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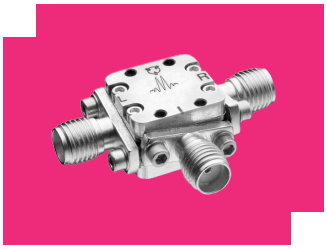
M2-0250LNVT

Triple-Balanced Mixers

DEVICE OVERVIEW

General Description

M2 triple balanced mixers are hybrid assemblies that have been hand-tuned to feature low conversion loss and high isolations. M2 mixers offer ultrabroadband overlapping frequency coverage on all 3 ports. Many M2 mixers have replaced with MM2 mixers with superior performance, repeatability, and availability. M2 mixers suitable for systems where an MM2 mixer is not available.



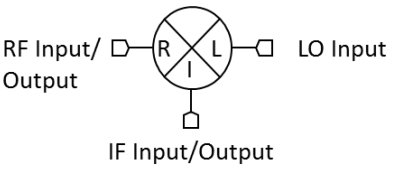
Features

- LO/RF 2.0 to 50.0 GHz
- IF 0.4 to 50.0 GHz
- 10 dB Typical Conversion Loss
- Ultra-Broadband RF, LO, and IF
- 2.40 mm Connectors

Applications

N/A

Functional Block Diagram



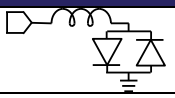
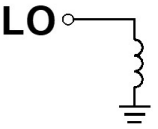
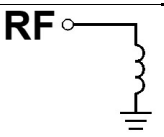
Part Ordering Options

Part Number	Description	Package	Connectors	Green Status	Product Lifecycle	Export Classification	Recommended Replacement
M2-0250LNVT	Triple-Balanced Mixers	NVT	Standard	Consult Factory	Not Recommended for New Design	EAR99	-

Table Of Contents

Port Configuration and Functions

Port Functions

Port	Function	Connector Type	Description	Equivalent Circuit for Package
Port 1	IF	2.4F	The IF port is DC coupled to the diodes and AC matched to 50 Ohms from 0.4 to 50 GHz. Blocking capacitor is optional.	
Port 2	LO	2.4F	The LO port is DC coupled to ground and AC matched to 50 Ohms from 2 to 50 GHz. Blocking capacitor is optional.	
Port 3	RF	2.4F	The RF port is DC coupled to ground and AC matched to 50 Ohms from 2 to 50 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: NVT	10g
Dimensions	-	11.94 x 11.94 mm

Recommended Operating Conditions

Parameter	Min	Nominal	Max	Unit
LO Input Power	10	-	20	-

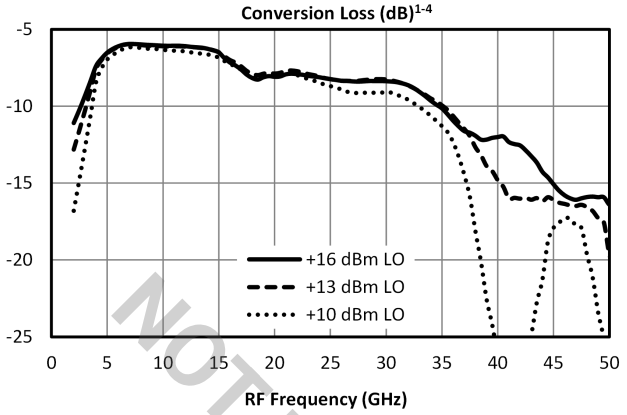
Electrical Specifications

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

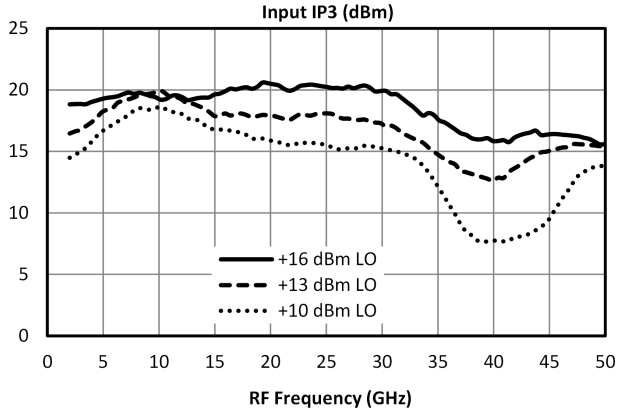
Parameter	Test Conditions	Min	Typ	Max	Unit
Conversion Loss	LO/RF=2-50 GHz IF=.4-50 GHz	-	10	-	dB
Input 1 dB Compression	LO/RF=2-50 GHz LO drive level, L Diode Option=10-20 dBm	-	5	-	dBm
Isolation, LO to IF	LO/RF=2-50 GHz	-	-	-	dB
Isolation, LO to RF	LO/RF=2-50 GHz	-	25	-	dB
Isolation, RF to IF	LO/RF=2-50 GHz	-	-	-	dB
IF Frequency Range	-	0.4	-	50	GHz
Input IP3	-	-	18	-	dBm
RF Frequency Range	-	2	-	50	GHz

