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

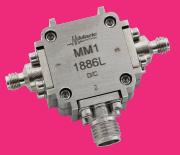
MM1-1886LM

GaAs MMIC mmWave Double Balanced Mixer

DEVICE OVERVIEW

General Description

The MM1-1886LM is a passive double balanced MMIC mixer. It features excellent 8.5 dB conversion loss, superior isolations and spurious performance across a broad 18 to 86 GHz RF/LO bandwidth. Low LO drive requirement allows operation at as low as +7 dBm inputs. The MM1-1886L is available as a wire bondable chip or a connectorized package.



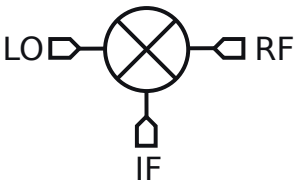
Features

- RF/LO Bandwidth, 18 to 86 GHz
- IF Bandwidth, DC to 20 GHz
- Low LO Drive Requirement, +7 dBm Minimum
- LO to RF Isolation, 50 dB Typical
- RoHS Compliant

Applications

- Test and Measurement Equipment
- Fixed RF up converters
- Electronic warfare equipment

Functional Block Diagram



Part Ordering Options

Part Number	Description	Package	Connectors	Green Status	Product Lifecycle	Export Classification
MM1-1886LM	GaAs MMIC mmWave Double Balanced Mixer	M	-	REACH RoHS	Released	EAR99

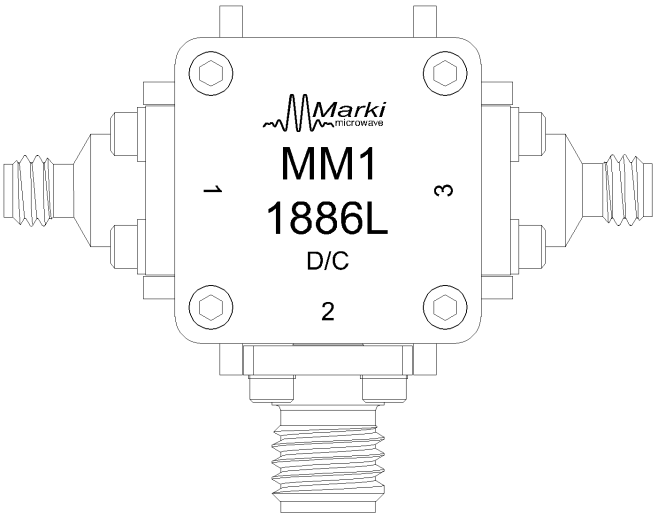
Table Of Contents

Revision History

Revision Code	Revision Date	Comment
-	2025-12-01	Initial Release

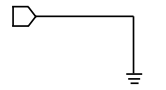
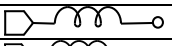
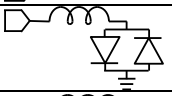
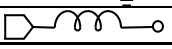
Port Configuration and Functions

Port Diagram

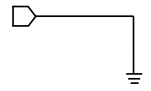
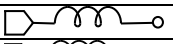
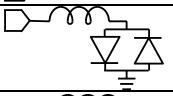
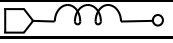


Port Functions

Configuration A

Port	Function	Connector Type	Description	DC Equivalent Circuit
GND	Ground	-	M package ground provided through metal housing and outer coax conductor.	
Port 1	LO	1.0F	Port 1 is DC open for the M package	
Port 2	IF	2.92F	Port 2 is diode connected for the M package.	
Port 3	RF	1.0F	Port 3 is DC open for the M package.	

Configuration B

Port	Function	Connector Type	Description	DC Equivalent Circuit
GND	Ground	-	M package ground provided through metal housing and outer coax conductor.	
Port 1	RF	1.0F	Port 1 is DC open for the M package.	
Port 2	IF	2.92F	Port 2 is diode connected for the M package.	
Port 3	LO	1.0F	Port 3 is DC open for the M package.	

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
Power Handling, at any Port	27	dBm

Package Information

Parameter	Details	Rating
Weight	Package name: M	34g
Dimensions	-	36.5 x 28.5 mm

Recommended Operating Conditions

Parameter	Min	Nominal	Max	Unit
LO Input Power	7	14	16	dBm

Electrical Specifications

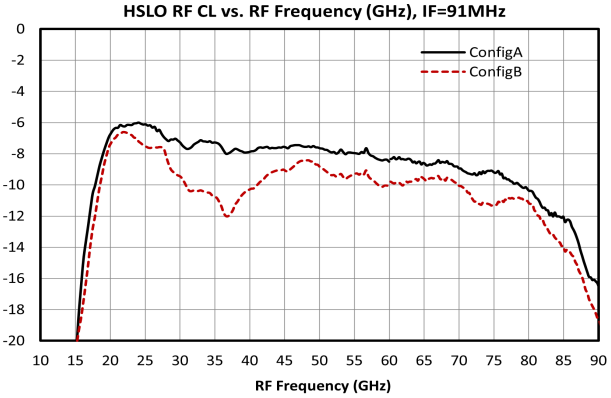
The electrical specifications apply at TA=+25°C in a 50Ω system. Typical data shown is for the connectorized M package mixer used in the forward direction with a +14 dBm sine wave input. Min and Max limits apply only to our connectorized units and are guaranteed at TA=+25°C. All bare die are 100% DC tested and visually inspected.

