CERAMIC BALUN

RF Transformer

NCS4-521+

50Ω 223 to 520 MHz 1:4 Ratio

FEATURES

- Wideband, 223 to 520 MHz
- Low phase unbalance 5 deg. and amplitude unbalance, 0.7 dB typ.
- Miniature size 0805, 0.079"x0.049"x0.033"
- LTCC construction
- Low cost
- Aqueous washable



Generic photo used for illustration purposes only

CASE STYLE: GE0805C-9

+RoHS Compliant

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

APPLICATIONS

- WLAN
- GSM
- Two way trunked radio

ELECTRICAL SPECIFICATIONS AT 25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Units
Impedance Ratio (Secondary/Primary)			4		
Frequency Range		223		520	MHz
Insertion Loss[1]	223 - 520	—	—	1.5	dB
Amplitude Unbalance	223 - 520	—	—	1.5	dB
Phase Unbalance[2]	223 - 520	—	—	10	Degree

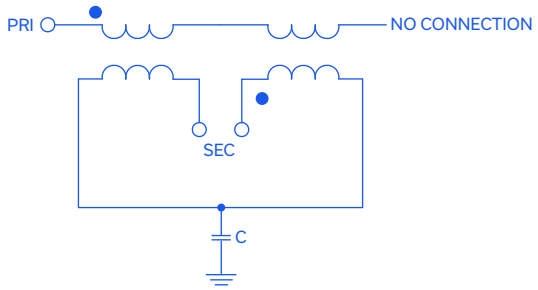
1. Reference Demo Board TB-626+
2. Relative to 180°

MAXIMUM RATINGS

Parameter	Ratings
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power[3]	2W

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

CONFIGURATION R



CERAMIC BALUN

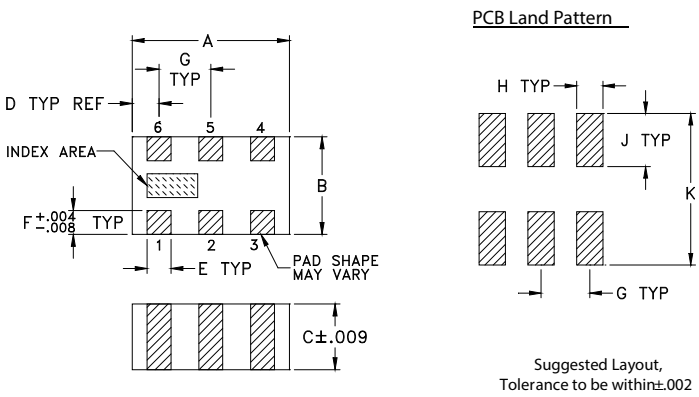
RF Transformer

NCS4-521+

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

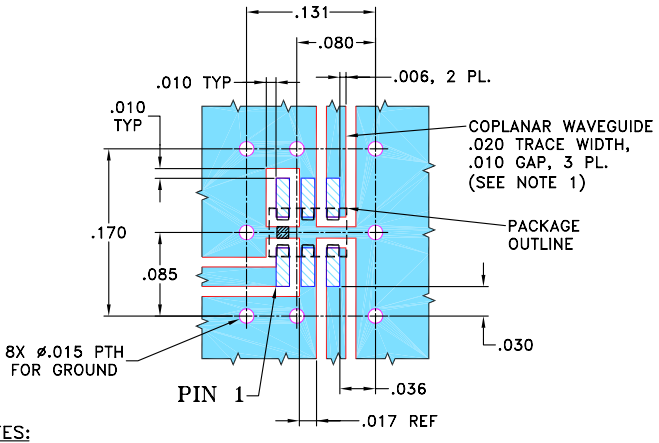
OUTLINE DRAWING



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	.033	.014	.012	.012
2.0	1.24	0.84	0.36	0.30	0.30

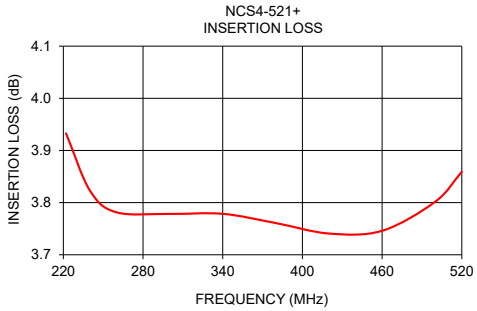
G	H	J	K		wt
.026	.014	.039	.110		grams
0.66	0.36	1.00	2.80		.008

