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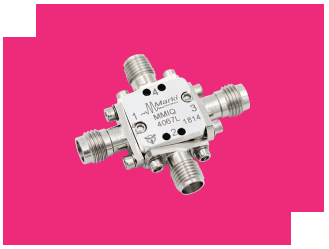
MMIQ-4067LU

Passive GaAs MMIC IQ Mixer

DEVICE OVERVIEW

General Description

MMIC IQ mixer. This is an ultra-broadband mixer spanning 40 to 67 GHz on the RF and LO ports with an IF from DC to 20 GHz. Up to 25 dB of image rejection is available due to the excellent phase and amplitude balance of its on-chip LO quadrature hybrid. This product is available as a connectorized module. Contact factory for information regarding wire bondable die.



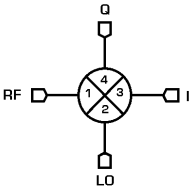
Features

RF/LO Frequency Range: 40 - 67 GHz
IF Frequency Range: DC - 20 GHz
I+Q Conversion Loss: 9 dB
Image Rejection: 35 dB
LO-RF Isolation: 33 dB

Applications

- Single Sideband and Image Rejection Mixing
- IQ Modulation / Demodulation
- Vector Amplitude Modulation
- Band Shifting

Functional Block Diagram



Part Ordering Options

Part Number	Description	Package	Connectors	Green Status	Product Lifecycle	Export Classification
MMIQ-4067LU	Passive GaAs MMIC IQ Mixer	U	Standard	REACH RoHS	Released	EAR99

Table Of Contents

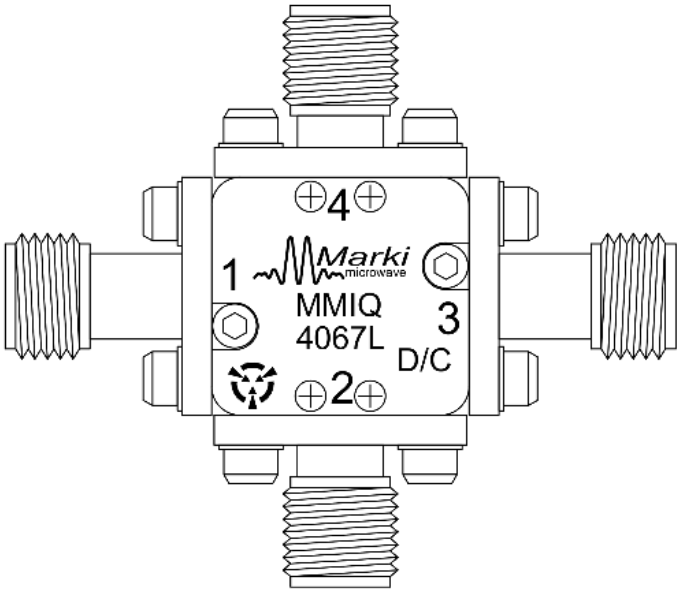
Revision History

Revision Code	Revision Date	Comment
-	2018-04-01	Datasheet Initial Release
A	2019-10-01	Updated Max Power Spec

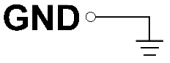
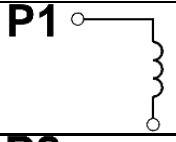
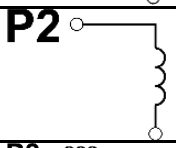
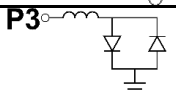
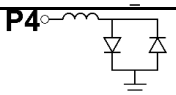
Port Configuration and Functions

Port Diagram

A top-down view of the MMIQ-4067L's U package outline drawing is shown below. The mixer may be operated as either a downconverter or an upconverter. Use of the RF or IF as the input or output port will depend on the application.



