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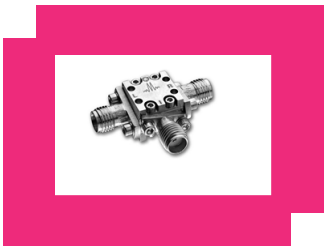
T3-0838GLES-1

High-Linearity Triple-Balanced Mixers

DEVICE OVERVIEW

General Description

The T3-0838G is a high performance mixer featuring LO/RF from 8 to 38 GHz and IF from 10 MHz to 10 GHz. As with all T3 mixers, this mixer offers unparalleled nonlinear performance in terms of IIP3, P1dB, and spurious performance with a flexible LO drive requirement from +13 dBm to +25 dBm. The T3-0838G is offered in connectorized and drop-in style packaging, suitable for any type of system level integration. The T3-0838G is a form fit function replacement for the obsolete T3-0838, built with GaAs diodes instead of Si.



Features

- LO/RF 8.0 to 38.0 GHz
- IF 0.01 to 10.0 GHz
- 8 dB Typical Conversion Loss
- Ultra-Broadband RF, LO, and IF
- 2.92 mm Connectors

Applications

N/A

Functional Block Diagram

N/A

Part Ordering Options

Part Number	Description	Package	Green Status	Product Lifecycle	Export Classification
T3-0838GLES-2	High-Linearity Triple-Balanced Mixers	ES	Non-RoHS	Released	EAR99
T3-0838GLES-1	High-Linearity Triple-Balanced Mixers	ES	Non-RoHS	Released	EAR99

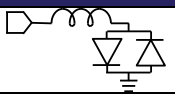
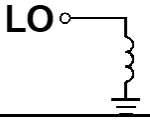
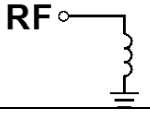
Table Of Contents

Revision History

Revision Code	Revision Date	Comment
PRE	2021-03-01	Pre-release Draft

Port Configuration and Functions

Port Functions

Port	Function	Description	Equivalent Circuit for Package
IF	IF	The IF port is DC coupled to the diodes and AC matched to 50 Ohms from 0.01 to 10 GHz. Blocking capacitor is optional.	
LO	LO	The LO port is DC coupled to ground and AC matched to 50 Ohms from 8 to 38 GHz. Blocking capacitor is optional.	
RF	RF	The RF port is DC coupled to ground and AC matched to 50 Ohms from 8 to 38 GHz. Blocking capacitor is optional.	

Specifications

Absolute Maximum Ratings

Parameter	Maximum Rating	Unit
ESD Sensitivity (HBM)	1	A
IF DC Current	50	Amp
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), (L -Version)	25	dBm

Package Information

Parameter	Details	Rating
ESD	250 to < 500 Volts	HBM Class 1A
Weight	Package name: ES	1g
Dimensions	-	8.13 x 8.13 mm

