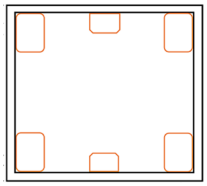
Microwave Precision

Fixed Attenuator Die YAT-D-SERIES

50Ω Up to 2W DC to 26.5 GHz



The Big Deal

- Excellent power handling, up to 2W
- Wideband, DC to 26.5 GHz
- Usable to 40 GHz
- Unpackaged die form

Product Overview

YAT-D-series MMIC attenuator dice (RoHS compliant) are fixed value, absorptive attenuators fabricated using highly repetitive MMIC processing with thin film resistors on Silicon substrates. They contain through-wafer Cu metallization vias to realize low thermal resistance and very wideband operation. YAT attenuator dice are available from stock with nominal attenuation values of 0 to 10 dB (in 1 dB steps), and 12, 15, 20, and 30 dB.

Key Features

Feature	Advantages
Wideband operation, DC to 26.5 GHz Usable to 40 GHz	YAT-D-series attenuator dice support a wide array of applications including wireless cellular, microwave communications, satellite, defense and aerospace, medical broadband and optical applications. They are also usable in applications up to 40 GHz such as 5G systems (See application note AN-70-019).
High power handling, up to 2W	Power handling up to 2W makes YAT attenuator dice suitable for a wide range of system power requirements.
Wide range of nominal attenuation values: • 0 to 10 dB (in 1 dB steps) and 12, 15, 20 and 30 dB	Small increment offerings enable circuit designers to change attenuation values without motherboard redesign, making the YAT-D-series ideal for adjusting attenuation values based on test results.
Excellent attenuation flatness	Provides precise, consistent attenuation across the entire frequency band, ideal for broadband and multi-band usage.
Unpackaged die	Enables the user to integrate the attenuator die directly into hybrids.

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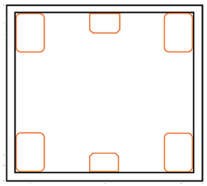
Fixed Attenuator Die

YAT-9-D+

50Ω 2W 9dB DC to 26.5 GHz

Product Features

- wide bandwidth, DC-26.5 GHz
- excellent attenuation accuracy & flatness
- exceptional power handling, up to 2W



+RoHS Compliant

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

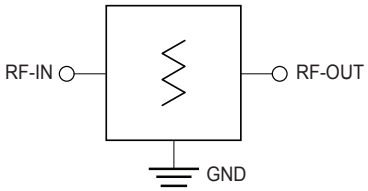
Typical Applications

- Cellular
- PCS
- communications
- radar
- defense

General Description

YAT-9-D+ is a absorptive attenuator die fabricated using highly repetitive MMIC process including thin film resistors on Silicon substrate. YAT-9-D+ attenuator die contains through-wafer Cu metallization vias to realize low thermal resistance and wideband operation.

Simplified Schematic and Pad description



Pad	Description
RF-IN	RF input pad
RF-OUT	RF output pad
GND	GND pads

Note: 1. Bond Pad material - Gold
2. Bottom of Die - Gold plated

Electrical Specifications at 25°C, 50Ω

Parameter		Condition (GHz)	Min.	Typ.	Max.	Unit
Frequency Range			DC		26.5	GHz
Attenuation[1]		DC - 5 5 - 15 15 - 18 18 - 26.5		9.0 9.2 9.2 9.6		dB
VSWR[1]		DC - 5 5 - 15 15 - 18 18 - 26.5		1.1 1.3 1.3 1.4		:1
Operating Input Power at[2] **:**	**25°C**	DC - 18		2		W
	85°C	DC - 18		1		W

1. Electrical specifications are typical measured characteristics on die using MPI Titan Series 250 µm pitch GSG probe.
2. Tested in industry standard 2x2 mm, 6-lead MCLP package.

Absolute Maximum Ratings

Operating Temperature (ground)	-40°C to 85°C
RF Input Power	2W

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

Die Layout

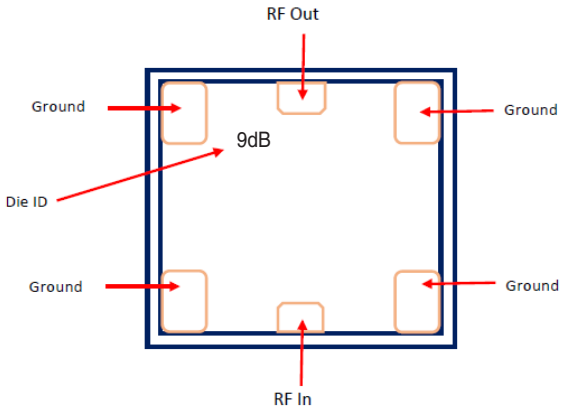


Fig 2. Die Layout

Note: Alternate Die ID: ATN3590_09

Bonding Pad Position

(Dimensions in µm, Typical)