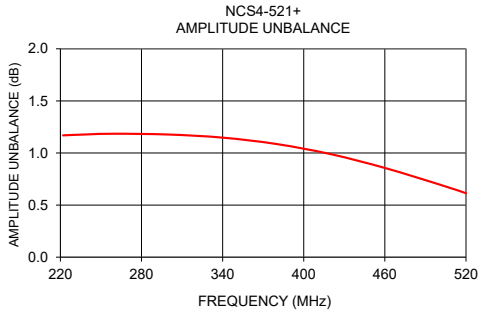
TAPE & REEL INFORMATION: F74

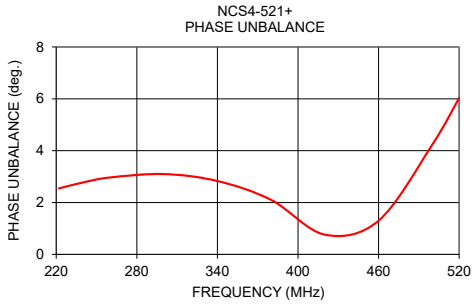
TYPICAL PERFORMANCE DATA[3]

Frequency (MHz)	Insertion Loss (dB)	Input Return Loss (dB)	Amplitude Unbalance (dB)	Phase Unbalance (deg)
222	3.93	14.04	1.17	2.54
240	3.82	16.11	1.18	2.78
260	3.78	16.43	1.18	2.97
300	3.78	15.25	1.18	3.10
340	3.78	15.17	1.15	2.83
380	3.76	16.57	1.09	2.10
420	3.74	20.00	0.99	0.76
460	3.75	28.91	0.86	1.30
500	3.80	25.68	0.70	4.23
520	3.86	20.52	0.61	6.04

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

LTCC Balun

RF Transformer NCS4-521+

Typical Performance Data

FREQUENCY (MHz)	AVERAGE INSERTION LOSS (dB)	INPUT RETURN LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE[1] (deg.)
150	3.99	3.19	1.11	0.96
160	3.13	4.22	1.12	1.24
170	2.45	5.45	1.13	1.48
180	1.93	6.88	1.14	1.72
190	1.55	8.48	1.15	1.93
200	1.27	10.21	1.16	2.15
210	1.08	11.99	1.16	2.34
220	0.96	13.72	1.17	2.51
222	0.93	14.04	1.17	2.54
230	0.87	15.16	1.17	2.65
240	0.82	16.11	1.18	2.78
250	0.80	16.48	1.18	2.88
260	0.78	16.43	1.18	2.97
270	0.77	16.15	1.19	3.04
280	0.77	15.81	1.18	3.07
290	0.78	15.49	1.18	3.10
300	0.78	15.25	1.18	3.10
310	0.78	15.09	1.17	3.07
320	0.78	15.03	1.17	3.03
330	0.78	15.05	1.16	2.95
340	0.78	15.17	1.15	2.83
350	0.78	15.37	1.14	2.69
360	0.77	15.67	1.12	2.52
370	0.77	16.06	1.11	2.34
380	0.76	16.57	1.09	2.10
390	0.76	17.18	1.07	1.83
400	0.75	17.94	1.04	1.52
410	0.74	18.85	1.02	1.17
420	0.74	20.00	0.99	0.76
430	0.74	21.40	0.96	0.32
440	0.74	23.20	0.93	0.16
450	0.74	25.59	0.89	0.71
460	0.75	28.91	0.86	1.30
470	0.76	33.44	0.82	1.97
480	0.77	34.43	0.78	2.66
490	0.78	29.64	0.74	3.41
500	0.80	25.68	0.70	4.23
510	0.83	22.76	0.65	5.12
520	0.86	20.52	0.61	6.04
530	0.89	18.69	0.57	7.02
540	0.94	17.16	0.53	8.08
550	0.98	15.84	0.48	9.20
560	1.03	14.69	0.44	10.39
570	1.09	13.68	0.40	11.64
580	1.15	12.77	0.36	12.95
590	1.21	11.95	0.33	14.34
600	1.28	11.21	0.29	15.78
610	1.36	10.54	0.26	17.30
620	1.44	9.93	0.23	18.89
630	1.52	9.37	0.20	20.53
640	1.61	8.86	0.18	22.26
650	1.70	8.39	0.16	24.03

