

Microwave

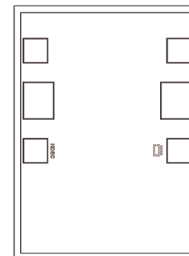
# Gain Equalizer Die

## EQY-XX-24-D+ Series

50Ω DC to 20 GHz

### The Big Deal

- Excellent Return Loss, 20dB typ.
- Wide bandwidth, DC - 20 GHz



### Product Overview

EQY-XX-24-D+ series of absorptive Gain Equalizer dice are fabricated using highly repetitive GaAs IPD\* MMIC process incorporating resistors, capacitors and inductors having negative insertion loss slope. EQY-XX-24-D+ are available with nominal attenuation slope of 0,2,3,5,6,8,10,12 dB.

### Key Features

Feature	Advantages
Negative Insertion Loss Slope vs. Frequency	Useful for compensating negative gain slope of amplifiers, receivers, transmitters to achieve flat gain versus frequency.
Wide range of values 0,2,3,5,6,8,10,12 dB	Enables circuit designer to change nominal insertion loss values without motherboard redesign making the EQY-XX-24-D+ series ideal for select at test application.
Wideband operation, DC to 20 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	Enables its use at the output of a variety of amplifiers
Unpackaged Die	Enables the user to intergrate the gain equalizer directly into hybrids.

\*GaAs IPD (Gallium Arsenide Integrated Passive Device)



# Gain Equalizer Die

## EQY-5-24-D+

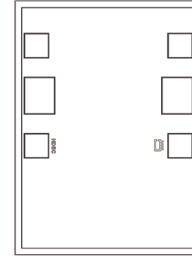
50Ω 5dB DC to 20 GHz

### Product Features

- 4.9 dB Slope
- Wide Bandwidth, DC-20 GHz
- Excellent Return Loss, 20 dB typ.

### Typical Applications

- Fixed Satellite
- Mobile
- Radio location
- Space research



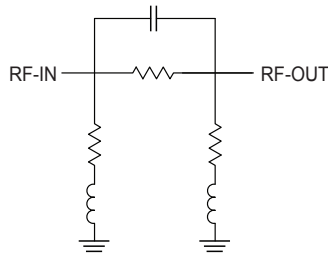
**+RoHS Compliant**  
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Ordering Information: Refer to Last Page

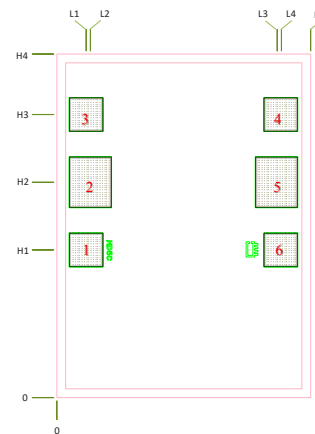
### General Description

EQY-5-24-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-5-24-D+ has a nominal attenuation slope of 4.9 dB.

### Simplified Schematic and Pad description



### Bonding Pad Position



Dimensions in  $\mu\text{m}$ , Typical

Pad Number	Function	Description
2	RF-IN	RF-Input pad
5	RF-OUT	RF-Output pad
1,3,4,6	GND	Ground

L1	L2	L3	L4	L5	H1	H2	H3	H4	Thickness	Die Size	Bond Pad #1, #3, #4, #6	Bond Pad #2, #5
87	99	649	661	750	436	636	836	1015	100	750x1015	92 X 92	117 X 142

**Electrical Specifications<sup>1</sup> at 25°C, 50Ω, unless otherwise noted.**

Parameter	Condition (GHz)	Min.	Typ.	Max.	Units
Frequency Range		DC		20	GHz
Insertion Loss	0.01	—	5.7	—	dB
	5	—	5.0	—	
	10	—	3.4	—	
	18	—	1.2	—	
	20	—	0.8	—	
VSWR	0.01 - 5	—	1.14	—	:1
	5 - 10	—	1.21	—	
	10 - 18	—	1.34	—	
	18 - 20	—	1.32	—	

