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Sales & Customer Support: sales@markimicrowave.com
Tech Support: support@markimicrowave.com

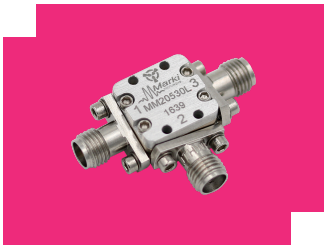
MM2-0530LS

GaAs MMIC Triple Balanced Mixer

DEVICE OVERVIEW

General Description

The MM2-0530L 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 MM2-0530L is available as a wire bondable chip or connectorized SMA package.



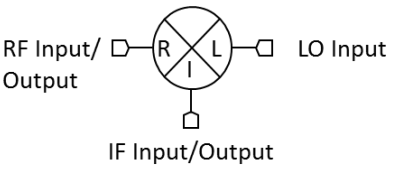
Features

- Broadband IF Port
- Typical Input 1 dB Compression of +8 dBm
- High Input IP3 of +19 dBm
- Excellent LO to IF Isolation
- Unit-to-Unit Repeatability
- RoHS Compliant

Applications

N/A

Functional Block Diagram



Part Ordering Options

Part Number	Description	Package	Connectors	Green Status	Product Lifecycle	Export Classification
MM2-0530LS	GaAs MMIC Triple Balanced Mixer	S	Standard	REACH RoHS	Released	EAR99

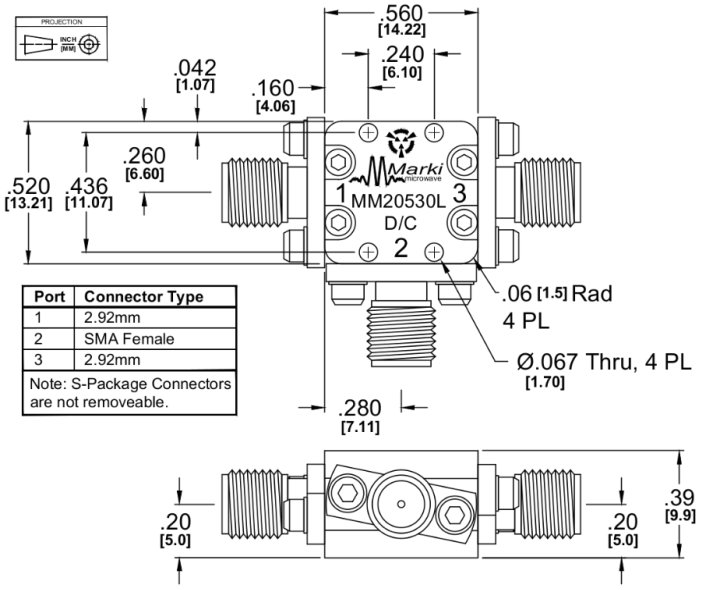
Table Of Contents

Revision History

Revision Code	Revision Date	Comment
-	2016-01-01	Initial Release
A	2026-02-13	MTTF Table Added

Port Configuration and Functions

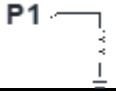
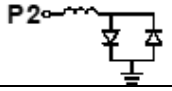
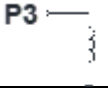
Port Diagram



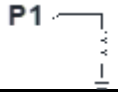
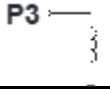
Port	Connector Type
1	2.92mm
2	SMA Female
3	2.92mm
Note: S-Package Connectors are not removeable.	

Port Functions

Configuration A

Port	Function	Connector Type	Description	DC Equivalent Circuit
Port 1	LO	2.92F	Port 1 is DC short and AC matched to 50 Ω from 5 to 30 GHz. Blocking capacitor is optional.	
Port 2	IF	SMAF	Port 2 is DC coupled to the diodes. Blocking capacitor is optional.	
Port 3	RF	2.92F	Port 3 is DC short and AC matched to 50 Ω from 5 to 30 GHz. Blocking capacitor is optional.	

Configuration B

Port	Function	Connector Type	Description	DC Equivalent Circuit
Port 1	RF	2.92F	Port 1 is DC short and AC matched to 50 Ω from 5 to 30 GHz. Blocking capacitor is optional.	
Port 2	IF	SMAF	Port 2 is DC coupled to the diodes. Blocking capacitor is optional.	-
Port 3	LO	2.92F	Port 3 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
Port 1 DC Current	21	mA
Port 2 DC Current	15	mA
Port 3 DC Current	24	mA
RF Power Handling (RF+LO), 100°C	20	dBm
RF Power Handling (RF+LO), 25°C	25	dBm

