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T3-18GLCTG-1

Two-Tone-Terminator Mixer

DEVICE OVERVIEW

General Description

The T3-18G is a high performance mixer featuring LO/RF from 10 MHz to 18 GHz and IF from 1 MHz to 10 GHz. As with all T3 mixers, this mixer offers unparalleled nonlinear performance in terms of IIP3, P1dB, and spurious performance with a flexible LO drive requirement from +15 dBm to +25 dBm. The T3-18G is offered in connectorized, surface mount, and drop-in style packaging, suitable for any type of system level integration. The T3-18G differs from its sister product the T3-18 in that the T3-18G is built using GaAs diodes instead of Si.

Features

- Ultra-Broadband RF, LO, and IF
- Compatible with Sine or Square-Wave LO
- Square-Wave LO delivers Industry-Leading Spurious, IP3, and P_{1dB} Performance

Applications

N/A

Functional Block Diagram

N/A

Part Ordering Options

Part Number	Description	Package	Packing Size	Green Status	Product Lifecycle	Export Classification
<u>T3-18GLCTG-2</u>	Two-Tone-Terminator Mixer	CTG	-		Released	EAR99
T3-18GLCTG-1	Two-Tone-Terminator Mixer	CTG	-	RoHS	Released	EAR99

Table Of Contents

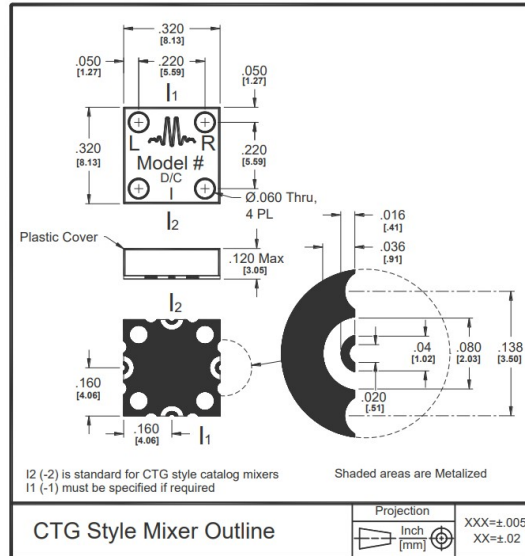
- **Device Overview**
 - General Description
 - Features
 - Applications
- **Port Configuration and Functions**
 - Port Diagram
 - Port Functions
- **Revision History**
- **Specifications**
 - Absolute Maximum Ratings
 - Package Information
 - Recommended Operating Conditions
 - Electrical Specifications
 - Typical Performance Plots
 - Spur Tables
- **Mechanical Data**
 - Outline Drawing
- **Footprint Image**
- **Notes**

Revision History

Revision Code	Revision Date	Comment
-	2020-07-07	Initial Release

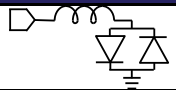
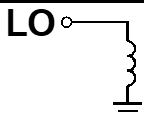
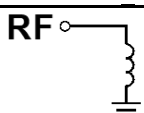
Port Configuration and Functions

Port Diagram



CTG Substrate material is 10-mil thick FR4, 1.0 Oz Electrodeposited Cu.
I/O Pads & Ground Finish is Gold Flash, 5 to 10 μ -inches, over Solderable Electroless Nickel, 100-200 μ -inches, over Cu.

Port Functions

Port	Function	Description	Equivalent Circuit for Package
IF	IF	The IF port is DC blocked and AC matched to 50 Ohms from 1 MHz to 10 GHz.	
LO	LO	The LO port is DC short to ground and AC matched to 50 Ohms from 10 MHz to 18 GHz. Blocking capacitor is optional.	
RF	RF	The RF port is DC short to ground and AC matched to 50 Ohms from 10 MHz to 18 GHz. Blocking capacitor is optional.	