Typical Performance Plots

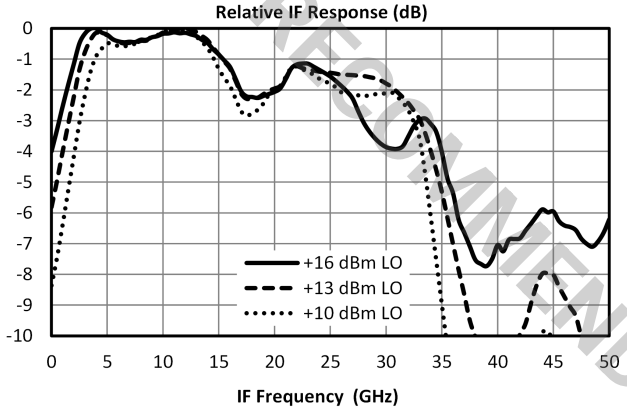
Conversion Loss (dB)[1-4]



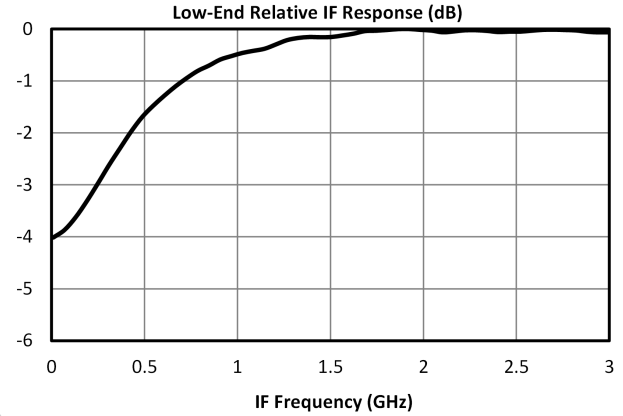
Input IP3 (dBm)



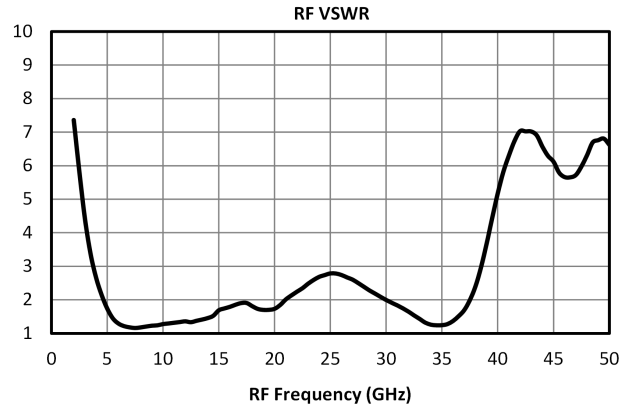
Relative IF Response (dB)



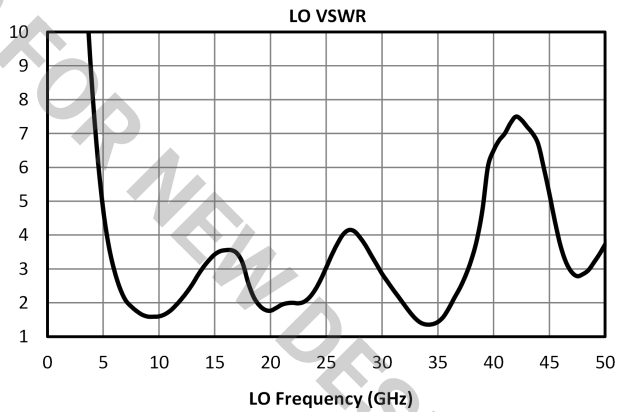
Low-End Relative IF Response (dB)



