

50Ω 2400 to 2500 MHz 1:4 Ratio

## The Big Deal

- Band optimized for Bluetooth, Zigbee and low band Wi-Fi
- Tiny size, 0805
- Low insertion loss, 0.5 dB
- Low unbalance, 0.4 dB, 4°
- Low cost



CASE STYLE: GE0805C-9

## Product Overview

Mini-Circuits BLGE4-252R+ is a miniature ceramic RF balun transformer with an impedance ratio (secondary/primary) of 1:4. This model covers the 2400 to 2500 MHz frequency band and has been performance optimized for use in Bluetooth, Zigbee and low band Wi-Fi applications. This model provides low insertion loss, low amplitude unbalance, and RF input power handling up to 2W. Fabricated using LTCC technology, it comes housed in a tiny package (0.08 x 0.05 x 0.04") and is suitable for high-volume production.

## Key Features

Feature	Advantages
Low insertion loss, 0.5 dB	Enables excellent signal power transmission from input to output.
Low unbalance, 0.5 dB, 2°	Low unbalance can improve a system's electromagnetic compatibility by rejecting unwanted common-mode noise.
2W power handling	Supports a wide range of power requirements
DC Isolation	Provides DC isolation between circuits and efficient AC transmission, eliminating the need for external DC biasing components.
Tiny size, 0805	Accommodates tight space requirements for dense PCB layouts.

### 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)

# Ceramic Balun RF Transformer

50Ω 2400 to 2500 MHz 1:4 Ratio

## BLGE4-252R+



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

**Available Tape and Reel at no extra cost**

Reel Size	Devices/Reel
7"	20, 50, 100, 200, 500, 1000, 4000

### Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature*	-55°C to 100°C
Input RF Power	2W

\*Refer to product storage temperature after installation. Suggestion for T&R unused product storage condition: +5--+35°C, Humidity 45-75%RH, 12 Month max. Permanent damage may occur if any of these limits are exceeded.

### Pad Connections

PRIMARY DOT (Unbalanced Port)	1
PRIMARY (GND) or DC Feed	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

- low phase unbalance, 4 deg. and amplitude unbalance, 0.4 dB typ.
- miniature size 0805 (2.0x1.2 mm)
- LTCC construction
- low cost
- aqueous washable

### Applications

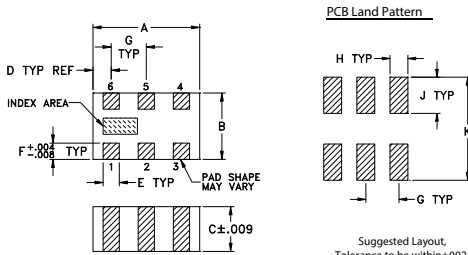
- ISM Band
- WLAN/Wi-Fi
- Bluetooth
- Zigbee

### Electrical Specifications at 25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Impedance Ratio			4		
Frequency Range		2400	—	2500	MHz
Insertion Loss*	2400 - 2500	—	0.5	1.2	dB
Amplitude Unbalance	2400 - 2500	—	0.4	1.6	dB
Phase Unbalance†	2400 - 2500	—	4	10	Degree
Unbalance Return Loss	2400 - 2500	11	25	—	dB