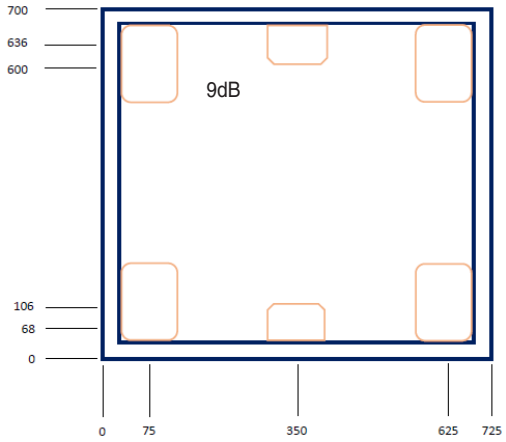


Fig 3. Bonding Pad Positions

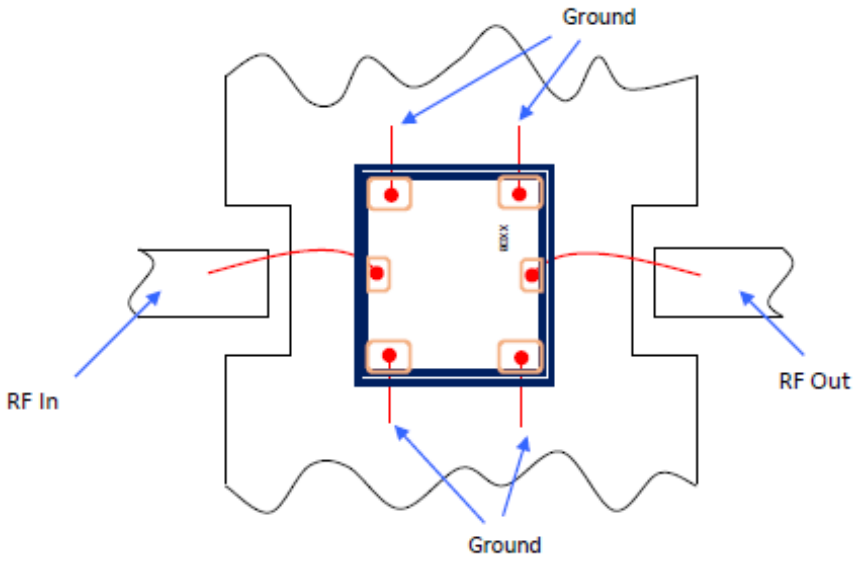
Critical Dimensions

Parameter	Values
Die Thickness, µm	100
Die Width, µm	725
Die Length, µm	700
RF IN and RF OUT Bond Pad Size, µm	110 x 75
Ground Bond Pad Size, µm	110 x 150

Assembly and Handling Procedure

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

Assembly Diagram



Note: Ground bond wires are optional.

Recommended Wire Length, Typical

Wire	Wire Length (mm)	Wire Loop Height (mm)
ALL WIRES	0.25	0.15

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 port extension(.zip file)
Case Style	Die
Die Ordering and packaging information	Quantity, Package Small, Gel - Pak: 5,10,50,100 KGD* YAT-9-DG+ Medium†, Partial wafer: KGD*<2160 YAT-9-DP+ Large†, Full Wafer YAT-9-DF+ †*Available upon request contact sales representative* Refer to AN-60-067
Environmental Ratings	ENV-80

*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 1A (250 to 500V) in accordance with JESD22 - A114

** Tested in industry standard 2x2 mm, 6-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

D. Mini-Circuits does not warrant the accuracy or completeness of the information, text, graphics and other items contained within this document and same are provided as an accommodation and on an "As is" basis, with all faults.

E. Purchasers of this part are solely responsible for proper storing, handling, assembly and processing of Known Good Dice (including, without limitation, proper ESD preventative measures, die preparation, die attach, wire bond ing and related assembly and test activities), and Mini-Circuits assumes no responsibility therefor or for environmental effects on Known Good Dice.

