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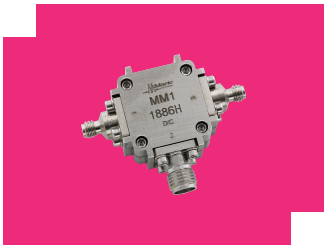
MM1-1886HM

GaAs MMIC mmWave Double Balanced Mixer

DEVICE OVERVIEW

General Description

The MM1-1886HM is a passive double balanced MMIC mixer. It features excellent 8.5 dB conversion loss, superior isolations and outstanding spurious performance across a broad 18 to 86 GHz RF/LO bandwidth. Optimized for higher LO drive levels, the MM1-1886HM delivers enhanced linearity with a minimum LO drive of +13 dBm. For a lower LO drive option, see MM1-1886LM. The MM1-1886H is available as a wire bondable chip or a connectorized package.



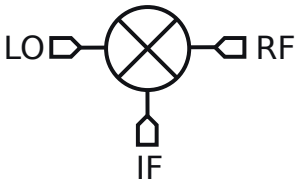
Features

- RF/LO Bandwidth, 18 to 86 GHz
- IF Bandwidth, DC to 20 GHz
- LO Drive Requirement, +13 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
MM1-1886HM	GaAs MMIC mmWave Double Balanced Mixer	M	Standard	REACH RoHS	Released	EAR99

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- **Mechanical Data**
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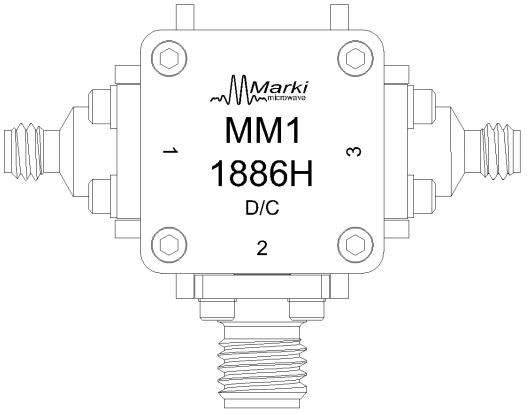
Revision History

Revision Code	Revision Date	Comment
-	2026-06-01	Initial Release

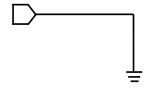
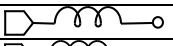
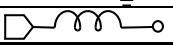
Port Configuration and Functions

Port Diagram

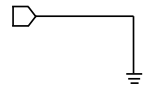
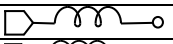
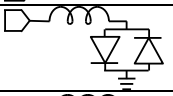
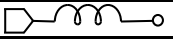


Port Functions

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	13	16	-	dBm

Electrical Specifications

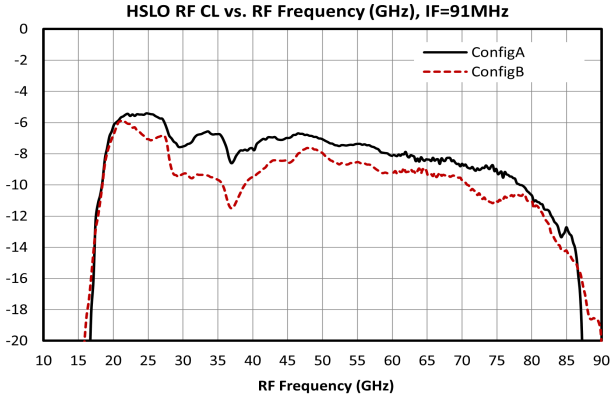
The electrical specifications apply at TA=+25°C in a 50Ω system. Typical data shown is for the connectorized M package mixer used in the forward direction with a +16 dBm sine wave input. Min and Max limits apply only to our connectorized units and are guaranteed at TA=+25°C.