\* Tested on Evaluation Board TB-BLGE4-252R+

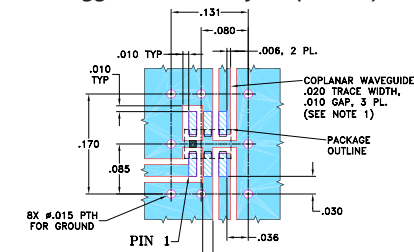
### Outline Drawing



### Outline Dimensions (inch/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	

### Evaluation Board MCL P/N: TB-BLGE4-252R+ Suggested PCB Layout (PL-264)

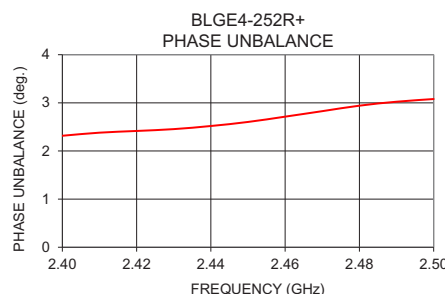
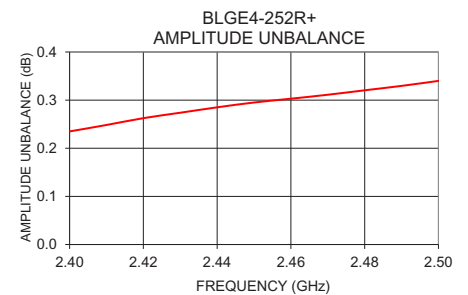
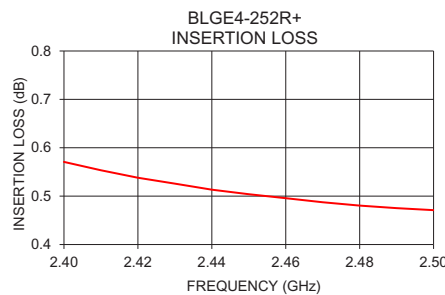


- NOTES:**
1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .010" ± .001". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
  2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).
- DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

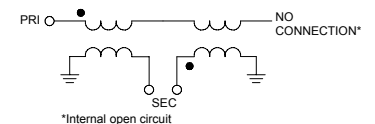
### Typical Performance Data at 25°C\*\*

FREQUENCY (GHz)	INSERTION LOSS (dB)	INPUT R. LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE (Deg.)
2.40	0.57	17.95	0.23	2.32
2.41	0.55	18.85	0.25	2.38
2.42	0.54	19.85	0.26	2.42
2.43	0.53	20.98	0.27	2.45
2.44	0.51	22.23	0.29	2.52
2.45	0.50	23.68	0.30	2.60
2.46	0.50	25.38	0.30	2.71
2.47	0.49	27.45	0.31	2.83
2.48	0.48	30.13	0.32	2.94
2.49	0.48	33.83	0.33	3.02
2.50	0.47	39.18	0.34	3.08

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



### Configuration J



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REV. OR  
M172548  
BLGE4-252R+  
AV/CP/AM  
200918

