

HIGH-LINEARITY TRIPLE-BALANCED MIXERS

T3-0838G

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, P_{1dB}, 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. For a list of recommended LO driver amps for all mixers and IQ mixers, see [here](#).



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

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)	8.0-38.0	8.0-38.0	0.01-10.0		8.0	13.0	
Isolation (dB)							
LO-RF	8.0-38.0	8.0-38.0			See Plots		
LO-IF	8.0-38.0	8.0-38.0			See Plots		
RF-IF	8.0-38.0	8.0-38.0			See Plots		
Input 1 dB Compression (dBm)	8.0-38.0	8.0-38.0			See Plot		L (+13 to +25)
Input Two-Tone Third Order Intercept Point (dBm)	8.0-38.0	8.0-38.0			See Plot		L (+13 to +25)

Part Number Options

Please specify diode level and package style by adding to model number.							
Package Styles			Examples				
			T3-0838GLN				
Connectorized	N		T3-0838G		L		N
Microstrip ^{1,2}	ES		(Model)		(Diode Option)		(Package)

¹Connectorized test fixtures available for most microstrip and surface mount packages. Consult factory.

²For non-connectorized packages, specify I-port configuration by adding -1 or -2 suffix to model number. Default is -2 configuration when not specified.

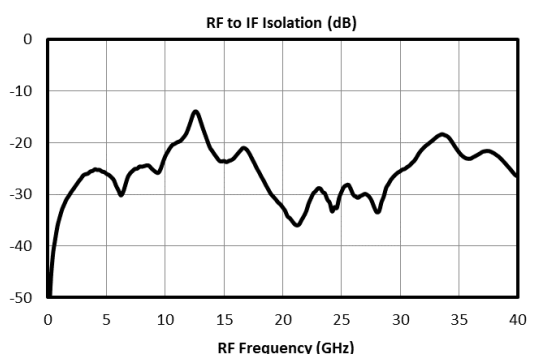
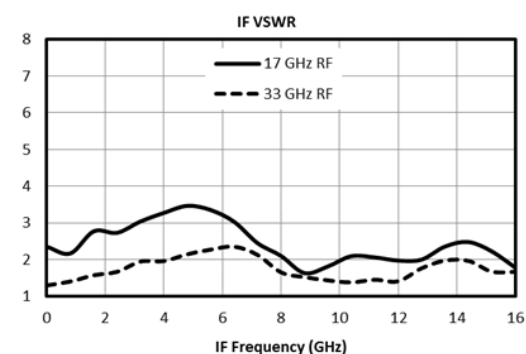
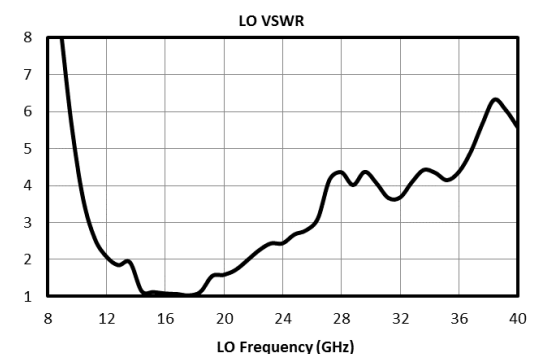
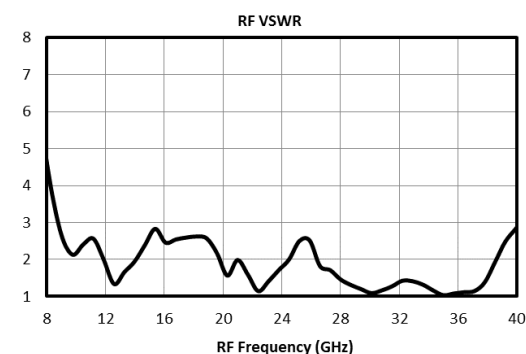
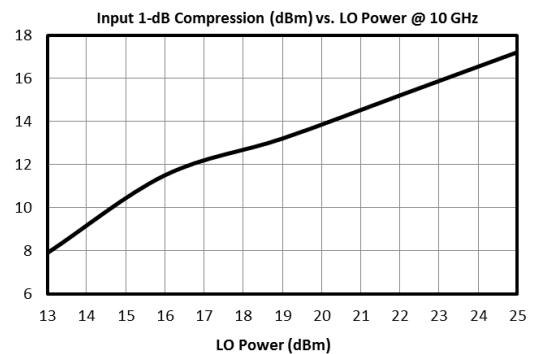
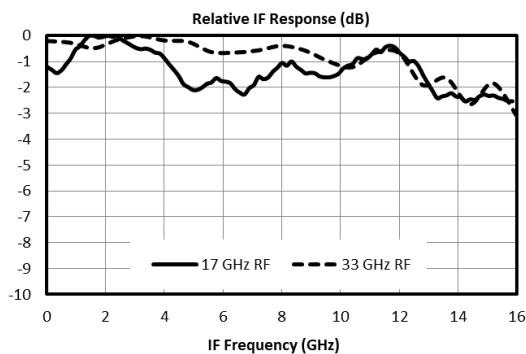
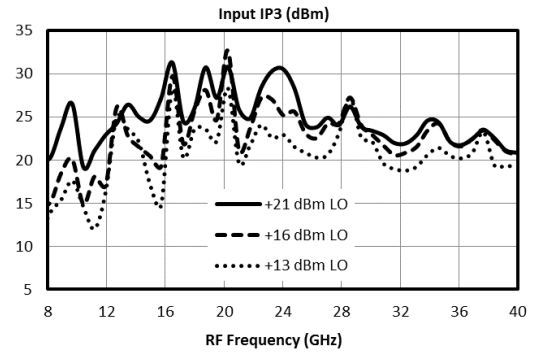
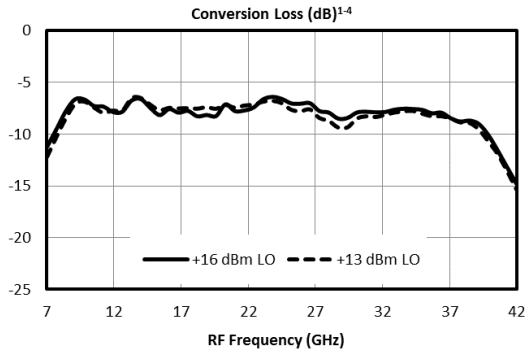
HIGH-LINEARITY TRIPLE-BALANCED MIXERS

