Sales: 408-778-9952 | General: 408-778-4200 | Fax: 408-778-4300
Sales & Customer Support: sales@markimicrowave.com
Tech Support: support@markimicrowave.com

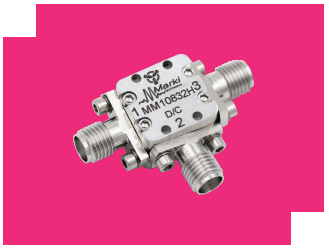
MM1-0832HS

GaAs MMIC Double Balanced Mixer

DEVICE OVERVIEW

General Description

The MM1-0832H is a GaAs MMIC double balanced mixer that is designed for and operates at X through K bands. MM1-0832H is a high linearity K band mixer that works well as both an up and down converter. This mixer offers low conversion loss and high LO to RF isolations over a broadband X to K band. The sister component MM1-0832L is recommended for low power applications. The MM1-0832H is available as both a wire bondable die and as a connectorized module.



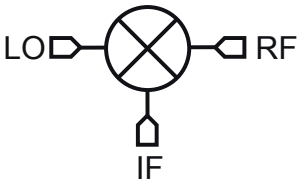
Features

- Low cost K band mixer
- Broadband Performance
- RoHS Compliant

Applications

- Test and Measurement Equipment
- SATCOM
- 5G
- Radar

Functional Block Diagram



Part Ordering Options

Part Number	Description	Package	Connectors	Green Status	Product Lifecycle	Export Classification
MM1-0832HS	GaAs MMIC Double Balanced Mixer	S	Standard	REACH RoHS	Released	EAR99

Table Of Contents

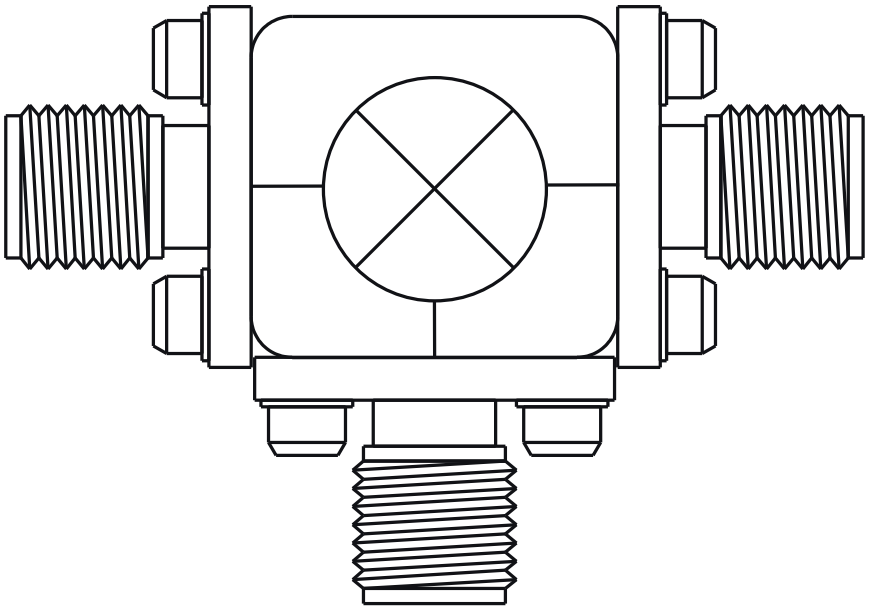
Revision History

Revision Code	Revision Date	Comment
-	2018-10-01	Datasheet Initial Release

Port Configuration and Functions

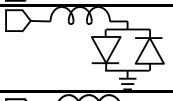
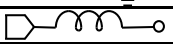
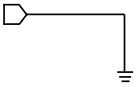
Port Diagram

The MM1-0832H has the input and output ports given in Port Functions. The MM1-0832H can be used in either an up or down conversion. For configuration A, input the LO into port 1, use port 3 for the RF, and port 2 for the IF. For configuration B, input the LO into port 3, use port 1 for the RF, and port 2 for the IF.

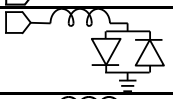
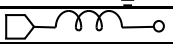
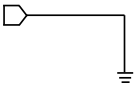


Port Functions

Configuration A

Port	Function	Connector Type	Description	Equivalent Circuit for Package
1	LO	2.92F	Port 1 is DC open for the CH and S packages.	
2	IF	SMAF	Port 2 is diode connected for the CH and S packages.	
3	RF	2.92F	Port 3 is DC open for the CH and S packages.	
GND	Ground	-	S package ground provided through metal housing and outer coax conductor.	

Configuration B

Port	Function	Connector Type	Description	Equivalent Circuit for Package
1	RF	2.92F	Port 1 is DC open for the CH and S packages.	
2	IF	SMAF	Port 2 is diode connected for the CH and S packages.	
3	LO	2.92F	Port 3 is DC open for the CH and S packages.	
GND	Ground	-	S package ground provided through metal housing and outer coax conductor.	

