

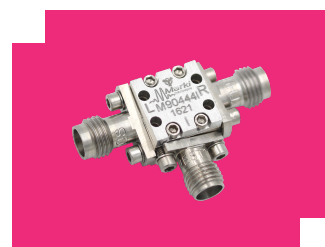
M9-0444INV

Double-Balanced Mixers

DEVICE OVERVIEW

General Description

M9 mixers double balanced mixers are hybrid assemblies that offer ultra-broadband RF, LO and IF bandwidths. M9 mixers have generally been replaced with MM1 mixers with superior performance, repeatability, and availability. M9 mixers are still used in legacy systems and where an MM1 mixer is not available.



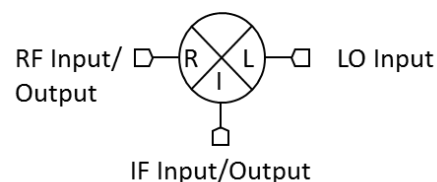
Features

- LO/RF 4.0 to 44.0 GHz
- IF DC to 3.0 GHz
- 7.5 dB Typical Conversion Loss
- Ultra-Broadband RF, LO, and IF
- 2.40 mm Connectors

Applications

N/A

Functional Block Diagram



Part Ordering Options

Part Number	Description	Package	Connectors	Green Status	Product Lifecycle	Export Classification
<u>M9-0444LNV</u>	Double-Balanced Mixers	NV	<u>Standard</u>	Non-RoHS	End of Life	EAR99
M9-0444INV	Double-Balanced Mixers	NV	<u>Standard</u>	Non-RoHS	Not Recommended for New Design	EAR99

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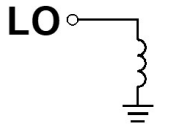
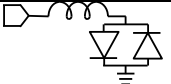
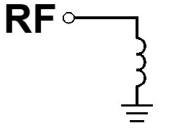
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■ Notes

NOT RECOMMENDED FOR NEW DESIGN

Port Configuration and Functions

Port Functions

Port	Function	Connector Type	Description	Equivalent Circuit for Package
Port 1	LO	2.4F	The LO port is DC coupled to ground and AC matched to 50 Ohms from 4 to 44 GHz. Blocking capacitor is optional.	
Port 2	IF	2.4F	The IF port is DC coupled to the diodes. Blocking capacitor is optional.	
Port 3	RF	SMAF	The RF port is DC coupled to ground and AC matched to 50 Ohms from 4 to 44 GHz. Blocking capacitor is optional.	

Specifications

Absolute Maximum Ratings

Parameter	Maximum Rating	Unit
IF DC Current	50	mA
LO DC Current	1	Amp
Maximum Operating Temperature	100	°C
Maximum Storage Temperature	125	°C
Minimum Operating Temperature	-55	°C
Minimum Storage Temperature	-65	°C
RF DC Current	1	Amp
RF Power Handling (RF+LO), 100°C	20	dBm
RF Power Handling (RF+LO), 25°C	23	dBm

Package Information

Parameter	Details	Rating
ESD	< 250 Volts	HBM Class 0
Weight	Package name: NV	11g
Dimensions	-	11.94 x 11.94 mm