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=16 dBm	-	8.5	-	dB
Conversion Loss	B	LO/RF=18-86 GHz IF=91 MHz LO drive level=16 dBm	-	10	-	dB
Input IP3	A	LO/RF=18-67 GHz IF=DC-20 GHz LO drive level=16 dBm	-	18.5	-	dBm
Input IP3	B	LO/RF=18-67 GHz IF=DC-20 GHz LO drive level=16 dBm	-	21.5	-	dBm
Input P1dB	-	LO/RF=18-86 GHz IF=DC-20 GHz LO drive level=16 dBm	-	7.5	-	dBm
LO-RF Isolation	A	LO/RF=18-86 GHz IF=91 MHz LO drive level=16 dBm	-	50	-	dB
LO-RF Isolation	B	LO/RF=18-86 GHz IF=91 MHz LO drive level=16 dBm	-	50	-	dB
LO-IF Isolation	A	LO/RF=18-86 GHz IF=91 MHz LO drive level=16 dBm	-	35	-	dB
LO-IF Isolation	B	LO/RF=18-86 GHz IF=91 MHz LO drive level=16 dBm	-	56	-	dB
RF-IF Isolation	A	LO/RF=18-86 GHz IF=91 MHz LO drive level=16 dBm	-	55	-	dB
RF-IF Isolation	B	LO/RF=18-86 GHz IF=91 MHz LO drive level=16 dBm	-	33	-	dB
Noise Figure [1]	A	LO/RF=18-86 GHz IF=91 MHz LO drive level=16 dBm	-	8.5	-	dB
Noise Figure [2]	B	LO/RF=18-86 GHz IF=91 MHz LO drive level=16 dBm	-	10	-	dB

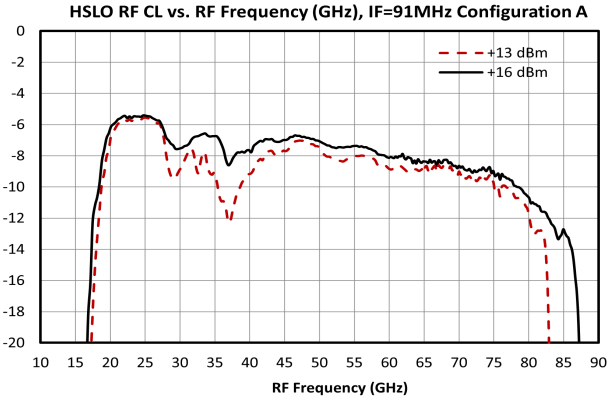
[1][2] Mixer Noise Figure typically measures within 0.5 dB of conversion loss for IF frequencies greater than 5 MHz.

Typical Performance Plots

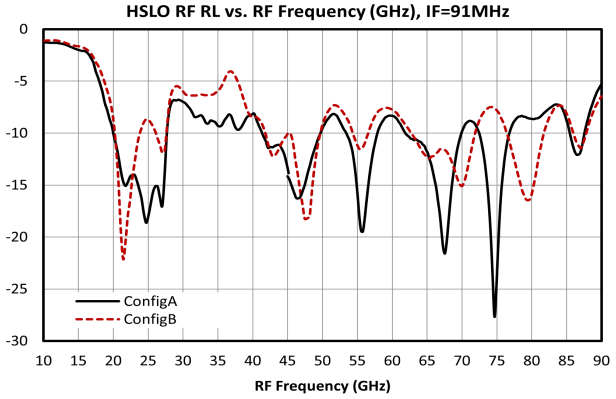
HSLO RF CL vs. RF Frequency (GHz), IF=91MHz



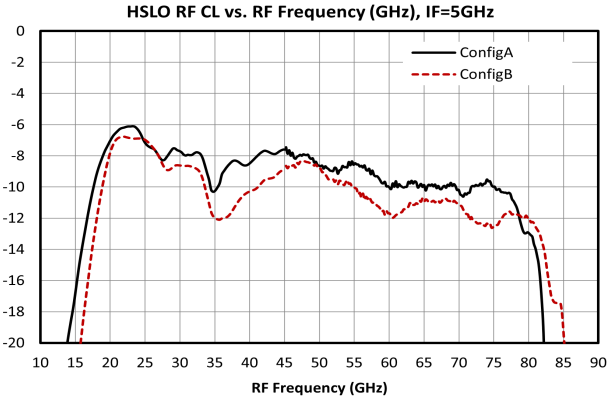
HSLO RF CL vs. RF Frequency (GHz), IF=91MHz Configuration A



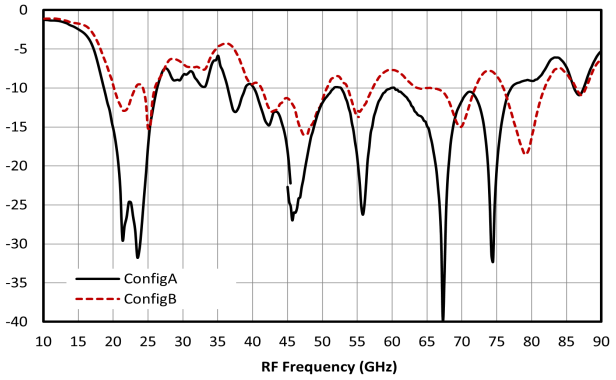
HSLO RF RL vs. RF Frequency (GHz), IF=91MHz