FIT and MTTF Table

T (°C)	λ (TIF)	MTTF (hr)	MTTF (yr)
125	6,494.37	153,980	17.57757
85	644.3396	1,551,977	177.1663
55	78.70691	1.3E+07	1,450.384
40	23.6513	4.2E+07	4,826.595
25	6.297343	1.6E+08	18,127.53

Package Information

Parameter	Details	Rating
ESD	250 to < 500 Volts	HBM Class 1A
Dimensions	-	14.22 x 13.21mm

Recommended Operating Conditions

Parameter	Min	Nominal	Max	Unit
LO Input Power	9	-	17	-

Electrical Specifications

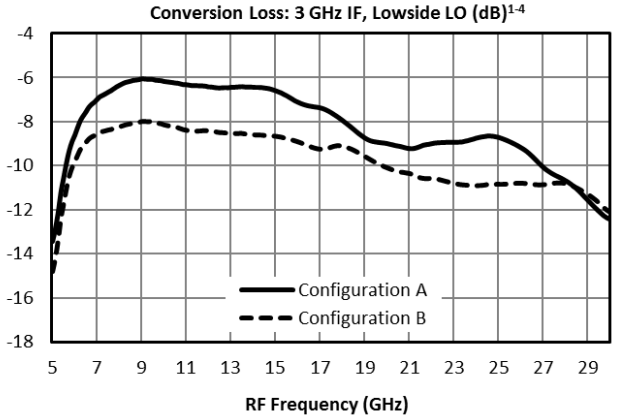
Specifications guaranteed from -55 to +100°C, measured in a 50Ω system. Specifications are shown for Configurations A (B). RF testing is performed on a sample basis to verify conformance to datasheet guaranteed specifications. Consult factory for more information.

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=15	-	9	-	dB
Input IP3 [2]	A	LO/RF=5-30 GHz IF=2-20 GHz LO Drive Level= 9-17	-	15	-	dBm
Input P1dB	A	LO/RF=5-30 GHz IF=2-20 GHz LO Drive Level= 9-17	-	8	-	dBm
LO-RF Isolation	A	-	-	44	-	dB
Conversion Loss [3]	B	LO/RF=5-30 GHz IF=2-20 GHz LO Drive Level=15	-	10	-	dB
Input IP3 [4]	B	LO/RF=5-30 GHz IF=2-20 GHz LO Drive Level= 9-17	-	19	-	dBm
Input P1dB	B	LO/RF=5-30 GHz IF=2-20 GHz LO Drive Level= 9-17	-	10	-	dBm
IF Frequency Range	-	-	2	-	20	GHz
LO Frequency Range	-	-	5	-	30	GHz
RF Frequency Range	-	-	5	-	30	GHz

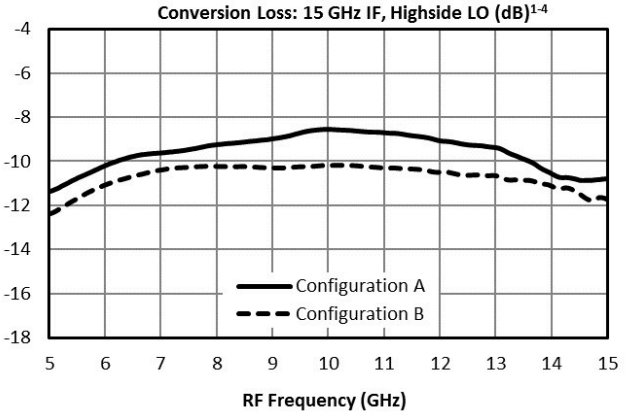
[1][3] Measured Conversion Loss measured at 3 GHz fixed IF
[2][4] IP3 depends on LO drive conditions, see plots for more details

Typical Performance

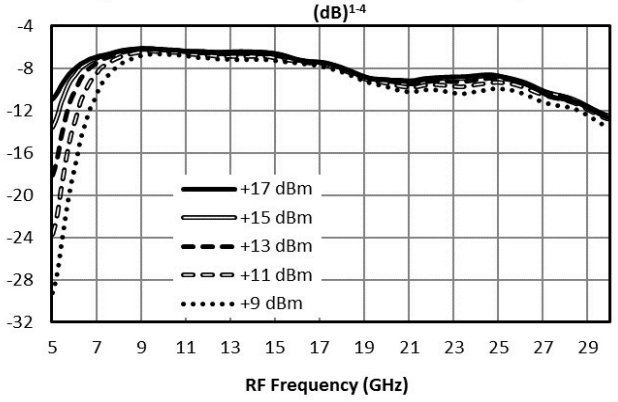
Conversion Loss: 3 GHz IF, Lowside LO (dB)[1-4]



