

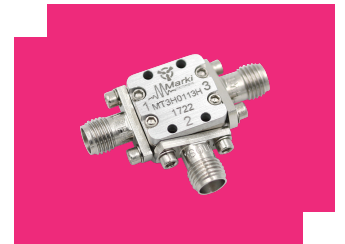
MT3H-0113HS

GaAs MMIC High Dynamic Range Mixer

DEVICE OVERVIEW

General Description

The MT3H-0113H is a triple balanced passive diode mixer offering high dynamic range, low conversion loss, and excellent repeatability. 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 +16 dBm to +24 dBm. RF, LO, and IF ports are all operated single ended due to integrated baluns. The MT3H-0113H is available as a wire bondable chip or an SMA connectorized package. The MT3H-0113H is a superior alternative to Marki Microwave carrier and packaged T3 mixers.



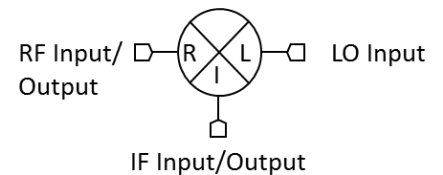
Features

- Broadband, Overlapping RF, LO and IF
- RoHS Compliant
- Square-Wave LO delivers Industry-Leading Spurious, IP3, and P1dB Performance

Applications

N/A

Functional Block Diagram



Part Ordering Options

Part Number	Description	Package	Packing Size	Green Status	Product Lifecycle	Export Classification
MT3H-0113HS	GaAs MMIC High Dynamic Range Mixer	S	-	RoHS	Released	EAR99

Table Of Contents

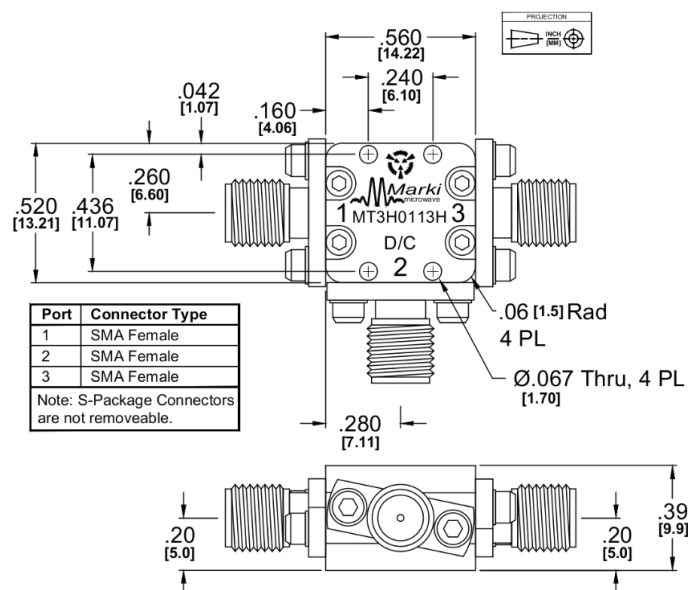
- **Device Overview**
 - General Description
 - Features
 - Applications
 - Functional Block Diagram
- **Port Configuration and Functions**
 - Port Diagram
 - Port Functions
- **Revision History**
- **Specifications**
 - Absolute Maximum Ratings
 - Package Information
 - Recommended Operating Conditions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

Revision History

Revision Code	Revision Date	Comment
-	2017-01-01	Initial Release
A	2019-01-01	Revised square wave LO IP3 plots. End note 5 updated to reflect new test condition.

Port Configuration and Functions

Port Diagram

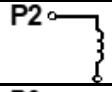
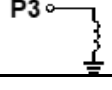


Port Functions

Configuration A

Port	Function	Description	Equivalent Circuit for Package
Port 1	LO	Port 1 is DC short and AC matched to 50 Ω from 0.8 to 13 GHz. Blocking capacitor is optional.	
Port 2	IF	Port 2 is DC open. Blocking capacitor is optional.	
Port 3	RF	Port 3 is DC short and AC matched to 50 Ω from 0.8 to 13 GHz. Blocking capacitor is optional.	

Configuration B

Port	Function	Description	Equivalent Circuit for Package
Port 1	RF	Port 1 is DC short and AC matched to 50 Ω from 0.8 to 13 GHz. Blocking capacitor is optional.	
Port 2	IF	Port 2 is DC open. Blocking capacitor is optional.	
Port 3	LO	Port 3 is DC short and AC matched to 50 Ω from 0.8 to 13 GHz. Blocking capacitor is optional.	