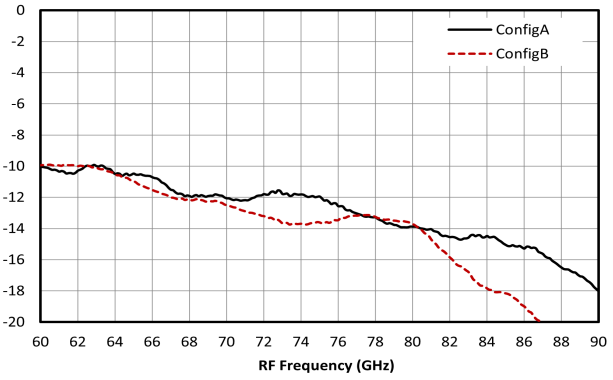
HSLO RF CL vs. RF Frequency (GHz), IF=5GHz



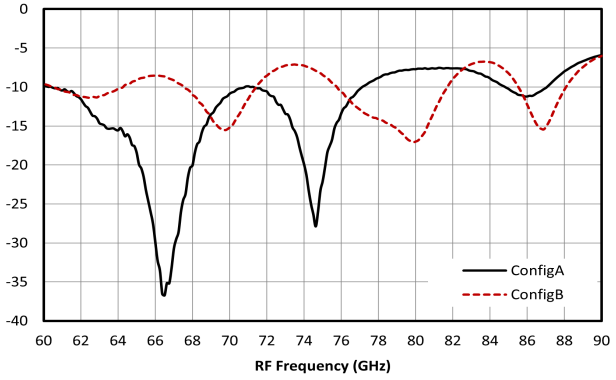
HSLO RF RL vs. RF Frequency (GHz), IF=5GHz



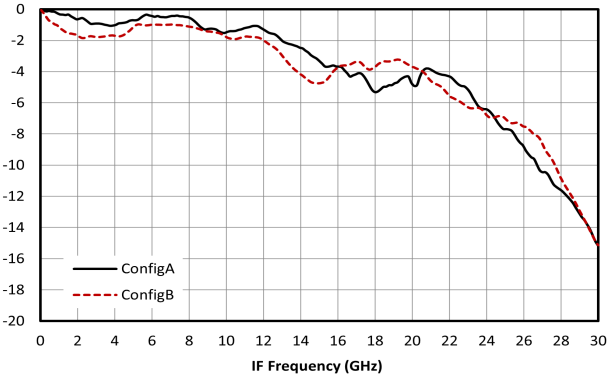
LSLO RF CL vs. RF Frequency (GHz), IF=10GHz



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



Relative IF Response, HSLO IF, RF=20GHz



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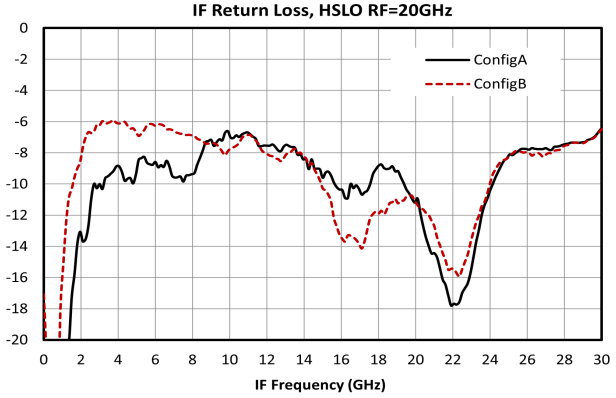
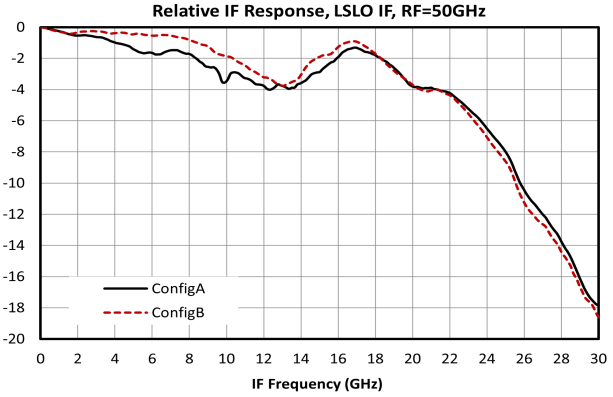
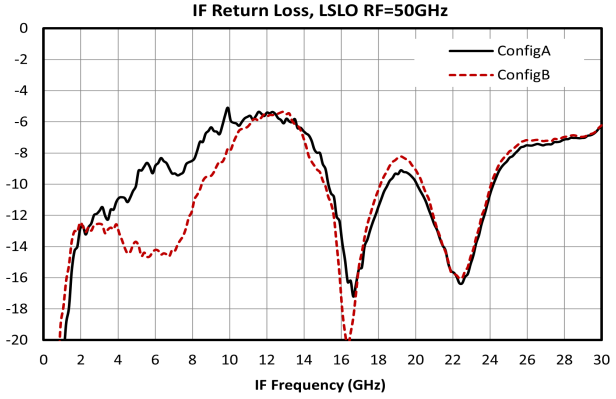
IF Return Loss, HSLO RF=20GHz