Port Functions

Port	Function	Connector Type	Description	Equivalent Circuit for Package
GND	Ground	-	U package ground path is provided through the metal housing and outer coax conductor.	
Port 1	LO Input	1.85F	Port 1 is DC open and AC matched to 50Ω over the specified RF frequency range.	
Port 2	I Input / Output	SMAF	Port 2 is DC open and AC matched to 50Ω over the specified LO frequency range.	
Port 3	RF Input / Output	1.85F	Port 3 is diode coupled and AC matched to 50Ω over the specified I port frequency range.	
Port 4	Q Input / Output	SMAF	Port 4 is diode coupled and AC matched to 50Ω over the specified Q port frequency range.	

Specifications

Absolute Maximum Ratings

The Absolute Maximum Ratings indicate limits beyond which damage may occur to the device. If these limits are exceeded, the device may be inoperable or have a reduced lifetime.

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 2 DC Current	50	mA
Port 4 DC Current	50	mA
Power Handling, at any Port	26	dBm

Package Information

Parameter	Details	Rating
Weight	Package name: U	14.5g
Dimensions	-	14.22 x 13.21 mm

Recommended Operating Conditions

The Recommended Operating Conditions indicate the limits, inside which the device should be operated, to guarantee the performance given in Electrical Specifications. Operating outside these limits may not necessarily cause damage to the device, but the performance may degrade outside the limits of the electrical specifications. For limits, above which damage may occur, see Absolute Maximum Ratings.

Parameter	Min	Nominal	Max	Unit
LO Input Power	11	15	20	dBm
RF/IF Input Power	-	-	6	dBm
Ambient Temperature	-55	25	100	°C

Sequencing Requirements

There is no requirement to apply power to the ports in a specific order. However, it is recommended to provide a 50Ω termination to each port before applying power. This is a passive diode mixer that requires no DC bias.

Electrical Specifications

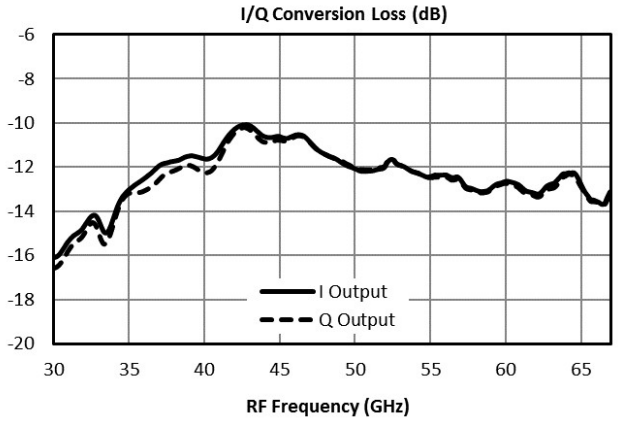
The electrical specifications apply at TA=+25°C in a 50Ω system. Typical data shown is for a down conversion application with a +15dBm sine wave LO input. Min and Max limits apply only to our connectorized units and are guaranteed at TA=+25°C. All bare die are 100% DC tested and visually inspected.

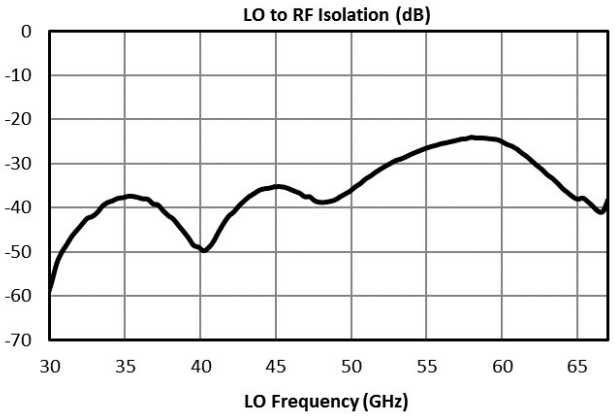
Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
RF Frequency Range	-	-	-	40	-	67	GHz
LO Frequency Range	-	-	-	40	-	67	GHz
Conversion Loss [1]	RF/LO = 40 - 67 GHz: I = 0.2 - 20 GHz	40	67	-	14	-	dB
Conversion Loss [2]	RF/LO = 40 - 67 GHz I = DC – 0.2 GHz	40	67	-	12	-	dB
Conversion Loss [3]	RF/LO = 40 - 67 GHz Q = 0.2 - 20 GHz	40	67	-	14	-	dB
Conversion Loss	RF/LO = 40 - 67 GHz: Q = DC -0.2 GHz	40	67	-	12	-	dB
Noise Figure [4]	RF/LO = 40 - 67 GHz I = DC – 0.2 GHz	40	67	-	12	-	dB
Noise Figure [5]	RF/LO = 40 - 67 GHz Q = DC – 0.2 GHz	40	67	-	12	-	dB
Image Rejection [6]	RF/LO = 40 - 67 GHz I+Q = DC – 0.2 GHz	40	67	-	35	-	dBc
Input IP3 [7]	RF/LO = 40 - 67 GHz I = DC – 0.2 GHz	40	67	-	19	-	dBm
IF Frequency Range	-	-	-	0	-	20	GHz
Q (Port 4) Frequency Range	-	-	-	0	-	20	GHz
Isolation, LO to IF	IF/LO = 40-67 GHz	40	67	-	40	-	dB
Isolation, LO to RF	RF/LO = 40-67 GHz	40	67	-	33	-	dB
Isolation, RF to IF	RF/IF = 40-67 GHz	40	67	-	37	-	dB

