CERAMIC BALUN

RF Transformer

NCS1-112+

50Ω 700 to 1100 MHz 1:1 Ratio

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

Generic photo used for illustration purposes only

CASE STYLE: GE0805C-1AP

+RoHS Compliant

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

APPLICATIONS

- WCDMA
- PCS
- GPS

PRODUCT OVERVIEW

Mini-Circuits new RF Transformer, NCS1-112+ converts single ended, unbalanced RF signals, that propogate 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.

RF Transformer

NCS1-112+

ELECTRICAL SPECIFICATIONS AT 25°C

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

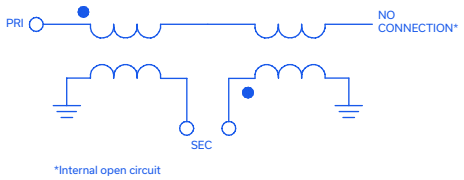
1. Insertion Loss is referenced to mid-band loss, 0.7 dB. Reference Demo Board TB-419+
2. Relative to 180°

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



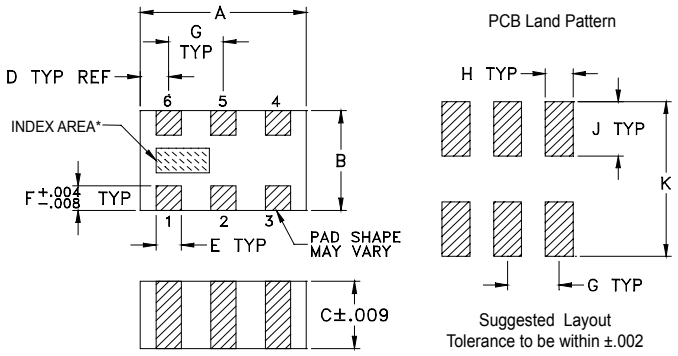
*Internal open circuit

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

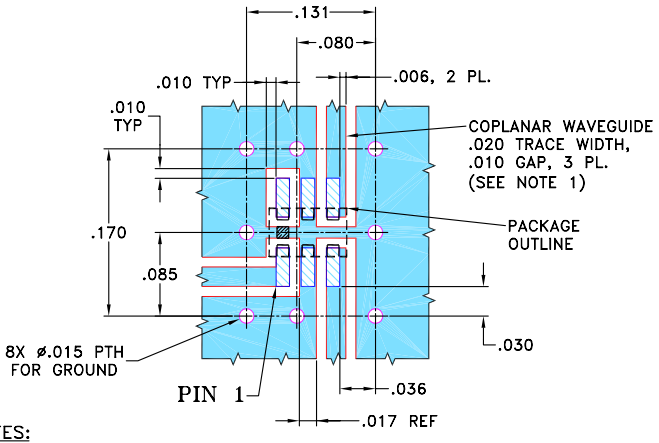
OUTLINE DRAWING



*Shape of index marking may vary

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 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	.028	.014	.012	.012
2.00	1.25	0.70	0.35	0.30	0.30

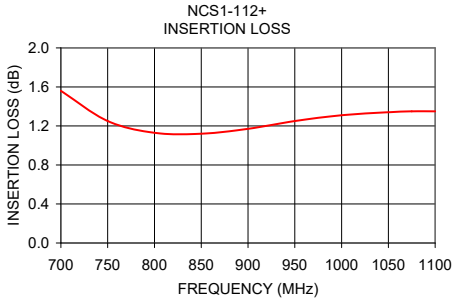
G	H	J	K	wt
.026	.014	.039	.110	grams
0.65	0.35	1.00	2.80	.008

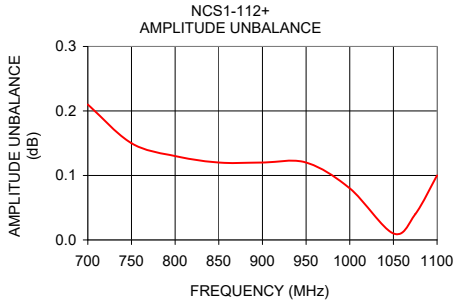
TAPE & REEL INFORMATION: F74

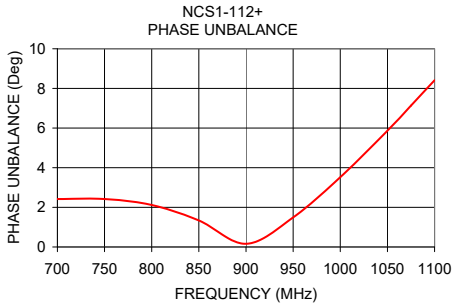
TYPICAL PERFORMANCE DATA[3]