Specifications

Absolute Maximum Ratings

Parameter	Maximum Rating	Unit
LO DC Current	1	Amp
Maximum Operating Temperature	100	°C
Maximum Storage Temperature	125	°C
Minimum Operating Temperature	-55	°C
Minimum Storage Temperature	-65	°C
RF DC Current	1	Amp
RF Power Handling (RF+LO)	25	dBm

Package Information

Parameter	Details	Rating
ESD	250 to < 500 Volts	HBM Class 1A
Dimensions	-	8.13 x 8.13 mm

Recommended Operating Conditions

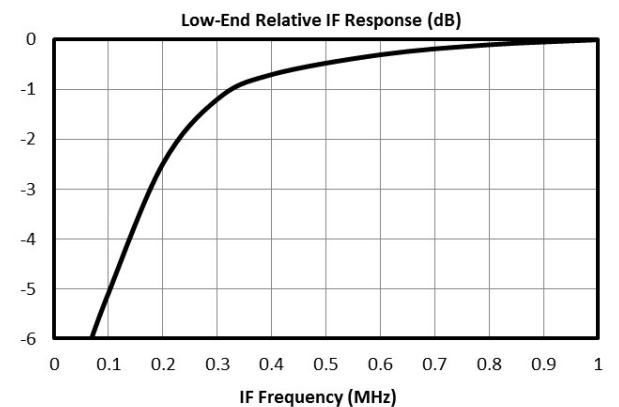
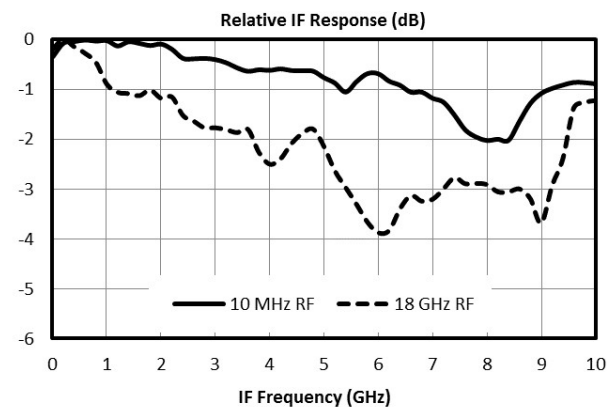
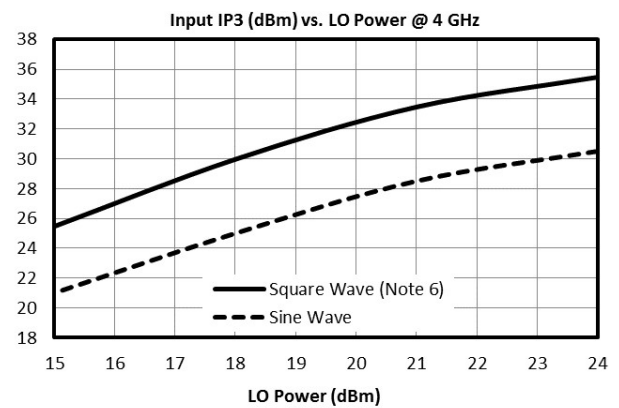
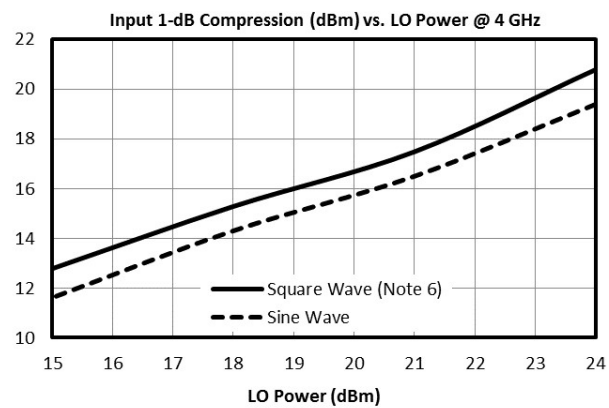
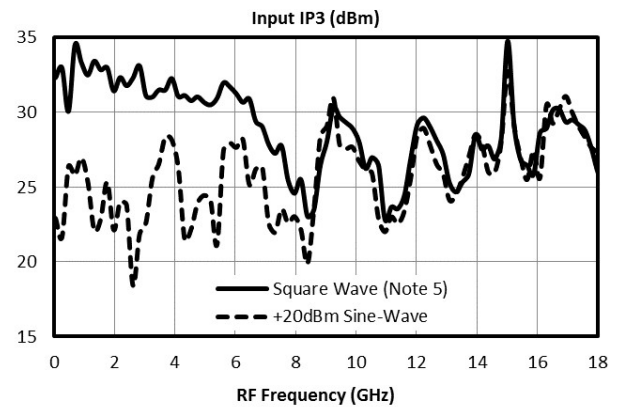
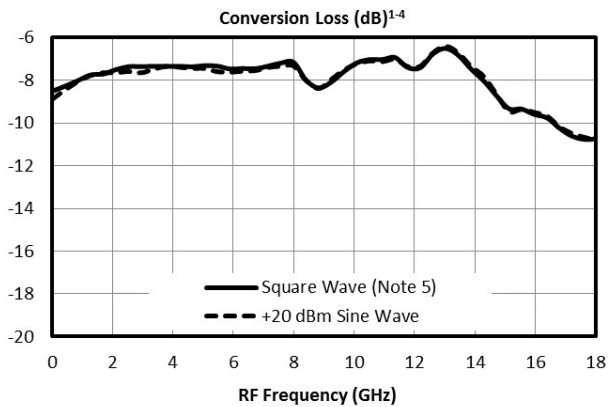
Parameter	Min	Nominal	Max	Unit
LO Input Power	15	-	25	dBm

