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Tech Support: support@markimicrowave.com

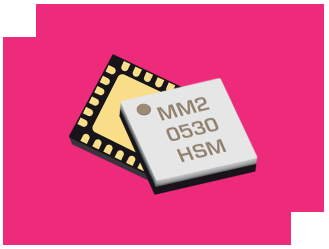
MM2N-0530HSM-01

GaAs MMIC Triple Balanced Mixer

DEVICE OVERVIEW

General Description

The MM2N-0530HSM-01 is a passive MMIC triple balanced mixer. It features a broadband IF port that spans from 2 to 20 GHz, and has excellent spurious suppression. GaAs MMIC technology improves upon the previous generation of hand assembled, hybrid M2 triple balanced mixers with improved isolations, unit-to-unit repeatability and reliability. The MM2N-0530HSM-01 is 4x4 mm QFN packaged. Evaluation boards are available.



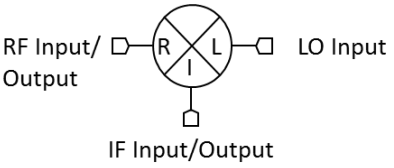
Features

- Broadband IF Port
- Typical Input 1 dB Compression of +15 dBm
- High Input IP3 of +21 dBm
- Excellent LO to RF Isolation
- Unit-to-Unit Repeatability
- RoHS Compliant

Applications

N/A

Functional Block Diagram



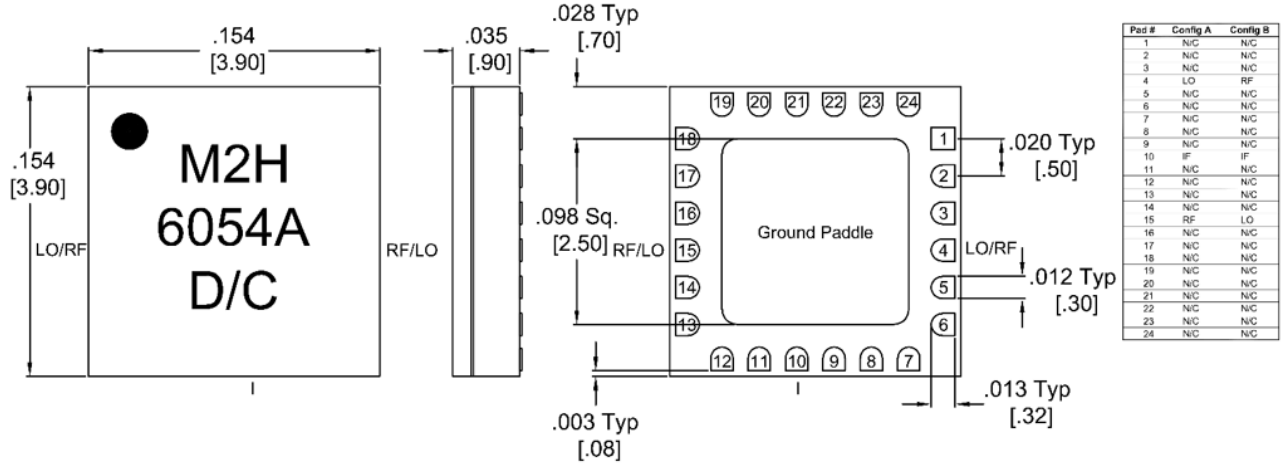
Part Ordering Options

Part Number	Description	Package	Green Status	Product Lifecycle	Export Classification
MM2N-0530HSM-01	GaAs MMIC Triple Balanced Mixer	QFN	REACH RoHS	Released	EAR99

Table Of Contents

Port Configuration and Functions

Port Diagram

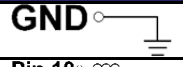
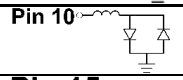
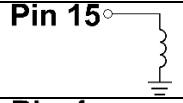
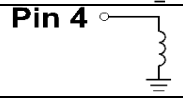


Outline Drawing – 4mm QFN package

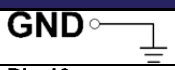
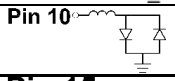
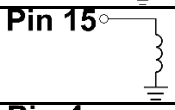
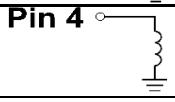
1. Substrate material is Ceramic.
2. I/O leads and Die Paddle are: Ni: 8.89um MAX 1.27um MIN. Pd : 0.17um MAX 0.07um MIN. Au : 0.254um MAX 0.03um MIN
3. All unconnected pads should be connected to PCB RF ground

Port Functions

Configuration A

Port	Function	Description	Equivalent Circuit for Package
GND	Ground	SM package ground path is provided through the ground paddle.	
Pin 10	IF	Pin 10 is DC coupled to the diodes. Blocking capacitor is optional.	
Pin 15	RF	Pin 15 is DC short and AC matched to 50 Ω from 5 to 30 GHz. Blocking capacitor is optional.	
Pin 4	LO	Pin 4 is DC short and AC matched to 50 Ω from 5 to 30 GHz. Blocking capacitor is optional.	

