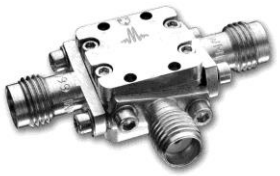
# GaAs DOUBLE-BALANCED MIXER MM1-2567LS

The MM1-2567LS is a passive GaAs double balanced MMIC mixer suitable for both up and down-conversion applications. As with all Marki Microwave mixers, it features excellent conversion loss, isolation and spurious performance across a broad bandwidth and in a small form factor. The MM1-2567LS is available in a connectorized package. Owing to its passive balun circuitry, the mixer can be used in two different configurations: Configuration A for highest efficiency and Configuration B for the best spurious performance and lowest LO drive. Refer to page 2 for more information on the operating configurations.



### Features

- Connectorized Package
- Broadband Performance
- Excellent Unit-to-Unit Repeatability
- Extremely Low LO Drive Operation

**Electrical Specifications** - Specifications guaranteed from -55 to +100°C, measured in a 50Ω system.
Specifications are shown for Configurations A (B). See page 2 for port locations.

| Parameter | LO (GHz) | RF (GHz) | IF (GHz) | Min | Typ | Max | Diode Option **LO drive level** (dBm) |
|---|---|---|---|---|---|---|---|
| Conversion Loss | 25-60 | | DC-30 | | 9 (15) | 16 (21) | |
| Isolation (dB)<br>LO-RF<br>LO-IF<br>RF-IF | 25-67 | | | | See Plots | | |
| Input 1 dB Compression (dBm) | | | | | +1 (+5) | | L-Config. A: +10 to +16<br>(L-Config. B: +6 to +12) |
| Input Two-Tone Third Order Intercept Point (dBm) | | | | | +9 (+15) | | L-Config. A: +10 to +16<br>(L-Config. B: +6 to +12) |

### Part Number Options

| Model Number | Description |
|---|---|
| MM1-2567LCH-2 | Wire bondable die |
| MM1-2567LS [1] | Connectorized, L-Diode |

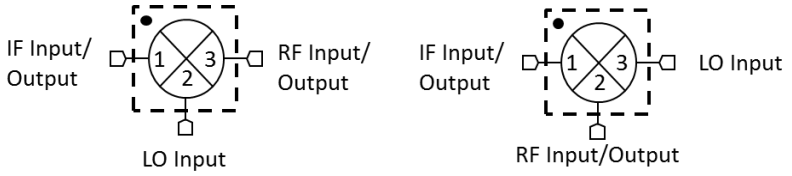
[1] Note: For port locations and I/O designations, refer to the drawings on page 2 of this document.