Parameter	Port Configuration	Test Conditions	Min	Typ	Max	Unit
RF Frequency Range	-	-	18	-	86	GHz
LO Frequency Range	-	-	18	-	86	GHz
IF Frequency Range	-	-	0	-	20	GHz
Conversion Loss	A	LO/RF=18-86 GHz IF=91 MHz LO drive level=14 dBm	-	8.5	-	dB
Conversion Loss	B	LO/RF=18-86 GHz IF=91 MHz LO drive level=14 dBm	-	10	-	dB
Input IP3	A	LO/RF=18-67 GHz IF=DC-20 GHz LO drive level=14 dBm	-	13.5	-	dBm
Input IP3	B	LO/RF=18-67 GHz IF=DC-20 GHz LO drive level=14 dBm	-	15.5	-	dBm
Input P1dB	A	LO/RF=18-86 GHz IF=DC-20 GHz LO drive level=14 dBm	-	4	-	dBm
Input P1dB	B	LO/RF=18-86 GHz IF=DC-20 GHz LO drive level=14 dBm	-	5	-	dBm
LO-RF Isolation	A	LO/RF=18-86 GHz IF=91 MHz LO drive level=14 dBm	-	50	-	dB
LO-RF Isolation	B	LO/RF=18-86 GHz IF=91 MHz LO drive level=14 dBm	-	50	-	dB
LO-IF Isolation	A	LO/RF=18-86 GHz IF=91 MHz LO drive level=14 dBm	-	35	-	dB
LO-IF Isolation	B	LO/RF=18-86 GHz IF=91 MHz LO drive level=14 dBm	-	56	-	dB
RF-IF Isolation	A	LO/RF=18-86 GHz IF=91 MHz LO drive level=14 dBm	-	33	-	dB
RF-IF Isolation	B	LO/RF=18-86 GHz IF=91 MHz LO drive level=14 dBm	-	55	-	dB
Noise Figure [1]	A	LO/RF=18-86 GHz IF=91 MHz LO drive level=14 dBm	-	8.5	-	dB
Noise Figure [2]	B	LO/RF=18-86 GHz IF=91 MHz LO drive level=14 dBm	-	10	-	dB

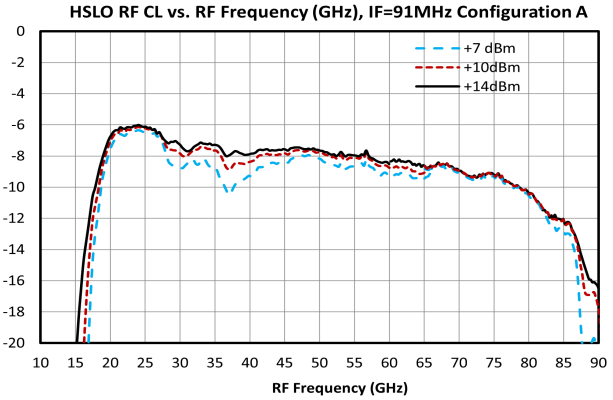
[1][2] Mixer Noise Figure typically measures within 0.5 dB of conversion loss for IF frequencies greater than 5 MHz.

Typical Performance Plots

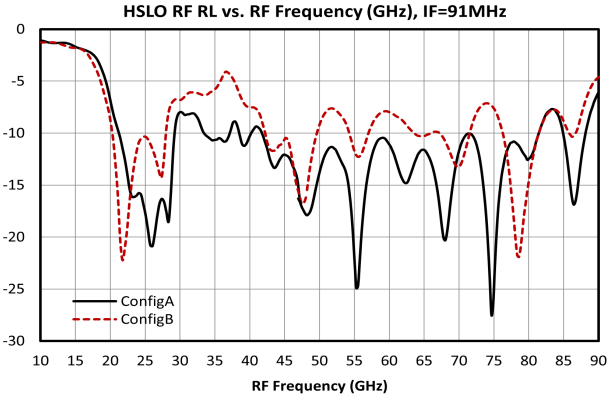
HSLO RF CL vs. RF Frequency (GHz), IF=91MHz