Configuration B

Port	Function	Description	Equivalent Circuit for Package
GND	Ground	SM package ground path is provided through the ground paddle.	
Pin 10	IF	Pin 10 is DC coupled to the diodes. Blocking capacitor is optional.	
Pin 15	LO	Pin 15 is DC short and AC matched to 50 Ω from 5 to 30 GHz. Blocking capacitor is optional.	
Pin 4	RF	Pin 4 is DC short and AC matched to 50 Ω from 5 to 30 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
Pin 10 DC Current	15	mA
Pin 15 DC Current	24	mA
Pin 4 DC Current	21	mA
RF Power Handling (RF+LO), 100°C	20	dBm
RF Power Handling (RF+LO), 25°C	28	dBm

Package Information

Parameter	Details	Rating
Dimensions	-	4 x 4 mm
Moisture Sensitivity Level	-	MSL 1

Recommended Operating Conditions

Parameter	Min	Nominal	Max	Unit
LO Input Power	16	-	22	-

Electrical Specifications

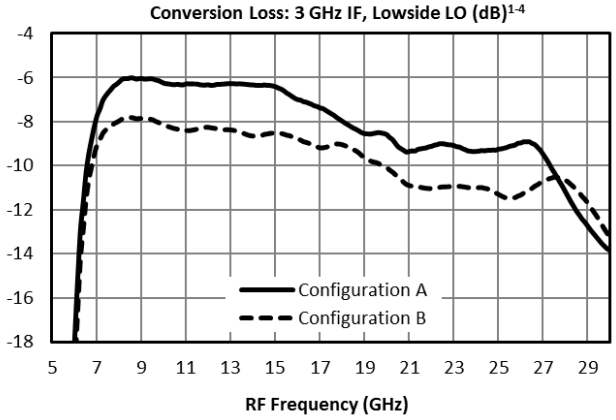
The electrical specifications apply at TA=+25°C in a 50Ω system. Min and Max limits are guaranteed between TA=-50°C and TA=+100°C.

Parameter	Port Configuration	Test Conditions	Min	Typ	Max	Unit
Conversion Loss [1]	A	LO/RF=5-30 GHz IF=2-20 GHz LO Drive Level= 20	-	8	-	dB
Input 1 dB Compression	A	LO/RF=5-30 GHz IF=2-20 GHz LO Drive Level= 16-22	-	14	-	dBm
Input IP3 [2]	A	LO/RF=5-30 GHz IF=2-20 GHz LO Drive Level= 16-22	-	21	-	dBm
Conversion Loss [3]	B	LO/RF=5-30 GHz IF=2-20 GHz LO Drive Level= 20	-	9	-	dB
Input 1 dB Compression	B	LO/RF=5-30 GHz IF=2-20 GHz LO Drive Level= 16-22	-	19	-	dBm
Input IP3 [4]	B	LO/RF=5-30 GHz IF=2-20 GHz LO Drive Level= 16-22	-	28	-	dBm
IF Frequency Range	-	-	2	-	20	GHz
Isolation, LO to RF	-	-	-	40	-	dB
LO Frequency Range	-	-	5	-	30	GHz
RF Frequency Range	-	-	5	-	30	GHz

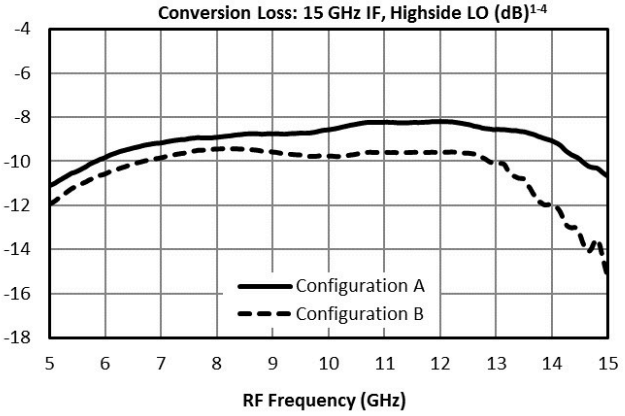
[1][3] Measured Conversion Loss measured at 3 GHz fixed IF
[2][4] IP3 depends on LO drive conditions, see plots for more details

