TWO-TONE-TERMINATOR MIXER/LO-AMPLIFIER T3A-07SMG

The T3A-07SMG is a lead-free, versatile, robust, broadband Two-Tone-Terminator mixer integrated with a fast rise time square wave amplifier. The T3A-07SMG employs the most sophisticated mixer on the market today and offers unparalleled performance when compared to other mixer technologies. The T3A-07SMG delivers exceptional IMD suppression with low conversion loss, offering superior IP3 as compared to discrete amplifier/mixer combinations.

Features

- Ultra-Broadband Integrated RF, LO, and IF Baluns
- Integrated Square-Wave LO Amplifier
- Low Minimum LO Drive
- Industry Leading Spurious, IP3, and P_{1dB} Performance
- Application Note: T3 Mixer Primer
- RoHS Compliant

Electrical Specifications - Specifications guaranteed from -30 to +70°C, measured in a 50Ω system.

Parameter	LO (GHz)	RF (GHz)	IF (GHz)	Min	Typ	Max
Conversion Loss (dB)	.01-7 .01-7	.01-7 .01-7	.001-0.5 .001-4.0		6.5 7.5	10.0 11.0
Saturated LO Drive Level (dBm)				+10		+15
Linear LO Drive Level (dBm)				-1		+5
LO Leakage (dBm) LO-RF LO-IF	.01-7	.01-7			See Plots	
RF-IF Isolation (dB)	.01-7	.01-7			See Plot	
Input 1 dB Compression (dBm)	.01-7	.01-7			+17	
Input Two-Tone Third Order Intercept Point (dBm)	.01-7	.01-7			See Plot	
Bias Requirements (mA)[1] +5.0 Volts DC (+7 V max) -0.2 Volts DC					 160 0	 200 1

Part Number Options

Model Number	Description
T3A-07SMG-2, T3A-07SMG-1 [1]	Surface Mount, IF Port Configuration -2 or Configuration -1
EVAL-T3A-07	Connectorized Evaluation Fixture

[1]See -2 and -1 I-port configuration options on page 4.

The T3A-07SMG is released for pre-production, recommended for evaluation and prototyping. Environmental qualification is ongoing with expected completion in Q2 2018. 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 of or application of any product.

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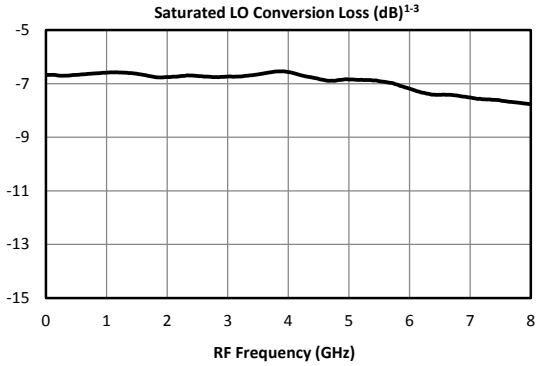
TWO-TONE-TERMINATOR MIXER/LO AMPLIFIER T3A-07SMG

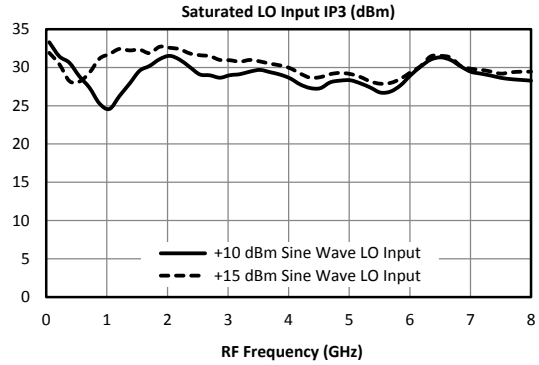
LO/RF 10 MHz to 7 GHz
IF 1 MHz to 4 GHz

Typical Performance
Unless otherwise specified, data is taken with +10 dBm LO, 5.0V Positive Bias, -0.2 Negative Bias