Frequency (MHz)	Insertion Loss (dB)	Input Return Loss (dB)	Amplitude Unbalance (dB)	Phase Unbalance (deg)
700	1.56	10.10	0.21	2.42
750	1.25	13.51	0.15	2.42
800	1.13	16.24	0.13	2.12
850	1.12	16.12	0.12	1.34
900	1.17	14.60	0.12	0.16
950	1.25	13.37	0.12	1.49
1000	1.31	12.75	0.08	3.52
1050	1.34	12.64	0.01	5.87
1075	1.35	12.79	0.04	7.13
1100	1.35	13.09	0.10	8.41

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 NCS1-112+

Typical Performance Data

FREQUENCY MHz	AVERAGE INSERTION LOSS* (dB)	INPUT RETURN LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE** (deg.)
700.0	1.56	10.10	0.21	2.42
705.0	1.52	10.42	0.20	2.44
710.0	1.48	10.75	0.20	2.45
715.0	1.45	11.08	0.19	2.46
720.0	1.41	11.42	0.19	2.47
725.0	1.38	11.76	0.18	2.47
730.0	1.35	12.11	0.17	2.46
735.0	1.32	12.46	0.17	2.46
740.0	1.30	12.81	0.16	2.45
745.0	1.27	13.17	0.16	2.44
750.0	1.25	13.51	0.15	2.42
755.0	1.23	13.85	0.15	2.41
760.0	1.21	14.19	0.15	2.39
765.0	1.20	14.52	0.14	2.38
770.0	1.18	14.83	0.14	2.35
775.0	1.17	15.13	0.14	2.32
780.0	1.16	15.41	0.13	2.29
785.0	1.15	15.66	0.13	2.26
790.0	1.14	15.89	0.13	2.22
795.0	1.13	16.08	0.13	2.17
800.0	1.13	16.24	0.13	2.12
805.0	1.12	16.36	0.13	2.05
810.0	1.12	16.45	0.13	2.00
820.0	1.11	16.52	0.12	1.85
830.0	1.11	16.48	0.12	1.71
840.0	1.11	16.34	0.12	1.53
850.0	1.12	16.12	0.12	1.34
860.0	1.13	15.85	0.12	1.14
870.0	1.14	15.54	0.12	0.92
880.0	1.15	15.22	0.12	0.69
890.0	1.16	14.91	0.12	0.43
900.0	1.17	14.60	0.12	0.16
910.0	1.19	14.30	0.13	0.14
920.0	1.20	14.03	0.13	0.45
930.0	1.22	13.78	0.12	0.78
940.0	1.23	13.56	0.12	1.13
950.0	1.25	13.37	0.12	1.49
960.0	1.26	13.20	0.11	1.87
970.0	1.27	13.05	0.10	2.27
980.0	1.29	12.92	0.10	2.67
990.0	1.30	12.83	0.09	3.09
1000.0	1.31	12.75	0.08	3.52
1010.0	1.32	12.69	0.07	3.96
1020.0	1.33	12.64	0.06	4.42
1030.0	1.33	12.61	0.05	4.90
1040.0	1.34	12.61	0.03	5.38
1050.0	1.34	12.64	0.01	5.87
1060.0	1.35	12.69	0.01	6.37
1070.0	1.35	12.75	0.03	6.88
1080.0	1.35	12.84	0.05	7.39
1090.0	1.36	12.95	0.08	7.90
1100.0	1.35	13.09	0.10	8.41

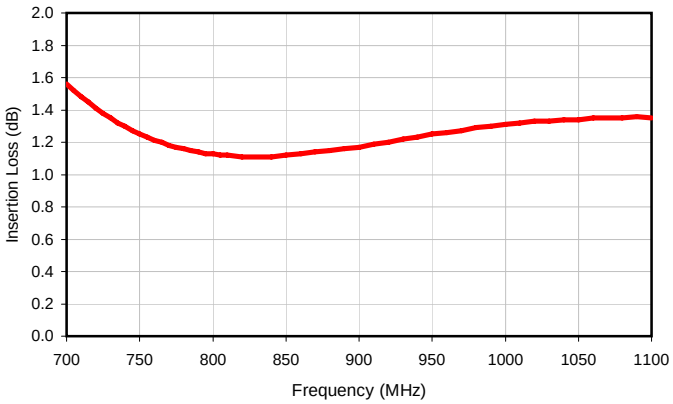
* Insertion Loss is referenced to mid-band loss , 0.7 dB.