Specifications

Absolute Maximum Ratings

Parameter	Maximum Rating	Unit
Maximum Operating Temperature	100	°C
Maximum Storage Temperature	125	°C
Minimum Operating Temperature	-55	°C
Minimum Storage Temperature	-65	°C
RF Power Handling (RF+LO)	30	dBm

Package Information

Parameter	Details	Rating
Dimensions	-	14.22x13.21mm

Recommended Operating Conditions

Parameter	Min	Nominal	Max	Unit
LO Input Power	16	-	24	dBm

Electrical Specifications

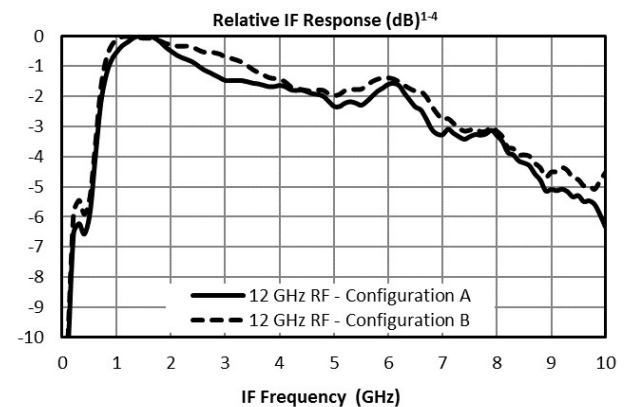
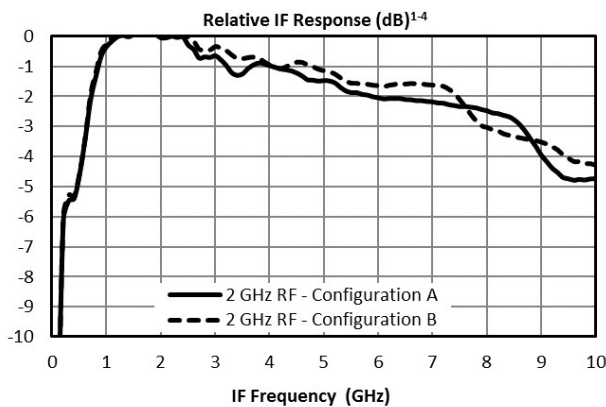
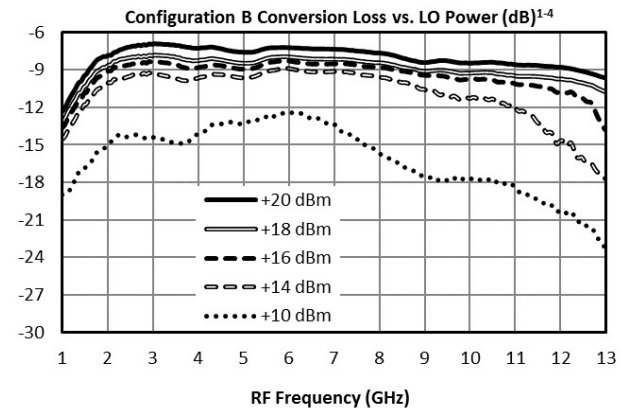
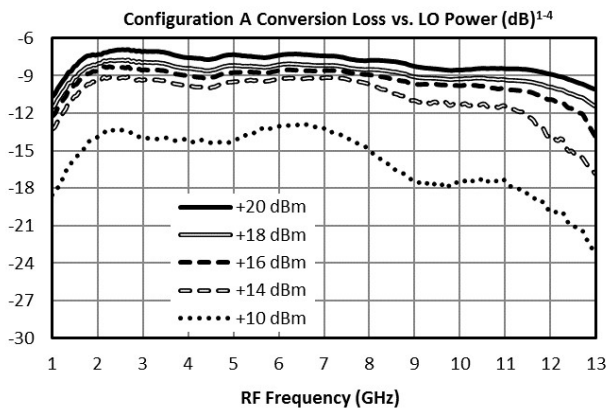
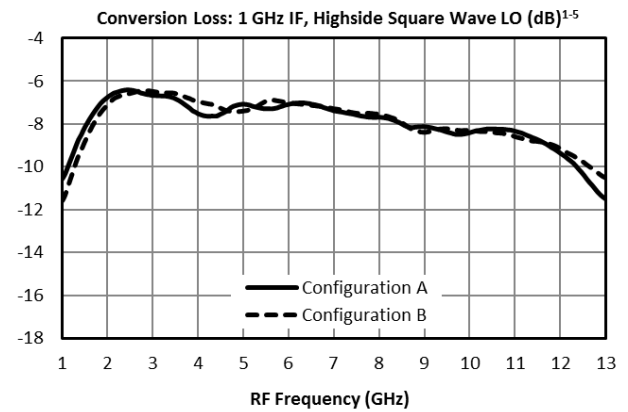
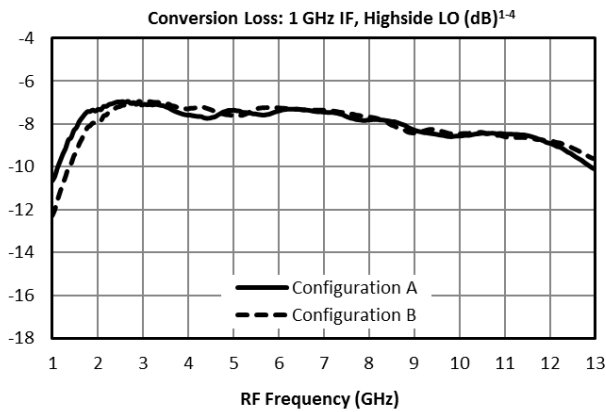
Specifications guaranteed from -55 to +100°C, measured in a 50Ω system. All bare die are 100% DC tested and 100% visually inspected. RF testing is performed on a sample basis to verify conformance to datasheet guaranteed specifications.

