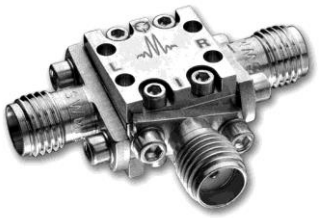
HIGH-LINEARITY TRIPLE-BALANCED MIXERS T3-1040

The T3-1040 is a high performance mixer featuring LO/RF from 10 to 40 GHz and IF from 1 to 18 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 T3-1040 is offered in connectorized and drop-in style packaging, suitable for any type of system level integration.



Features

- LO/RF 10.0 to 40.0 GHz
- IF 1.0 to 18.0 GHz
- 8 dB Typical Conversion Loss
- Ultra-Broadband RF, LO, and IF
- 2.92 mm Connectors
- Recommended Amplifier Module: AMM-6702UC
- Recommended Amplifier Die: AMM-6702CH

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)	10.0-40.0 10.0-40.0	10.0-40.0 10.0-40.0	1.0-15.0 15.0-18.0		8.0 13.0	15.0 17.0	
Isolation (dB) LO-RF LO-IF RF-IF	 10.0-40.0 10.0-40.0 10.0-40.0	 10.0-40.0 10.0-40.0 10.0-40.0			 See Plots		
Input 1 dB Compression (dBm)	10.0-40.0	10.0-40.0			See Plot		L (+13 to +25)
Input Two-Tone Third Order Intercept Point (dBm)	10.0-40.0	10.0-40.0			See Plot		L (+13 to +25)

Part Number Options

Please specify diode level and package style by adding to model number.				
Package Styles		**Examples**		
		T3-1040LN		
Connectorized	N	T3-1040	L	N
Microstrip[1,2]	ES	(Model)	(Diode Option)	(Package)

[1]Connectorized test fixtures available for most microstrip and surface mount packages. Consult factory.
[2]For 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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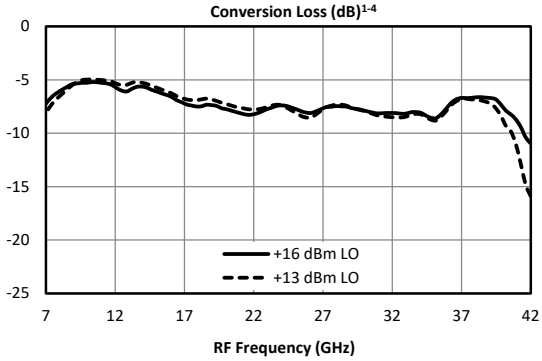
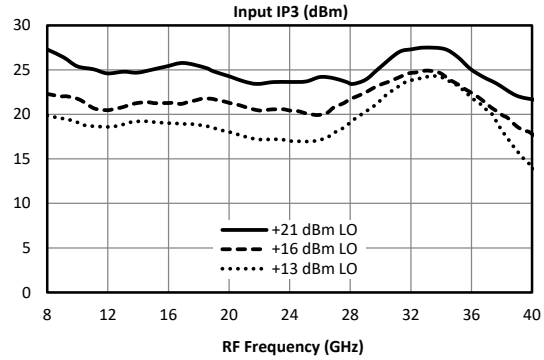
LO/RF 10.0 to 40.0 GHz
IF 1.0 to 18.0 GHz

Typical Performance

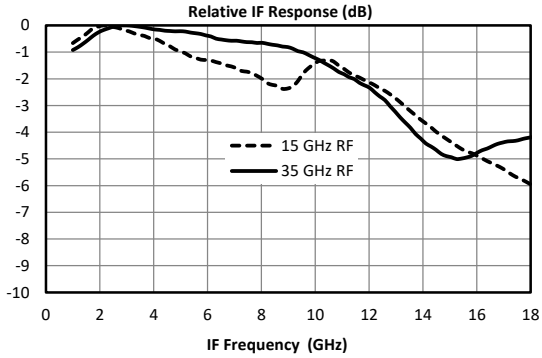
Conversion Loss (dB)[1-4]