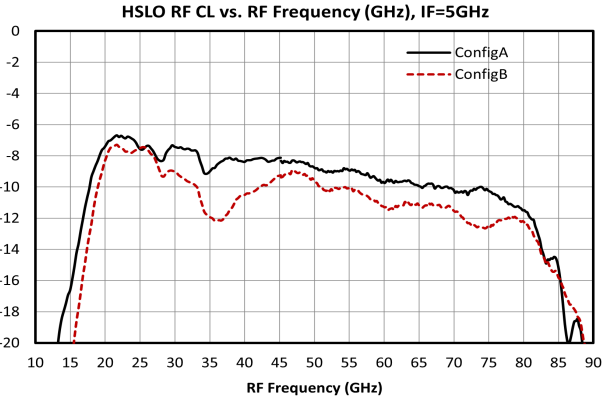
HSLO RF CL vs. RF Frequency (GHz), IF=91MHz Configuration A



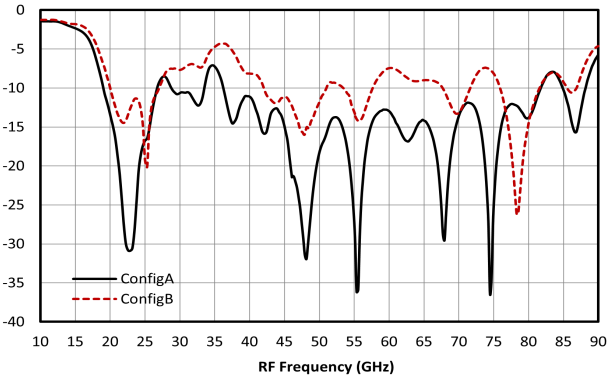
HSLO RF RL vs. RF Frequency (GHz), IF=91MHz



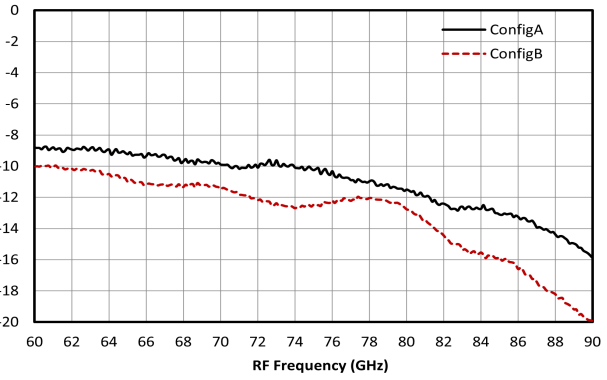
HSLO RF CL vs. RF Frequency (GHz), IF=5GHz



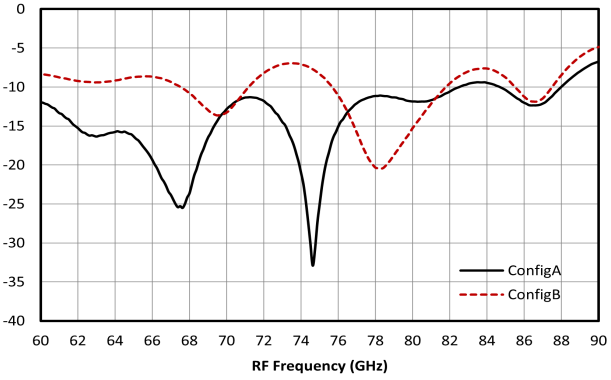
HSLO RF RL vs. RF Frequency (GHz), IF=5GHz



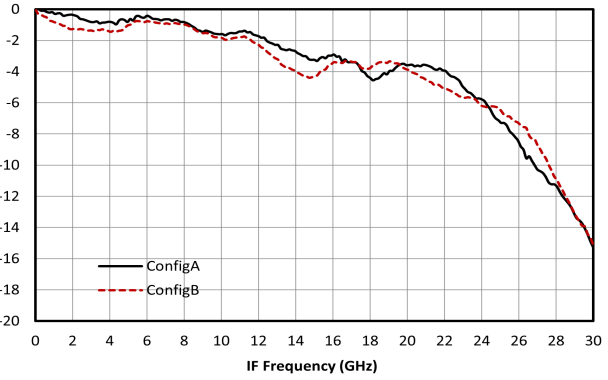
LSLO RF CL vs. RF Frequency (GHz), IF=10GHz