Parameter	Port Configuration	Test Conditions	Min	Typ	Max	Unit
RF Frequency Range	A	-	1.5	-	13	GHz
LO Frequency Range	A	-	1.5	-	13	GHz
Conversion Loss ¹	A	LO/RF=1.5-13 GHz IF=0.8-1 GHz LO Drive level=20 dBm	-	8	11	dB
Conversion Loss ²	B	LO/RF=1.5-13 GHz IF=0.8-1 GHz LO Drive level=20 dBm	-	11.5	-	dB
Isolation, LO to RF	-	-	-	37	-	dB
Input IP3 ³	B	LO/RF=1.5-13 GHz IF=0.8-8.5 GHz LO Drive level=16-24 dBm	-	29	-	dBm
Input IP3 ⁴	B	LO/RF=1.5-13 GHz IF=0.8-8.5 GHz LO Drive level=16-24 dBm	-	28	-	dBm
IF Frequency Range	A	-	0.8	-	8.5	GHz

[1][2] Measured Conversion Loss measured at 1 GHz fixed IF.

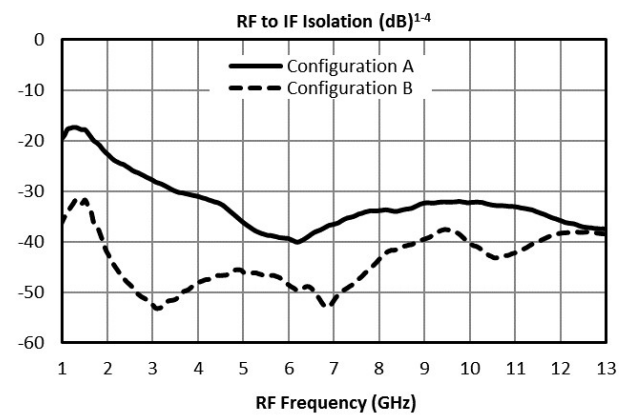
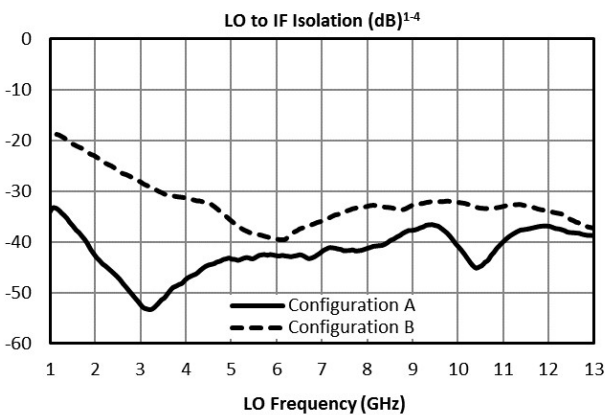
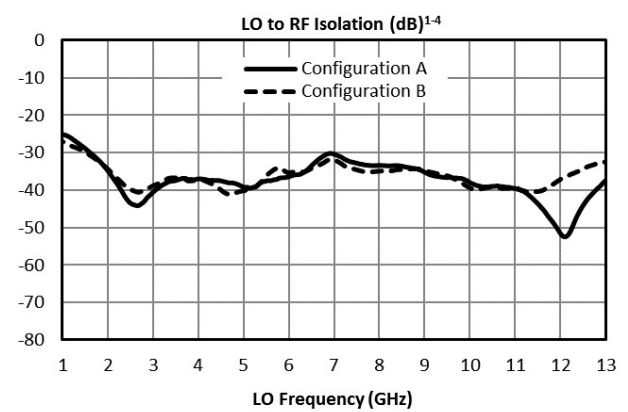
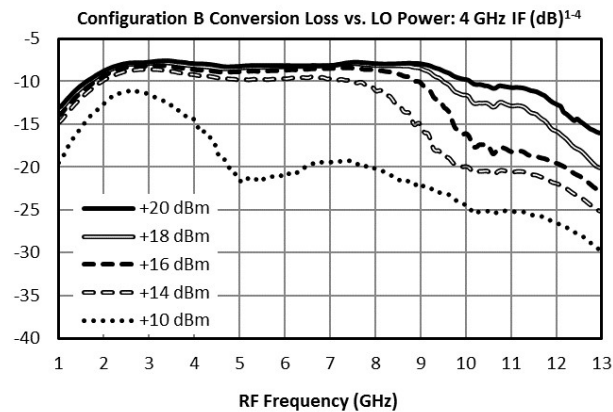
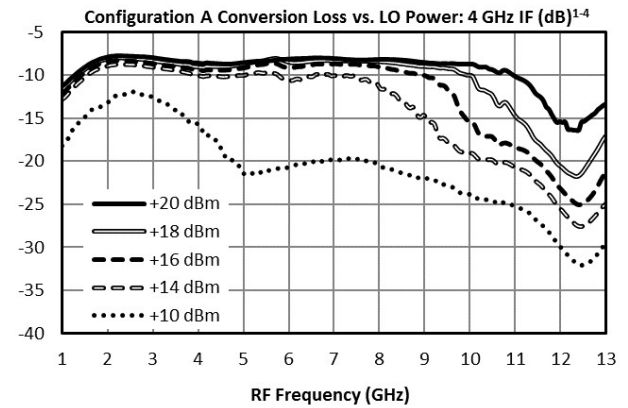
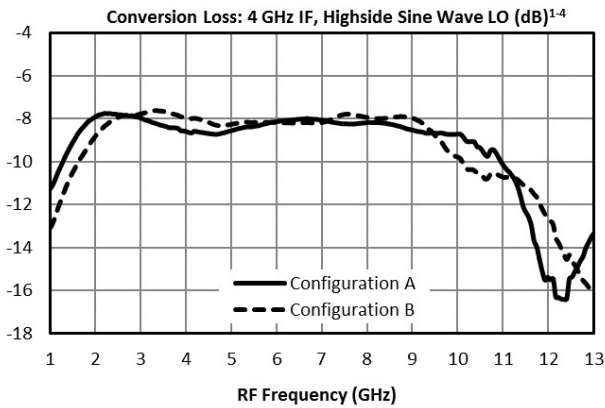
[3][4] IP3 depends on LO drive conditions, see plots for more details.

