CERAMIC BALUN

# RF Transformer

# NCS4-232+

50Ω 1600 to 2300 MHz 1:4 Ratio

## FEATURES

- Wideband, 1600 to 2300 MHz
- Low Phase Unbalance, 5 Degrees and Amplitude Unbalance, 0.5 dB Typ.
- Miniature Size, 0.079x0.049x0.033"
- LTCC Construction
- Low Cost
- Aqueous Washable



*Generic photo used for illustration purposes only*

CASE STYLE: GE0805C-1

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

## APPLICATIONS

- WLAN
- WCDMA
- PCS

## ELECTRICAL SPECIFICATIONS[1] AT +25°C

| Parameter | Frequency (MHz) | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| Impedance Ratio (Secondary/Primary) | | | 4 | | |
| Frequency Range | | 1600 | | 2300 | MHz |
| Insertion Loss[1] | 1600 - 2300 | | 1.0 | | dB |
| Amplitude Unbalance | 1600 - 2300 | | 0.5 | | dB |
| Phase Unbalance[2] | 1600 - 2300 | | 5 | | Degree |

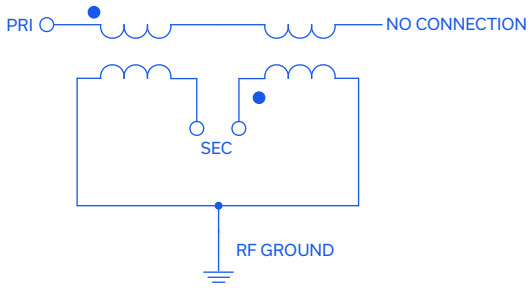
1. Insertion Loss is referenced to mid-band loss, 0.8 dB. Reference Demo Board TB-NCS4-232+.
2. Relative to 180°.

## ABSOLUTE MAXIMUM RATINGS

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

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

## CONFIGURATION R



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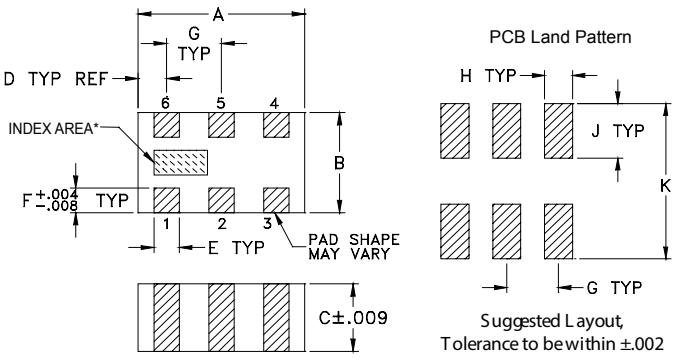
50Ω 1600 to 2300 MHz 1:4 Ratio

## PAD CONNECTIONS

| | |
|---|---|
| PRIMARY DOT (Unbalanced Port) | 1 |
| RF GROUND (GND) | 2 |
| SECONDARY DOT (Balanced) | 4 |
| SECONDARY (Balanced) | 3 |
| NO CONNECTION | 6 |
| RF GROUND (GND Externally) | 5 |

Pads 2,3,4 are DC-connected internally.

## OUTLINE DRAWING

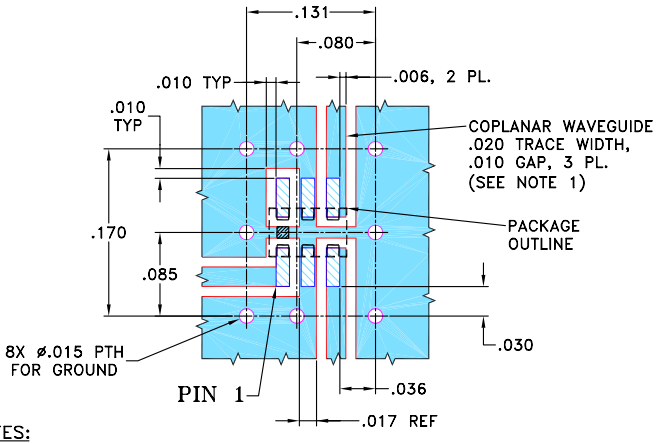



*Shape of index marking may vary

## PRODUCT MARKING: N/A

## DEMO BOARD MCL P/N: TB-NCS4-232+

## SUGGESTED PCB LAYOUT (PL-264)




NOTES:

1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS RO4350B 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

## 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

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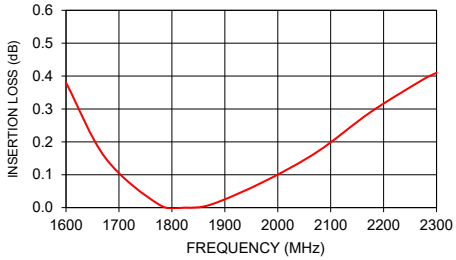
50Ω 1600 to 2300 MHz 1:4 Ratio

## TYPICAL PERFORMANCE DATA[3]

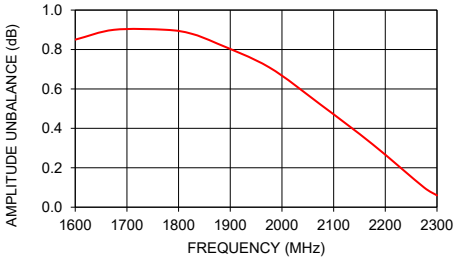
| Frequency (MHz) | Insertion Loss (dB) | Input Return Loss (dB) | Amplitude Unbalance (dB) | Phase Unbalance[4] (Degree) |
|---|---|---|---|---|
| 1600 | 0.38 | 12.22 | 0.85 | 4.63 |
| 1675 | 0.15 | 16.70 | 0.90 | 5.43 |
| 1775 | 0.01 | 30.41 | 0.90 | 6.52 |
| 1825 | 0.00 | 29.75 | 0.88 | 7.15 |
| 1875 | 0.01 | 22.28 | 0.83 | 7.61 |
| 1975 | 0.08 | 16.15 | 0.71 | 8.78 |
| 2075 | 0.17 | 13.28 | 0.52 | 9.63 |
| 2175 | 0.29 | 11.67 | 0.32 | 10.06 |
| 2275 | 0.39 | 10.72 | 0.10 | 9.93 |
| 2300 | 0.41 | 10.55 | 0.06 | 9.73 |

3. Measured with Agilent E5071B network analyzer using impedance conversion and port extension.
4. Relative to 180°.

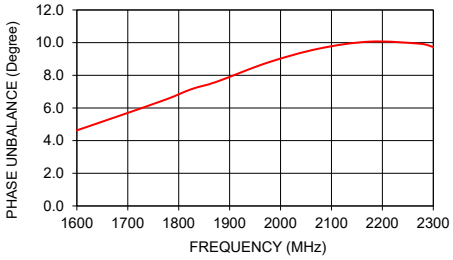
INSERTION LOSS[3]




AMPLITUDE UNBALANCE




PHASE UNBALANCE[4]




**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/terms/viewterm.html