Typical Performance

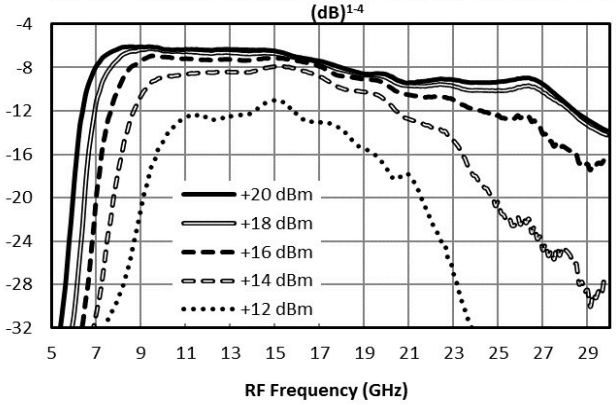
Conversion Loss: 3 GHz IF, Lowside LO (dB)[1-4]



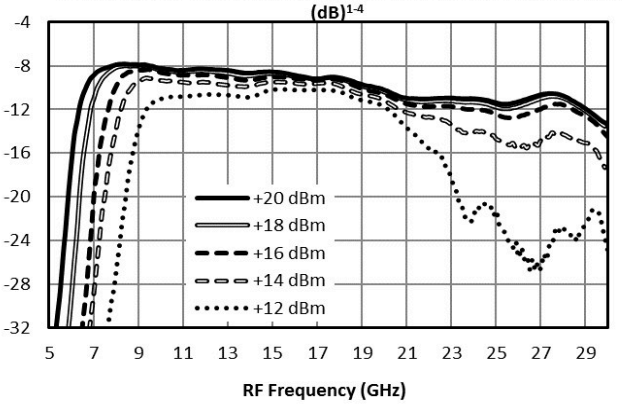
Conversion Loss: 15 GHz IF, Highside LO (dB)[1-4]



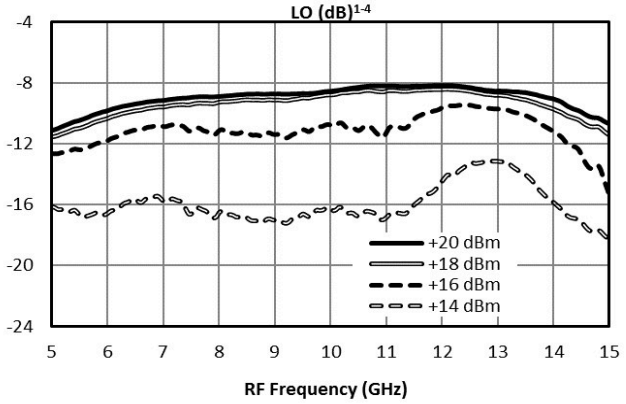
Configuration A Conversion Loss vs. LO Power: 3 GHz IF, Lowside LO (dB)[1-4]



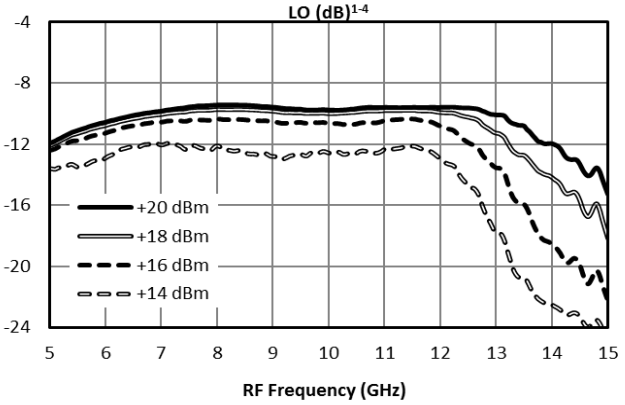
Configuration B Conversion Loss vs. LO Power: 3 GHz IF, Lowside LO (dB)[1-4]



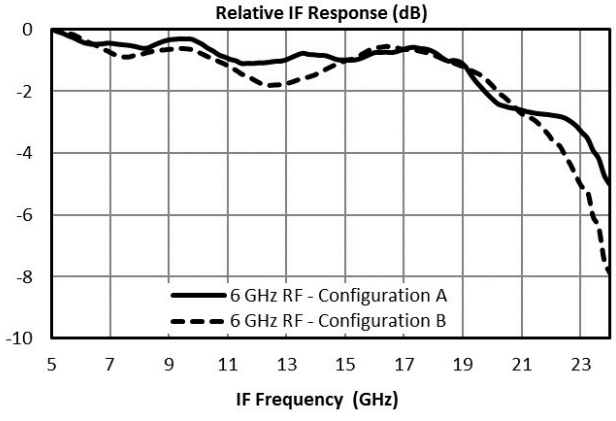
Configuration A Conversion Loss vs. LO Power: 15 GHz IF, Highside LO (dB)[1-4]