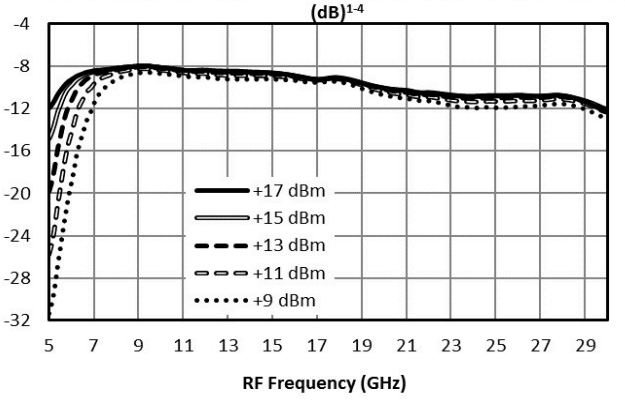
Conversion Loss: 15 GHz IF, Highside LO (dB)[1-4]



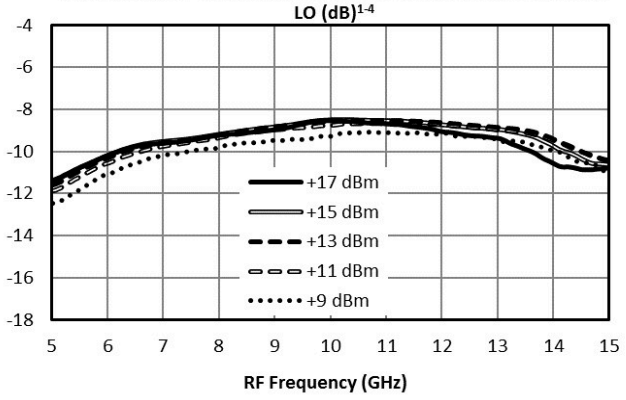
Configuration A Conversion Loss vs. LO Power: 3 GHz IF, Lowside LO (dB)[1-4]



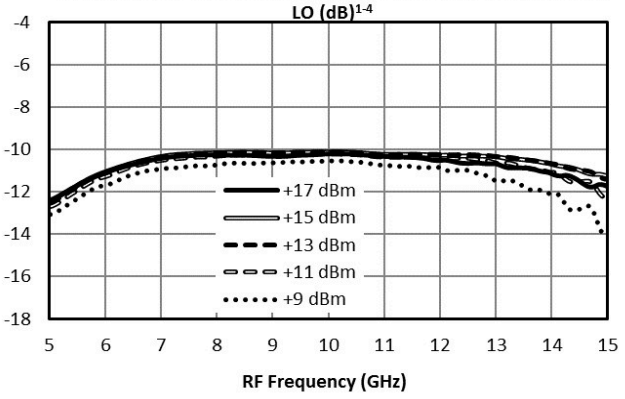
Configuration B Conversion Loss vs. LO Power: 3 GHz IF, Lowside LO (dB)[1-4]



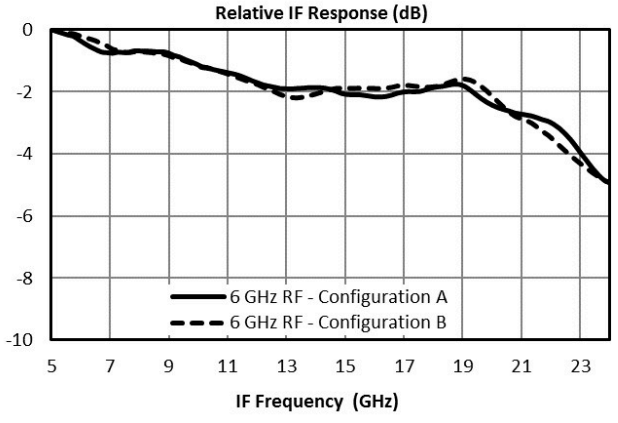
Configuration A Conversion Loss vs. LO Power: 15 GHz IF, Highside LO (dB)[1-4]



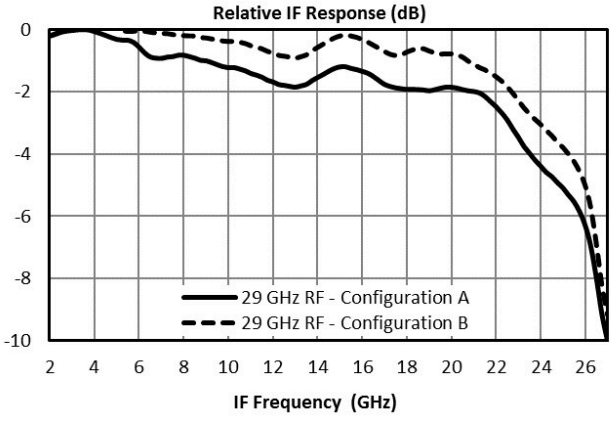
Configuration B Conversion Loss vs. LO Power: 15 GHz IF, Highside LO (dB)[1-4]