Recommended Operating Conditions

Parameter	Min	Nominal	Max	Unit
LO Input Power	13	-	25	-

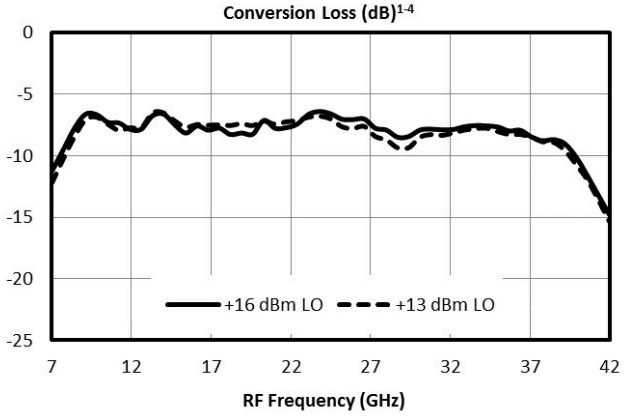
Electrical Specifications

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

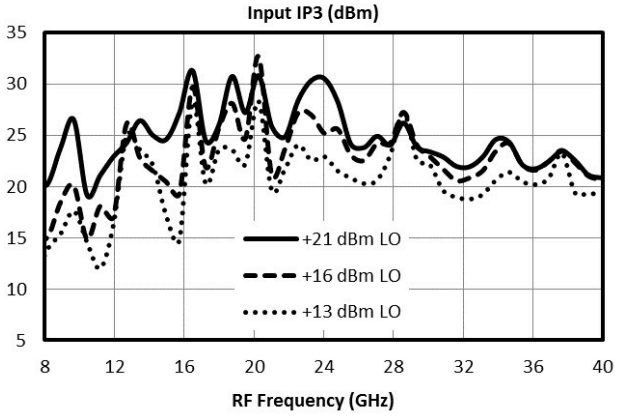
Parameter	Test Conditions	Min	Typ	Max	Unit
Conversion Loss	LO/RF=8.0-38.0 GHz IF=0.01-10.0 GHz	-	8	13	dB
IF Frequency Range	-	0.01	-	10	GHz
LO Frequency Range	-	8	-	38	GHz
RF Frequency Range	-	8	-	38	GHz
Input IP3	-	-	25	-	dBm
Isolation, LO to RF	-	-	31	-	dB

Typical Performance Plots

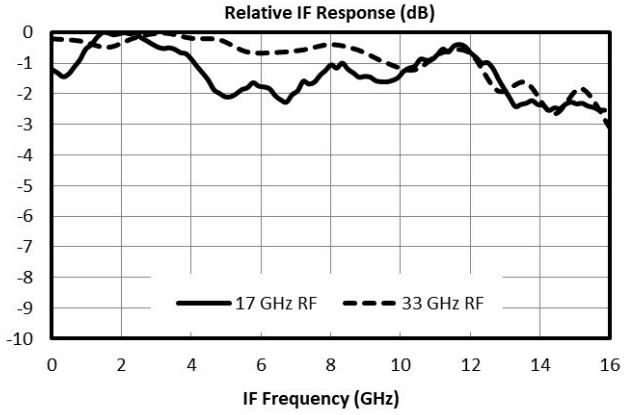
Conversion Loss (dB)[1-4]



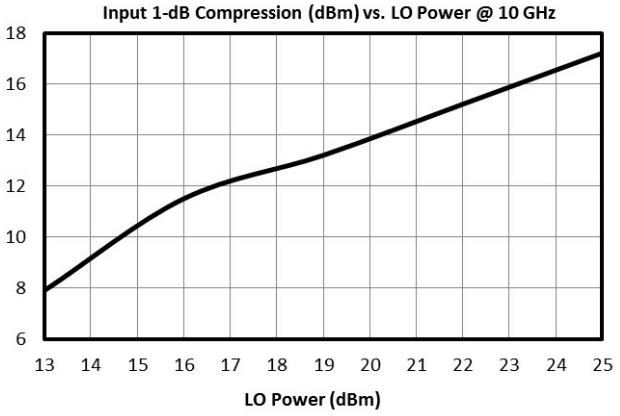
Input IP3 (dBm)



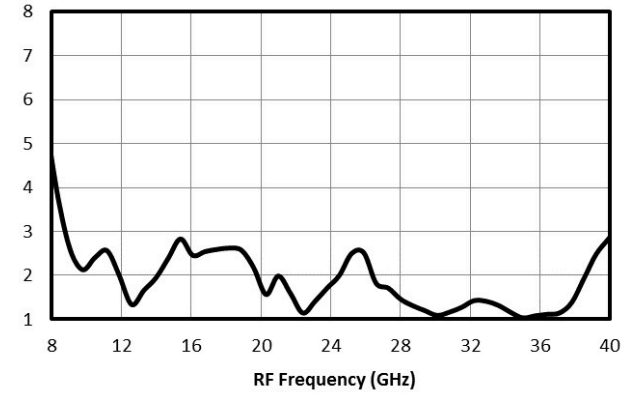
Relative IF Response (dB)