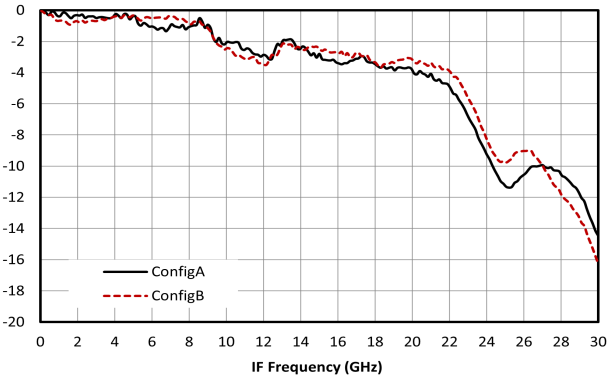
Relative IF Response, LSLO IF, RF=50GHz



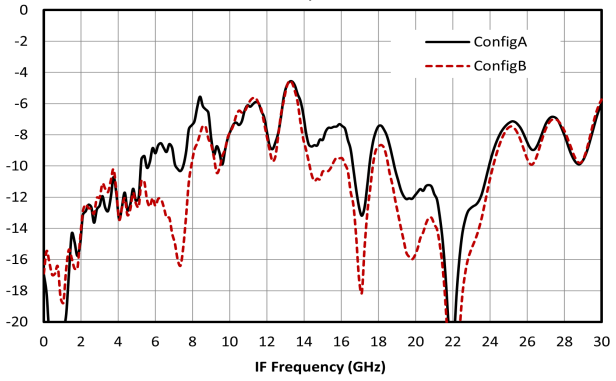
IF Return Loss, LSLO RF=50GHz



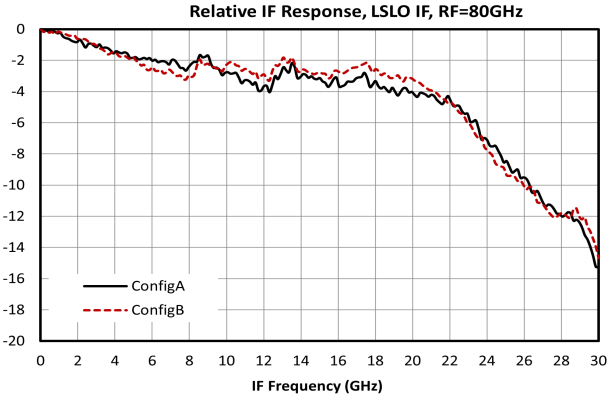
Relative IF Response, HSLO IF, RF=45GHz



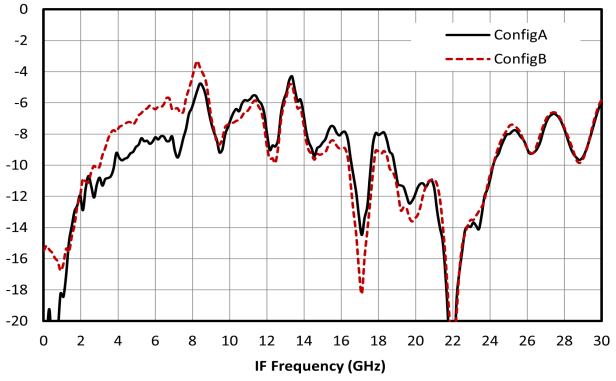
IF Return Loss, HSLO RF=45GHz



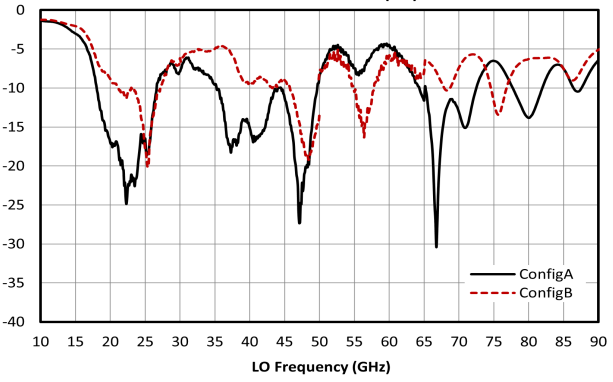
