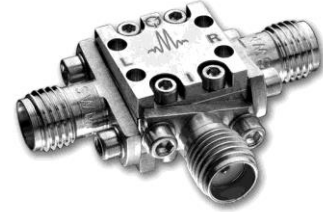


HIGH-LINEARITY TRIPLE-BALANCED MIXERS

T3-0838

The T3-0838 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 T3-0838 is offered in connectorized and drop-in style packaging, suitable for any type of system level integration. 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

Note: This part is being discontinued due to material obsolescence (see [EOL letter](#)). The T3-0838G is a form-fit-function replacement using GaAs diodes, with a target release date of October 2020.

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					
RF-IF	8.0-38.0	8.0-38.0					
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				
			T3-0838LN				
Connectorized	<u>N</u>		<u>T3-0838</u>		<u>L</u>		<u>N</u>
Microstrip ^{1,2}	<u>ES</u>		(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.

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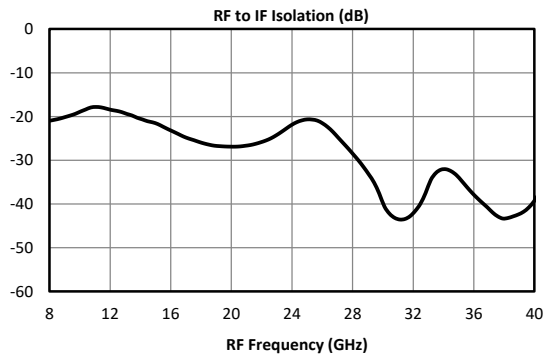
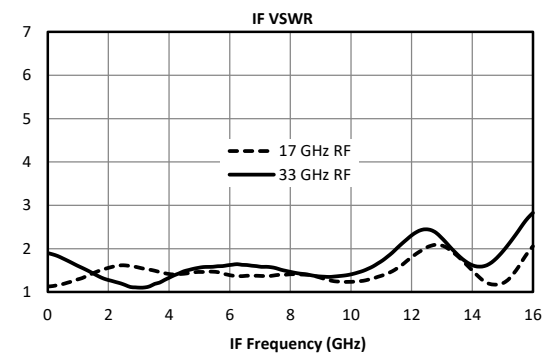
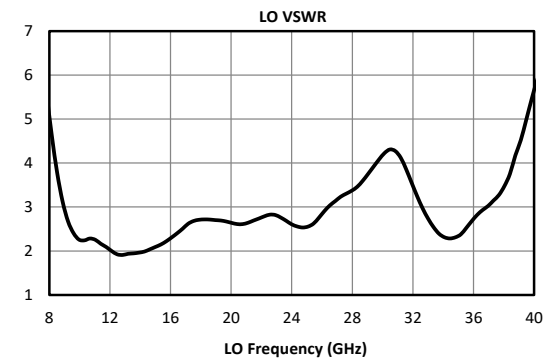
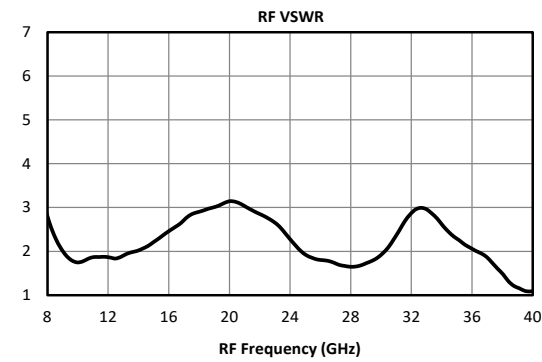
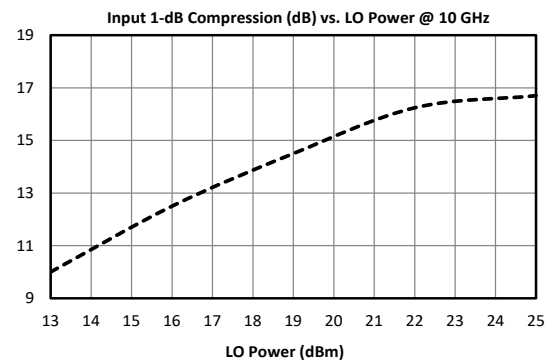
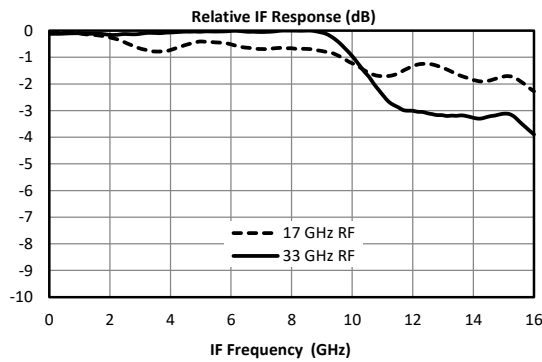
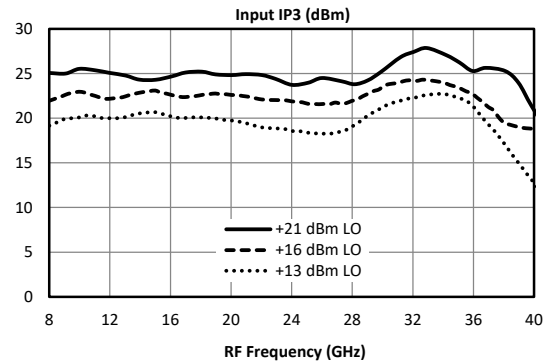
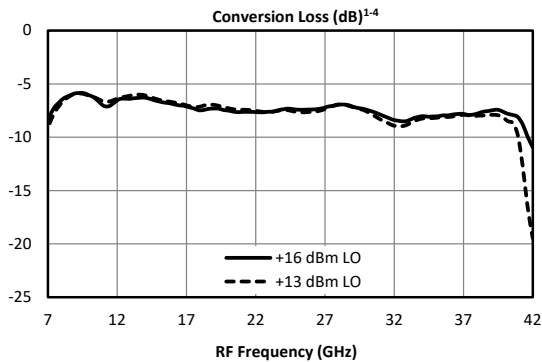
HIGH-LINEARITY TRIPLE-BALANCED MIXERS

