



CERAMIC

# Bandpass Filter & Balun **BBFCG2-382+**

50Ω 3490 to 4190 MHz

## THE BIG DEAL

- Tiny size, (0805)
- Compact design includes Balun & Filter in one package
- Low cost
- Temperature stable
- Hermetically sealed



Generic photo used for illustration purposes only

CASE STYLE: GE0805C-15

### +RoHS Compliant

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

## APPLICATIONS

- Telecommunications
- 5G sub 6GHz

## PRODUCT OVERVIEW

Mini-Circuits' BBFCG2-382+ is a tiny ceramic RF balun filter with an impedance ratio of 1:2, covering a variety of wireless communications applications from 3490 to 4190 MHz. This model provides low insertion loss, low phase unbalance (relative to 180°), low amplitude unbalance. Fabricated using LTCC technology, the unit comes housed in a tiny, rugged ceramic package (0.079" x 0.049" x 0.037") suitable for harsh operating environments.

## KEY FEATURES

Feature	Advantages
Compact Design	Integrates filter and balun in one tiny package
Tiny size, 0805	Accommodates tight space requirements for dense PCB layouts.
LTCC construction	LTCC process enables tiny size and low cost, suitable for high-volume production. Rugged ceramic package provides excellent reliability in harsh operating environments.



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# Bandpass Filter & Balun **BBFCG2-382+**

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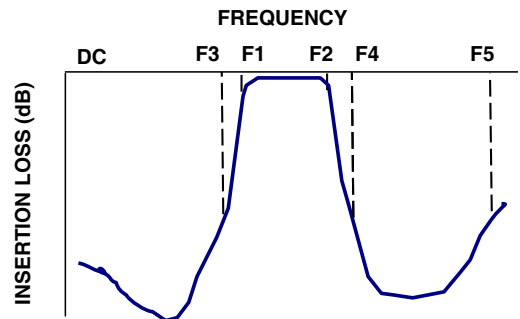
### ELECTRICAL SPECIFICATIONS AT 25°C

Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Units
Impedance Ratio	—	—	2			
Insertion Loss	F1-F2	3490 - 4190	—	—	3.4	dB
Return Loss	Unbalanced Port	F1-F2	8.5	—	—	dB
	Balanced Port	F1-F2	8.5	—	—	
Stopband Rejection	DC-F3	DC - 2408	27	—	—	dB
	F4-F5	7606 - 8306	33	—	—	
Amplitude Unbalance ±	F1-F2	3490 - 4190	-1.5	—	1.5	dB
Phase Unbalance	F1-F2	3490 - 4190	-13	—	13	Degree

### MAXIMUM RATINGS

Parameter	Ratings
Operating Temperature	-55°C to 125°C
Storage Temperature	-55°C to 125°C
RF Power Input	0.5W at 25°C

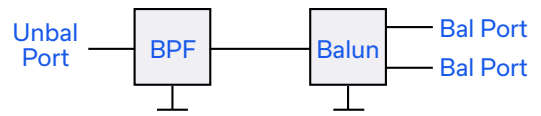
### TYPICAL FREQUENCY RESPONSE



### DC INTERFACE TABLE

Unbalance Port - GND	DC short
Unbalance Port - Balance Ports	DC open
Balance port - GND	DC open
Balance port-Balance Port	DC short

### FUNCTIONAL SCHEMATIC





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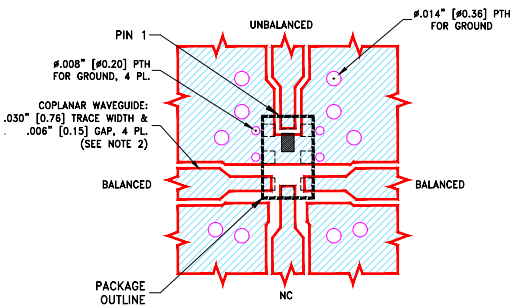
# Bandpass Filter & Balun **BBFCG2-382+**

