MINIATURE CERAMIC

Fixed Attenuator

PAT-1+

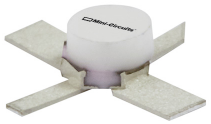
50Ω 1 W 1 dB DC to 7 GHz

FEATURES

- Wideband, DC to 7 GHz
- Excellent VSWR Through Entire Band
- Miniature Size
- Aqueous Washable

APPLICATIONS

- Power Leveling
- Impedance Match Improvement



Generic photo used for illustration purposes only

CASE STYLE: AF320

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

ELECTRICAL SPECIFICATIONS AT +25°C

Parameter	Condition (GHz)	Min.	Typ.	Max.	Unit
Frequency Range		DC		7	GHz
Attenuation, Nominal			1±0.2		dB
Attenuation, Flatness[1]	DC - 1 DC - 2.5 DC - 7			0.3 0.4 0.7	dB
VSWR	DC - 1 DC - 2.5 DC - 7			1.2 1.3 1.5	:1
Input Power[2]				1.0	W

1. Flatness = variation over band divided by 2.
2. RF power at +25°C case temperature: 1 Watt. Derate linearly to 0.1 Watt at +100°C.

ABSOLUTE MAXIMUM RATINGS

Parameter	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.

REV. J
ECO-024219
PAT-1+
MCL NY
250114

MINIATURE CERAMIC

Fixed Attenuator

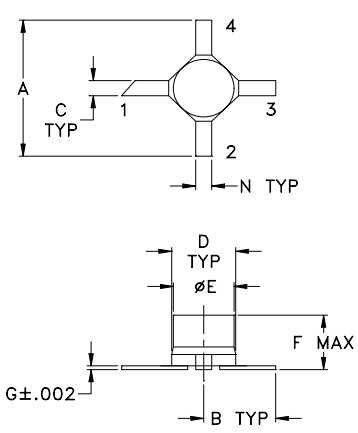
PAT-1+

50Ω 1 W 1 dB DC to 7 GHz

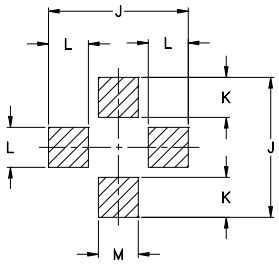
PIN CONNECTIONS

INPUT	1
OUTPUT	3
GROUND	2,4

OUTLINE DRAWING

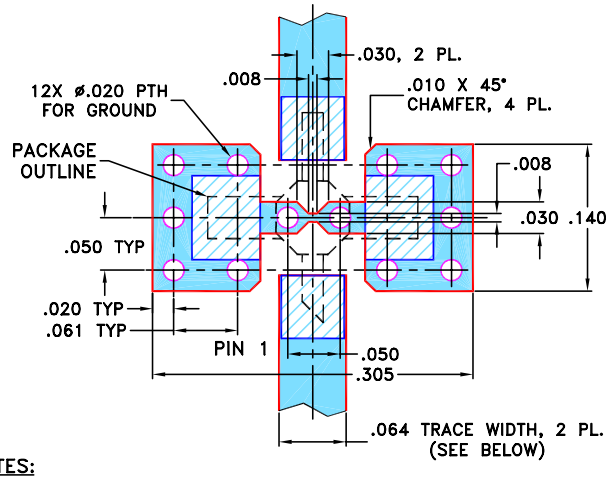


PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

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

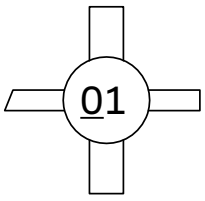
OUTLINE DIMENSIONS (Inch / mm)

