

DOUBLE-BALANCED MIXERS

M9-0950



Features

- LO/RF 9.0 to 50.0 GHz
- IF 1.0 to 22.0 GHz
- 10 dB Typical Conversion Loss
- Ultra-Broadband RF, LO, and IF
- 2.40 mm Connectors

Electrical Specifications - Specifications guaranteed from -55 to +100°C, measured in a 50-Ohm system.

Parameter	LO (GHz)	RF (GHz)	IF (GHz)	Min	Typ	Max	Diode Option LO drive level (dBm)
Conversion Loss (dB) ¹	9.0-50.0	9.0-50.0	1.0-22.0		10	16	
Isolation (dB)							
LO-RF	9.0-50.0	9.0-50.0			See Plots		
LO-IF	9.0-50.0	9.0-50.0					
RF-IF	9.0-50.0	9.0-50.0					
Input 1 dB Compression (dBm)	9.0-50.0	9.0-50.0			+2 +6		L (+9 to +14) I (+15 to +18)
Input Two-Tone Third Order Intercept Point (dBm)	9.0-50.0	9.0-50.0			See Plot		L (+9 to +14) I (+15 to +18)

¹Measured using fixed 2 GHz IF

Part Number Options

Please specify diode level and package style by adding to model number.				
Package Styles		Examples		
		M9-0950LNV		
Connectorized	NV	<u>M9-0950</u> (Model)	<u>L</u> (Diode Option)	<u>NV</u> (Package)

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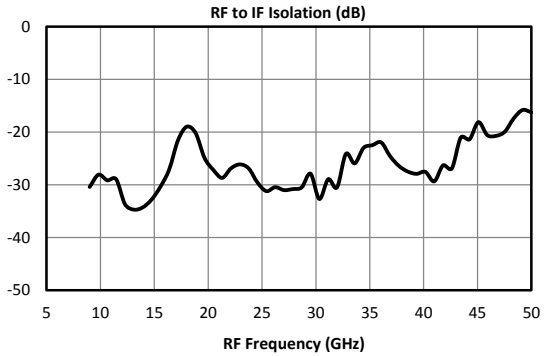
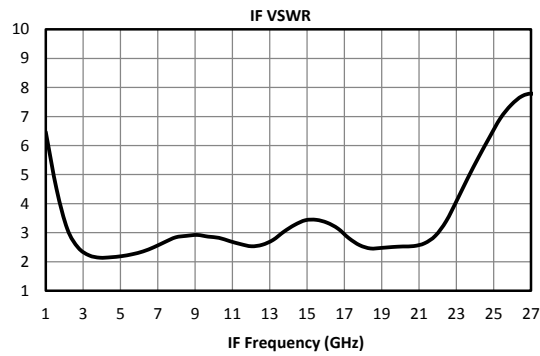
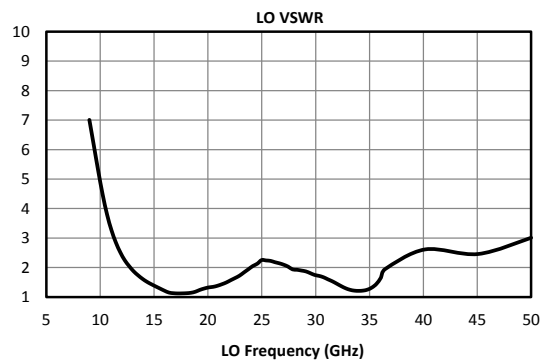
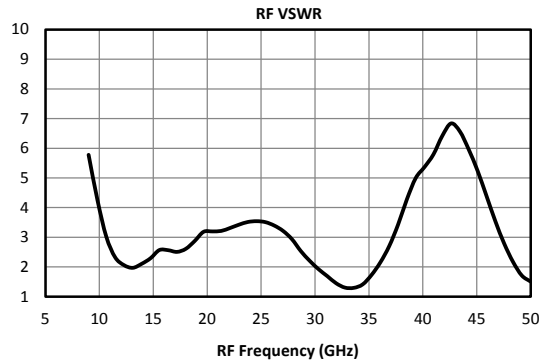
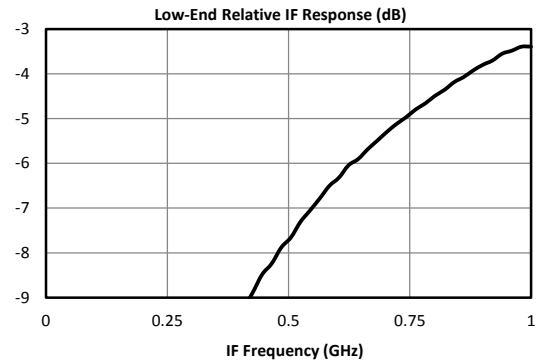
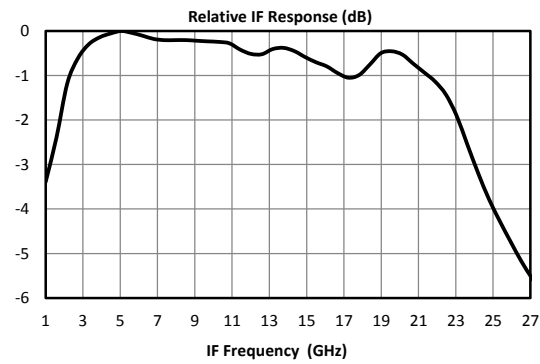
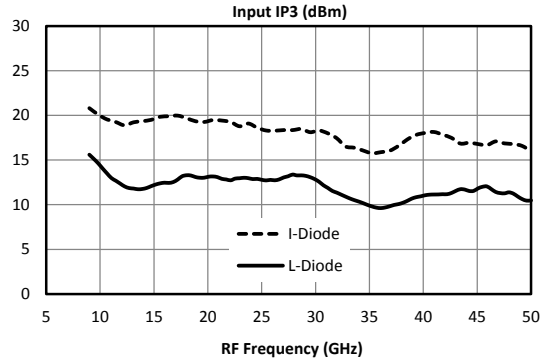
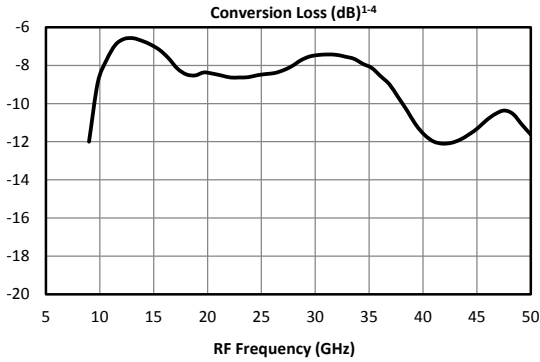
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LO/RF 9.0 to 50.0 GHz
IF 1.0 to 22.0 GHz

