

50Ω 2 W 9 dB DC to 20 GHz

RCAT-09+

THE BIG DEAL

- Wide Bandwidth, DC to 20 GHz
- Excellent Power Handling, 2 W
- Excellent Attenuation Accuracy & Flatness
- Miniature Size, 2.25 x 2.25 x 1.1 mm
- Ceramic, Hermetic, Nitrogen Filled
- Aqueous Washable



Generic photo used for illustration purposes only CASE STYLE: LZ1737

+RoHS Compliant The +Suffix identifies RoHS Compliance. See our website for methodologies and qualifications

APPLICATIONS

- Cellular
- PCS
- Communications
- Radar
- Wideband Military
- Test and Measurement Equipment

PRODUCT OVERVIEW

RCAT-09+ (RoHS compliant) is a wideband fixed attenuator with excellent attenuation accuracy and flatness. It can handle up to 2 W. The integrated circuits comprising of thin film resistors is bonded in an optimized multi layer integrated LTCC substrate, and then hermetically sealed under a controlled nitrogen atmosphere with gold-plated covers and eutectic AuSn solder. These attenuators are capable of meeting MIL requirements for gross leak, fine leak, thermal shock, vibration, acceleration, mechanical shock, and HTOL. The testing can be done if requested.

KEY FEATURES

Feature	Advantages
Max Power Input 2 W	Thermally optimized design can operate reliably at much higher input power as compared to similar devices
Wide Bandwidth, DC to 20 GHz	Supports a broad band of applications with predictable and repeatable performance, excellent choice to buffer cascaded reflective components.
Ceramic Hermetic Package	Highly reliable hermetic package provides predictable and repeatable performance in military applications including ground, air, and ship requirements
Very Small Size	Miniature 2.25 mm x 2.25 mm and very low profile of 1.1 mm.

REV. C ECO-024243 RCAT-09+ MCL NY 250117

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MICROWAVE PRECISION

Fixed Attenuator



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ELECTRICAL SPECIFICATIONS¹ AT +25°C, 50Ω

Parameter	Condition (GHz)	Min.	Тур.	Max.	Unit
Frequency Range		DC		20	GHz
	1	8.5	9.03	9.5	
Attenuation	10	9.2	9.67	10.2	dB
	20	10.3	11.06	11.9	
	1		30		
Return Loss	10		20		dB
	20		16		

1. Tested using characterization test circuit as defined in Figure 1. See data and graphs for performance at all other frequencies.

ABSOLUTE MAXIMUM RATINGS²

Parameter	Ratings
Operating Case Temperature ³	-55°C to +125°C
Storage Temperature	-65°C to +150°C
RF Input Power ⁴	2 W at +25°C

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

3. Case is defined as ground lead.

4. RF Power at +25°C case temperature: 2 W. Derate linearly to 0.33 W at +125°C.



MICROWAVE PRECISION

Fixed Attenuator



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Function	Pad Number	Description
RF-IN / RF-OUT	1	RF input / output pad
RF-OUT / RF-IN	3	RF input / output pad
GND	2,4	Connected to circuit ground

PAD DESCRIPTION

CHARACTERIZATION TEST CIRCUIT



Fig 1. Block diagram of Test Circuit used for characterization. Characterization was performed by Modelithics, conditions test board details are available at: www.modelithics.com/mvp/minicircuits

PRODUCT MARKING



Marking may contain other features or characters for internal lot control.

Mini-Circuits www.minicircuits.com P.O. Box 350166, Brooklyn, NY 11235-0003 (718) 934-4500 sales@minicircuits.com PAGE 3 OF 5



MICROWAVE PRECISION

Fixed Attenuator



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TYPICAL PERFORMANCE DATA AT +25°C

Frequency (GHz)	Attenuation (dB)	VSWR (:1)
0.05	9.01	31.32
2.00	9.07	29.41
5.00	9.23	22.90
8.00	9.47	20.45
10.00	9.67	20.03
12.00	9.89	19.49
15.00	10.27	18.39
17.00	10.63	17.55
19.00	10.87	16.43
20.00	11.06	16.29







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ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASHBOARD. CLICK HERE

Porformance Data and Granks	Data Table
	Swept Graphs
Case Style	LZ1737 Ceramic package, Terminal finish: Ni-Pd-Au
Tape & Reel	F66
Suggested Layout for PCB Design	PL-386
Evaluation Board	TB-668-09+
Environmental Ratings	ENV71

ESD RATING

Human Body Model (HBM): Class 1A (Pass 250 V) (JESD22-A114)

Machine Model (MM): Class B (Pass 200 V) (JESD22-A115)

MSL RATING

Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC J-STD-020D

NOTES

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/terms/viewterm.html



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.