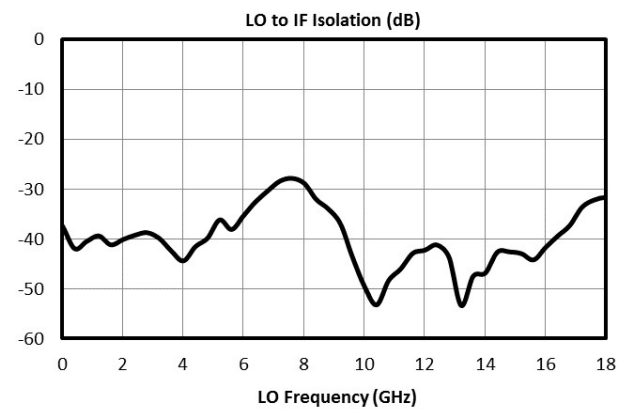
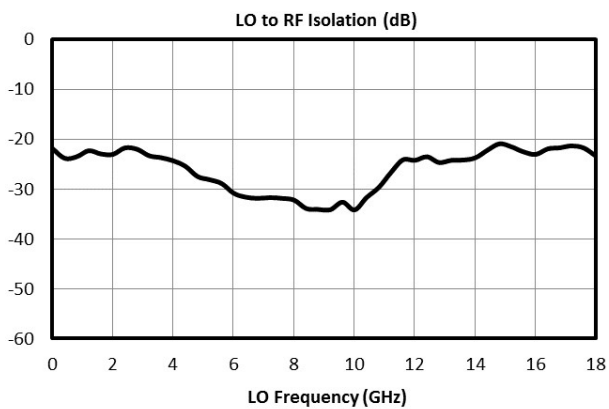
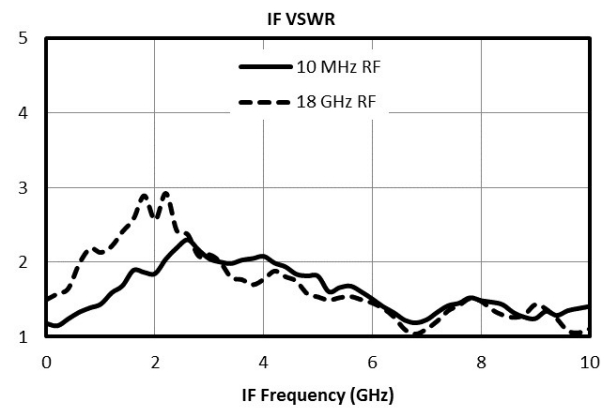
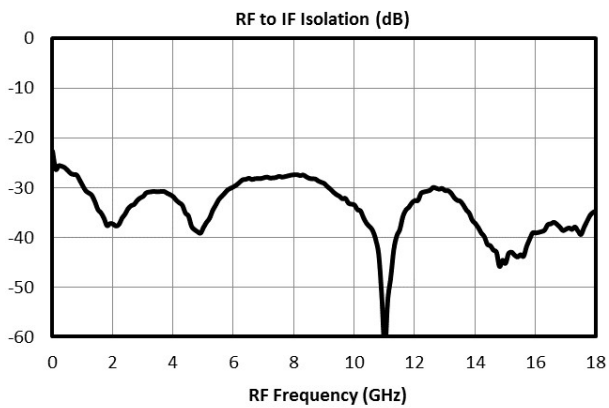
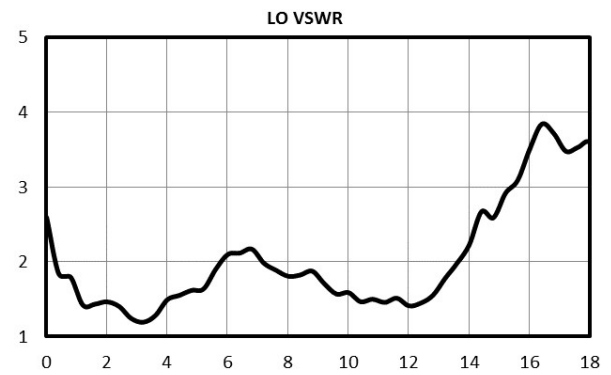
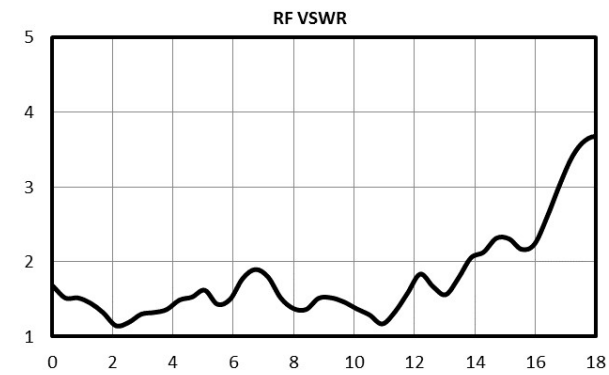
Electrical Specifications