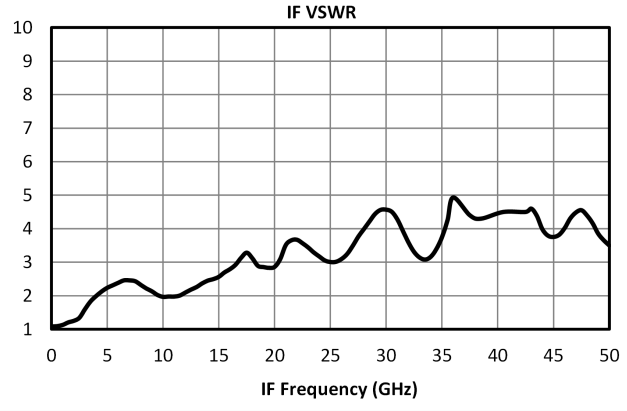
RF VSWR



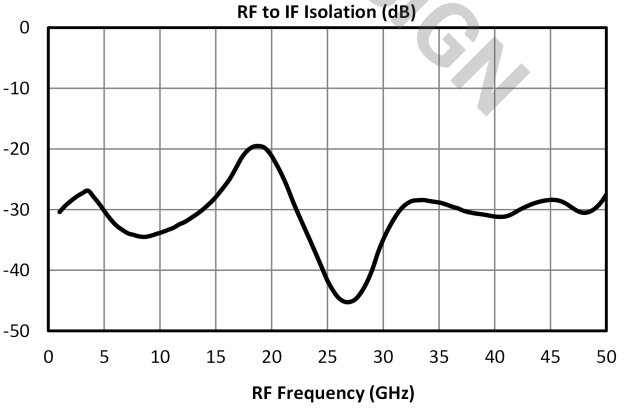
LO VSWR



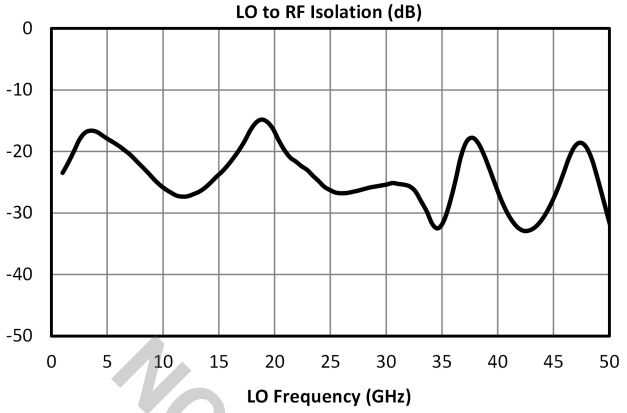
IF VSWR



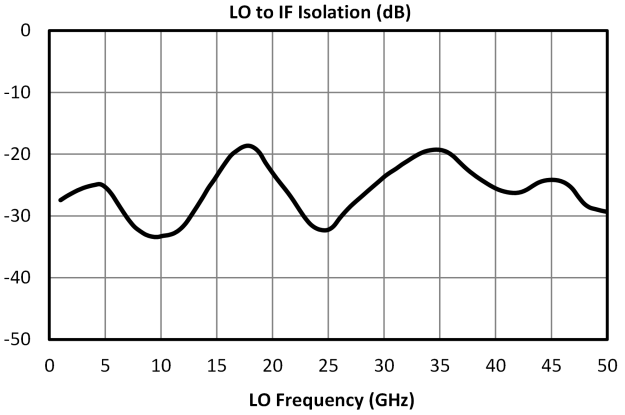
RF to IF Isolation (dB)



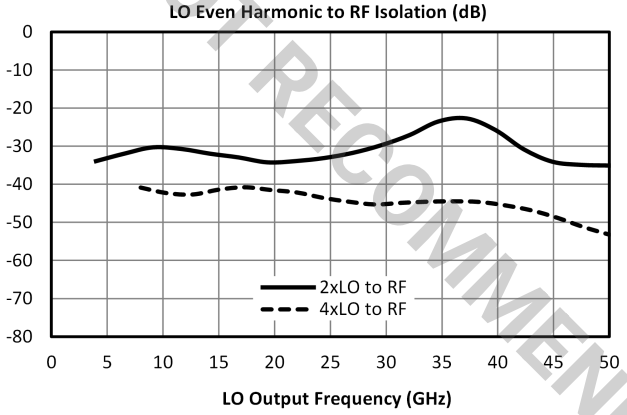
LO to RF Isolation (dB)



