

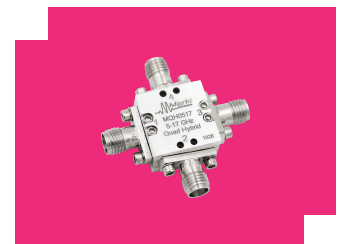
MQH-0517UB

MMIC 5-17GHz Quadrature Hybrid

DEVICE OVERVIEW

General Description

The MQH-0517 is a MMIC 5 GHz – 17 GHz quadrature (90°) hybrid. Wire bondable 50Ω terminations are available on-chip. Passive GaAs MMIC technology allows production of smaller constructions that replace larger form factor circuit board constructions. Tight fabrication tolerances allow for less unit to unit variation than traditional quadrature hybrid technologies. The MQH-0517 is available as a wire bondable chip or connectorized module. Low variation allows for accurate simulations using the provided S4P file taken from measured production units. Applications include single sideband upconverters, image rejection downconverters, IQ modulators, balanced amplifiers, microwave correlators, and microwave Butler matrices.



[Download s-parameters here](#)

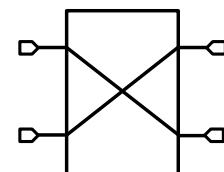
Features

- Designed for X/Ku-band applications
- Excellent amplitude and phase balance
- High isolation
- Low insertion loss
- On-chip 50Ω load terminations

Applications

N/A

Functional Block Diagram



Part Ordering Options

Part Number	Description	Package	Packing Size	Green Status	Product Lifecycle	Export Classification
MQH-0517UB	MMIC 5-17GHz Quadrature Hybrid	UB	-	RoHS	Released	EAR99

Table Of Contents

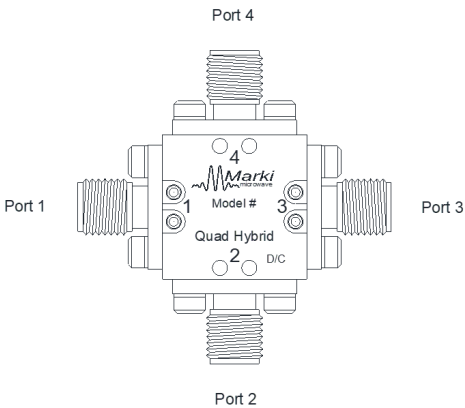
- **Device Overview**
 - General Description
 - Features
 - Applications
 - Functional Block Diagram
- **Port Configuration and Functions**
 - Port Diagram
 - Port Functions
- **Revision History**
- **Specifications**
 - Absolute Maximum Ratings
 - Package Information
 - Electrical Specifications
 - Typical Performance Plots
 - Amplitude and Phase Balance
- **Mechanical Data**
 - Outline Drawing
- **Operation**
 - Application Information

Revision History

Revision Code	Revision Date	Comment
-	2018-08-01	Datasheet Initial Release

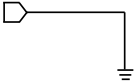
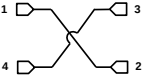
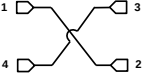
Port Configuration and Functions

Port Diagram

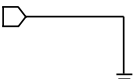
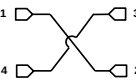
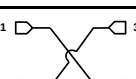


Port Functions

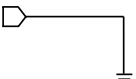
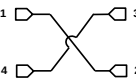
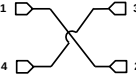
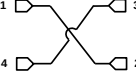
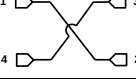
Configuration A

Port	Function	Description	Equivalent Circuit for Package
GND	Ground	Package ground provided through metal housing and outer coax conductor.	
Port 1	Input	Port 1 is DC short to port 2 and open to ground.	
Port 2	0° Output	Port 2 is DC short to port 1 and open to ground.	
Port 3	90° Output	Port 3 is DC short to port 4 and open to ground.	
Port 4	Isolated	Port 4 is DC short to port 3 and open to ground.	

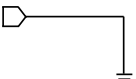
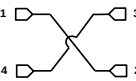
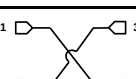
Configuration B

Port	Function	Description	Equivalent Circuit for Package
GND	Ground	Package ground provided through metal housing and outer coax conductor.	
Port 1	0° Output	Port 1 is DC short to port 2 and open to ground.	
Port 2	Input	Port 2 is DC short to port 1 and open to ground.	
Port 3	Isolated	Port 3 is DC short to port 4 and open to ground.	
Port 4	90° Output	Port 4 is DC short to port 3 and open to ground.	