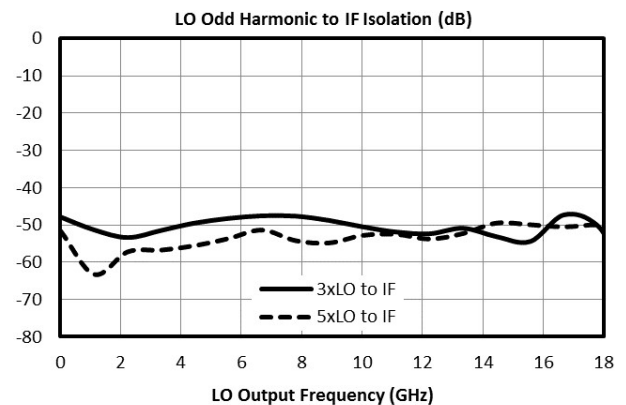
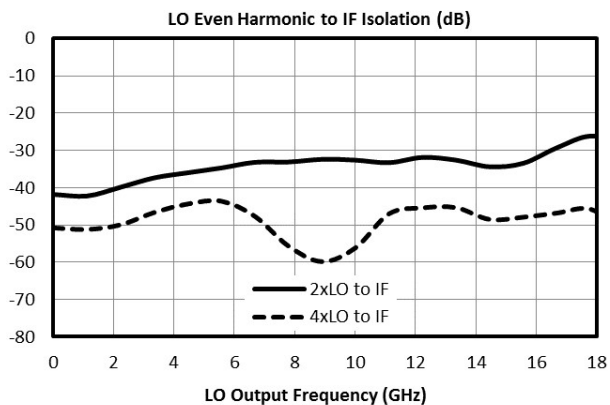
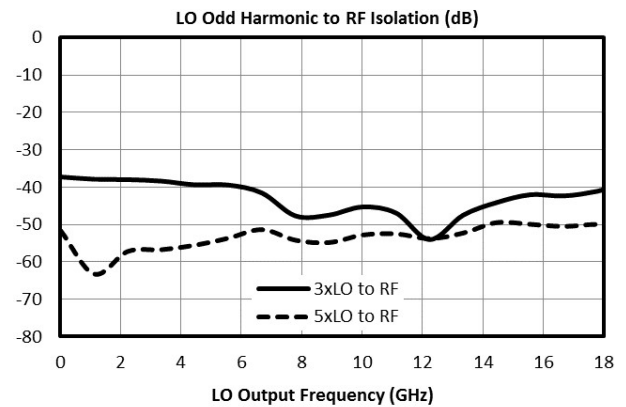
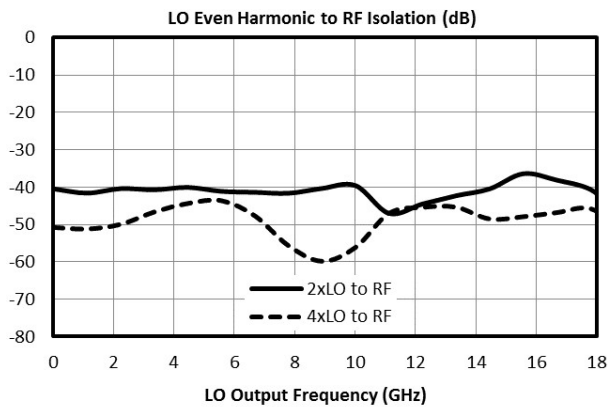
Specifications guaranteed from -55 to +100°C, measured in a 50Ω system.

