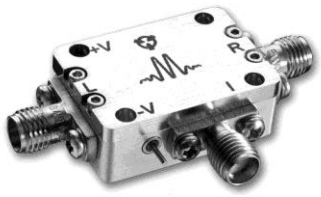
TWO-TONE-TERMINATOR MIXER/LO-AMPLIFIER T3A-07PA

The T3A-07PA is a versatile, robust, and broadband Two-Tone-Terminator mixer integrated with a sub 10 ps risetime square wave amplifier. The T3A-07PA employs the most sophisticated mixer on the market today and offers unparalleled performance when compared to all other mixer technologies. The T3A-07PA delivers exceptional IMD suppression with low conversion loss.



Features

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

Electrical Specifications - Specifications guaranteed from 0 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 8.0	9.0 10.5
LO Drive Level (Square Wave)				+10		+15
LO Leakage (Sine Wave) LO-RF LO-IF	 .01-7 .01-7	 .01-7 .01-7		0	 See Plots	+10
RF-IF Isolation (dB)	.01-7	.01-7			See Plot	
Input 1 dB Compression (dBm)	.01-7	.01-7			+16	
Input Two-Tone Third Order Intercept Point (dBm)	.01-7	.01-7			See Plot	
Bias Requirements (mA) +5.0 Volts DC (+7 V max) 0 to -0.2 Volts DC					250	 300 0.5

Part Number Options

Model Number	Description
T3A-07PA	Connectorized Package

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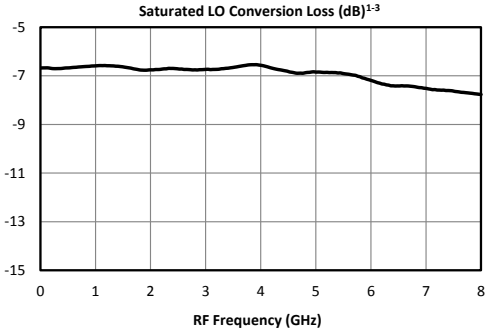
TWO-TONE-TERMINATOR MIXER/LO AMPLIFIER T3A-07PA

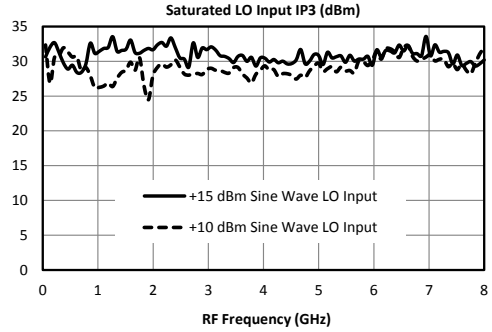
LO/RF 10 MHz to 7 GHz
IF 1 MHz to 4 GHz

Typical Performance

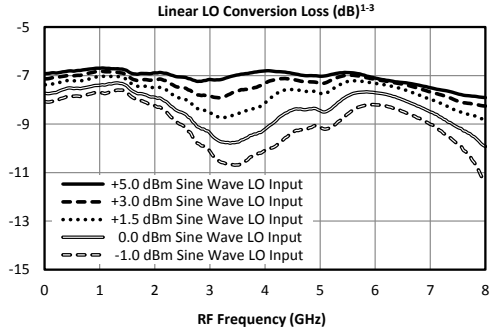
Saturated LO Conversion Loss (dB)[1-3]



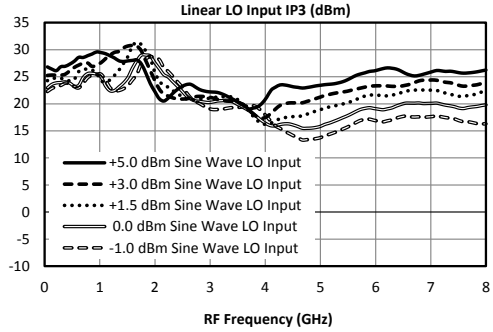
Saturated LO Input IP3 (dBm)