**Phase Unbalance is relative to 180˚

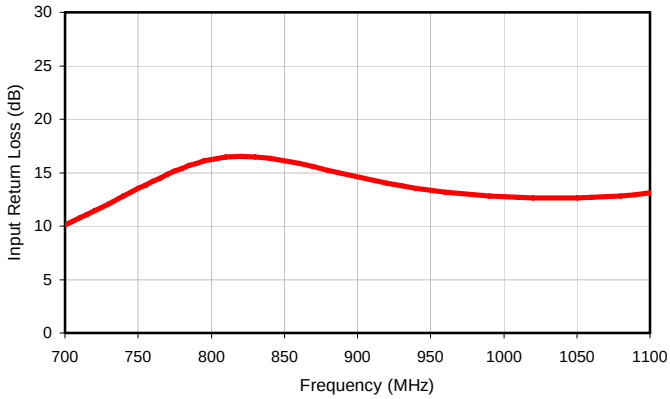
RF Transformer NCS1-112+

Typical Performance Data

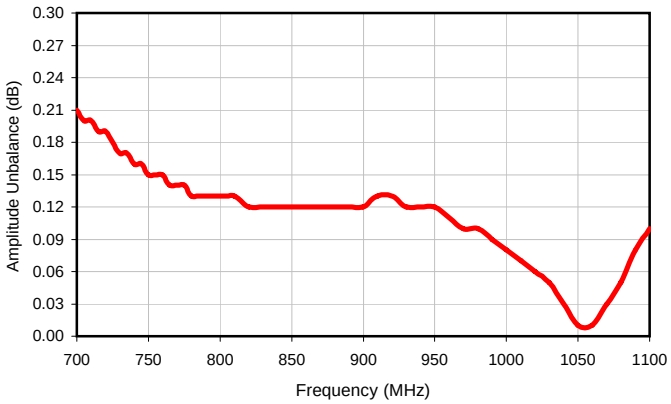
Average Insertion Loss



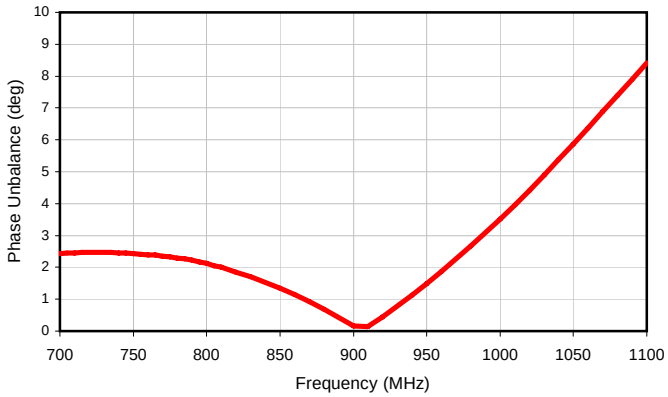
Input Return Loss



Amplitude Unbalance

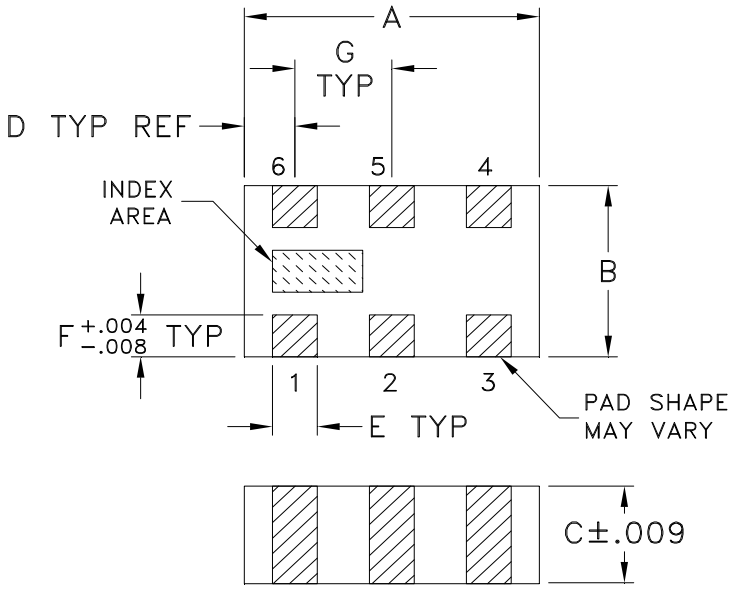


Phase Unbalance

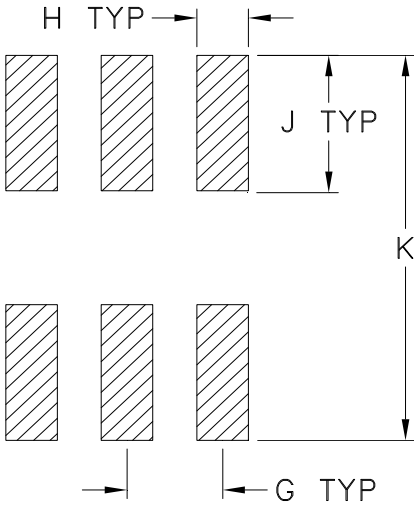


GE0805C-1AP

Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

CASE #	A	B	C	D	E	F	G	H	J	K	WT. GRAM
GE0805C-1AP	.079 (2.00)	.049 (1.25)	.028 (0.70)	.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. ± .01; 3 Pl. ± .005

Notes:

1. Open style, ceramic base.
2. Termination finish: For RoHS Case Styles: Silver platinum plate. All models, (+) suffix.