## PAD CONNECTIONS

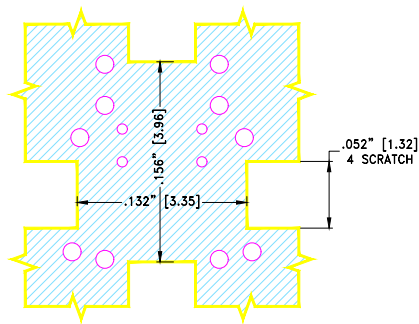
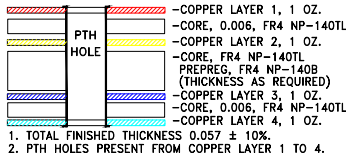
UNBALANCED PORT	1
BALANCED PORT	4,6
GROUND	2,3,7,8
NOT CONNECT OR GND	5

PRODUCT MARKING: N/A

DEMO BOARD MCL P/N: TB-BBFCG2-382+  
SUGGESTED PCB LAYOUT (PL-724)



### STACK-UP DIAGRAM

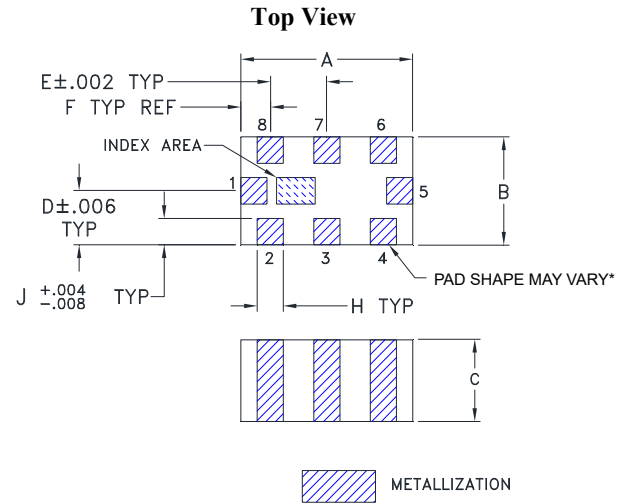


### NOTES:

- PCB IS MULTILAYER PCB, SEE STACK-UP DIAGRAM.
- TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR FR4 NP-140TL WITH DIELECTRIC THICKNESS .006"±.0005"; COPPER: 1 OZ. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
- COPPER LAYERS 3,4 OF THE PCB IS CONTINUOUS GROUND PLANES.

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

## OUTLINE DRAWING



\*During the manufacturing process, the pad shape may not be rectangular and may take on a more semi-circle shape. However, the pad dimensions reflect this, with the pad shape being within the specified lengths. The metallization compensates accordingly and so performance will not be affected. In addition, solderability will not be influenced by the pad shape.

## OUTLINE DIMENSIONS (Inches/mm)

A	B	C	D	E	F	G	H	J	wt
.079	.049	.037	.025	.026	.014	.110	.012	.010	grams
2.00	1.25	0.95	0.63	0.65	0.35	2.80	0.30	0.25	.008