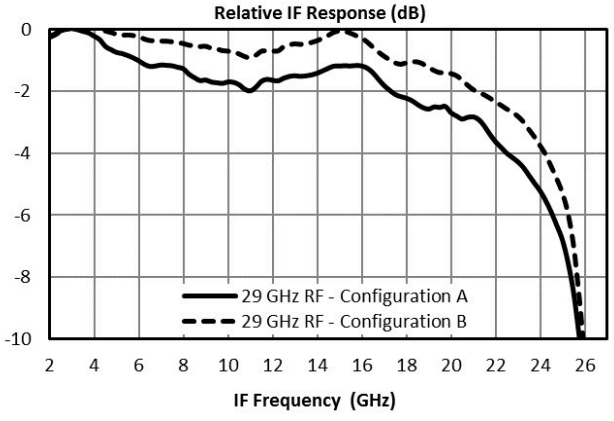
Configuration B Conversion Loss vs. LO Power: 15 GHz IF, Highside LO (dB)[1-4]

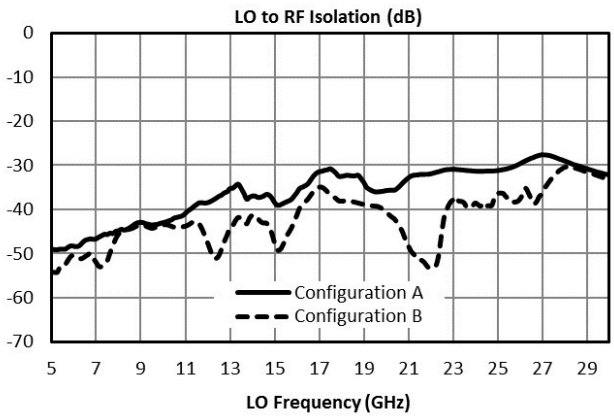


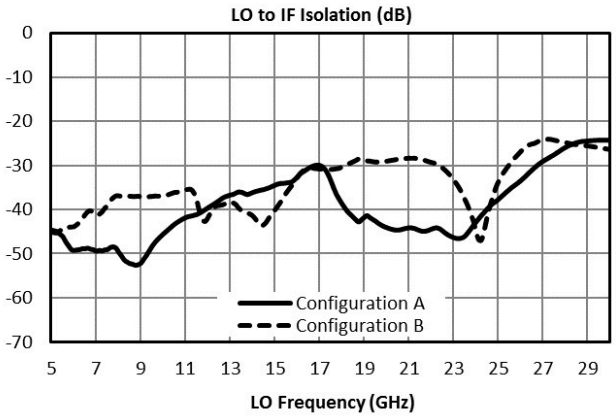
Relative IF Response (dB)

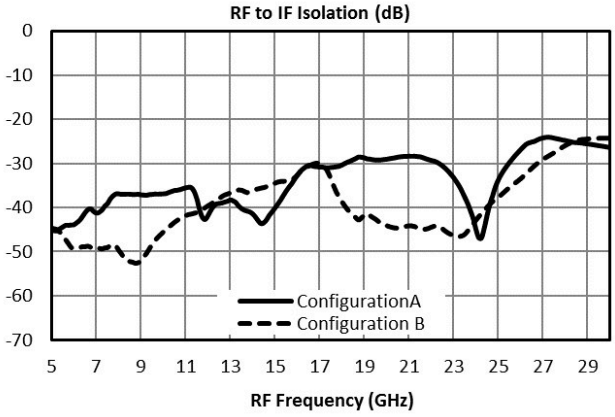


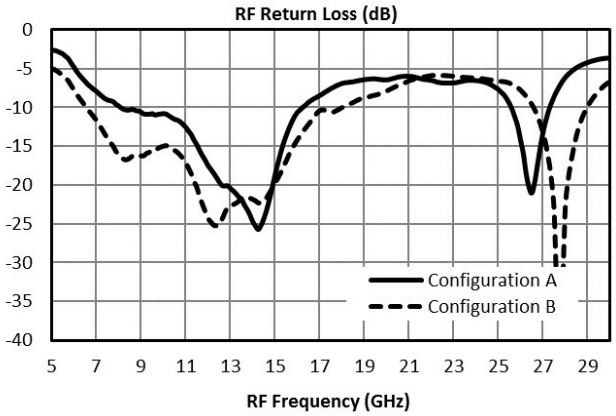
Relative IF Response (dB)