Configuration C

Port	Function	Description	Equivalent Circuit for Package
GND	Ground	Package ground provided through metal housing and outer coax conductor.	
Port 1	90° Output	Port 1 is DC short to port 2 and open to ground.	
Port 2	Isolated	Port 2 is DC short to port 1 and open to ground.	
Port 3	Input	Port 3 is DC short to port 4 and open to ground.	
Port 4	0° Output	Port 4 is DC short to port 3 and open to ground.	

Configuration D

Port	Function	Description	Equivalent Circuit for Package
GND	Ground	Package ground provided through metal housing and outer coax conductor.	
Port 1	Isolated	Port 1 is DC short to port 2 and open to ground.	
Port 2	90° Output	Port 2 is DC short to port 1 and open to ground.	
Port 3	0° Output	Port 3 is DC short to port 4 and open to ground.	
Port 4	Input	Port 4 is DC short to port 3 and open to ground.	

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

Package Information

Parameter	Details	Rating
Dimensions	-	16.26 x 16.26 mm

Electrical Specifications

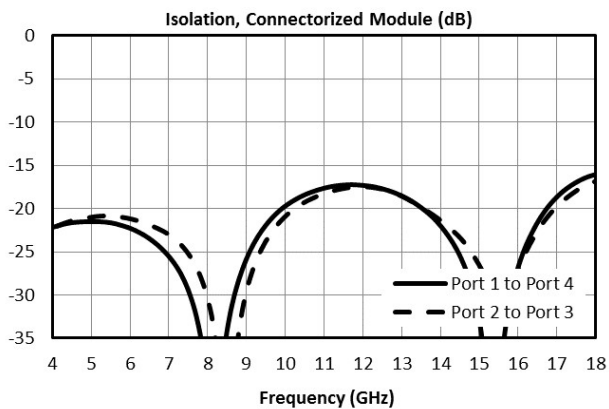
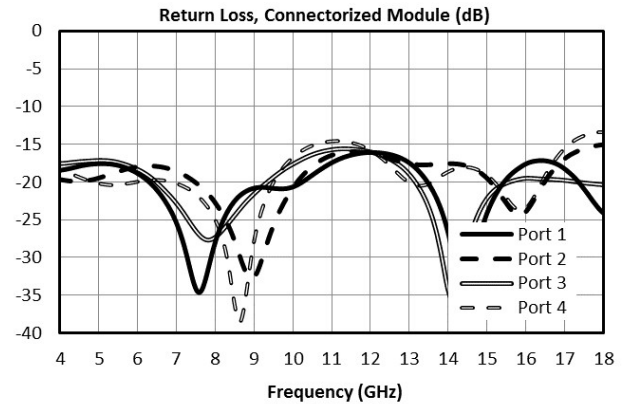
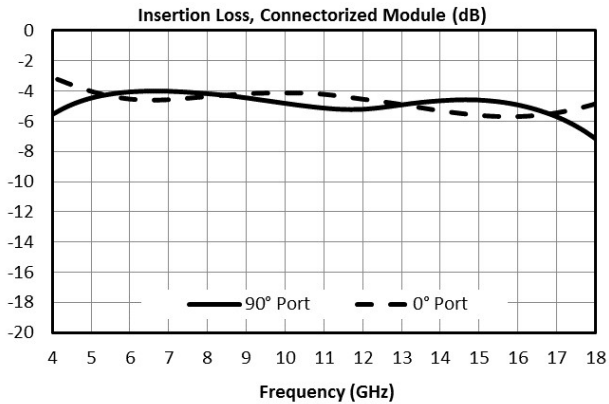
The electrical specifications apply at TA=+25°C in a 50Ω system.

Parameter	Port Configuration	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
Nominal Phase Shift	A	-	5	17	-	90	-	°
Amplitude Balance	A	-	5	17	-	0.6	2	dB
Phase Balance	A	-	5	17	-	4	12	°
Excess Through Line Insertion Loss	A	-	5	17	-	1.6	4.5	dB
Isolation	A	-	5	17	14	23	-	dB
VSWR	A	-	5	17	-	1.15	-	-
Mean Coupling	A	-	5	17	-	3	-	dB
Impedance	-	-	5	17	-	50	-	Ω