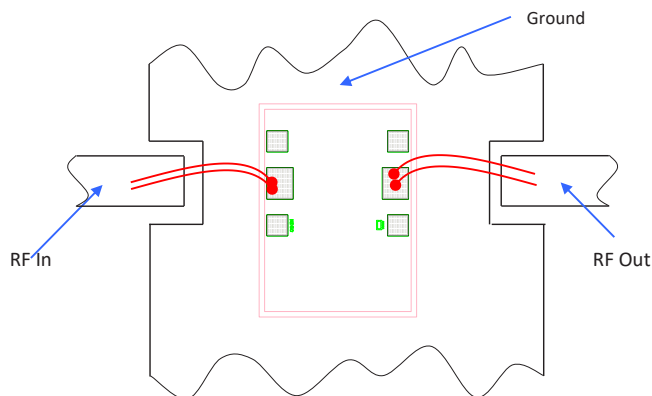
1. Measured on Die using MPI Titan series, 200 μm pitch GSG probe.

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

Operating Case Temperature	-55°C to 105°C
RF Input Power <sup>3</sup>	34 dBm

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

3. Derates linearly to 32 dBm at 105°C

**Assembly Diagram****Assembly and Handling Procedure**

- Storage**  
Dice should be stored in a dry nitrogen purged desiccators or equivalent.
- 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.
- 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.

<b>Additional Detailed Technical Information</b> <i>additional information is available on our dash board.</i>	
<b>Performance Data</b>	Data Table
	Swept Graphs
	S-Parameter (S2P Files) Data Set with and without port extension(.zip file)
<b>Case Style</b>	Die
<b>Die Ordering and packaging information</b>	Quantity, Package <span style="float: right;">Model No.</span>
	Small, Gel - Pak: 5,10,50,100 KGD* <span style="float: right;">EQY-5-24-DG+</span> Medium†, Partial wafer: KGD*<1710 <span style="float: right;">EQY-5-24-DP+</span>
	†Available upon request contact sales representative
	Refer to <a href="#">AN-60-067</a>
<b>Environmental Ratings</b>	ENV80

\*Known Good Die (KGD) means the die in question have been taken from a wafer that has been RF tested at select frequencies and visually inspected per Mini-Circuits' criteria. While this is not definitive, it does provide a higher degree of confidence that die 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.
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# MMIC Gain Equalizer Die

# EQY-5-24-D+

## Typical Performance Data

Temperature = 25°C

FREQUENCY (MHz)	INSERTION LOSS (dB)	INPUT VSWR (:1)	OUTPUT VSWR (:1)
10	5.73	1.14	1.14
50	5.72	1.14	1.14
100	5.73	1.14	1.14
500	5.72	1.12	1.12
1000	5.70	1.12	1.11
1500	5.65	1.11	1.10
2000	5.59	1.10	1.09
2500	5.51	1.09	1.08
3000	5.42	1.09	1.08
3500	5.31	1.09	1.09
4000	5.21	1.11	1.11
4500	5.10	1.13	1.14
5000	4.98	1.16	1.18
5500	4.85	1.20	1.23
6000	4.72	1.24	1.27
6500	4.58	1.27	1.29
7000	4.42	1.29	1.30
7500	4.26	1.29	1.28
8000	4.08	1.28	1.26
8500	3.88	1.26	1.22
9000	3.66	1.23	1.19
9500	3.43	1.19	1.16
10000	3.22	1.17	1.16
10500	3.03	1.20	1.22
11000	2.90	1.28	1.31
11500	2.81	1.38	1.42
12000	2.73	1.46	1.48
12500	2.62	1.49	1.50
13000	2.48	1.48	1.48
13500	2.30	1.44	1.42
14000	2.14	1.40	1.37
14500	1.97	1.36	1.35
15000	1.83	1.33	1.33
15500	1.69	1.31	1.31
16000	1.57	1.28	1.30
16500	1.44	1.23	1.26
17000	1.29	1.16	1.22
17500	1.13	1.11	1.18
18000	0.99	1.07	1.12
18500	0.87	1.05	1.06
19000	0.77	1.05	1.03
19500	0.67	1.04	1.01
20000	0.59	1.04	1.01
20500	0.53	1.06	1.05
21000	0.52	1.07	1.08
21500	0.54	1.10	1.08
22000	0.59	1.12	1.13
22500	0.72	1.17	1.17
23000	0.84	1.21	1.22

