

Surface Mount RF Transformer

75Ω 0.3 to 475 MHz

TC9-1-75+

TC9-1-75X+
Upgraded Version*



Generic photo used for illustration purposes only

CASE STYLE: AT224-1

*Addition of Top hat™ feature

Benefits

- Allows faster pick-and-place
- Enables visual identification marking

+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" | 20, 50, 100, 200, 500 |
| 13" | 1000, 2000 |

Maximum Ratings

| | |
|-----------------------|----------------|
| Operating Temperature | -20°C to 85°C |
| Storage Temperature | -55°C to 100°C |
| RF Power | 0.25W |
| DC Current | 30mA |

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

Pin Connections

| | |
|---------------|---|
| PRIMARY DOT | 6 |
| PRIMARY | 3 |
| SECONDARY DOT | 1 |
| SECONDARY | 3 |

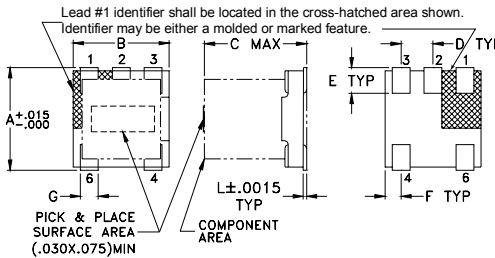
Features

- wideband 0.3-475 MHz
- good return loss, 23 dB typ in 1 dB bandwidth
- step-down 9:1 autotransformer
- plastic base with leads
- aqueous washable

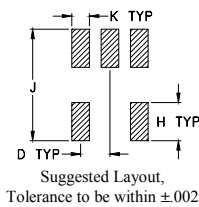
Applications

- matching laser diode

Outline Drawing AT224-1



PCB Land Pattern

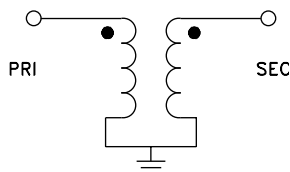


Outline Dimensions (inch/mm)

| | | | | | |
|------|------|------|------|------|-------|
| A | B | C | D | E | F |
| .150 | .150 | .160 | .050 | .040 | .025 |
| 3.81 | 3.81 | 4.06 | 1.27 | 1.02 | 0.64 |
| G | H | J | K | L | wt |
| .028 | .065 | .190 | .030 | .007 | grams |
| 0.71 | 1.65 | 4.83 | 0.76 | 0.18 | 0.15 |

Demo Board MCL P/N: TB-276

Config. D



Transformer Electrical Specifications

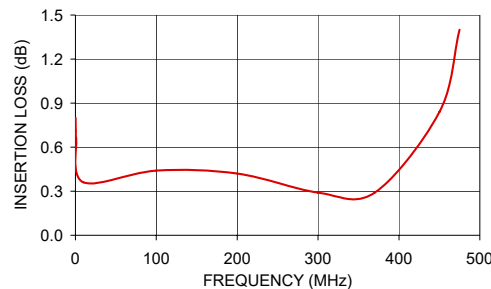
| Ω RATIO (Primary/Secondary) | FREQUENCY (MHz) | INSERTION LOSS* | | |
|-----------------------------------|--------------------|-----------------|-------------|-------------|
| | | 3 dB MHz | 2 dB MHz | 1 dB MHz |
| 75/8 | 0.3-475 | 0.3-475 | 0.5-450 | 0.9-370 |

* Insertion Loss is referenced to mid-band loss, 0.4 dB typ.
Stepdown, 75 ohm primary, 51 pF across secondary