RCAT-09+

Typical Performance Data

FREQUENCY	ATTENUATION	RETURN LOSS
(GHz)	(dB)	(dB)
0.05	9.01	31.32
0.5	9.02	33.70
1.0	9.03	32.89
1.5	9.05	31.20
2.0	9.07	29.41
2.5	9.08	27.79
3.0	9.10	26.46
3.5	9.13	25.38
4.0	9.16	24.42
4.5	9.20	23.58
5.0	9.23	22.90
5.5	9.27	22.32
6.0	9.30	21.84
6.5	9.34	21.44
7.0	9.38	21.05
7.5	9.43	20.72
8.0	9.47	20.45
8.5	9.52	20.24
9.0	9.57	20.23
9.5	9.61	20.10
10.0	9.67	20.03
10.5	9.71	19.82
11.0	9.77	19.66
11.5	9.84	19.61
12.0	9.89	19.49
12.5	9.94	19.44
13.0	9.98	19.32
13.5	10.04	19.12
14.0	10.12	18.90
14.5	10.18	18.74
15.0	10.27	18.39
15.5	10.34	18.12
16.0	10.47	17.80
16.5	10.56	17.66
17.0	10.63	17.55
17.5	10.67	17.33
18.0	10.67	17.03
18.5	10.77	16.67
19.0	10.87	16.43
19.5	10.95	16.37
20.0	11.06	16.29





REV. OR

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 • Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site RCAT-09+ The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com 4/24/2013

Typical Performance Curves







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Case Style

Outline Dimensions

PCB Land Pattern

LZ

LZ1737



CASE #	N	Р	Q	R	WT. GRAM
LZ1737	.022	.026	.017	-	.015
	(.550)	(.00)	(.432)	-	

Dimensions are in inches (mm). Tolerances: 2 Pl. \pm .01; 3 Pl. \pm .005

Notes:

- 1. Case material: Ceramic.
- 2. Base material: 36 mil thk laminate.
- 3. Termination finish: Electroless Nickel-Palladium-Gold Plate.



Tape & Reel Packaging TR-F66

DEVICE ORIENTATION IN T&R

DIRECTION OF FEED

Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel see note	
8	4	7	Small quantity standard	20 50 100 200 500
		7	Standard	1000, 2000, 3000

Note: Please consult individual model data sheet to determine device per reel availability.

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf

 Internet
 http://www.minicircuits.com

 Distribution Centers NORTH AMERICA 800-654-7949
 • 417-335-5935
 • Fax 417-335-5945
 • EUROPE 44-1252-832600
 • Fax 44-1252-837010

 Mini-Circuits ISO 9001 & ISO 14001 Certified



- FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED. 2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
- 3. IN ORDER TO ACHIEVE PERFORMANCE AT HIGHER FREQUENCIES, THICKNESS OF SOLDER MASK SHALL BE MINIMAL.

DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

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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	-55° to 125° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-65° to 150° C Ambient Environment	Individual Model Data Sheet
Thermal Shock (device level)	-55° to 125°C, 100 cycles	MIL-STD-202, Method 107
Thermal Shock (board level)	-55° to 150°C, 1000 cycles	MIL-STD-202, Method 107
HTOL	1000 hours, 25°C, @ rated power	MIL-STD-202, Method 108, cond D.
Constant Acceleration	Y1 plane only, 30 Kg	MIL-STD-883, Method 2001, Cond. E
Vibration	10-2000MHz sine, 20g, 3 axis	MIL-STD-202, Method 204, Cond. D
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
PIND	20G's @130 Hz	MIL-STD-750, Method 2052.2
Resistance to Soldering Heat	3X Reflow, Peak Temperature 260°C	JESD22-B102
Moisture Sensitivity Level	Hermetic device, MSL-1 by construction	JESD22-A113, MSL1/260
Hermeticity	Fine Leak, Gross Leak	MIL-STD-202, Method 112, Cond. C&D
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Environmental Specifications ENV71 Mini-Circuits 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** Autoclave 15 psig, 100% RH, 121°C, 96 hours JESD22 - Method A102

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