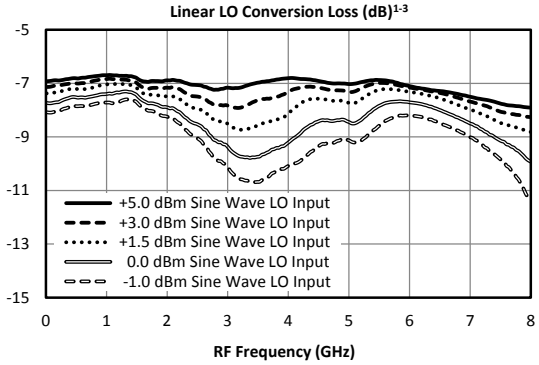
Saturated LO Conversion Loss (dB)[1-3]



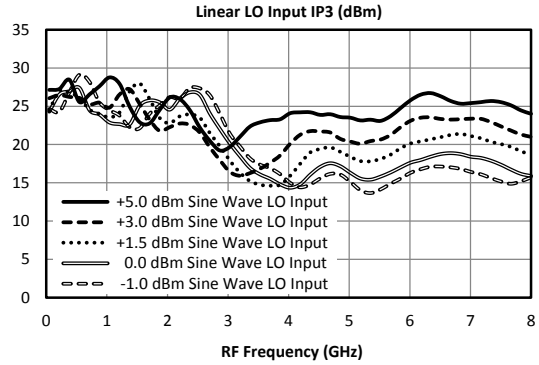
Saturated LO Input IP3 (dBm)

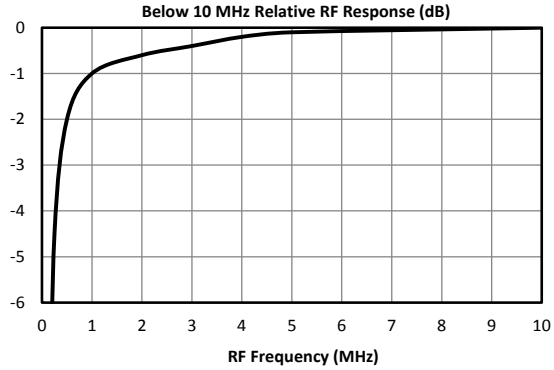


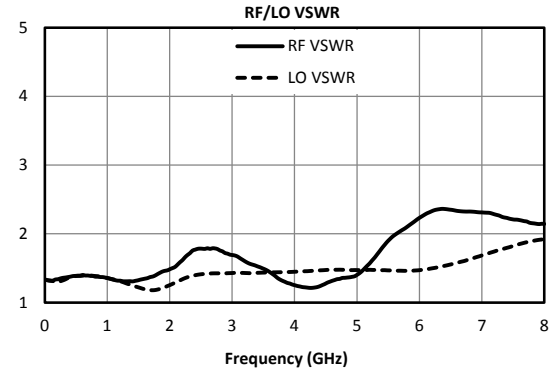
Linear LO Conversion Loss (dB)[1-3]

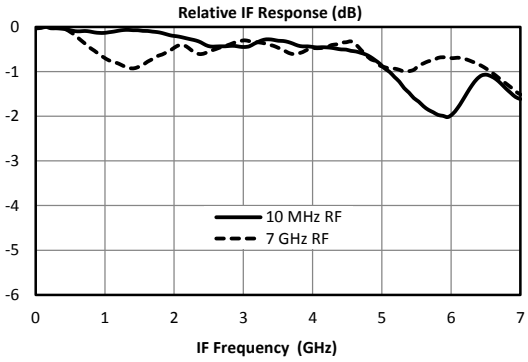


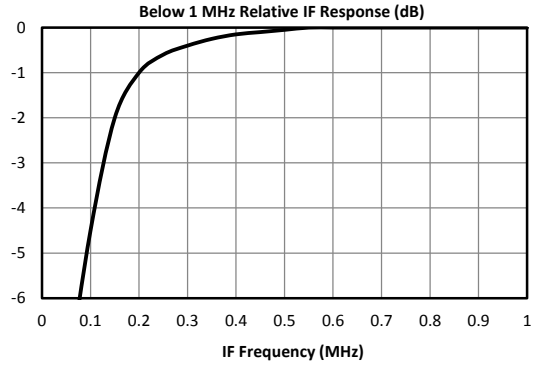
Linear LO Input IP3 (dBm)







