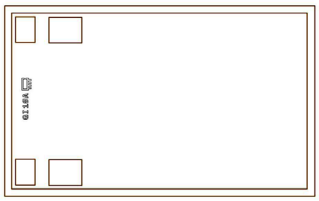
Microwave

Gain Equalizer Die

EQY-D-SERIES

50Ω 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 communi-cations, 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

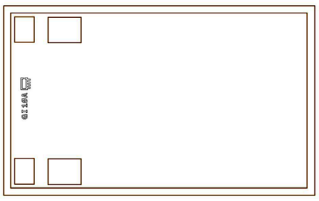
*GaAs IPD (Gallium Arsenide Integrated Passive Device)

Microwave

Gain Equalizer Die

EQY-10-63-D+

50Ω 10dB DC to 6 GHz



Product Features

- 10.2 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

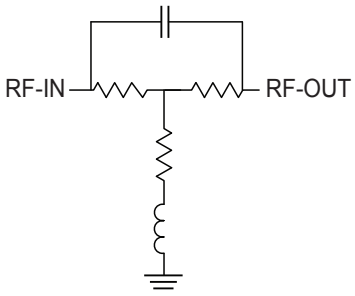
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Ordering Information: Refer to Last Page

General Description

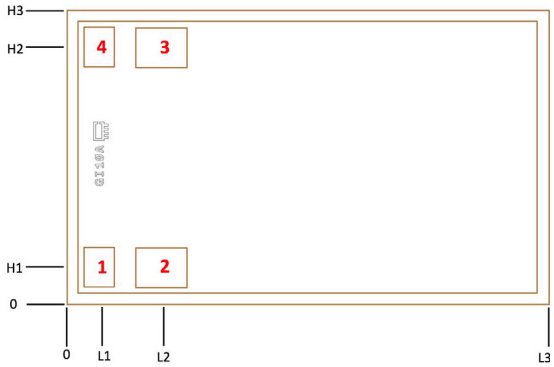
EQY-10-63-D+ is an absorptive Gain Equalizer Die fabricated using highly repetitive GaAs IPD MMIC process incorporating resistors, capacitors and inductors having negative insertion loss slope. EQY-10-63-D+ has a nominal attenuation slope of 10.2 dB.

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 µm, Typical

L1	L2	L3	H1	H2	H3	Thickness	Die Size	Bond Pad #1, #4	Bond Pad #2, #3
79	224	1150	86.5	613.5	700	100	1150x700	67 X 92	117 X 92

Electrical Specifications[1] at 25°C, 50Ω, unless otherwise noted.

Parameter	Condition (GHz)	Min.	Typ.	Max.	Units
Frequency Range		DC		6	GHz
Insertion Loss	0.01		11.2		dB
	1		10.0		
	2		7.5		
	3		4.9		
	4		2.9		
	5		1.7		
	6		1.0		
VSWR	0.01 -1		1.06		:1
	1 - 2		1.03		
	2 - 3		1.05		
	3 - 4		1.05		
	4 - 5		1.04		
	5 - 6		1.12		

1. Measured on Mini-Circuits Characterization Test Board. Die is packaged in 2x2mm, 8-lead MCLP and soldered on testboard TB-1041-10-63+ See Characterization Test Circuit (Fig. 1)

Absolute Maximum Ratings[2]