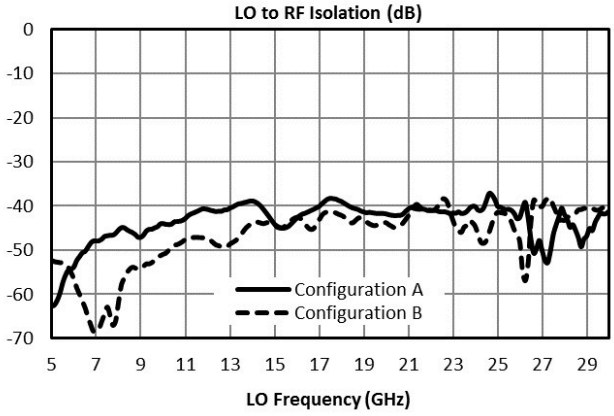
Relative IF Response (dB)



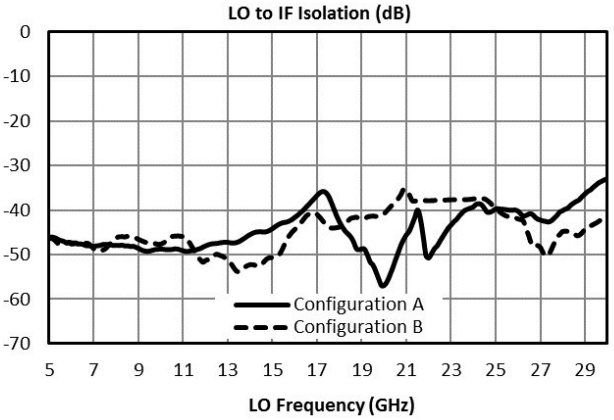
Relative IF Response (dB)



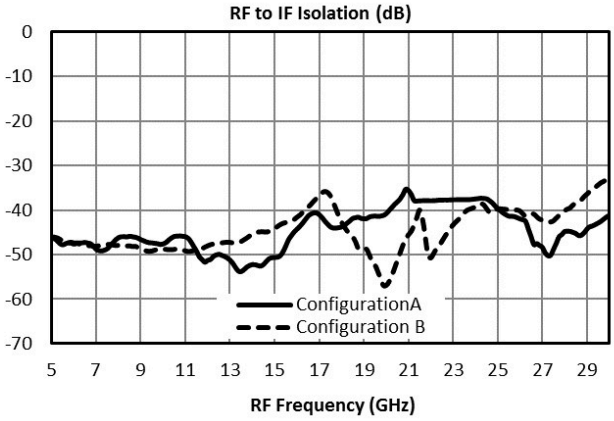
LO to RF Isolation (dB)



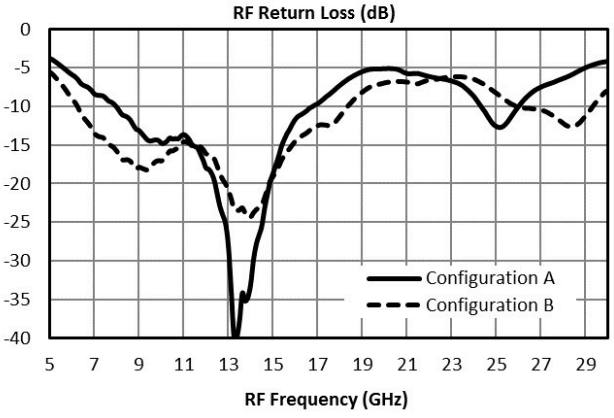
LO to IF Isolation (dB)



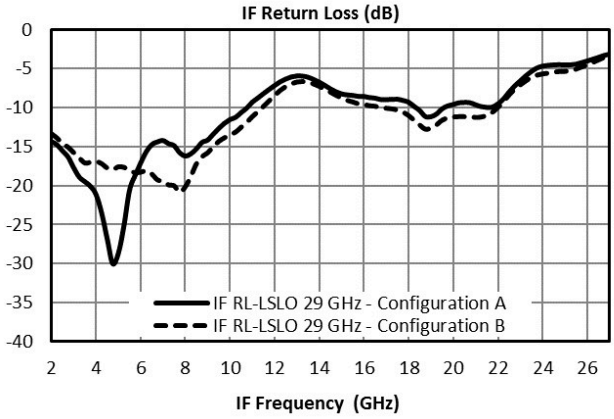
RF to IF Isolation (dB)