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

TAPE & REEL INFORMATION: F26

PRODUCT MARKING



Marking may contain other features or characters for internal lot control

MINIATURE CERAMIC

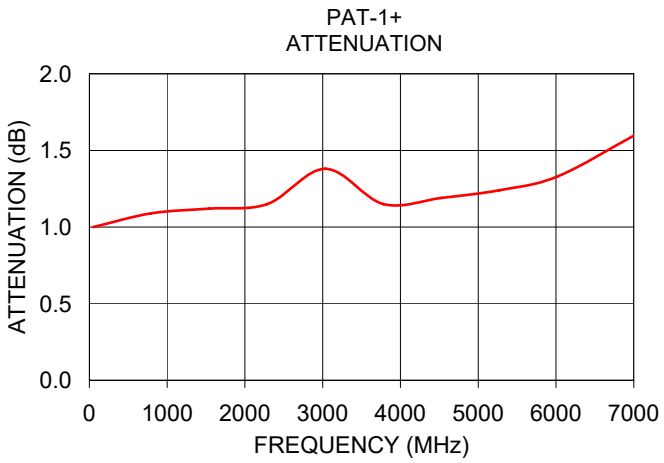
Fixed Attenuator

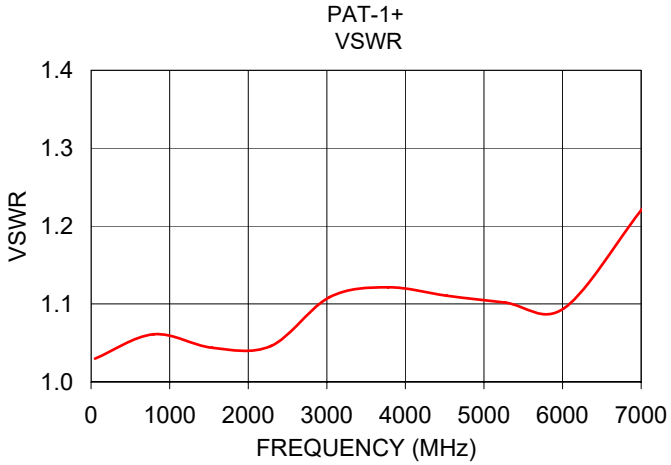
PAT-1+

50Ω 1 W 1 dB DC to 2.5 GHz

TYPICAL PERFORMANCE DATA AND CHARTS

Frequency (MHz)	Attenuation (dB)	VSWR (:1)
50.00	1.00	1.03
796.25	1.09	1.06
1542.50	1.12	1.04
2288.75	1.15	1.05
3035.00	1.38	1.11
3781.25	1.15	1.12
4527.50	1.19	1.11
5273.75	1.24	1.10
6020.00	1.33	1.09
7015.00	1.60	1.22





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-Circuits' 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/terms/viewterm.html

Fixed Attenuator PAT-1+

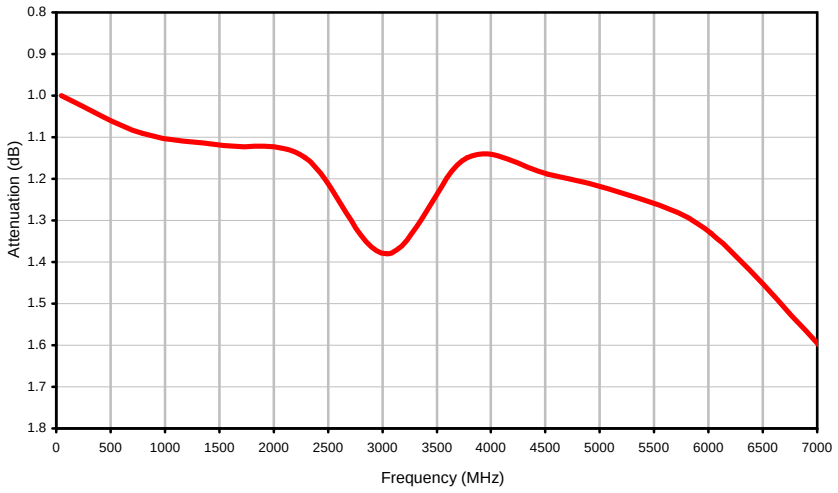
Typical Performance Data

FREQUENCY (MHz)	ATTENUATION (dB)	RETURN LOSS (dB)
50.00	1.00	36.66
796.25	1.09	30.56
1542.50	1.12	33.38
2288.75	1.15	32.95
3035.00	1.38	25.75
3781.25	1.15	24.85
4527.50	1.19	25.61
5273.75	1.24	26.31
6020.00	1.33	26.91
7015.00	1.60	20.00

