



CERAMIC BALUN

RF Transformer

NCS2-222-3+

50Ω 1275 to 2200 MHz 1:2 Ratio

FEATURES

- Wideband, 1275 to 2200 MHz
- Low phase unbalance, 5 deg. and amplitude unbalance, 0.4 dB typ.
- Miniature size, 0.079"x0.049"x0.033"
- LTCC construction
- Low cost
- Aqueous washable



Generic photo used for illustration purposes only

CASE STYLE: GE0805C-1

APPLICATIONS

- GPS
- WCDMA
- PCS

+RoHS Compliant

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

ELECTRICAL SPECIFICATIONS AT 25°C

| Parameter | Frequency (MHz) | Min. | Typ. | Max. | Units |
|-------------------------------------|-----------------|------|------|------|--------|
| Impedance Ratio (Secondary/Primary) | | | 2 | | |
| Frequency Range | | 1275 | | 2200 | MHz |
| Insertion Loss ¹ | 1275 - 2200 | — | 1.0 | — | dB |
| Amplitude Unbalance | 1275 - 2200 | — | 0.4 | — | dB |
| Phase Unbalance ² | 1275 - 2200 | — | 5 | — | Degree |

1. Insertion Loss is referenced to mid-band loss, 0.6 dB.

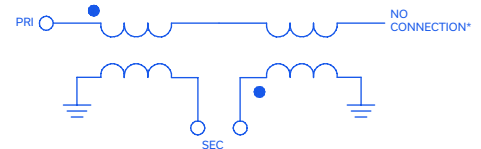
2. Relative to 180°

MAXIMUM RATINGS

| Parameter | Ratings |
|-----------------------|----------------|
| Operating Temperature | -40°C to 85°C |
| Storage Temperature | -55°C to 100°C |
| RF Power | 3W |

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

CONFIGURATION J





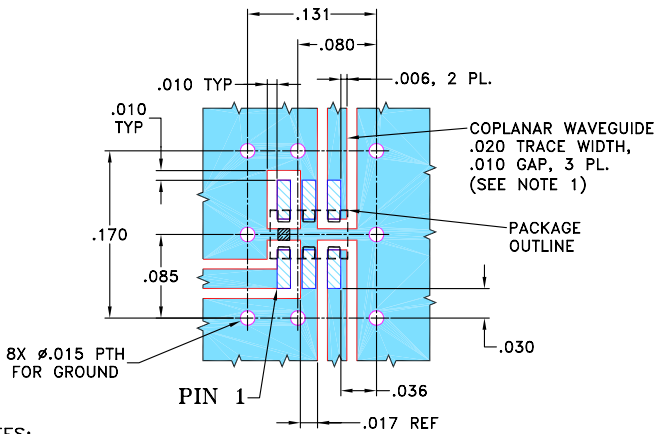
PAD CONNECTIONS

| | |
|-------------------------------|---|
| PRIMARY DOT (Unbalanced Port) | 1 |
| PRIMARY (GND) | 2 |
| SECONDARY DOT (Balanced) | 4 |
| SECONDARY (Balanced) | 3 |
| NO CONNECTION | 6 |
| NOT USED (GND Externally) | 5 |

Pads 2,3,4 are DC-connected internally

PRODUCT MARKING: N/A

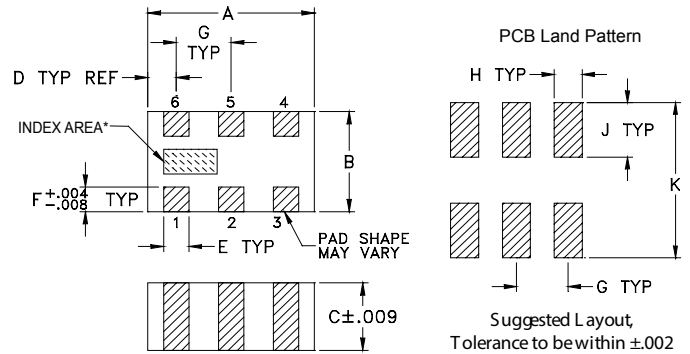
DEMO BOARD MCL P/N: TB-419+ SUGGESTED PCB LAYOUT (PL-264)



NOTES:

1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS $.010'' \pm .001''$. COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP 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 DRAWING