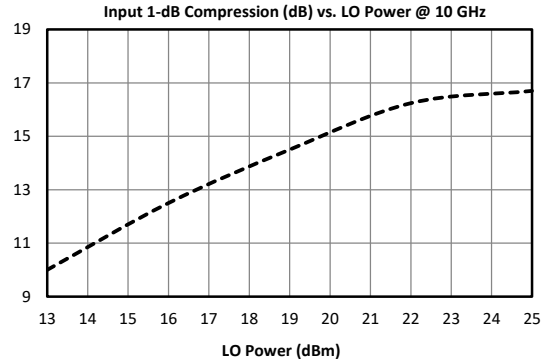
Input IP3 (dBm)



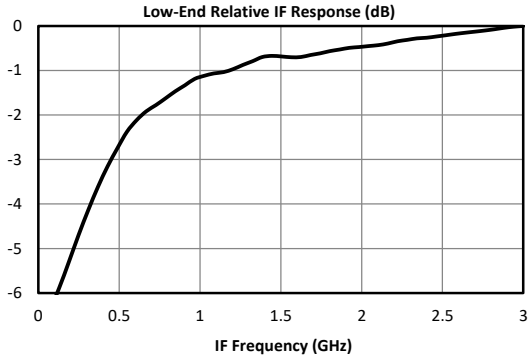
Relative IF Response (dB)



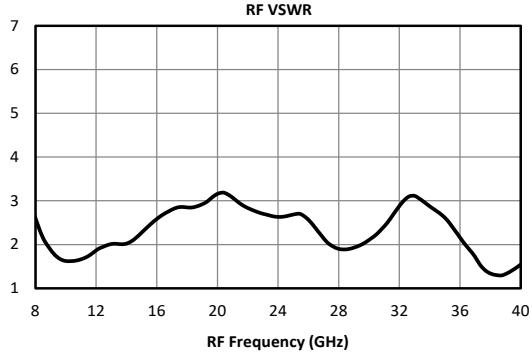
Input 1-dB Compression (dB) vs. LO Power @ 10 GHz



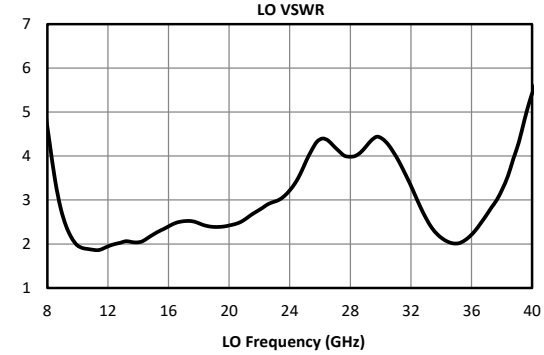
Low-End Relative IF Response (dB)



RF VSWR



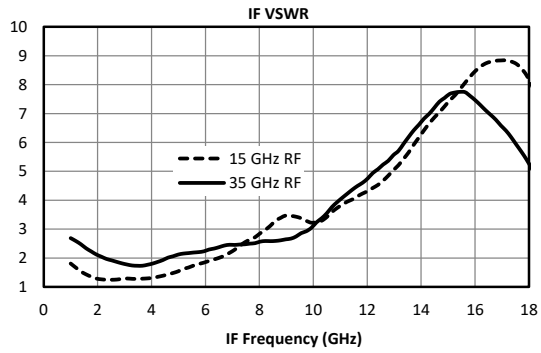
LO VSWR

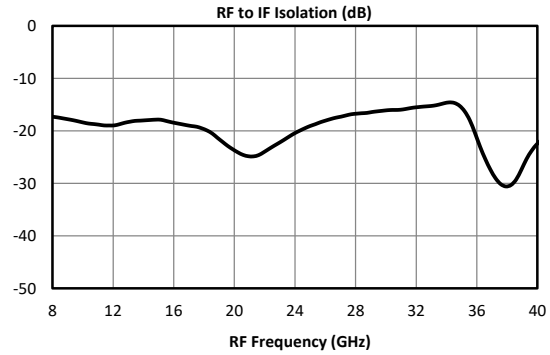


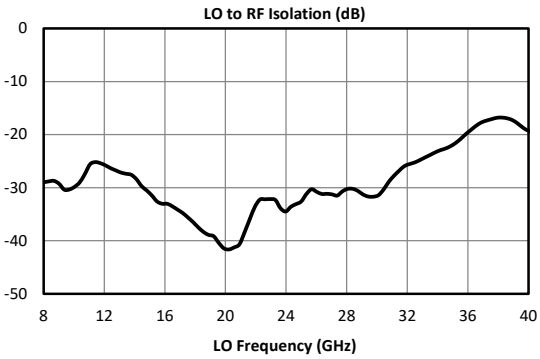
HIGH-LINEARITY TRIPLE-BALANCED MIXERS T3-1040

