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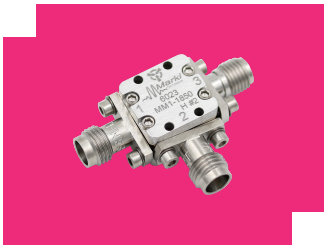
MM1-1850HS

GaAs DOUBLE-BALANCED MIXER

DEVICE OVERVIEW

General Description

The MM1-1850H 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 MM1-1850H is available as a wire bondable chip or in a connectorized package. The MM1-1850H is a superior alternative to Marki Microwave carrier and packaged M9 mixers.



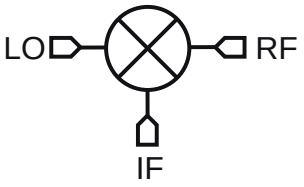
Features

- 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
- Fixed RF up converters
- Electronic warfare equipment

Functional Block Diagram



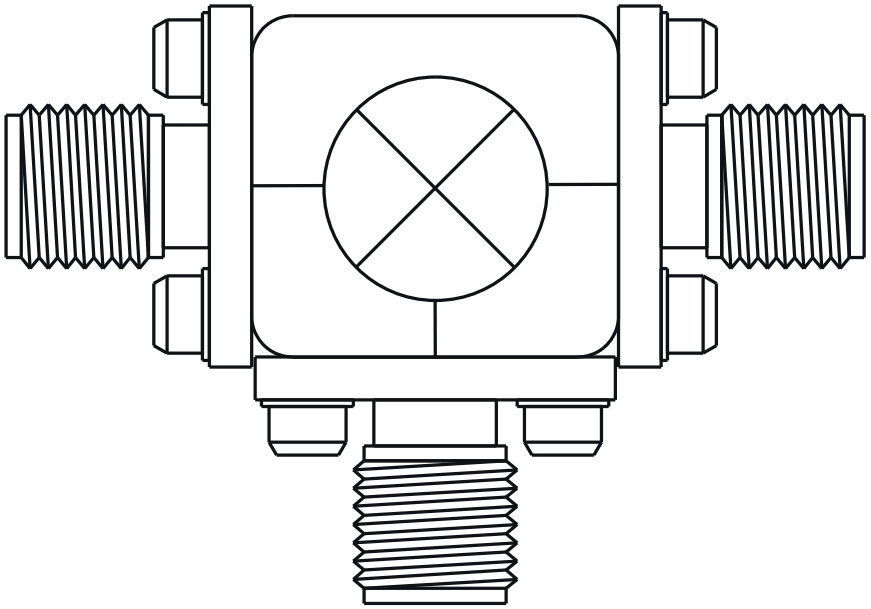
Part Ordering Options

Part Number	Description	Package	Packing Size	Green Status	Product Lifecycle	Export Classification
MM1-1850HS	GaAs DOUBLE-BALANCED MIXER	S	-	RoHS	Released	EAR99

Table Of Contents

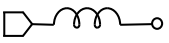
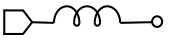
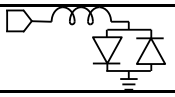
Port Configuration and Functions

Port Diagram

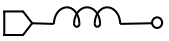
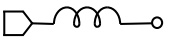
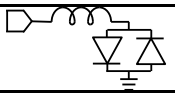


Port Functions

Configuration A

Port	Function	Description	Equivalent Circuit for Package
Port 1	RF	Port 1 is DC open and AC matched to 50 Ohms from 18 to 50 GHz. Blocking capacitor is optional.	
Port 2	LO	Port 2 is DC open and AC matched to 50 Ohms from 18 to 50 GHz. Blocking capacitor is optional.	
Port 3	IF	Port 3 is DC coupled to the diodes. Blocking capacitor is optional.	

Configuration B

Port	Function	Description	Equivalent Circuit for Package
Port 1	LO	Port 1 is DC open and AC matched to 50 Ohms from 18 to 50 GHz. Blocking capacitor is optional.	
Port 2	RF	Port 2 is DC open and AC matched to 50 Ohms from 18 to 50 GHz. Blocking capacitor is optional.	
Port 3	IF	Port 3 is DC coupled to the diodes. Blocking capacitor is optional.	