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



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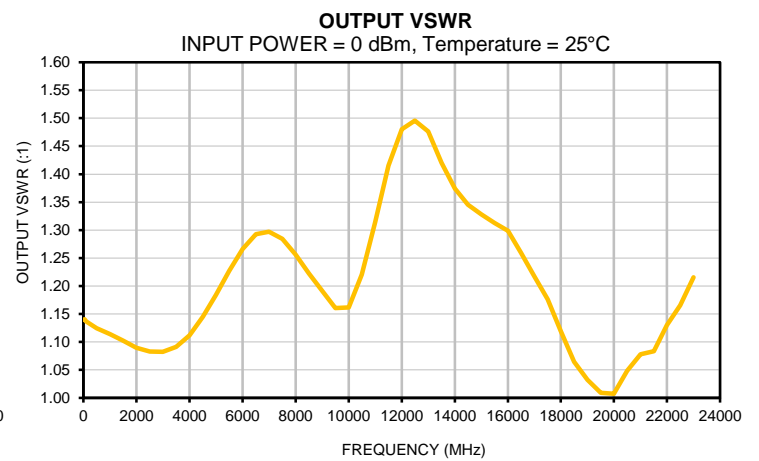
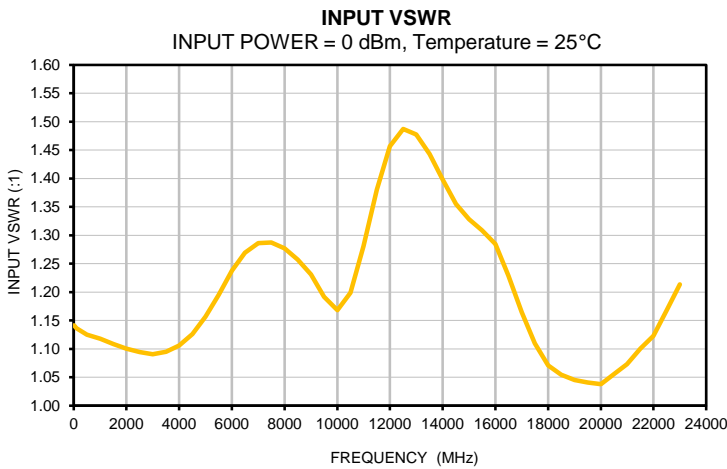
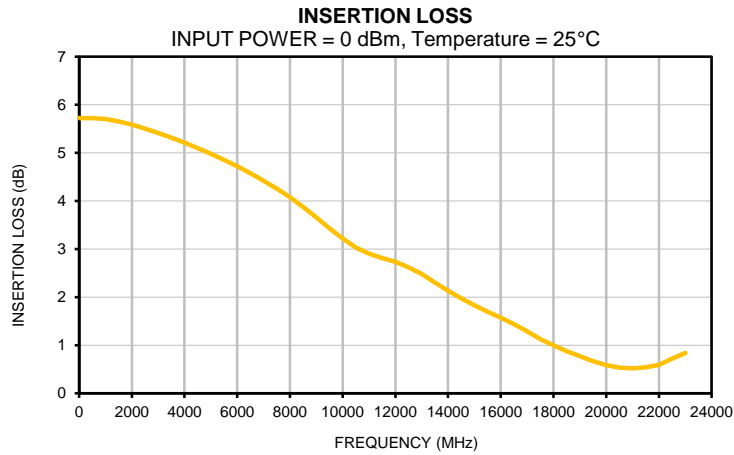


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IF/RF MICROWAVE COMPONENTS

REV. OR  
EQY-5-24-D+  
1/30/2019  
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## Typical Performance Curves



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

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)	