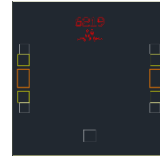


# Passive MMIC 60GHz Equalizer

# MEQ10-60A

Page 1

The MEQ10-60A is a passive MMIC equalizer. It is a positive gain slope equalizer designed to pass DC to 60GHz. Equalization can be applied to reduce low pass filtering effects in both RF/microwave and high speed digital systems. Passive GaAs MMIC technology allows production of smaller equalizer constructions that replace larger form factor circuit board constructions. Better IC tolerances allow for less unit to unit variation that traditionally etched circuits have. Low unit to unit variation allow for accurate simulations using the provided S2P file taken from measured production units.



## Features

- Insertion loss typically 1.6dB at 60GHz
- 10dB low frequency attenuation
- Excellent return loss
- Broadband Operation
- RoHS Compliant
- [MEQ10-60A.S2P](#)

**Electrical Specifications** - Specifications guaranteed for +25°C for chip (CH) package, measured in a 50Ω system.

Parameter	Frequency (GHz)	Min	Typ.	Max
Insertion Loss (dB)	0.01		10	
	40		1	
	60		1.6	2.5
	67		1.5	
Return Loss (dB)	DC-40	12	15	
	40-60		8	
	60-67		10	
Impedance (Ω)			50	

## Part Number Option

Please specify package style by adding to model number.			
Package Style		Example MEQ10-60ACH	
Chip <sup>1-2</sup> (RoHS)	CH	MEQ10-60A (Model)	CH (Package)
MEQ-60CH-KIT	Evaluation Kit contains 5x of each model: MEQ3-60ACH, MEQ6-60ACH, MEQ10-60ACH. Contact <a href="mailto:info@markimicrowave.com">info@markimicrowave.com</a> for pricing and availability.		

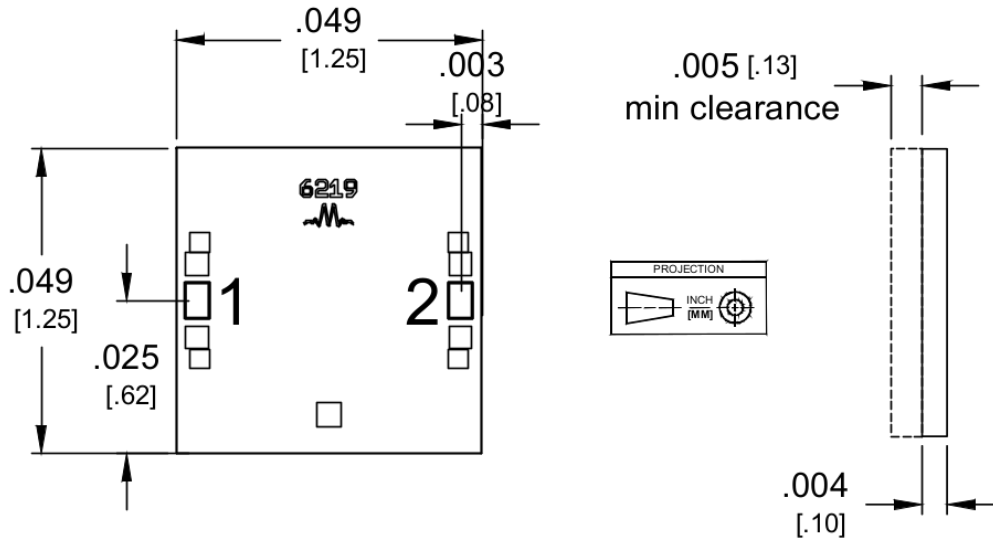
<sup>1</sup>Chip package connects to external circuit through wire bondable gold pads.

<sup>2</sup>Note: For port locations and I/O designations, refer to the drawings on page 2 of this document.