Recommended Operating Conditions

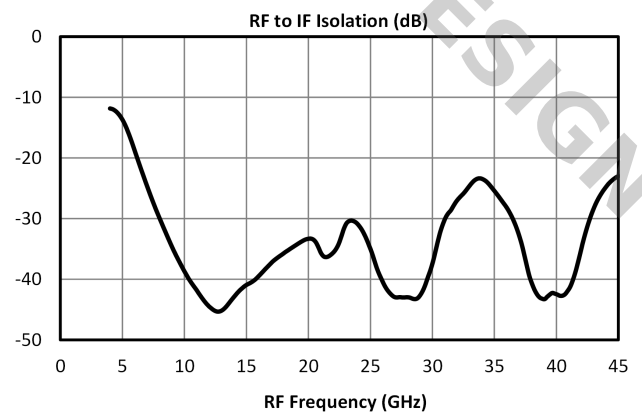
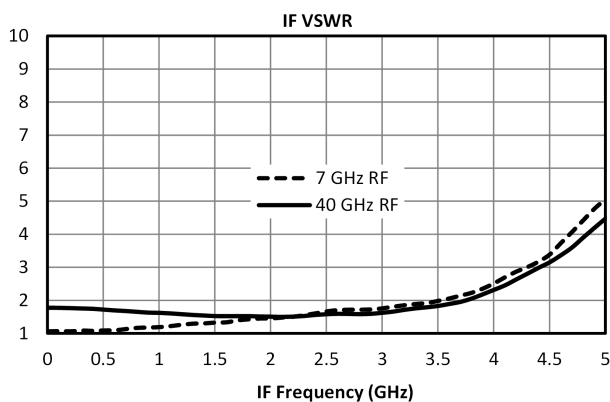
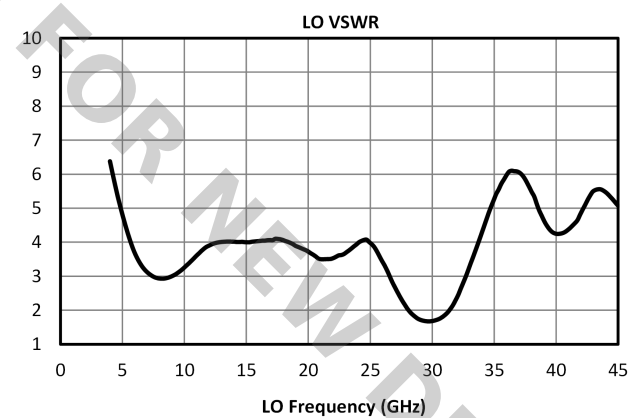
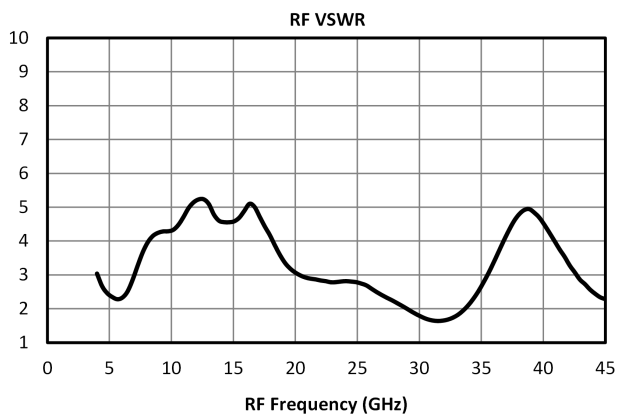