T3-0838G

Page 2

LO/RF 8.0 to 38.0 GHz
IF 0.01 to 10.0 GHz

Typical Performance



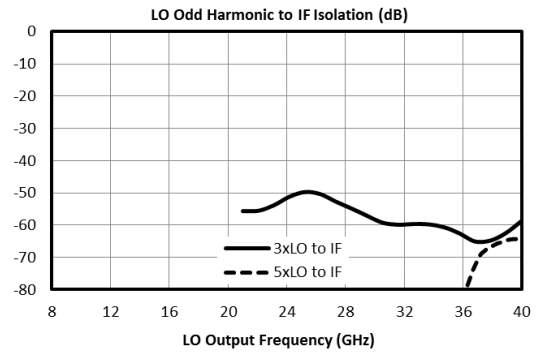
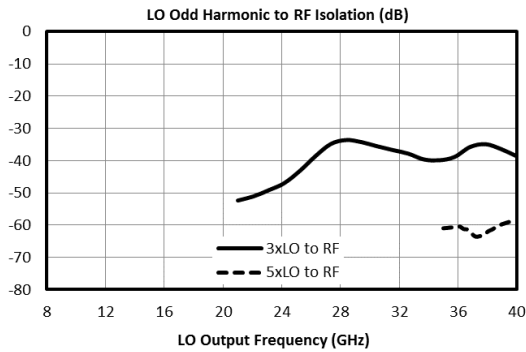
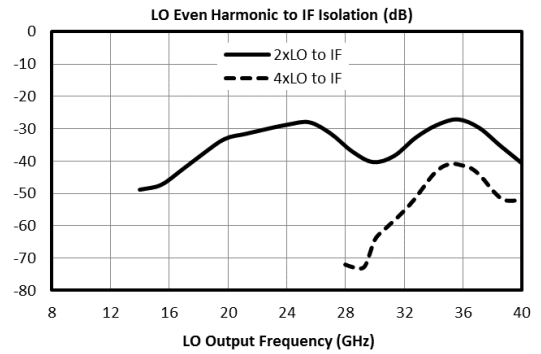
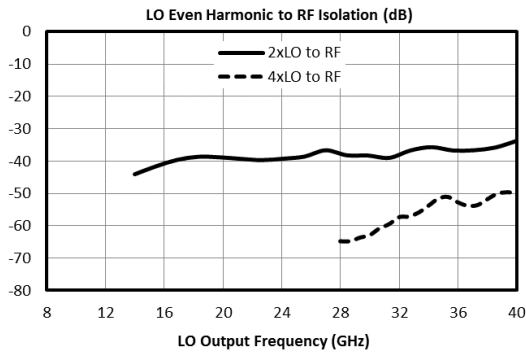
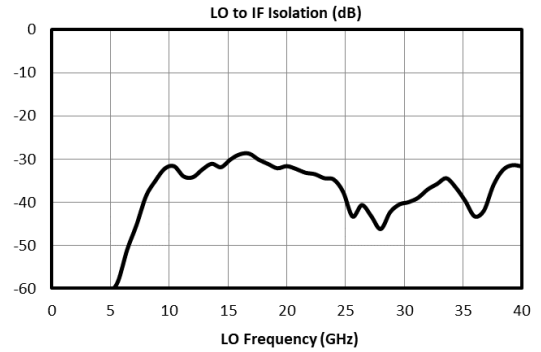
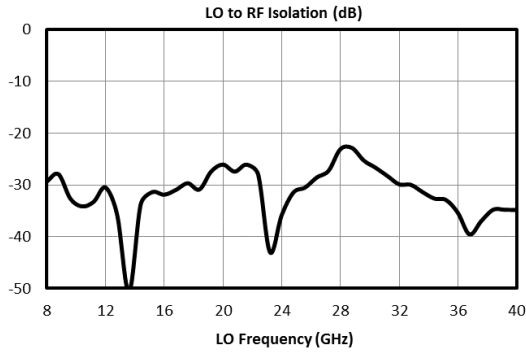
HIGH-LINEARITY TRIPLE-BALANCED MIXERS