Specifications

Absolute Maximum Ratings

The Absolute Maximum Ratings indicate limits beyond which damage may occur to the device. If these limits are exceeded, the device may be inoperable or have a reduced lifetime.

Parameter	Maximum Rating	Unit
Maximum Operating Temperature	100	°C
Maximum Storage Temperature	125	°C
Minimum Operating Temperature	-55	°C
Minimum Storage Temperature	-65	°C
Power Handling, at any Port	30	dBm

Package Information

Parameter	Details	Rating
ESD	250 to < 500 Volts	HBM Class 1A
Weight	Package name: S	12g
Dimensions	-	14.22 x 13.21 mm

Recommended Operating Conditions

The Recommended Operating Conditions indicate the limits, inside which the device should be operated, to guarantee the performance given in Electrical Specifications Operating outside these limits may not necessarily cause damage to the device, but the performance may degrade outside the limits of the electrical specifications. For limits, above which damage may occur, see Absolute Maximum Ratings.

Parameter	Min	Nominal	Max	Unit
LO Input Power	11	-	20	°C
Ambient Temperature	-55	25	100	°C

Sequencing Requirements

There is no requirement to apply power to the ports in a specific order. However, it is recommended to provide a 50Ω termination to each port before applying power. This is a passive diode mixer that requires no DC bias.

Electrical Specifications

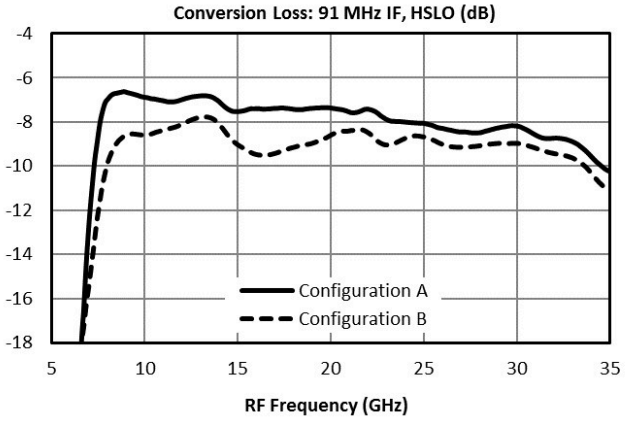
The electrical specifications apply at TA=+25°C in a 50Ω system. Typical data shown is or the connectorized S package mixer used in the forward direction with a +15 dBm sine wave input. Min and Max limits apply only to our connectorized units and are guaranteed at TA=+25°C. All bare die are 100% DC tested and visually inspected.

Parameter	Port Configuration	Test Conditions	Min	Typ	Max	Unit
Conversion Loss [1]	A	RF/LO = 8 - 32 GHz I = 3 - 12 GHz	-	9.5	-	dB
Conversion Loss [2]	A	RF/LO = 8 - 32 GHz I = DC - 4 GHz	-	7.6	9.5	dB
Input 1 dB Gain Compression Point (P1dB)	A	-	-	9	-	dBm
Input IP3	A	RF/LO = 8 - 32 GHz I = DC – 0.2 GHz	-	22.8	-	dBm
Isolation, LO to IF	A	IF/LO = 8 - 32 GHz	-	33	-	dB
Isolation, LO to RF	A	RF/LO = 8 - 32 GHz	-	50	-	dB
Isolation, RF to IF	A	RF/IF = 8 - 32 GHz	-	35	-	dB
Noise Figure [3]	A	RF/LO = 8 - 32 GHz I = DC – 0.2 GHz	-	8	-	dB
Conversion Loss [4]	B	RF/LO = 8 - 32 GHz I = 3 - 12 GHz	-	11	-	dB
Conversion Loss [5]	B	RF/LO = 8 - 32 GHz I = DC - 4 GHz	-	9	10.5	dB
Input 1 dB Gain Compression Point (P1dB)	B	-	-	11	-	dBm
Input IP3	B	RF/LO = 8 - 32 GHz I = DC – 0.2 GHz	-	23.7	-	dBm
IF Frequency Range	-	-	0	-	12	GHz
LO Frequency Range	-	-	8	-	32	GHz
RF Frequency Range	-	-	8	-	32	GHz

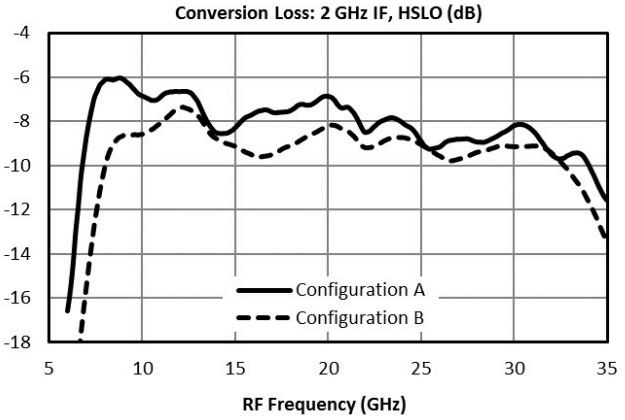
[1][2][4][5] Measured as a down converter to a fixed 91MHz IF.
[3] Mixer Noise Figure typically measures within 0.5 dB of conversion loss for IF frequencies greater than 5 MHz.