Typical Performance



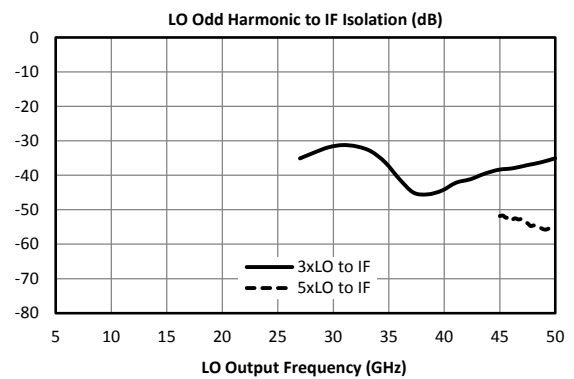
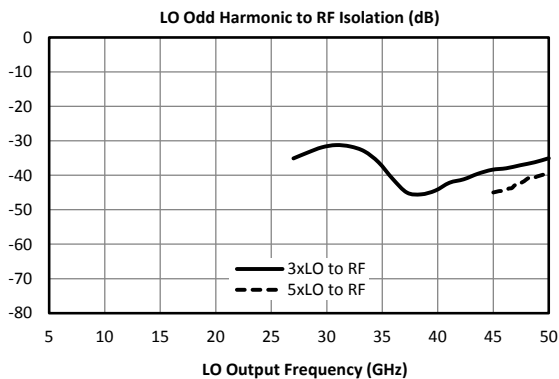
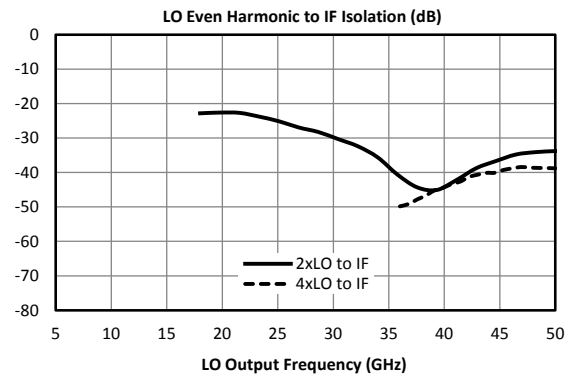
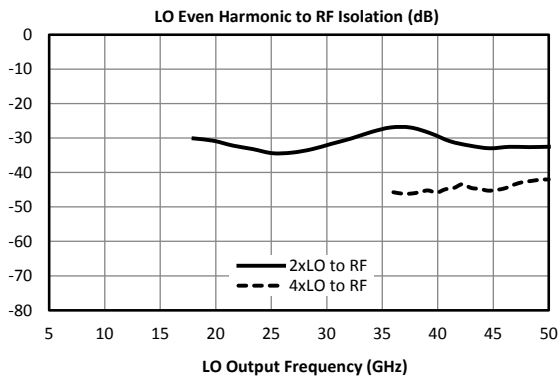
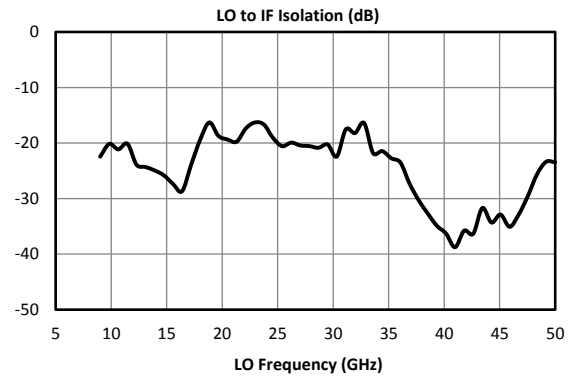
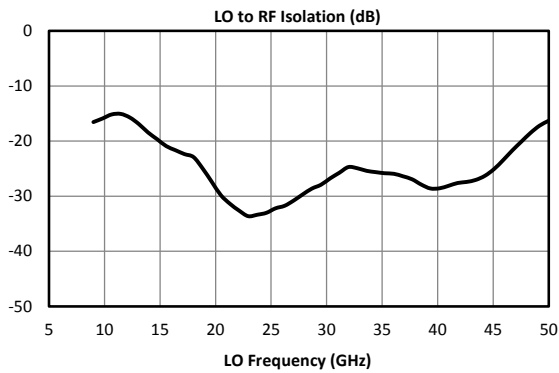
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LO/RF 9.0 to 50.0 GHz
IF 1.0 to 22.0 GHz

Typical Performance



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**LO/RF 9.0 to 50.0 GHz
IF 1.0 to 22.0 GHz**

