Millimeter Wave Precision

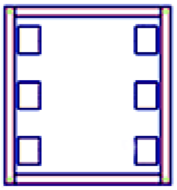
Fixed Attenuator Die

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-30-D+

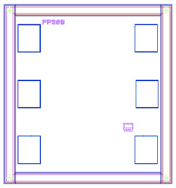
50Ω 1.0W 30dB DC to 43.5 GHz

Product Features

- Wide bandwidth, DC to 43.5 GHz
- Excellent attenuation accuracy & flatness
- Exceptional power handling, up to 1.0W

Typical Applications

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



+RoHS Compliant

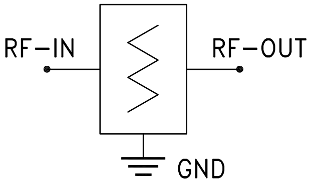
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Ordering Information: Refer to Last Page

General Description

KAT-30-D+ is an absorptive attenuator die fabricated using highly repetitive MMIC process including thin film resistors on GaAs substrate. KAT-30-D+ attenuator die contains through-wafer vias to realize low thermal resistance and wideband operation.

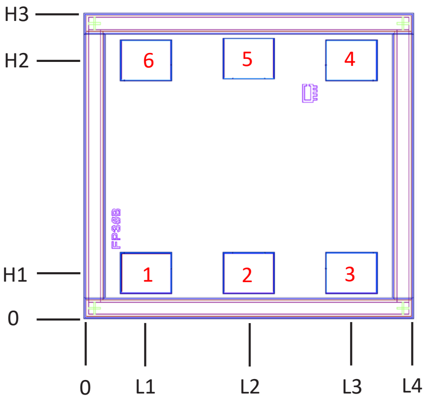
Simplified Schematic



Pad #	Description
2	RF-IN
5	RF-OUT
1,3,4,6	Ground
Die bottom	Ground

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

Bonding Pad Position / Description



Die dimensions in µm

L1	L2	L3	L4	H1	H2	H3	Thickness	Bond pad size
125	375	625	750	85	610	700	100	125 x 100

(Numbers on bond pads are for identification only, not marked on Die)

Electrical Specifications at 25°C, 50Ω

Parameter		Condition (GHz)	Min.	Typ.	Max.	Unit
Frequency Range			DC		43.5	GHz
Attenuation[1]		DC - 5		29.9±0.1		dB
		5 - 15		30±0.4		
		15 - 18		30.1±0.2		
		18 - 26.5		30.2±0.3		
		26.5 - 43.5		30.2±1.0		
VSWR[1]		DC - 5		1.1		:1
		5 - 15		1.2		
		15 - 18		1.2		
		18 - 26.5		1.2		
		26.5 - 43.5		1.2		
Operating Input Power at[2] **:**	**25°C**	DC - 43.5		1.0		W
	85°C	DC - 43.5		0.8		W

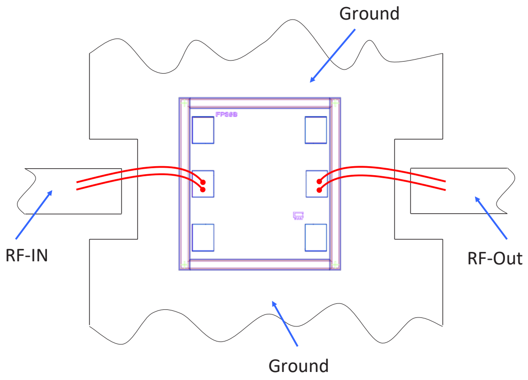
1. Electrical specifications are typical measured characteristics on die using MPI Titan Series 250 μm pitch GSG probe.
2. Tested in industry standard 2x2 mm, 6-lead MCLP package.

Absolute Maximum Ratings

Operating Temperature (ground)	-40°C to 85°C
RF Input Power	1.0W

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

Assembly Diagram



(Ground Bond Wires are optional)

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.

Additional Detailed Technical Information *additional information is available on our dash board.*	
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-30-DG+ Medium†, Partial wafer: KGD*<2.115K KAT-30-DP+ Large†, Full Wafer KAT-30-DF+ †*Available upon request contact sales representative* Refer to AN-60-067
Environmental Ratings	ENV-80

*Known Good Dice ("KGD") means that the dice are taken from PCM good wafer and visually inspected in question have been subjected to Mini-Circuits while this 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

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 bonding and related assembly and test activities), and Mini-Circuits assumes no responsibility therefor or for environmental effects on Known Good Dice.

F. Mini-Circuits and the Mini-Circuits logo are registered trademarks of Scientific Components Corporation d/b/a Mini-Circuits. All other third-party trademarks are the property of their respective owners. A reference to any third-party trademark does not constitute or imply any endorsement, affiliation, sponsorship, or recommendation by any such third-party of Mini-Circuits or its products.