215 Vineyard Court, Morgan Hill, CA 95037 | Ph: 408.778.4200 | Fax 408.778.4300 | info@markimicrowave.com

# GaAs DOUBLE-BALANCED MIXER MM1-2567LS

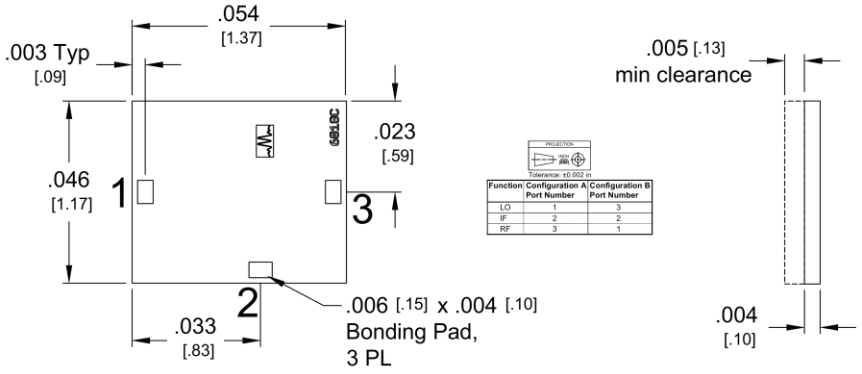


**LO/RF 25 to 67 GHz**
**IF DC to 30 GHz**

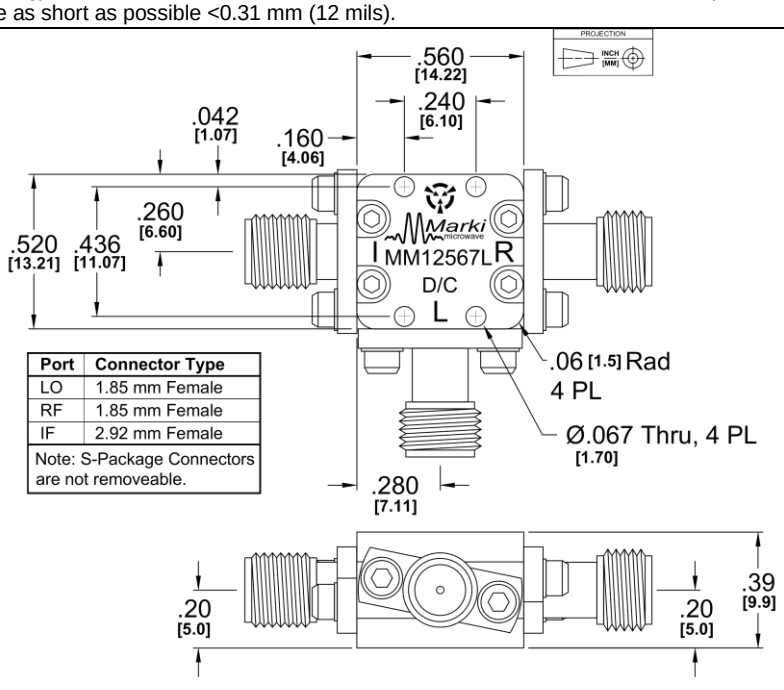



**Configuration A** **Configuration B**

1. Configuration A/B refer to the same part number (MM1-2567H) used in one of two different ways for optimal spurious performance. For the lowest conversion loss, use the mixer in Configuration A (port 2 as the LO input, port 3 as the RF input or output). If you need to use a lower LO drive, use the mixer in Configuration B (port 2 as the RF input or output, port 3 as the LO input). For optimal spurious suppression, experimentation or simulation is required to choose between Configuration A and B. For more information, see here.




1. CH Substrate material is .004 in thick GaAs.
2. I/O traces finish is 4.2 microns Au. Ground plane finish is 5 microns Au.
3. Wire Bonding - Ball or wedge bond with 0.025 mm (1 mil) diameter pure gold wire. Thermosonic wirebonding with a nominal stage temperature of 150 °C and a ball bonding force of 40 to 50 grams or wedge bonding force of 18 to 22 grams is recommended. Use the minimum level of ultrasonic energy to achieve reliable wirebonds. Wirebonds should be started on the chip and terminated on the package or substrate. All bonds should be as short as possible <0.31 mm (12 mils).




| Port | Connector Type |
|---|---|
| LO | 1.85 mm Female |
| RF | 1.85 mm Female |
| IF | 2.92 mm Female |
| Note: S-Package Connectors are not removeable. | |

