Miniature Ceramic

Fixed Attenuator

PAT-30+

50Ω 1W 30dB DC to 7000 MHz

Generic photo used for illustration purposes only

CASE STYLE: AF320

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

Available Tape and Reel at no extra cost

Reel Size	Devices/Reel
7"	1000

Maximum Ratings

Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C

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

Pin Connections

INPUT	1
OUTPUT	3
GROUND	2,4

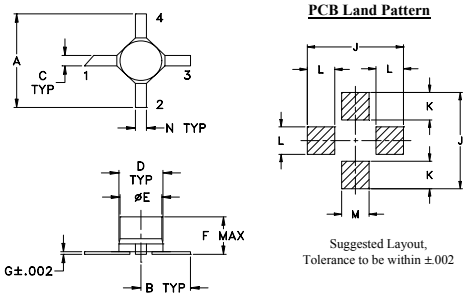
Features

- wideband, DC to 7000 MHz
- excellent VSWR, through entire band
- miniature size
- aqueous washable

Applications

- power leveling
- impedance match improvement

Outline Drawing

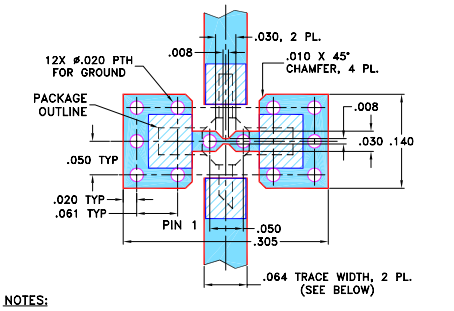


Outline Dimensions (inch / mm)

A	B	C	D	E	F	G
.200	.100	.020	.070	.068	.057	.005
5.08	2.54	0.51	1.78	1.73	1.45	0.13

H	J	K	L	M	N	wt
--	.230	.065	.060	.080	.040	grams
--	5.84	1.65	1.52	2.03	1.02	0.04

Demo Board MCL P/N: TB-319
Suggested PCB Layout (PL-208)



NOTES:
1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

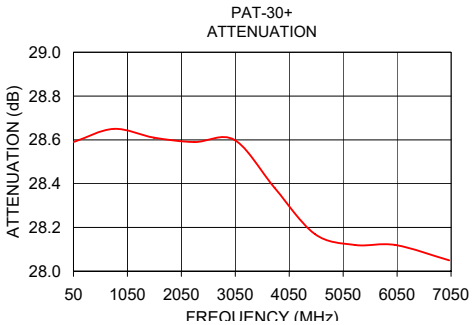
Electrical Specifications at 25°C

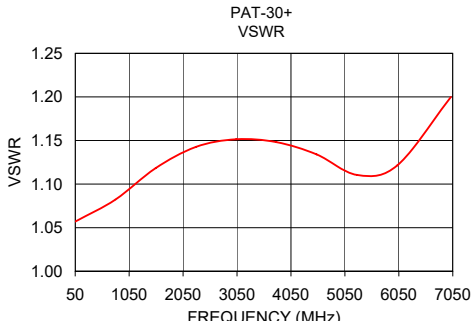
FREQ. RANGE (MHz)	ATTENUATION (dB) Flatness, Max.				VSWR (:1) Max.			MAX. INPUT POWER (W)
f_L-f_U	Nom.	DC-1 GHz	DC-2.5 GHz	DC-f_U GHz	DC-1 GHz	DC-2.5 GHz	DC-f_U GHz	
DC-7000	30±1.7	0.4	0.9	2.8	1.4	1.4	1.5	1

1. RF power at 25°C case temperature: 1 Watt. Derate linearly to 0.1 Watt at 100°C.

Typical Performance Data

Frequency (MHz)	Attenuation (dB)	VSWR (:1)
50.00	28.59	1.06
796.25	28.65	1.08
1542.50	28.61	1.12
2288.75	28.59	1.14
3035.00	28.60	1.15
3781.25	28.38	1.15
4527.50	28.17	1.13
5273.75	28.12	1.11
6020.00	28.12	1.12
7015.00	28.05	1.20