[1] Relative to 180°

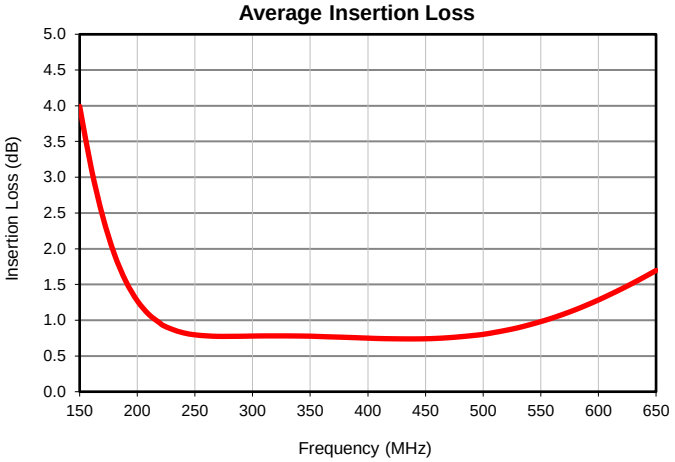
LTCC Balun

RF Transformer

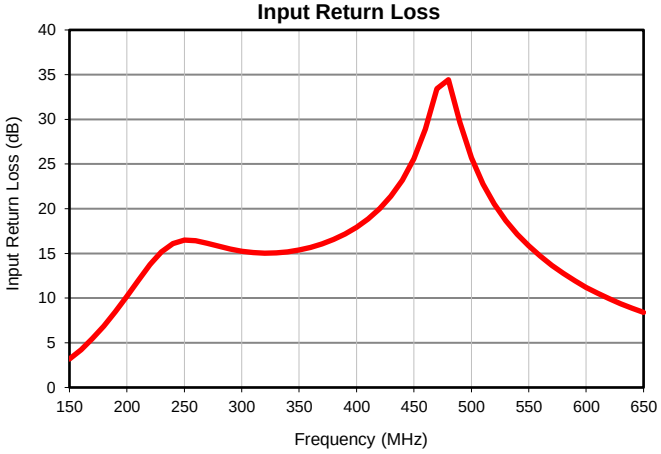
NCS4-521+

Typical Performance Data

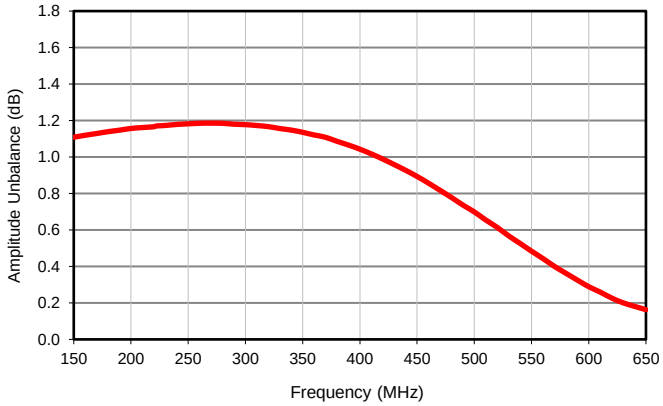
Average Insertion Loss



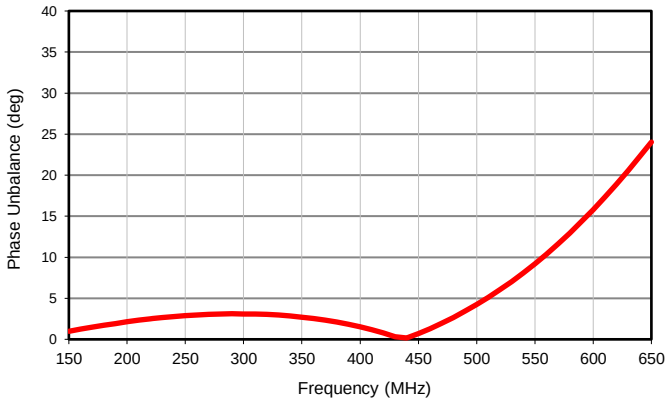
Input Return Loss



Amplitude Unbalance

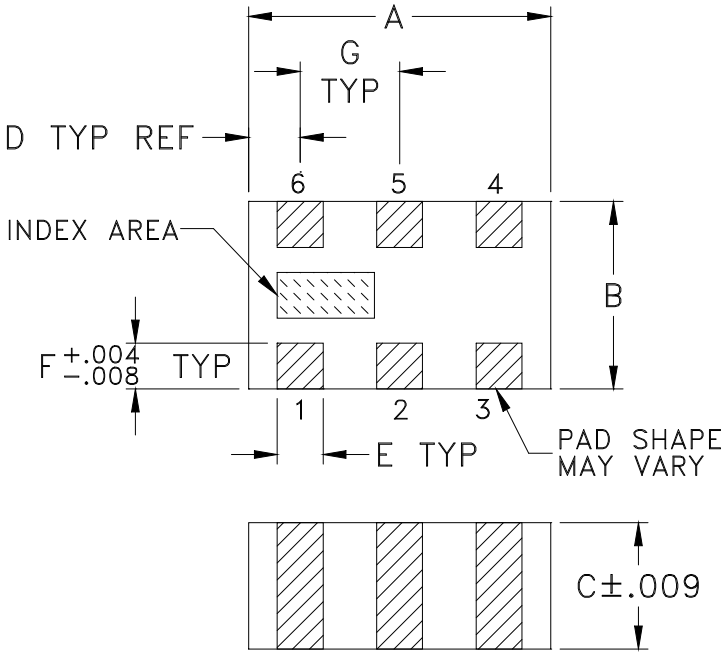


Phase Unbalance

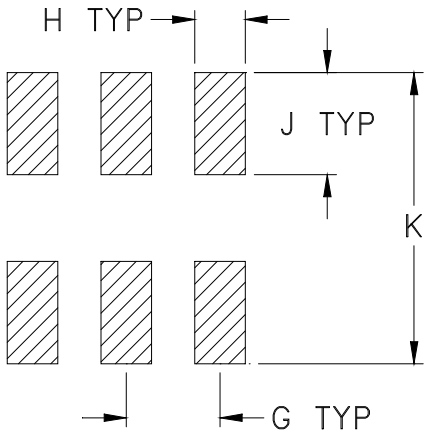


GE0805C-9

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-9	.079 (2.00)	.049 (1.25)	.037 (0.95)	.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: Tin plate over Nickel plate. All models, (+) suffix.
   For RoHS-5 Case Styles: Tin-Lead plate over Nickel plate. All models, no (+) suffix.