# GaAs DOUBLE-BALANCED MIXER

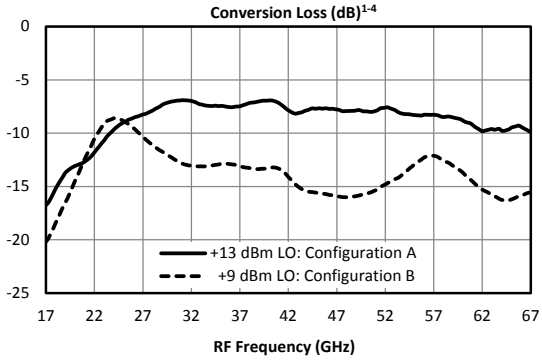
# MM1-2567LS



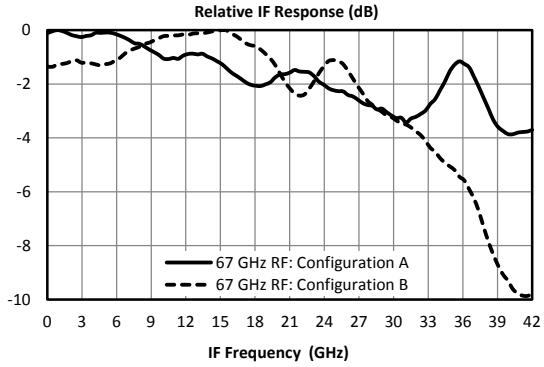
**LO/RF 25 to 67 GHz**
**IF DC to 30 GHz**

