

**The Big Deal**

- Low Unbalance, .3 dB & 2 deg. typ.
- Industry leading combination of size/performance



CASE STYLE: GE0805C-1AP

**Product Overview**

Mini-Circuits new RF Transformer, NCS1-112+ converts single ended, unbalanced RF signals, that propagate through systems, to balanced signals that are required for many semiconductor devices. The NCS series offers a low cost small size alternative for matching, A/D converters, System on Chips, and up/down converters. The outstanding phase and amplitude unbalance make this component a versatile building block for use in a variety of systems and sub-system designs. package with low inductance, excellent thermal efficiency, and high ESD rating.

**Key Features**

Feature	Advantages
Small Size	Offered in the EIA-0805 package size, the NCS1-112+ offers an industry leading combination of size and performance. The small footprint (2.0 mm x 1.25 mm) allows for reduced parasitics in systems with improved performance and simplified layout.
Low Phase and Amplitude Unbalance	Supporting 8 deg. and 0.8 dB unbalance make this RF Transformer applicable for use in higher level integrated components such as A/D converters and system on a chip.

**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](http://www.minicircuits.com/MCLStore/terms.jsp)

# RF Transformer

## NCS1-112+

50Ω 700 to 1100 MHz 1:1 Ratio



CASE STYLE: GE0805C-1AP

**+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, 1000, 2000

### Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature <sup>3</sup>	-55°C to 100°C
Input RF Power	3W

3. Shelf life 12 months when kept in sealed bags. Unused parts are to be resealed to preserve shelf life for proper solderability.

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

### 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*

### Features

- wideband, 700 to 1100 MHz
- low phase unbalance, 2 deg. and amplitude unbalance, 0.3 dB typ.
- miniature size, 0.079"x0.049"x0.028"
- LTCC construction
- low cost
- aqueous washable

### Applications

- WCDMA
- PCS
- GPS

### Electrical Specifications at 25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
<b>Impedance Ratio</b>			1		
<b>Frequency Range</b>		700	—	1100	MHz
<b>Insertion Loss<sup>1</sup></b>	700 - 730	—	1.1	—	dB
	730 - 950	—	0.75	1.2	
	950 - 1000	—	0.8	1.2	
	1000 - 1100	—	1.1	—	
<b>Amplitude Unbalance</b>	700 - 730	—	0.85	—	dB
	730 - 950	—	0.75	0.95	
	950 - 1000	—	0.65	0.85	
	1000 - 1100	—	0.87	—	
<b>Phase Unbalance<sup>2</sup></b>	700 - 730	—	0.85	—	Degree
	730 - 950	—	4.5	9	
	950 - 1000	—	8	12	
	1000 - 1100	—	13	—	

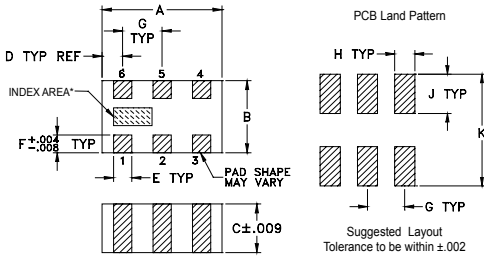
1. Insertion Loss is referenced to mid-band loss, 0.7 dB. Reference Demo Board TB-419+  
2. Relative to 180°

### Typical Performance Data at 25°C\*

FREQUENCY (MHz)	INSERTION LOSS (dB)	INPUT R. LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE (Deg.)
700.00	1.56	10.10	0.21	2.42
750.00	1.25	13.51	0.15	2.42
800.00	1.13	16.24	0.13	2.12
850.00	1.12	16.12	0.12	1.34
900.00	1.17	14.60	0.12	0.16
950.00	1.25	13.37	0.12	1.49
1000.00	1.31	12.75	0.08	3.52
1050.00	1.34	12.64	0.01	5.87
1075.00	1.35	12.79	0.04	7.13
1100.00	1.35	13.09	0.10	8.41

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

### Outline Drawing

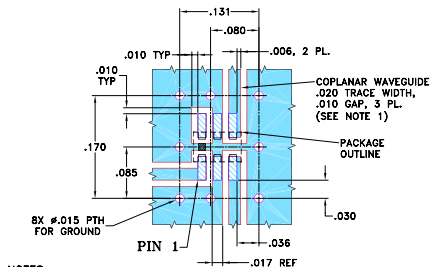


\*Shape of index marking may vary

### Outline Dimensions (inch/mm)

A	B	C	D	E	F
.079	.049	.028	.014	.012	.012
2.00	1.25	0.70	0.35	0.30	0.30
G	H	J	K	wt	
.026	.014	.039	.110	grams	
0.65	0.35	1.00	2.80	.008	

### Demo Board MCL P/N: TB-419+ Suggested PCB Layout (PL-264)

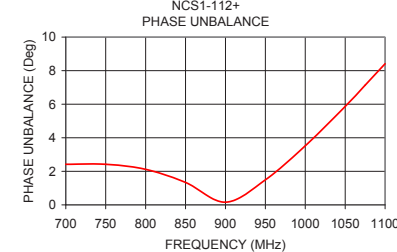
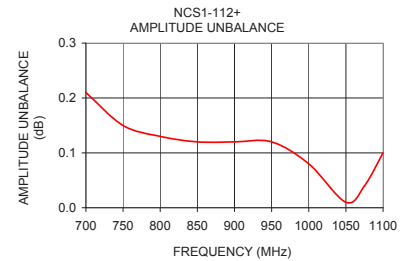
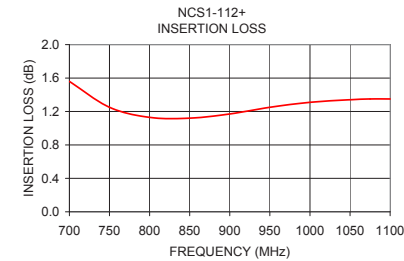


#### NOTES:

- 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.
  - BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
- DENOTES COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).
- DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

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### configuration J