# Passive MMIC 60GHz Equalizer

MEQ10-60A

Page 2



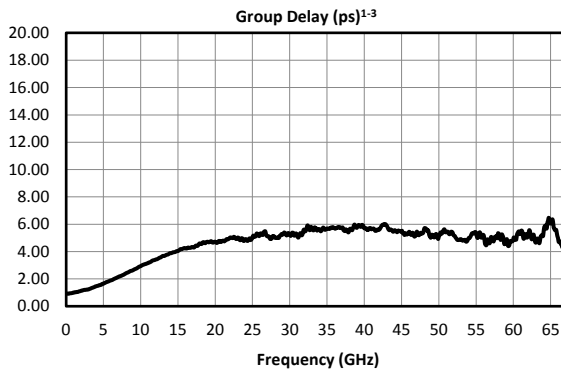
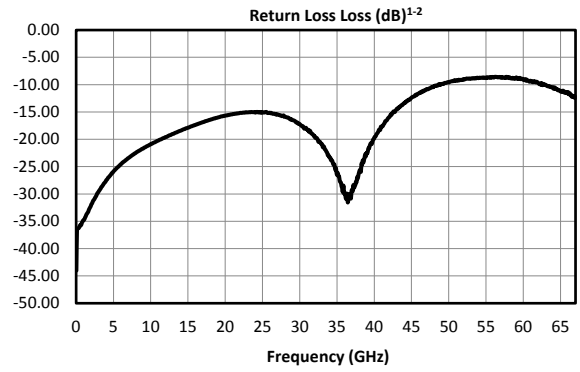
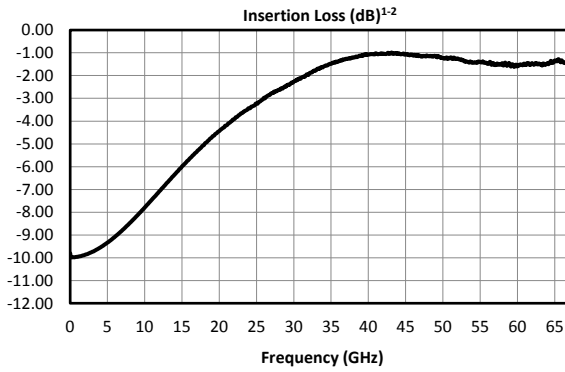
1. CH Substrate material is .004 thick GaAs.
2. I/O traces finish is 5 microns Au. Ground plane finish is 4 microns Au.
3. Wire Bonding - Ball or wedge bond with 0.025 mm (1 mil) diameter pure gold wire. Thermosonic wirebonding with a nominal stage temperature of 150 °C and a ball bonding force of 40 to 50 grams or wedge bonding force of 18 to 22 grams is recommended. Use the minimum level of ultrasonic energy to achieve reliable wirebonds. Wirebonds should be started on the chip and terminated on the package or substrate. All bonds should be as short as possible <0.31 mm (12 mils).

# Passive MMIC 60GHz Equalizer

# MEQ10-60A

Page 3

## Typical Performance



## Mounting and Bonding Recommendations

Marki MMICs should be attached directly to a ground plane with conductive epoxy. The ground plane electrical impedance should be as low as practically possible. This will prevent resonances and permit the best possible electrical performance. Datasheet performance is only guaranteed in an environment with a low electrical impedance ground.

**Mounting** - To epoxy the chip, apply a minimum amount of conductive epoxy to the mounting surface so that a thin epoxy fillet is observed around the perimeter of the chip. Cure epoxy according to manufacturer instructions.

**Wire Bonding** - Ball or wedge bond with 0.025 mm (1 mil) diameter pure gold wire. Thermosonic wirebonding with a nominal stage temperature of 150 °C and a ball bonding force of 40 to 50 grams or wedge bonding force of 18 to 22 grams is recommended. Use the minimum level of ultrasonic energy to achieve reliable wirebonds. Wirebonds should be started on the chip and terminated on the package or substrate. All bonds should be as short as possible <0.31 mm (12 mils).

