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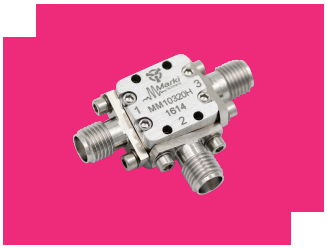
MM1-0320HS

GaAs DOUBLE-BALANCED MIXER

DEVICE OVERVIEW

General Description

The MM1-0320H is a passive double balanced MMIC mixer. It features excellent conversion loss, superior isolations and spurious performance across a broad bandwidth, in a highly miniaturized form factor. Accurate, nonlinear simulation models are available for Microwave Office® through the Marki Microwave PDK. The MM1-0320H is available as a wire bondable chip or an SMA connectorized package. The MM1-0320H is a superior alternative to Marki Microwave carrier and packaged M1 and M3 mixers



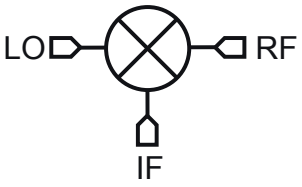
Features

- CAD Optimized for Superior Isolation and Spurious Response
- Broadband Performance
- Excellent Unit-to-Unit Repeatability
- Fully nonlinear software models available with Marki PDK for Microwave Office®
- RoHS Compliant

Applications

- Test and Measurement Equipment
- SATCOM
- Radar

Functional Block Diagram



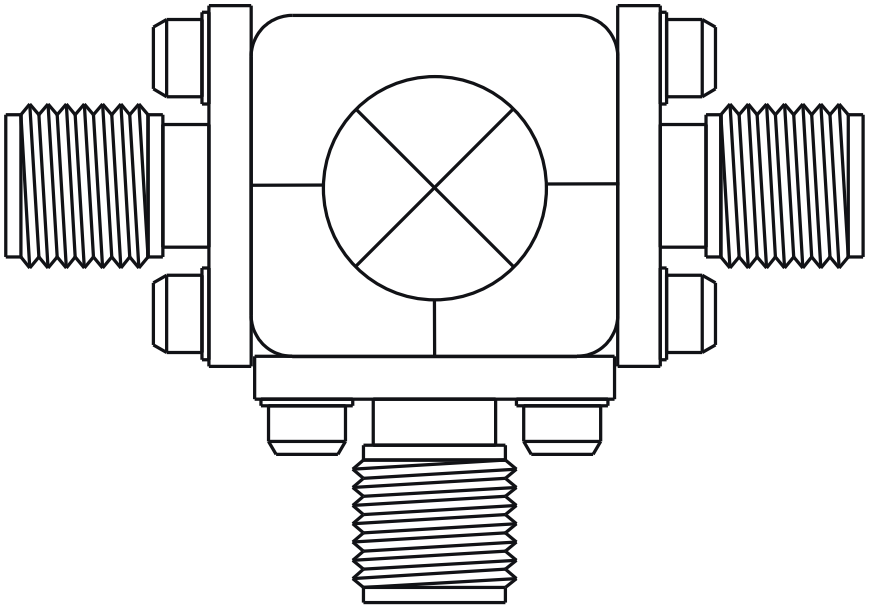
Part Ordering Options

Part Number	Description	Package	Connectors	Green Status	Product Lifecycle	Export Classification
MM1-0320HS	GaAs DOUBLE-BALANCED MIXER	S	Standard	REACH RoHS	Released	EAR99

Table Of Contents

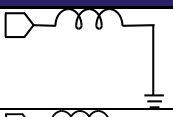
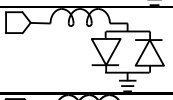
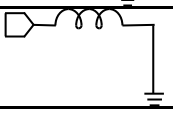
Port Configuration and Functions

Port Diagram

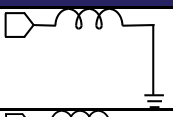
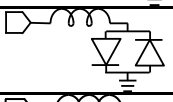
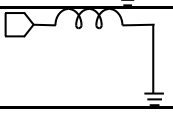