Parameter	Test Conditions	Min	Typ	Max	Unit
RF Frequency Range	-	0.01	-	18	GHz
LO Frequency Range	-	0.01	-	18	GHz
Conversion Loss	LO/RF=.01-18GHz IF=.001-2GHz	-	8	12	dB
Conversion Loss	LO/RF=.01-18GHz IF=.001-5GHz	-	9	13.5	dB
Isolation, LO to RF	-	-	25	-	dB
Input IP3	-	-	28	-	dBm
IF Frequency Range	-	0.001	-	10	GHz

Typical Performance Plots







Spur Table

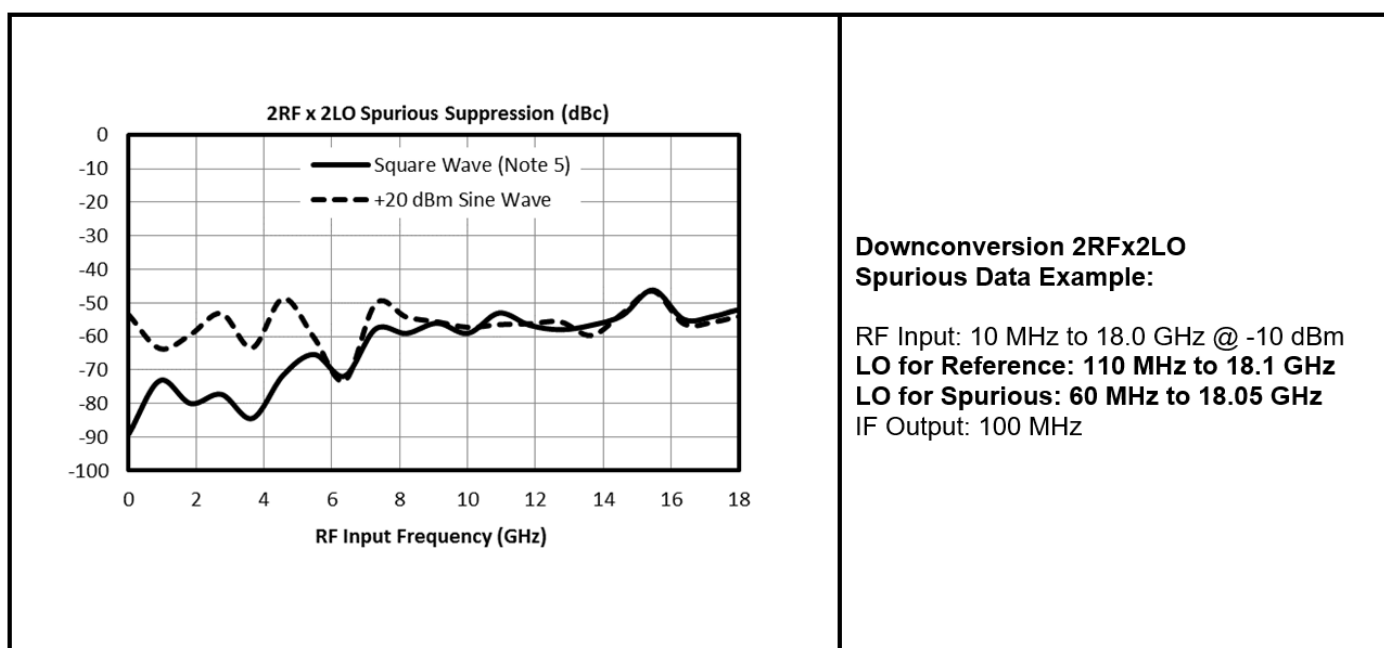
Downconversion Spurious Suppression

Spurious data is taken by selecting RF and LO frequencies (+mLO+nRF) within the 10 MHz to 18 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 63 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 73 dBc.

Typical Downconversion Spurious Suppression (dBc): Square Wave (Sine Wave) LO⁵

-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	20 (23)	Reference	23 (32)	10 (11)	23 (34)	15 (19)
2xRF	66 (64)	69 (65)	63 (56)	67 (63)	67 (55)	72 (60)
3xRF	100 (96)	88 (80)	92 (90)	85 (78)	92 (89)	90 (75)
4xRF	>110	>110	>110	>110	>110	>110
5xRF	>120	>120	>120	>120	>120	>120

A sample downconversion spurious sweep is shown below. An LO which is 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 18 GHz RF input band is the number shown in the table above.