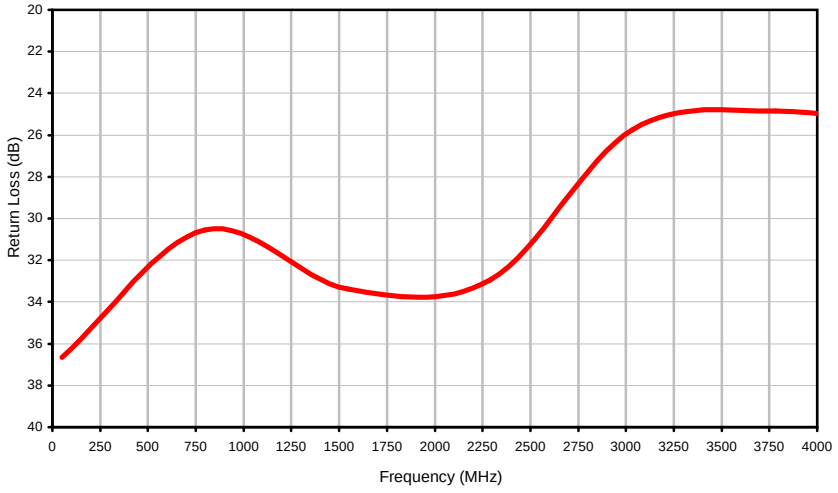
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Typical Performance Curves

Attenuation



Return Loss

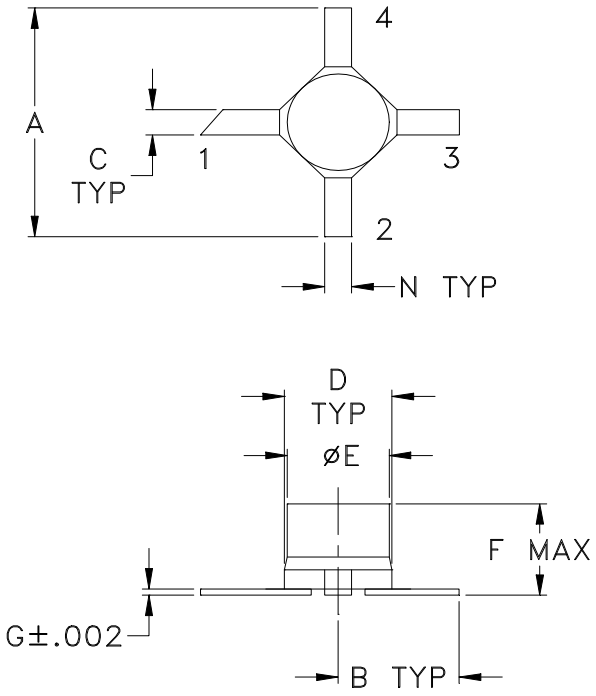


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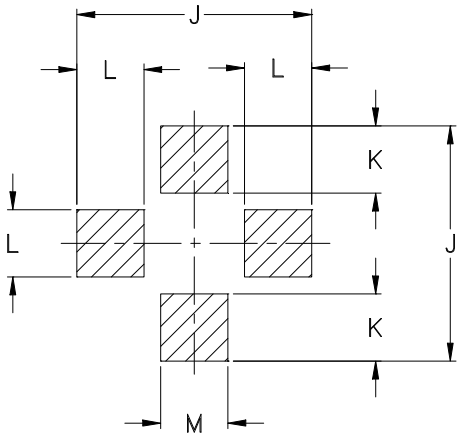
Case Style AF

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:

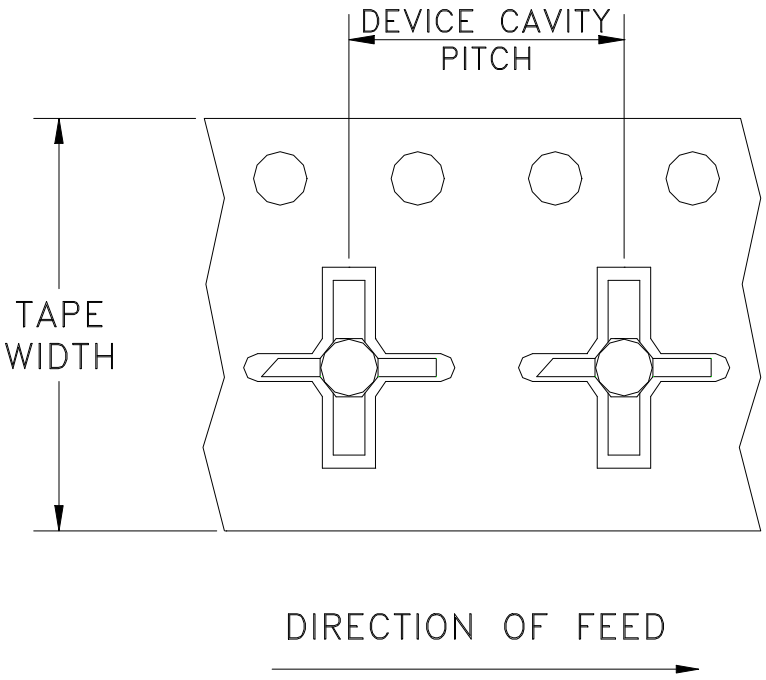
1. Case material: Ceramic.
2. Termination material:
   Nickel-Iron alloy 42.
3. Termination finish:
   For RoHS Case Styles: Tin-Silver alloy plate over Nickel barrier or Matte-Tin. (See Data Sheet)
   For RoHS-5 Case Styles: Tin-Lead plate.
4. Termination (1):
   May have diagonal cut. Input and output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