*Typical Performance Data*

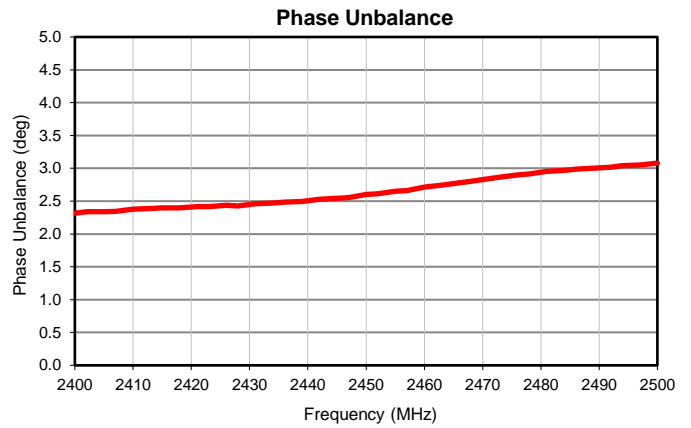
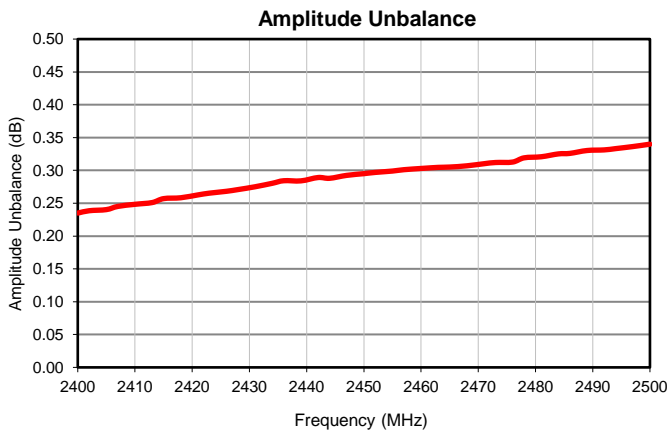
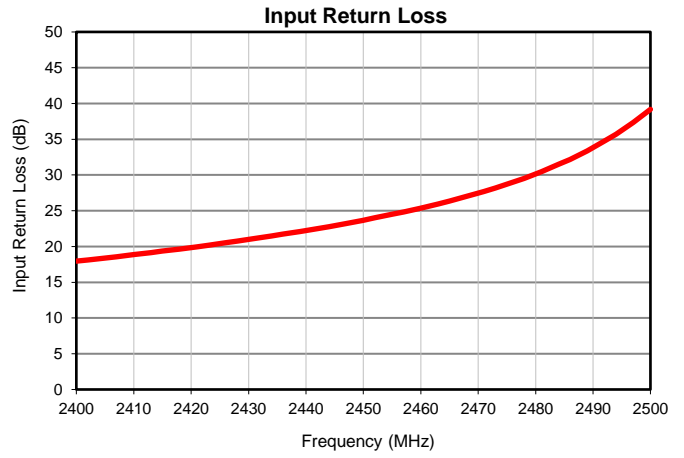
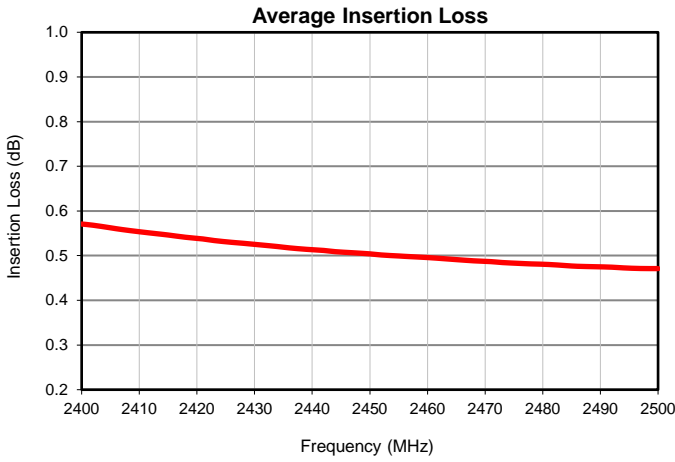
FREQUENCY (MHz)	AVERAGE INSERTION LOSS (dB)	INPUT RETURN LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE <sup>(1)</sup> (deg.)
2400	0.57	17.95	0.23	2.32
2402	0.57	18.12	0.24	2.34
2405	0.56	18.39	0.24	2.34
2407	0.56	18.57	0.25	2.35
2410	0.55	18.85	0.25	2.38
2413	0.55	19.14	0.25	2.39
2415	0.55	19.34	0.26	2.40
2418	0.54	19.64	0.26	2.40
2421	0.54	19.96	0.26	2.42
2423	0.53	20.17	0.27	2.42
2426	0.53	20.52	0.27	2.44
2428	0.53	20.74	0.27	2.43
2431	0.52	21.09	0.28	2.46
2434	0.52	21.46	0.28	2.47
2436	0.52	21.71	0.28	2.48
2439	0.51	22.10	0.28	2.50
2442	0.51	22.51	0.29	2.53
2444	0.51	22.78	0.29	2.54
2447	0.51	23.23	0.29	2.56
2450	0.50	23.68	0.30	2.60
2452	0.50	24.00	0.30	2.61
2455	0.50	24.49	0.30	2.65
2457	0.50	24.83	0.30	2.66
2460	0.50	25.38	0.30	2.71
2463	0.49	25.94	0.30	2.75
2465	0.49	26.35	0.31	2.77
2468	0.49	27.00	0.31	2.80
2471	0.49	27.69	0.31	2.84
2473	0.48	28.18	0.31	2.87
2476	0.48	28.96	0.31	2.90
2478	0.48	29.52	0.32	2.91
2481	0.48	30.44	0.32	2.95
2484	0.48	31.48	0.33	2.97
2486	0.48	32.18	0.33	2.99
2489	0.48	33.39	0.33	3.00
2492	0.47	34.74	0.33	3.02
2494	0.47	35.72	0.33	3.04
2497	0.47	37.35	0.34	3.05
2500	0.47	39.18	0.34	3.08