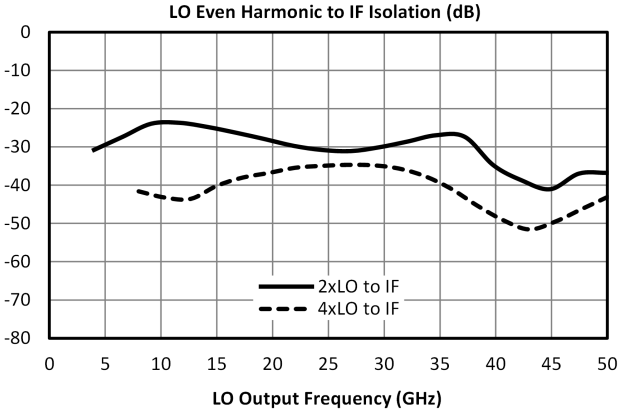
LO to IF Isolation (dB)



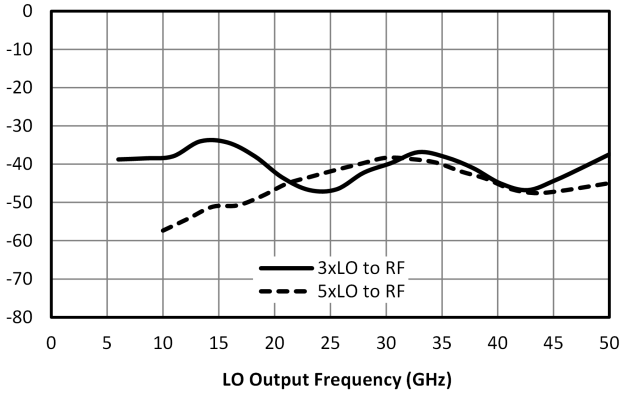
LO Even Harmonic to RF Isolation (dB)



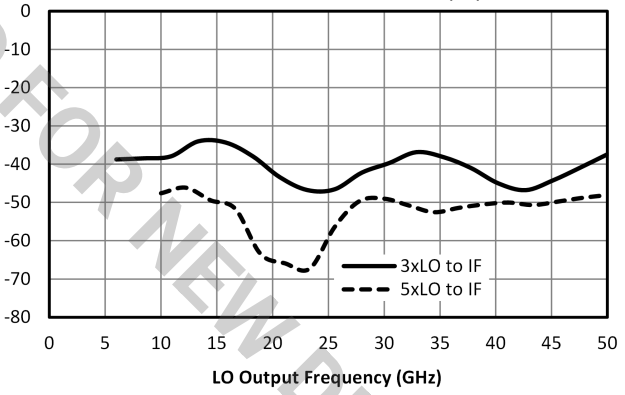
LO Even Harmonic to IF Isolation (dB)



LO Odd Harmonic to RF Isolation (dB)



LO Odd Harmonic to IF Isolation (dB)