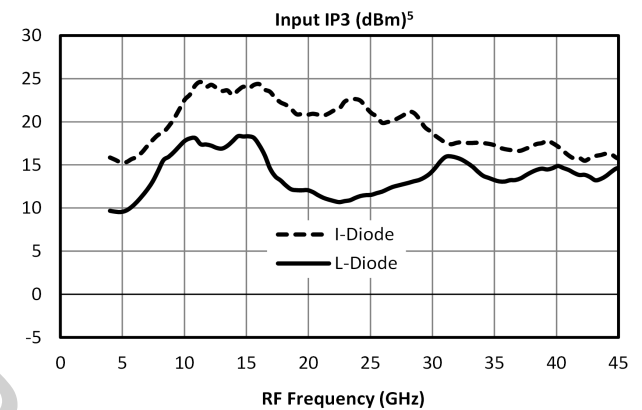
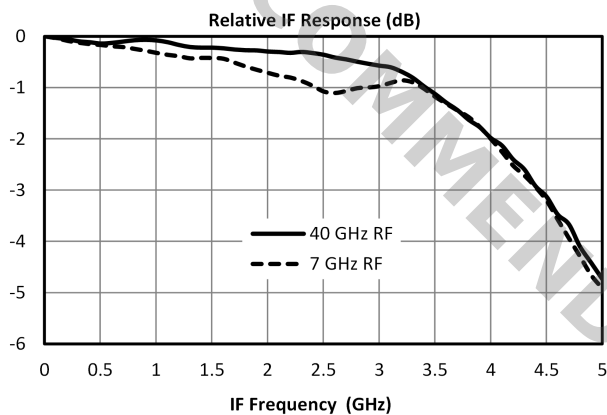
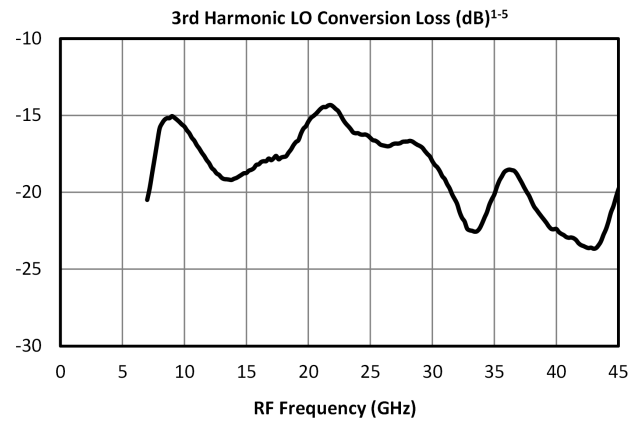
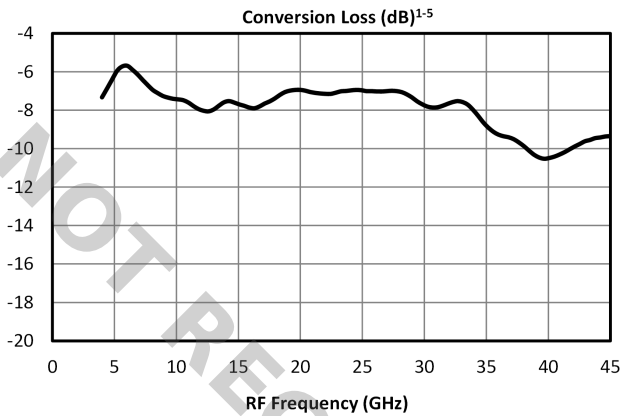
Parameter	Min	Nominal	Max	Unit
LO Input Power	14	-	18	dBm