Tape & Reel Packaging TR-F74

DEVICE ORIENTATION IN T&R

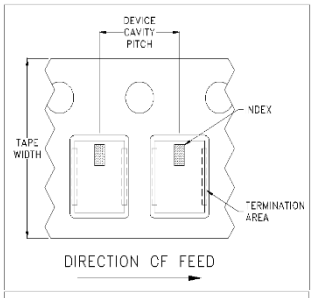


ILLUSTRATION 1

Applicable Case Styles
GE0805C-1
GE0805C-1AP
JV1210C-1
GU2939

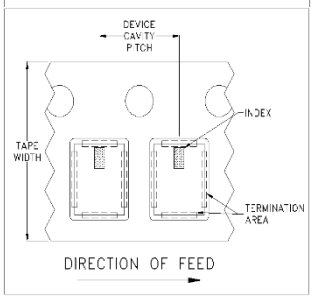


ILLUSTRATION 2

Applicable Case Styles
JV1210C
JV1210C-2
JV1210C-3
JV1210C-4
JV1210C-5
JV1210C-6
JV1210C-11

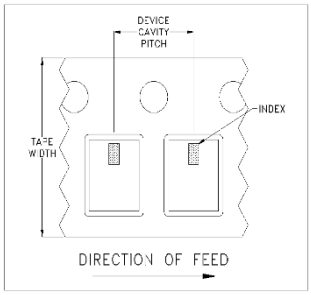


ILLUSTRATION 3

Applicable Case Styles
JC0603C-8
JC0603C-9
JV1210C-7
JV1210C-8
JV1210C-9
JV1210C-10
JV1210C-13
GE0805C-13
GE0805C-19
GE0805C-20

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
				1000
			Standard	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.
Go to: www.minicircuits.com/pages/pdfs/tape.pdf