T3-0838

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

Typical Performance



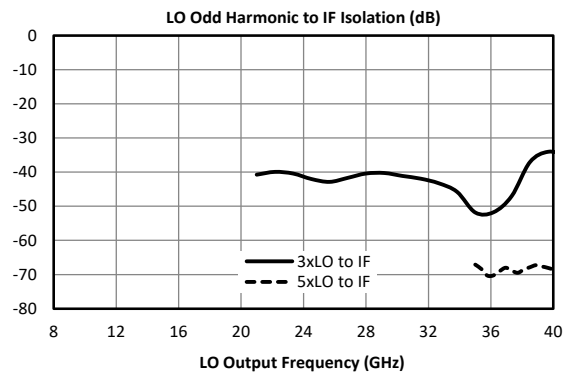
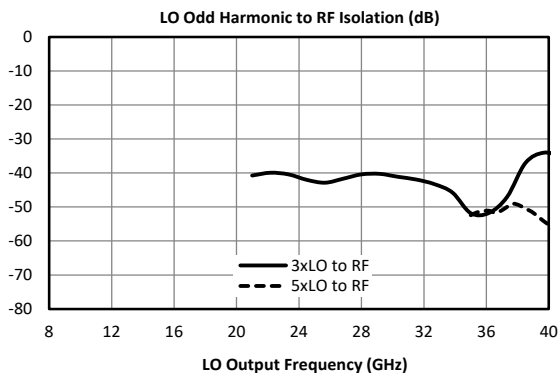
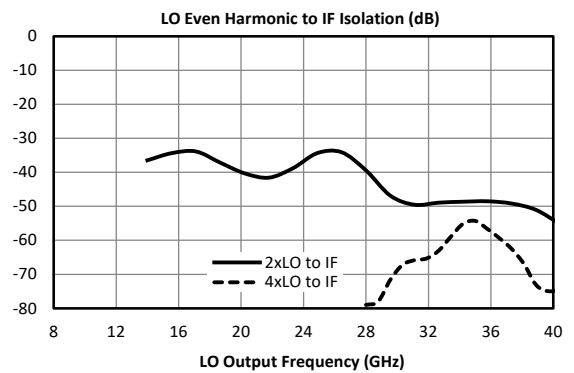
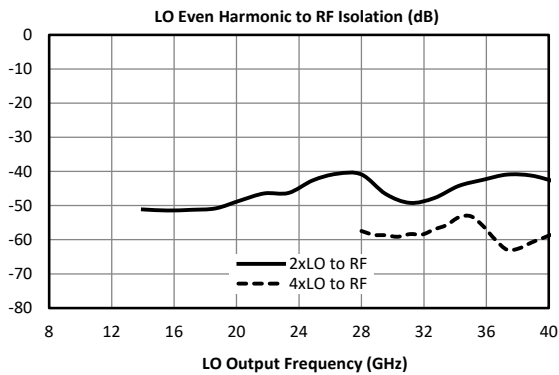
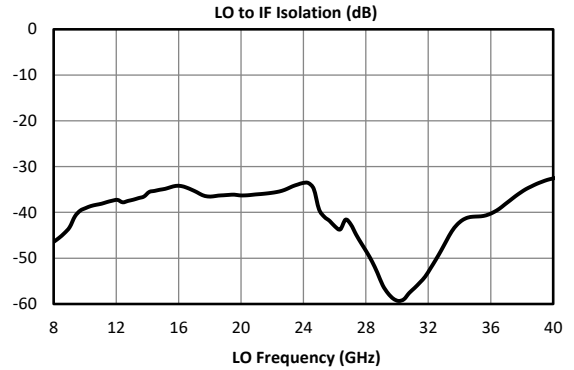
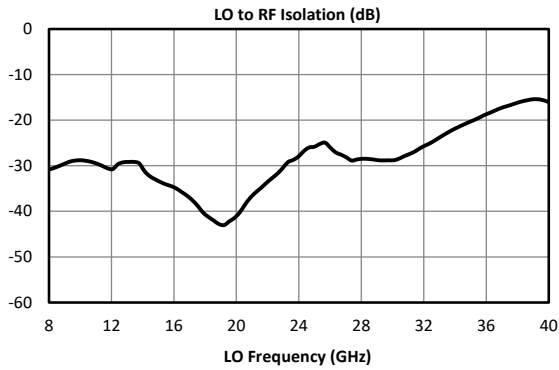
HIGH-LINEARITY TRIPLE-BALANCED MIXERS