<sup>(1)</sup> Relative to 180°

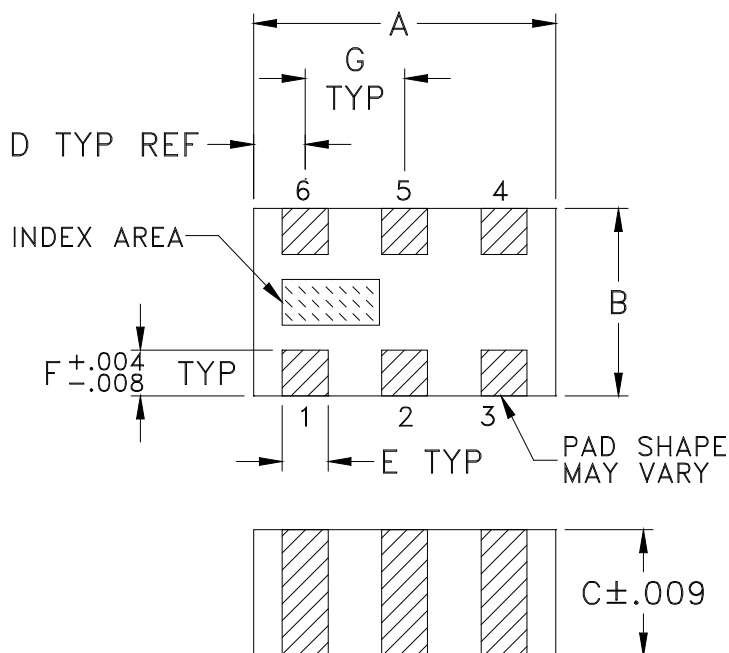
# LTCC Balun RF Transformer

## BLGE4-252R+

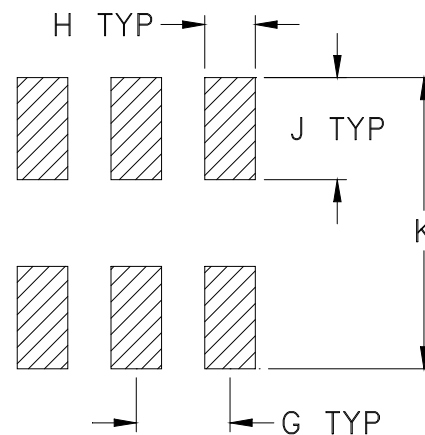
### Typical Performance Data



### Outline Dimensions



### PCB Land Pattern



Suggested Layout,  
Tolerance to be within  $\pm 0.002$

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.  $\pm .01$ ; 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 Styles: Tin-Lead plate over Nickel plate. All models, no (+) suffix.