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

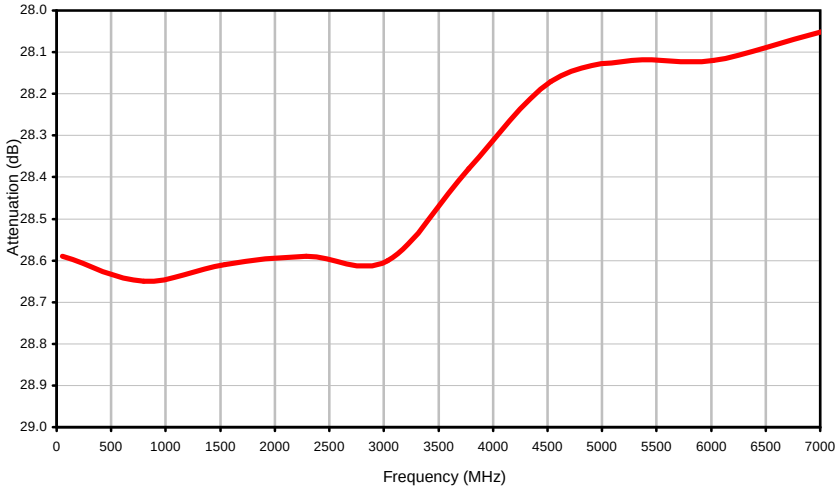
Fixed Attenuator PAT-30+

Typical Performance Data

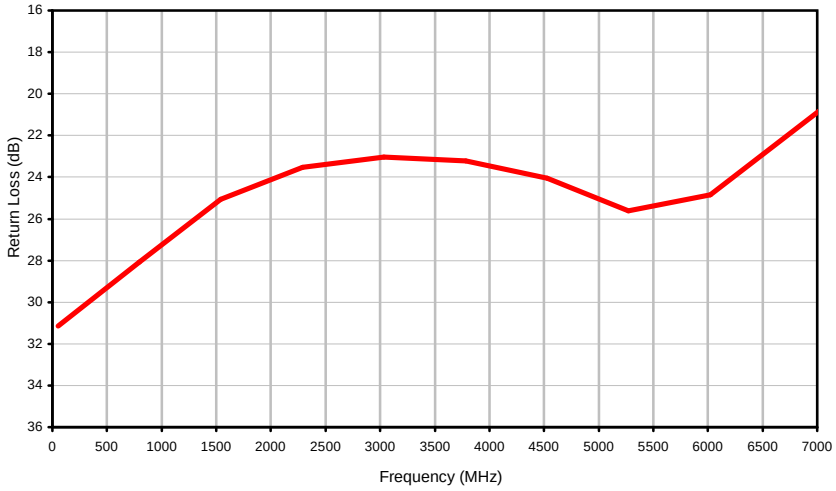
FREQUENCY (MHz)	ATTENUATION (dB)	RETURN LOSS (dB)
50.00	28.59	31.15
796.25	28.65	28.07
1542.50	28.61	25.06
2288.75	28.59	23.53
3035.00	28.60	23.05
3781.25	28.38	23.23
4527.50	28.17	24.04
5273.75	28.12	25.62
6020.00	28.12	24.85
7015.00	28.05	20.83