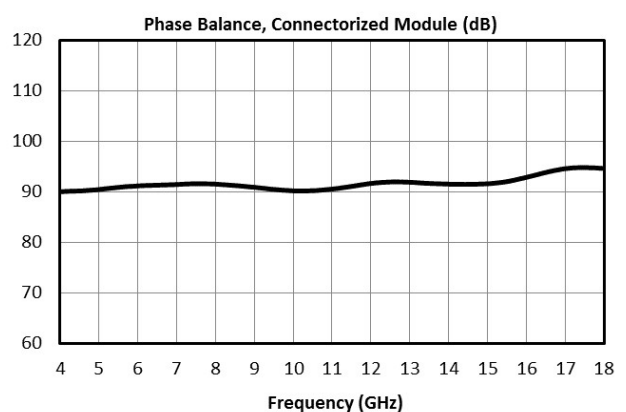
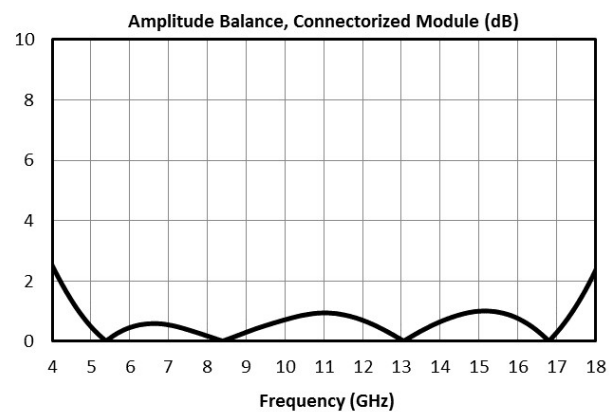
Typical Performance Plots

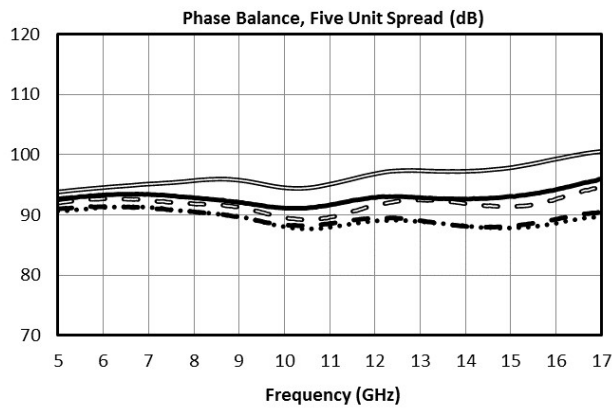
Insertion Loss, Return Loss, and Isolation

All measurements taken in a 50 Ω environment. Phase balance spread is shown due to large performance spread. Minimal variance observed in amplitude balance and insertion loss. Performance spread is related to packaging and bond wire inductance variation. On-chip load was not used when taking measurements.



Amplitude and Phase Balance

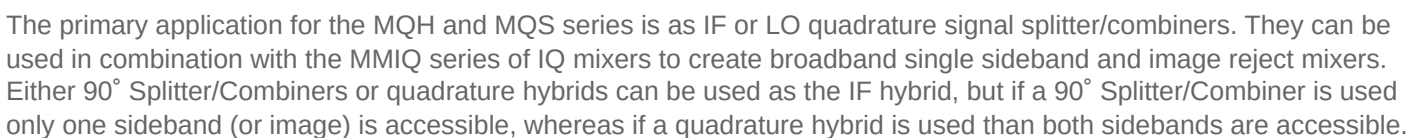




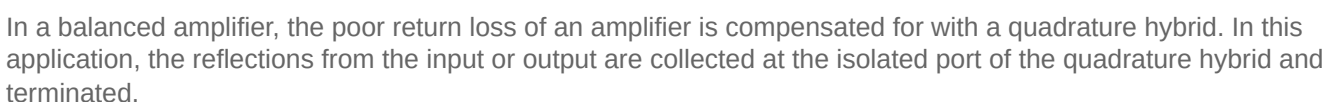
Quadrature signal generation is useful for many applications in analog signal processing. Marki MQH/S MMIC quadrature hybrids and 90° Splitter/Combiners offer this functionality in a small factor with high repeatability. Below are applications and how they can be realized with the MQH and MQS product lines.

Some products are 'true' quadrature hybrids, while others are 90° Splitter/Combiners. A quadrature hybrid is symmetric about all four ports, meaning that in a splitting application any port can be used as an input, with the isolated and output ports following from this selection. Likewise, for a combining application, any port can be used as an output.