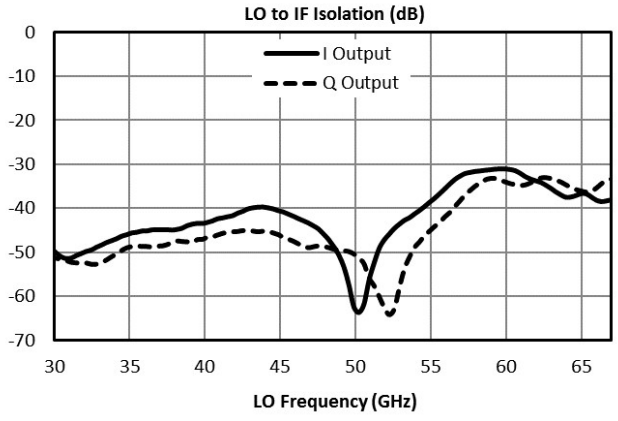
[1][2][3] Measured as an I/Q down converter. (i.e., I and Q powers are not combined)
[4][5] Mixer Noise Figure typically measures within 0.5 dB of conversion loss for IF frequencies greater than 5 MHz.
[6] Image Rejection and Single sideband performance plots are defined by the upper sideband (USB) or lower sideband (LSB) with respect to the LO signal. Plots are defined by which sideband is selected by the external IF quadrature hybrid.
[7] Typical IIP3 measured with I and Q ports combined with an external quadrature hybrid coupler.

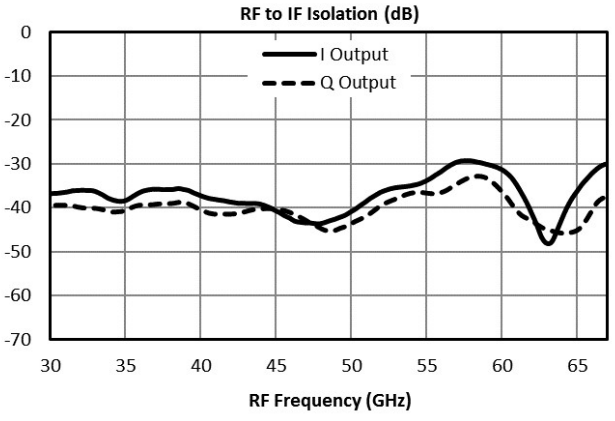
Typical Performance Plots

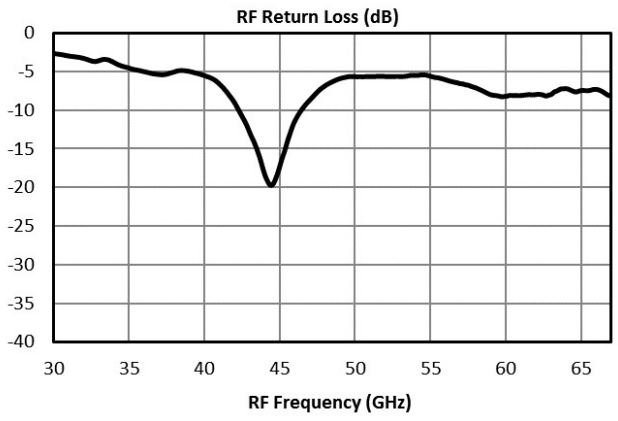
I output means that the IF output signal is measured at the I port of the mixer and the Q port is loaded. Q output means the IF output signal is measured at the Q port of the mixer while the I port is loaded.