Relative IF Response, LSLO IF, RF=80GHz



IF Return Loss, LSLO RF=80GHz



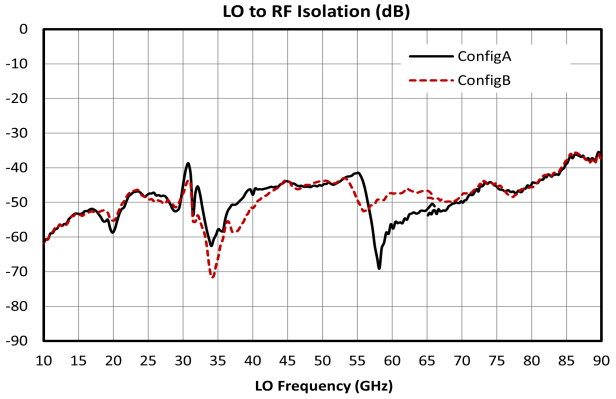
LO Return Loss (dB)



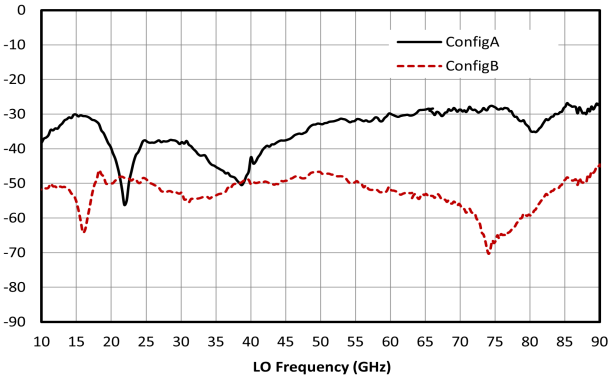
MM1-1886HM

GaAs MMIC mmWave Double Balanced Mixer

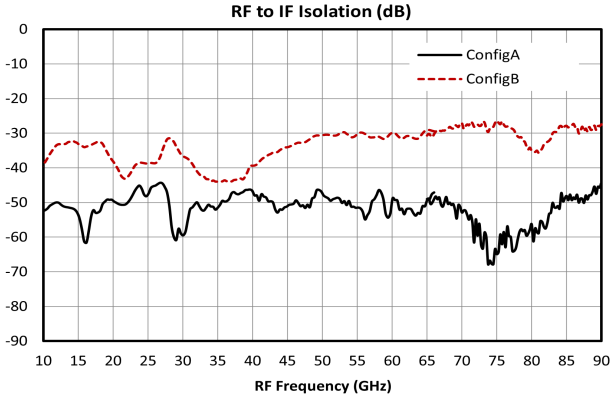
LO to RF Isolation (dB)



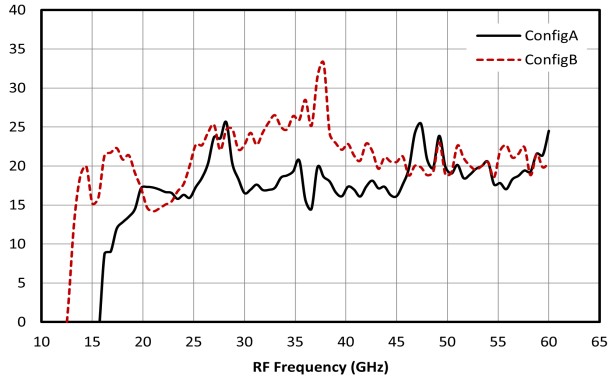
LO to IF Isolation (dB)