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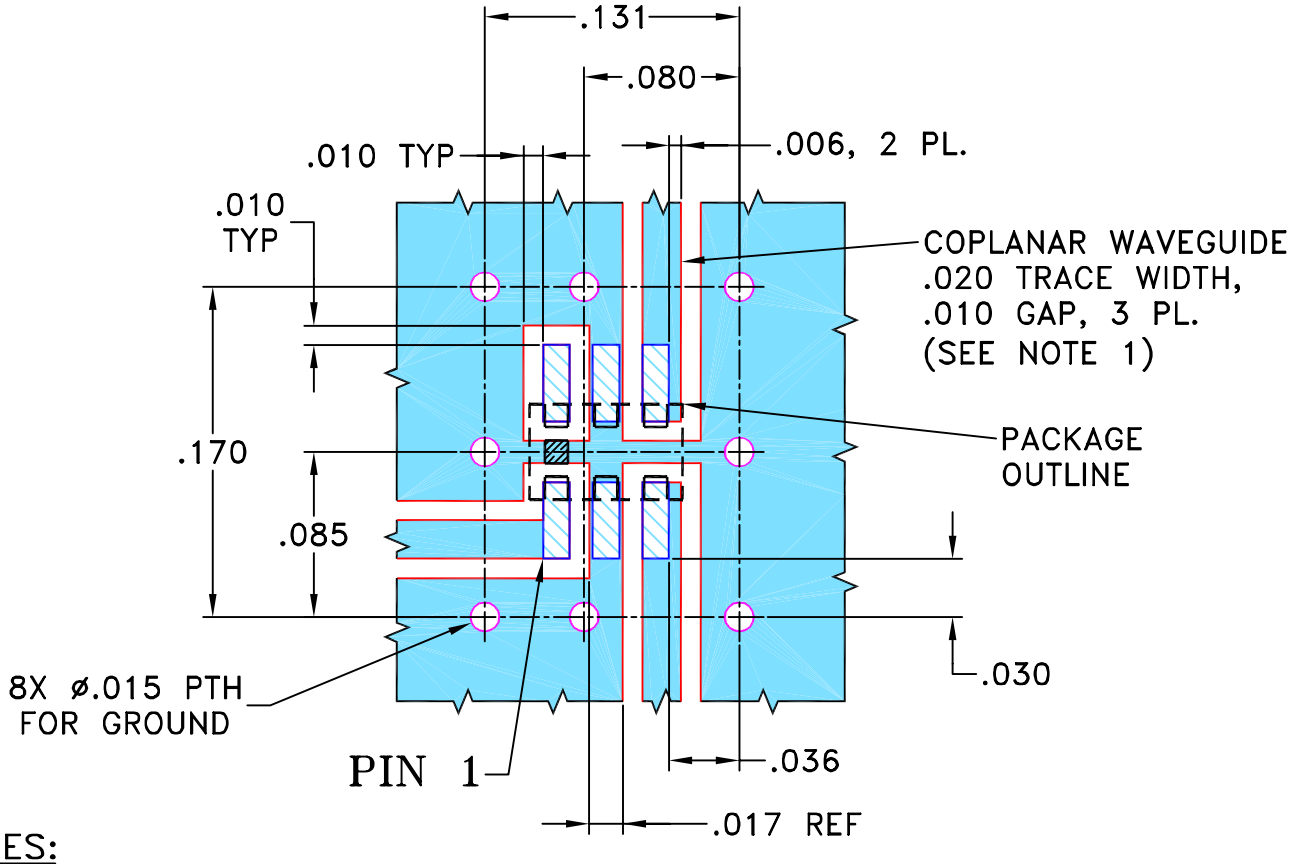
THIRD ANGLE PROJECTION

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 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

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	PW	01/30/07
TOLERANCES ON:	CHECKED	IL	01/31/07
2 PL DECIMALS ±	APPROVED	DJ	01/31/07
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