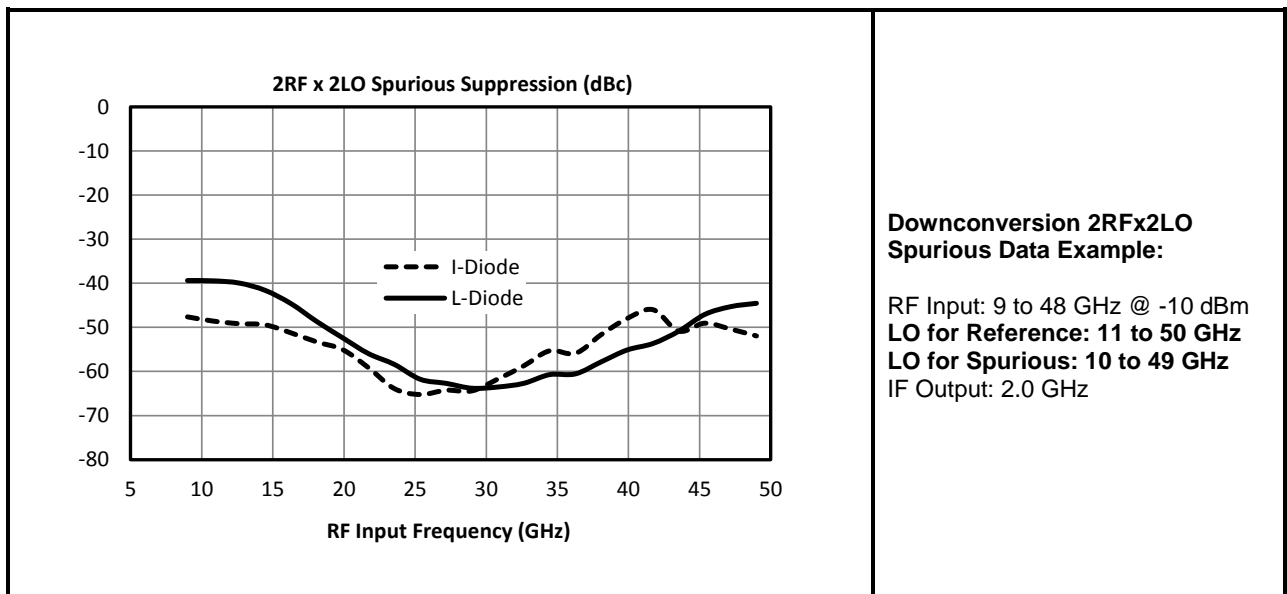
Downconversion Spurious Suppression

Spurious data is taken by selecting RF and LO frequencies ($\pm mLO \pm nRF$) within the 9 to 50 GHz RF/LO bands, which create a 2.0 GHz IF spurious output. The mixer is swept across the 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 55 dBc for a -10 dBm input (I-Diode), so a -20 dBm RF input creates a spur that is $(2-1) \times (-10 \text{ dB})$ dB lower, or 65 dBc.

Typical Downconversion Spurious Suppression (dBc): I-Diode (L-Diode) ⁵

-10 dBm RF Input	0xLO	1xLO	2xLO	3xLO	4xLO	5xLO
0xRF	-----	See LO to IF Isolation and LO Harmonic to IF Isolation Plots (Page 3)				
1xRF	16 (15)	Reference	29 (29)	13 (12)	37 (34)	22 (28)
2xRF	56 (50)	56 (55)	55 (51)	60 (52)	58 (46)	58 (55)
3xRF	78 (76)	53 (50)	77 (72)	67 (60)	84 (74)	67 (56)
4xRF	103 (97)	90 (92)	94 (84)	100 (89)	98 (86)	108 (93)
5xRF	116 (115)	104 (101)	114 (106)	106 (89)	118 (107)	111 (98)

A sample downconversion spurious sweep is shown below. An LO which is 2.0 GHz higher than the RF is used to create a 2.0 GHz reference IF. A second LO is used to create a 2x2 spurious IF, also at 2.0 GHz (1.0 GHz fundamental IF). The difference between these two output levels is the spurious suppression in dBc. The mean value across the 9 to 48 GHz RF input band is the number shown in the table above.



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**LO/RF 9.0 to 50.0 GHz
IF 1.0 to 22.0 GHz**