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Tape & Reel Packaging TR-F114

DEVICE ORIENTATION IN T&R

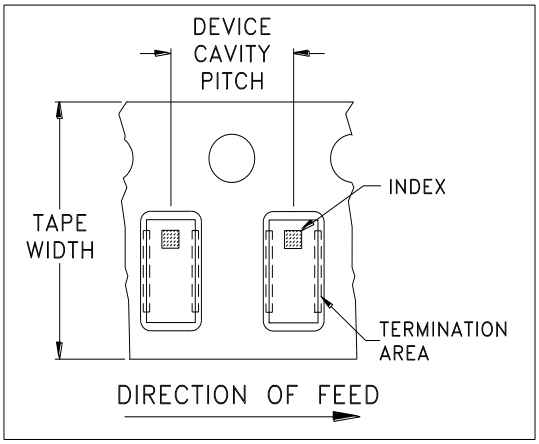


ILLUSTRATION 1

Applicable Case Styles	
GE0805C	JC0603C
GE0805C-1	JC0603C-4
GE0805C-1AP	JC0603C-6
GE0805C-7	
GE0805C-9	
GE0805C-10	
GE0805C-11	
GE0805C-12	

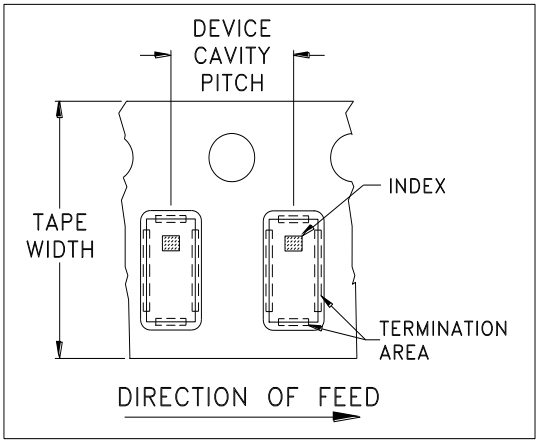


ILLUSTRATION 2

Applicable Case Styles	
GE0805C-2	JC0603C-1
GE0805C-3	JC0603C-2
GE0805C-4	JC0603C-3
GE0805C-5	JC0603C-5
GE0805C-6	JC0603C-7
GE0805C-8	
GE0805C-15	

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

Note: Please Consult individual model data sheet to determine device per reel availability.