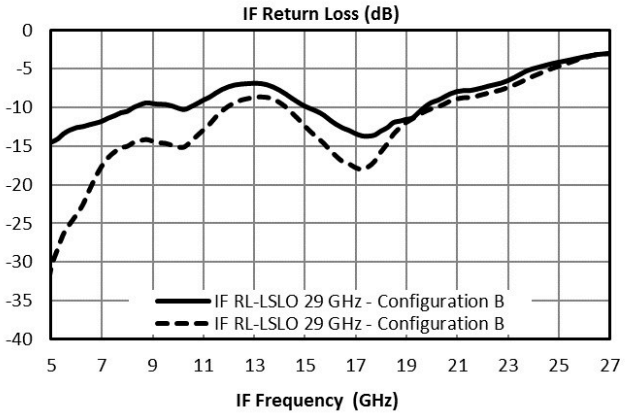


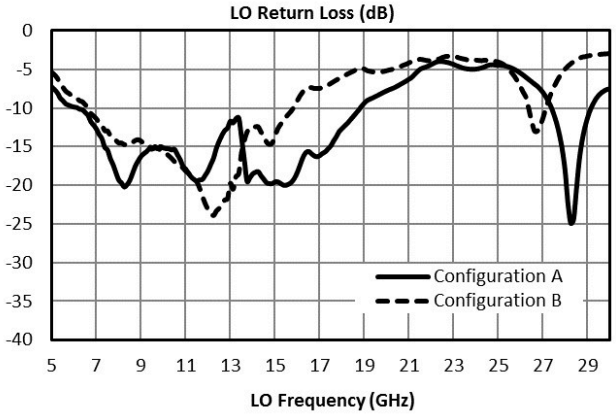


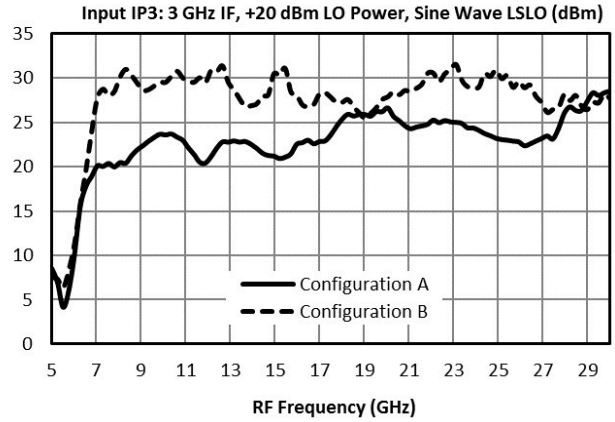


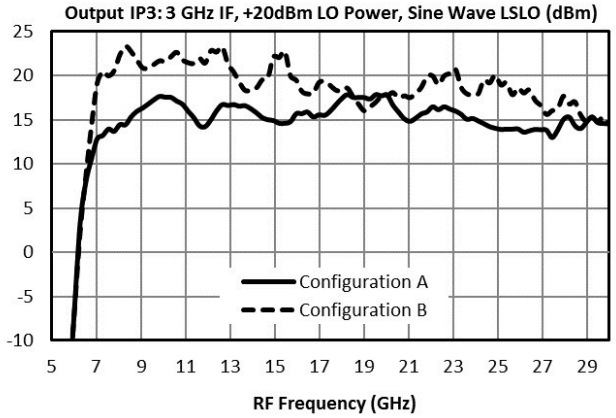




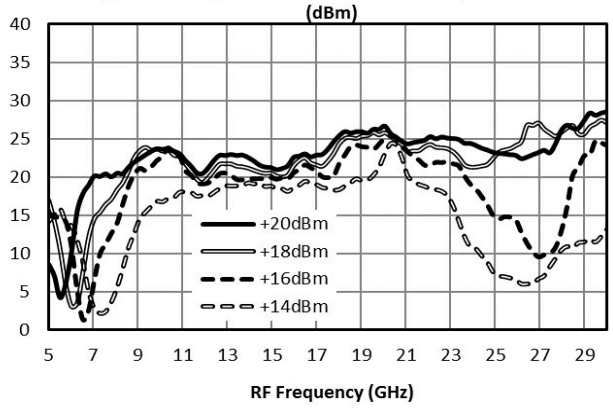




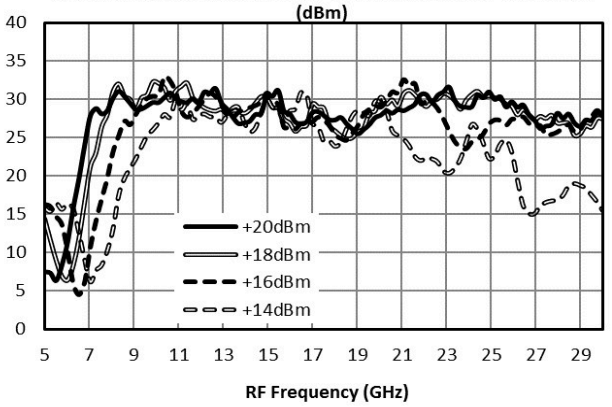




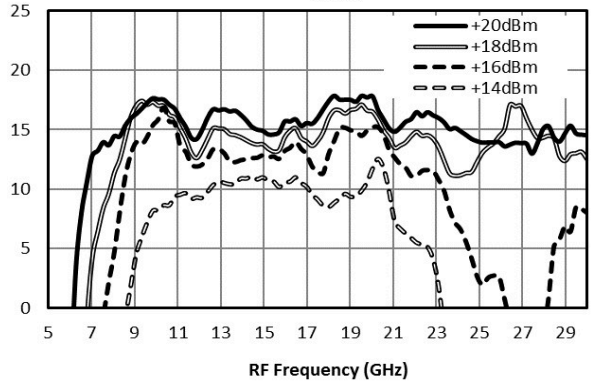
Configuration A Input IP3 vs LO Power: 3 GHz IF, Sine Wave LSLO (dBm)



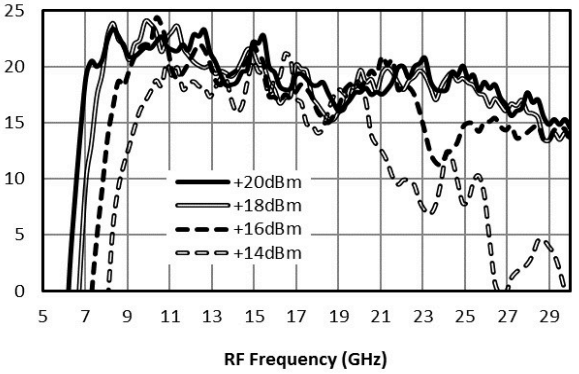