Typical Performance Plots



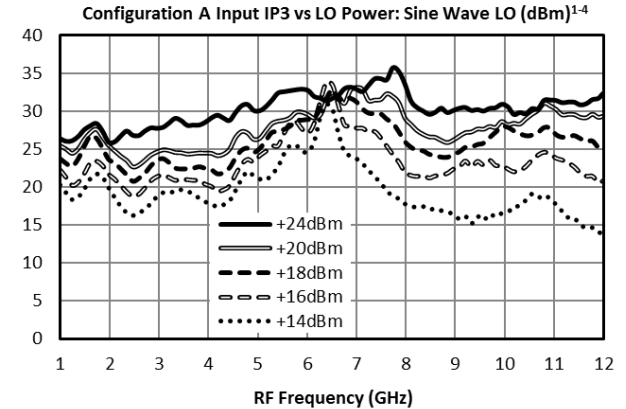
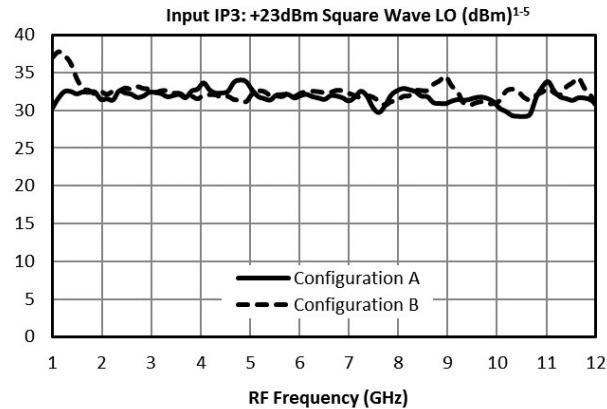
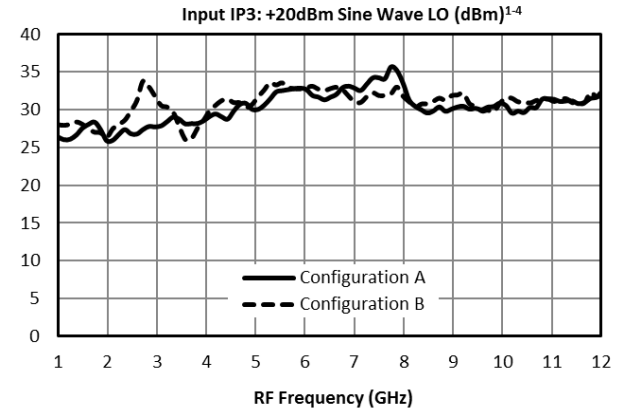
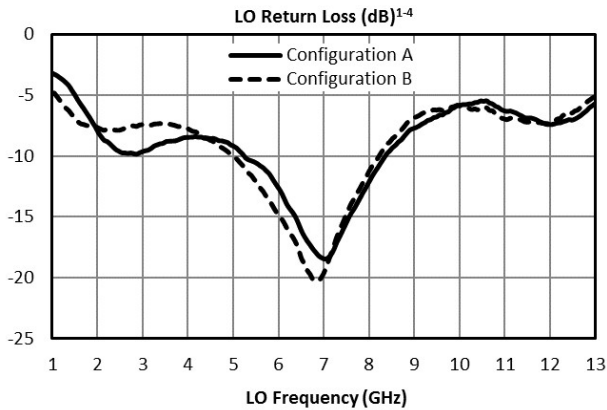
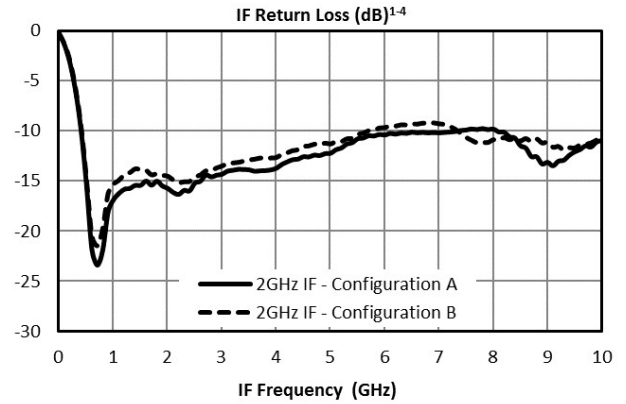
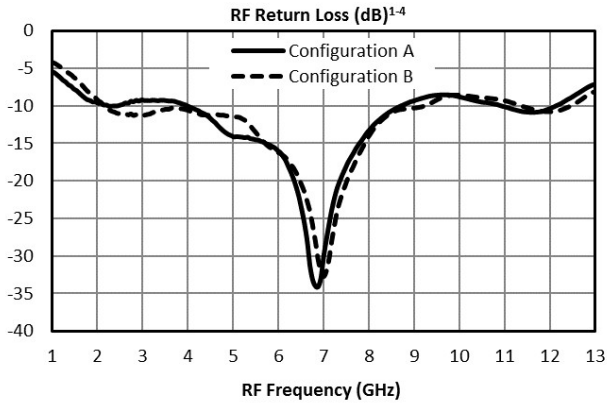
MT3H-0113HS