Typical Performance Curves

Attenuation



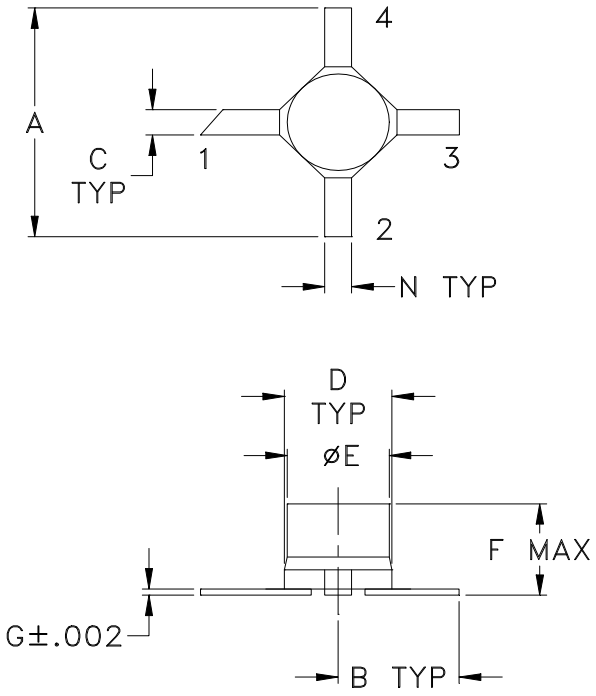
Return Loss



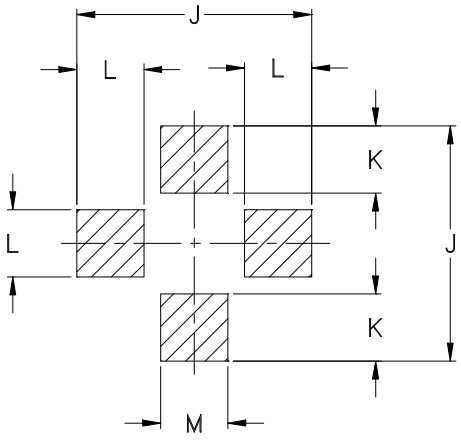
Case Style AF

AF320

Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

CASE #	A	B	C	D	E	F	G	H	J	K	L	M	N	WT. GRAM
AF320	.200 (5.08)	.100 (2.54)	.020 (0.51)	.070 (1.78)	.068 (1.73)	.057 (1.45)	.005 (0.13)	-	.230 (5.84)	.065 (1.65)	.060 (1.52)	.080 (2.03)	.040 (1.02)	.04

Dimensions are in inches (mm). Tolerances: 2Pl. ± .03; 3Pl. ± .015

Notes:

1. Case material: Ceramic.
2. Termination material:
   Nickel-Iron alloy 42.
3. Termination finish:
   For RoHS Case Styles: Tin-Silver alloy plate over Nickel barrier or Matte-Tin. (See Data Sheet)
   For RoHS-5 Case Styles: Tin-Lead plate.
4. Termination (1):
   May have diagonal cut. Input and output interchangeable for PAT models only.
5. Special Tolerances: Termination width ± .005 inch, termination thickness ± .002 inch, cap diameter ±.005 inch.

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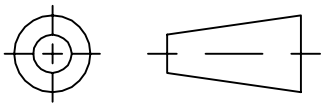
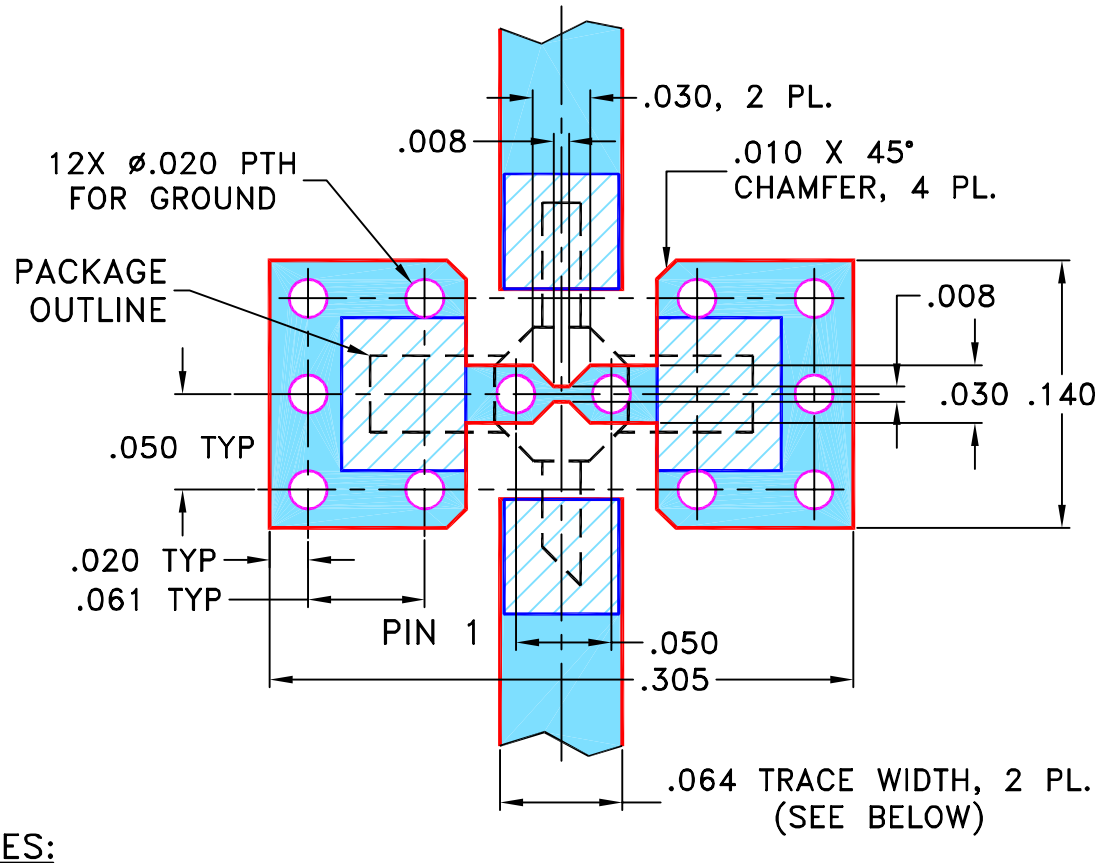
THIRD ANGLE PROJECTION



REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M100749	NEW RELEASE	09/19/05	MMG	MM
A	M102713	ADDED "...WITH SMOBC"	01/12/06	GT	IL

SUGGESTED MOUNTING CONFIGURATION FOR AF320 CASE STYLES, "hl" PIN CONNECTION



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DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	MMG	09/12/05
TOLERANCES ON:	CHECKED	AV	09/16/05
2 PL DECIMALS ±	APPROVED	MM	09/19/05
3 PL DECIMALS ± .005			
ANGLES ± 1°			
FRACTIONS ±			

ASHEETA1.DWG REV:A DATE:01/12/95

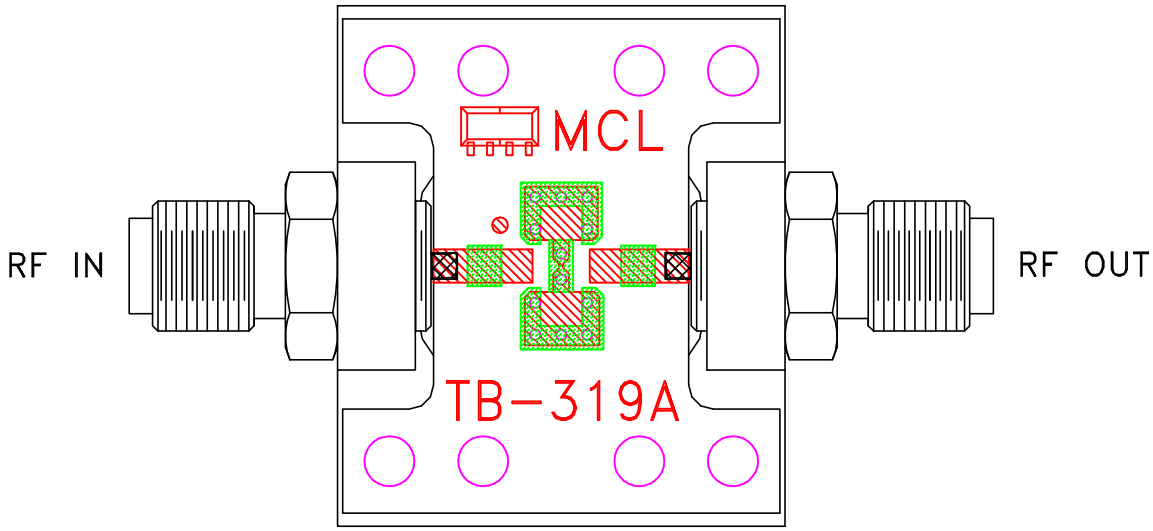
Mini-Circuits®
13 Neptune Avenue
Brooklyn NY 11235