T3-0838G

Page 3

LO/RF 8.0 to 38.0 GHz
IF 0.01 to 10.0 GHz

Typical Performance



HIGH-LINEARITY TRIPLE-BALANCED MIXERS

T3-0838G

Page 4

**LO/RF 8.0 to 38.0 GHz
IF 0.01 to 10.0 GHz**

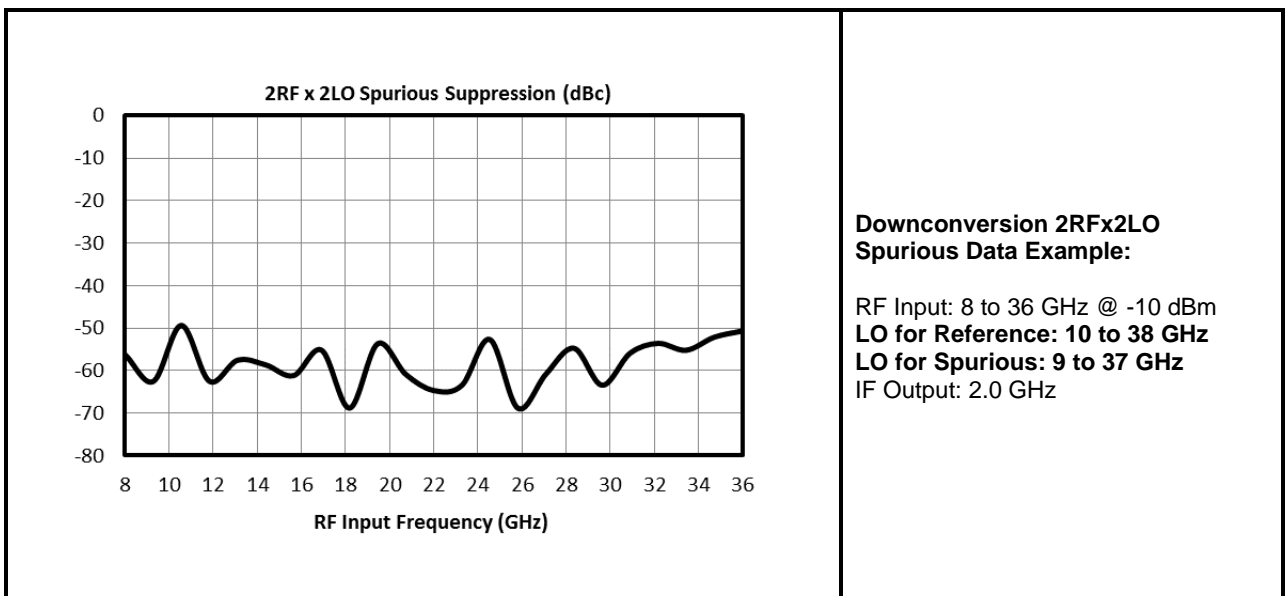
Downconversion Spurious Suppression

Spurious data is taken by selecting RF and LO frequencies ($\pm mLO \pm nRF$) 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 $(2-1) \times (-10 \text{ dB})$ dB lower, or 72 dBc.

Typical Downconversion Spurious Suppression (dBc): L-Diode⁵

-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.