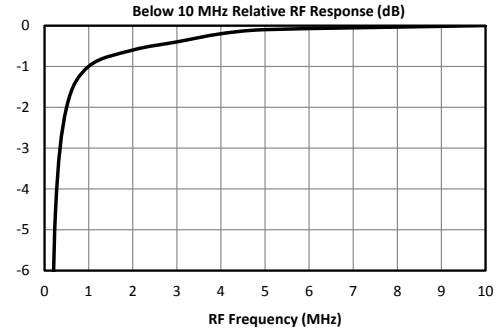
Linear LO Conversion Loss (dB)[1-3]



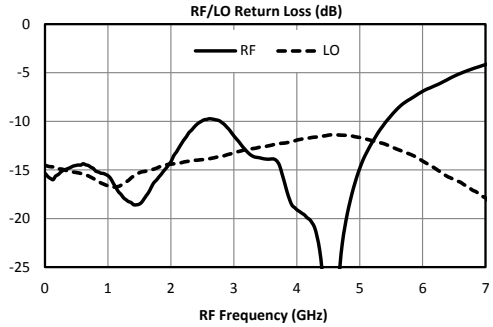
Linear LO Input IP3 (dBm)



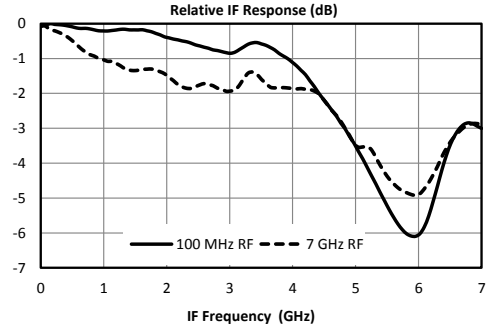
Below 10 MHz Relative RF Response (dB)



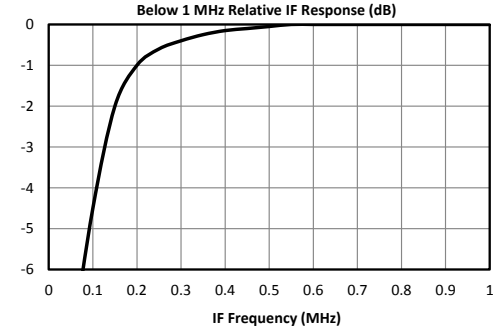
RF/LO Return Loss (dB)



Relative IF Response (dB)



Below 1 MHz Relative IF Response (dB)