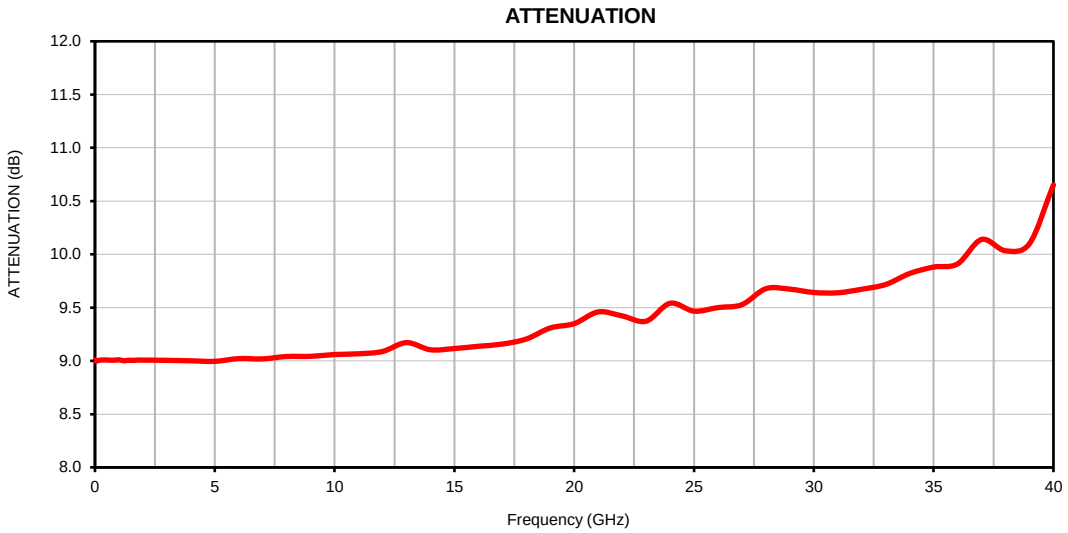
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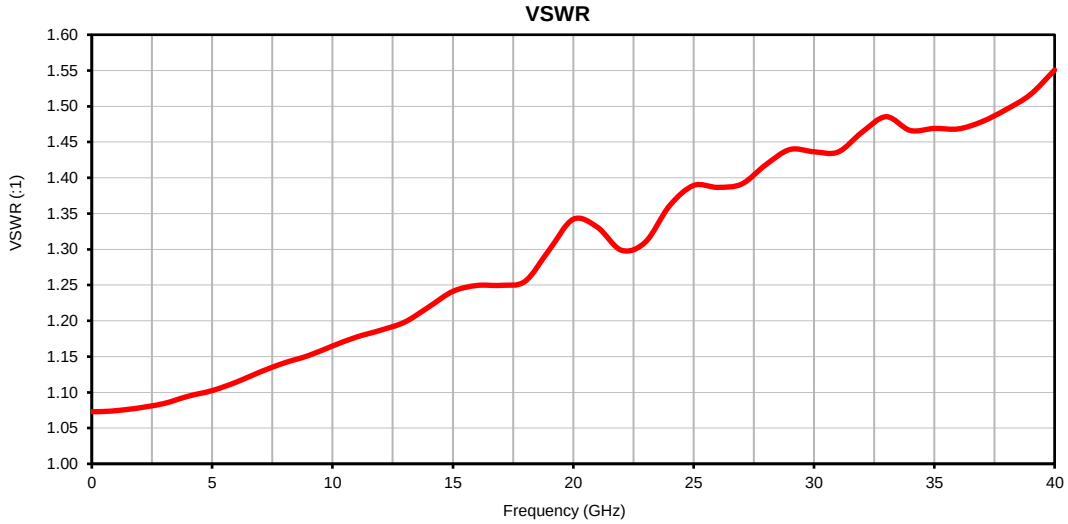
Fixed Attenuator Die YAT-9-D+

Typical Performance Data

FREQUENCY (GHz)	ATTENUATION (dB)	VSWR (:1)
0.01	9.01	1.07
0.02	9.00	1.07
0.04	9.00	1.07
0.06	9.00	1.07
0.08	9.00	1.07
0.10	9.00	1.07
0.20	9.01	1.07
0.40	9.01	1.07
0.60	9.01	1.07
0.80	9.01	1.07
1.00	9.01	1.07
1.20	9.00	1.08
1.40	9.01	1.08
1.60	9.00	1.08
1.80	9.01	1.08
2.00	9.01	1.08
3.00	9.00	1.08
4.00	9.00	1.09
5.00	9.00	1.10
6.00	9.02	1.11
7.00	9.02	1.13
8.00	9.04	1.14
9.00	9.04	1.15
10.0	9.06	1.16
11.0	9.07	1.18
12.0	9.09	1.19
13.0	9.17	1.20
14.0	9.10	1.22
15.0	9.12	1.24
16.0	9.14	1.25
17.0	9.16	1.25
18.0	9.21	1.26
19.0	9.31	1.30
20.0	9.35	1.34
21.0	9.46	1.33
22.0	9.42	1.30
23.0	9.37	1.31
24.0	9.54	1.36
25.0	9.47	1.39
26.0	9.50	1.39
27.0	9.53	1.39
28.0	9.68	1.42
29.0	9.67	1.44
30.0	9.64	1.44
31.0	9.64	1.44
32.0	9.67	1.46
33.0	9.72	1.49
34.0	9.82	1.47
35.0	9.88	1.47
36.0	9.91	1.47
37.0	10.14	1.48
38.0	10.03	1.50
39.0	10.10	1.52
40.0	10.65	1.55

Typical Performance Curves





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)	

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