Specifications

Absolute Maximum Ratings

Parameter	Maximum Rating	Unit
Port 1 DC Current	21	mA
Port 2 DC Current	21	mA
Port 3 DC Current	22.8	mA

Package Information

Parameter	Details	Rating
Dimensions	-	14.22x13.21mm

Recommended Operating Conditions

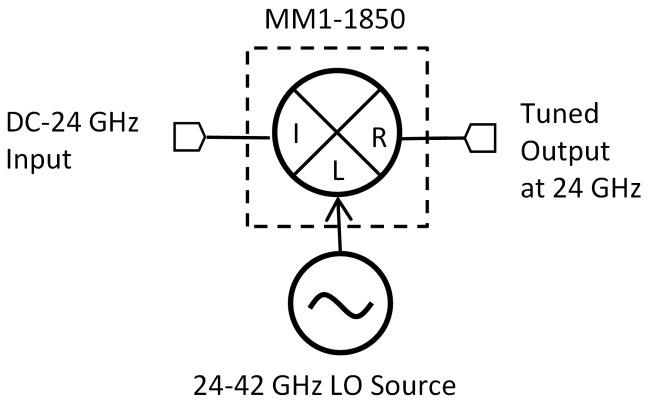
Parameter	Min	Nominal	Max	Unit
LO Input Power	12	-	20	dBm

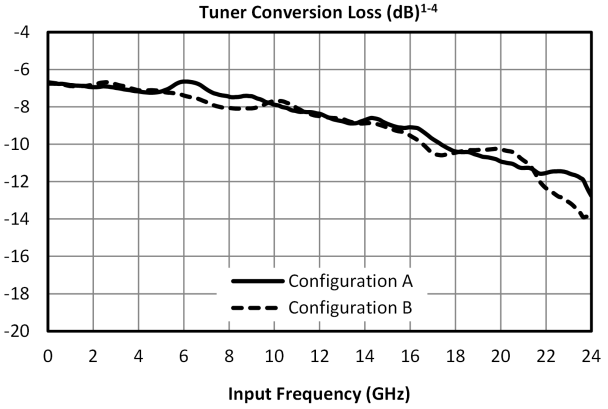
Electrical Specifications

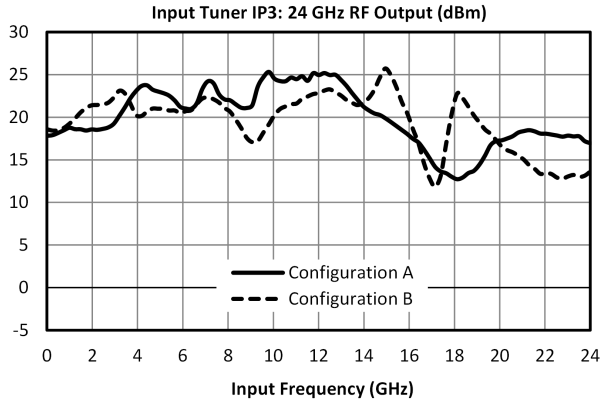
Specifications guaranteed from -55 to +100°C, measured in a 50Ω system. All bare die are 100% DC tested and 100% visual inspected. RF testing is performed on a sample basis to verify conformance to datasheet guaranteed specifications. Consult factory for more information.

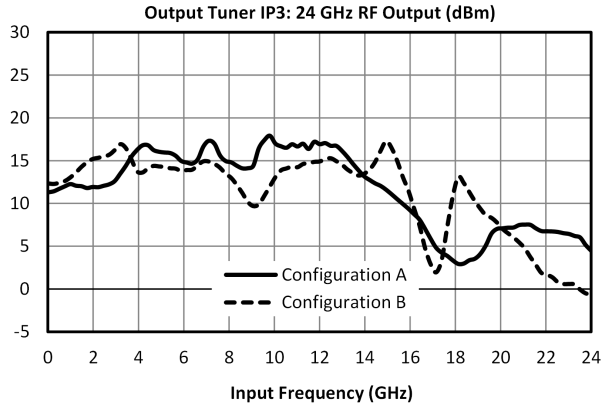
Parameter	Port Configuration	Test Conditions	Min	Typ	Max	Unit
RF Frequency Range	-	-	18	-	50	GHz
LO Frequency Range	-	-	18	-	50	GHz
Conversion Loss	A	LO/RF=18-50GHz IF=DC-20GHz	-	8	-	dB
Conversion Loss	B	LO/RF=18-50GHz IF=DC-20GHz	-	8.5	-	dB
Isolation, LO to RF	A	-	-	43	-	dB
Input IP3	A	LO/RF=18-50GHz IF=DC-20GHz LO drive level=13-20dBm	-	21	-	dBm
Input IP3	B	LO/RF=18-50GHz IF=DC-20GHz LO drive level=12-17dBm	-	19	-	dBm
IF Frequency Range	-	-	0	-	20	GHz
Input 1 dB Compression	A	LO/RF=18-50GHz IF=DC-20GHz LO drive level=13-20dBm	-	9	-	dBm
Input 1 dB Compression	B	LO/RF=18-50GHz IF=DC-20GHz LO drive level=12-17dBm	-	9	-	dBm