Configuration B Input IP3 vs LO Power: 3 GHz IF, Sine Wave LSLO (dBm)



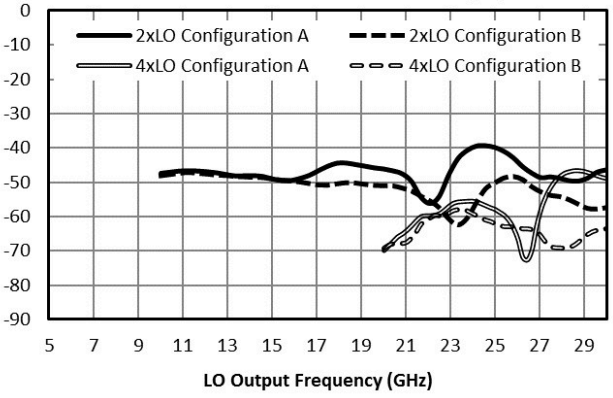
Configuration A Output IP3 vs LO Power: 3 GHz IF, Sine Wave LSLO (dBm)



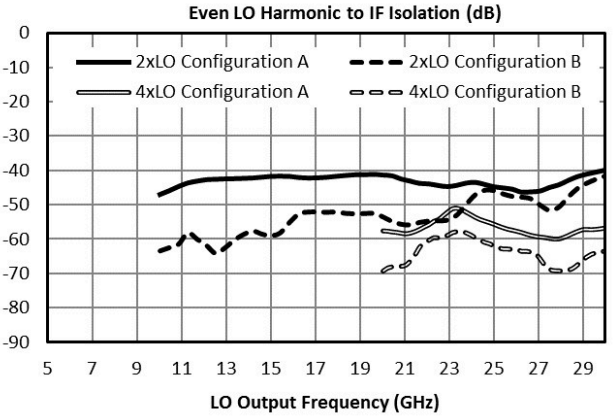
Configuration B Output IP3 vs LO Power: 3 GHz IF, Sine Wave LSLO (dBm)



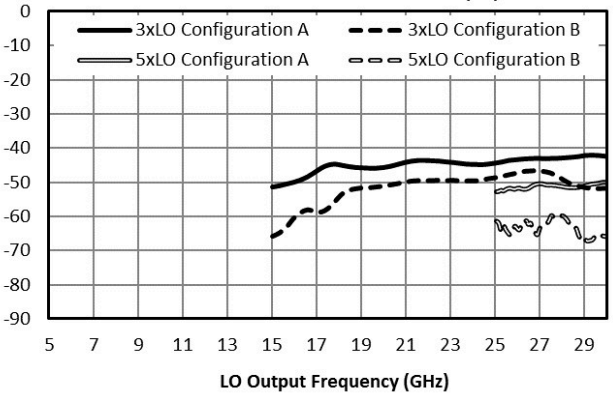
Even LO Harmonic to RF Isolation (dB)