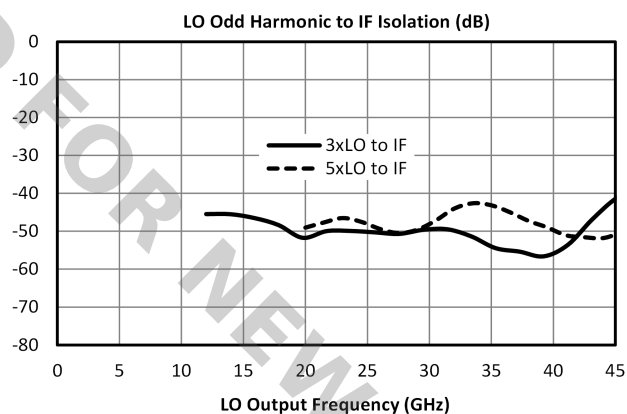
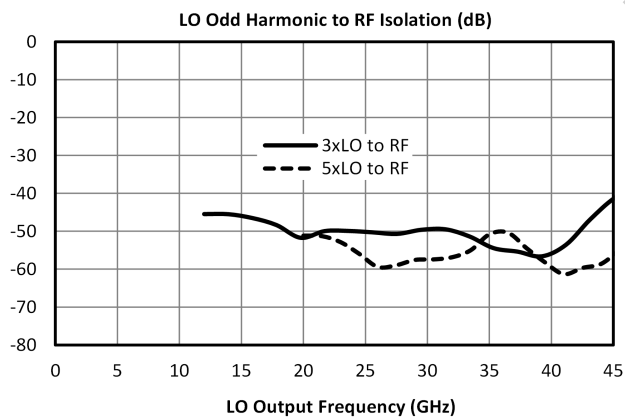
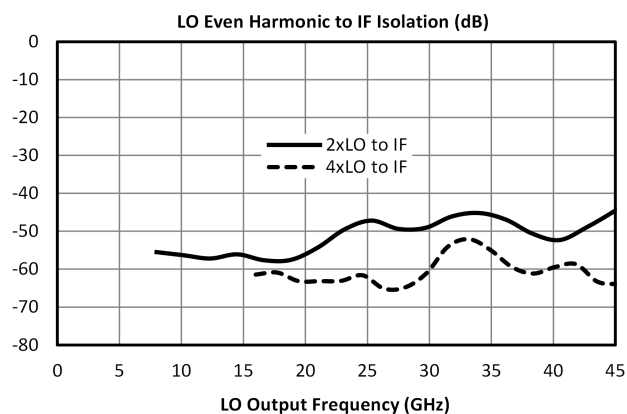
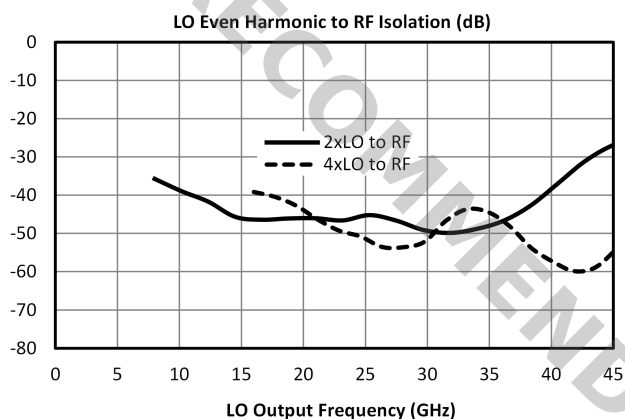
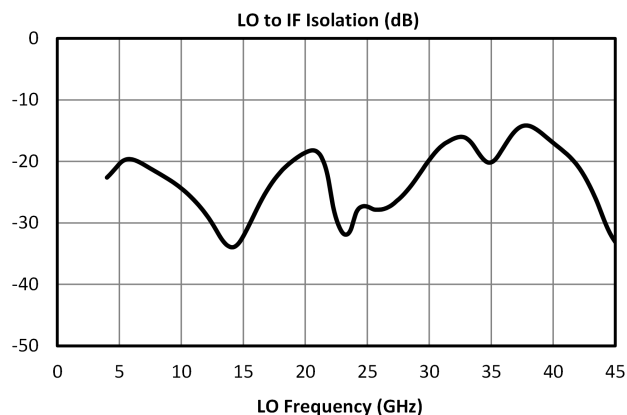
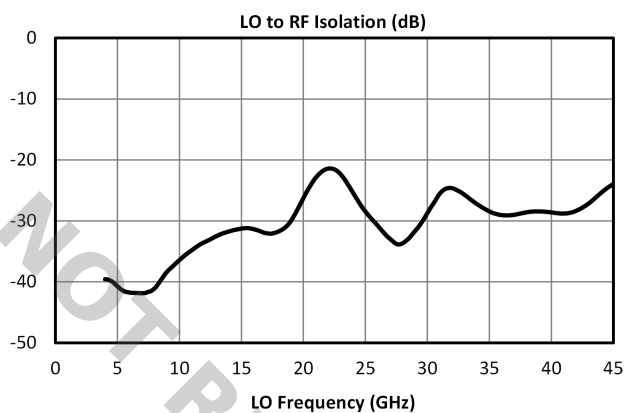
Electrical Specifications