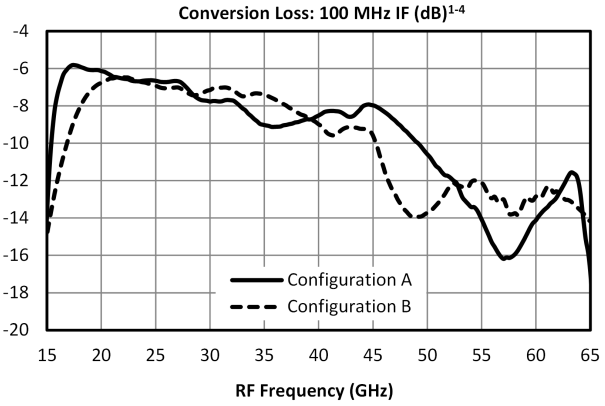
Typical Performance

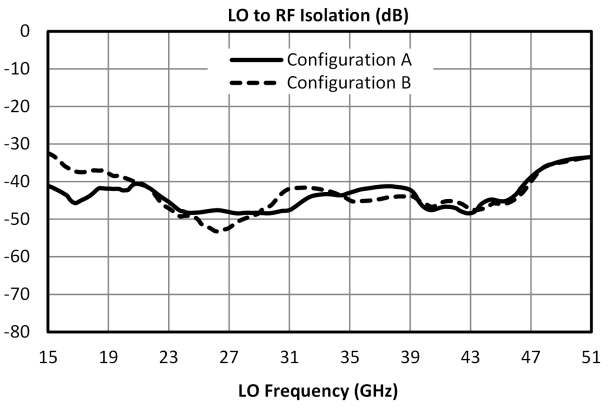


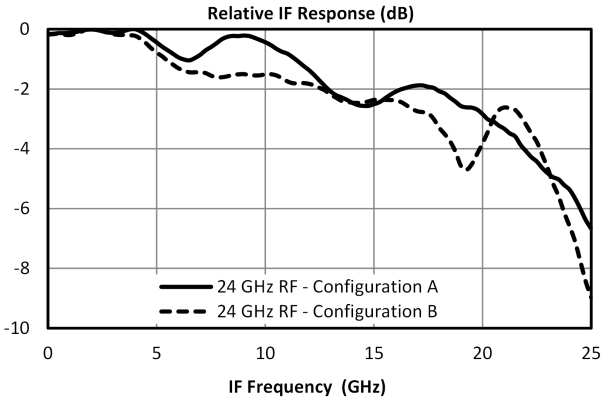


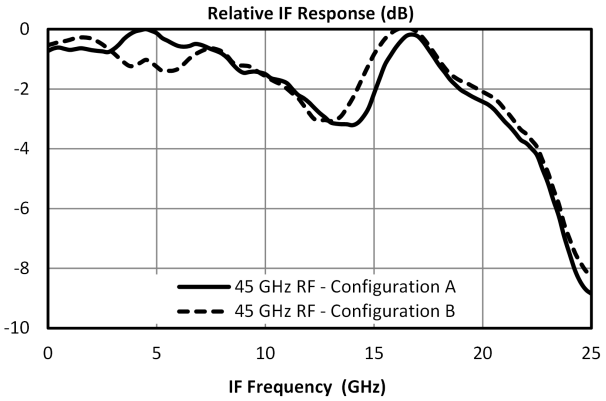


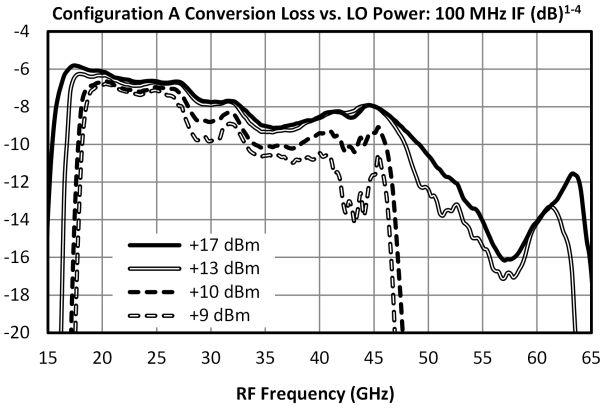


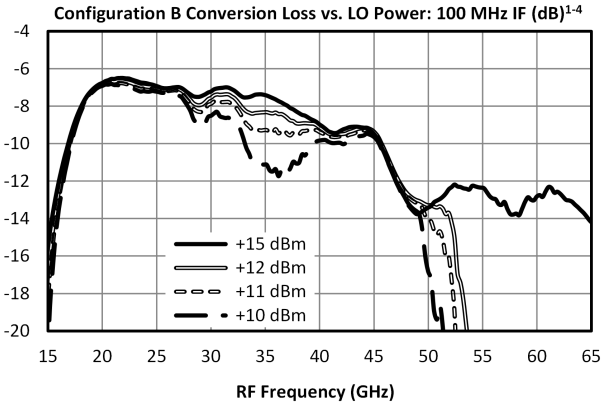


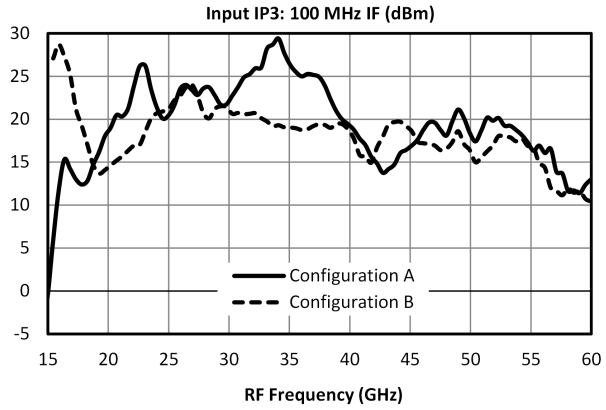


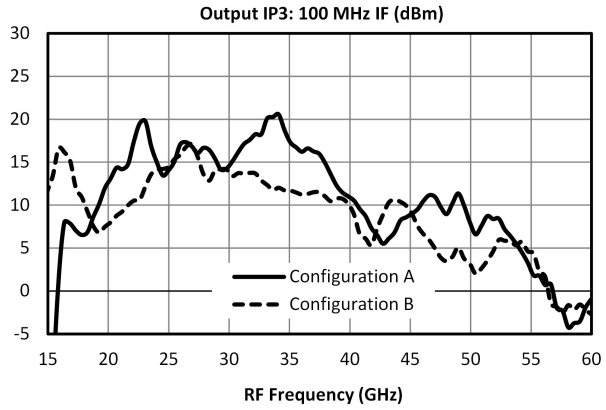


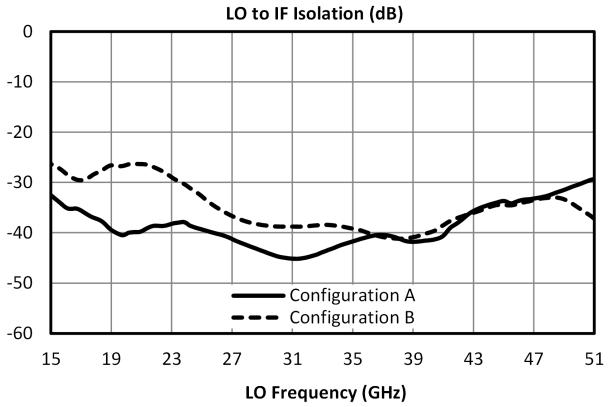