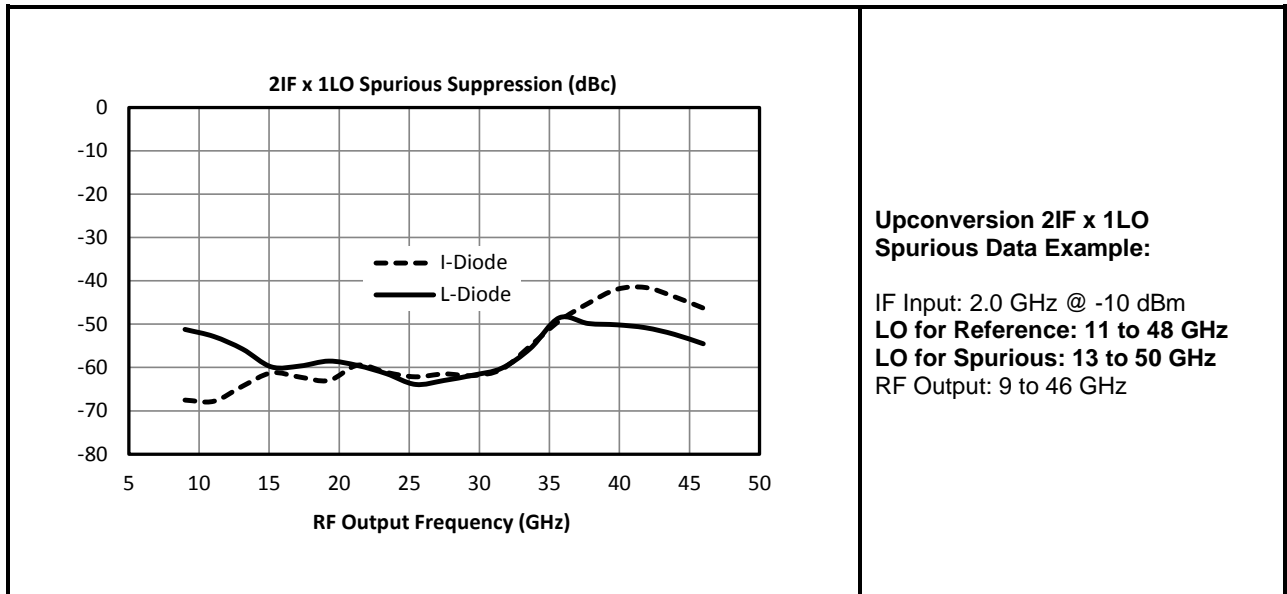
Upconversion Spurious Suppression

Spurious data is taken by mixing a 2.0 GHz IF with LO frequencies ($\pm mLO \pm nIF$) which create an RF within the 9 to 50 GHz RF band. The mixer is swept across the 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 56 dBc for a -10 dBm input (I-Diode), so a -20 dBm IF input creates a spur that is $(2-1) \times (-10 \text{ dB})$ dB lower, or 66 dBc.

Typical Upconversion Spurious Suppression (dBc): I-Diode (L-Diode) ⁵

-10 dBm IF Input	0xLO	1xLO	2xLO	3xLO	4xLO	5xLO
0xIF	-----	See LO to RF Isolation and LO Harmonic to RF Isolation Plots (Page 3)				
1xIF	18 (20)	Reference	26 (27)	11 (11)	32 (34)	35 (30)
2xIF	57 (50)	56 (58)	57 (60)	57 (47)	52 (52)	48 (42)
3xIF	89 (80)	76 (69)	89 (77)	70 (64)	82 (73)	68 (64)
4xIF	114 (97)	109 (106)	109 (98)	102 (94)	101 (94)	97 (84)
5xIF	125 (122)	123 (119)	127 (120)	118 (110)	116 (108)	114 (102)

A sample upconversion spurious sweep is shown below. A 2.0 GHz reference IF input is used to create an RF output that is 2.0 GHz below the LO input ($LO-IF=RF$). A second LO (2.0 GHz higher) is combined with the same 2.0 GHz IF input ($LO-2xIF=RF$) to create the same 9 to 46 GHz RF output band. The difference between these two output levels is the spurious suppression in dBc. The mean value across the RF output band is the number shown in the table above.






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**LO/RF 9.0 to 50.0 GHz
IF 1.0 to 22.0 GHz**

Port	Description	DC Interface Schematic
LO	The LO port is DC coupled to ground and AC matched to 50 Ohms from 9 to 50 GHz. Blocking capacitor is optional.	
RF	The RF port is DC coupled to ground and AC matched to 50 Ohms from 9 to 50 GHz. Blocking capacitor is optional.	
IF	The IF port is DC coupled to ground and AC matched to 50 Ohms from 1 to 22 GHz. Blocking capacitor is optional.	

Absolute Maximum Ratings	
Parameter	Maximum Rating
RF DC Current	1 Amp
LO DC Current	1 Amp
IF DC Current	1 Amp
RF Power Handling (RF+LO)	+23 dBm at +25°C, derated linearly to +20 dBm at +100°C
Operating Temperature	-55°C to +100°C
Storage Temperature	-65°C to +125°C
ESD Sensitivity (HBM)	Class 0

DATA SHEET NOTES:

1. Mixer Conversion Loss Plot IF frequency is 4.0 GHz.
2. Mixer Noise Figure typically measures within 0.5 dB of conversion loss.
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, L-diode data is taken with +11 dBm LO drive, and I-diode data is taken with +16 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.

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