Single Sideband and Image Reject Mixers

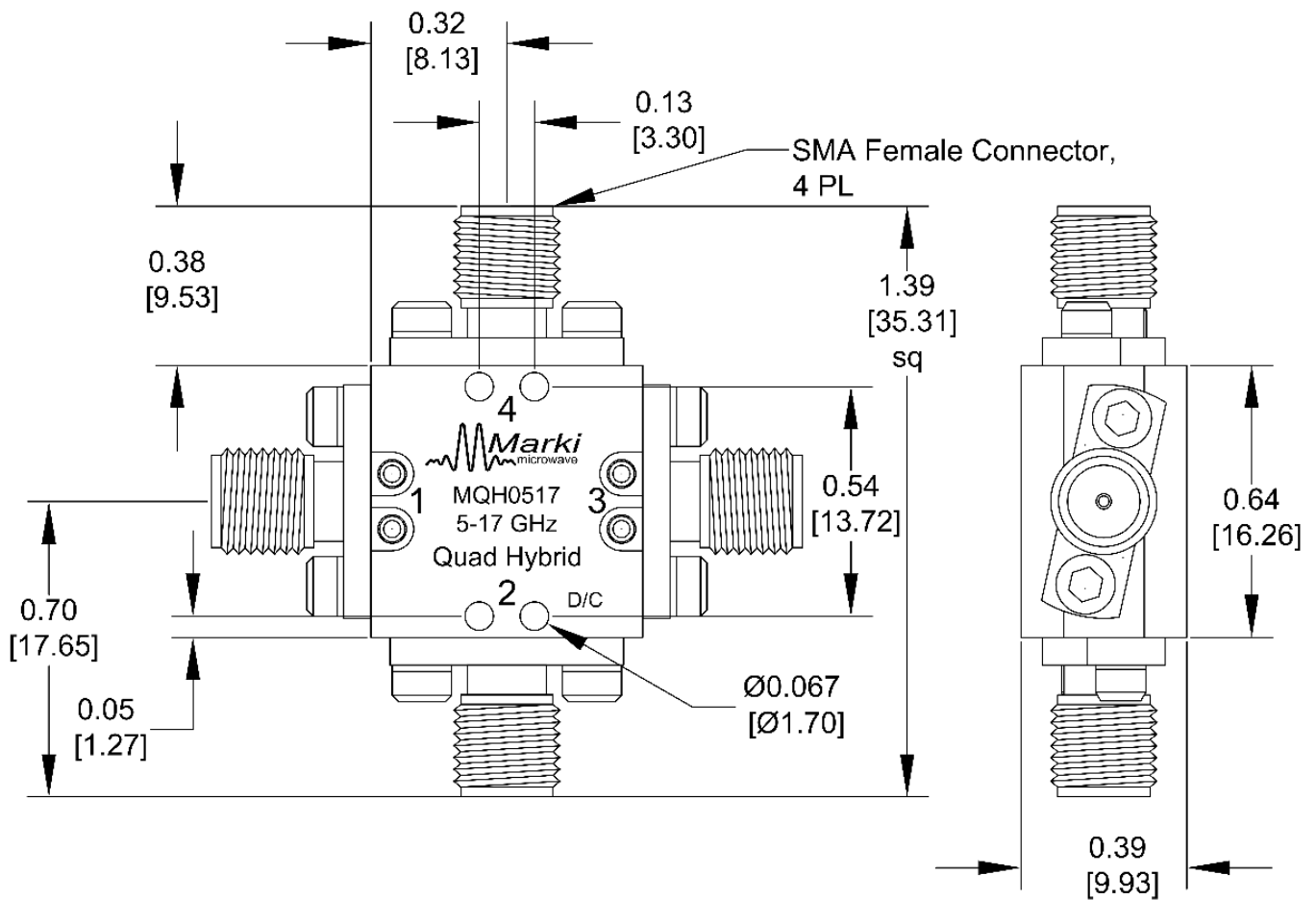


Balanced Amplifiers



Mechanical Data

Outline Drawing



DISCLAIMER

MARKI MICROWAVE, INC., ("MARKI") PROVIDES TECHNICAL SPECIFICATIONS AND DATA (INCLUDING DATASHEETS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, AND OTHER INFORMATION AND RESOURCES "AS IS" AND WITH ALL FAULTS. MARKI DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT.

These resources are intended for developers skilled in the art designing with Marki products. You are solely responsible for (1) selecting the appropriate products for your application, (2) designing, validating, and testing your application, and (3) ensuring your application meets applicable standards and other requirements. Marki makes no guarantee regarding the suitability of its products for any particular purpose, nor does Marki assume any liability whatsoever arising out of your use or application of any Marki product.

Marki grants you permission to use these resources only for development of an application that uses Marki products. Other reproduction or use of these resources is strictly prohibited. No license is granted to any other Marki intellectual property or to any third-party intellectual property. Marki reserves the right to make changes to the product(s) or information contained herein without notice.

MARKI MICROWAVE and T3 MIXER are trademarks or registered trademarks of Marki Microwave, Inc. All other trademarks used are the property of their respective owners.

© 2018, Marki Microwave, Inc