GaAs MMIC High Dynamic Range Mixer



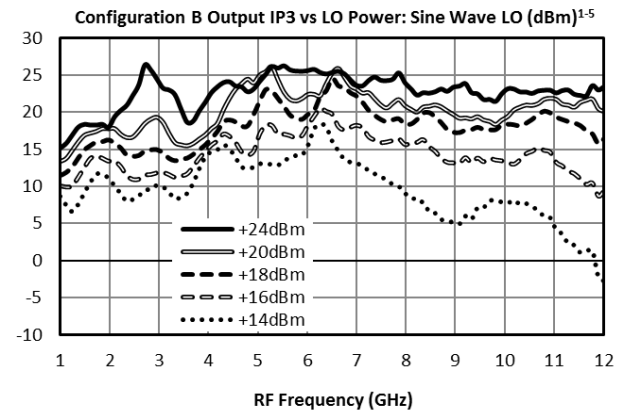
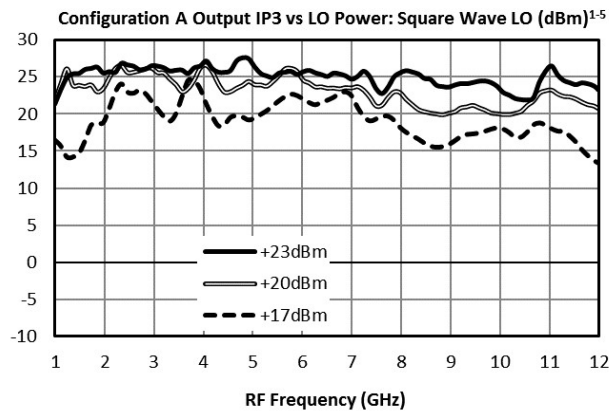
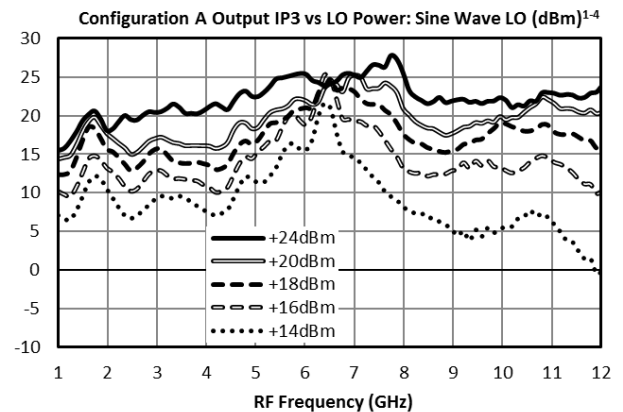
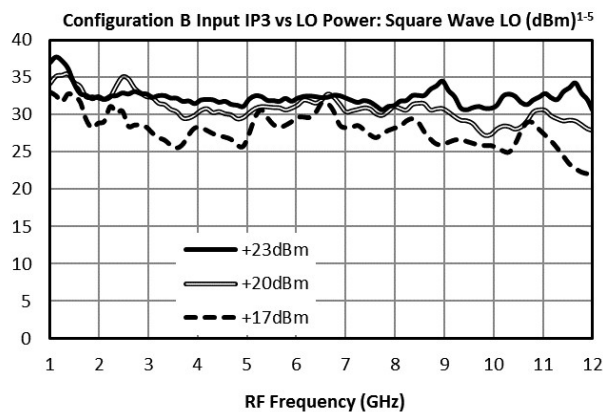
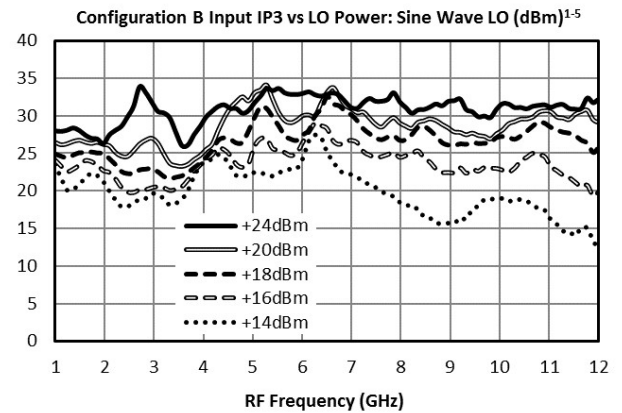
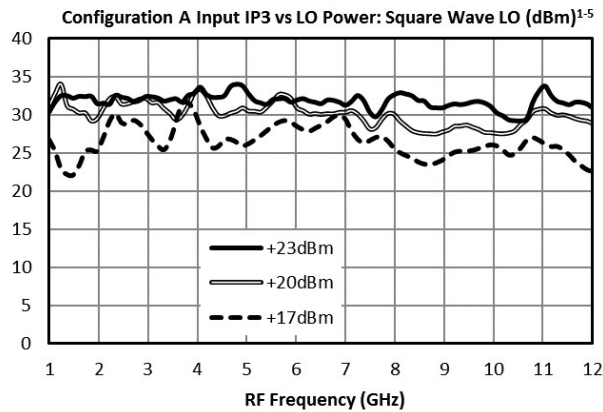
MT3H-0113HS