Typical Performance Plots

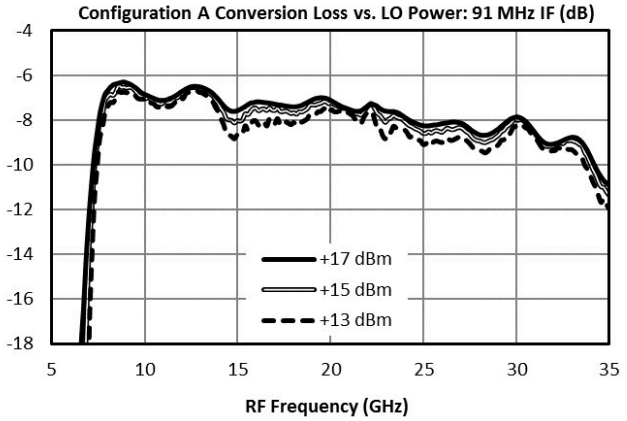
Conversion Loss: 91 MHz IF, HSLO (dB)



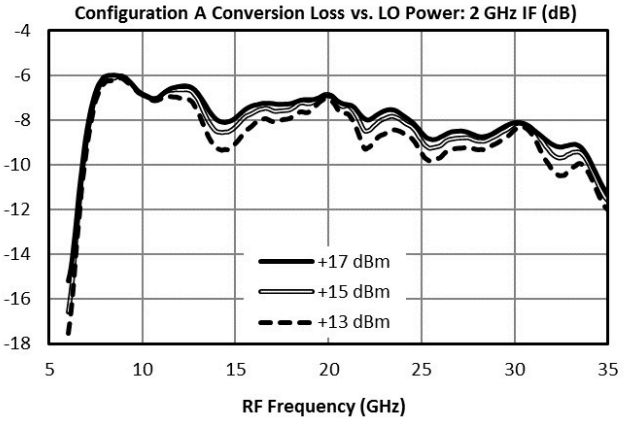
Conversion Loss: 2 GHz IF, HSLO (dB)



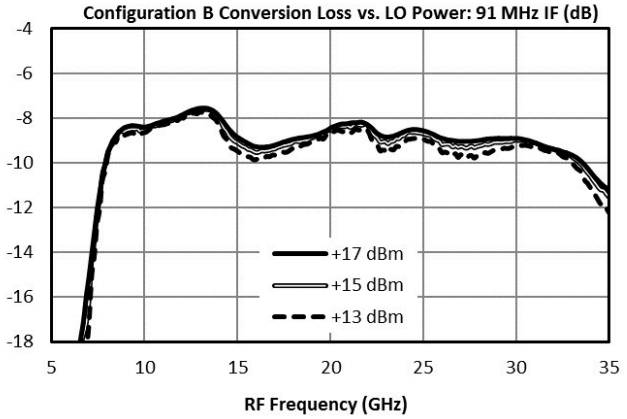
Configuration A Conversion Loss vs. LO Power: 91 MHz IF (dB)



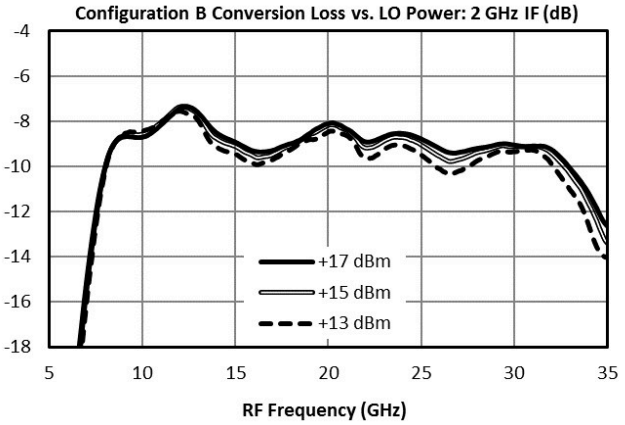
Configuration A Conversion Loss vs. LO Power: 2 GHz IF (dB)



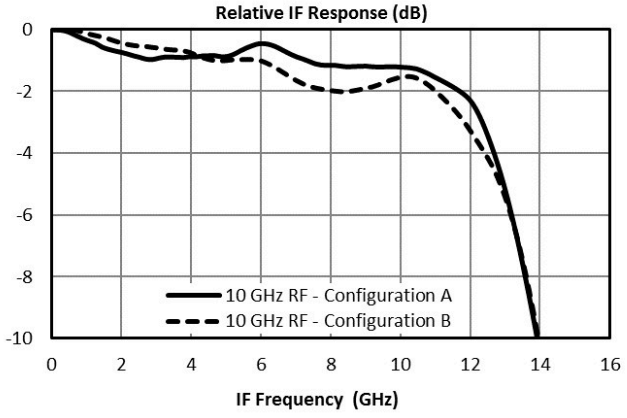
Configuration B Conversion Loss vs. LO Power: 91 MHz IF (dB)



