

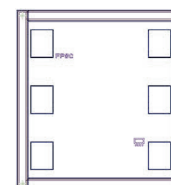
Fixed Attenuator Die

KAT-D-Series

50Ω Up to 2W DC to 43.5 GHz

The Big Deal

- Ultra-wide band, DC to 43.5 GHz
- Excellent power handling, up to 2W
- Contiguous ground plane for easy installation



Product Overview

Mini-Circuits' KAT-D-series MMIC attenuator dice (RoHS compliant) are fixed value, absorptive attenuators fabricated using highly repetitive MMIC processing with thin film resistors on GaAs substrates. Providing precise attenuation from DC up to 43.5 GHz, these attenuators are ideal for a very wide range of applications up to millimeter wave bands including 5G systems and more. KAT-D-series 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
Ultra-wide band operation, DC to 43.5 GHz	KAT-D-series attenuator dice support a wide array of applications including 5G systems, microwave communications, satellite, defense and aerospace, medical broadband and optical applications
Single, contiguous ground plane	The attenuators achieve ultra-wide band performance up to 43.5 GHz with single, contiguous ground plane, simplifying installation into customer hybrids.
High power handling, up to 2W	Power handling up to 2W makes KAT 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 KAT-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.

Millimeter Wave Precision

Fixed Attenuator Die

KAT-0-D+

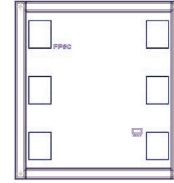
50Ω 2W 0dB DC to 43.5 GHz

Product Features

- Wide bandwidth, DC to 43.5 GHz
- Excellent attenuation accuracy & flatness
- Exceptional power handling, up to 2W

Typical Applications

- Cellular
- PCS
- Communications
- Radar
- Defense
- 5G



+RoHS Compliant

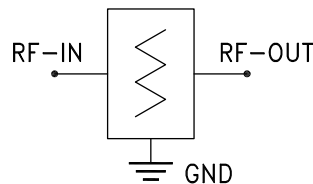
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Ordering Information: Refer to Last Page

General Description

KAT-0-D+ is an absorptive attenuator die fabricated using highly repetitive MMIC process including thin film resistors on GaAs substrate. KAT-0-D+ attenuator die contains through-wafer 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

Electrical Specifications at 25°C, 50Ω

Parameter	Condition (GHz)	Min.	Typ.	Max.	Unit
Frequency Range		DC		43.5	GHz
Attenuation ¹	DC - 5		0.1±0.1		dB
	5 - 15		0.1±0.1		
	15 - 18		0.1±0.1		
	18 - 26.5		0.2±0.2		
	26.5 - 43.5		0.5±0.5		
VSWR ¹	DC - 5		1.1		:1
	5 - 15		1.1		
	15 - 18		1.1		
	18 - 26.5		1.2		
	26.5 - 43.5		1.5		
Operating Input Power at ² :	25°C	DC - 43.5		2	W
	85°C	DC - 43.5		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

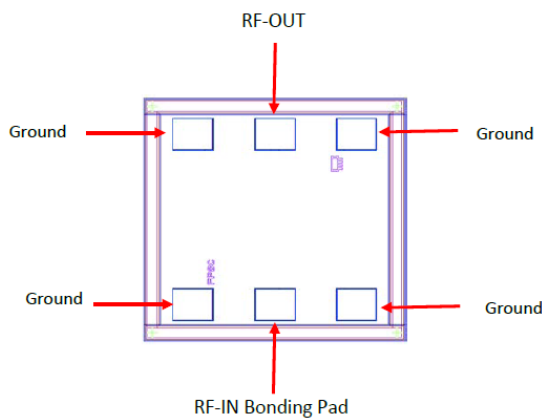


Fig 1. Die Layout

Bonding Pad Position
(Dimensions in μm, Typical)

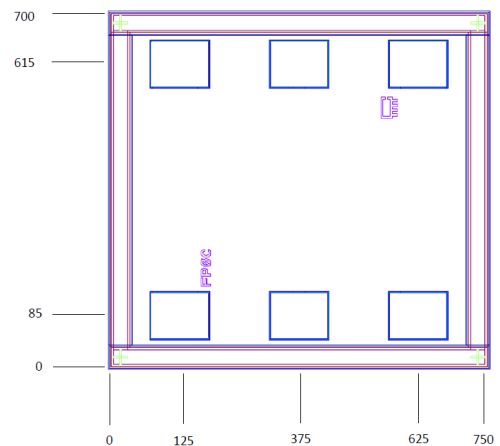


Fig 2. Bonding Pad Positions

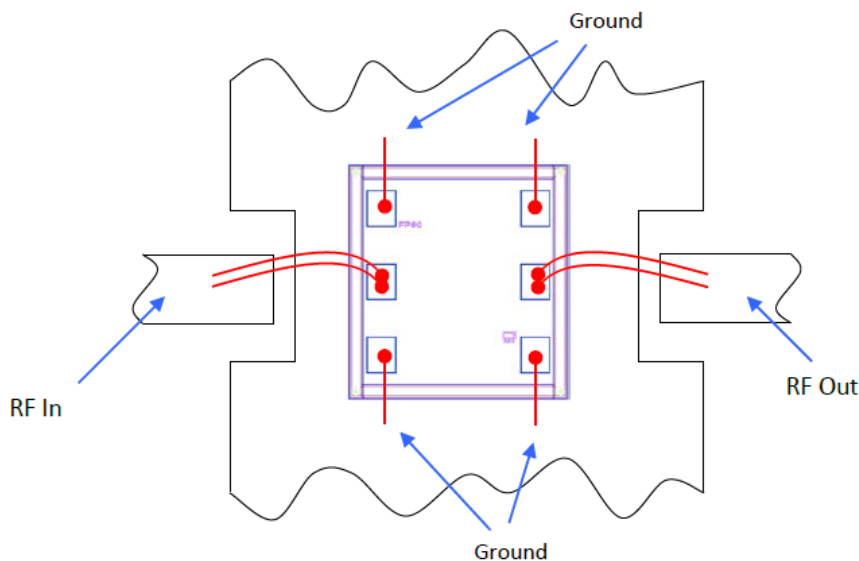
Critical Dimensions

Parameter	Values
Die Thickness, μm	100
Die Width, μm	750
Die Length, μm	700
Bond Pad Size, μm	125 x 100

Assembly and Handling Procedure

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



Recommended Wire Length, Typical

Wire	Wire Length (mm)	Wire Loop Height (mm)
ALL WIRES	0.35	0.15

Additional Detailed Technical Information <i>additional information is available on our dash board.</i>	
Performance Data	Data Table
	Swept Graphs
	S-Parameter (S2P Files)
Case Style	Die
Die Ordering and packaging information	Quantity, Package Small, Gel - Pak: 5,10,50,100 KGD* KAT-0-DG+ Medium†, Partial wafer: KGD*<5K KAT-0-DP+ Large†, Full Wafer KAT-0-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 2 (Pass 2000V) in accordance with ANSI/ESD STM5.1-2001

** Tested in industry standard 2x2 mm, 6-lead MCLP package.

Additional Notes

- 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.
- 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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