GaAs MMIC High Dynamic Range Mixer



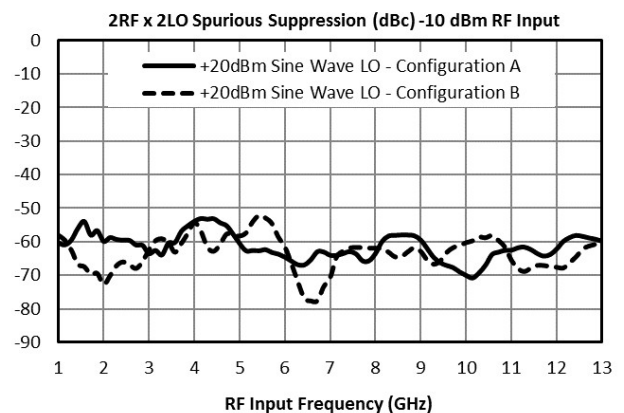
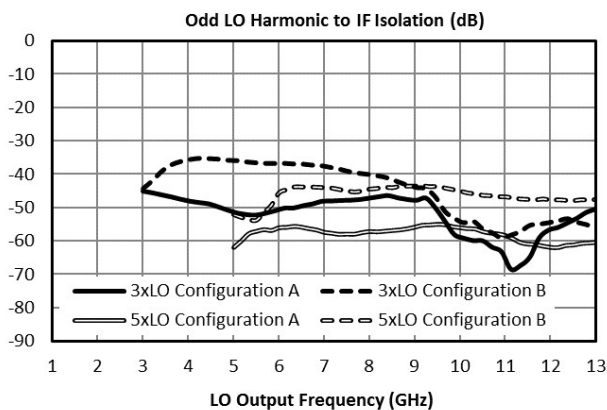
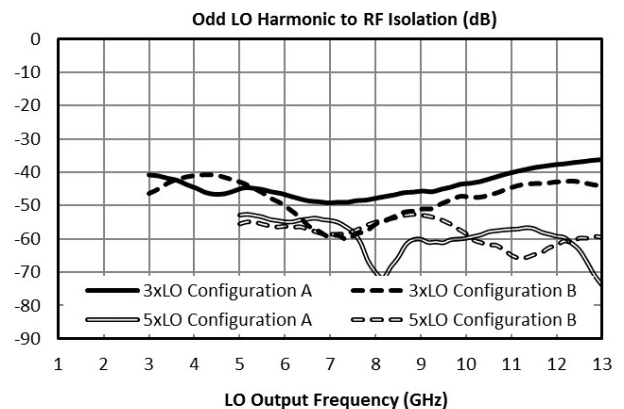
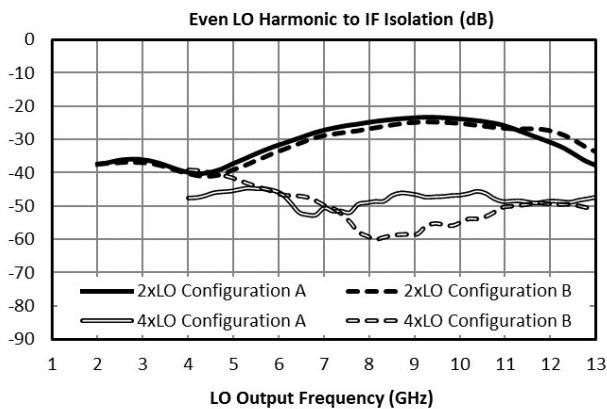
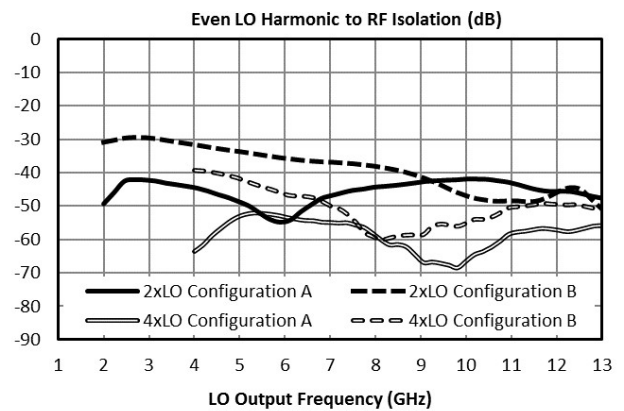
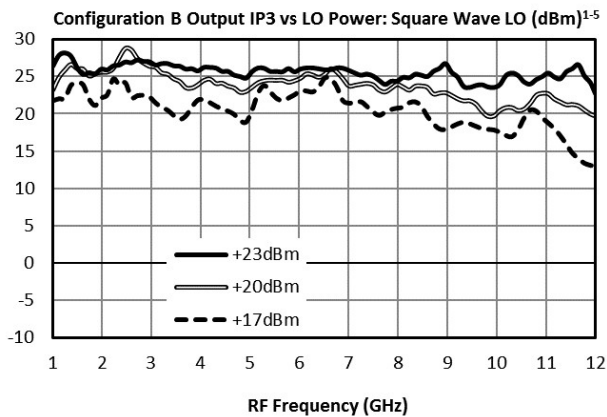
MT3H-0113HS