Port Functions

Configuration A

Port	Function	Connector Type	Description	Equivalent Circuit for Package
Port 1	LO	SMAF	Port 1 is DC short to ground and AC matched to 50 Ohms from 3.5 to 20 GHz. Blocking capacitor is optional.	
Port 2	IF	SMAF	Port 2 is DC coupled to the diodes. Blocking capacitor is optional.	
Port 3	RF	SMAF	Port 3 is DC short to ground and AC matched to 50 Ohms from 3.5 to 20 GHz. Blocking capacitor is optional	

Configuration B

Port	Function	Connector Type	Description	Equivalent Circuit for Package
Port 1	RF	SMAF	Port 1 is DC short to ground and AC matched to 50 Ohms from 3.5 to 20 GHz.Blocking capacitor is optional.	
Port 2	IF	SMAF	Port 2 is DC coupled to the diodes.Blocking capacitor is optional	
Port 3	LO	SMAF	Port 3 is DC short to ground and AC matched to 50 Ohms from 3.5 to 20 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	15	mA
Port 2 DC Current	30	mA
Port 3 DC Current	15	mA
RF Power Handling (RF+LO), 100°C	21	dBm
RF Power Handling (RF+LO), 25°C	25	dBm

Package Information

Parameter	Details	Rating
Dimensions	-	14.22 x 13.21mm

Recommended Operating Conditions

Parameter	Min	Nominal	Max	Unit
LO Input Power	12	-	20	-

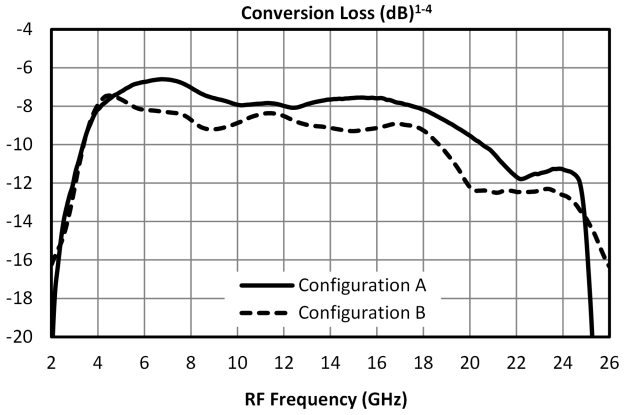
Electrical Specifications

Specifications guaranteed from -55 to +100 C measured in a 50Ω system.

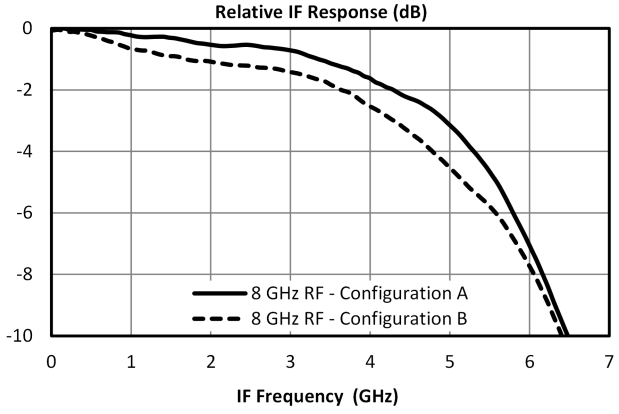
Parameter	Port Configuration	Test Conditions	Min	Typ	Max	Unit
Conversion Loss	A	LO/RF=3.5-20GHz IF=DC-4GHz	-	8	13	dB
Input 1 dB Compression	A	LO/RF=3.5-20GHz IF=DC-4GHz LO Drive level=13-20dBm	-	9	-	dBm
Input IP3	A	LO/RF=3.5-20GHz IF=DC-4GHz LO drive level=13-20dBm	-	20	-	dBm
Isolation, LO to RF	A	-	-	52	-	dB
Conversion Loss	B	LO/RF=3.5-20GHz IF=DC-4GHz	-	9	16	dB
Input 1 dB Compression	B	LO/RF=3.5-20GHz IF=DC-4GHz LO drive level=12-17dBm	-	9	-	dBm
Input IP3	B	LO/RF=3.5-20GHz IF=DC-4GHz LO drive level=12-17dBm	-	20	-	dBm
IF Frequency Range	-	-	0	-	4	GHz
LO Frequency Range	-	-	3.5	-	20	GHz
RF Frequency Range	-	-	3.5	-	20	GHz