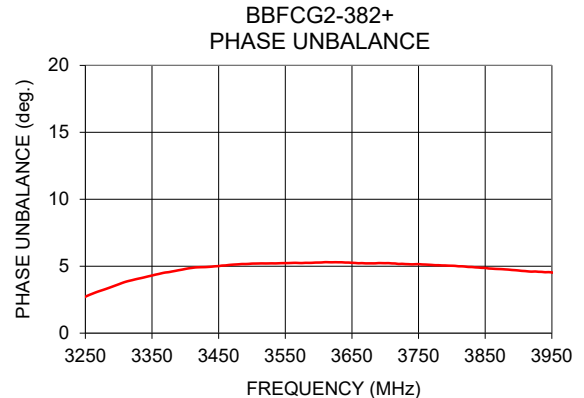
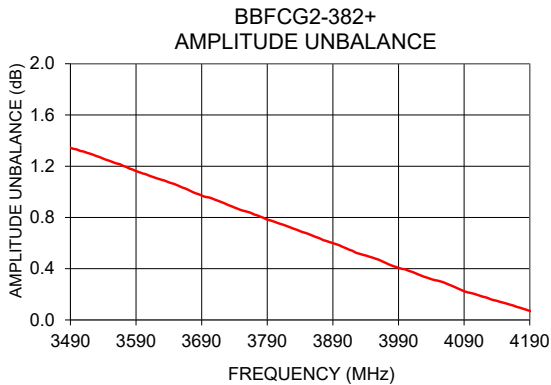
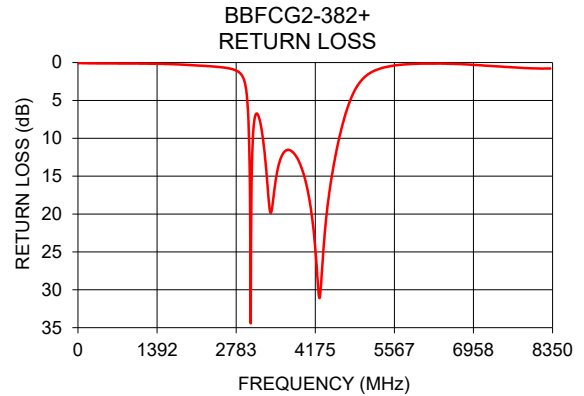
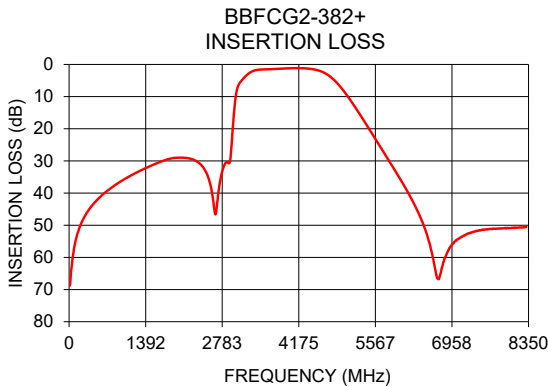
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# Bandpass Filter & Balun **BBFCG2-382+**

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### TYPICAL PERFORMANCE DATA

Frequency (MHz)	Insertion Loss (dB)	Return Loss (dB)	Amplitude Unbalance (dB)	Phase Unbalance (Deg.)
10	68.81	0.10	1.98	18.16
100	56.27	0.09	0.40	0.54
1000	35.73	0.13	2.44	2.88
2408	31.41	0.54	8.47	99.86
2500	33.88	0.60	9.25	108.59
2600	40.15	0.69	8.89	149.01
3490	1.58	15.03	1.34	5.16
4190	1.16	25.89	0.07	3.67
5000	8.45	2.24	0.30	2.62
7606	51.27	0.61	4.85	178.94
8306	50.60	0.79	2.34	177.42
8310	50.52	0.79	2.31	177.39



- 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.
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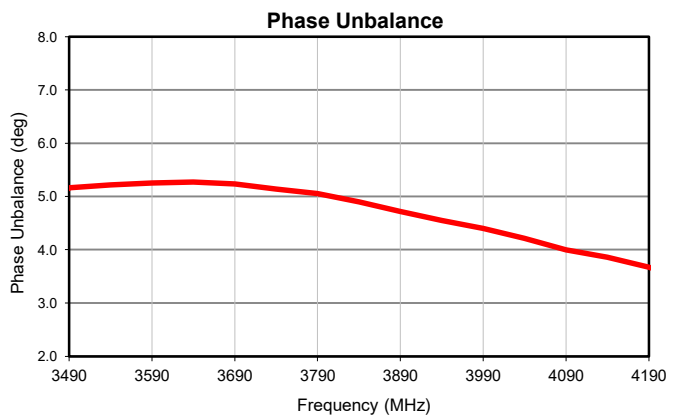
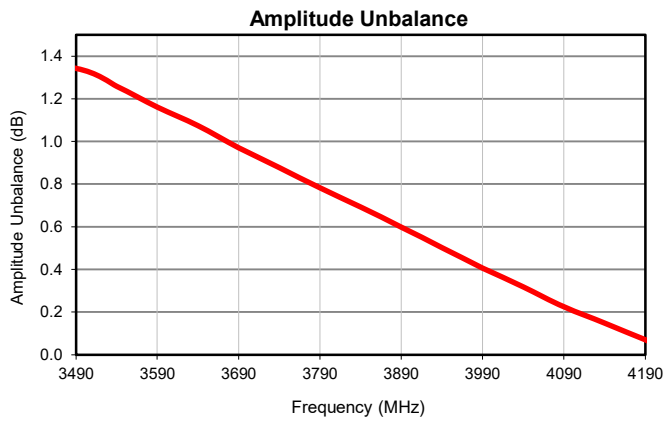
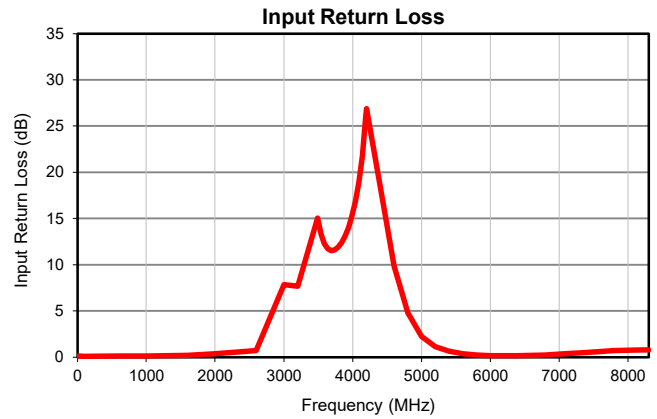