*Shape of index marking may vary

OUTLINE DIMENSIONS (Inches/mm)

| | | | | | |
|------|------|------|------|-------|------|
| A | B | C | D | E | F |
| .079 | .049 | .033 | .014 | .012 | .012 |
| 2.01 | 1.24 | 0.84 | 0.36 | 0.30 | 0.30 |
| G | H | J | K | wt | |
| .026 | .014 | .039 | .110 | grams | |
| 0.66 | 0.36 | 1.00 | 2.80 | .008 | |

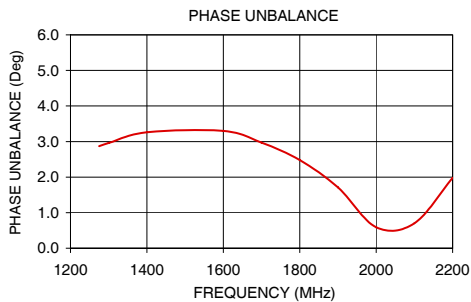
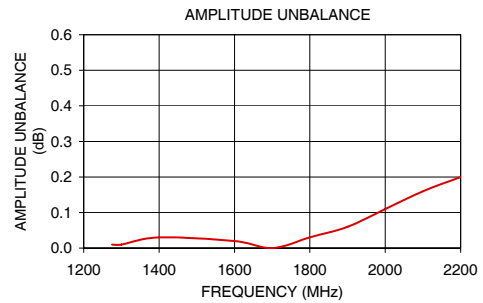
TAPE & REEL INFORMATION: F74



TYPICAL PERFORMANCE DATA³

| Frequency (MHz) | Insertion Loss (dB) | Input Return Loss (dB) | Amplitude Unbalance (dB) | Phase Unbalance (deg) |
|-----------------|---------------------|------------------------|--------------------------|-----------------------|
| 1275 | 0.29 | 13.01 | 0.01 | 2.87 |
| 1300 | 0.23 | 14.10 | 0.01 | 2.96 |
| 1400 | 0.06 | 20.32 | 0.03 | 3.26 |
| 1600 | 0.00 | 23.50 | 0.02 | 3.30 |
| 1700 | 0.05 | 18.13 | 0.00 | 2.97 |
| 1800 | 0.11 | 15.42 | 0.03 | 2.48 |
| 1900 | 0.18 | 13.83 | 0.06 | 1.71 |
| 2000 | 0.24 | 12.80 | 0.11 | 0.59 |
| 2100 | 0.29 | 12.18 | 0.16 | 0.70 |
| 2200 | 0.33 | 11.83 | 0.20 | 1.98 |