T3-0838

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

Typical Performance





HIGH-LINEARITY TRIPLE-BALANCED MIXERS

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

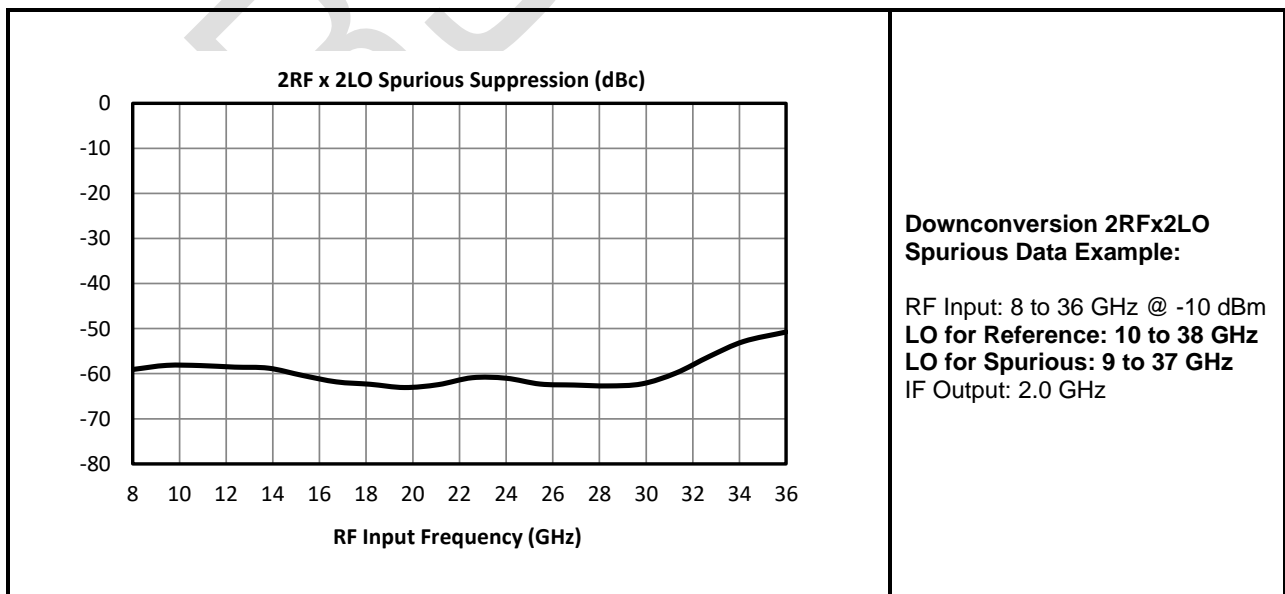
Downconversion Spurious Suppression

Spurious data is taken by selecting RF and LO frequencies (+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 59 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 69 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	22	Reference	30	15	42	30
2xRF	69	67	59	66	55	66
3xRF	97	73	86	68	82	65
4xRF	115	113	108	116	108	112
5xRF	125	116	130	123	130	122

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

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

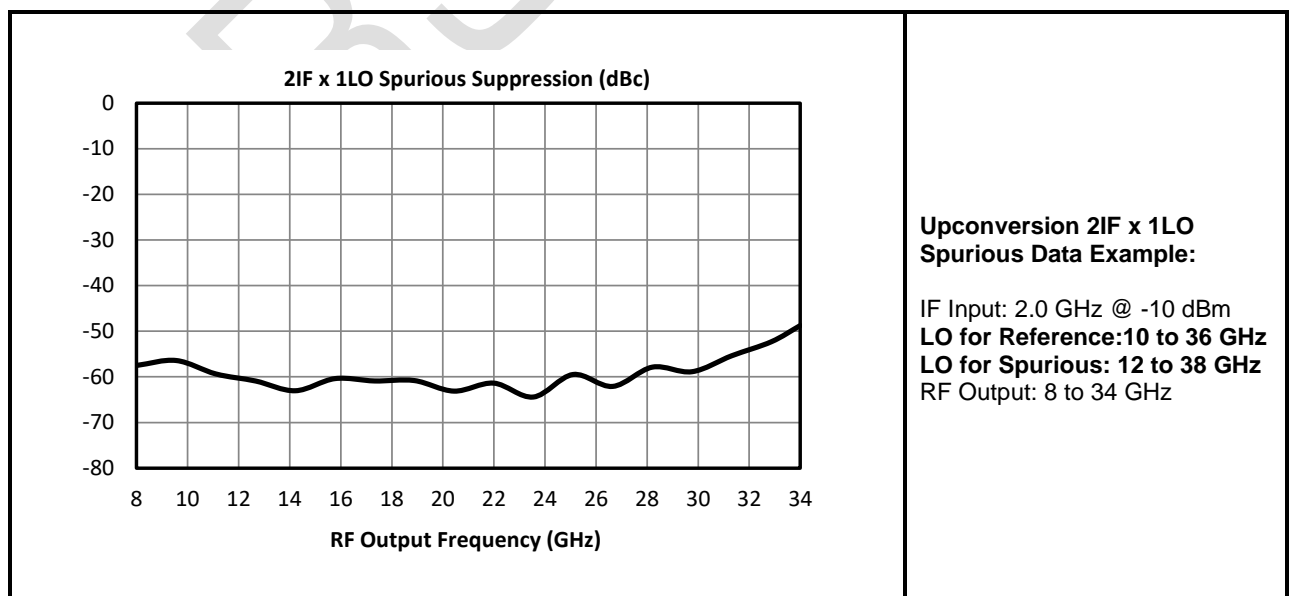
Upconversion Spurious Suppression

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 $2IF \times 1LO$ 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	19	Reference	30	16	37	25
2xIF	66	59	68	59	72	59
3xIF	85	73	84	70	82	68
4xIF	116	112	113	109	108	107
5xIF	129	128	125	120	122	119

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

T3-0838

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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:

- Mixer Conversion Loss Plot IF frequency is 2.0 GHz.
- Mixer Noise Figure typically measures within 0.5 dB of conversion loss.
- 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.
- Conversion Loss typically degrades less than 0.5 dB at +100°C and improves less than 0.5 dB at -55°C.
- Unless otherwise specified, L-diode data is taken with +16 dBm LO drive.
- Specifications are subject to change without notice. Contact Marki Microwave for the most recent specifications and data sheets.
- Catalog mixer circuits are continually improved. Configuration control requires custom mixer model numbers and specifications.

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