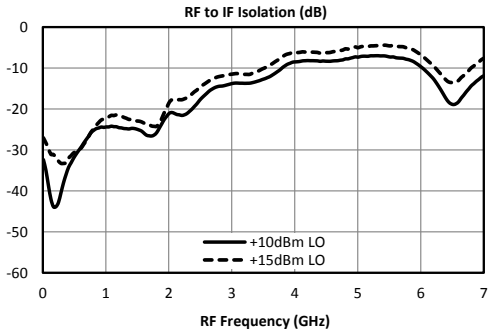


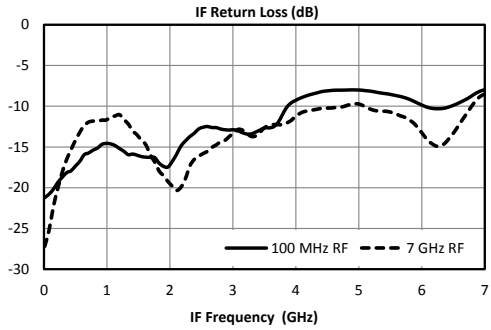
TWO-TONE-TERMINATOR MIXER

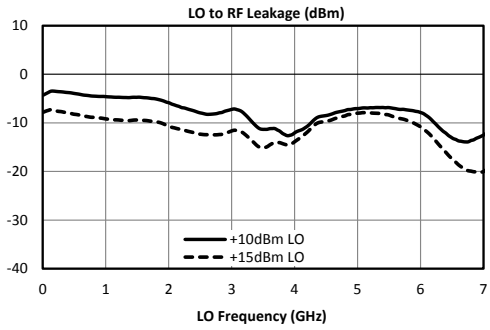
T3A-07PA

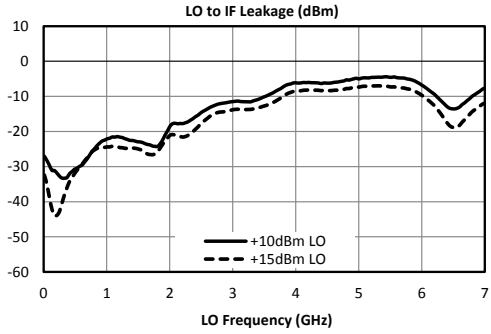
LO/RF 10 MHz to 7 GHz
IF 1 MHz to 4 GHz

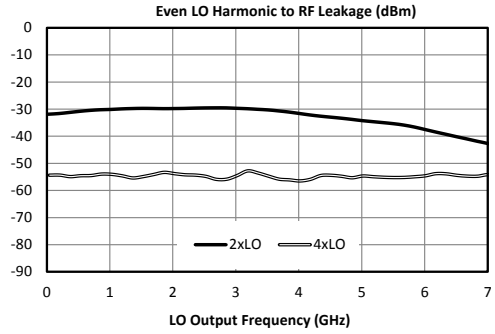
Typical Performance

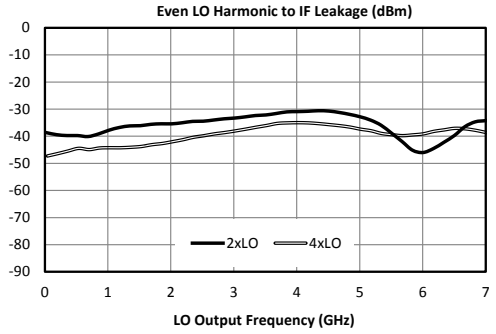


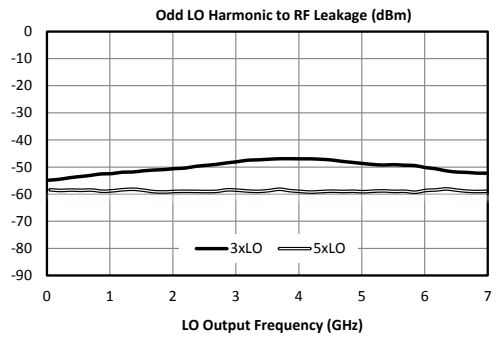


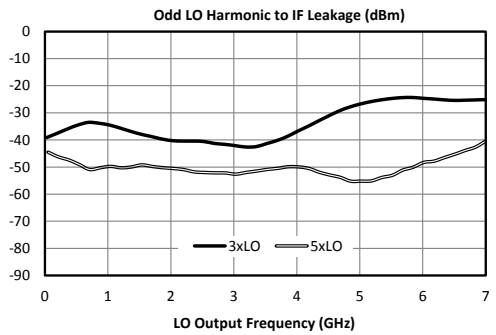








