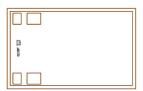
# Gain Equalizer Die

# **EQY-D-SERIES**

50 $\Omega$  DC to 6 GHz

# **The Big Deal**

- Excellent Return Loss, 20dB typ.
- Wide bandwidth, DC 6 GHz
- Excellent power handling 31 dBm



# **Product Overview**

EQY Series Dice of absorptive Gain Equalizers are fabricated using highly repetitive GaAs IPD\* MMIC process incorporating resistors, capacitors and inductors having negative insertion loss slope. EQYs are available with nominal attenuation slope of 1,2,3,4,5,6,8 & 10 dB.

# **Key Features**

Feature	Advantages
Negative Insertion Loss Slope vs. Frequency	Useful for compesating negative gain slope of amplifiers, receivers, transmitters to achieve flat gain versus frequency.
Wide range of values 1,2,3,4,5,6,8 & 10 dB	Enables circuit designer to change nominal insertion loss values without mother-board redesign making the EQY series ideal for select at test application.
Wideband operation, DC to 6 GHz	Supports a wide array of applications including wireless cellular, microwave communications, satellite, defense and aerospace, medical broadband and optic applications.
Excellent Power Handling Capability 31/32 dBm	Enables its use at the output of a variety of amplfiers
Unpackaged Die	Enables the user to integrate the gain equalizer directly into hybrids

<sup>\*</sup>GaAs IPD (Gallium Arsenide Integrated Passive Device)

# Gain Equalizer Die

**EQY-5-63-D+** 

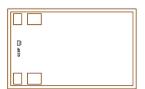
 $50\Omega$  5dB DC to 6 GHz

#### **Product Features**

- 5.0 dB Slope
- Excellent power handling 31 dBm
- Wide Bandwidth, DC-6 GHz
- Excellent Return Loss, 20 dB typ.

# **Typical Applications**

- Cellular
- PCS
- Communications
- Radar
- Defense



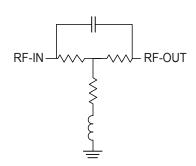
+RoHS Compliant
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Ordering Information: Refer to Last Page

# **General Description**

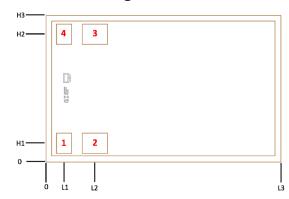
EQY-5-63-D+ is an absorptive Gain Equalizer Die fabricated using highly repetitive GaAs IPD MMIC process incorporating resistors, capacitors and inductors having negative insertion loss slope. EQY-5-63-D+ has a nominal attenuation slope of 5.0 dB.

# **Simplified Schematic and Pad description**



Pad Number	Function	Description
2	RF-IN	RF-Input pad
3	RF-OUT	RF-Output pad
1,4 & Bottom of Die	GND	Ground

## **Bonding Pad Position**



Dimensions in  $\mu m,\, Typical$ 

L1	L2	L3	H1	H2	НЗ	Thickness	Die Size	Bond Pad #1, #4	Bond Pad #2, #3
84	234	1130	87.5	612.5	700	100	1130x700	67 X 92	117 X 92



## Electrical Specifications 1 at 25 °C, 50 $\Omega$ , unless otherwise noted.

Parameter	Condition (GHz)	Min.	Тур.	Max.	Units
Frequency Range		DC		6	GHz
Insertion Loss	0.01		6.0		dB
	1		5.6		
	2		4.6		
	3		3.5		
	4		2.4		
	5		1.6		
	6		1.0		
VSWR	0.01 -1		1.04		:1
	1 - 2		1.08		
	2 - 3		1.11		
	3 - 4		1.12		
	4 - 5		1.14		
	5 - 6		1.24		

<sup>1.</sup> Measured on Mini-Circuits Characterization Test Board. Die is packaged in 2x2mm, 8-lead MCLP and soldered on testboard TB-1041-5-63+ See Characterization Test Circuit (Fig. 1)

## **Absolute Maximum Ratings<sup>2</sup>**

Operating Case Temperature	-40°C to 85°C
RF Input Power	31 dBm

<sup>2.</sup> Permanent damage may occur if any of these limits are excedeed.