LSLO RF RL vs. RF Frequency (GHz), IF=10GHz



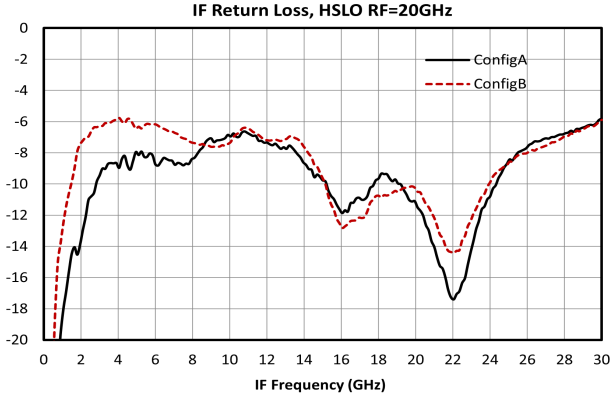
Relative IF Response, HSLO IF, RF=20GHz



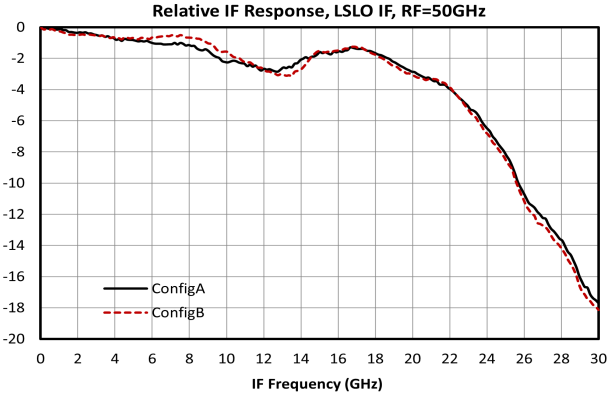
MM1-1886LM

GaAs MMIC mmWave Double Balanced Mixer

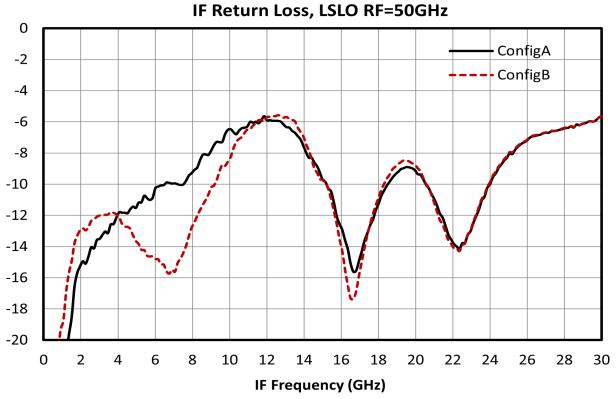
IF Return Loss, HSLO RF=20GHz



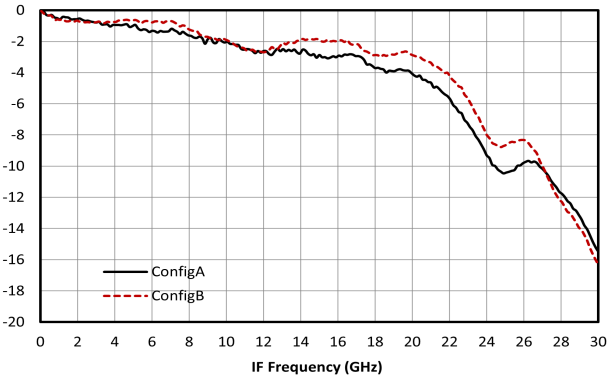
Relative IF Response, LSLO IF, RF=50GHz



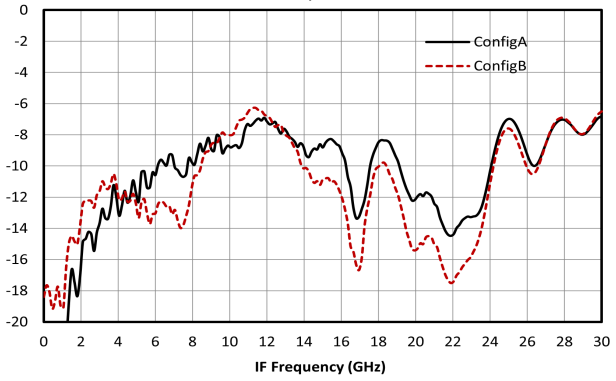
IF Return Loss, LSLO RF=50GHz



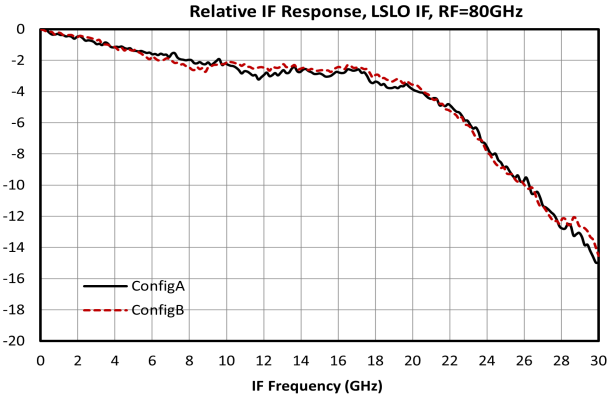