Typical Performance

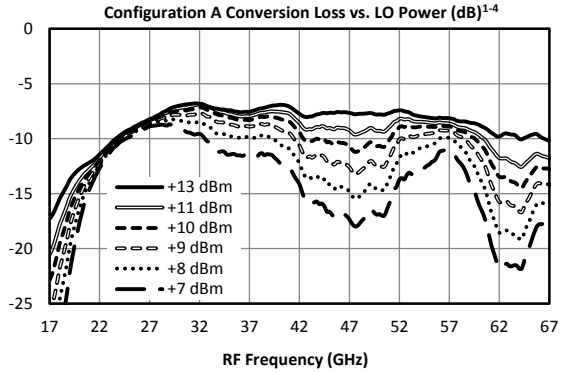
**Conversion Loss (dB)[1-4]**



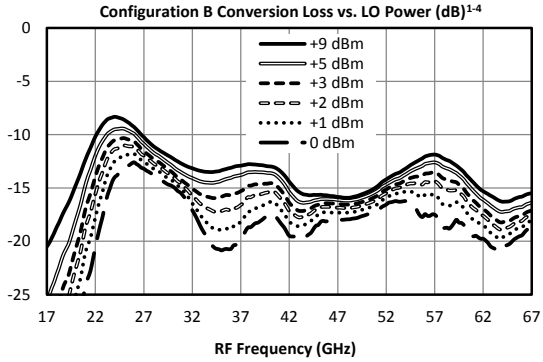

**Relative IF Response (dB)**



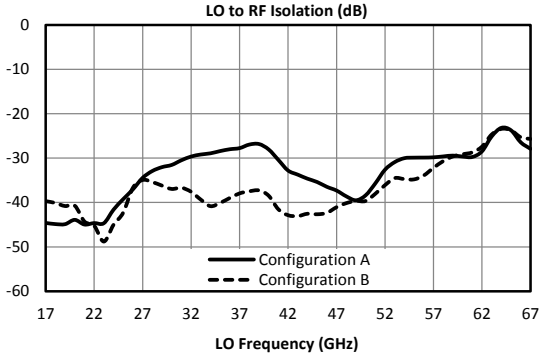

**Configuration A Conversion Loss vs. LO Power (dB)[1-4]**



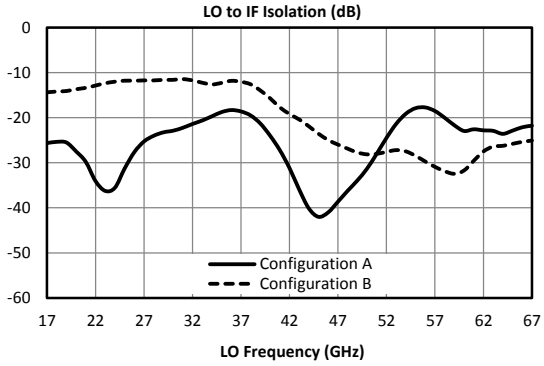

**Configuration B Conversion Loss vs. LO Power (dB)[1-4]**



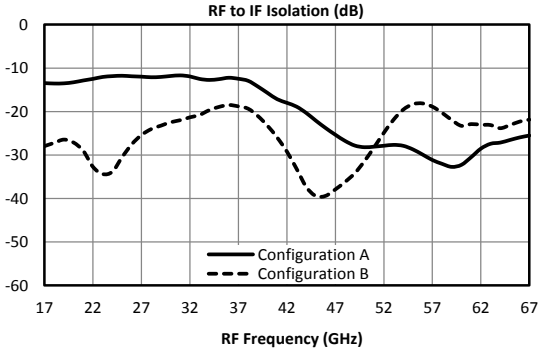

**LO to RF Isolation (dB)**




**LO to IF Isolation (dB)**




**RF to IF Isolation (dB)**



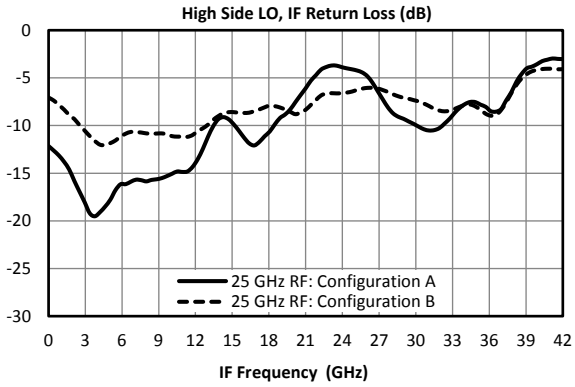
# GaAs DOUBLE-BALANCED MIXER

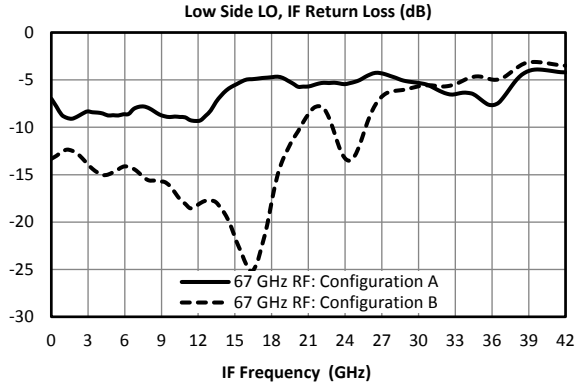
# MM1-2567LS

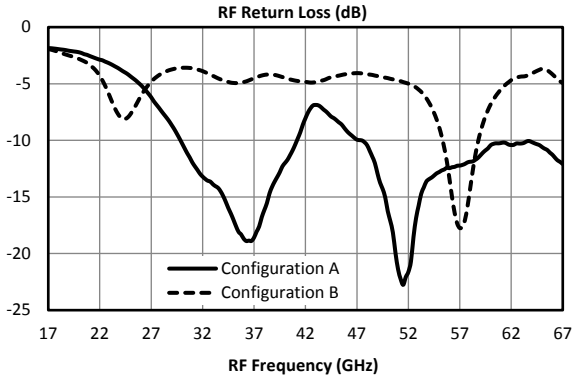


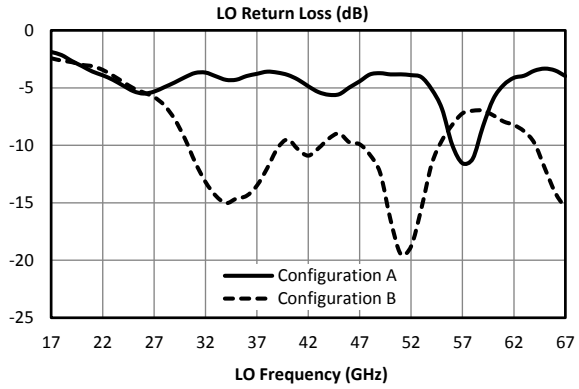
**LO/RF 25 to 67 GHz**
**IF DC to 30 GHz**