P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



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RF/IF MICROWAVE COMPONENTS

# Tape & Reel Packaging TR-F114

## DEVICE ORIENTATION IN T&R

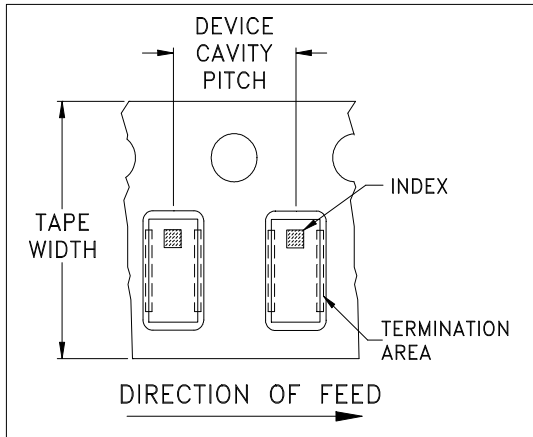


ILLUSTRATION 1

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

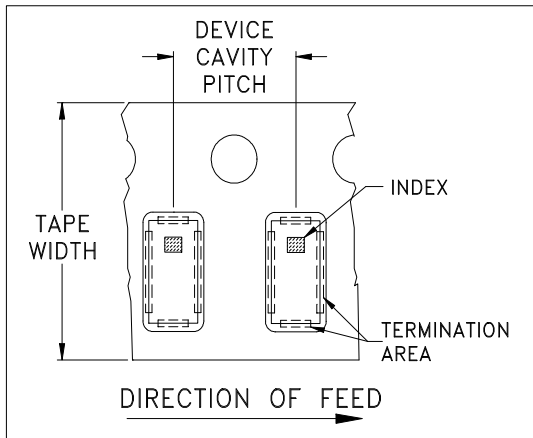


ILLUSTRATION 2

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	JV1210C-1
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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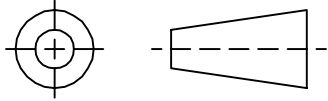
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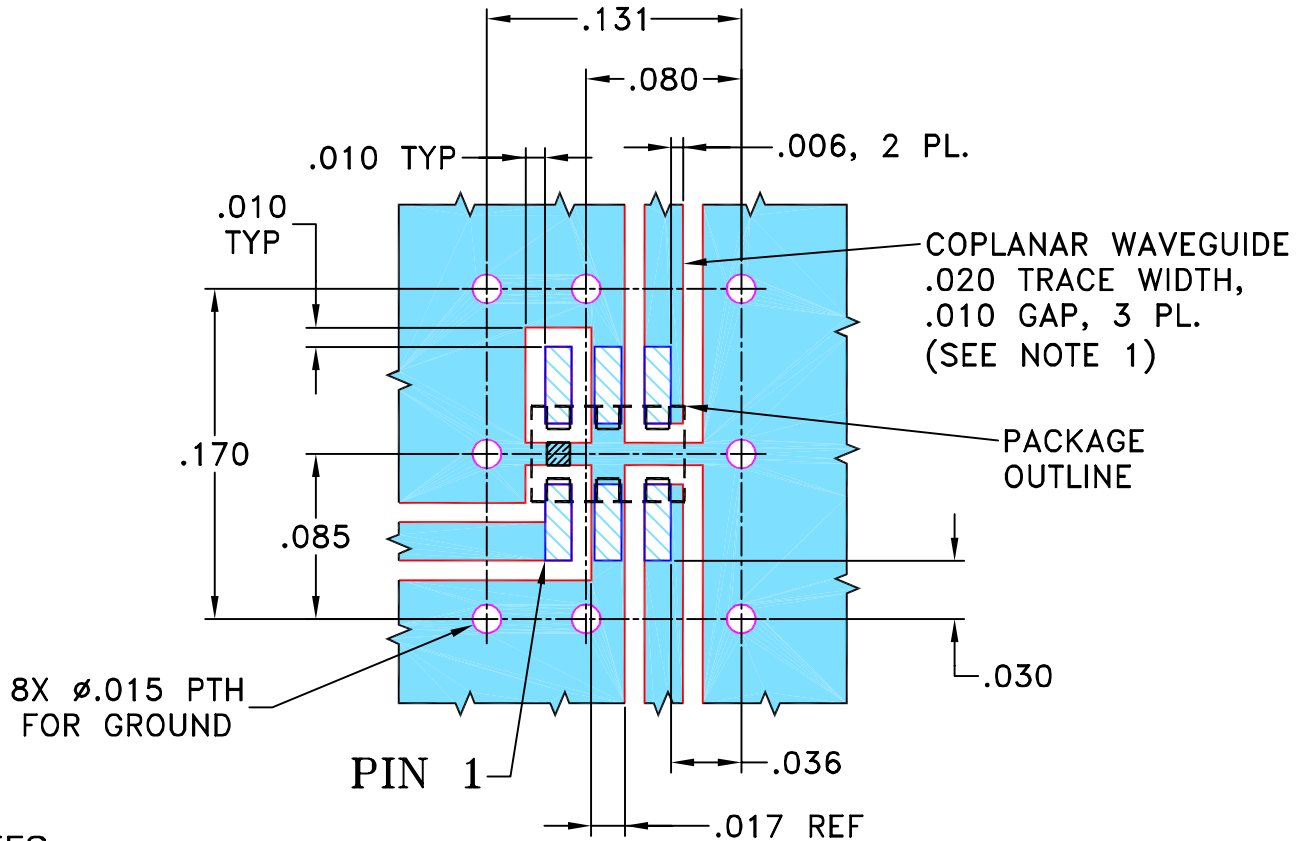
THIRD ANGLE PROJECTION