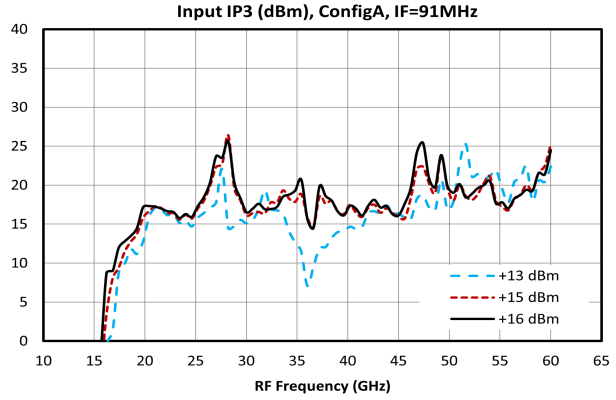
RF to IF Isolation (dB)



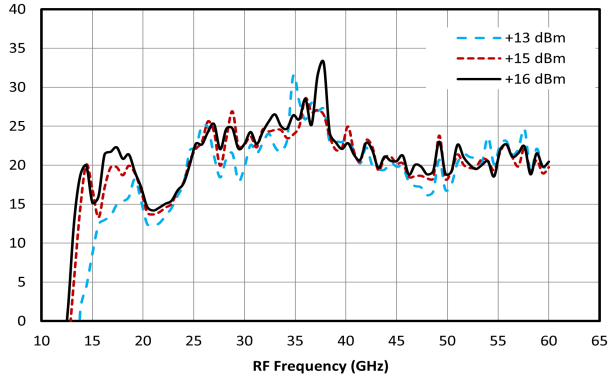
Input IP3 (dBm), IF=91MHz



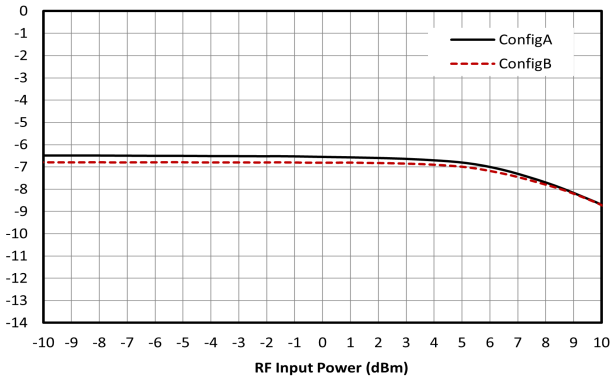
Input IP3 (dBm), ConfigA, IF=91MHz



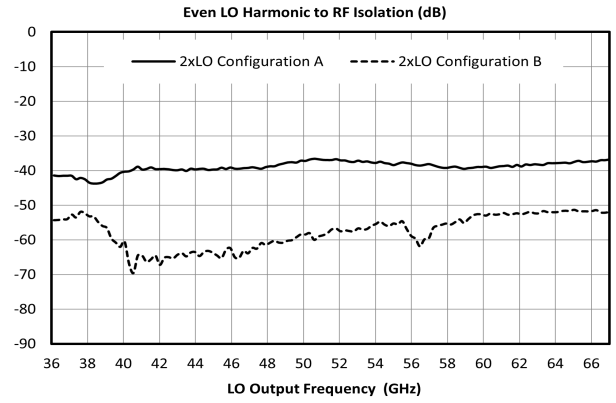
Input IP3 (dBm), ConfigB, IF=91MHz

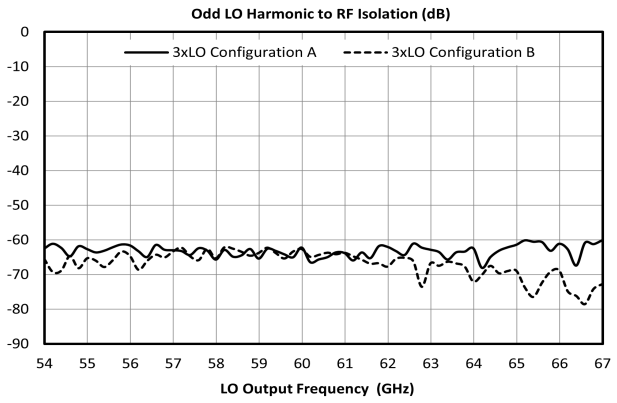


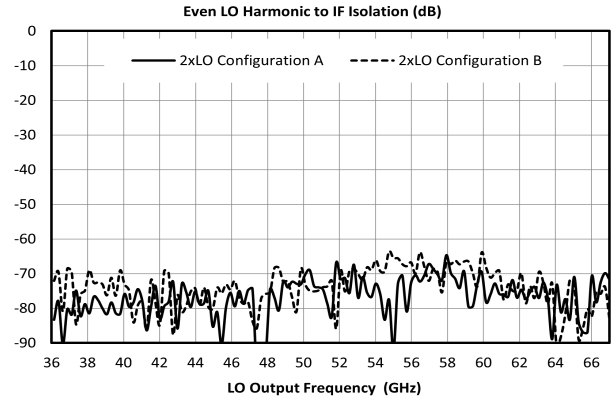
Conversion Loss (dB) vs. RF Input Power (dBm) with Fixed 20 GHz RF

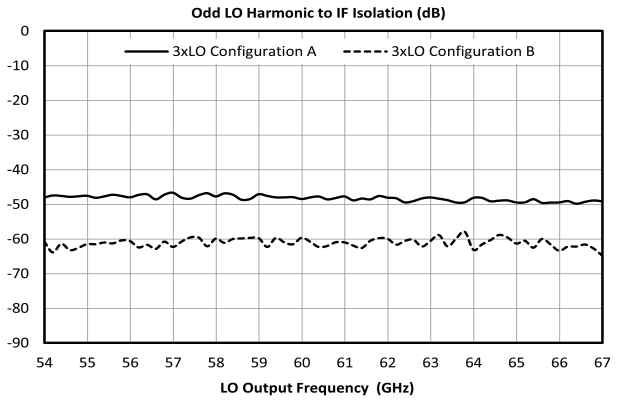


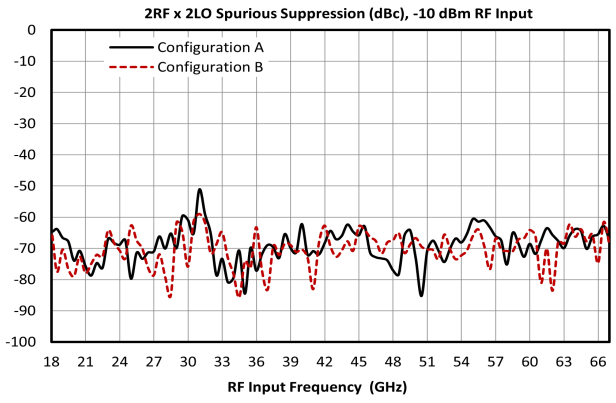