Relative IF Response, HSLO IF, RF=45GHz



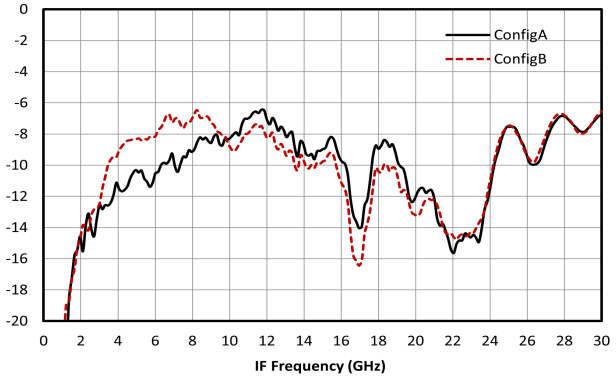
IF Return Loss, HSLO RF=45GHz



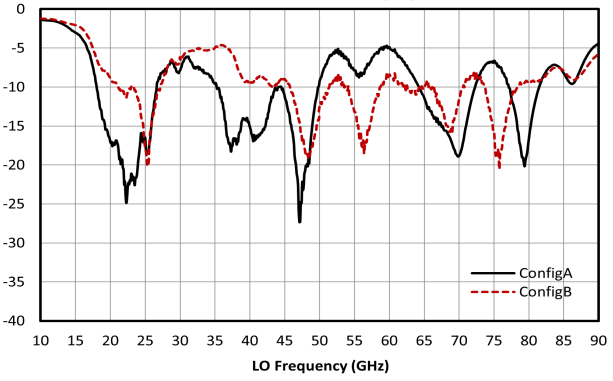
Relative IF Response, LSLO IF, RF=80GHz



IF Return Loss, LSLO RF=80GHz



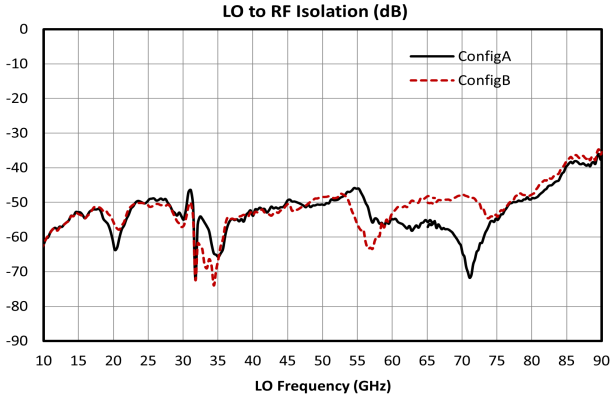
LO Return Loss (dB)



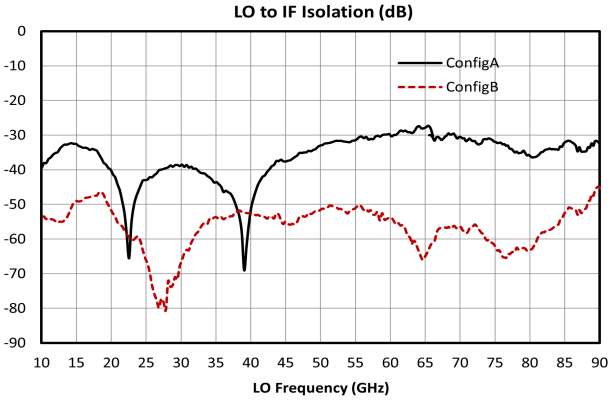
MM1-1886LM

GaAs MMIC mmWave Double Balanced Mixer

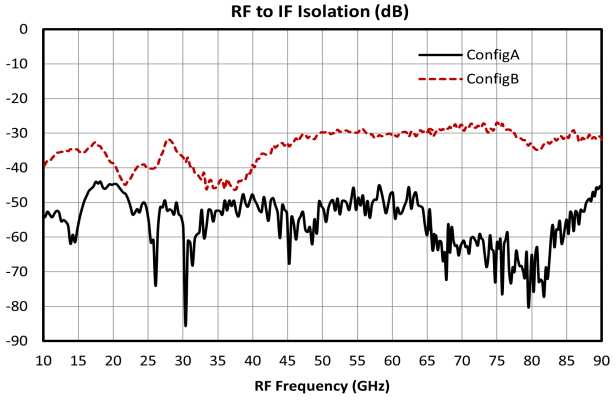
LO to RF Isolation (dB)



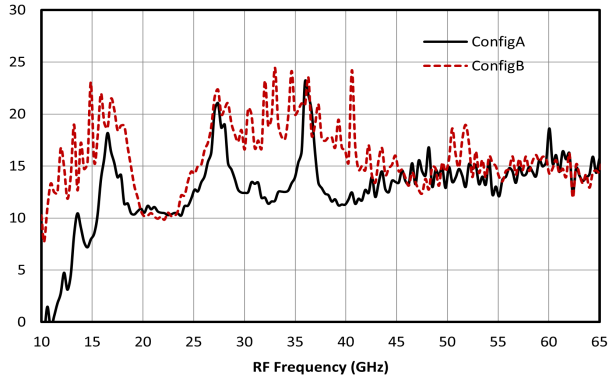
LO to IF Isolation (dB)