Typical Performance Plots

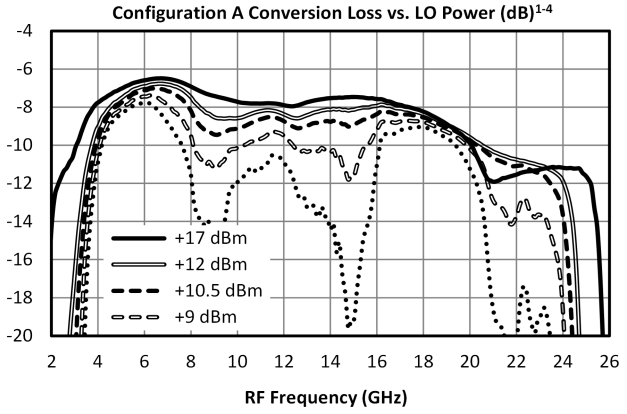
Conversion Loss (dB)[1-4]



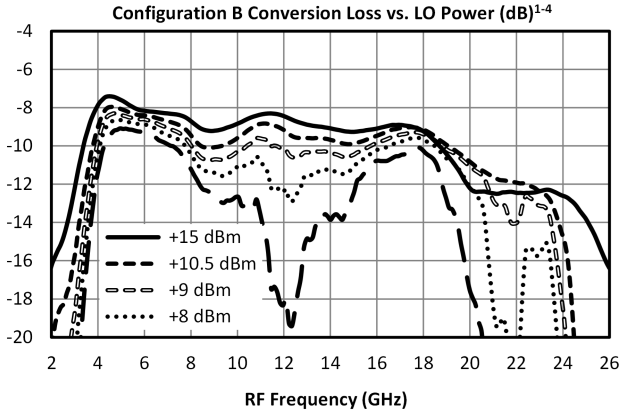
Relative IF Response (dB)



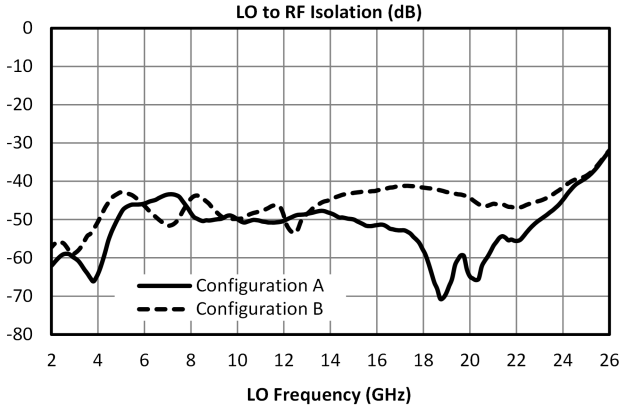
Configuration A Conversion Loss vs. LO Power (dB)[1-4]



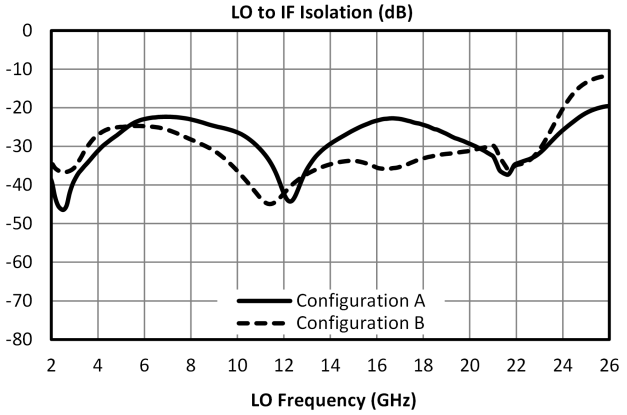
Configuration B Conversion Loss vs. LO Power (dB)[1-4]