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Tape & Reel Packaging TR-F26

DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
12	8	7	1000

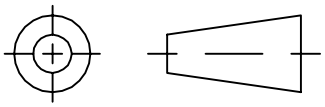
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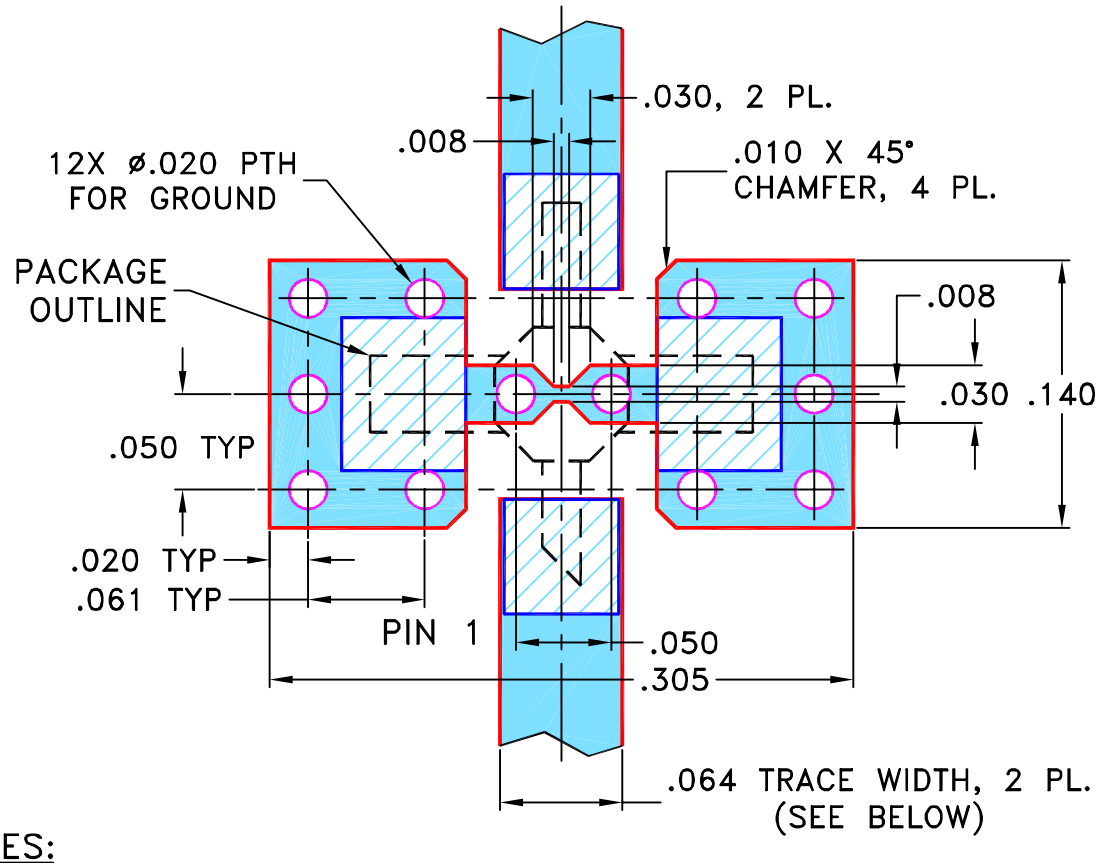
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THIRD ANGLE PROJECTION