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

Parameter	Test Conditions	Min	Typ	Max	Unit
RF Frequency Range	-	4	-	44	GHz
Conversion Loss	LO/RF=4-44 GHz IF=1.5-3 GHz	-	8.5	12.5	dB
Conversion Loss	LO/RF=4-44 GHz IF=DC-1.5 GHz	-	7.5	11.5	dB
Isolation, LO to RF	-	-	30	-	dB
Input IP3	-	-	21	-	dBm
IF Frequency Range	-	0	-	3	GHz
Third Harmonic LO Conversion Loss	LO=2.67-14.67 GHz RF=8-44 GHz IF=DC-3 GHz LO drive level, I Diode Option=18-22 dBm	-	18	-	dB
Input 1 dB Compression	LO/RF=4-44 GHz LO drive level, I Diode Option=14-18 dBm	-	6	-	dBm

Typical Performance Plots





Spur Table

Downconversion Spurious Suppression

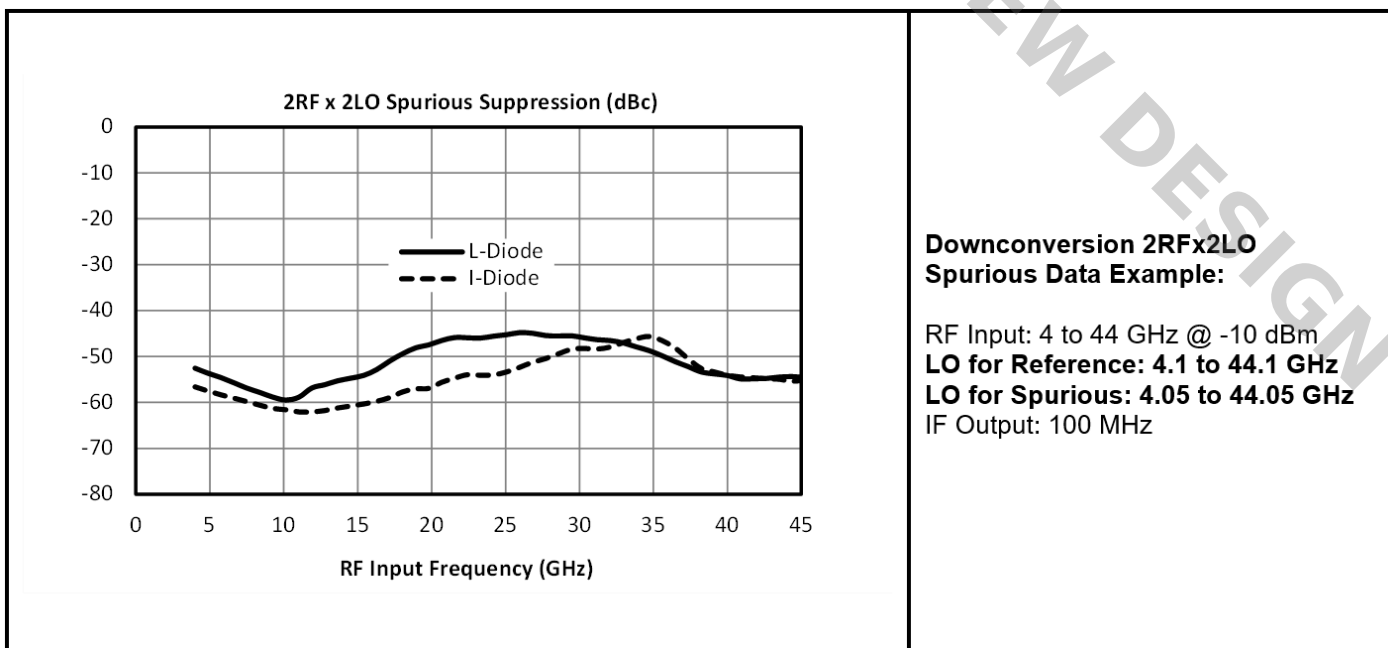
Spurious data is taken by selecting RF and LO frequencies (+mLO+nRF) over the 4 to 44 GHz RF/LO bands, which create a 100 MHz IF spurious output. The mixer is swept across the spurious band and the mean is calculated. The numbers shown in the table below are for a -10 dBm RF input. Spurious suppression 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) x (-10 dB) dB lower, or 65 dBc.

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

-10 dBm RF Input	0xLO	1xLO	2xLO	3xLO	4xLO	5xLO
0xRF	-----	See LO to IF Isolation and LO Harmonic to IF Isolation Plots				
1xRF	24 (25)	Reference	23 (25)	14 (13)	26 (32)	21 (24)
2xRF	59 (56)	53 (46)	55 (52)	58 (53)	59 (54)	61 (58)
3xRF	85 (76)	64 (53)	73 (63)	68 (58)	78 (67)	73 (61)
4xRF	109 (99)	98 (84)	99 (91)	105 (86)	100 (88)	105 (87)
5xRF	124 (119)	113 (100)	118 (101)	116 (94)	119 (103)	114 (97)

Unless otherwise specified, L-diode data is taken with +11 dBm LO drive, and I-Diode data is taken with +16 dBm LO drive.