**Ceramic Bandpass Filter & Balun BBFCG2-382+**

*Typical Performance Data*

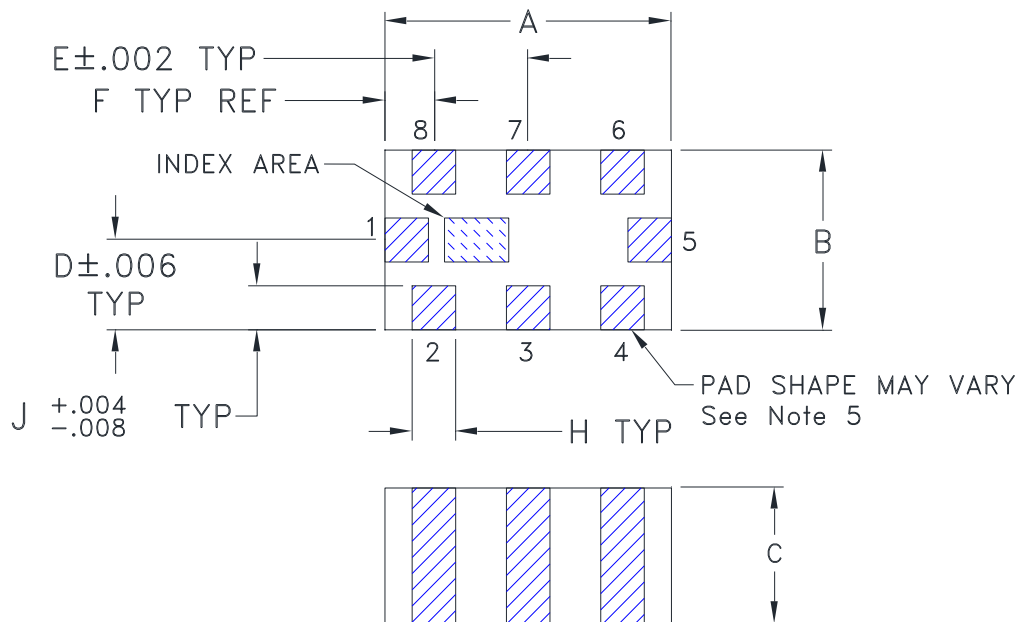
FREQUENCY (MHz)	INSERTION LOSS (dB)	RETURN LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE (deg.)
10	68.81	0.10	1.98	18.16
100	56.27	0.09	0.40	0.54
600	40.63	0.12	0.38	0.50
1000	35.73	0.13	2.44	2.88
1600	30.69	0.20	10.72	65.01
2000	28.99	0.34	1.53	115.07
2600	40.15	0.69	8.89	149.01
3000	14.47	7.86	0.79	24.34
3200	3.79	7.66	1.52	1.27
3490	1.58	15.03	1.34	5.16
3540	1.54	13.29	1.26	5.22
3590	1.51	12.26	1.16	5.25
3640	1.49	11.73	1.07	5.27
3690	1.45	11.52	0.97	5.23
3740	1.41	11.61	0.88	5.14
3790	1.37	11.91	0.78	5.06
3840	1.33	12.39	0.69	4.90
3890	1.28	13.09	0.60	4.72
3940	1.24	14.03	0.50	4.55
3990	1.21	15.25	0.41	4.40
4040	1.18	16.82	0.32	4.22
4090	1.16	18.94	0.22	4.00
4140	1.15	21.76	0.15	3.86
4190	1.16	25.89	0.07	3.67
4200	1.16	26.89	0.06	3.63
4400	1.41	18.42	0.20	2.92
4600	2.30	9.85	0.37	2.38
4800	4.57	4.80	0.41	2.17
5000	8.45	2.24	0.30	2.62
5200	13.32	1.13	0.07	4.33
5400	18.63	0.62	0.84	7.61
5600	24.09	0.35	2.22	12.95
5800	29.58	0.22	4.50	20.63
6000	35.14	0.15	8.06	33.29
6200	41.10	0.14	13.26	64.64
6400	48.20	0.14	13.27	137.32
6600	59.14	0.17	6.41	177.43
6800	61.52	0.24	1.02	114.77
7000	55.19	0.32	18.19	117.42
7400	51.72	0.51	6.63	178.35
7800	51.00	0.70	3.71	179.99
8200	50.69	0.79	2.49	177.76
8300	50.57	0.79	2.31	177.45