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



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

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 ±			

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

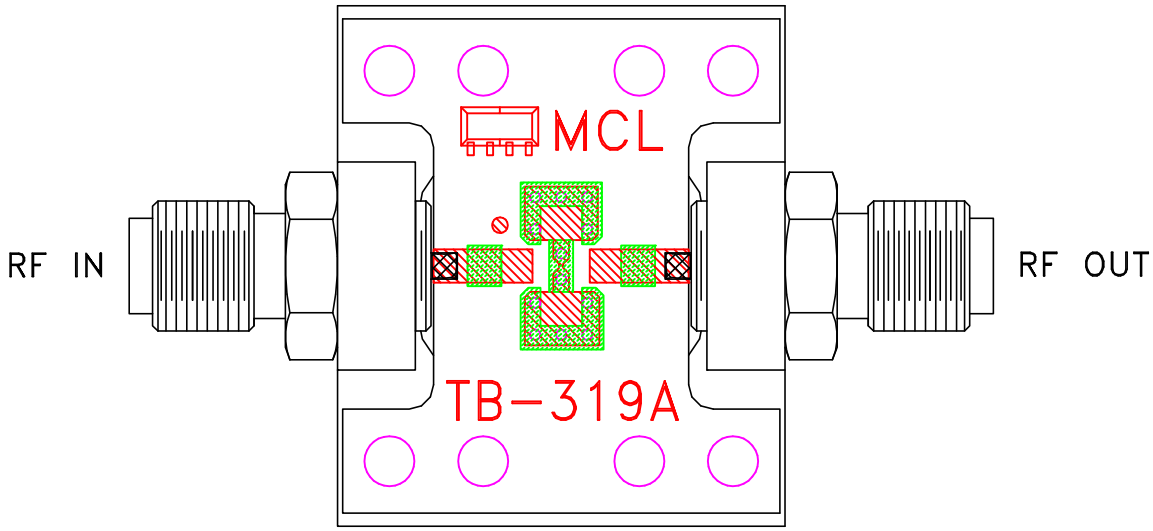
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Brooklyn NY 11235

PL, hl, AF320, PAT, TB-319

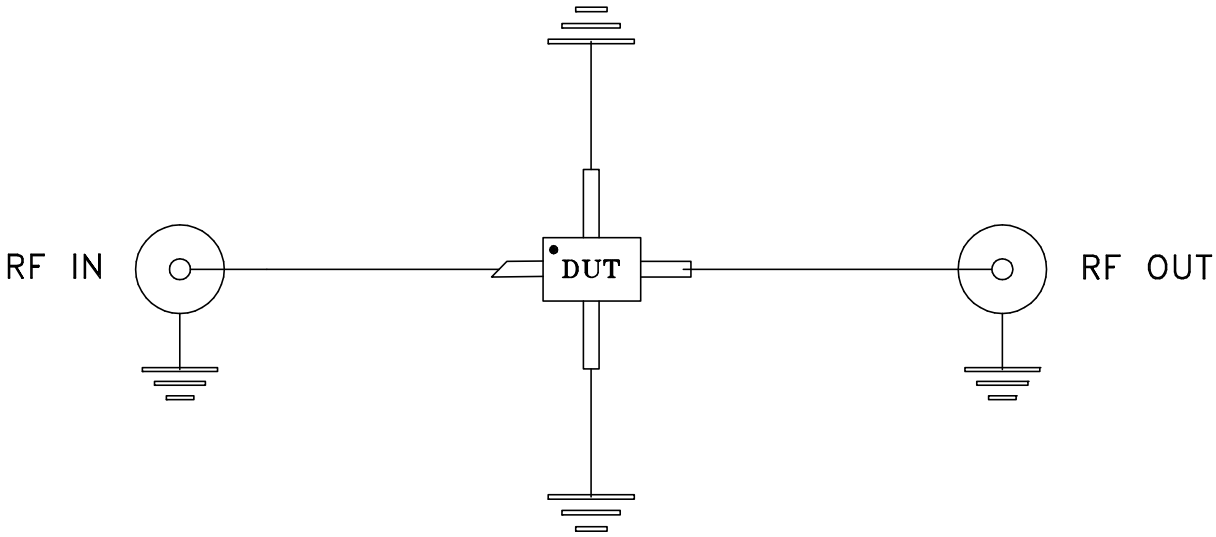
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-208	A

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

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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

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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

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