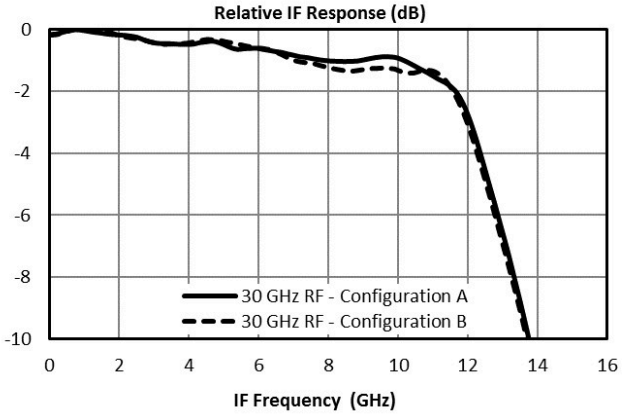
Configuration B Conversion Loss vs. LO Power: 2 GHz IF (dB)

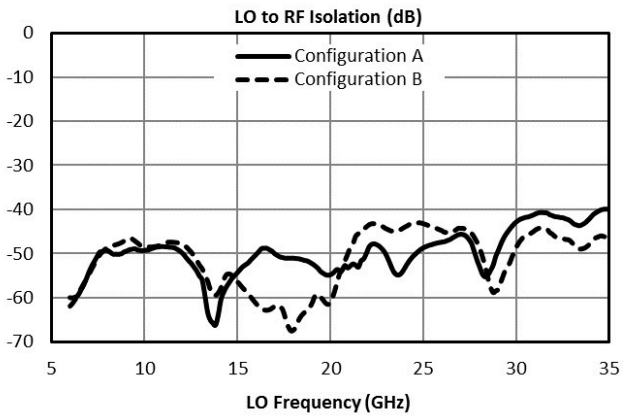


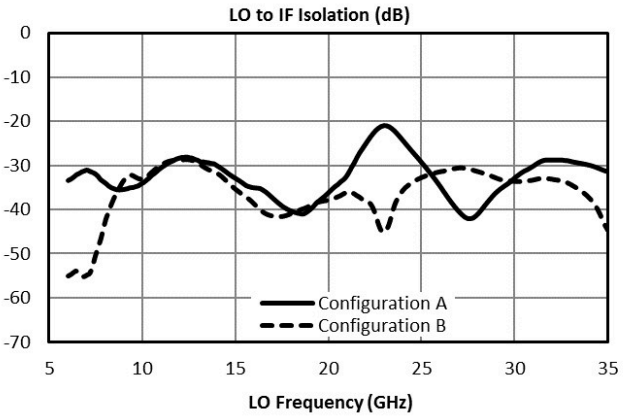
Relative IF Response (dB)

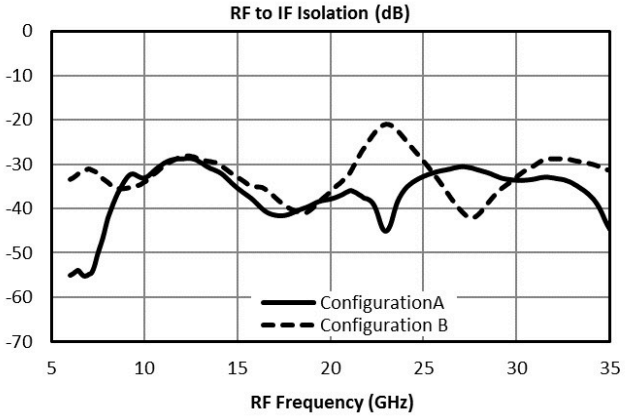


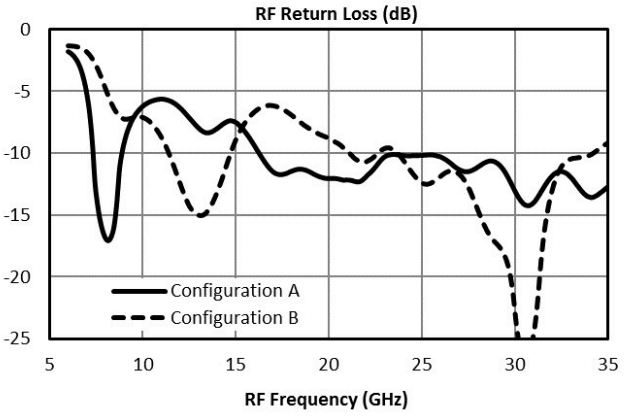
Relative IF Response (dB)