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.

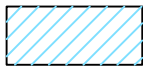


NOTES:

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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



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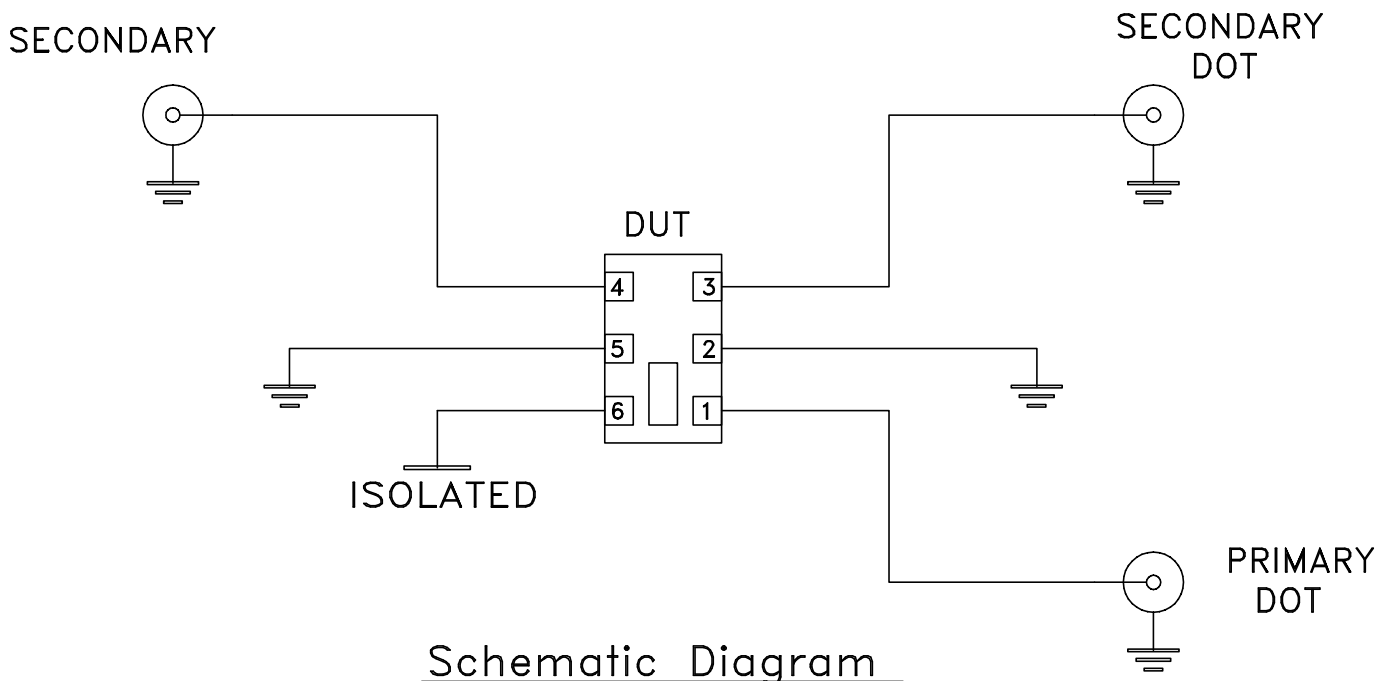
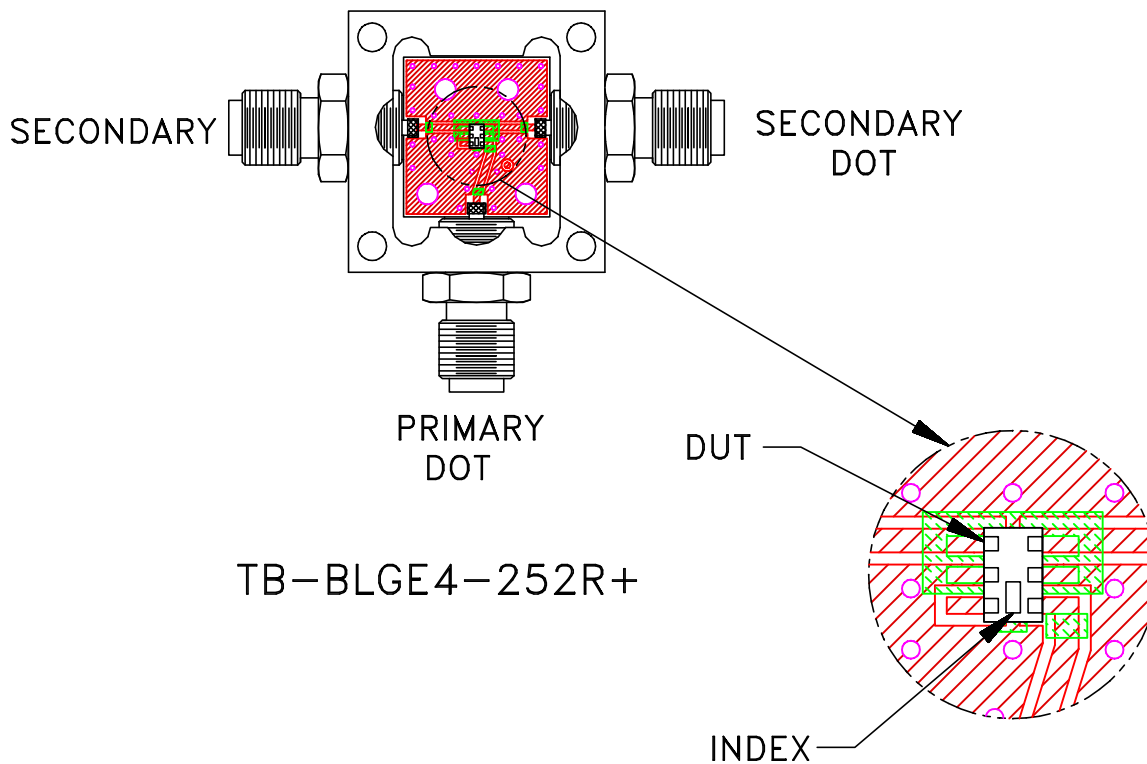
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PL, ry, GE0805C-1, NCS, TB-419+

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

# Evaluation Board and Circuit



## Notes:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent,  
Dielectric Constant=3.5, Thickness=.010 inch.

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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