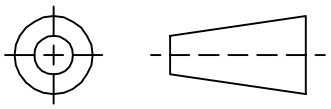
Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

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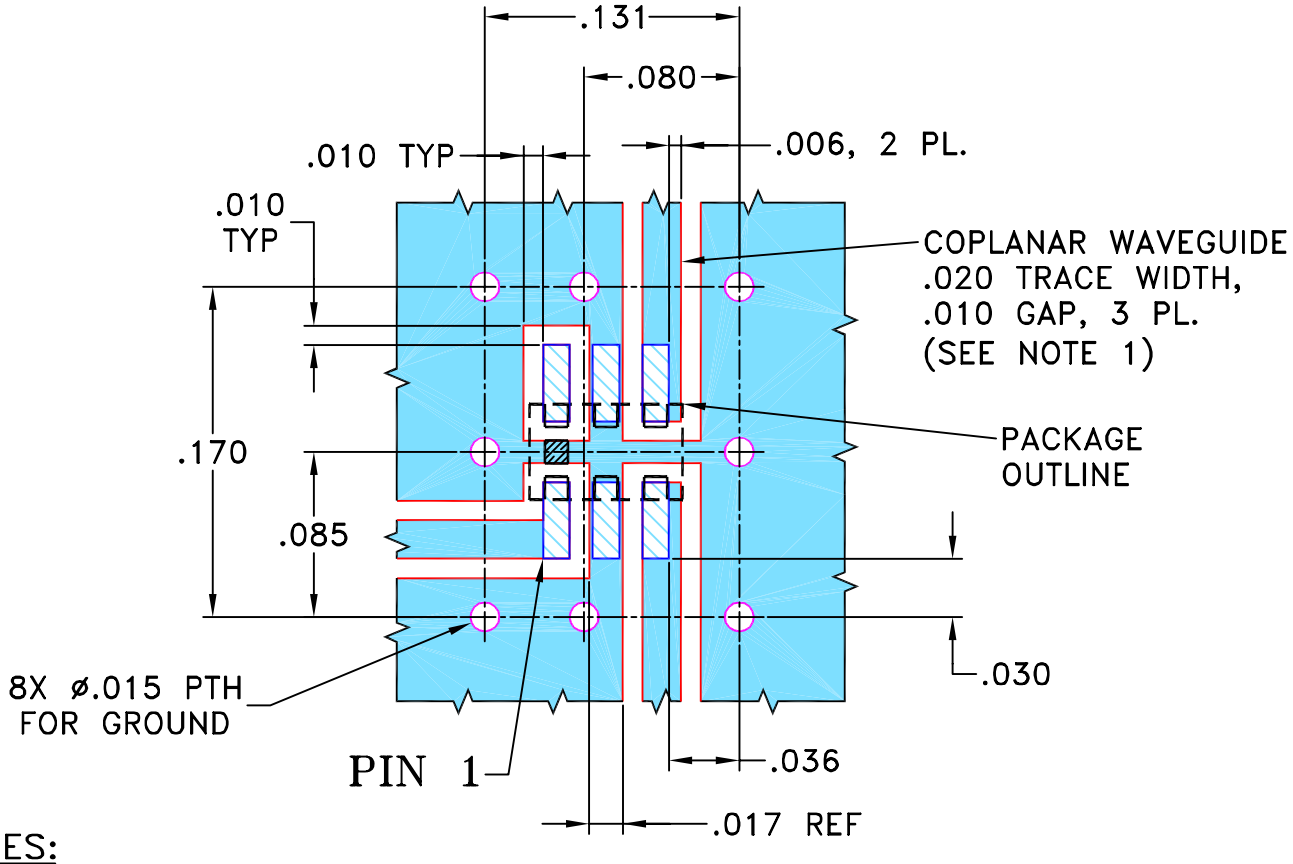
THIRD ANGLE PROJECTION



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 ±			

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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

Mini-Circuits

Environmental Specifications ENV06T2

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

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