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

2. Permanent damage may occur if any of these limits are excedeed.

Characterization Test Circuit

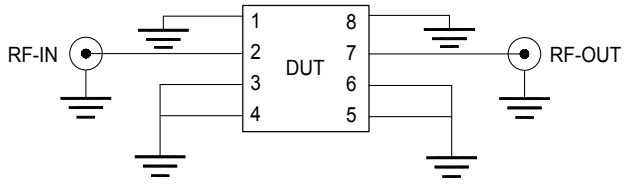
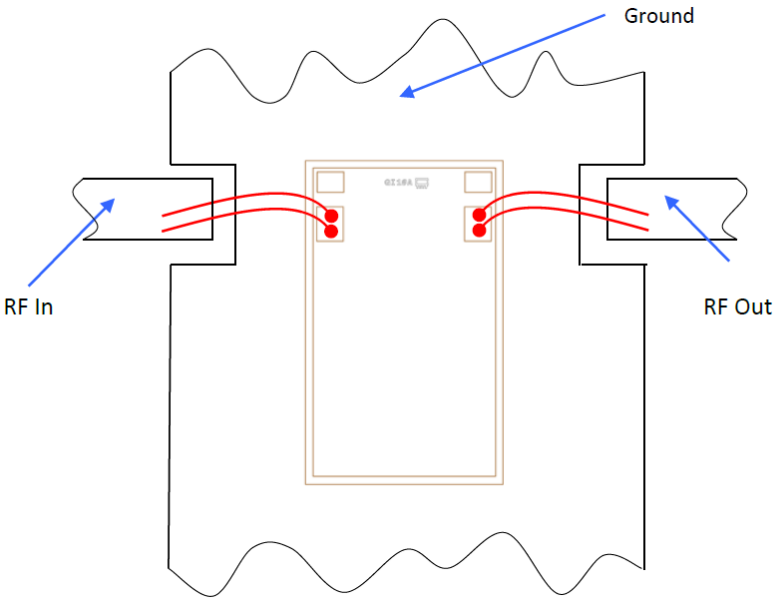


Fig 1. Block Diagram of Test Circuit used for characterization. Die is packaged in 2x2mm, 8-lead MCLP and soldered on testboard TB-1041-10-63+
Conditions: Attenuation & Return Loss Pin=0 dBm

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 workstation. 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.
4. 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 Technical Information

additional information is available on our dash board.

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

*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

** Tested in industry standard 2 x 2mm, 8-lead MCLP package

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.

C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp

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MMIC Gain Equalizer Die EQY-10-63-D+

Typical Performance Data

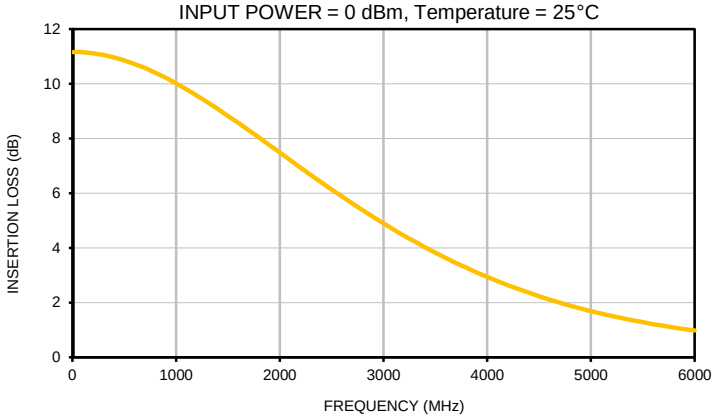
Temperature = 25°C

FREQUENCY	INSERTION LOSS	INPUT VSWR	OUTPUT VSWR
(MHz)	(dB)	(:1)	(:1)
10	11.16	1.06	1.06
50	11.17	1.07	1.07
100	11.15	1.07	1.07
200	11.11	1.07	1.07
300	11.05	1.06	1.06
400	10.97	1.06	1.06
500	10.86	1.05	1.06
600	10.73	1.05	1.05
700	10.58	1.05	1.05
800	10.40	1.04	1.04
900	10.22	1.04	1.04
1000	10.01	1.04	1.03
1100	9.80	1.03	1.03
1200	9.57	1.02	1.03
1300	9.33	1.02	1.02
1400	9.08	1.02	1.02
1500	8.83	1.02	1.02
1600	8.57	1.02	1.02
1700	8.30	1.03	1.02
1800	8.03	1.03	1.03
1900	7.76	1.04	1.03
2000	7.48	1.05	1.03
2100	7.21	1.05	1.04
2200	6.94	1.05	1.04
2300	6.67	1.06	1.05
2400	6.40	1.06	1.05
2500	6.14	1.06	1.05
2600	5.88	1.06	1.06
2700	5.62	1.06	1.06
2800	5.37	1.06	1.06
2900	5.13	1.06	1.06
3000	4.90	1.06	1.06
3100	4.67	1.06	1.06
3200	4.45	1.06	1.06
3300	4.23	1.06	1.06
3400	4.02	1.05	1.06
3500	3.83	1.05	1.05
3600	3.63	1.04	1.05
3700	3.45	1.04	1.04
3800	3.27	1.03	1.03
3900	3.10	1.02	1.03
4000	2.94	1.01	1.02
4100	2.78	1.01	1.02
4200	2.64	1.02	1.02
4300	2.50	1.03	1.02
4400	2.36	1.04	1.03
4500	2.24	1.05	1.04
4600	2.11	1.06	1.06
4700	2.00	1.08	1.07
4800	1.89	1.09	1.08
4900	1.79	1.09	1.09
5000	1.69	1.11	1.11
5100	1.60	1.12	1.12
5200	1.51	1.13	1.13
5300	1.43	1.14	1.14
5400	1.36	1.16	1.16
5500	1.28	1.17	1.17
5600	1.21	1.17	1.18
5700	1.15	1.18	1.19
5800	1.09	1.19	1.20
5900	1.03	1.20	1.21
6000	0.98	1.21	1.22

