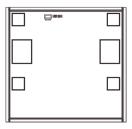
# *Microwave*

# Gain Equalizer Die EQY-XX-453-D+ Series

50 $\Omega$  DC to 45 GHz

# **The Big Deal**

- Excellent Return Loss, 20dB typ.
- Wide bandwidth, DC 45 GHz



## **Product Overview**

EQY-XX-453-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-453-D+ are available with nominal attenuation slope of 3, 4, 5, 6, 7, 8, 9 &10dB.

# **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 3,4,5,6,7, 8, 9 &10dB	Enables circuit designer to change nominal insertion loss values without motherboard redesign making the EQY-XX-453-D+ Series ideal for select at test application.				
Wideband operation, DC to 45 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.				

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

# **Microwave**

# **Gain Equalizer Die**

EQY-7-453-D+

 $50\Omega$  7.4dB DC to 45 GHz

#### **Product Features**

- 7.4 dB Slope
- Wide Bandwidth, DC-45 GHz
- Excellent Return Loss, 20 dB typ.

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## **Typical Applications**

- Cellular Infrastructure
- 5G
- Wideband Communications
- Test Instrumentation
- Defense

#### +RoHS Compliant

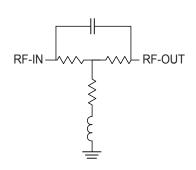
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Ordering Information: Refer to Last Page

#### **General Description**

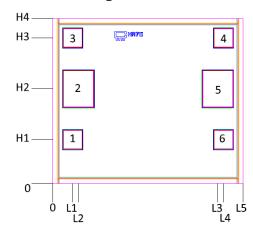
EQY-7-453-D+ is an absorptive Gain Equalizer Die fabricated using highly repetitive GaAs IPD MMIC process incorporating resistors, capacitors and inductors having negative insertion loss slope. EQY-7-453-D+ has a nominal attenuation slope of 7.4 dB.

### Simplified Schematic and Pad description



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

#### **Bonding Pad Position**



Dimensions in µm, Typical

L1	L2	L3	L4	L5	H1	H2	НЗ	H4	Thickness	Die Size	Pad Size 2 & 5	Pad Size 1,3,4,6
79	101	650	673	750	174	374	574	650	100	750x650	117x142	72x72

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

Parameter	Condition (GHz)	Min.	Тур.	Max.	Units
Frequency Range		DC		45	GHz
Insertion Loss	0.01	_	8.7	_	dB
	10	_	7.2	_	
	20	_	4.8	_	
	30	_	2.8	_	
	40	_	1.4	_	
	45	_	1.3	_	
VSWR	0.01 - 10	_	1.11	_	:1
	10 - 20	_	1.18	_	
	20 - 30	_	1.26	_	
	30 - 40	_	1.32	_	
	40 - 45	_	1.41	_	

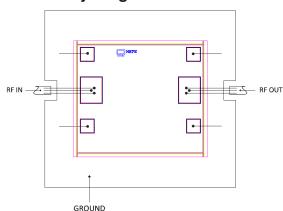
<sup>1.</sup> Electrical specifications are typical measured using MPI Titan Series 200um pitch GSG probe.

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

Operating Case Temperature	-55°C to 105°C
RF Input Power <sup>3</sup>	27 dBm

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

#### **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.

#### 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.



<sup>3.</sup> Derates linearly to 23 dBm at 105°C

Additional Detailed Technical Information additional information is available on our dash board.						
	Data Table	Data Table				
Performance Data	Swept Graphs					
	S-Parameter (S2P Files) Data Set with	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* Medium <sup>†</sup> , Partial wafer: KGD*<2205	EQY-7-453-DG+ EQY-7-453-DP+				
	†Available upon request contact sales representative					
	Refer to AN-60-067					
<b>Environmental Ratings</b>	ENV80					

<sup>\*</sup>Known Good Die (KGD) means that the die are taken from PCM good wafer and then visually inspected per Mini-Circuits' criteria. Though 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

#### **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, 6-lead MCLP package