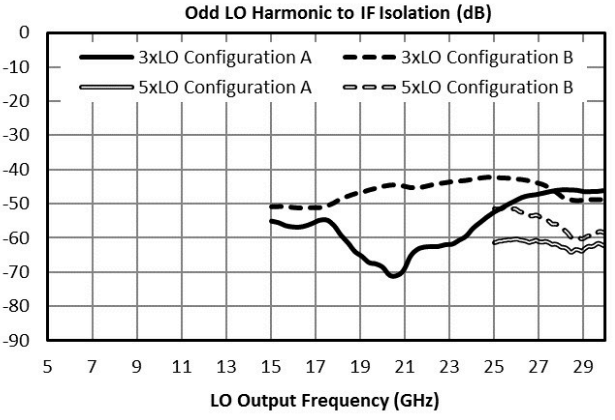
Even LO Harmonic to IF Isolation (dB)

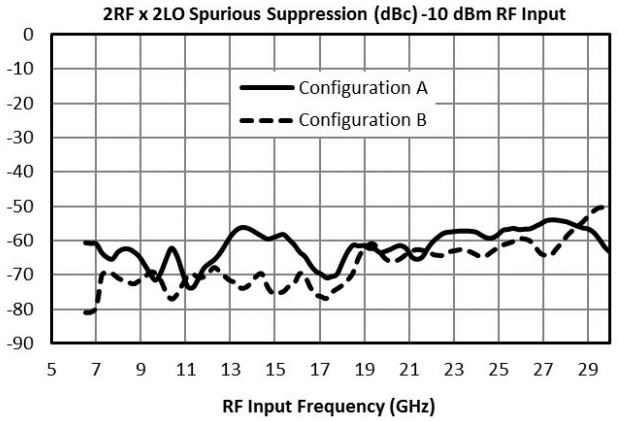


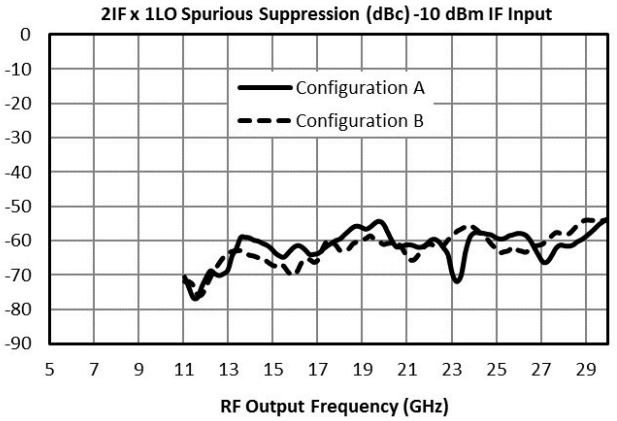
Odd LO Harmonic to RF Isolation (dB)



Odd LO Harmonic to IF Isolation (dB)







Spur Table

Downconversion Spurious Suppression

Spurious data is taken by selecting RF and LO frequencies (+mLO+nRF) within the 5 to 30 GHz RF/LO bands, which create a 3 GHz 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 62 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 72 dBc.

Typical Downconversion Spurious Suppression (dBc): A Configuration (B Configuration), Sine Wave LO [5]

-10 dBm RF Input	0xLO	1xLO	2xLO	3xLO	4xLO	5xLO
1xRF	27 (30)	Reference	33 (41)	18 (13)	35 (43)	25 (28)
2xRF	72 (69)	62 (61)	62 (67)	63 (66)	66 (72)	71 (72)
3xRF	107 (102)	74 (80)	95 (95)	78 (84)	96 (102)	79 (87)
4xRF	155 (152)	88 (123)	123 (124)	119 (126)	117 (127)	120 (127)
5xRF	174 (172)	138 (142)	148 (152)	136 (146)	146 (152)	143 (149)

Specifications are subject to change without notice. Contact Marki Microwave for the most recent specifications and data sheets.

Upconversion Spurious Suppression

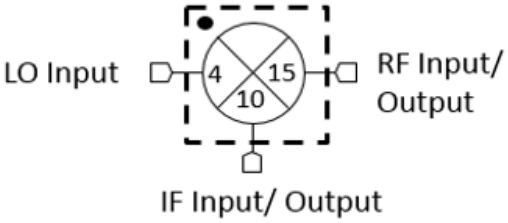
Spurious data is taken by mixing a 3 GHz IF with LO frequencies (+mLO+nIF), which creates an RF within the 5 to 30 GHz RF band. The mixer is swept across the full spurious output band and the mean is calculated. The numbers shown in the table below are for a -10 dBm IF input. Spurious suppression is scaled for different IF input power levels by (n-1), where "n" is the IF spur order. For example, the 2IFx1LO spur is typically 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 [5]