3. Measured with Agilent E5071B network analyzer using impedance conversion and port extension.



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

RF Transformer

NCS2-222-3+

Typical Performance Data

| FREQUENCY (MHz) | INSERTION LOSS* (dB) | INPUT RETURN LOSS (dB) | AMPLITUDE UNBALANCE (dB) | PHASE UNBALANCE** (deg) |
|--------------------|-------------------------|------------------------------|--------------------------------|-------------------------------|
| 775 | 4.96 | 2.23 | 0.12 | 1.06 |
| 800 | 4.54 | 2.47 | 0.10 | 1.14 |
| 850 | 3.77 | 2.99 | 0.08 | 1.28 |
| 900 | 3.08 | 3.62 | 0.05 | 1.60 |
| 950 | 2.48 | 4.34 | 0.04 | 1.69 |
| 1000 | 1.95 | 5.20 | 0.01 | 1.90 |
| 1050 | 1.50 | 6.17 | 0.02 | 2.07 |
| 1100 | 1.13 | 7.31 | 0.01 | 2.37 |
| 1150 | 0.82 | 8.63 | 0.02 | 2.44 |
| 1200 | 0.57 | 10.16 | 0.00 | 2.61 |
| 1250 | 0.38 | 11.99 | 0.01 | 2.75 |
| 1275 | 0.30 | 13.01 | 0.01 | 2.87 |
| 1300 | 0.24 | 14.10 | 0.01 | 2.96 |
| 1325 | 0.18 | 15.36 | 0.00 | 3.03 |
| 1350 | 0.13 | 16.84 | 0.00 | 3.15 |
| 1375 | 0.09 | 18.47 | 0.02 | 3.23 |
| 1400 | 0.07 | 20.32 | 0.03 | 3.26 |
| 1425 | 0.04 | 22.70 | 0.02 | 3.26 |
| 1450 | 0.02 | 25.86 | 0.01 | 3.30 |
| 1475 | 0.01 | 30.13 | 0.02 | 3.34 |
| 1500 | 0.00 | 34.87 | 0.03 | 3.38 |
| 1525 | 0.00 | 33.49 | 0.02 | 3.40 |
| 1550 | 0.00 | 29.10 | 0.01 | 3.38 |
| 1575 | 0.00 | 25.84 | 0.01 | 3.36 |
| 1600 | 0.01 | 23.50 | 0.02 | 3.30 |
| 1625 | 0.02 | 21.74 | 0.02 | 3.25 |
| 1650 | 0.03 | 20.33 | 0.01 | 3.17 |
| 1675 | 0.04 | 19.15 | 0.00 | 3.08 |
| 1700 | 0.06 | 18.13 | 0.00 | 2.97 |
| 1725 | 0.07 | 17.28 | 0.00 | 2.88 |
| 1750 | 0.09 | 16.59 | 0.02 | 2.74 |
| 1775 | 0.11 | 15.99 | 0.03 | 2.63 |
| 1800 | 0.12 | 15.42 | 0.03 | 2.48 |
| 1825 | 0.14 | 14.92 | 0.03 | 2.32 |
| 1850 | 0.15 | 14.52 | 0.04 | 2.14 |
| 1875 | 0.17 | 14.17 | 0.05 | 1.90 |
| 1900 | 0.19 | 13.83 | 0.06 | 1.71 |
| 1950 | 0.22 | 13.23 | 0.08 | 1.16 |
| 2000 | 0.25 | 12.80 | 0.11 | 0.59 |
| 2050 | 0.28 | 12.42 | 0.13 | 0.12 |
| 2100 | 0.30 | 12.18 | 0.16 | 0.70 |
| 2150 | 0.32 | 11.96 | 0.18 | 1.25 |
| 2200 | 0.34 | 11.83 | 0.20 | 1.98 |
| 2250 | 0.35 | 11.76 | 0.24 | 2.61 |
| 2300 | 0.37 | 11.70 | 0.24 | 3.46 |
| 2400 | 0.39 | 11.70 | 0.29 | 4.84 |
| 2500 | 0.39 | 11.90 | 0.35 | 5.96 |
| 3000 | 0.41 | 13.82 | 0.73 | 8.99 |
| 3500 | 0.57 | 14.30 | 1.45 | 7.60 |
| 4000 | 1.24 | 12.41 | 1.86 | 11.11 |

* Insertion Loss is referenced to mid-band loss , 0.6 dB.Reference Demo Board TB-626+