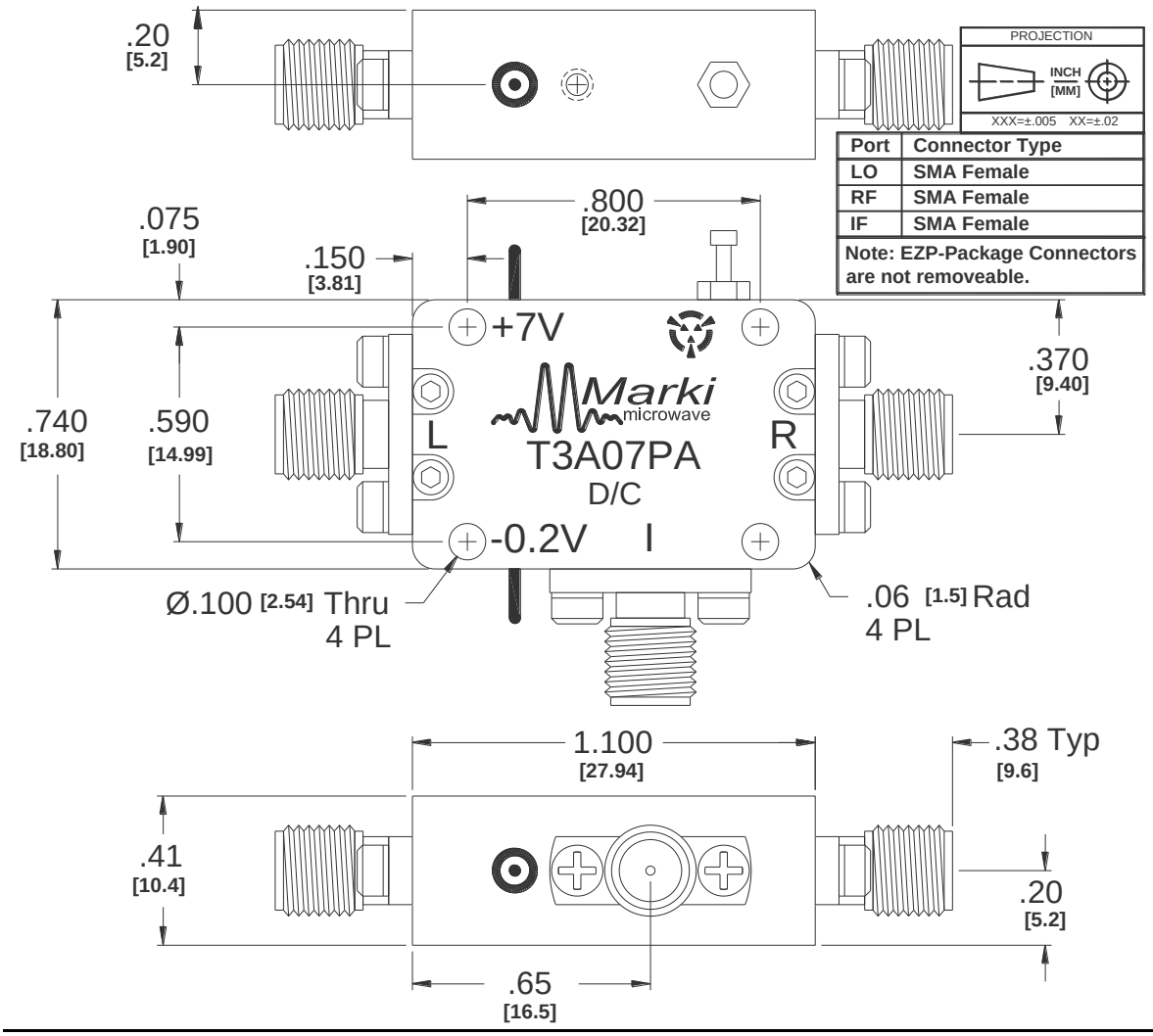




TWO-TONE-TERMINATOR MIXER

T3A-07PA

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



Connectorized Outline Drawing

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

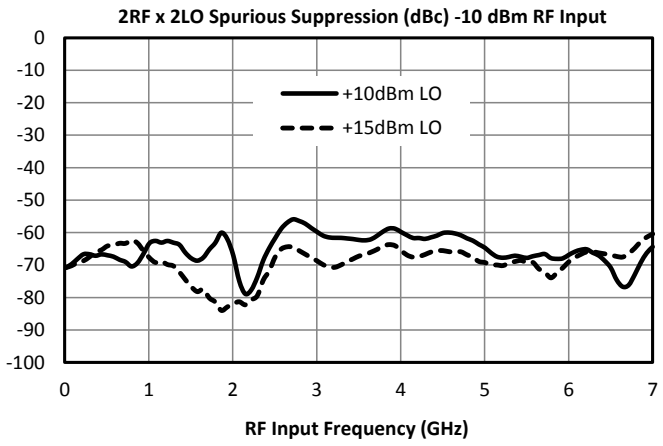
Downconversion Spurious Suppression

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 65 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 75 dBc.