Spur Table

Downconversion Spurious Suppression

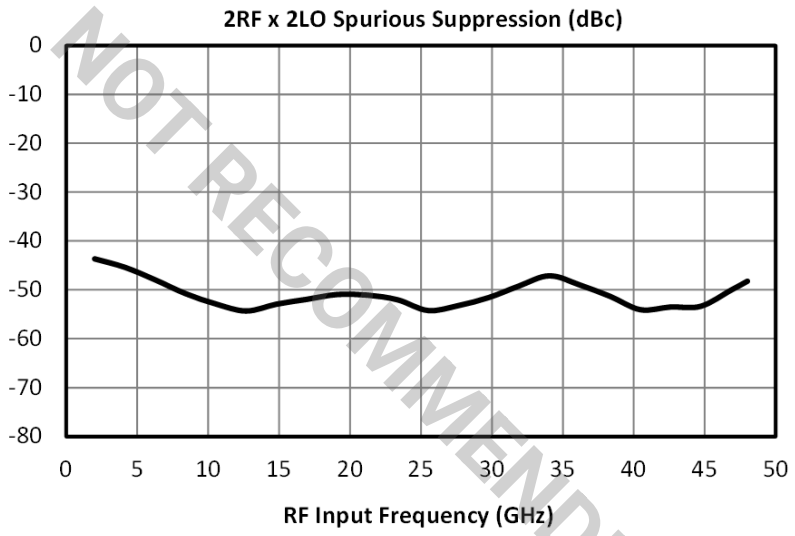
Spurious data is taken by selecting RF and LO frequencies (+mLO+nRF) within the 2 to 50 GHz RF/LO bands, which create a 2.0 GHz IF spurious output. The mixer is swept across the spurious band and the mean is calculated. The numbers shown in the table below are for a -10 dBm RF input. Spurious suppression is scaled for different RF power levels by (n-1), where "n" is the RF spur order. For example, the 2RFx2LO spur is 52 dBc for a -10 dBm input, so a -20 dBm RF input creates a spur that is (2-1) x (-10 dB) dB lower, or 62 dBc.

Typical Downconversion Spurious Suppression (dBc): 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	22	Reference	29	13	36	24
2xRF	61	48	52	52	51	50
3xRF	89	62	73	70	78	72
4xRF	110	95	94	95	96	98
5xRF	127	108	112	110	114	118

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

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 2 to 48 GHz RF input band is the number shown in the table above.



Downconversion 2RFx2LO Spurious Data Example:

RF Input: 2 to 48 GHz @ -10 dBm
LO for Reference: 4 to 50 GHz
LO for Spurious: 3 to 49 GHz
IF Output: 2.0 GHz

Upconversion Spurious Suppression

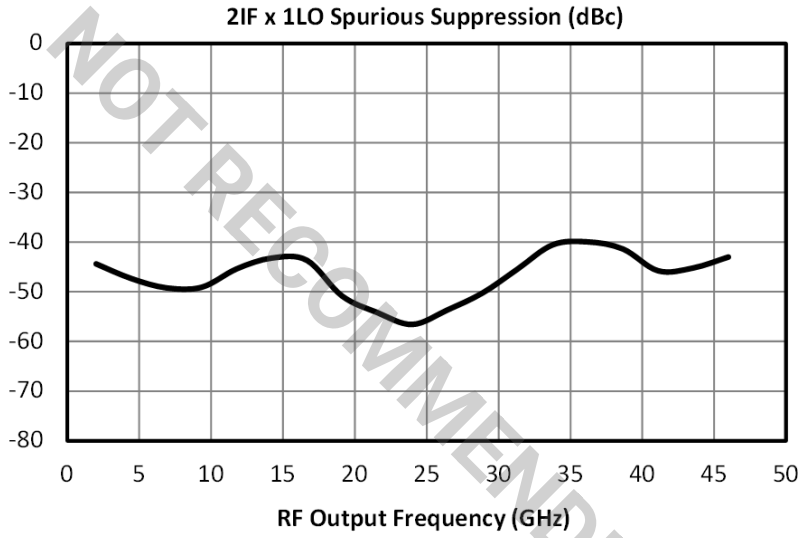
Spurious data is taken by mixing a 2.0 GHz IF with LO frequencies (+mLO+nIF) which create an RF within the 2 to 50 GHz RF band.The mixer is swept across the spurious output band and the mean is calculated. The numbers shown in the table below are for a -10 dBm IF input. Spurious suppression is scaled for different IF input power levels by (n-1), where “n” is the IF spur order. For example, the 2IFx1LO spur is typically 47 dBc for a -10 dBm input, so a -20 dBm IF input creates a spur that is (2-1) x (-10 dB) dB lower, or 57 dBc.

Typical Upconversion Spurious Suppression (dBc): L-Diode

-10 dBm IF Input	0xLO	1xLO	2xLO	3xLO	4xLO	5xLO
0xIF	----------	See LO to RF Isolation and LO Harmonic to RF Isolation Plots				
1xIF	17	Reference	27	12	31	23
2xIF	47	47	52	47	51	48
3xIF	72	63	71	66	70	66
4xIF	98	91	95	91	93	90
5xIF	118	109	113	109	109	107

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

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 2 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.