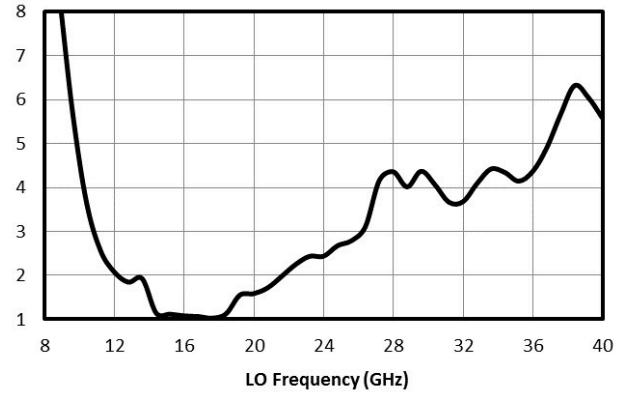
Input 1-dB Compression (dBm) vs. LO Power @ 10 GHz



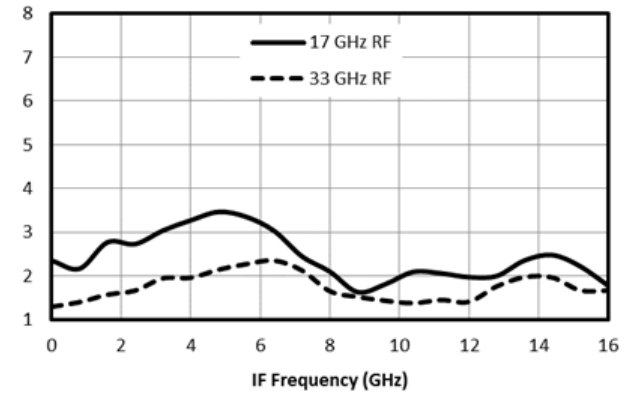
RF VSWR



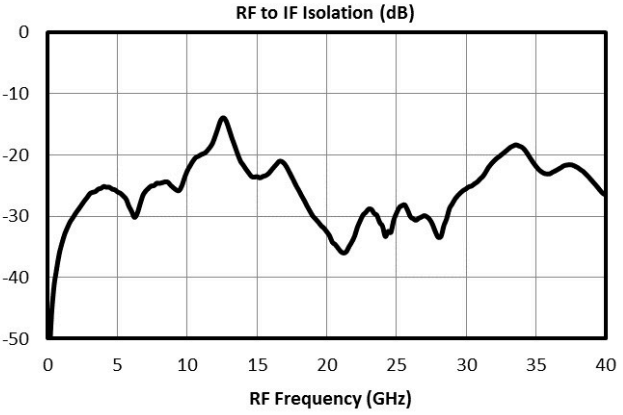
LO VSWR