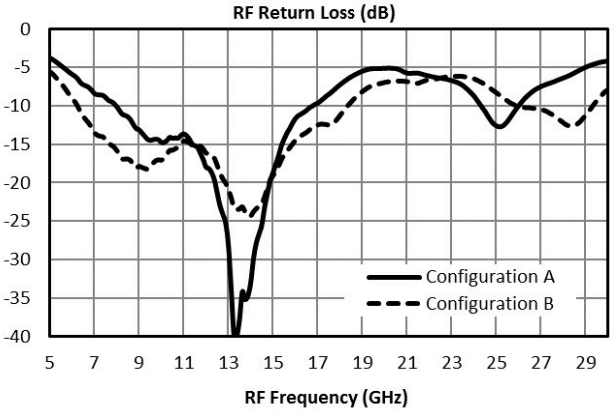
RF Return Loss (dB)



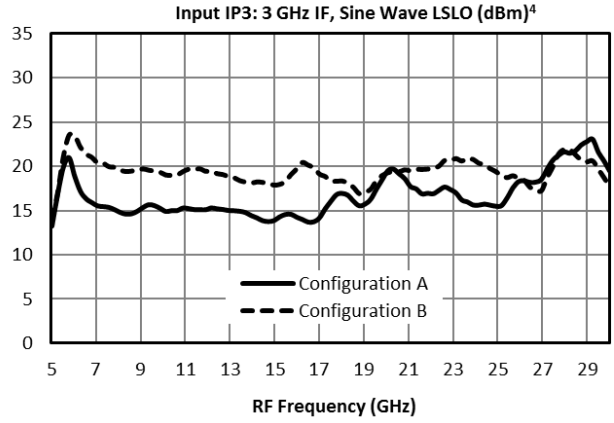
IF Return Loss (dB)



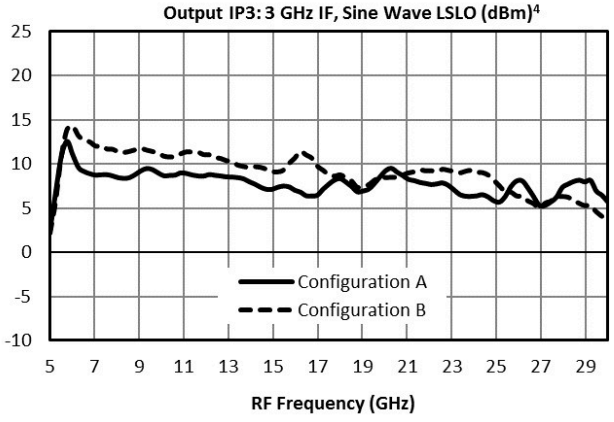
RF Return Loss (dB)



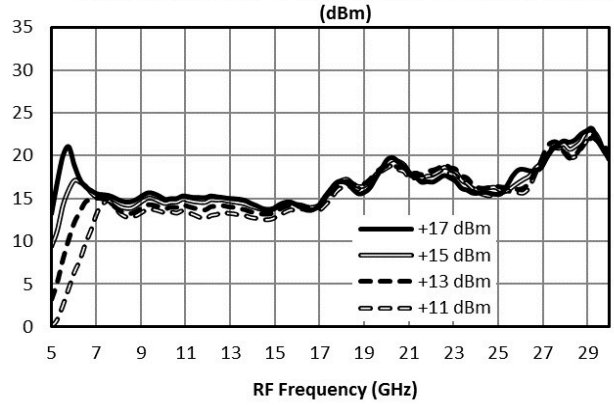
Input IP3: 3 GHz IF, Sine Wave LSLO (dBm)[4]



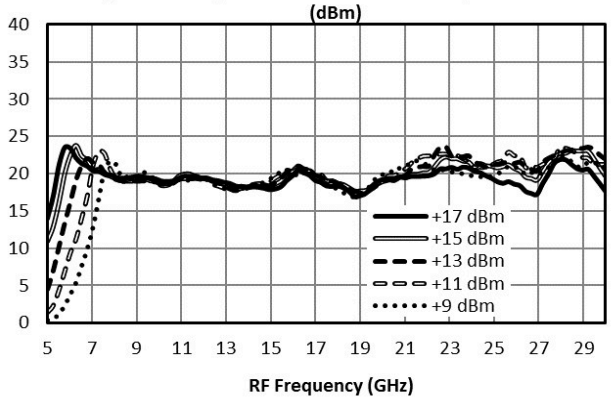
Output IP3: 3 GHz IF, Sine Wave LSLO (dBm)[4]