**Phase Unbalance is relative to 180°



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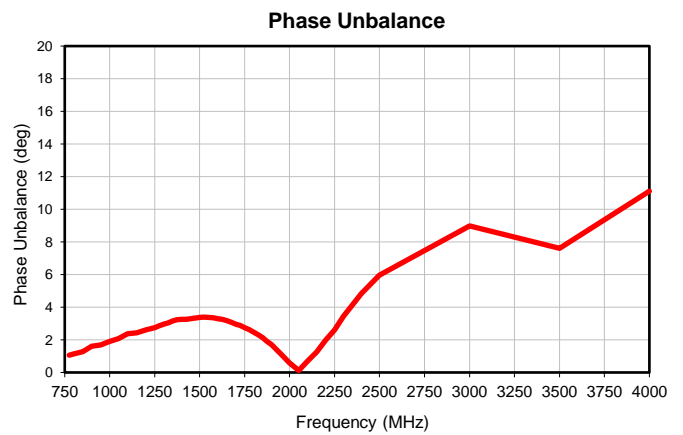
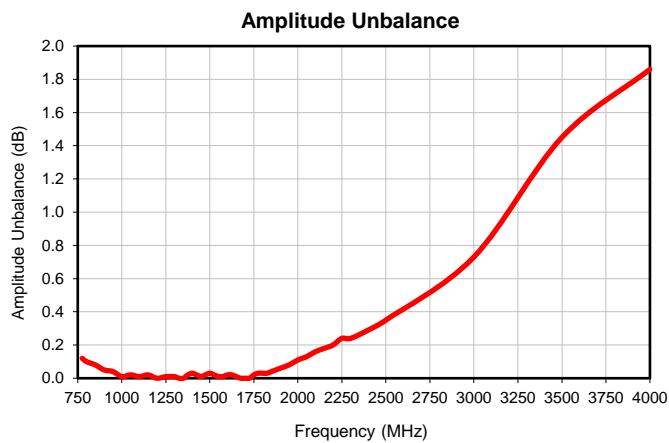
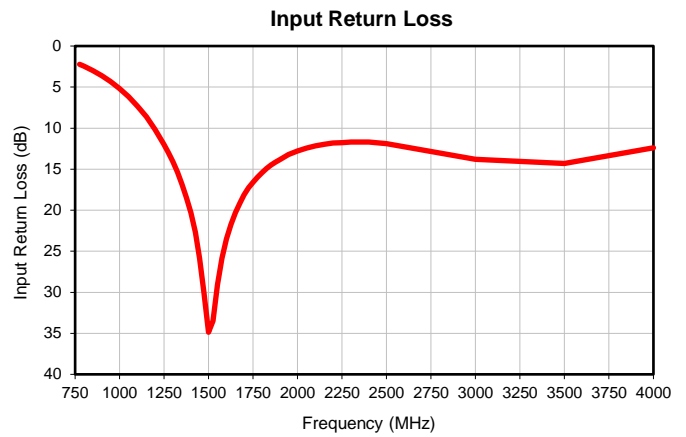
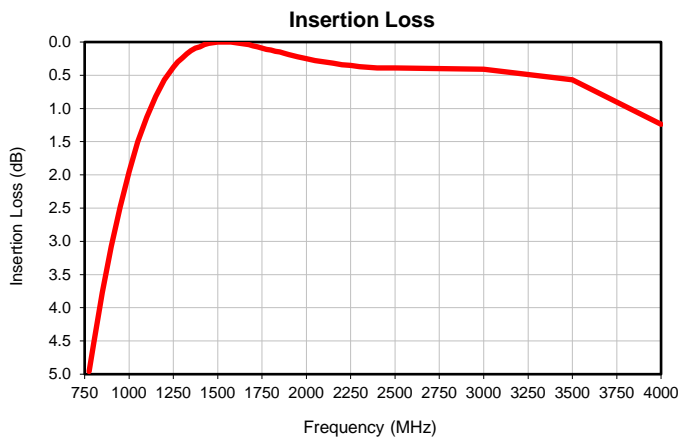


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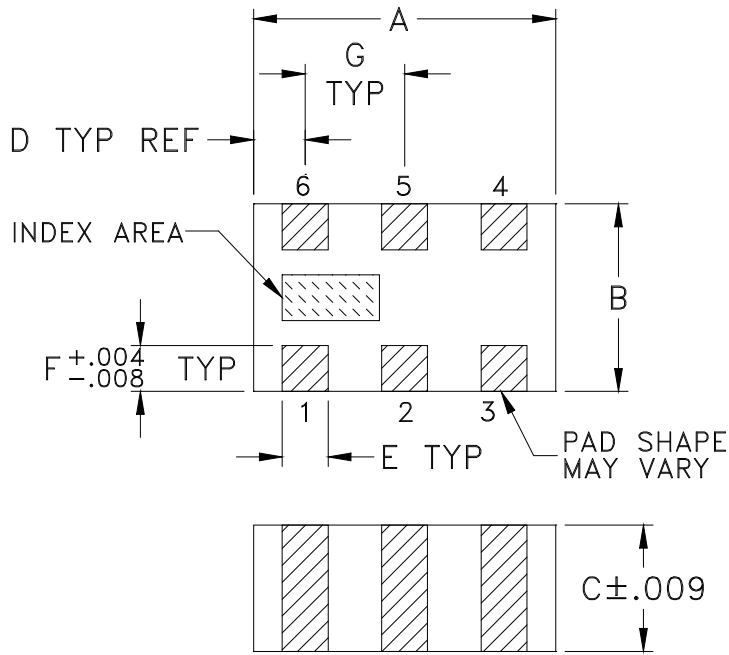
IF/RF MICROWAVE COMPONENTS