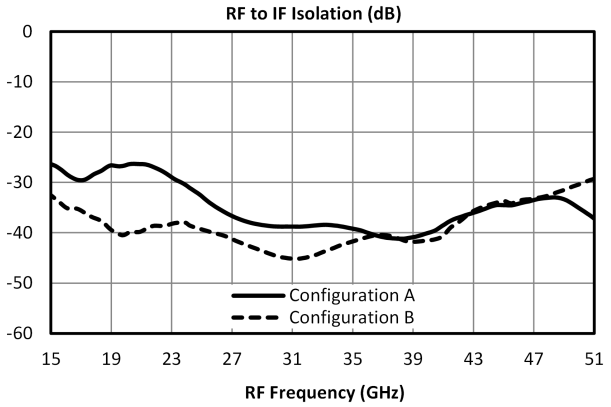


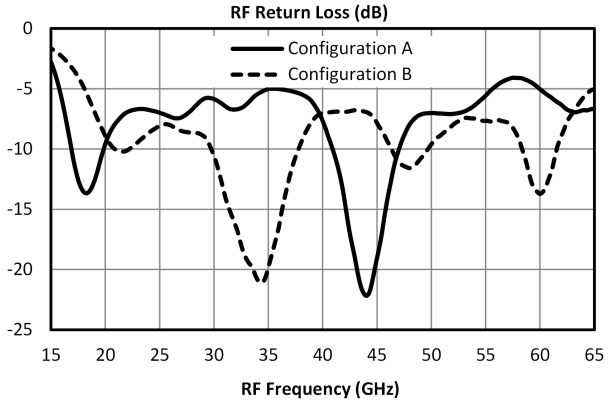


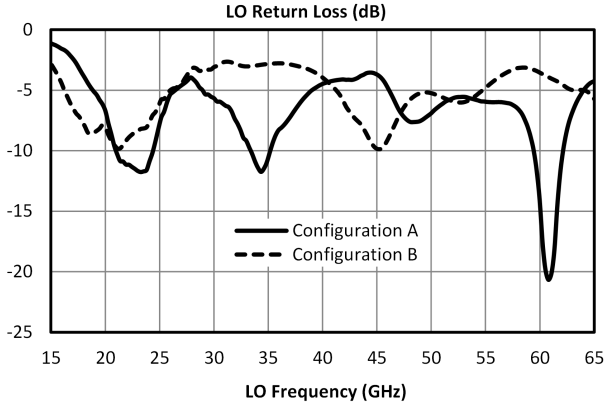












Spur Table

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 67 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 77 dBc.

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

-10 dBm RF Input	0xLO	1xLO	2xLO	3xLO	4xLO	5xLO
1xRF	26 (30)	Reference	26 (51)	9 (11)	32 (58)	N/A
2xRF	78 (75)	62 (43)	67 (65)	69 (46)	64 (71)	64 (49)
3xRF	92 (93)	53 (58)	75 (86)	70 (69)	82 (93)	73 (78)
4xRF	N/A	88 (101)	102 (100)	112 (92)	114 (114)	116 (98)
5xRF	N/A	N/A	99 (116)	117 (118)	120 (126)	117 (116)

Unless otherwise specified, data is taken with +15 dBm LO drive.

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 67 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 77 dBc.