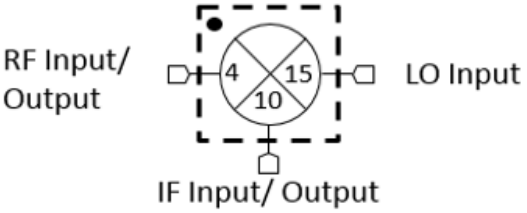
-10 dBm IF Input	0xLO	1xLO	2xLO	3xLO	4xLO	5xLO
1xIF	30 (34)	Reference	34 (34)	13 (12)	35 (35)	23 (20)
2xIF	77 (73)	62 (62)	63 (62)	63 (67)	72 (69)	59 (65)
3xIF	109 (110)	89 (90)	100 (103)	82 (87)	96 (107)	82 (85)
4xIF	126 (122)	113 (119)	115 (119)	120 (125)	124 (125)	113 (125)
5xIF	145 (154)	130 (140)	141 (152)	132 (148)	141 (145)	124 (139)

Specifications are subject to change without notice. Contact Marki Microwave for the most recent specifications and data sheets.

Application Circuit



Configuration A

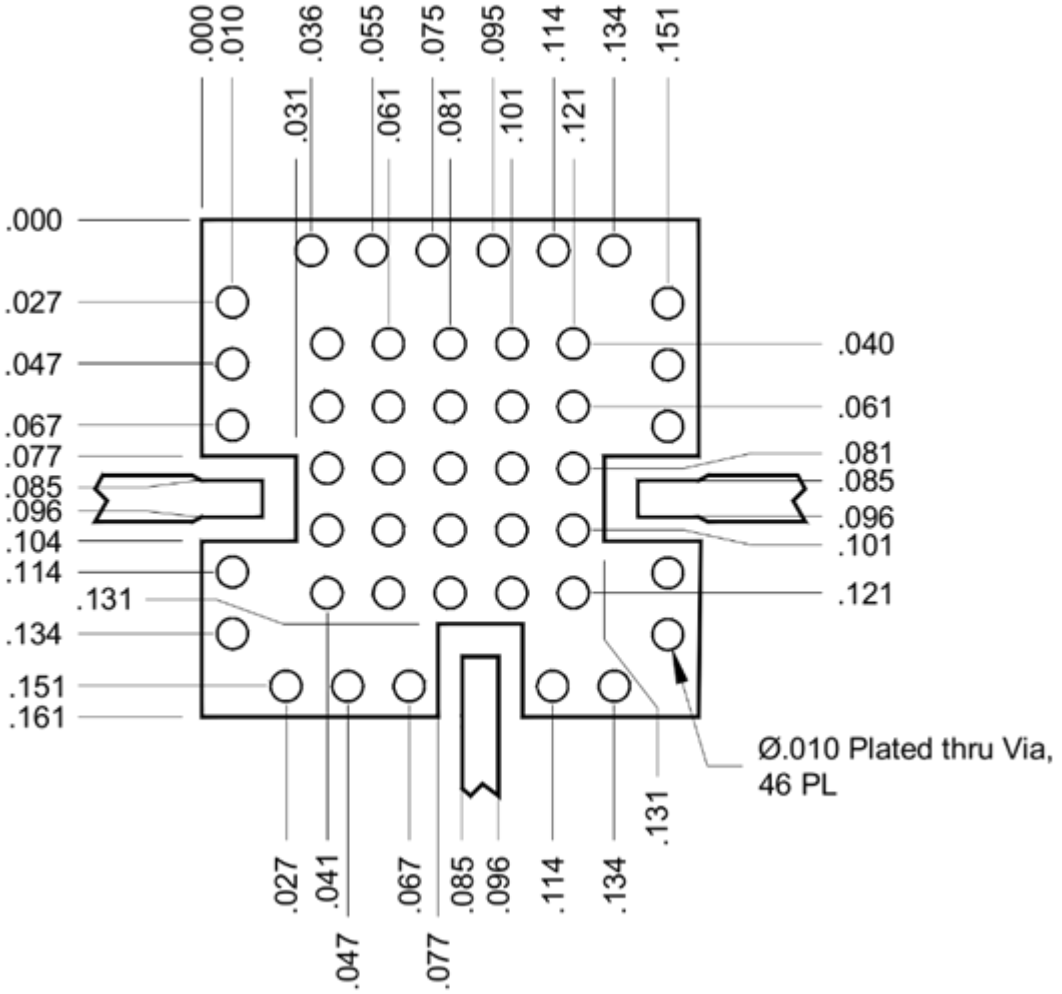


Configuration B

Application Circuit Description

Configuration A/B refer to the same part number (MM2N-0530HSM-01) used in one of two different ways for optimal spurious performance. For the lowest conversion loss, use the mixer in Configuration A (pin 4 as the LO input, pin 15 as the RF input or output). If you need to use a lower LO drive, use the mixer in Configuration B (pin 4 as the RF input or output, pin 15 as the LO input). For optimal spurious suppression, experimentation or simulation is required to choose between Configuration A and B.

Footprint Image



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