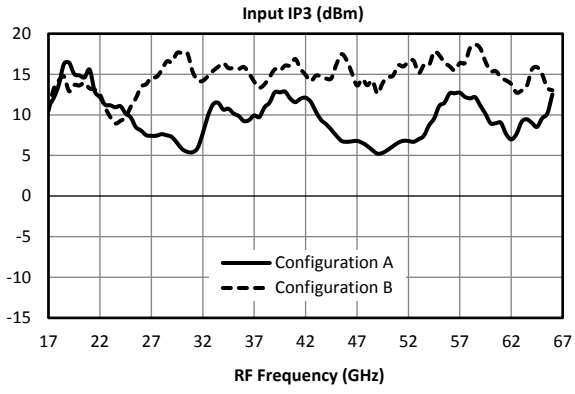
Typical Performance

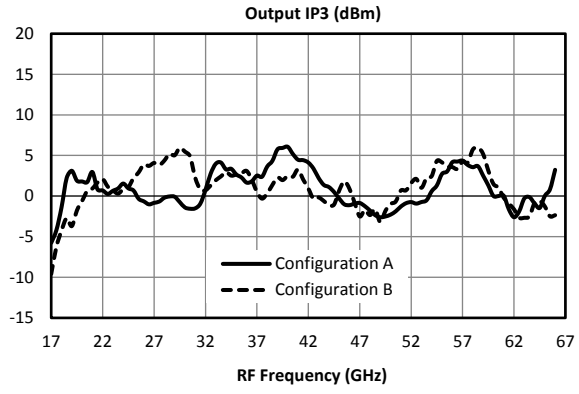


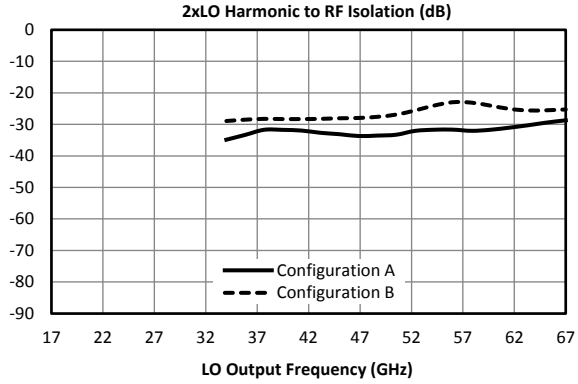
# GaAs DOUBLE-BALANCED MIXER

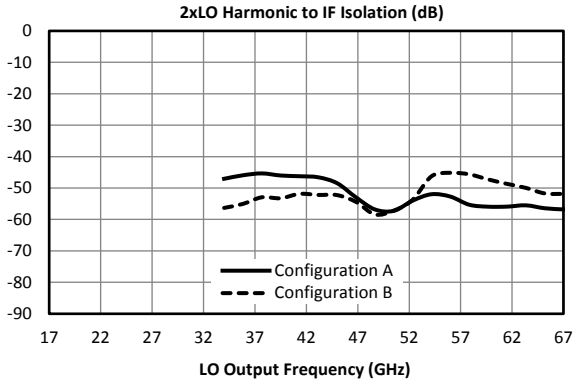
# MM1-2567LS

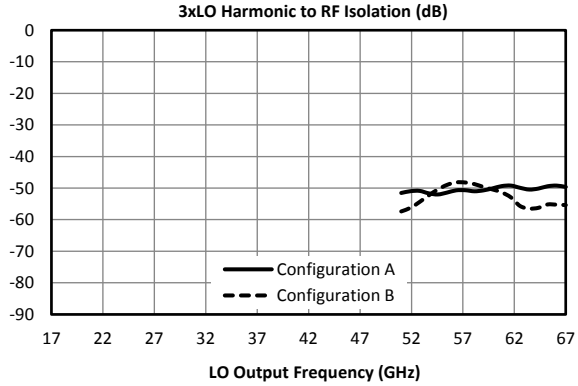


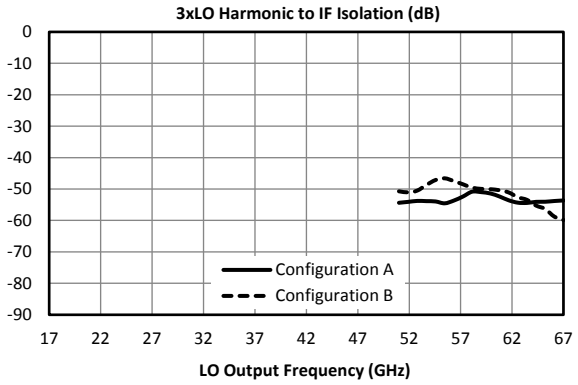
**LO/RF 25 to 67 GHz**
**IF DC to 30 GHz**

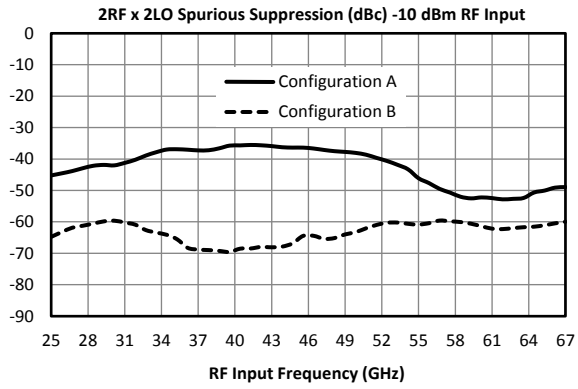
Typical Performance

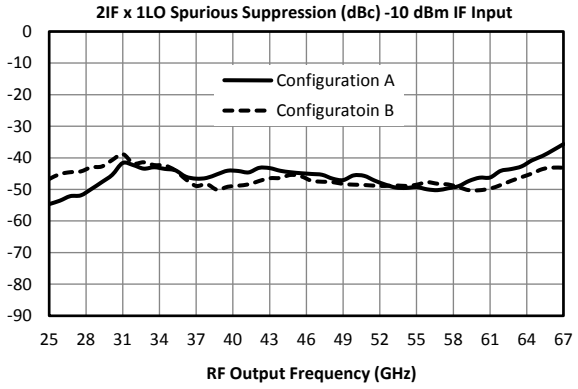


## Downconversion Spurious Suppression

Spurious data is taken by selecting RF and LO frequencies (±mLO±nRF) within the RF/LO bands, to create a spurious output within the IF output band. The mixer is swept across the full spurious band and the mean is calculated. The numbers shown in the table below are for a -10 dBm RF input. Spurious suppression is scaled for different RF power levels by (n-1), where "n" is the RF spur order. For example, the 2RFx2LO spur is 53 dBc for the A configuration for a -10 dBm input, so a -20 dBm RF input creates a spur that is (2-1) x (-10 dB) dB lower, or 53 dBc.

**Typical Downconversion Spurious Suppression (dBc): L Diode, A Configuration (B Configuration) [4]**

| **-10 dBm RF Input** | 0xLO | 1xLO | 2xLO | 3xLO | 4xLO | 5xLO |
|---|---|---|---|---|---|---|
| 1xRF | 14 (13) | Reference | 24 (27) | 11 (16) | 35 (36) | 26 (29) |
| 2xRF | 57 (60) | 36 (42) | 43 (63) | 31 (50) | 41 (52) | 38 (49) |
| 3xRF | 83 (77) | 51 (49) | 48 (73) | 50 (69) | 53 (73) | 51 (68) |
| 4xRF | 107 (105) | 94 (85) | 80 (104) | 78 (108) | 79 (103) | 73 (101) |
| 5xRF | 120 (116) | 114 (108) | 103 (108) | 105 (123) | 90 (119) | 91 (118) |