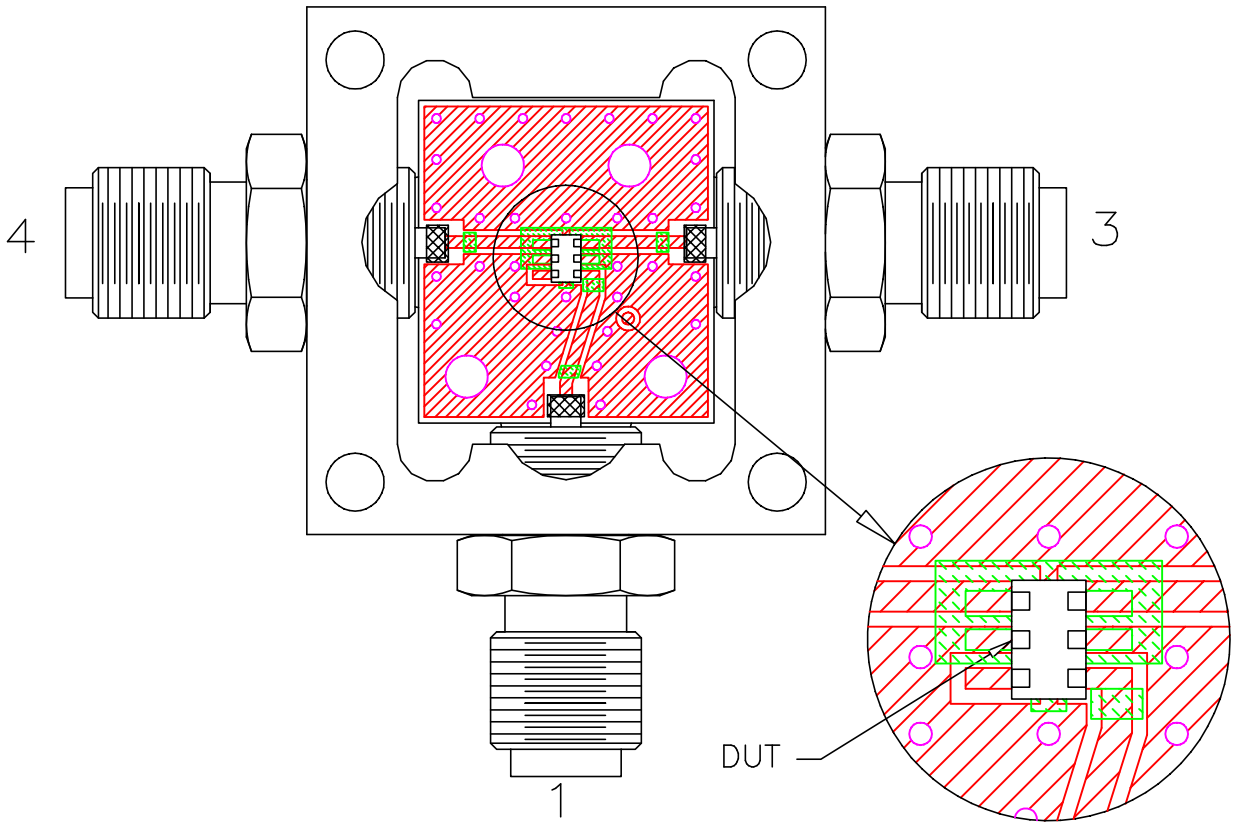
PL, ry, GE0805C-1, NCS, TB-419+

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-264	OR

FILE:	SCALE:	SHEET:
98PL264	10:1	1 OF 1

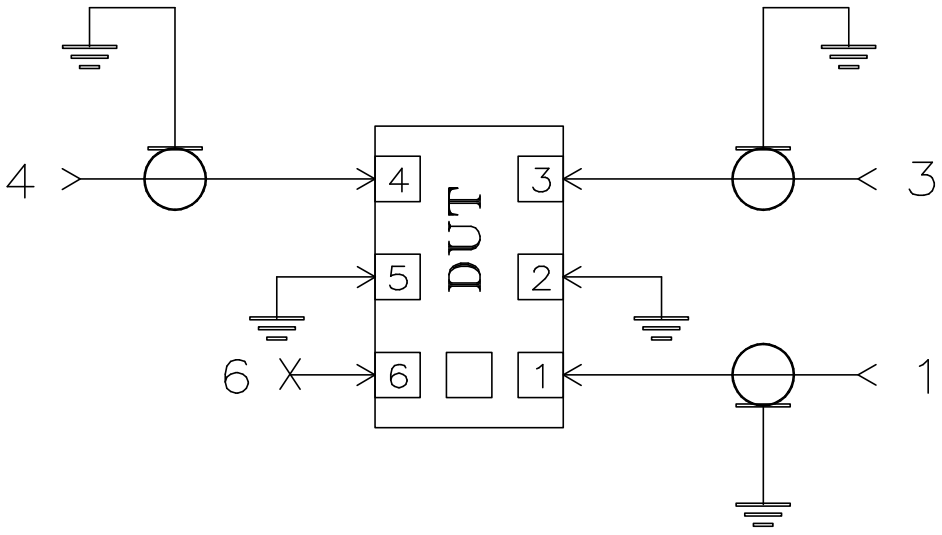
Evaluation Board and Circuit

For Pin Connections refer to Data Sheet of the DUT



TB-419+

DETAIL
(SCALE 5:1)



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.010 inch.

Mini-Circuits®

Mini-Circuits

Environmental Specifications **ENV06T2-01**

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	-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
Shelf Life	Shelf life is 12 months when kept in sealed bags. Unused parts are to be resealed to preseve shelf life for proper solderability.	