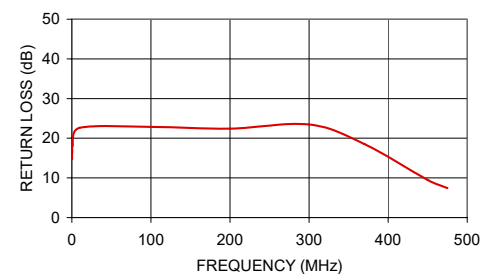
Typical Performance Data

| FREQUENCY (MHz) | INSERTION LOSS (dB) | INPUT R. LOSS (dB) |
|--------------------|---------------------------|--------------------------|
| 0.30 | 0.80 | 14.70 |
| 0.50 | 0.71 | 16.80 |
| 0.90 | 0.66 | 18.13 |
| 10.00 | 0.36 | 22.63 |
| 100.00 | 0.44 | 22.86 |
| 200.00 | 0.42 | 22.40 |
| 300.00 | 0.29 | 23.48 |
| 370.00 | 0.29 | 18.53 |
| 450.00 | 0.84 | 9.48 |
| 475.00 | 1.40 | 7.44 |

TC9-1-75+
INSERTION LOSS



TC9-1-75+
INPUT RETURN LOSS



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.
- The parts covered by this specification document are subject to Mini-Circuit's 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-Circuit's website at www.minicircuits.com/MCLStore/terms.jsp

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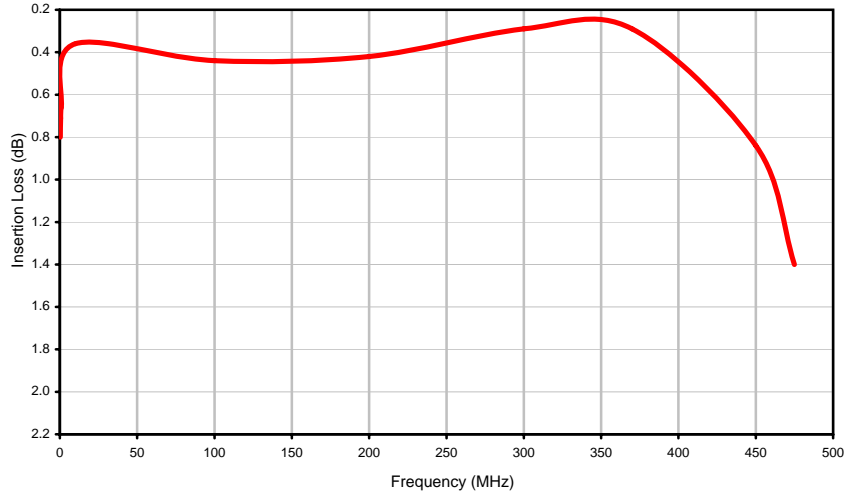
REV. D
M151107
TC9-1-75+
IG/TD/CP/AM
200407
Page 1 of 1

Typical Performance Data

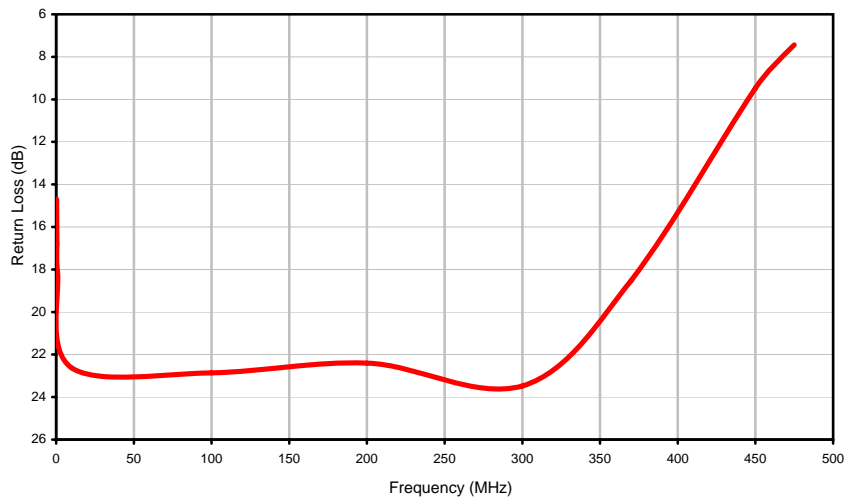
| FREQUENCY (MHz) | INSERTION LOSS (dB) | RETURN LOSS (dB) |
|--------------------|---------------------------|------------------------|
| 0.30 | 0.80 | 14.70 |
| 0.50 | 0.71 | 16.80 |
| 0.90 | 0.66 | 18.13 |
| 10.00 | 0.36 | 22.63 |
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| 300.00 | 0.29 | 23.48 |
| 370.00 | 0.29 | 18.53 |
| 450.00 | 0.84 | 9.48 |
| 475.00 | 1.40 | 7.44 |