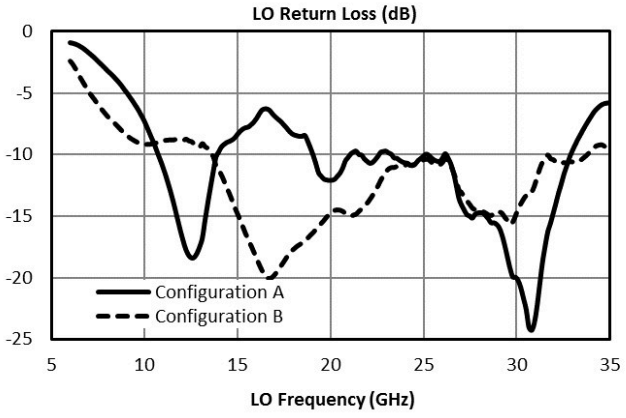


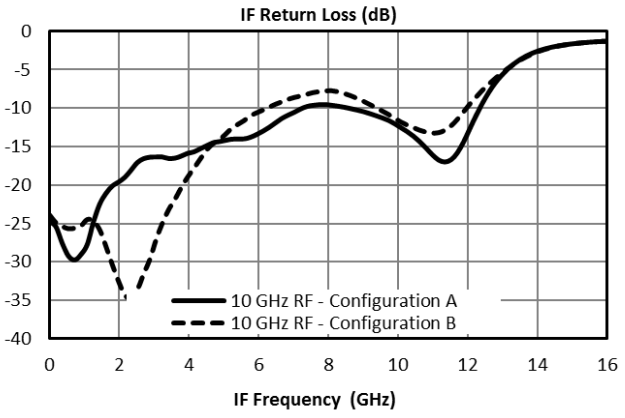


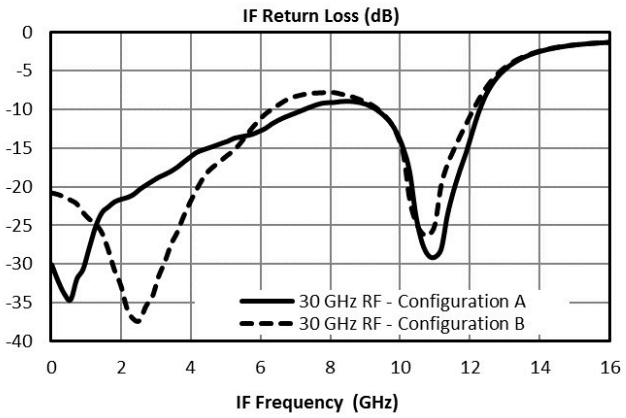




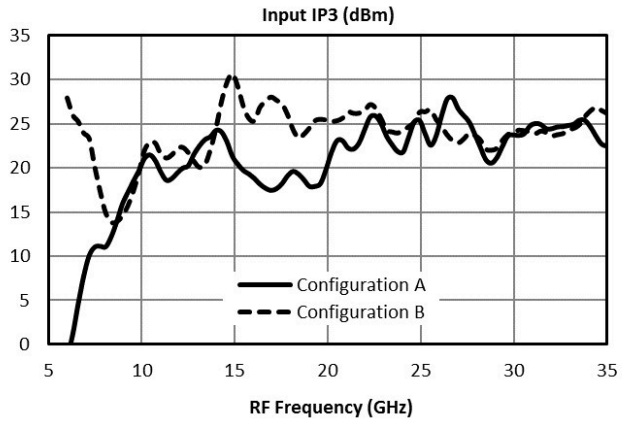


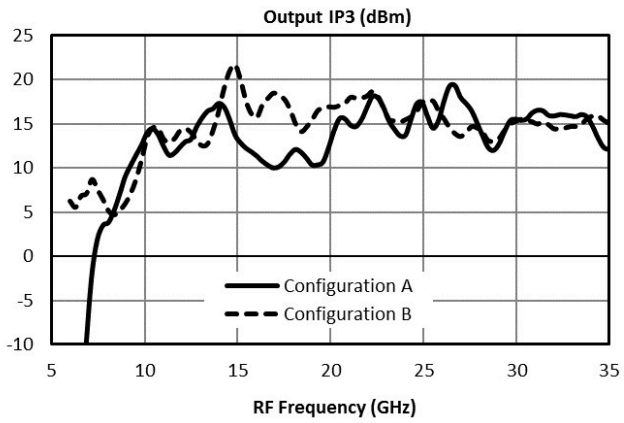


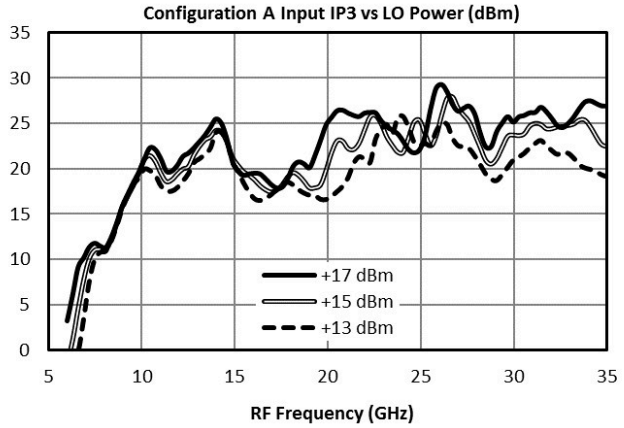


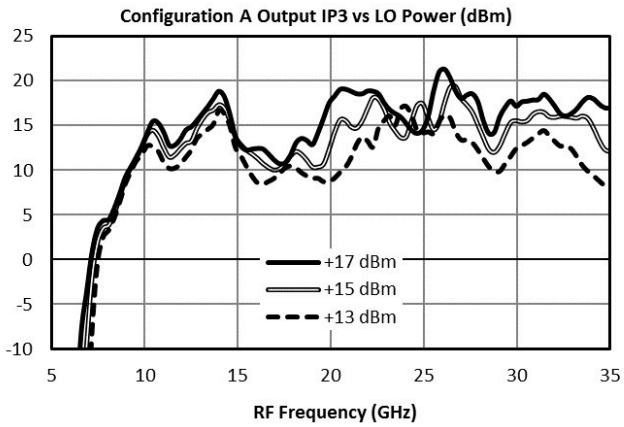


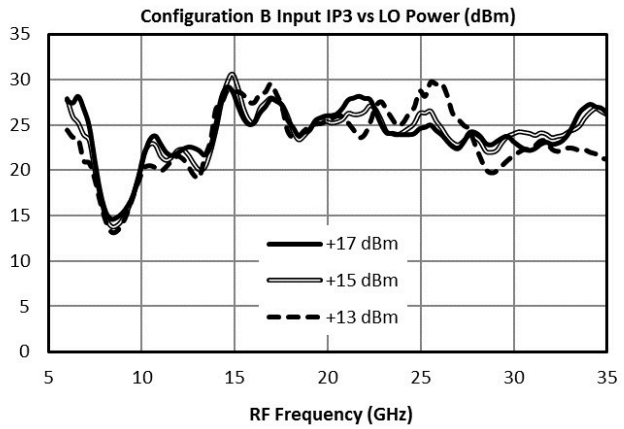
Typical Performance Plots: IP3

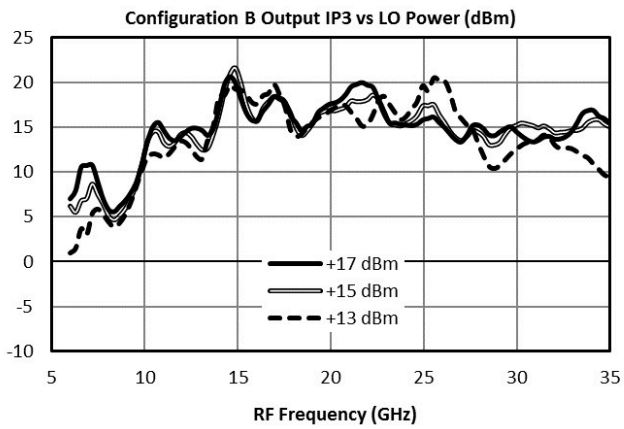




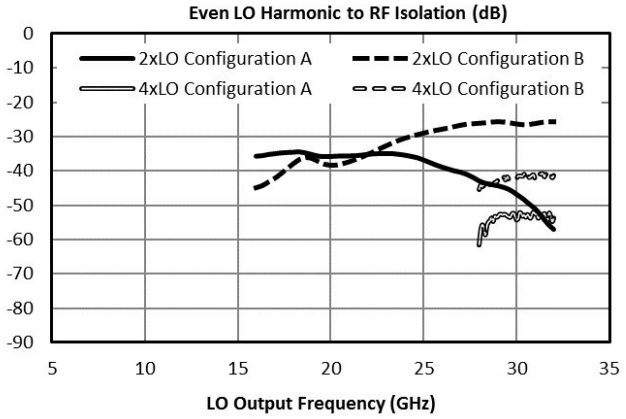


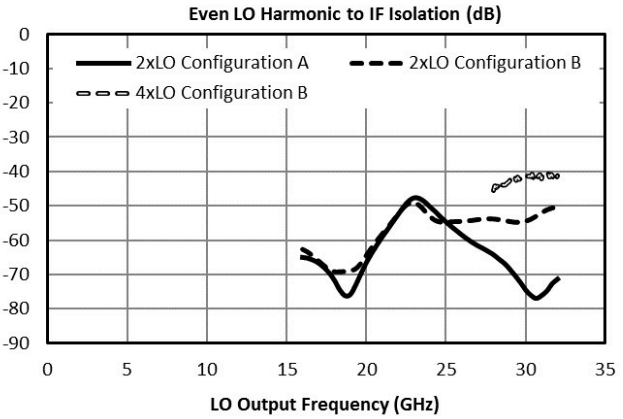


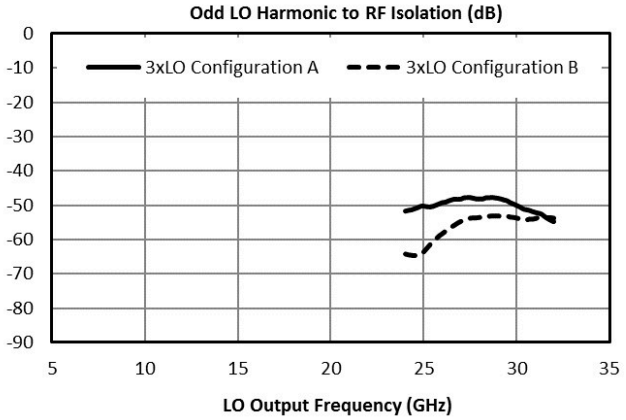


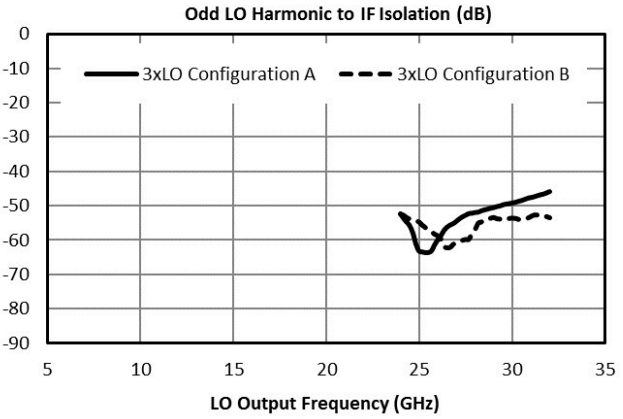


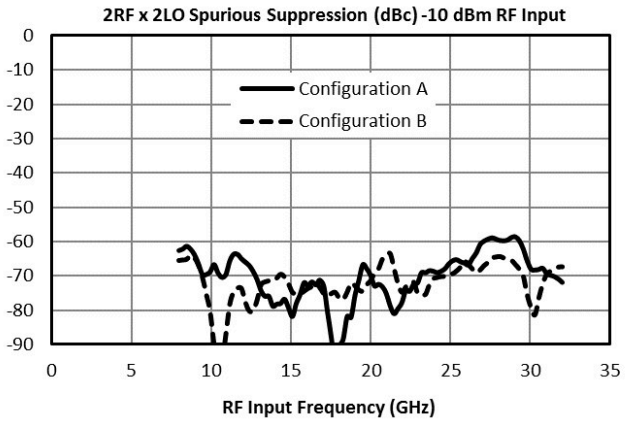