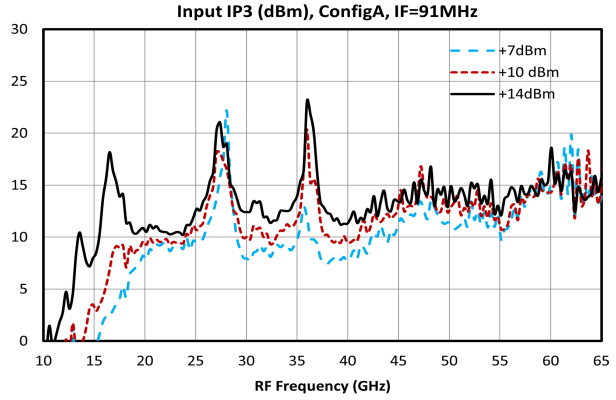
RF to IF Isolation (dB)



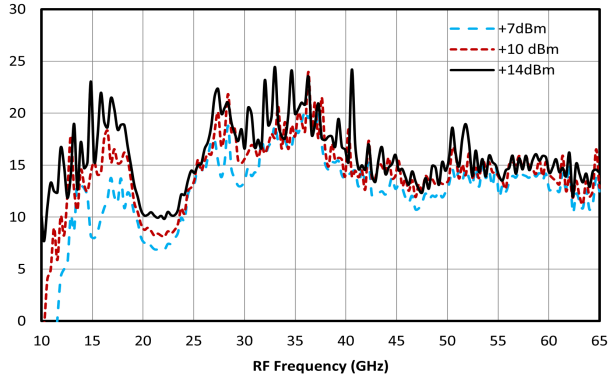
Input IP3 (dBm), IF=91MHz



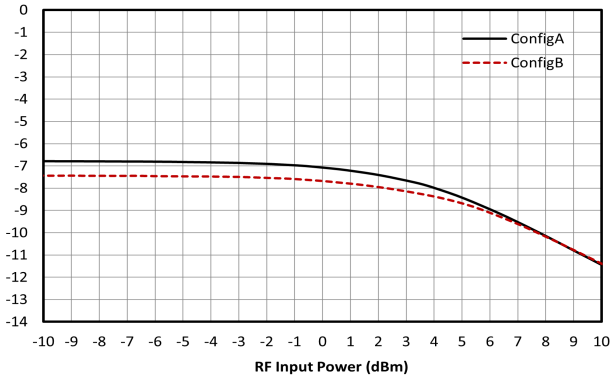
Input IP3 (dBm), ConfigA, IF=91MHz



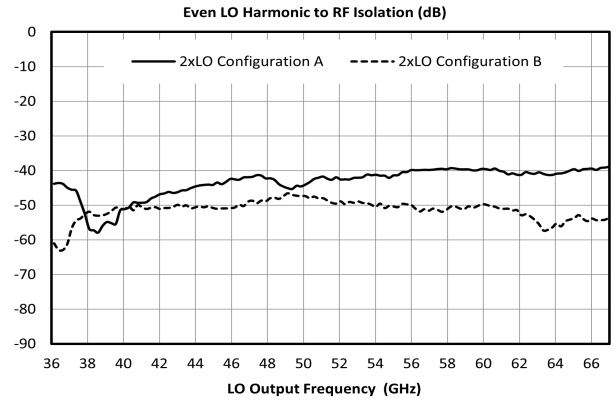
Input IP3 (dBm), ConfigB, IF=91MHz

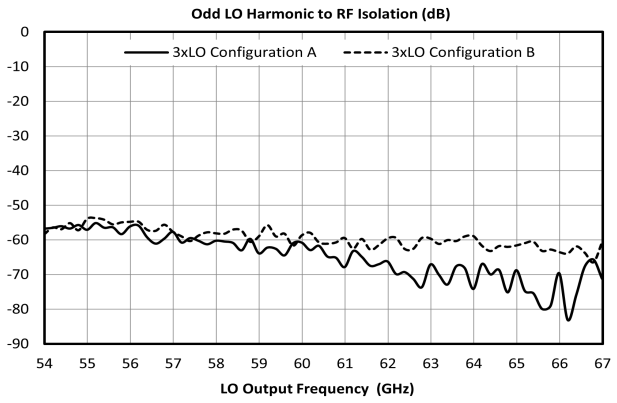


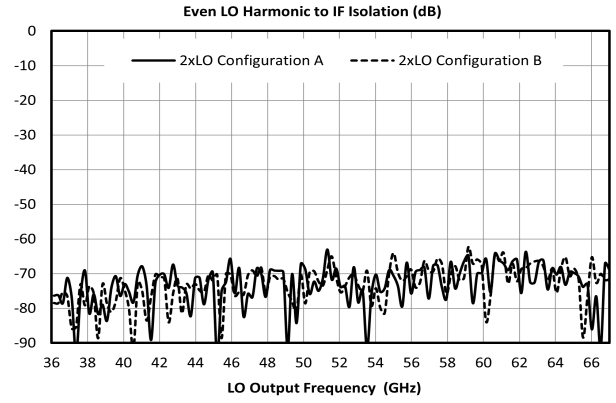
Conversion Loss (dB) vs. RF Input Power (dBm) with Fixed 20 GHz RF

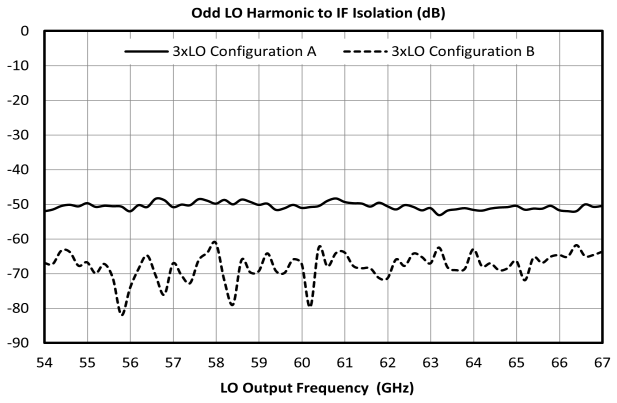


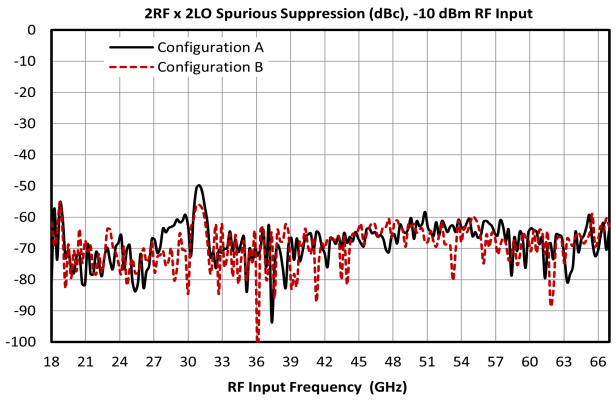
Typical Performance Plots: LO Harmonic Isolation

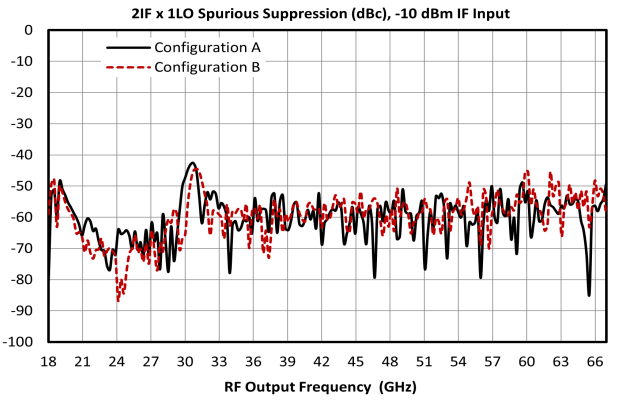












Spur Table

Downconversion Spurious Suppression

Spurious data is taken by selecting RF and LO frequencies (+mLO+nRF) within the 18 to 67 GHz RF/LO bands, which create a 91 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 70 dBc for the Configuration A for a -10 dBm input, so a -20 dBm RF input creates a spur that is (2-1) x (-10 dB) dB lower, or 80 dBc.

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

-10 dBm RF Input	0xLO	1xLO	2xLO	3xLO	4xLO	5xLO
1xRF	41 (23)	Reference	39 (35)	12 (13)	44 (32)	N/A
2xRF	69 (65)	62 (71)	70 (71)	61 (77)	73 (76)	61 (79)
3xRF	77 (73)	73 (73)	100 (99)	80 (84)	101 (96)	74 (80)
4xRF	93 (91)	109 (114)	113 (112)	110 (112)	112 (112)	110 (109)
5xRF	N/A	124 (123)	122 (120)	123 (122)	124 (120)	123 (120)

Upconversion Spurious Suppression

Spurious data is taken by mixing a 91 MHz IF with LO frequencies (+mLO+nIF), which creates an RF within the 18 to 67 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 66 dBc for the Configuration A for a -10 dBm input, so a -20 dBm IF input creates a spur that is (2-1) x (-10 dB) dB lower, or 76 dBc.