Typical Performance Curves

Insertion Loss

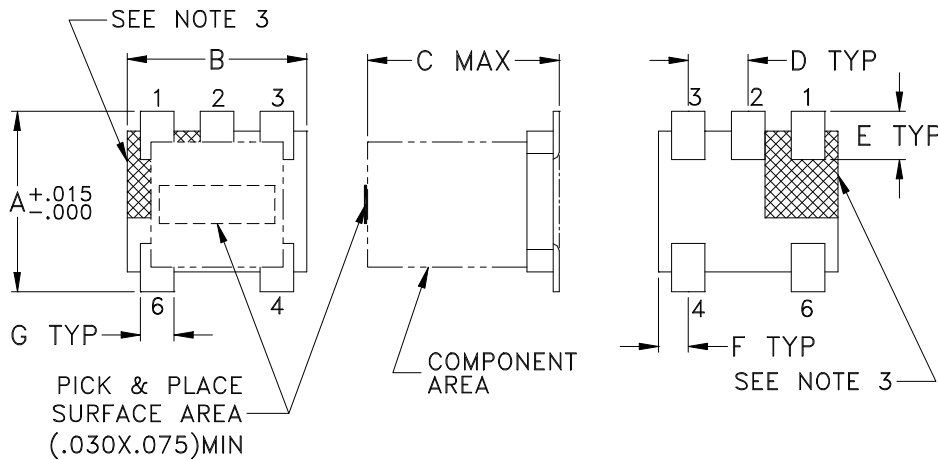


Return Loss

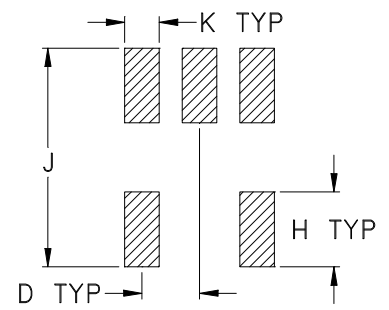


Outline Dimensions

AT224-1A



PCB Land Pattern



Suggested Layout,
Tolerance to be within $\pm .002$

| CASE # | A | B | C | D | E | F | G | H | J | K | WT. GRAMS |
|----------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------|
| AT224-1A | .150 (3.81) | .150 (3.81) | .160 (4.06) | .050 (1.27) | .040 (1.02) | .025 (0.64) | .028 (0.71) | .065 (1.65) | .190 (4.83) | .030 (0.76) | .15 |

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

Notes:

1. Case material: Plastic.
2. Termination finish:
For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.
3. Lead #1 identifier shall be located in the cross-hatched area shown.
Identifier may be either a molded or marked feature.