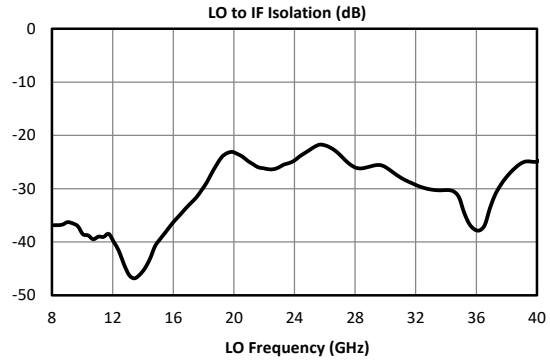
LO/RF 10.0 to 40.0 GHz
IF 1.0 to 18.0 GHz

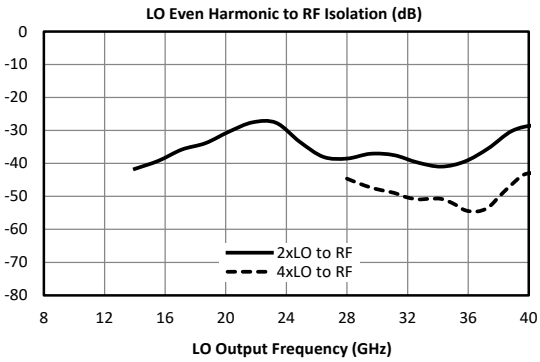
Typical Performance

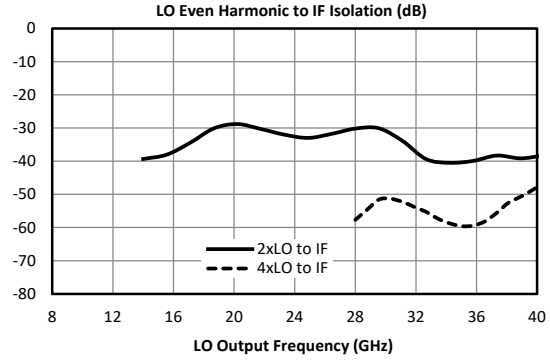


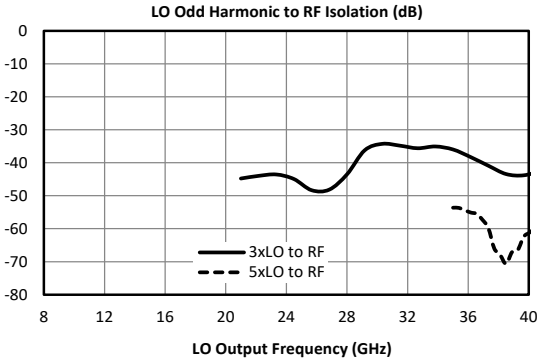


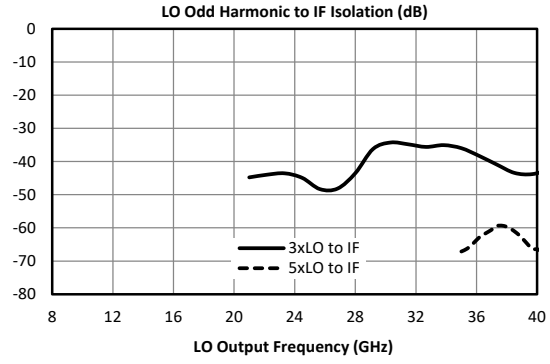












LO/RF 10.0 to 40.0 GHz
IF 1.0 to 18.0 GHz

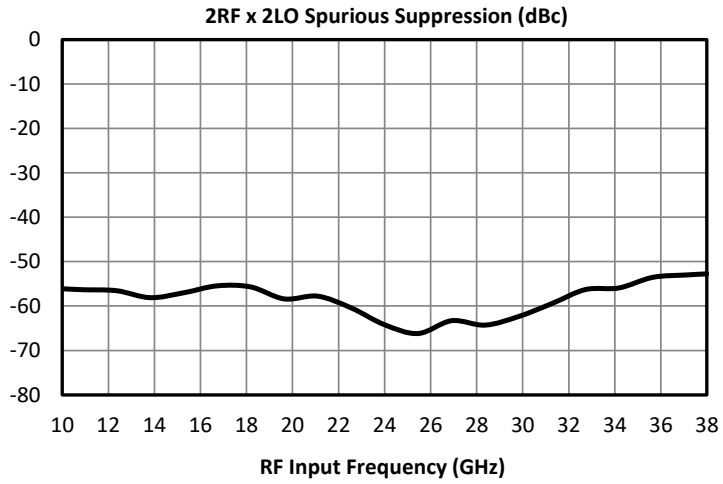
Downconversion Spurious Suppression

Spurious data is taken by selecting RF and LO frequencies (±mLO±nRF) within the 10 to 40 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 58 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 68 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	14	Reference	27	14	37	33
2xRF	63	58	58	57	56	58
3xRF	95	77	82	68	80	63
4xRF	114	112	108	110	104	107
5xRF	121	113	131	123	128	120

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 10 to 38 GHz RF input band is the number shown in the table above.



Downconversion 2RFx2LO Spurious Data Example:

RF Input: 10 to 38 GHz @ -10 dBm
LO for Reference: 12 to 40 GHz
LO for Spurious: 11 to 39 GHz
IF Output: 2.0 GHz

LO/RF 10.0 to 40.0 GHz
IF 1.0 to 18.0 GHz

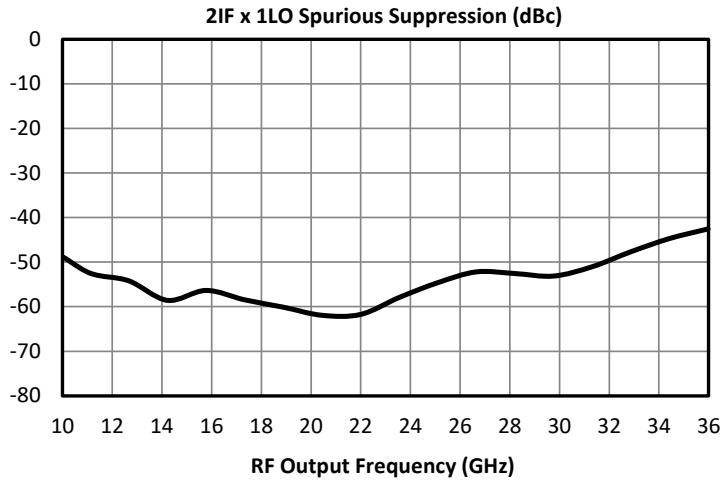
Upconversion Spurious Suppression