PL, hl, AF320, PAT, TB-319

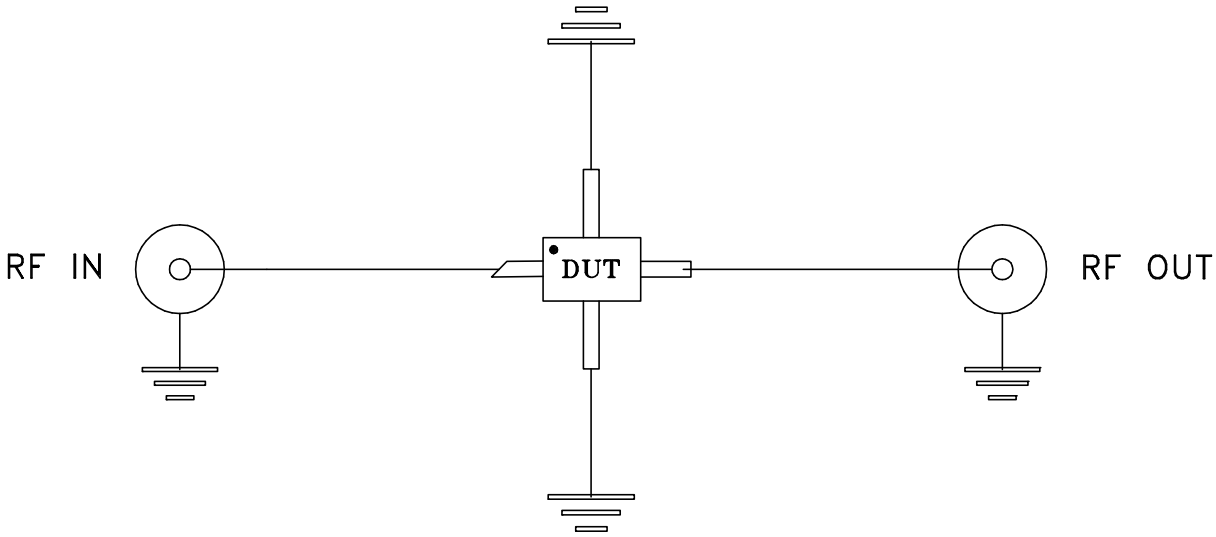
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-208	A

FILE:	SCALE:	SHEET:
98PL208	10:1	1 OF 1

Evaluation Board and Circuit



TB-319



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.030 inch.

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Environmental Specifications ENV09

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	-54° to 100°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-65° to 150° C Ambient Environment	Individual Model Data Sheet
Autoclave	15 psig, 100% RH, 121°C, 96 hours	JESD22-A102-C, Condition C
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Mechanical Shock	1.5Kg, 0.5 ms, 5 shock pulses, Y1 direction only	MIL-STD-883, Method 2002, Condition B, except Y1 direction only
Vibration (Variable Frequency)	50g peak	MIL-STD-883, Method 2007, Condition B
Constant Acceleration	Y1 plane only, 5 Kg	MIL-STD-883, Method 2001, Condition A, except Y1 plane only
Seal	Perfluorocarbon gross leak	MIL-STD-883, Method 1014, Condition C
HAST	130°C, 85% RH, 96 hours	JESD22-A110
Solderability	10X Magnification	J-STD-002, Para 4.2.5, Test S, 95% Coverage
Solder Reflow Heat	Sn-Pb Eutetic Process: 240°C peak Pb-Free Process: 260°C peak	J-STD-020, Table 4-1, 4-2 and 5-2; Figure 5-1

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
Moisture Sensitivity: Level 1	Bake at 125°C for 24 hours Soak at 85°C/85% RH for 168 hours, Reflow 3 cycles at 260°C peak	J-STD-020
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215