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

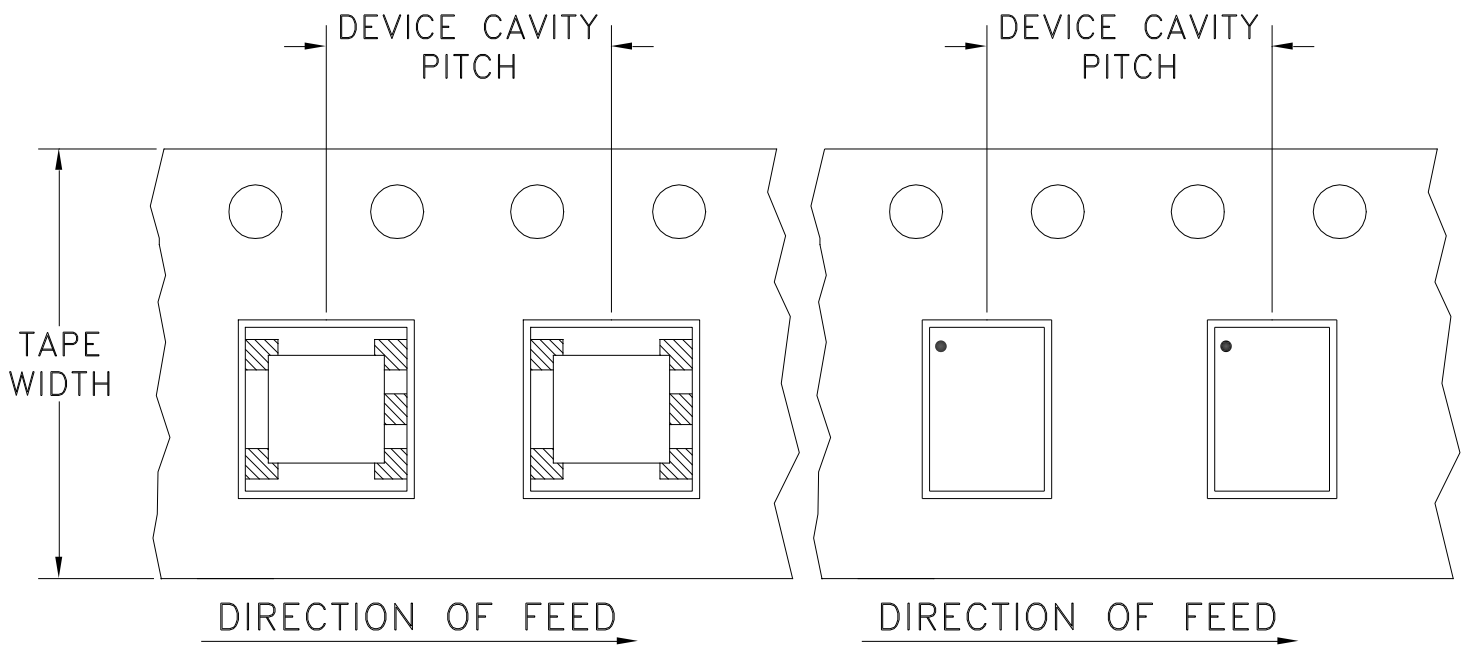


The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

RF/MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F17

DEVICE ORIENTATION IN T&R



| Tape Width, mm | Device Cavity Pitch, mm | Reel Size, inches | Devices per Reel | |
|----------------|-------------------------|-------------------|-------------------------------------|------|
| 12 | 8 | 7 | Small quantity standards (see note) | 20 |
| | | | | 50 |
| | | | | 100 |
| | | | | 200 |
| | | | | 500 |
| | | 13 | Standard | 1000 |
| | | | 2000 | |

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



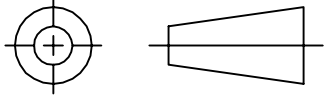
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RF/IF MICROWAVE COMPONENTS