Spurious data is taken by mixing a 2.0 GHz IF with LO frequencies (±mLO±nIF) which create an RF within the 10 to 40 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 54 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 64 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	11	Reference	27	15	33	23
2xIF	61	54	55	54	58	55
3xIF	88	73	80	65	83	66
4xIF	110	110	104	98	94	102
5xIF	132	131	126	113	120	118

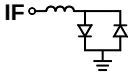
A sample upconversion spurious sweep is shown below. A 2.0 GHz reference IF input is used to create an RF output that is 2.0 GHz below the LO input (LO-IF=RF). A second LO (2.0 GHz higher) is combined with the same 2.0 GHz IF input (LO-2xIF=RF) to create the same 10 to 36 GHz RF output band. The difference 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:12 to 38 GHz
LO for Spurious: 14 to 40 GHz
RF Output: 10 to 36 GHz

LO/RF 10.0 to 40.0 GHz
IF 1.0 to 18.0 GHz

Port	Description	DC Interface Schematic
LO	The LO port is DC coupled to ground and AC matched to 50 Ohms from 10 to 40 GHz. Blocking capacitor is optional.	
RF	The RF port is DC coupled to ground and AC matched to 50 Ohms from 10 to 40 GHz. Blocking capacitor is optional.	
IF	The IF port is DC coupled to the diodes and AC matched to 50 Ohms from 1.0 to 18 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	-55ºC to +100ºC
Storage Temperature	-65ºC to +125ºC
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.

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