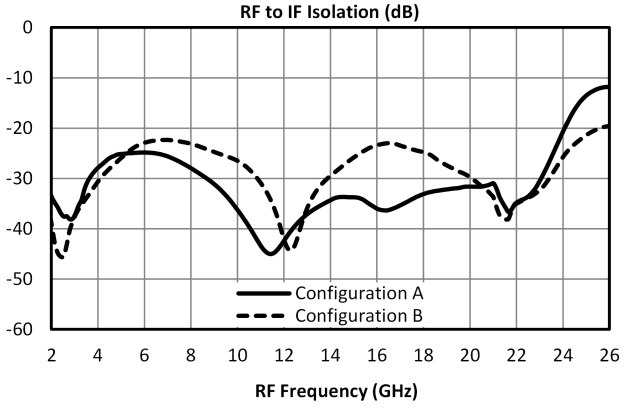
LO to RF Isolation (dB)



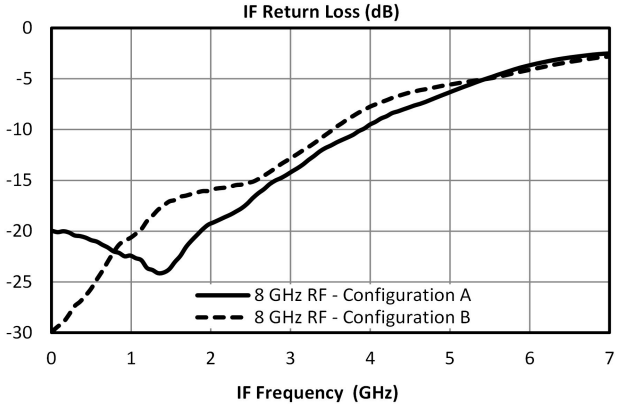
LO to IF Isolation (dB)



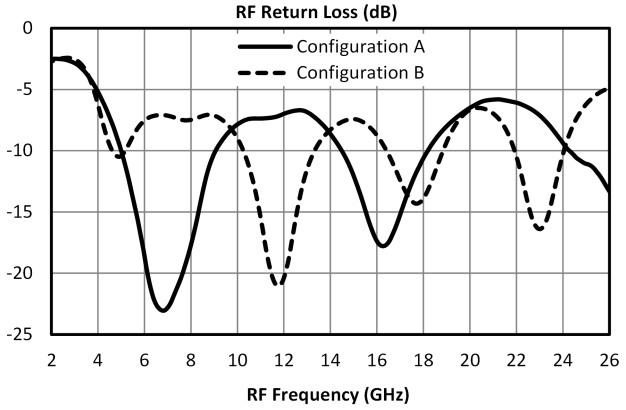
RF to IF Isolation (dB)



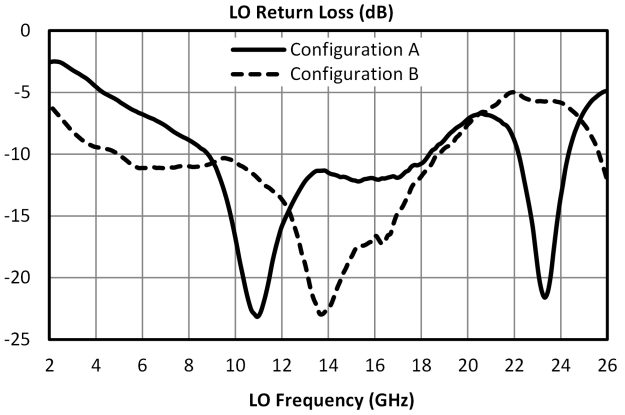
IF Return Loss (dB)



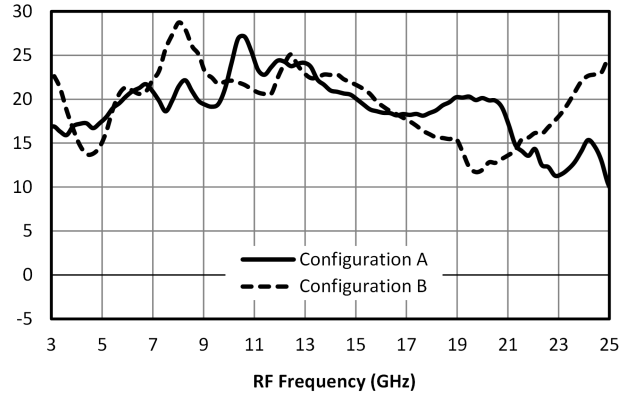
RF Return Loss (dB)