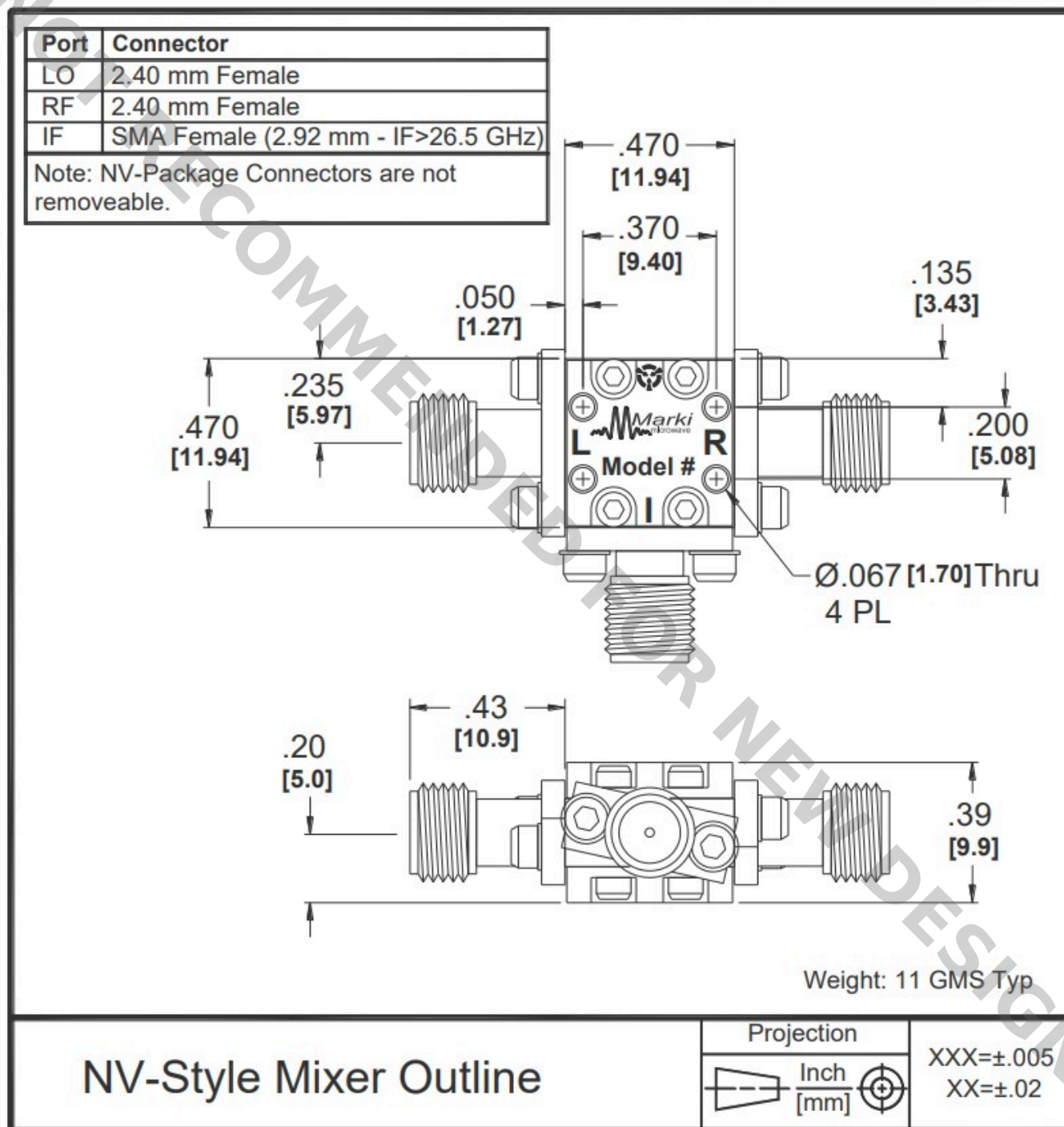
A sample downconversion spurious sweep is shown below. An LO which is 100 MHz higher than the RF is used to create a 100 MHz reference IF. A second LO is used to create a 2x2 spurious IF, also at 100 MHz (50 MHz fundamental IF). The difference between these two output levels is the spurious suppression in dBc. The mean value across the 4 to 44 GHz RF input band is the number shown in the table above.



Mechanical Data

Outline Drawing

Download : [Outline 3D Drawing](#) | [Outline 3D STP](#)



Notes

1. Mixer Conversion Loss Plot IF frequency is 100 MHz.
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 LO 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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