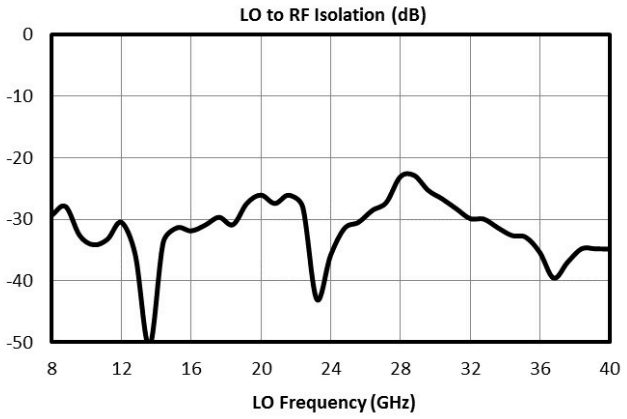


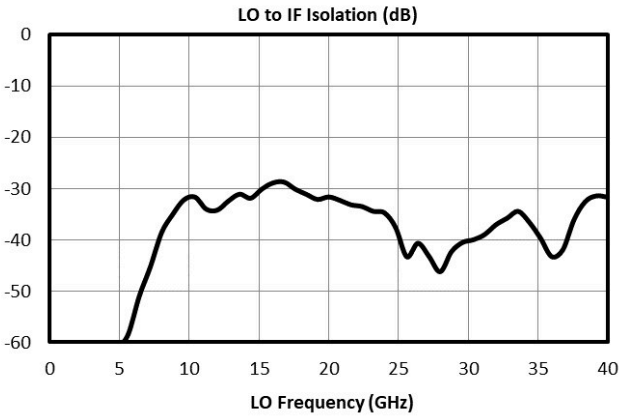
IF VSWR

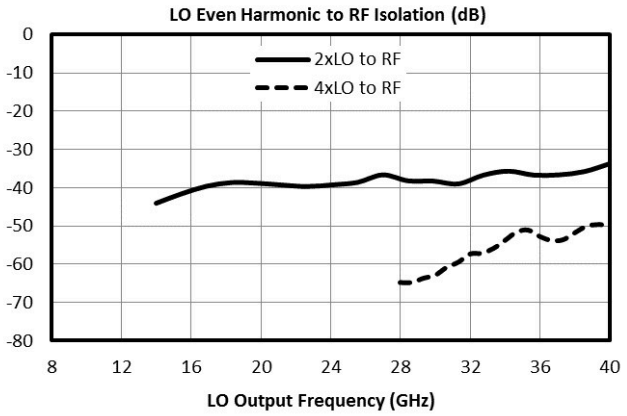


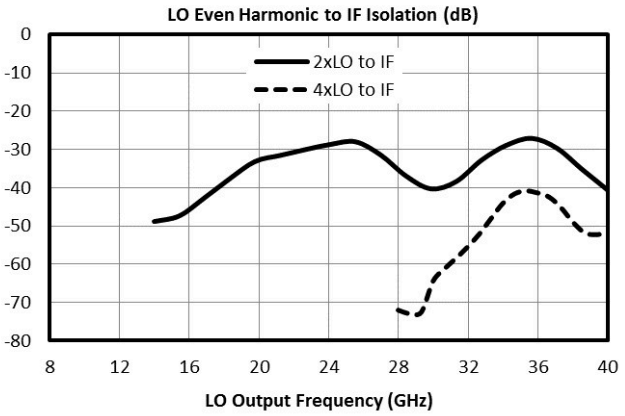
RF to IF Isolation (dB)