Typical Performance Plots: LO Harmonic Isolation

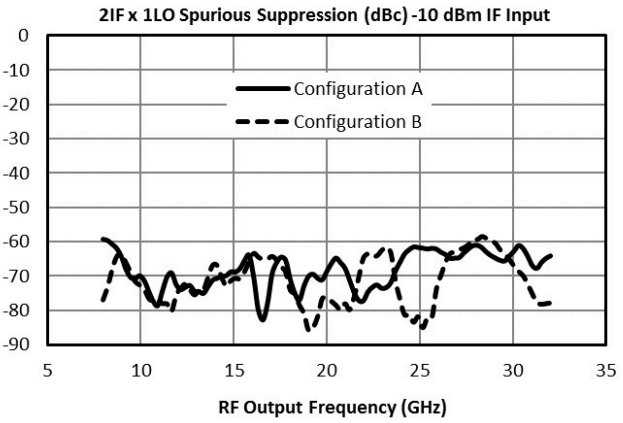












Spur Table

Typical Spurious Performance: Down-Conversion

Typical spurious data is provided by selecting RF and LO frequencies (± m*LO ± n*RF) 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 2RF x 2LO spur is 70 dBc for a -10 dBm input, so a -20 dBm RF input creates a spur that is (2-1) x (-10 dB) lower, or 80 dBc. Data is shown for the frequency plan in 3.6 Typical Performance.

Typical Down-conversion spurious suppression (dBc): Config A (B)

-10 dBm RF Input	0xLO	1xLO	2xLO	3xLO	4xLO	5xLO
1xRF	27 (24)	Reference	27 (37)	14 (14)	33 (40)	N/A
2xRF	77 (86)	61 (48)	70 (72)	62 (53)	69 (71)	58 (54)
3xRF	100 (104)	61 (62)	82 (90)	71 (75)	74 (91)	67 (73)
4xRF	121 (125)	98 (94)	110 (111)	109 (104)	108 (113)	108 (102)
5xRF	N/A	115 (108)	115 (123)	119 (126)	120 (125)	118 (121)

Typical Spurious Performance: Up-Conversion

Typical spurious data is taken by mixing an input within the IF band, with LO frequencies (± m*LO ± n*IF), 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 68 dBc for a -10 dBm input with a sine-wave LO, so a -20 dBm IF input creates a spur that is (2-1) x (-10 dB) lower, or 78 dBc. Data is shown for the frequency plan in 3.6 Typical Performance.