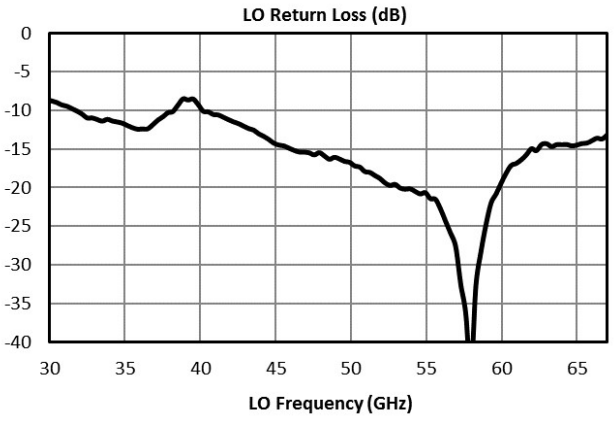


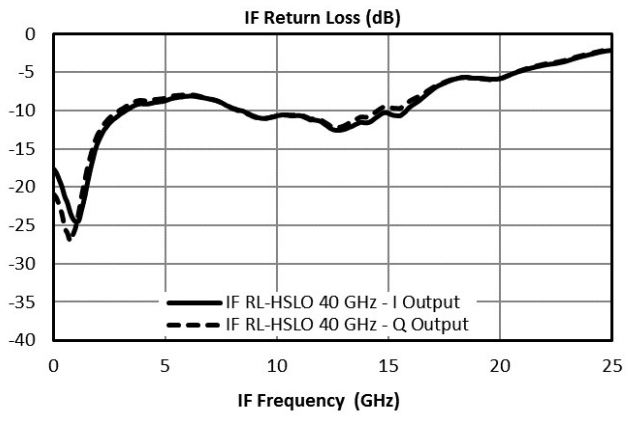


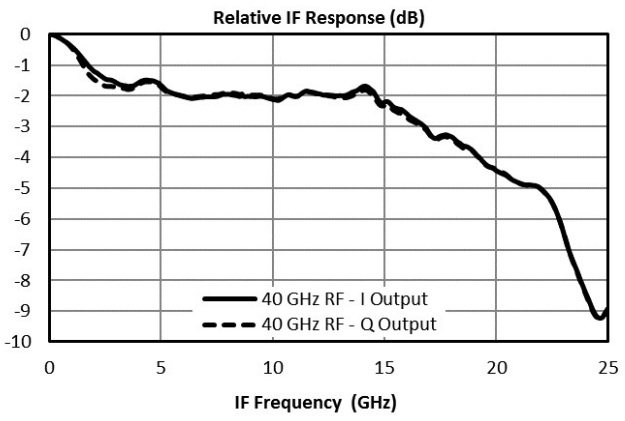




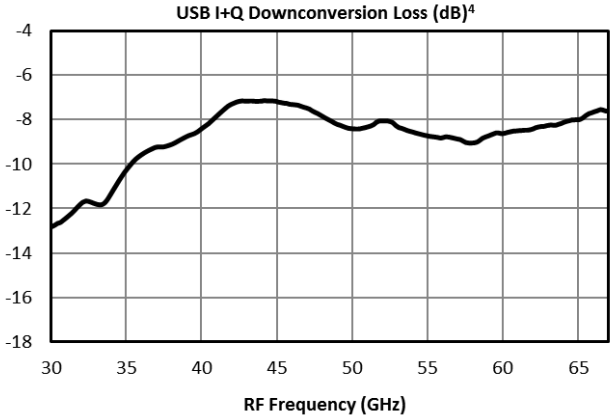




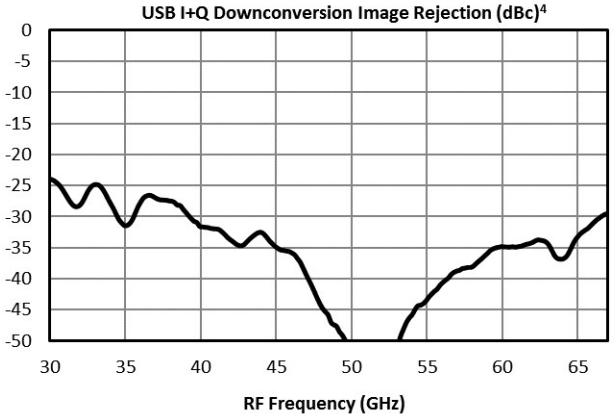