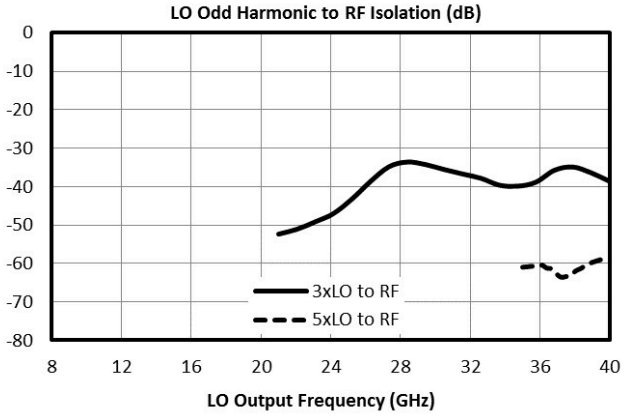


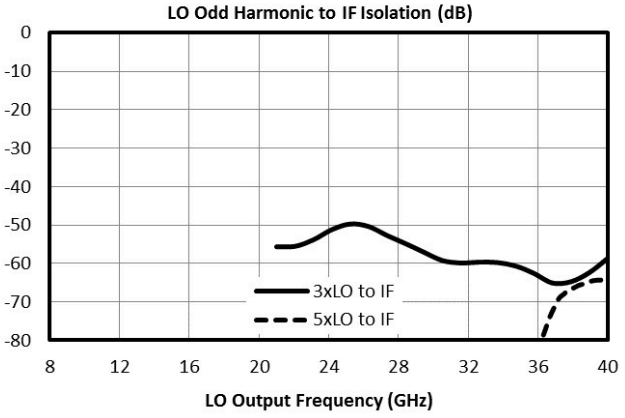












Spur Table

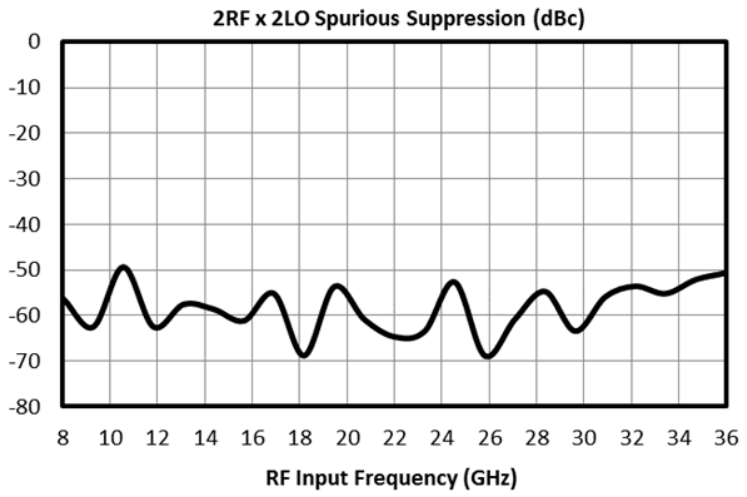
Downconversion Spurious Suppression

Spurious data is taken by selecting RF and LO frequencies (+mLO+nRF) within the 8 to 38 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 62 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 72 dBc.

Typical Downconversion Spurious Suppression (dBc): 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	Reference	28	13	32	19
2xRF	61	61	58	66	62	66
3xRF	89	75	85	71	86	72
4xRF	109	111	107	114	107	115
5xRF	144	136	131	129	136	128

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 8 to 36 GHz RF input band is the number shown in the table above.



Downconversion 2RFx2LO Spurious Data Example:

RF Input: 8 to 36 GHz @ -10 dBm
LO for Reference: 10 to 38 GHz
LO for Spurious: 9 to 37 GHz
IF Output: 2.0 GHz

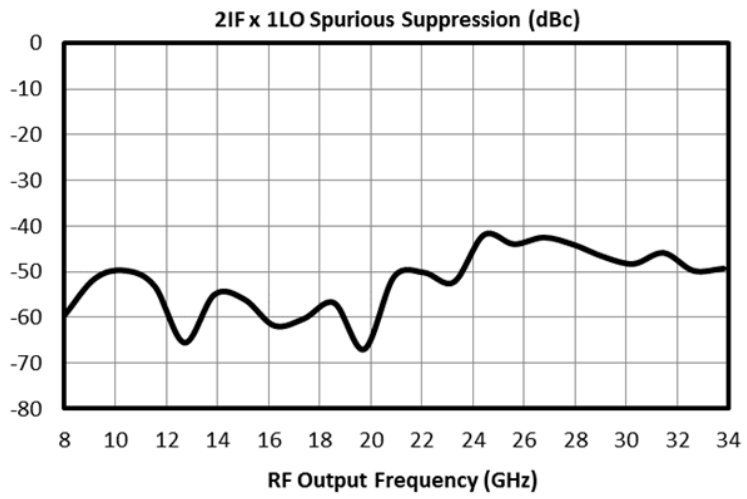
Upconversion Spurious Suppression

Spurious data is taken by mixing a 2.0 GHz IF with LO frequencies (+mLO+nIF) which create an RF within the 8 to 38 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 59 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 69 dBc.

Typical Upconversion Spurious Suppression (dBc): 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	Reference	26	12	30	23
2xIF	59	52	62	52	68	59
3xIF	77	73	84	74	94	81
4xIF	103	105	114	106	121	112
5xIF	118	124	136	127	137	141

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 8 to 34 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.