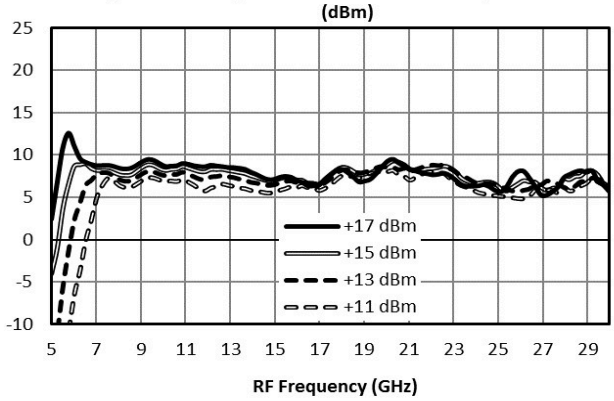
Configuration A Input IP3 vs LO Power: 3 GHz IF, Sine Wave LSLO (dBm)



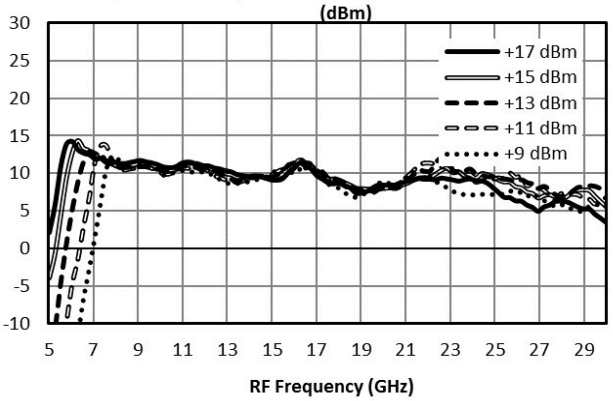
Configuration B Input IP3 vs LO Power: 3 GHz IF, Sine Wave LSLO (dBm)



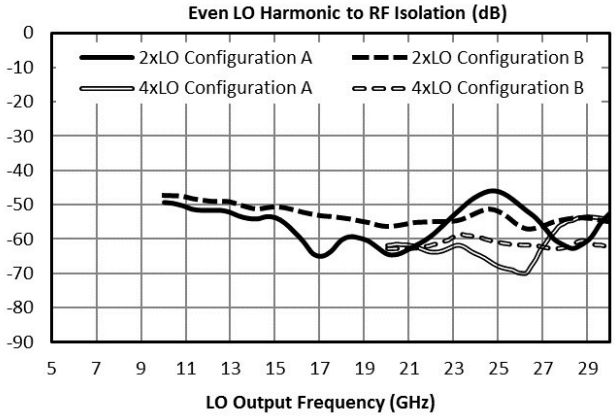
Configuration A Output IP3 vs LO Power: 3 GHz IF, Sine Wave LSLO (dBm)



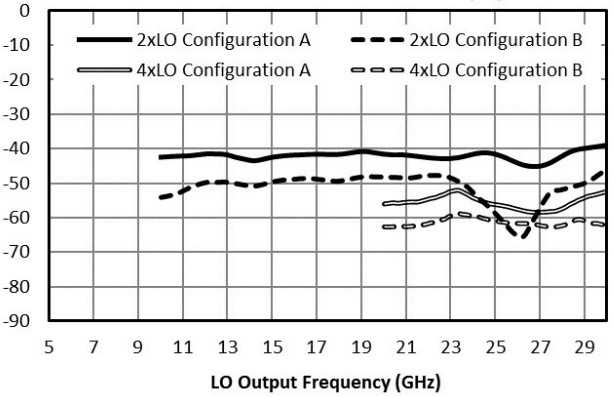
Configuration B Output IP3 vs LO Power: 3 GHz IF, Sine Wave LSLO (dBm)



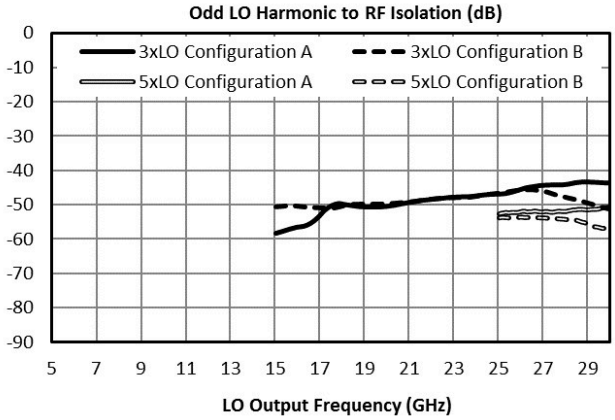
Even LO Harmonic to RF Isolation (dB)