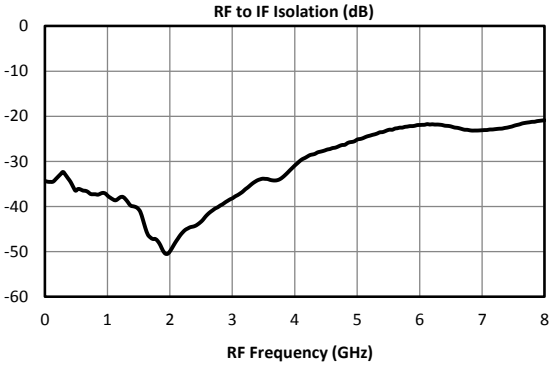


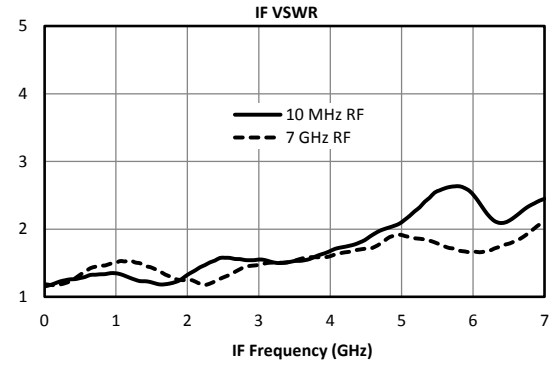


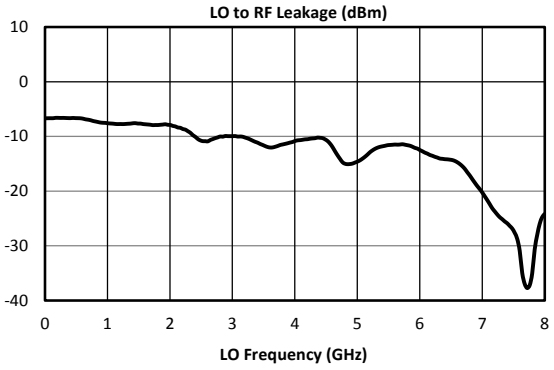
TWO-TONE-TERMINATOR MIXER/LO AMPLIFIER T3A-07SMG