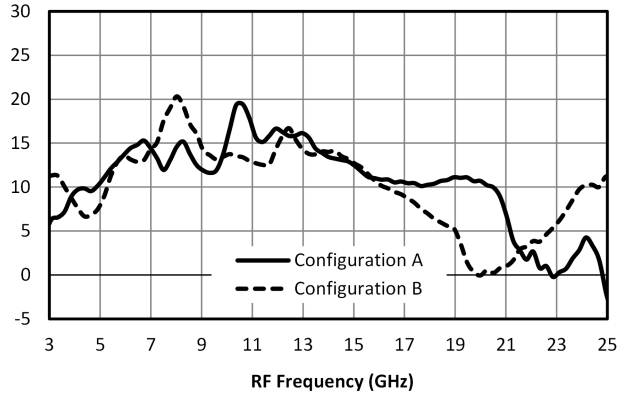
LO Return Loss (dB)



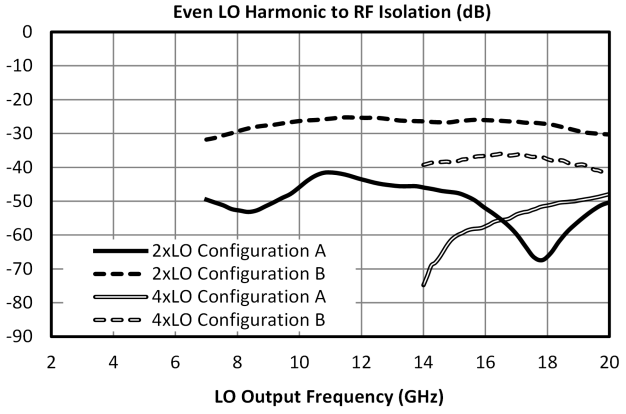
Input IP3 (dBm)



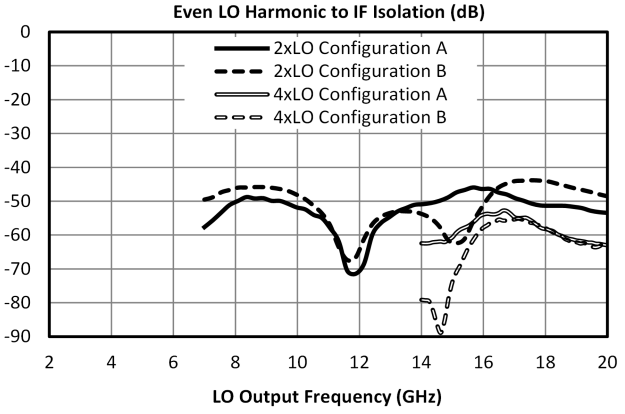
Output IP3 (dBm)



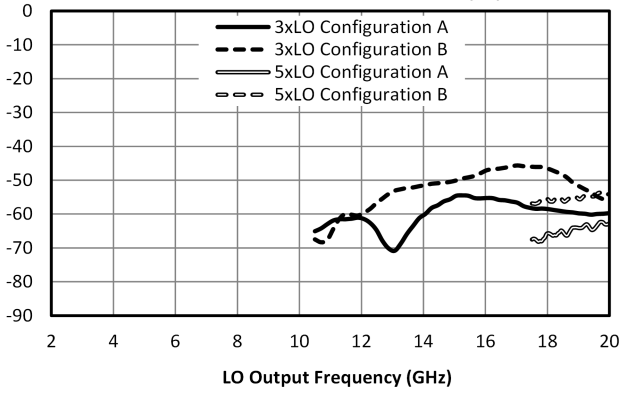
Even LO Harmonic to RF Isolation (dB)