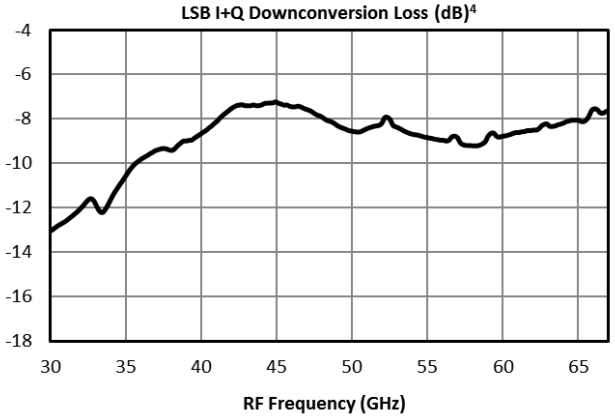
USB I+Q Downconversion Loss (dB)[4]



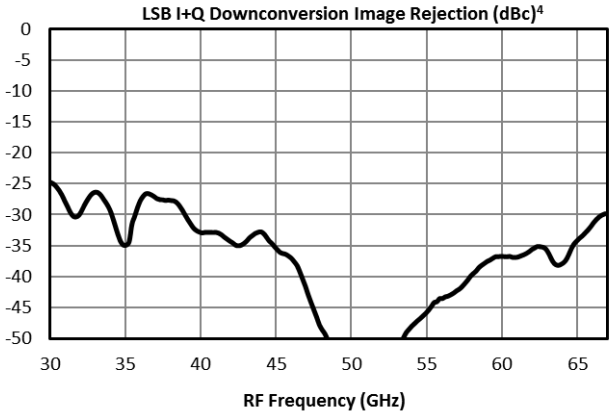
USB I+Q Downconversion Image Rejection (dBc)[4]



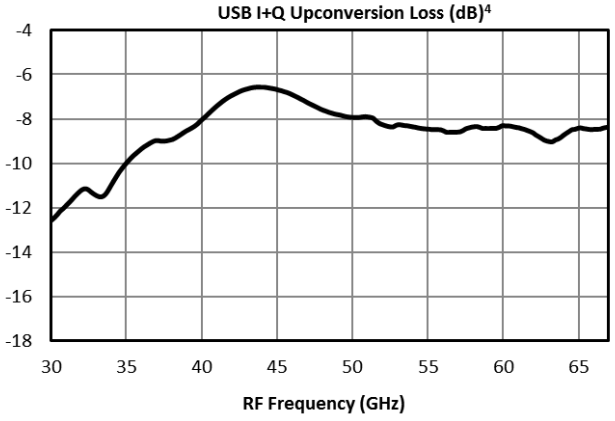
LSB I+Q Downconversion Loss (dB)[4]