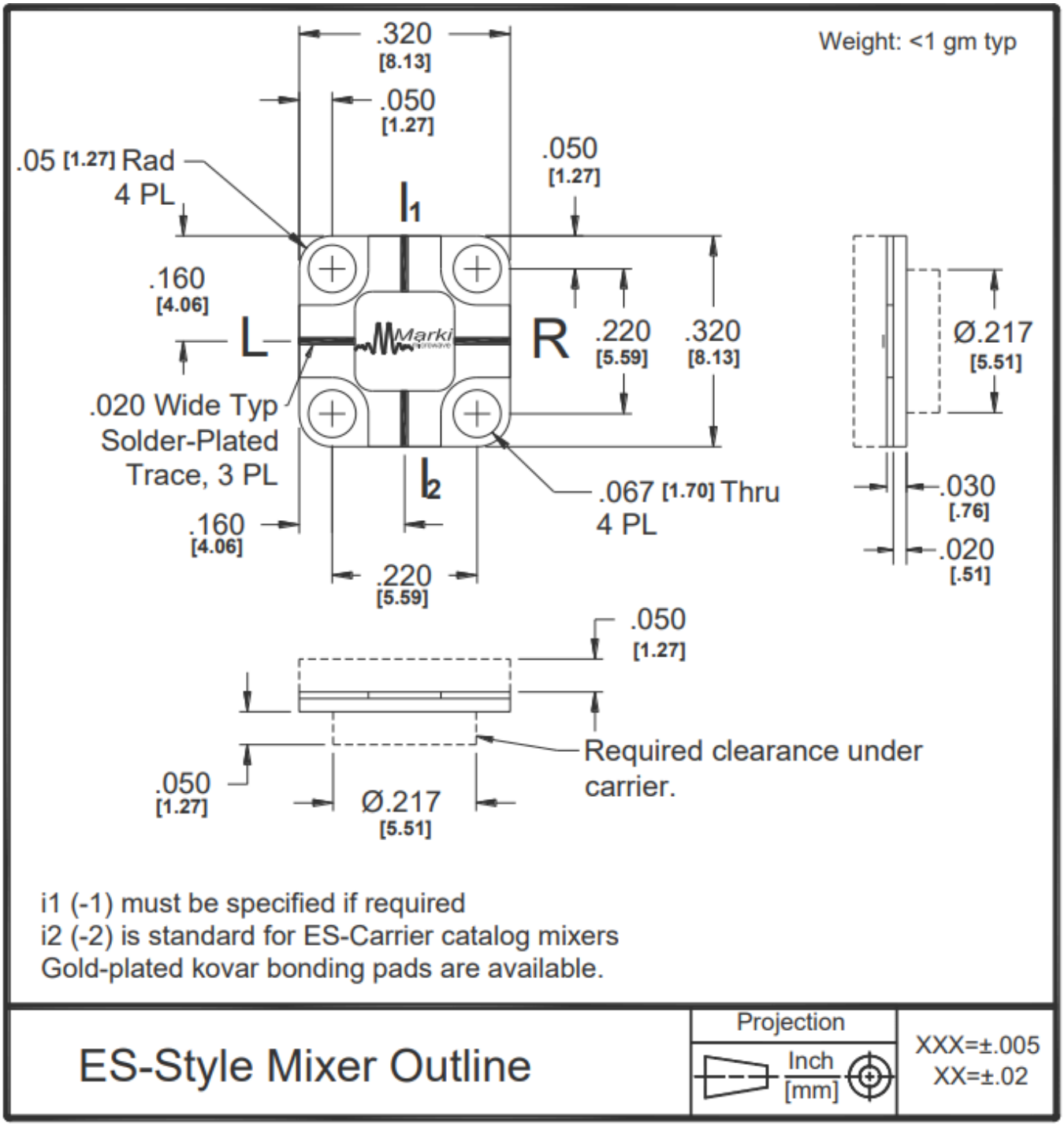
Upconversion 2IF x 1LO Spurious Data Example:

IF Input: 2.0 GHz @ -10 dBm
LO for Reference:10 to 36 GHz
LO for Spurious: 12 to 38 GHz
RF Output: 8 to 34 GHz

Mechanical Data

Outline Drawing

Download : Outline 2D Drawing



Notes

DATA SHEET 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.
8. Conversion loss may degrade when using an LO drive level greater than +20dBm.

DISCLAIMER