GaAs MMIC High Dynamic Range Mixer



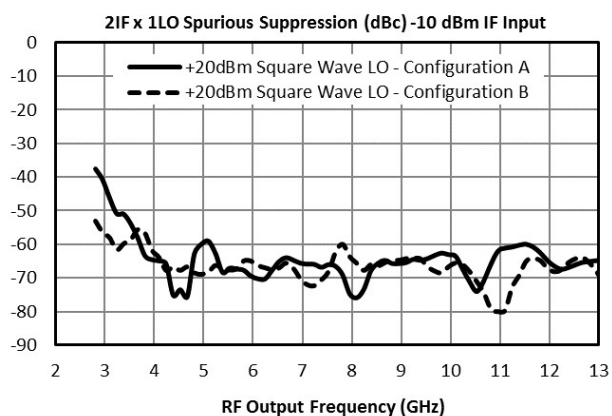
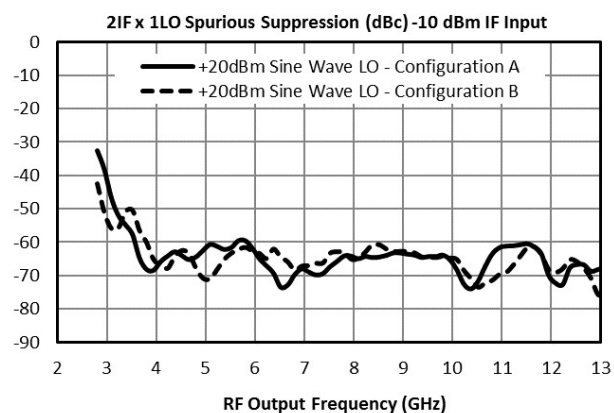
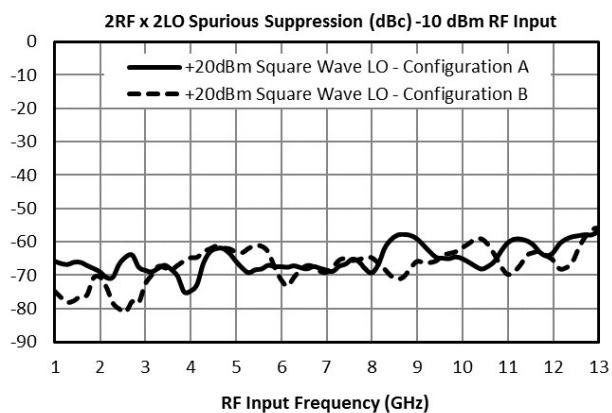
MT3H-0113HS

GaAs MMIC High Dynamic Range Mixer



MT3H-0113HS

GaAs MMIC High Dynamic Range Mixer



Spur Table

Downconversion Spurious Suppression

Spurious data is taken by selecting RF and LO frequencies (+mLO+nRF) within the RF/LO bands, to create a spurious output within the IF band. 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 60 dBc for the A configuration for a -10 dBm input, so a -20 dBm RF input creates a spur that is (2-1) x (-10 dB) dB lower, or 70 dBc.

Typical Downconversion Spurious Suppression (dBc): A Configuration (B Configuration), Sine Wave LO ⁶

-10 dBm RF Input	0xLO	1xLO	2xLO	3xLO	4xLO	5xLO
1xRF	27 (32)	Reference	27 (35)	20 (18)	22 (32)	28 (33)
2xRF	59 (59)	61 (58)	60 (62)	58 (55)	56 (59)	59 (53)
3xRF	106 (100)	83 (85)	93 (92)	77 (79)	92 (94)	126 (134)
4xRF	125 (127)	145 (145)	124 (126)	124 (123)	122 (122)	123 (123)
5xRF	159 (164)	150 (156)	153 (155)	149 (149)	154 (154)	143 (143)

Typical Downconversion Spurious Suppression (dBc): A Configuration (B Configuration), Square Wave LO ⁶

-10 dBm RF Input	0xLO	1xLO	2xLO	3xLO	4xLO	5xLO
1xRF	26 (32)	Reference	25 (32)	16 (12)	22 (31)	29 (29)
2xRF	62 (58)	62 (59)	63 (65)	60 (58)	61 (63)	64 (59)
3xRF	103 (106)	90 (91)	97 (99)	83 (84)	93 (99)	136 (135)
4xRF	129 (129)	145 (145)	129 (134)	131 (131)	128 (129)	126 (126)
5xRF	166 (167)	154 (159)	154 (160)	154 (157)	157 (161)	151 (155)

Upconversion Spurious Suppression

Spurious data is taken by mixing an input within the IF band, with LO frequencies (+mLO+nIF), to create a spurious output within the RF output 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 62 dBc for the A configuration for a -10 dBm input, so a -20 dBm IF input creates a spur that is (2-1) x (-10 dB) dB lower, or 72 dBc.