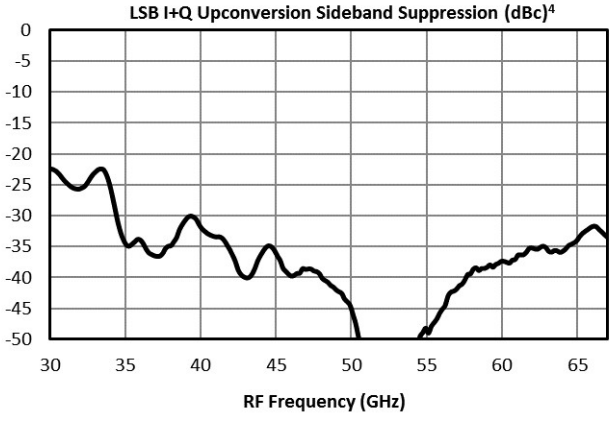
LSB I+Q Downconversion Image Rejection (dBc)[4]



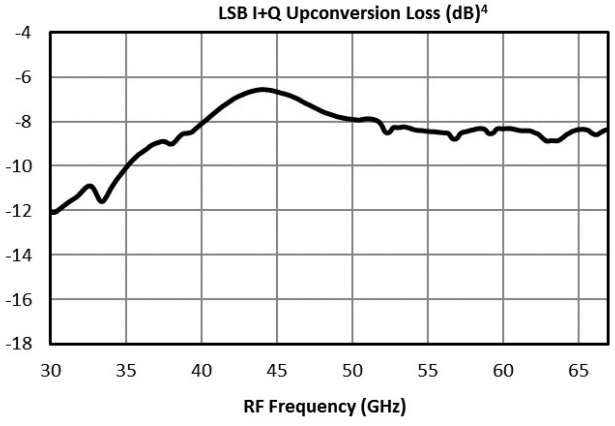
USB I+Q Upconversion Loss (dB)[4]



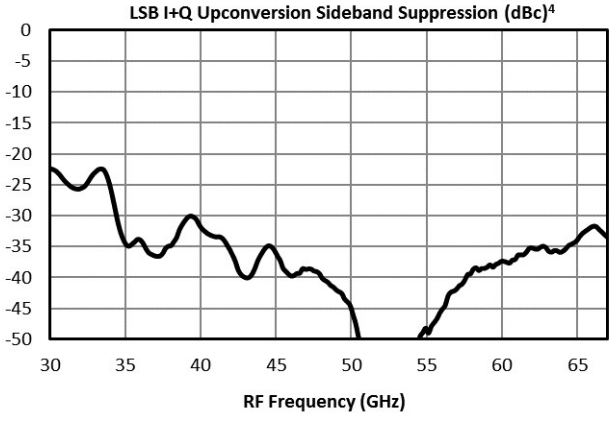
LSB I+Q Upconversion Sideband Suppression (dBc)[4]

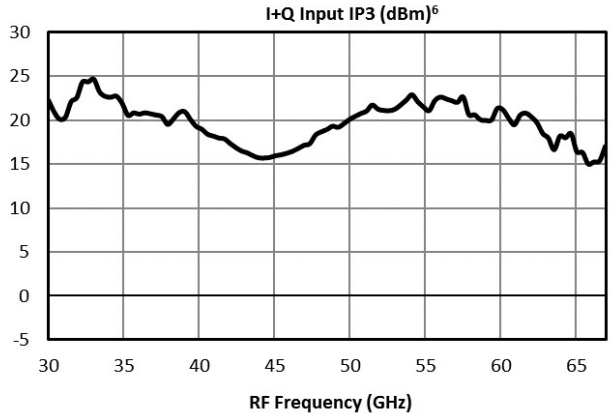


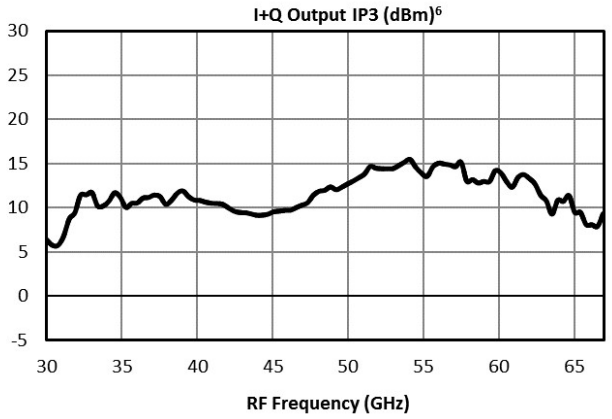
LSB I+Q Upconversion Loss (dB)[4]