REV. OR
NCS2-222-3+
4/6/2021
Page 1 of 1

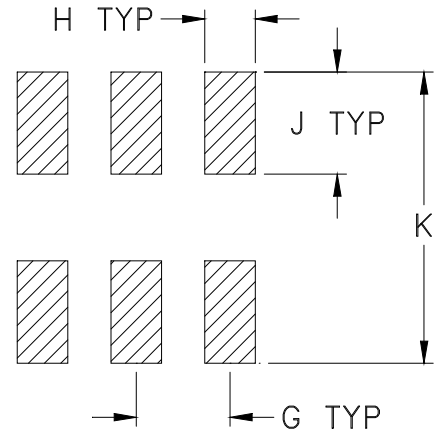
Typical Performance Data



Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within ± 0.002

| CASE # | A | B | C | D | E | F | G | H | J | K | WT. GRAM |
|-----------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------|
| GE0805C-1 | .079 (2.00) | .049 (1.25) | .033 (0.84) | .014 (0.35) | .012 (0.30) | .012 (0.30) | .026 (0.65) | .014 (0.35) | .039 (1.00) | .110 (2.80) | .008 |

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

Notes:

- Open style, ceramic base.
- Termination finish: For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.
For RoHS-5 Case Style: Tin-lead plate. All models, no (+) suffix.



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RF/IF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F74

DEVICE ORIENTATION IN T&R

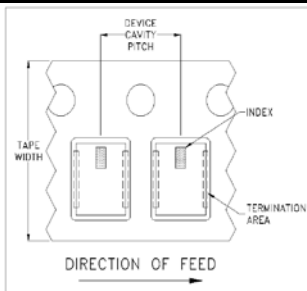


ILLUSTRATION 1

Applicable Case Styles

GE0805C-1
 GE0805C-1AP
 JV1210C-1
 GU2939

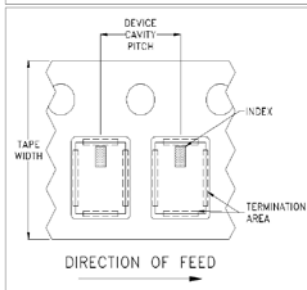


ILLUSTRATION 2

Applicable Case Styles

JV1210C
 JV1210C-2
 JV1210C-3
 JV1210C-4
 JV1210C-5
 JV1210C-6
 JV1210C-11

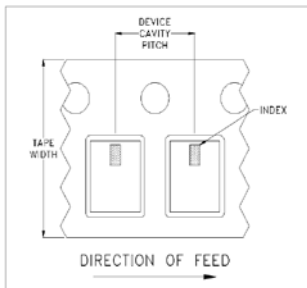


ILLUSTRATION 3

Applicable Case Styles

JC0603C-8
 JV1210C-7
 JV1210C-8
 JV1210C-9
 JV1210C-10
 JV1210C-13
 GE0805C-13

| Tape Width, mm | Device Cavity Pitch, mm | Real Size, inches | Devices per Reel | |
|----------------|-------------------------|-------------------|-------------------------------------|------|
| 8 | 4 | 7 | Small quantity standards (see note) | 20 |
| | | | | 50 |
| | | | | 100 |
| | | | | 200 |
| | | | | 500 |
| | | | Standard | 1000 |
| | | | | 2000 |
| | | | 4000 | |

Note: Small reel availability varies by model. Refer to pricing and availability on individual model dashboard.

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.