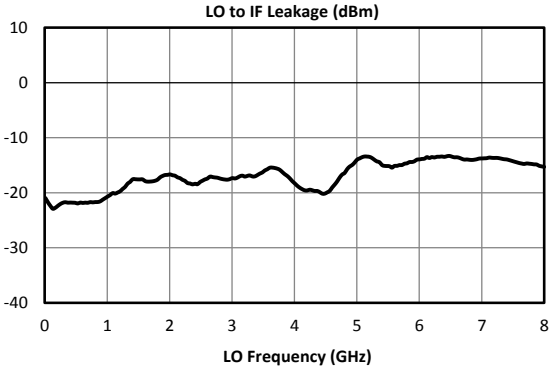
LO/RF 10 MHz to 7 GHz
IF 1 MHz to 4 GHz

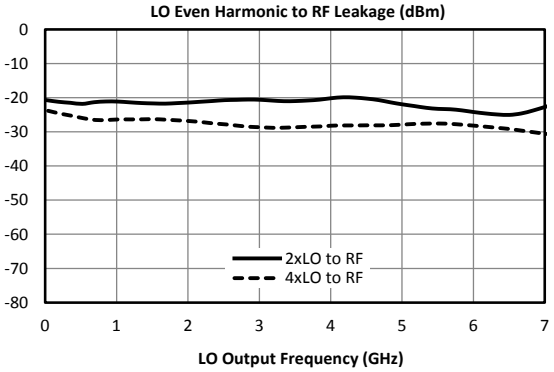
Typical Performance

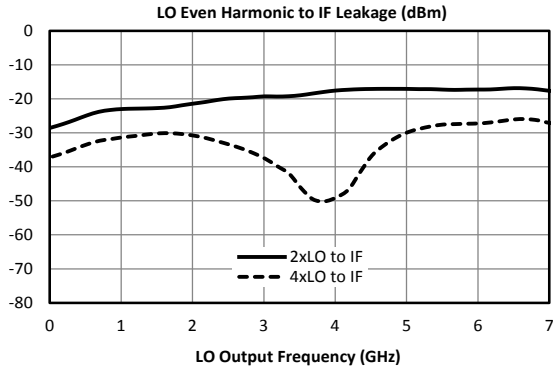


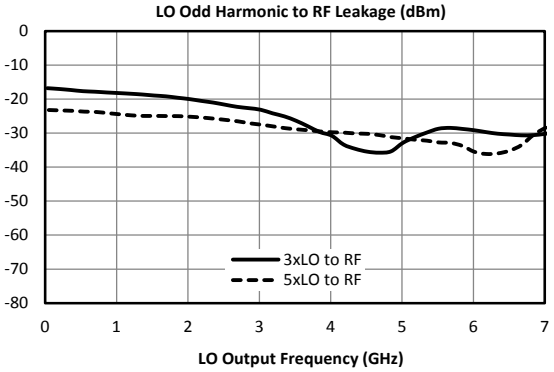


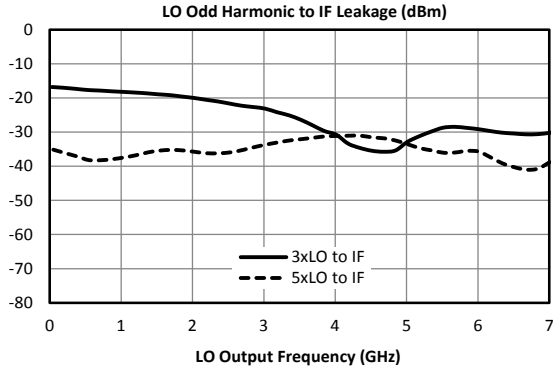