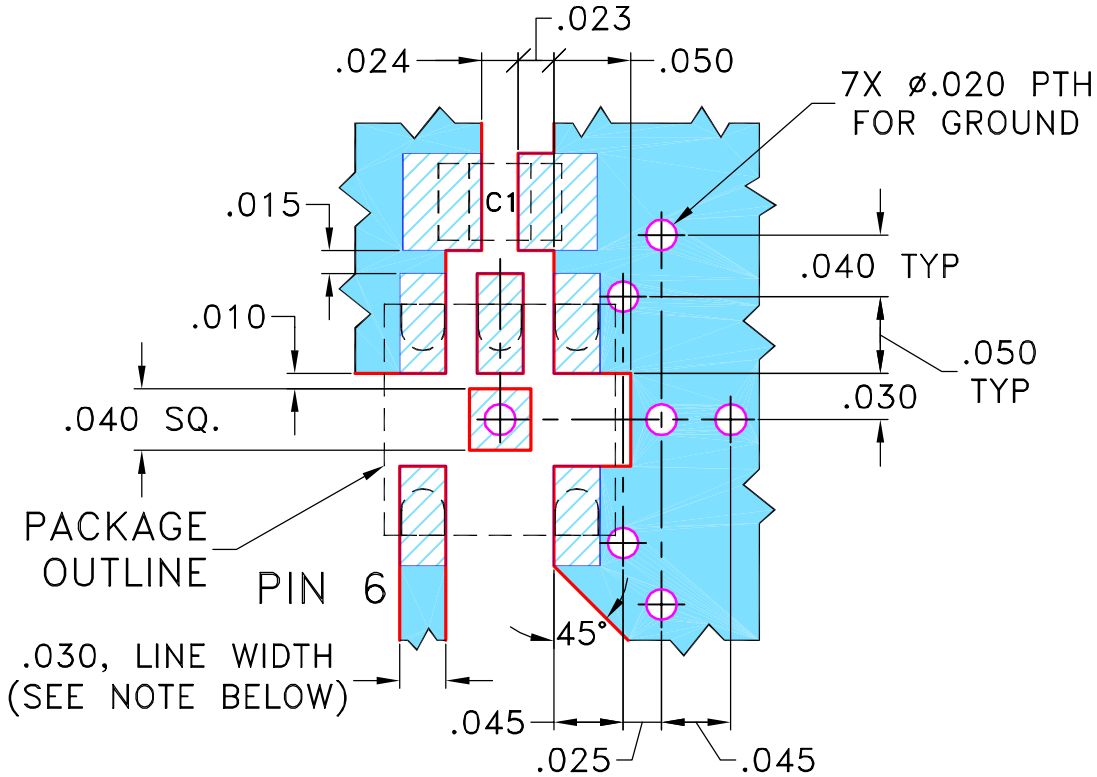
THIRD ANGLE PROJECTION



REVISIONS

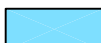
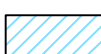
| REV | ECN No. | DESCRIPTION | DATE | DR | AUTH |
|-----|---------|-----------------------|----------|----|------|
| OR | M91565 | NEW RELEASE | 04/16/04 | AV | IG |
| A | M102713 | ADDED "...WITH SMOBC" | 01/12/06 | GF | IL |
| | | | | | |

SUGGESTED MOUNTING CONFIGURATION
FOR AT224 CASE STYLE, "pp/kp" PIN CONNECTION



CAPACITOR C1: 0805 SIZE, FOR VALUE SEE CATALOG.

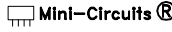
- NOTES:** 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

 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 TOLERANCES ON: 2 PL DECIMALS ± 3 PL DECIMALS ± .005 ANGLES ± FRACTIONS ± | DRAWN | AV 03/23/04 |
| | CHECKED | IL 04/16/04 |
| | APPROVED | IG 04/16/04 |