**Circuit Considerations** – 50 Ω transmission lines should be used for all high frequency connections in and out of the chip. Wirebonds should be kept as short as possible, with multiple wirebonds recommended for higher frequency connections to reduce parasitic inductance. In circumstances where the chip more than .001” thinner than the substrate, a heat spreading spacer tab is optional to further reduce bondwire length and parasitic inductance.

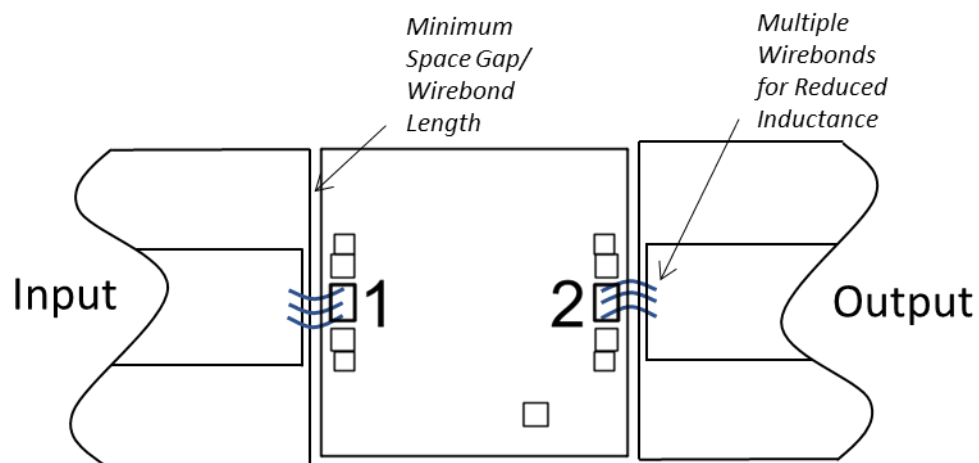
## Handling Precautions

**General Handling:** Chips should be handled with a vacuum collet when possible, or with sharp tweezers using well trained personnel. The surface of the chip is fragile and should not be contacted if possible.

**Static Sensitivity:** GaAs MMIC devices are subject to static discharge, and should be handled, assembled, tested, and transported only in static protected environments.

**Cleaning and Storage:** Do not attempt to clean the chip with a liquid cleaning system or expose the bare chips to liquid. Once the ESD sensitive bags the chips are stored in are opened, chips should be stored in a dry nitrogen atmosphere.

## Bonding Diagram





# Passive MMIC 60GHz Equalizer

MEQ10-60A

Page 5

Absolute Maximum Ratings	
Parameter	Maximum Rating
Port 1 DC Current	N/A
Port 2 DC Current	N/A
RF Power Handling	+30 dBm
Operating Temperature	+25°C
Spec Guaranteed Operating Temperature	-65°C to +125°C
Storage Temperature	-65°C to +125°C
ESD Rating (Human Body Model, per MIL-STD-750, Method 1020)	1A

### DATA SHEET NOTES:

1. Equalizer is symmetrical. Reverse measurement is equivalent to forward measurement.
2. Measured typical data available for integrated circuit only.
3. Group delay calculated using wrapped phase response.
4. Specifications are subject to change without notice. Contact Marki Microwave for the most recent specifications and data sheets.
5. Catalog circuits are continually improved. Configuration control requires custom model numbers and specifications.

Note: Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to device with only one parameter set at the limit and all other parameters set at or below their nominal value. Exceeding any of the limits listed here may result in permanent damage to the device.

### Revision History

Revision Code	Revision Date	Comment
-	2017	Initial Release
A	March 2019	Added ESD rating
B	January 2023	Added Extended Performance to 67 GHz

Marki Microwave reserves the right to make changes to the product(s) or information contained herein without notice. Marki Microwave makes no warranty, representation, or guarantee regarding the suitability of its products for any particular purpose, nor does Marki Microwave assume any liability whatsoever arising out of the use or application of any product.

[www.markimicrowave.com](http://www.markimicrowave.com)



**Passive MMIC 60GHz Equalizer**  
*Page 6*

**MEQ10-60A**