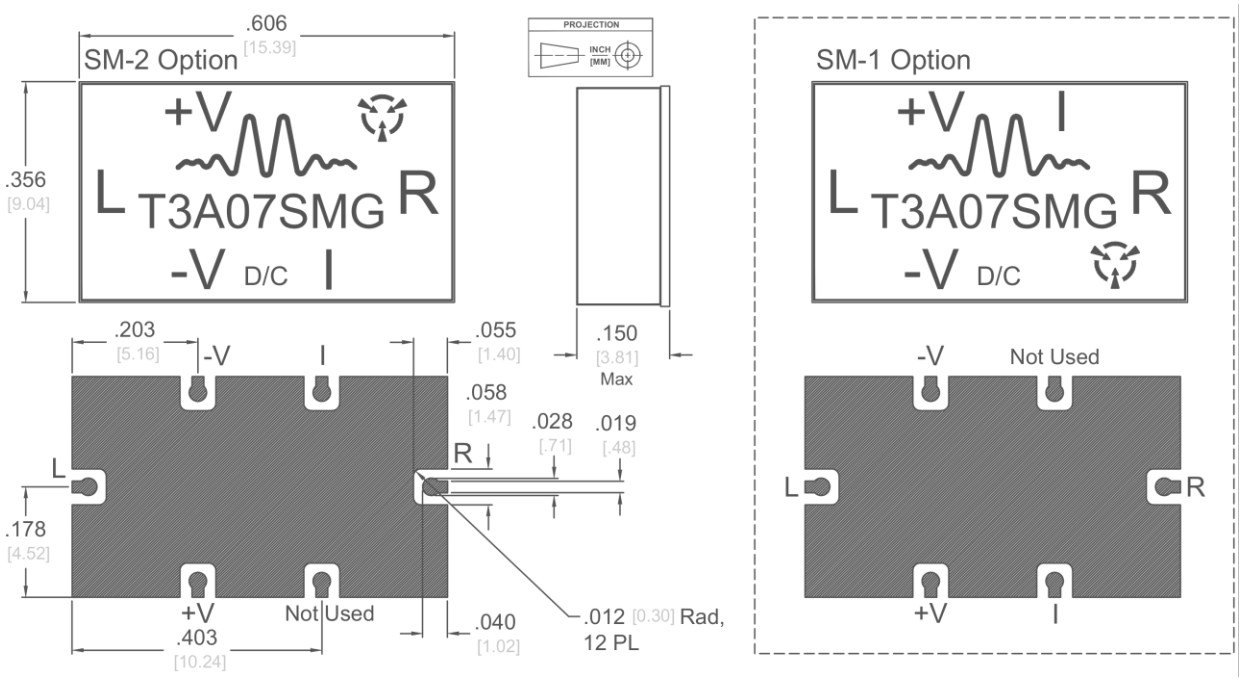






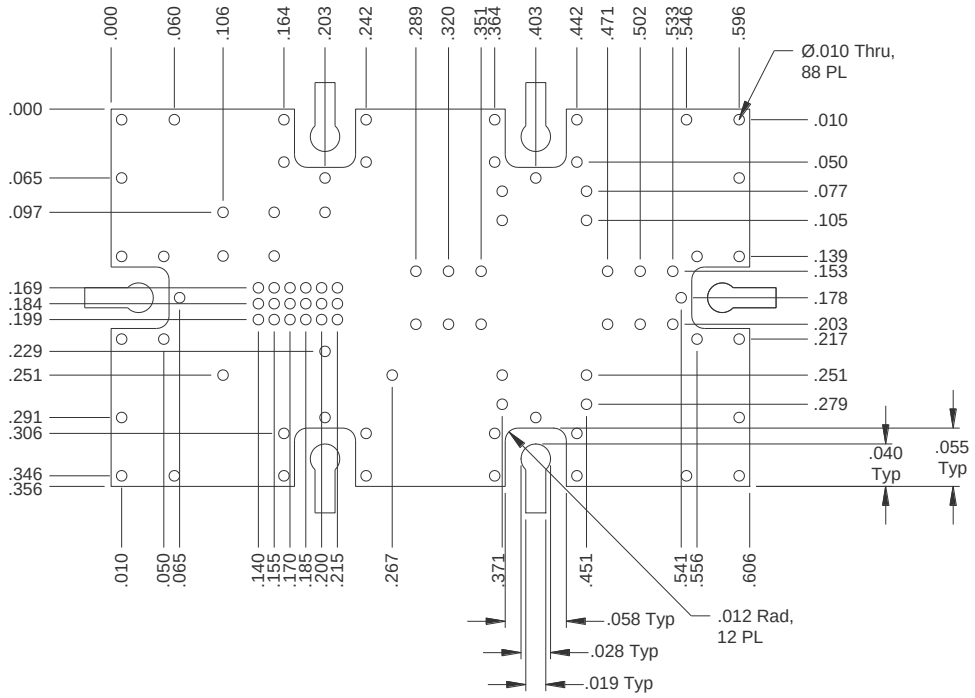
TWO-TONE-TERMINATOR MIXER/LO AMPLIFIER T3A-07SMG

LO/RF 10 MHz to 7 GHz
IF 1 MHz to 4 GHz



I/O Connections & Ground Plane Finish is Gold Flash, 5 to 10 µ-inches, over Solderable Electroless Nickel, 100-200 µ-inches, over Cu.