## Typical Performance Data



### Outline Dimensions

#### Top View



CASE#	A	B	C	D	E	F	G	H	J	WT, GRAM
GE0805C-15	.079 (2.00)	.049 (1.25)	.037 (0.95)	.025 (0.63)	.026 (0.65)	.014 (0.35)	.110 (2.80)	.012 (0.30)	.010 (0.25)	.008

Dimensions are in inches (mm). Tolerances: 2 Pl.  $\pm .01(.25)$ ; 3 Pl.  $\pm .005(.100)$

#### Notes:

- Open style, ceramic base
- Termination finish: For RoHS Case Styles: Tin plate over Nickel plate. All model, (+) suffix.  
For RoHS-5 Case Styles: Tin-lead plate over Nickel plate. All model, no (+) suffix.
- Pad tolerance to be non-cumulative. Minimum spacing between each pad is .004(0.1).
- Pin numbers do not appear on unit. For reference only.
- During the manufacturing process, the pad shape may not be rectangular and may take on a more semi-circle shape. However, the pad dimensions reflect this, with the pad shape being within the specified lengths. The metallization compensates accordingly and so performance will not be affected. In addition, solderability will not be influenced by the pad shape



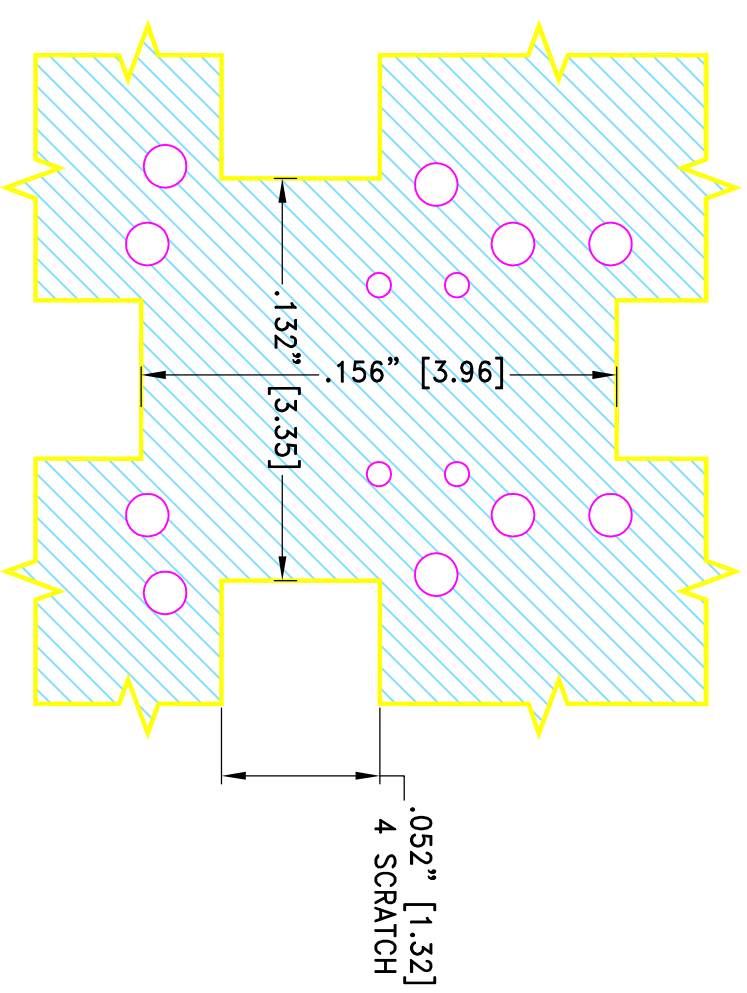
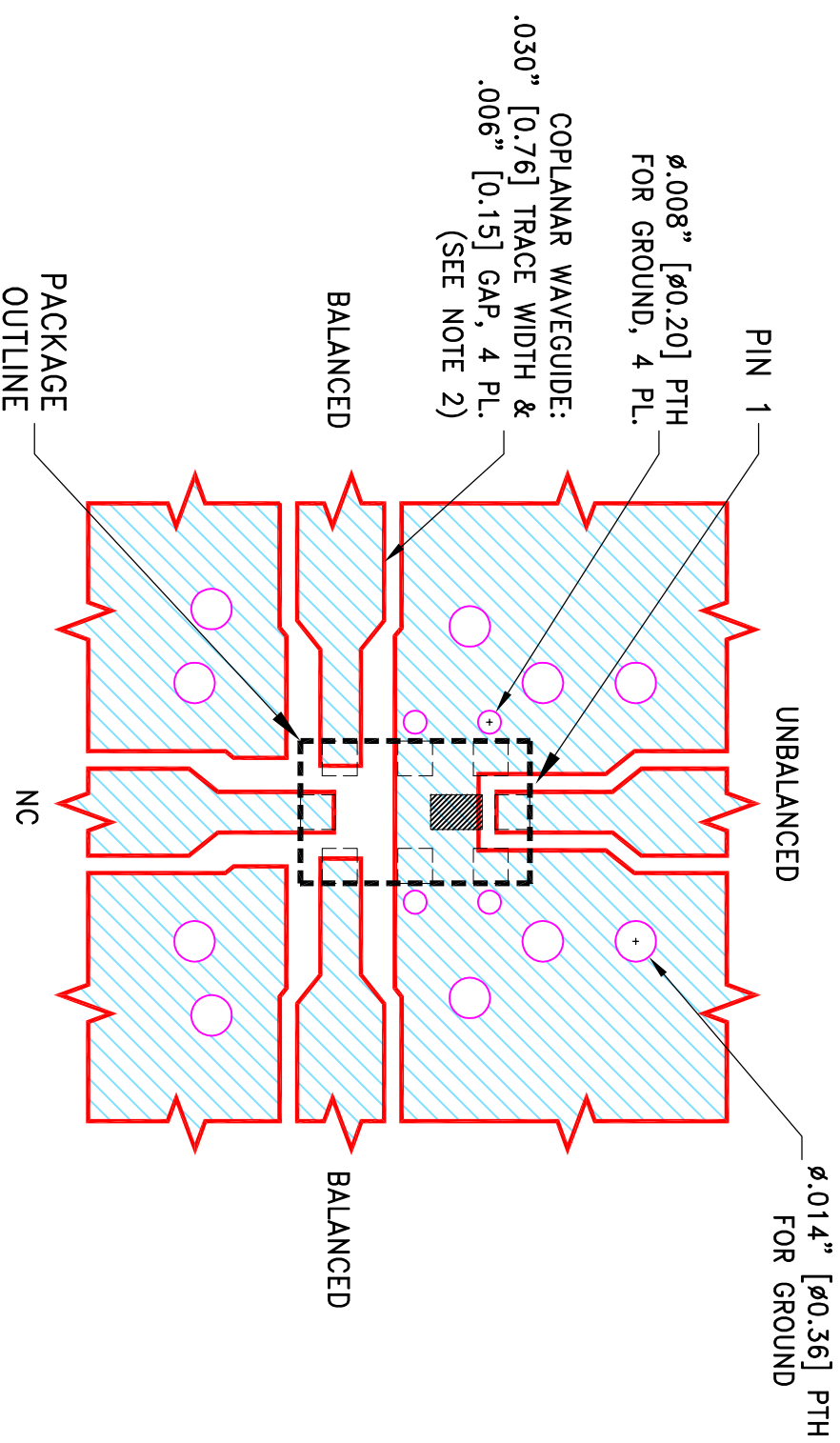
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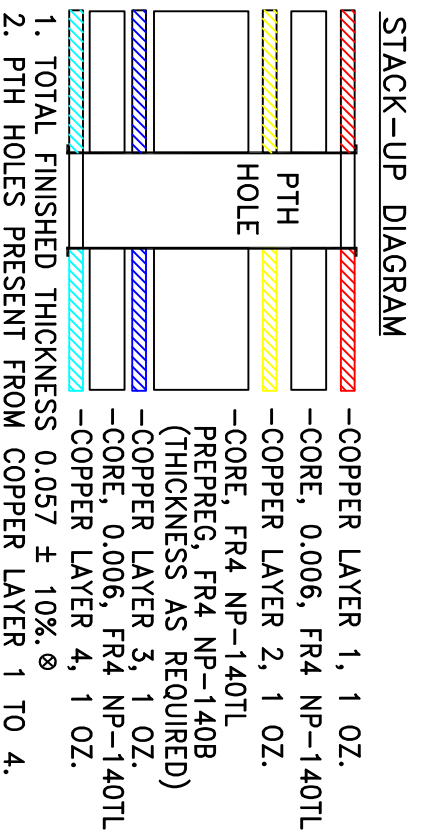
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**SUGGESTED MOUNTING CONFIGURATION  
FOR GE0805C-15 CASE STYLE**