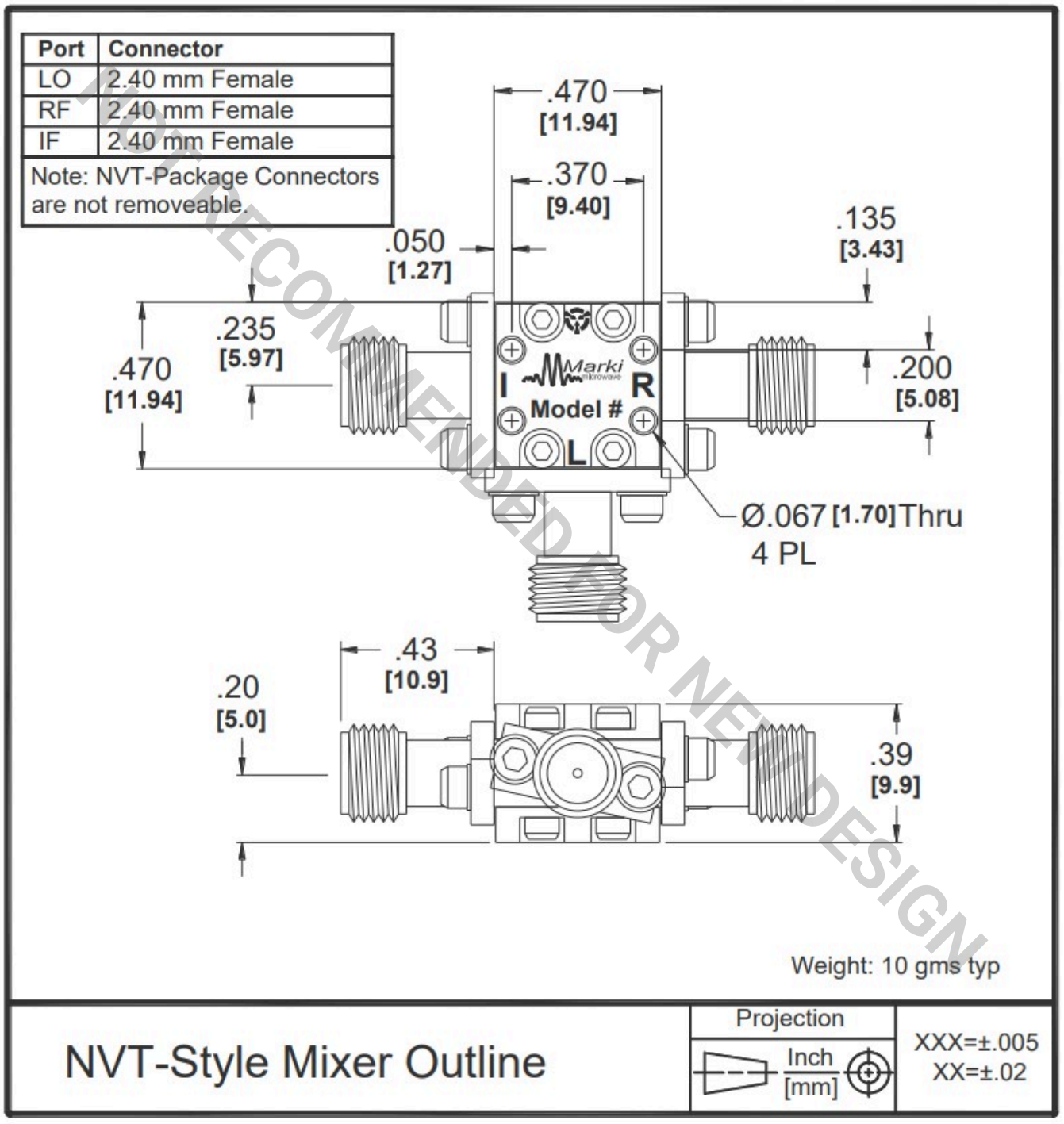
Upconversion 2IF x 1LO Spurious Data Example:

IF Input: 2.0 GHz @ -10 dBm
LO for Reference:4 to 48 GHz
LO for Spurious: 6 to 50 GHz
RF Output: 2 to 46 GHz

Mechanical Data

Outline Drawing

Download : Outline 3D Drawing | Outline 3D STP



Notes

1. Mixer Conversion Loss Plot IF frequency is 2.0 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 +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.

DISCLAIMER