Outline Drawing – SMG-2 and SMG-1 Packages



SMG-Package Landing Pattern
Click here for a DXF of the above layout.
Click here for leaded solder reflow. Click here for lead-free solder reflow.

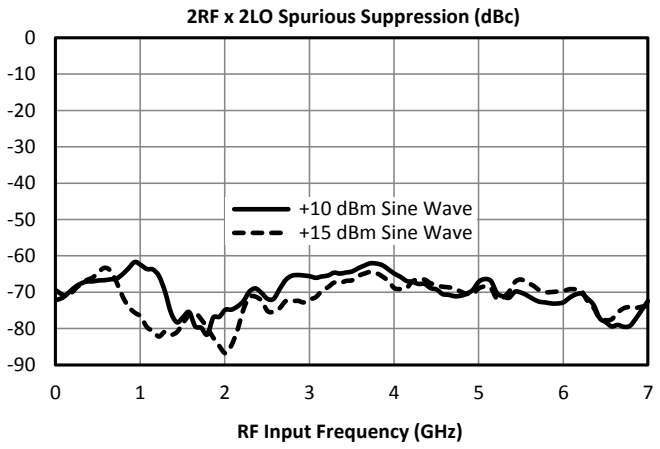
Downconversion Spurious Suppression

Spurious data is taken by selecting RF and LO frequencies (±mLO±nRF) within the 10 MHz to 7 GHz RF/LO bands, which create a 100 MHz IF spurious output. The mixer is swept across the full 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 72 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 82 dBc.

Typical Downconversion Spurious Suppression (dBc): +10 (+15) dBm Sine Wave LO

-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	23 (25)	Reference	32 (21)	10 (10)	37 (20)	17 (16)
2xRF	74 (74)	72 (72)	70 (72)	73 (73)	67 (70)	70 (74)
3xRF	101 (102)	89 (91)	95 (95)	83 (89)	92 (96)	82 (89)
4xRF	>110	>110	>110	>110	>110	>110
5xRF	>120	>120	>120	>120	>120	>120

A sample downconversion spurious sweep is shown below. An LO 100 MHz higher than the RF is used to create a 100 MHz reference IF. A second LO is used to create a 2x2 spurious IF, also at 100 MHz (50 MHz fundamental IF). The difference between these two output levels is the spurious suppression in dBc. The mean value across the full 10 MHz to 7 GHz RF input band is the number shown in the table above.



Downconversion 2RFx2LO Spurious Data Example:

RF Input: 10 MHz to 7.0 GHz @ -10 dBm
LO for Reference: 110 MHz to 7.1 GHz
LO for Spurious: 60 MHz to 7.05 GHz
IF Output: 100 MHz

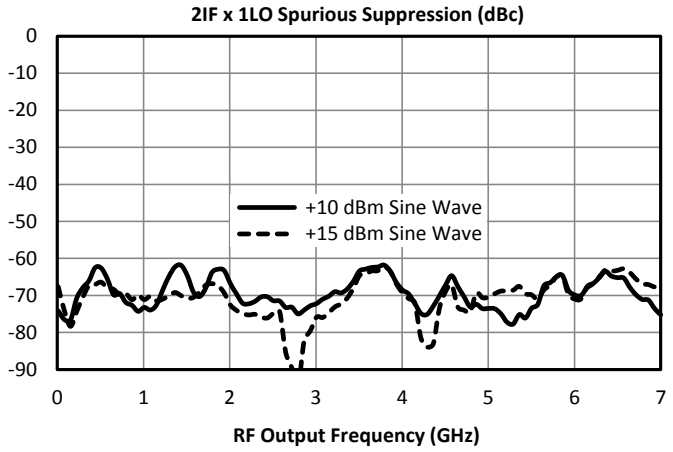
Upconversion Spurious Suppression

Spurious data is taken by mixing a 100 MHz IF with LO frequencies (±mLO±nIF), which creates an RF within the 10 MHz to 7 GHz RF band. The mixer is swept across the full 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 69 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 79 dBc.