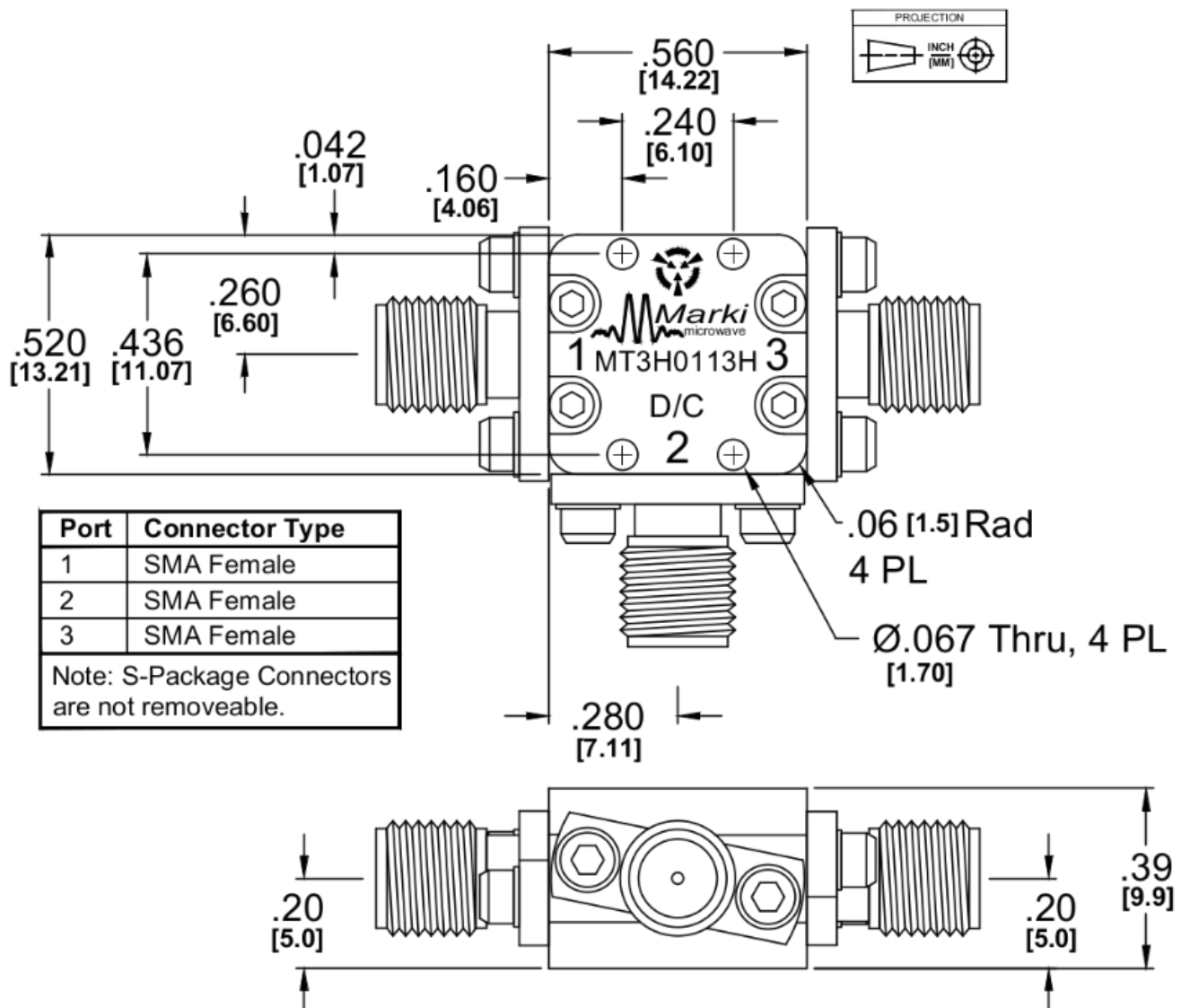
Typical Upconversion Spurious Suppression (dBc): A Configuration (B Configuration), Sine Wave LO ⁶

MT3H-0113HS

GaAs MMIC High Dynamic Range Mixer

Mechanical Data

Outline Drawing



DISCLAIMER

MARKI MICROWAVE, INC., ("MARKI") PROVIDES TECHNICAL SPECIFICATIONS AND DATA (INCLUDING DATASHEETS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, AND OTHER INFORMATION AND RESOURCES "AS IS" AND WITH ALL FAULTS. MARKI DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT.

These resources are intended for developers skilled in the art designing with Marki products. You are solely responsible for (1) selecting the appropriate products for your application, (2) designing, validating, and testing your application, and (3) ensuring your application meets applicable standards and other requirements. Marki makes no guarantee regarding the suitability of its products for any particular purpose, nor does Marki assume any liability whatsoever arising out of your use or application of any Marki product.

Marki grants you permission to use these resources only for development of an application that uses Marki products. Other reproduction or use of these resources is strictly prohibited. No license is granted to any other Marki intellectual property or to any third-party intellectual property. Marki reserves the right to make changes to the product(s) or information contained herein without notice.

MARKI MICROWAVE and T3 MIXER are trademarks or registered trademarks of Marki Microwave, Inc. All other trademarks used are the property of their respective owners.

© 2017, 2019, Marki Microwave, Inc