Typical Performance Plots: LO Harmonic Isolation

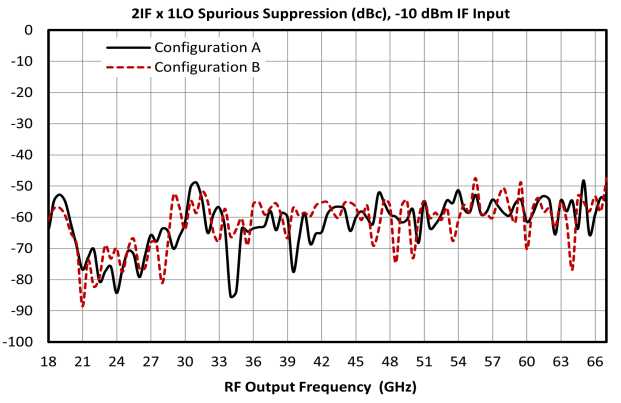












Spur Table

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	43 (23)	Reference	46 (33)	12 (13)	50 (31)	N/A
2xRF	68 (65)	65 (79)	70 (74)	63 (81)	78 (80)	63 (79)
3xRF	76 (75)	84 (88)	101 (100)	92 (94)	102 (98)	80 (88)
4xRF	92 (87)	115 (114)	110 (112)	112 (111)	113 (110)	113 (110)
5xRF	N/A	125 (121)	122 (123)	122 (120)	122 (120)	121 (121)

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 68 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 78 dBc.