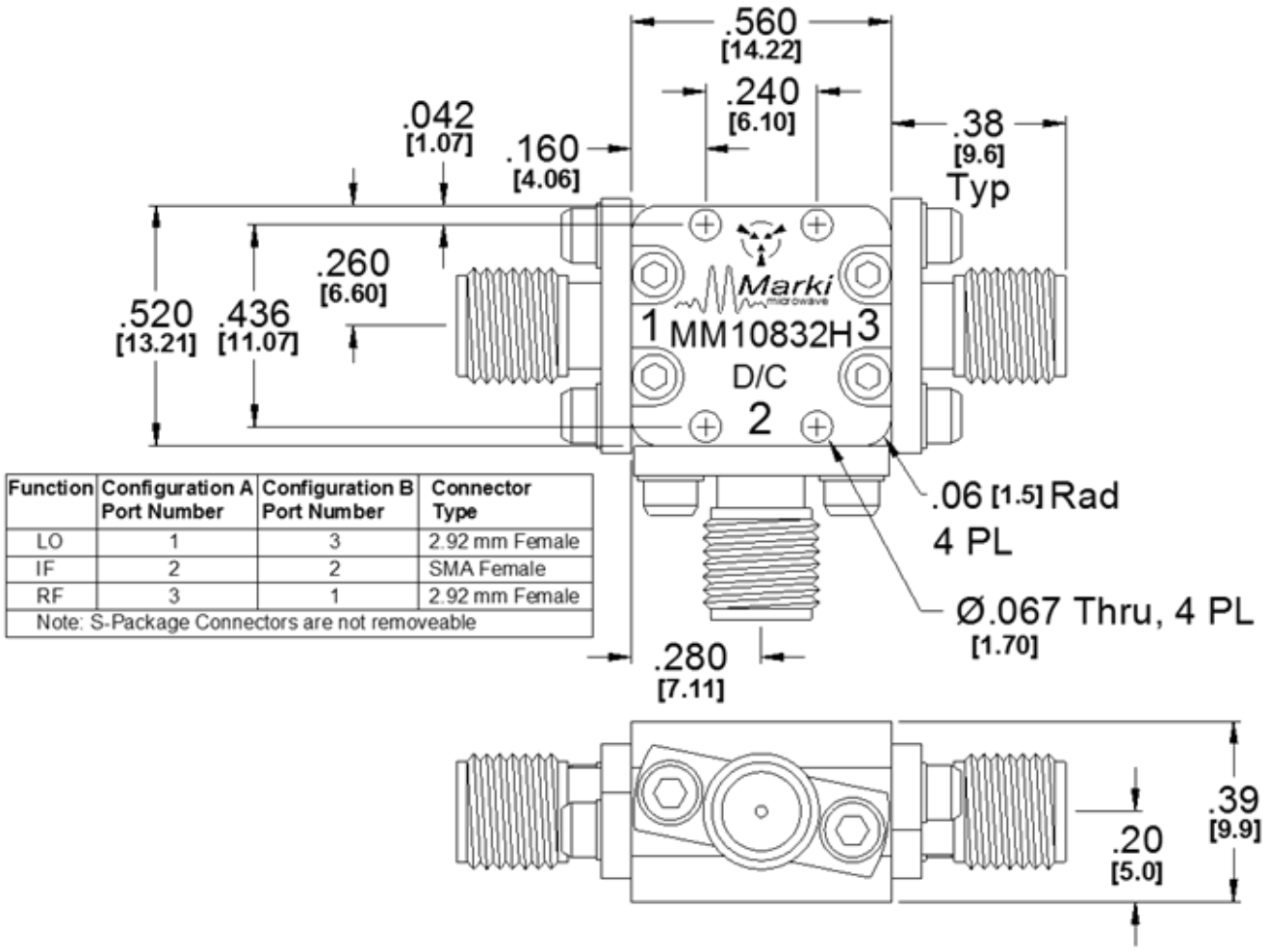
Typical Up-conversion spurious suppression (dBc): Config A (B)

-10 dBm RF Input	0xLO	1xLO	2xLO	3xLO	4xLO	5xLO
1xIF	28 (24)	Reference	28 (38)	15 (12)	32 (39)	18 (24)
2xIF	68 (60)	68 (71)	58 (51)	60 (73)	51 (49)	59 (77)
3xIF	86 (95)	66 (70)	76 (88)	68 (67)	71 (86)	53 (55)
4xIF	111 (100)	108 (109)	97 (93)	102 (113)	92 (100)	103 (111)
5xIF	110 (129)	109 (115)	116 (129)	104 (105)	118 (125)	106 (106)

Mechanical Data

Outline Drawing

Download : Outline 2D Drawing | Outline 3D Drawing | Outline 3D STP



Function	Configuration A Port Number	Configuration B Port Number	Connector Type
LO	1	3	2.92 mm Female
IF	2	2	SMA Female
RF	3	1	2.92 mm Female
Note: S-Package Connectors are not removeable			

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.