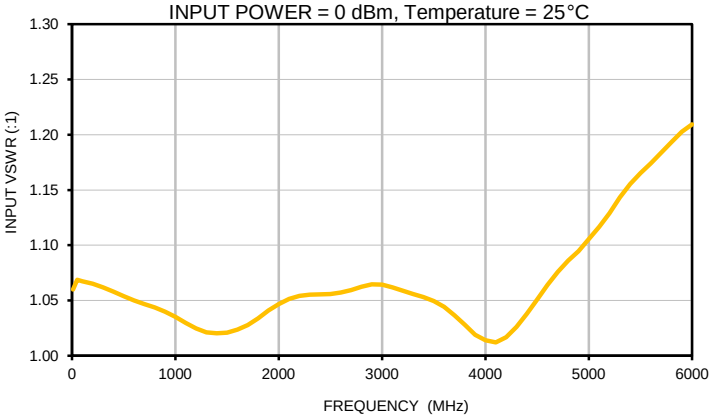
Note: Test data of Die packaged in industry standard 2x2mm 8-Lead MCLP Package

Typical Performance Curves

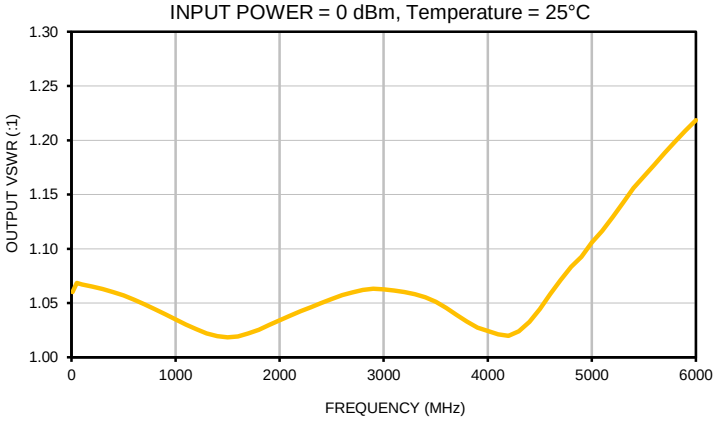
INSERTION LOSS
INPUT POWER = 0 dBm, Temperature = 25°C



INPUT VSWR
INPUT POWER = 0 dBm, Temperature = 25°C



OUTPUT VSWR
INPUT POWER = 0 dBm, Temperature = 25°C



Note: Test data of Die packaged in industry standard 2x2mm 8-Lead MCLP Package

Mini-Circuits

Environmental Specifications ENV80

All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-40° to 85° C or -40° to 105° C or -55° to 105° C or -45° to 105° C Ambient Environment	Refer to Individual Model Data Sheet
Storage Environment (Die)	-65° to 150°C	Individual Model Data Sheet
Storage Environment(Packaging)	-40° to 70°C and 40 to 60% humidity (In Factory Shipped Package)	