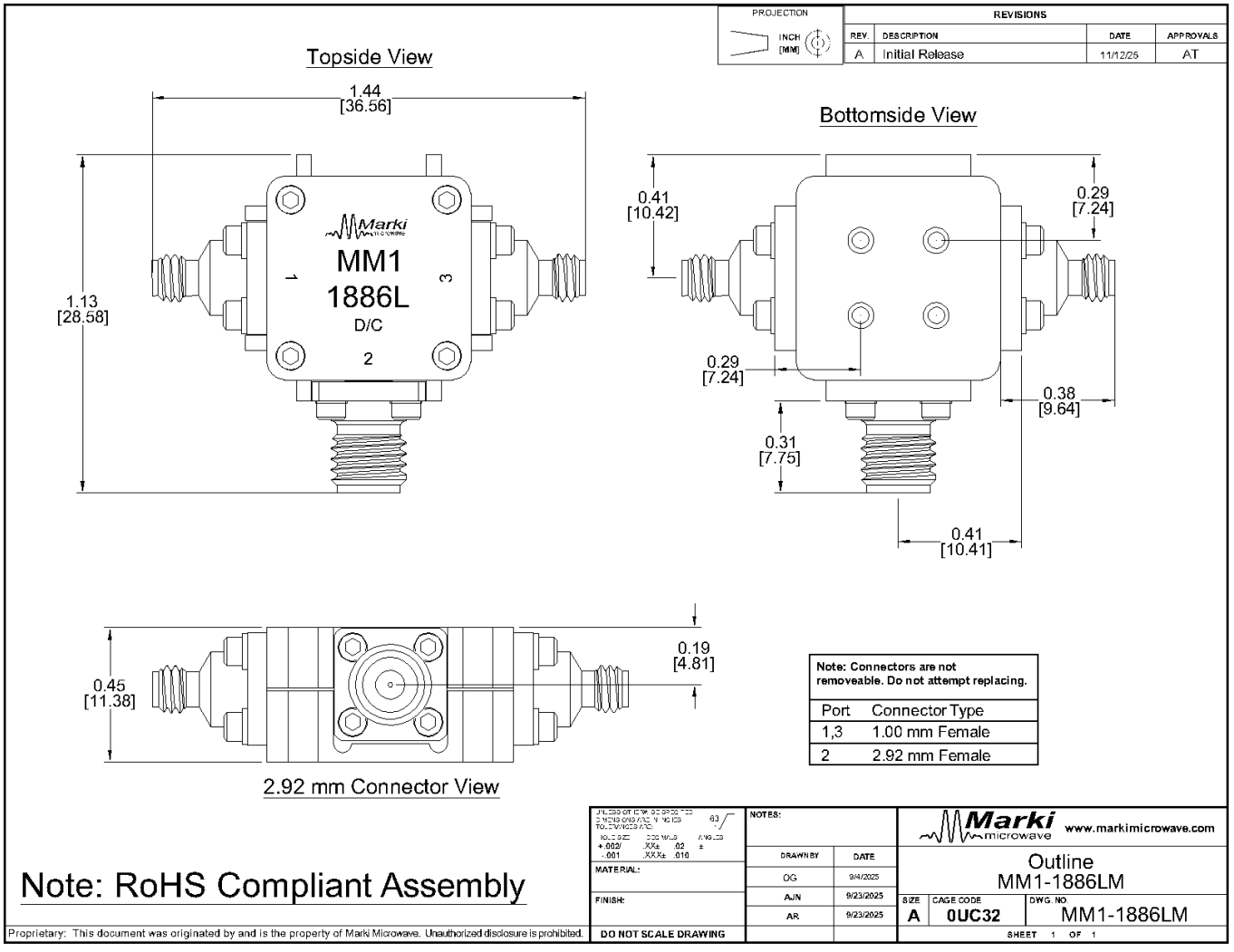
Typical Upconversion Spurious Suppression (dBc): Configuration A (Configuration B), Sine Wave LO

-10 dBm IF Input	0xLO	1xLO	2xLO	3xLO	4xLO	5xLO
1xIF	41 (23)	Reference	40 (37)	11 (11)	44 (32)	N/A
2xIF	54 (70)	66 (64)	63 (70)	69 (67)	73 (66)	74 (75)
3xIF	89 (85)	81 (83)	88 (87)	70 (67)	94 (91)	87 (84)
4xIF	92 (98)	104 (101)	96 (98)	97 (94)	100 (99)	101 (100)
5xIF	112 (109)	112 (109)	111 (107)	105 (103)	109 (106)	109 (106)

Mechanical Data

Outline Drawing

Download : Outline 2D Drawing



DISCLAIMER

MARKI MICROWAVE, LLC., (“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, LLC. All other trademarks used are the property of their respective owners.