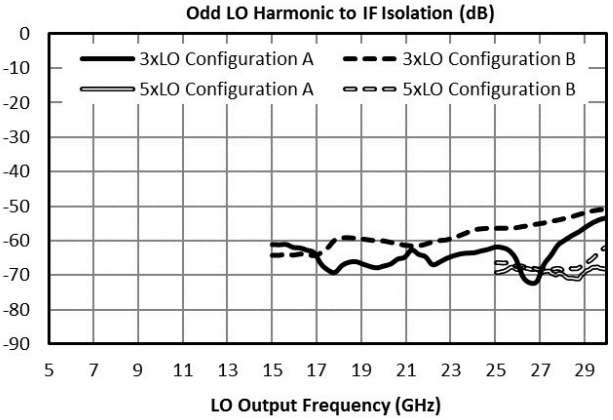
Even LO Harmonic to IF Isolation (dB)

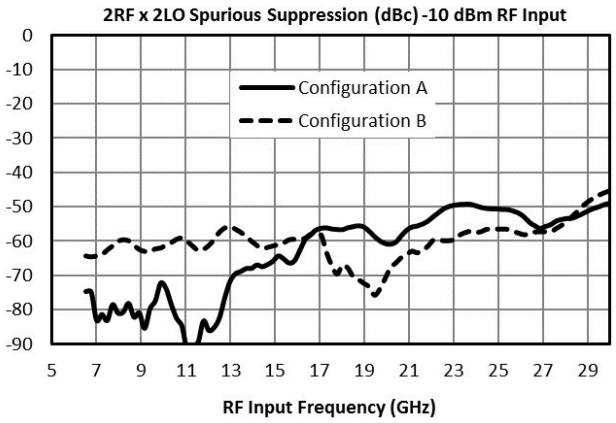


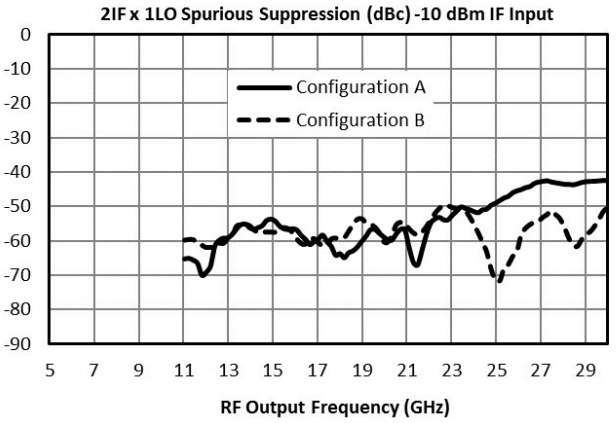
Odd LO Harmonic to RF Isolation (dB)



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 59 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 69 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	36 (37)	Reference	36 (44)	14 (12)	38 (43)	29 (21)
2xRF	65 (61)	57 (58)	63 (60)	59 (64)	64 (67)	70 (70)
3xRF	85 (87)	61 (62)	84 (85)	71 (70)	83 (85)	72 (69)
4xRF	152 (153)	82 (110)	113 (114)	116 (117)	115 (110)	116 (119)
5xRF	177 (173)	123 (122)	140 (139)	122 (123)	139 (140)	132 (129)

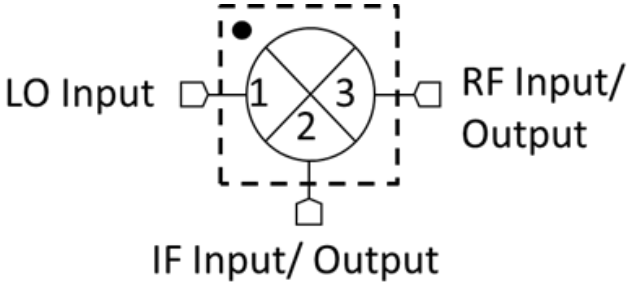
Upconversion Spurious Suppression

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 60 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 70 dBc.

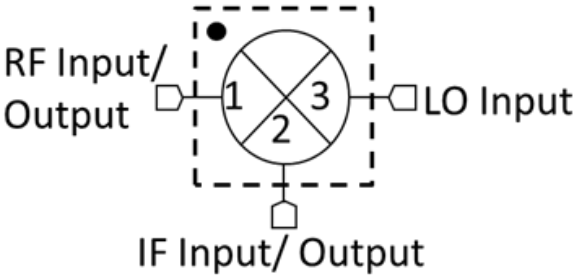
Typical Upconversion Spurious Suppression (dBc): A Configuration (B Configuration), Sine Wave LO [5]

-10 dBm RF Input	0xLO	1xLO	2xLO	3xLO	4xLO	5xLO
1xIF	38 (40)	Reference	41 (40)	12 (11)	43 (42)	22 (19)
2xIF	71 (66)	54 (58)	60 (62)	67 (66)	70 (66)	68 (63)
3xIF	90 (96)	69 (77)	89 (99)	71 (77)	88 (93)	68 (74)
4xIF	114 (111)	107 (111)	113 (118)	115 (117)	121 (117)	116 (124)
5xIF	134 (140)	125 (127)	138 (139)	119 (123)	141 (141)	123 (121)