## Upconversion Spurious Suppression

Spurious data is taken by mixing an input within the IF band, with LO frequencies (±mLO±nIF), to create a spurious output within the RF output band. The mixer is swept across the full spurious output band and the mean is calculated. The numbers shown in the table below are for a -10 dBm IF input. Spurious suppression is scaled for different IF input power levels by (n-1), where "n" is the IF spur order. For example, the 2IFx1LO spur is typically 46 dBc for the A configuration for a -10 dBm input, so a -20 dBm IF input creates a spur that is (2-1) x (-10 dB) dB lower, or 56 dBc.

**Typical Upconversion Spurious Suppression (dBc): L Diode, A Configuration (B Configuration) [4]**

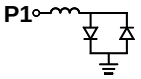
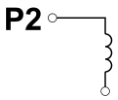
| **-10 dBm IF Input** | 0xLO | 1xLO | 2xLO | 3xLO | 4xLO | 5xLO |
|---|---|---|---|---|---|---|
| 1xIF | 12 (19) | Reference | 16 (28) | 10 (14) | 38 (50) | 29 (29) |
| 2xIF | 39 (45) | 46 (48) | 40 (37) | 50 (44) | 41 (39) | 51 (52) |
| 3xIF | 62 (67) | 54 (53) | 53 (61) | 58 (57) | 54 (63) | 44 (51) |
| 4xIF | 95 (96) | 95 (92) | 82 (83) | 91 (88) | 76 (75) | 84 (85) |
| 5xIF | 113 (111) | 109 (106) | 102 (102) | 105 (105) | 101 (103) | 91 (92) |

# GaAs DOUBLE-BALANCED MIXER

# MM1-2567LS



**LO/RF 25 to 67 GHz**
**IF DC to 30 GHz**

| Port | Description | DC Interface Schematic |
|---|---|---|
| Port 1 | Port 1 is DC coupled to the diodes. Blocking capacitor is optional. |   |
| Port 2 | Port 2 is DC short to ground and AC matched to 50 Ohms from 25 to 67 GHz. Blocking capacitor is optional. |   |
| Port 3 | Port 3 is DC short to ground and AC matched to 50 Ohms from 25 to 67 GHz. Blocking capacitor is optional. |   |

| Absolute Maximum Ratings | |
|---|---|
| **Parameter** | **Maximum Rating** |
| Port 2 DC Current | 21 mA |
| Port 3 DC Current | 30 mA |
| Port 1 DC Current | 30 mA |
| RF Power Handling (RF+LO) | +25 dBm at +25°C, derated linearly to +20 dBm at +100°C |
| Operating Temperature | -55ºC to +100ºC |
| Storage Temperature | -65ºC to +125ºC |

DATA SHEET NOTES:
1. Mixer Conversion Loss Plot IF frequency is 100 MHz.
2. Mixer Noise Figure typically measures within 0.5 dB of conversion loss for IF frequencies greater than 5 MHz.
3. Conversion Loss typically degrades less than 0.5 dB for LO drives 2 dB below the lowest and 3 dB above highest nominal LO drive levels.
4. Conversion Loss typically degrades less than 0.5 dB at +100°C and improves less than 0.5 dB at -55°C.
5. Unless otherwise specified, Configuration A data is taken with +13 dBm LO drive, and Configuration B is taken with +9 dBm drive
6. Specifications are subject to change without notice. Contact Marki Microwave for the most recent specifications and data sheets.
7. Catalog mixer circuits are continually improved. Configuration control requires custom mixer model numbers and specifications.



215 Vineyard Court, Morgan Hill, CA 95037 | Ph: 408.778.4200 | Fax 408.778.4300 | info@markimicrowave.com
**www.markimicrowave.com**