LSB I+Q Upconversion Sideband Suppression (dBc)[4]

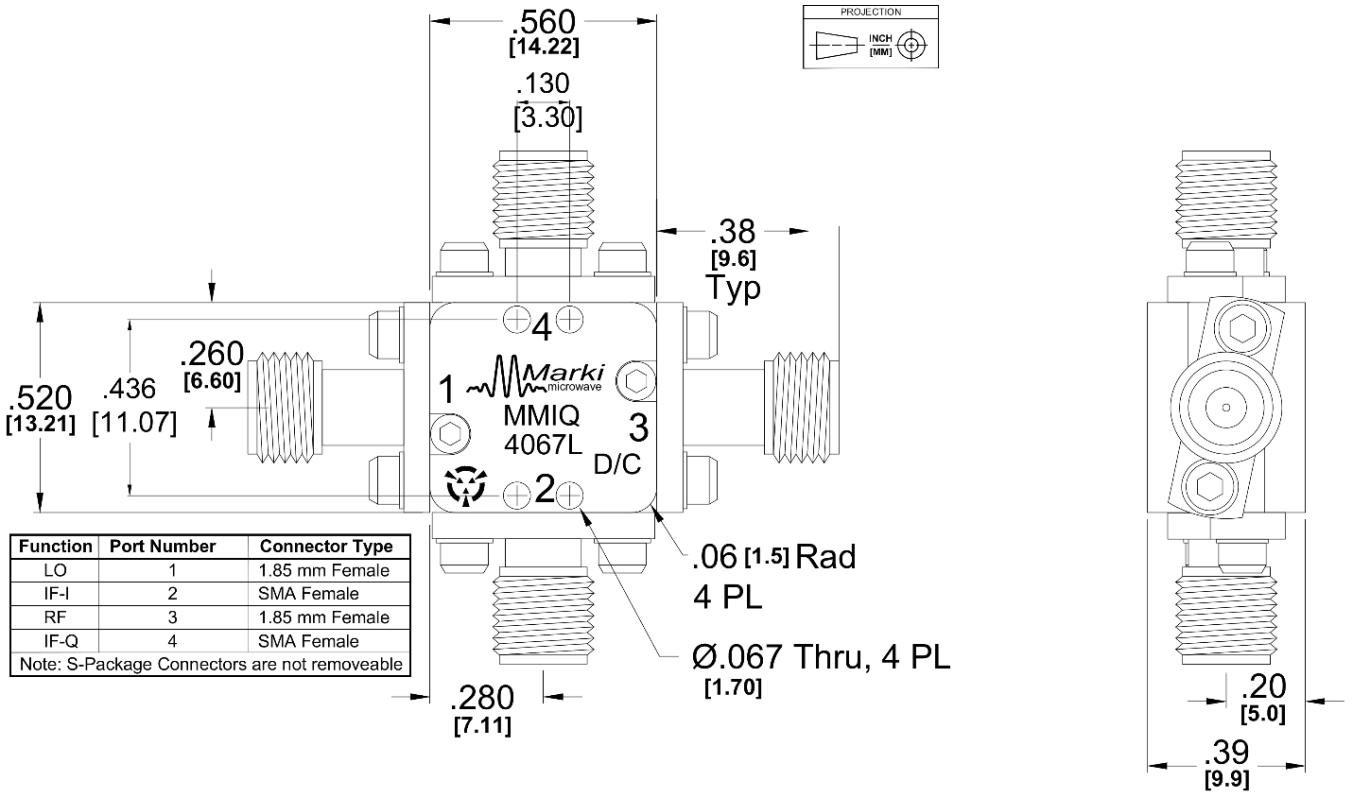






Mechanical Data

Outline Drawing



Function	Port Number	Connector Type
LO	1	1.85 mm Female
IF-I	2	SMA Female
RF	3	1.85 mm Female
IF-Q	4	SMA Female
Note: S-Package Connectors are not removeable		

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