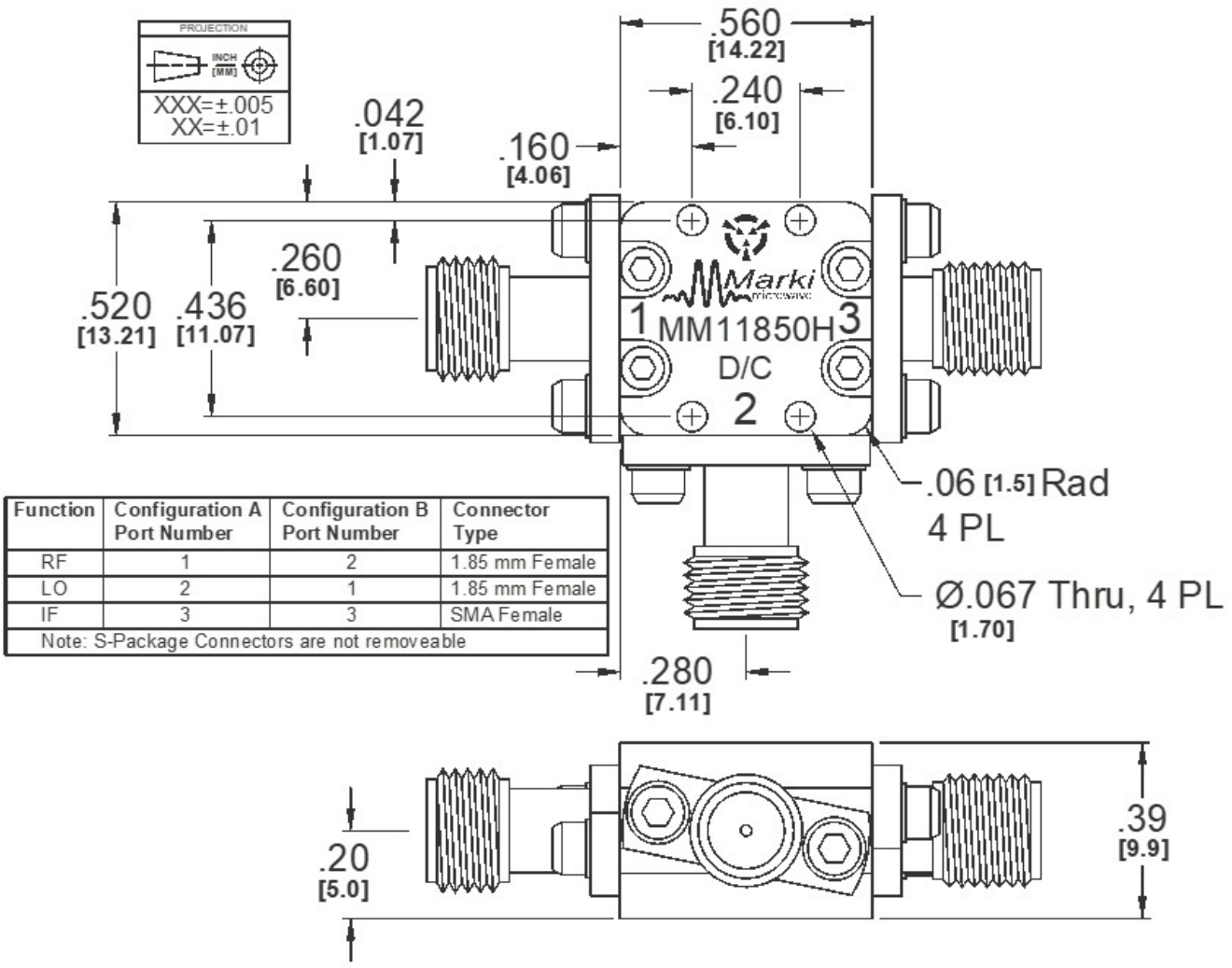
Typical Upconversion Spurious Suppression (dBc): A Configuration (B Configuration)

-10 dBm IF Input	0xLO	1xLO	2xLO	3xLO	4xLO	5xLO
1xIF	18 (28)	Reference	21 (49)	8 (9)	33 (57)	N/A
2xIF	65 (41)	67 (67)	68 (43)	64 (66)	61 (47)	71 (73)
3xIF	76 (91)	69 (65)	71 (87)	66 (64)	74 (88)	64 (66)
4xIF	112 (101)	107 (106)	108 (87)	110 (113)	104 (95)	112 (108)
5xIF	120 (134)	116 (108)	112 (119)	120 (120)	110 (124)	108 (113)

Unless otherwise specified, data is taken with +15 dBm LO drive.

Mechanical Data

Outline Drawing



Function	Configuration A Port Number	Configuration B Port Number	Connector Type
RF	1	2	1.85 mm Female
LO	2	1	1.85 mm Female
IF	3	3	SMA Female
Note: S-Package Connectors are not removeable			

Notes

DATA SHEET NOTES:

1. Mixer Conversion Loss Plot IF frequency is 100 MHz.
2. Mixer Noise Figure typically measures within 0.5 dB of conversion loss for IF frequencies greater than 5 MHz.
3. Conversion Loss typically degrades less than 0.5 dB at +100°C and improves less than 0.5 dB at -55°C.
4. Unless otherwise specified, data is taken with +15 dBm LO drive.
5. Specifications are subject to change without notice. Contact Marki Microwave for the most recent specifications and data sheets.
6. Catalog mixer circuits are continually improved. Configuration control requires custom mixer model numbers and specifications.

DISCLAIMER