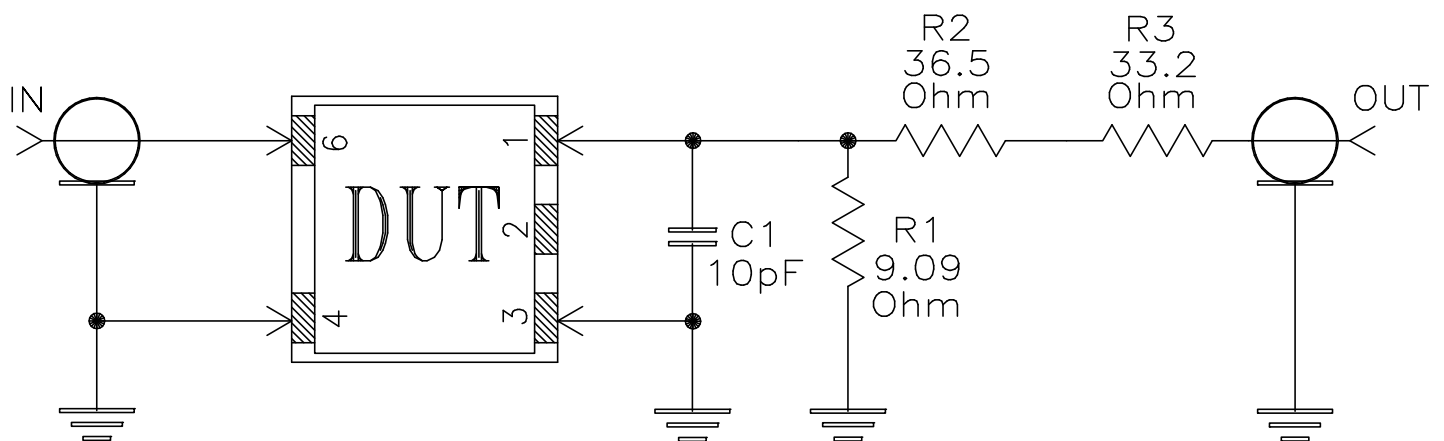
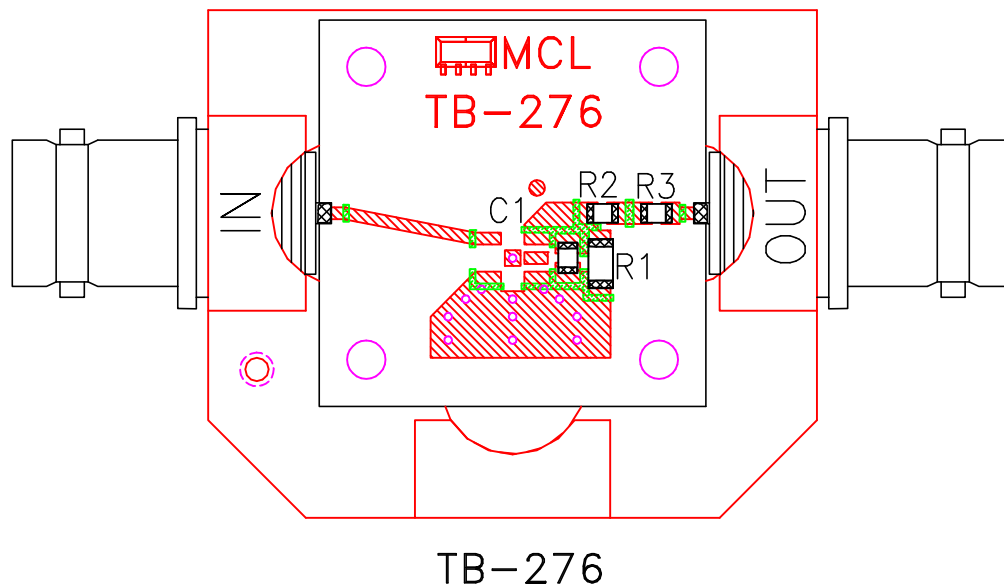
 **Mini-Circuits®** 13 Neptune Avenue
Brooklyn NY 11235

PL, pp/kp, 75, AT224, TC9, TB-276

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| SIZE | CODE IDENT | DRAWING NO: | REV: |
|----------------------------------|------------|-------------|--------|
| A | 15542 | 98-PL-155 | A |
| FILE: | 98PL155 | SCALE: | 8:1 |
| ASHEETA1.DWG REV:A DATE:01/12/95 | | SHEET: | 1 OF 1 |


Evaluation Board and Circuit



Schematic Diagram

Notes:

1. BNC Female connectors.
2. PCB Material: Rogers R04350 or equivalent, Dielectric Constant=3.5, Thickness=.030 inch.

 **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 |
|--------------------------------|---|--|
| Operating Temperature | -20° to 85°C Ambient Environment | Individual Model Data Sheet |
| Storage Temperature | -55° to 100° C Ambient Environment | Individual Model Data Sheet |
| Humidity | 90 to 95% RH, 240 hours, 50°C | MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours |
| Thermal Shock | -55° to 100°C, 100 cycles | MIL-STD-202, Method 107, Condition A-3, except +100°C |
| Solder Reflow Heat | Sn-Pb Eutetic Process: 225°C peak Pb-Free Process 245° - 250°C peak | J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1 |
| Solderability | 10X Magnification | J-STD-002, 95% Coverage |
| Vibration (High Frequency) | 20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36) | MIL-STD-202, Method 204, Condition 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 |
| 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 |