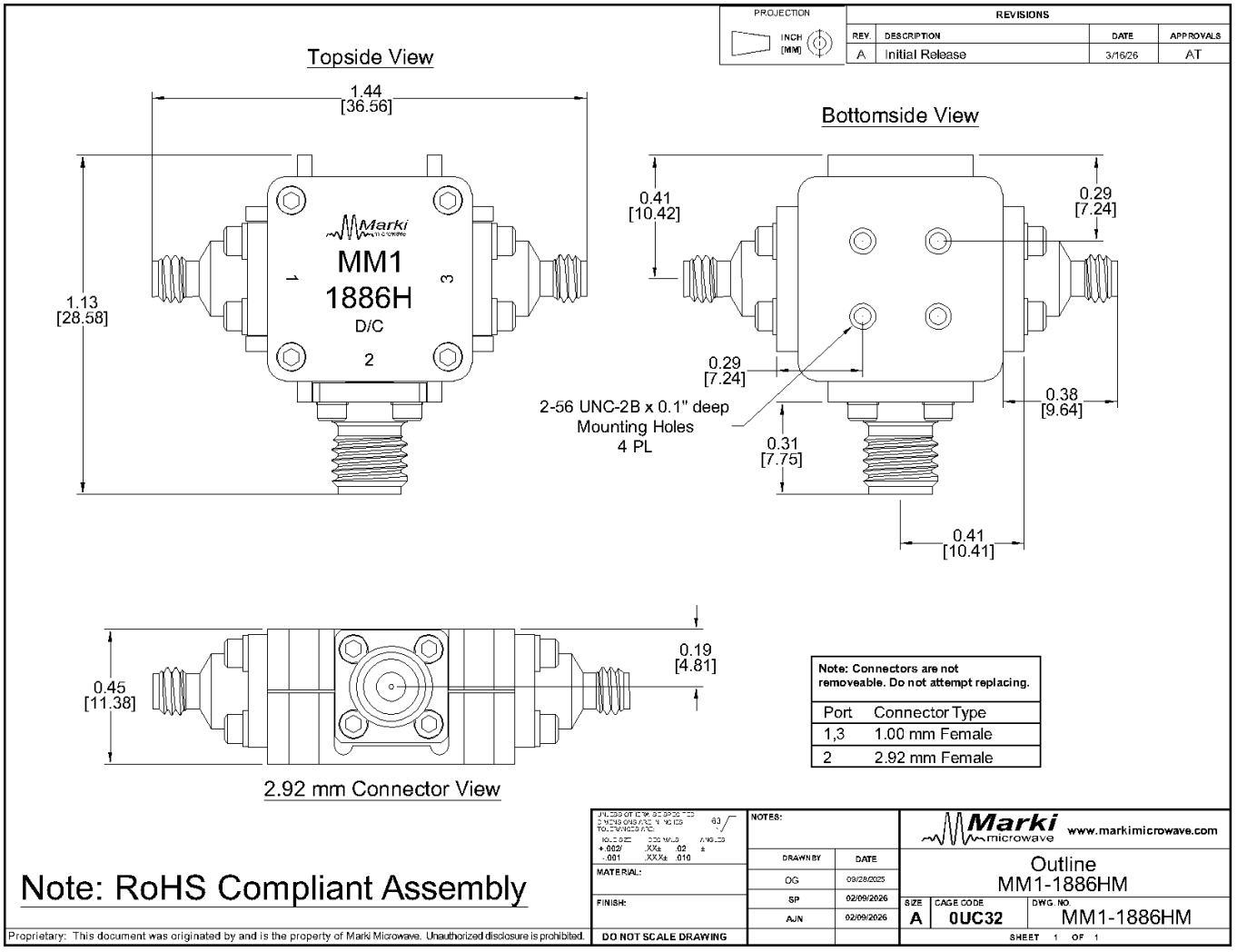
Typical Upconversion Spurious Suppression (dBc): Configuration A (Configuration B), Sine Wave LO

-10 dBm IF Input	0xLO	1xLO	2xLO	3xLO	4xLO	5xLO
1xIF	43 (23)	Reference	47 (34)	11 (11)	49 (30)	N/A
2xIF	77 (80)	68 (66)	65 (73)	70 (72)	72 (67)	75 (72)
3xIF	92 (90)	85 (86)	89 (87)	75 (77)	91 (89)	86 (86)
4xIF	99 (99)	101 (99)	97 (96)	96 (93)	101 (97)	98 (96)
5xIF	110 (110)	110 (108)	107 (105)	106 (106)	108 (108)	109 (107)

Mechanical Data

Outline Drawing

Download : Outline 2D Drawing



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