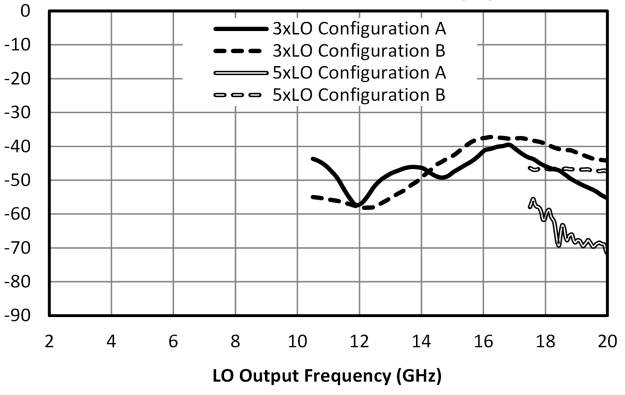
Even LO Harmonic to IF Isolation (dB)

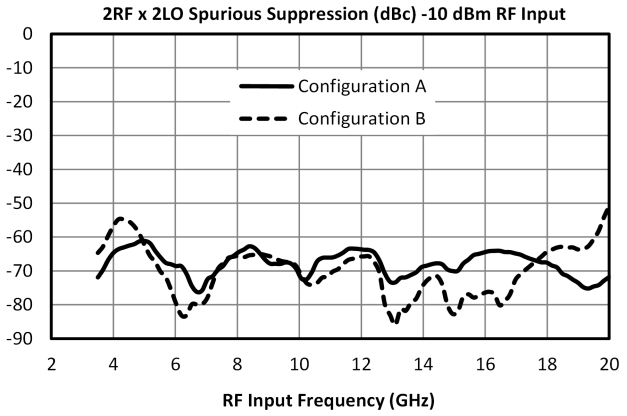


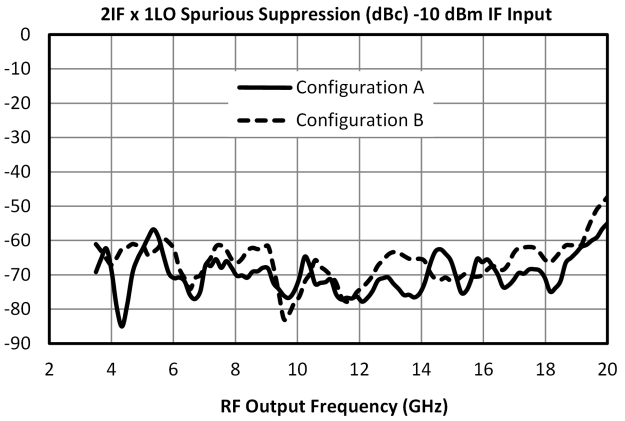
Odd LO Harmonic to RF Isolation (dB)



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 RF/LO bands, to create a spurious output within the IF output 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 2RFx2LO spur is 68 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 78 dBc.

Typical Downconversion Spurious Suppression (dBc): A Configuration (B Configuration)

-10 dBm RF Input	0xLO	1xLO	2xLO	3xLO	4xLO	5xLO
1xRF	23 (18)	Reference	19 (32)	13 (12)	34 (47)	21 (24)
2xRF	71 (74)	55 (49)	68 (70)	64 (50)	69 (64)	66 (51)
3xRF	88 (89)	66 (61)	78 (87)	74 (73)	82 (89)	68 (72)
4xRF	122 (124)	104 (106)	108 (110)	112 (107)	118 (115)	114 (105)
5xRF	134 (134)	123 (115)	120 (125)	119 (119)	125 (127)	123 (121)

Upconversion Spurious Suppression

Spurious data is taken by mixing an input within the IF band, with LO frequencies (+mLO+nIF), 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 70 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 80 dBc.