HIGH-LINEARITY TRIPLE-BALANCED MIXERS

T3-0838G

Page 5

**LO/RF 8.0 to 38.0 GHz
IF 0.01 to 10.0 GHz**

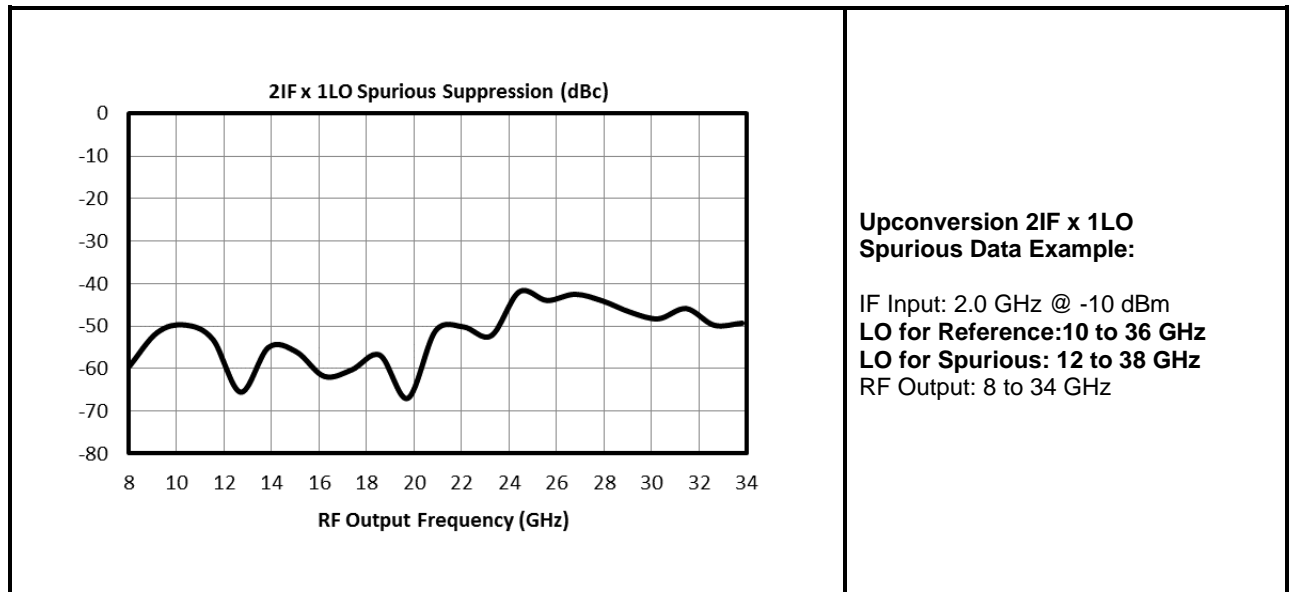
Upconversion Spurious Suppression

Spurious data is taken by mixing a 2.0 GHz IF with LO frequencies ($\pm mLO \pm nIF$) which create an RF within the 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 $(2-1) \times (-10 \text{ dB})$ dB lower, or 69 dBc.

Typical Upconversion Spurious Suppression (dBc): L-Diode⁵

-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.





HIGH-LINEARITY TRIPLE-BALANCED MIXERS

T3-0838G

Page 6

LO/RF 8.0 to 38.0 GHz
IF 0.01 to 10.0 GHz

Port	Description	DC Interface Schematic
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	The RF port is DC coupled to ground and AC matched to 50 Ohms from 8 to 38 GHz. Blocking capacitor is optional.	
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.	

Absolute Maximum Ratings	
Parameter	Maximum Rating
RF DC Current	1 Amp
LO DC Current	1 Amp
IF DC Current	50 mA
RF Power Handling (RF+LO)	+25 dBm (L-Version)
Operating Temperature	-55°C to +100°C
Storage Temperature	-65°C to +125°C
ESD Sensitivity (HBM)	Class 1A

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.



TWO-TONE-TERMINATOR MIXER

Page 7

T3H-0838G

LO/RF 8.0 to 38.0 GHz
IF 1.0 to 10.0 GHz

Revision History

Revision code	Revision Date	Comment
PRE	March 2021	Pre-release Draft

Marki Microwave reserves the right to make changes to the product(s) or information contained herein without notice. Marki Microwave makes no warranty, representation, or guarantee regarding the suitability of its products for any particular purpose, nor does Marki Microwave assume any liability whatsoever arising out of the use or application of any product.

215 Vineyard Court, Morgan Hill, CA 95037 | Ph: 408.778.9952 | Fax 408.778.4300 | sales@markimicrowave.com

Copyright © 2021 Marki Microwave, Inc. All Rights Reserved | Rev. PRE