Typical Upconversion Spurious Suppression (dBc): +10 (+15) dBm Sine Wave LO

-10 dBm RF Input	0xLO	1xLO	2xLO	3xLO	4xLO	5xLO
0xIF	----------	See LO to RF Isolation and LO Harmonic to RF Isolation Plots (Page 3)				
1xIF	27 (29)	Reference	29 (21)	11 (10)	34 (21)	17 (16)
2xIF	74 (78)	69 (71)	70 (75)	66 (71)	68 (74)	66 (72)
3xIF	102 (103)	86 (92)	95 (98)	82 (91)	94 (96)	81 (89)
4xIF	>110	>110	>110	>110	>110	>110
5xIF	>120	>120	>120	>120	>120	>120

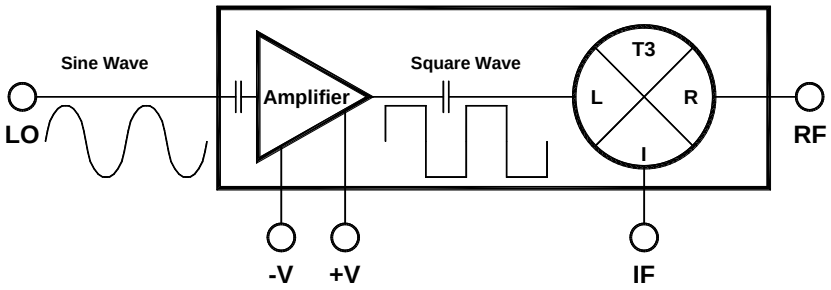
A sample upconversion spurious sweep is shown below. A 100 MHz reference IF input is used to create an RF output that is 100 MHz below the LO input (LO-IF=RF). A second LO (100 MHz higher) is combined with the same 100 MHz IF input (LO-2xIF=RF) to create the same 10 MHz to 7 GHz RF output band. The difference between these two output levels is the spurious suppression in dBc. The mean value across the full RF output band is the number shown in the table above.



Upconversion 2IF x 1LO Spurious Data Example:

IF Input: 100 MHz @ -10 dBm
LO for Reference: 110 MHz to 7.1 GHz
LO for Spurious: 210 MHz to 7.2 GHz
RF Output: 10 MHz to 7.0 GHz

LO/RF 10 MHz to 7 GHz
IF 1 MHz to 4 GHz



Port	Description	DC Interface Schematic
LO	The LO port is DC blocked and AC matched to 50 Ohms from 10 MHz to 7 GHz.	LO ⊣⊢ 1 uF
RF	The RF port is DC short to ground and AC matched to 50 Ohms from 10 MHz to 7 GHz. Blocking capacitor is optional.	RF
IF	The IF port is DC blocked and AC matched to 50 Ohms from 1 MHz to 4 GHz.	IF ⊣⊢ 2 uF

Absolute Maximum Ratings	
Parameter	**Maximum Rating**
RF DC Current	1 Amp
LO DC Current	N/A
RF Power Handling	+25 dBm
LO Power Handling	+17 dBm
Operating Temperature	-30ºC to +70ºC
Storage Temperature	-65ºC to +125ºC
ESD Sensitivity (HBM)	Class 0

DATA SHEET NOTES:

1. Mixer Conversion Loss Plot IF frequency is 100 MHz.
2. Mixer Noise Figure typically measures within 0.5 dB of conversion loss for IF frequencies greater than 5 MHz .
3. Conversion Loss typically degrades less than 0.5 dB at +100°C and improves less than 0.5 dB at -55°C.
4. Unless otherwise specified, data is taken with +10 dBm LO, 5.0V Positive Bias, -0.2 Negative Bias.
5. Specifications are subject to change without notice. Contact Marki Microwave for the most recent specifications and data sheets.
6. Catalog mixer circuits are continually improved. Configuration control requires custom mixer model numbers and specifications.

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