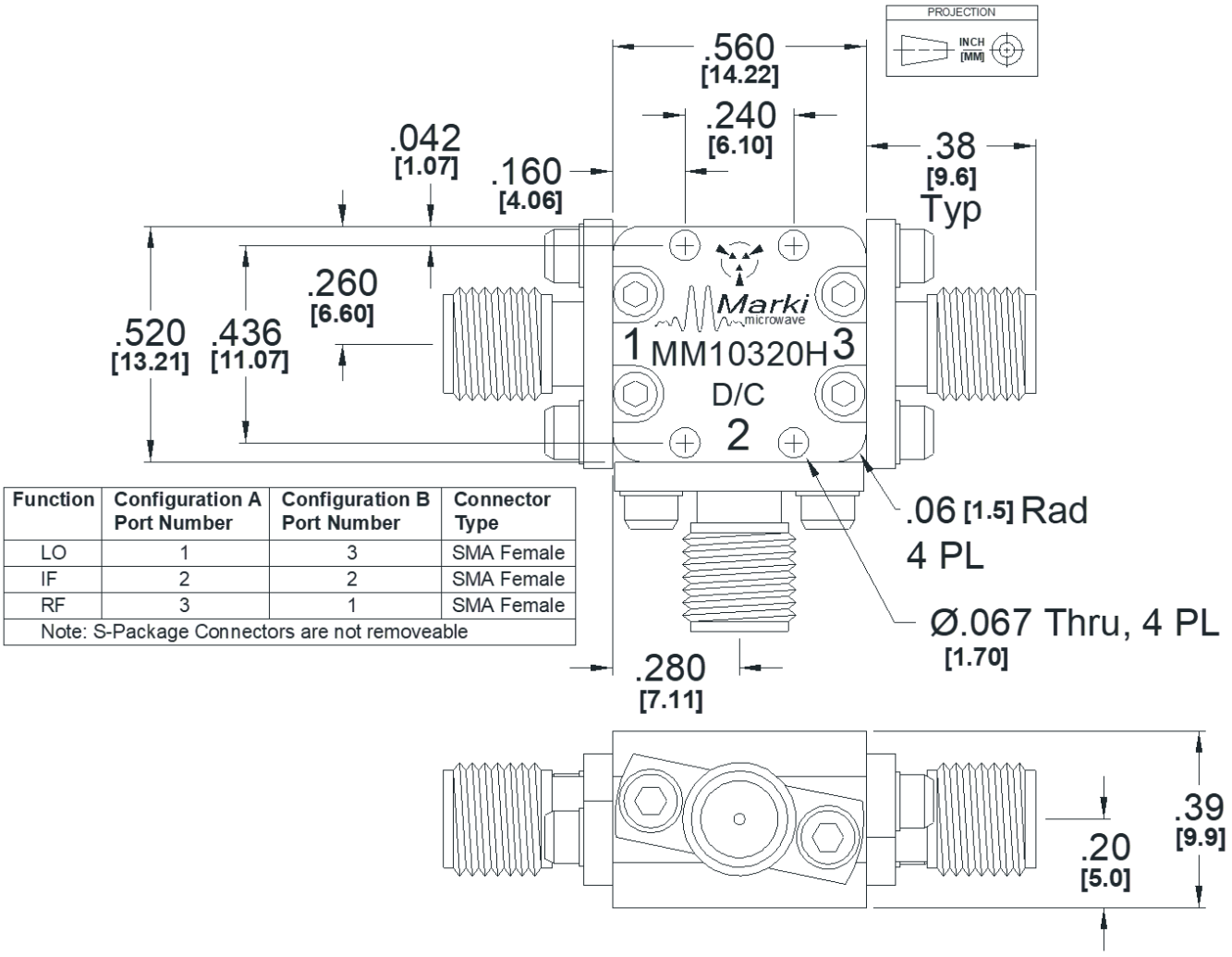
Typical Upconversion Spurious Suppression (dBc): A Configuration (B Configuration)

-10 dBm IF Input	0xLO	1xLO	2xLO	3xLO	4xLO	5xLO
1xIF	21 (25)	Reference	18 (31)	12 (11)	34 (37)	24 (22)
2xIF	55 (44)	70 (66)	60 (47)	68 (65)	59 (50)	66 (64)
3xIF	72 (78)	72 (72)	71 (82)	63 (68)	71 (81)	60 (56)
4xIF	112 (110)	121 (110)	121 (95)	110 (105)	115 (90)	99 (98)
5xIF	129 (129)	119 (121)	123 (123)	119 (110)	126 (118)	110 (94)

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	SMA Female
IF	2	2	SMA Female
RF	3	1	SMA Female
Note: S-Package Connectors are not removeable			

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