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

-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	24 (18)	Reference	26 (19)	11 (11)	26 (19)	17 (17)
2xRF	70 (72)	67 (67)	65 (69)	69 (75)	64 (73)	67 (69)
3xRF	102 (102)	88 (90)	96 (97)	84 (92)	95 (93)	81 (90)
4xRF	114 (113)	112 (114)	111 (111)	113 (111)	110 (110)	109 (110)
5xRF	125 (124)	123 (121)	122 (122)	122 (120)	122 (121)	123 (121)

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

TWO-TONE-TERMINATOR MIXER

T3A-07PA

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

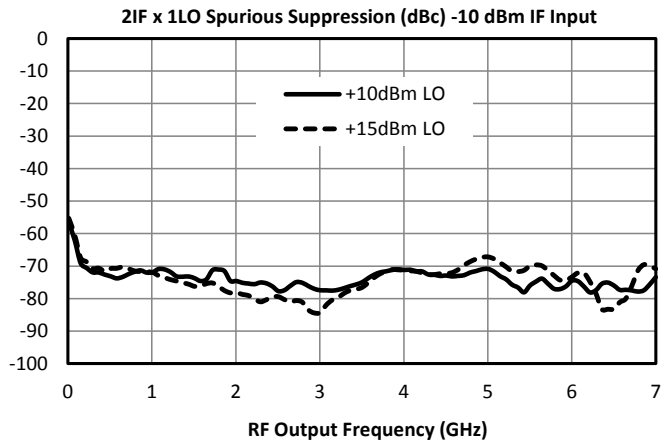
Upconversion Spurious Suppression

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 74 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 84 dBc.

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

-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	31 (24)	Reference	27 (19)	10 (10)	25 (19)	17 (17)
2xIF	70 (71)	74 (74)	75 (77)	76 (77)	78 (78)	79 (77)
3xIF	102 (102)	104 (101)	101 (103)	102 (104)	101 (102)	100 (101)
4xIF	113 (109)	112 (111)	113 (113)	115 (115)	116 (114)	114 (113)
5xIF	121 (122)	125 (124)	125 (122)	122 (126)	125 (122)	124 (121)

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.



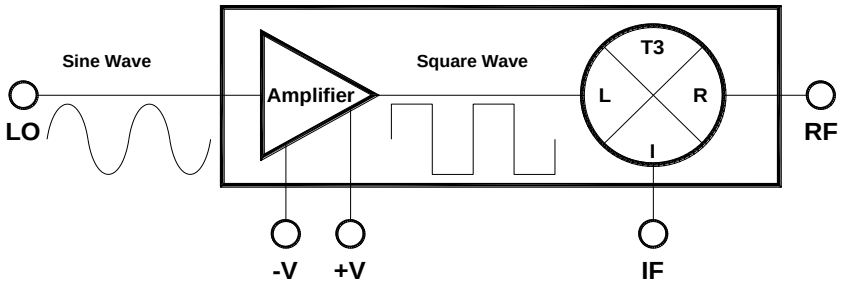
Upconversion 2IF x 1LO
Spurious Data Example:

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

TWO-TONE-TERMINATOR MIXER

T3A-07PA

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.	
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.	
IF	The IF port is DC blocked and AC matched to 50 Ohms from 1 MHz to 4 GHz.	

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	0ºC 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. Specifications are subject to change without notice. Contact Marki Microwave for the most recent specifications and data sheets.
5. Catalog mixer circuits are continually improved. Configuration control requires custom mixer model numbers and specifications.

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