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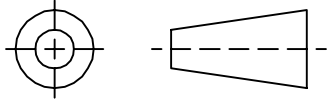
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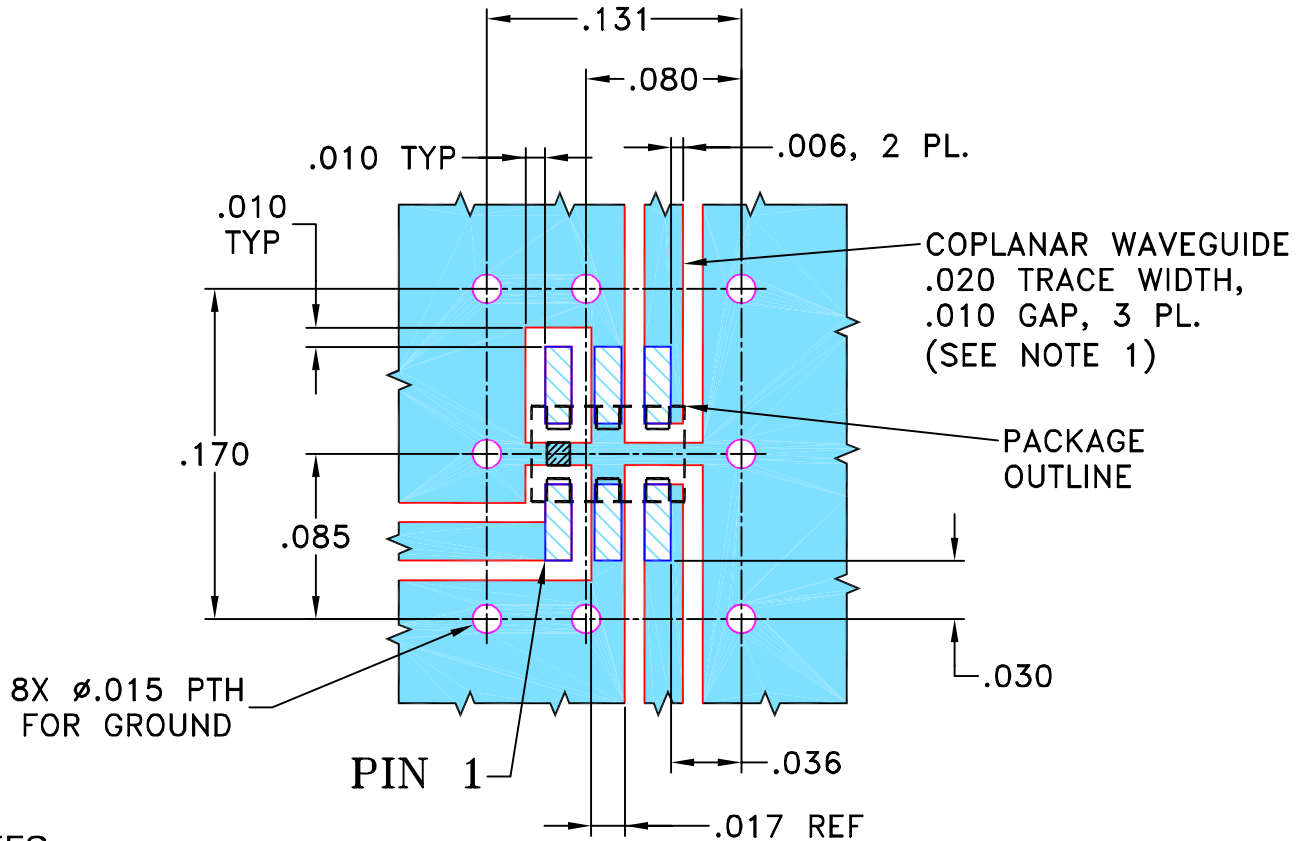
THIRD ANGLE PROJECTION



REVISIONS

| REV | ECN No. | DESCRIPTION | DATE | DR | AUTH |
|-----|---------|-------------|----------|----|------|
| OR | M109549 | NEW RELEASE | 01/31/07 | PW | DJ |
| | | | | | |
| | | | | | |

SUGGESTED MOUNTING CONFIGURATION
FOR GE0805C-1 CASE STYLE, "ry" PIN CONNECTION.



NOTES:

1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .010" ± .001". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP 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 | PW | 01/30/07 |
| | CHECKED | IL | 01/31/07 |
| | APPROVED | DJ | 01/31/07 |

Mini-Circuits® 13 Neptune Avenue
Brooklyn NY 11235

PL, ry, GE0805C-1, NCS, TB-419+

| | | | |
|------------------|---------------------|--------------------------|------------|
| SIZE A | CODE IDENT 15542 | DRAWING NO: 98-PL-264 | REV: OR |
| FILE: 98PL264 | SCALE: 10:1 | SHEET: 1 OF 1 | |

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| Specification | Test/Inspection Condition | Reference/Spec |
|----------------------------|---|--|
| Operating Temperature | -40° 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, Para 4.2.5, Test S, 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 |