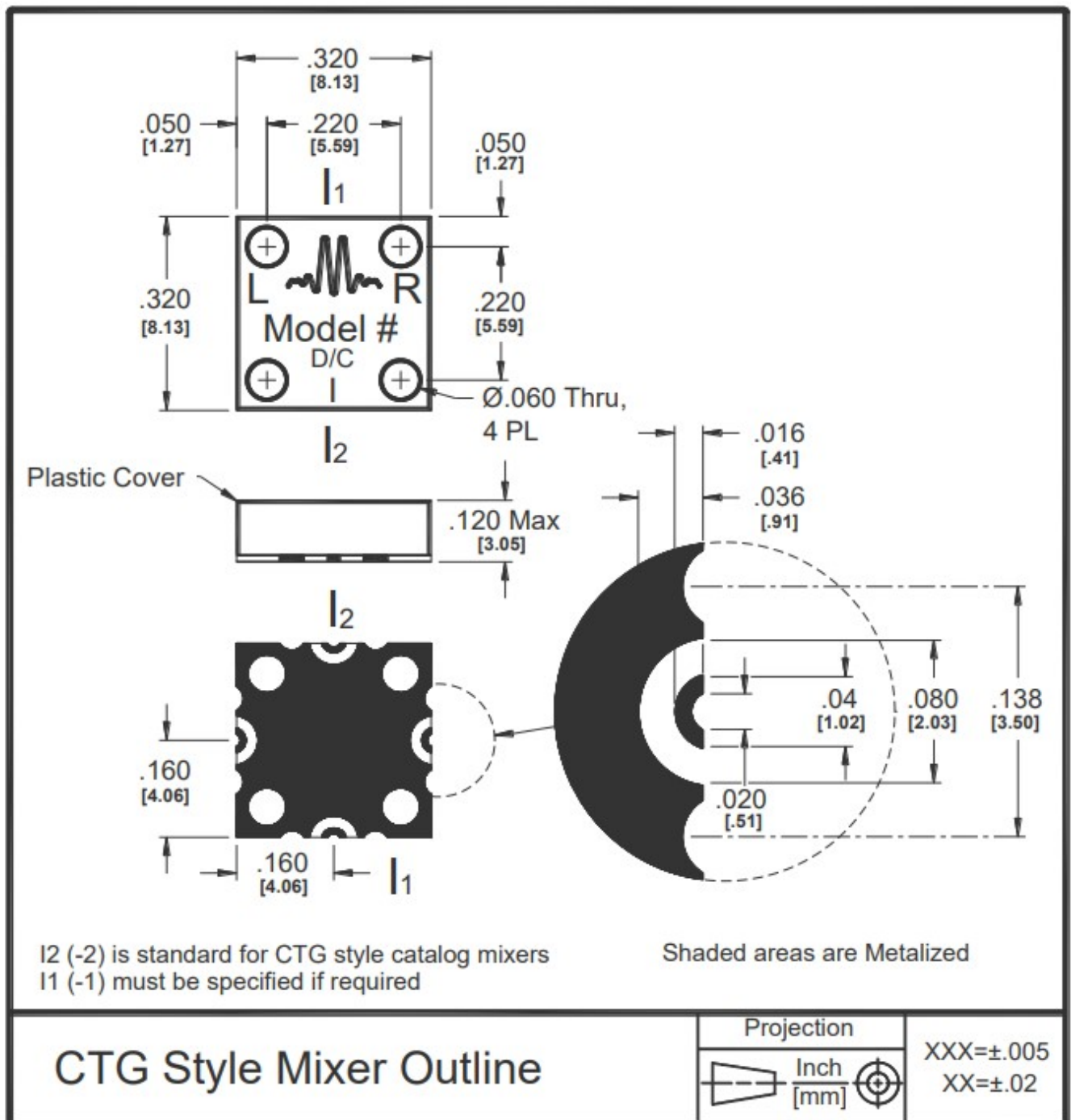


Upconversion Spurious Suppression

Spurious data is taken by mixing a 100 MHz IF with LO frequencies (+mLO+nIF), which creates an RF within the 10 MHz to 18 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 power levels by (n-1), where “n” is the IF spur order.