#### **Characterization Test Circuit**

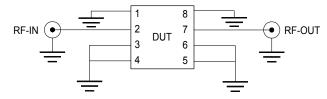
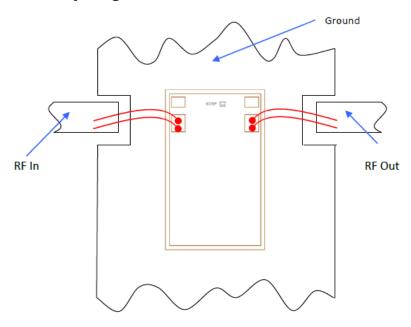


Fig 1. Block Diagram of Test Circuit used for characterization. Die is packaged in 2x2mm, 8-lead MCLP and soldered on testboard TB-1041-5-63+ Conditions: Attenuation & Return Loss Pin=0 dBm

## **Assembly Diagram**



#### **Assembly and Handling Procedure**

- 1. Storage
  - Dice should be stored in a dry nitrogen purged desiccators or equivalent.
- 2. ESD

MMIC GaAs Gain equalizer dice are susceptible to electrostatic and mechanical damage. Die are supplied in antistatic protected material, which should be opened in clean room conditions at an appropriately grounded anti-static worksta tion. Devices need careful handling using correctly designed collets, vacuum pickup tips or sharp antistatic tweezers to deter ESD damage to dice.

- 3. Die Attach
  - The die mounting surface must be clean and flat. Using conductive silver filled epoxy, recommended epoxies are DieMat DM6030HK-PT/H579 or Ablestik 84-1LMISR4. Apply sufficient epoxy to meet required epoxy bond line thickness, epoxy fillet height and epoxy coverage around total die periphery. Parts shall be cured in a nitrogen filled atmosphere per manufacturer's cure condition. It is recommended to use antistatic die pick up tools only.
- Wire Bonding

Bond pad openings in the surface passivation above the bond pads are provided to allow wire bonding to the dice gold bond pads. Thermosonic bonding is used with minimized ultrasonic content. Bond force, time, ultrasonic power and temperature are all critical parameters. Suggested wire is pure gold, 1 mil diameter. Bonds must be made from the bond pads on the die to the package or substrate. All bond wires should be kept as short as low as reasonable to minimize performance degradation due to undesirable series inductance.



Additional Detailed Technica additional information is available on our of				
	Data Table			
Performance Data	Swept Graphs			
	S-Parameter (S2P Files) Data Set with and without port extension(.zip file)			
Case Style	Die			
	Quantity, Package	Model No.		
	Small, Gel - Pak: 5,10,50,100 KGD*	EQY-5-63-DG+		
Die Ordering and packaging information	Medium <sup>†</sup> , Partial wafer: KGD*<1645 Large <sup>†</sup> , Full Wafer	EQY-5-63-DP+ EQY-5-63-DF+		
	†Available upon request contact sales representative			
	Refer to <u>AN-60-067</u>			
Environmental Ratings	ENV80			

<sup>\*</sup>Known Good Dice ("KGD") means that the dice in question have been subjected to Mini-Circuits DC test performance criteria and measurement instructions and that the parametric data of such dice fall within a predefined range. While DC testing is not definitive, it does help to provide a higher degree of confidence that dice are capable of meeting typical RF electrical parameters specified by Mini-Circuits.

## **ESD Rating\*\***

Human Body Model (HBM): Class 2 (Pass 2000V) in accordance with ANSI/ESD STM 5.1 - 2001

#### **Additional Notes**

- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
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<sup>\*\*</sup> Tested in industry standard 2 x 2mm, 8-lead MCLP package