Application Circuit



Configuration A



Configuration B

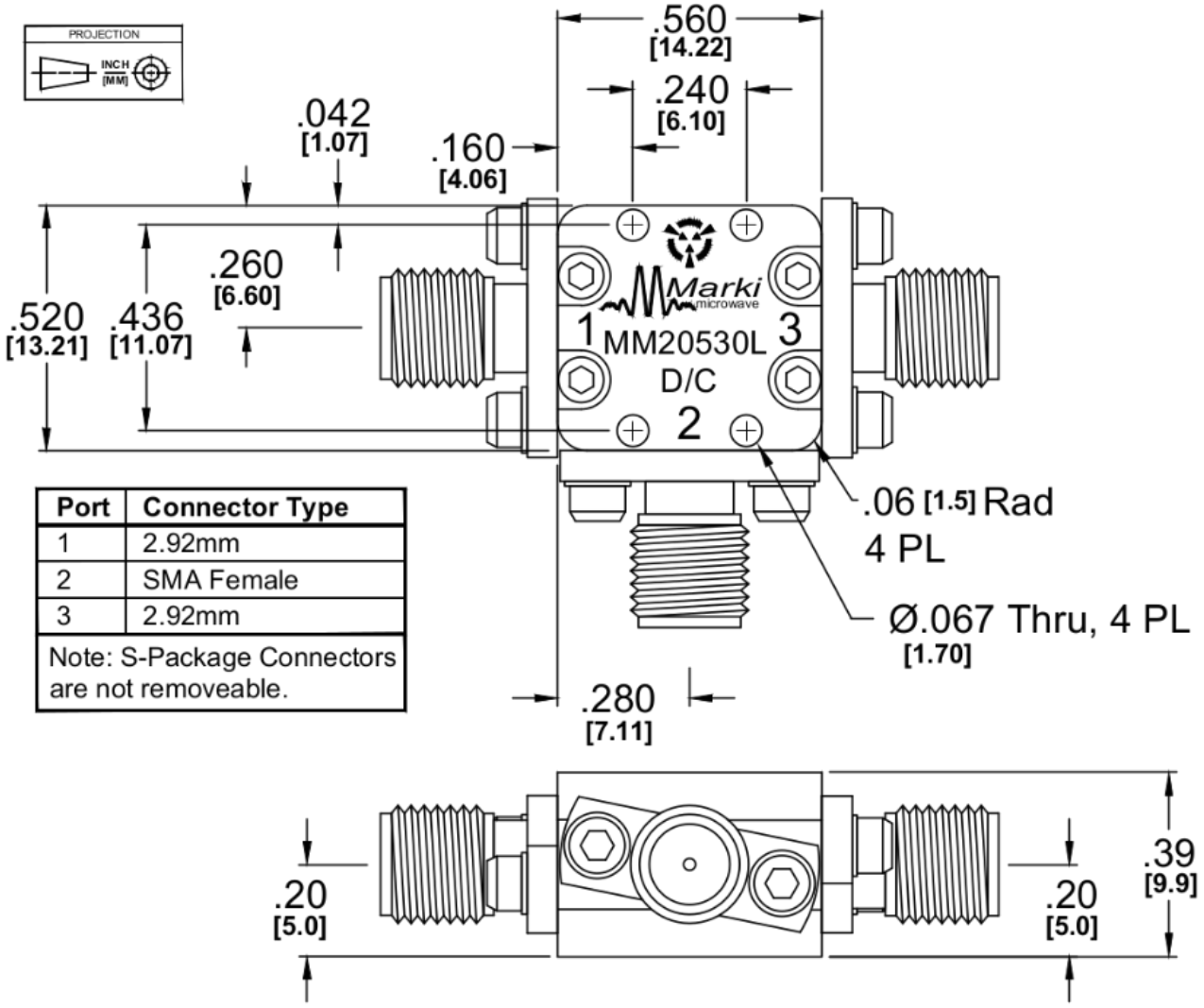
Application Circuit Description

Configuration A/B refer to the same part number (MM2-0530L) used in one of two different ways for optimal spurious performance. For the lowest conversion loss, use the mixer in Configuration A (port 1 as the LO input, port 3 as the RF input or output). If you need to use a lower LO drive, use the mixer in Configuration B (port 1 as the RF input or output, port 3 as the LO input). For optimal spurious suppression, experimentation or simulation is required to choose between Configuration A and B.

Mechanical Data

Outline Drawing

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



Port	Connector Type
1	2.92mm
2	SMA Female
3	2.92mm
Note: S-Package Connectors are not removeable.	

DISCLAIMER

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