Mechanical Data

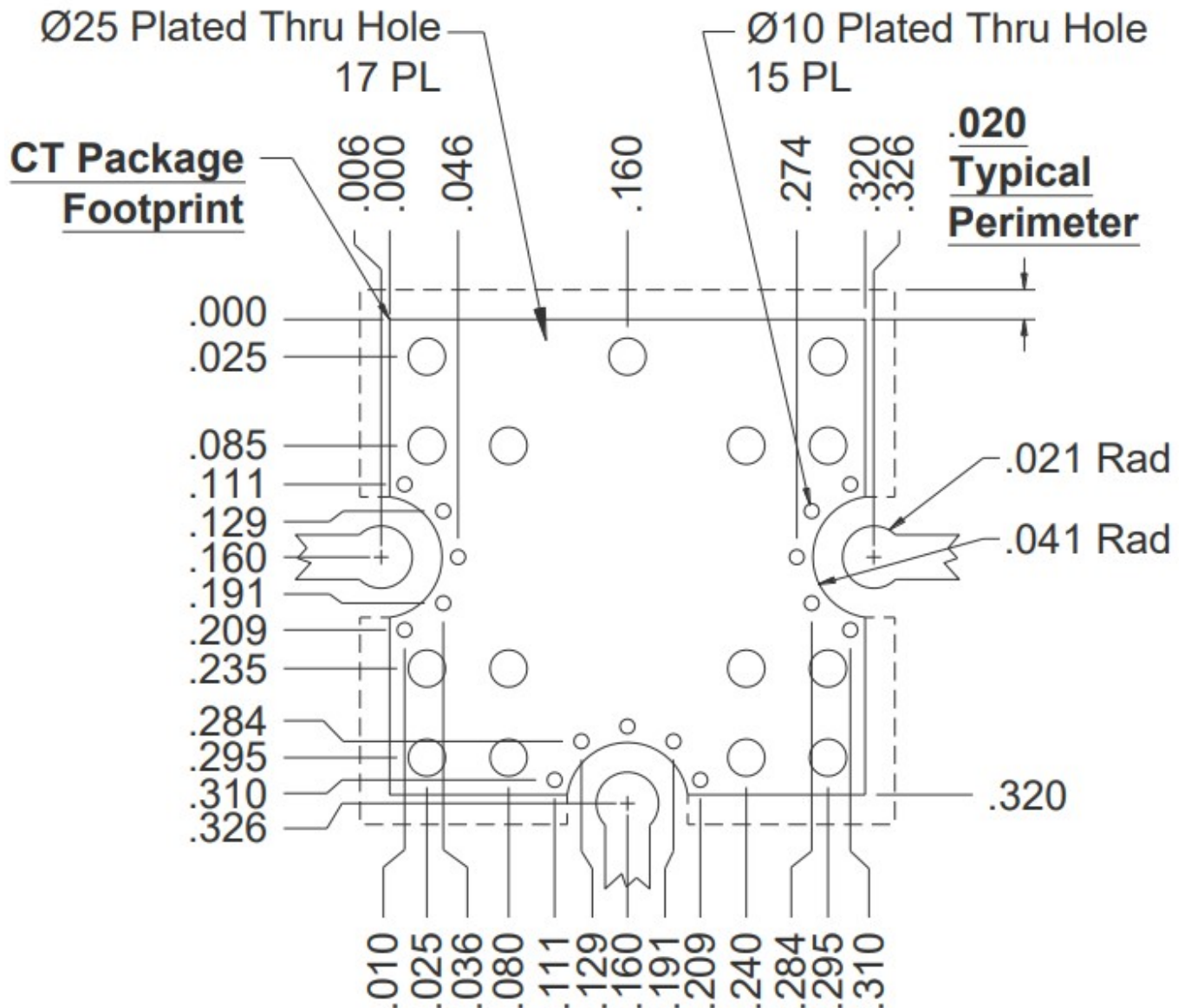
Outline Drawing



CTG Substrate material is 10-mil thick FR4, 1.0 Oz Electrodeposited Cu.

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

Footprint Image



Notes

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 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. Square Wave Drive created with a chain to two ADM1-0026SM, biased at + 7/-0.25 Volts, with a +10 dBm input. Sine Wave data is taken with a +20 dBm LO input.
6. Square Wave Drive created with an ADM1-0026SM, biased at + 7/-0.25 Volts, driving an ADM3-0022PA, biased at +7/+15/-0.25/-0.65V.
7. Specifications are subject to change without notice. Contact Marki Microwave for the most recent specifications and data sheets.
8. Catalog mixer circuits are continually improved. Configuration control requires custom mixer model numbers and specifications.

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