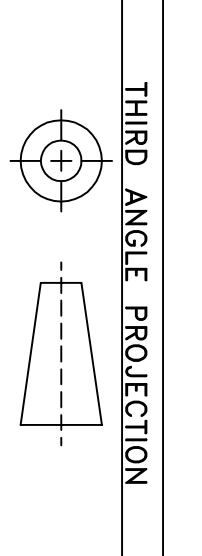


**TOP VIEW TO LAYER 2**



1. TOTAL FINISHED THICKNESS 0.057 ± 10%. ⊗
2. PTH HOLES PRESENT FROM COPPER LAYER 1 TO 4.

- NOTES:**
1. PCB IS MULTILAYER PCB, SEE STACK-UP DIAGRAM.
  2. TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR FR4 NP-140TL WITH DIELECTRIC THICKNESS .006"±.0005"; COPPER: 1 OZ. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
  3. COPPER LAYERS 3,4 OF THE PCB IS CONTINUOUS GROUND PLANES.
- DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.



OR	ECN	NO.	DESCRIPTION	DATE	DR	AUTH
ECO-010908			NEW RELEASE	12/02/21	ITG	IL

UNLESS OTHERWISE SPECIFIED		INITIALS		DATE	
DIMENSIONS ARE IN INCHES					
TOLERANCES ON:					
2 PL DECIMALS ±		ITG		12/02/21	
3 PL DECIMALS ±		GF		12/02/21	
ANGLES ±		IL		12/02/21	
FRACTIONS ±					

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13 Neptune Avenue  
Brooklyn NY 11235

**PL, GE0805C-15, TB-1233+**

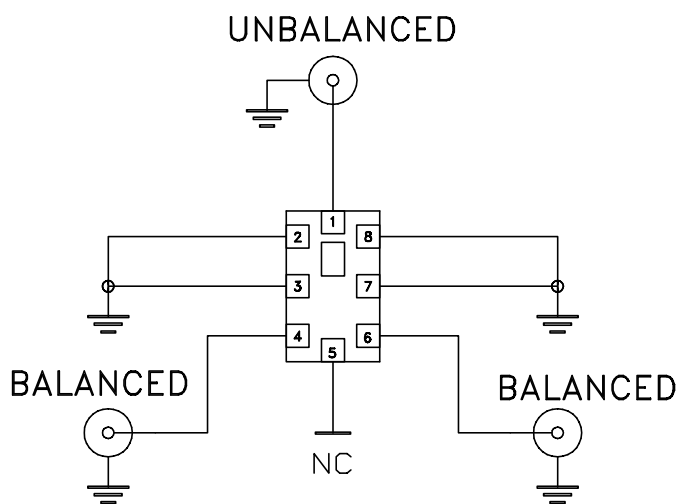
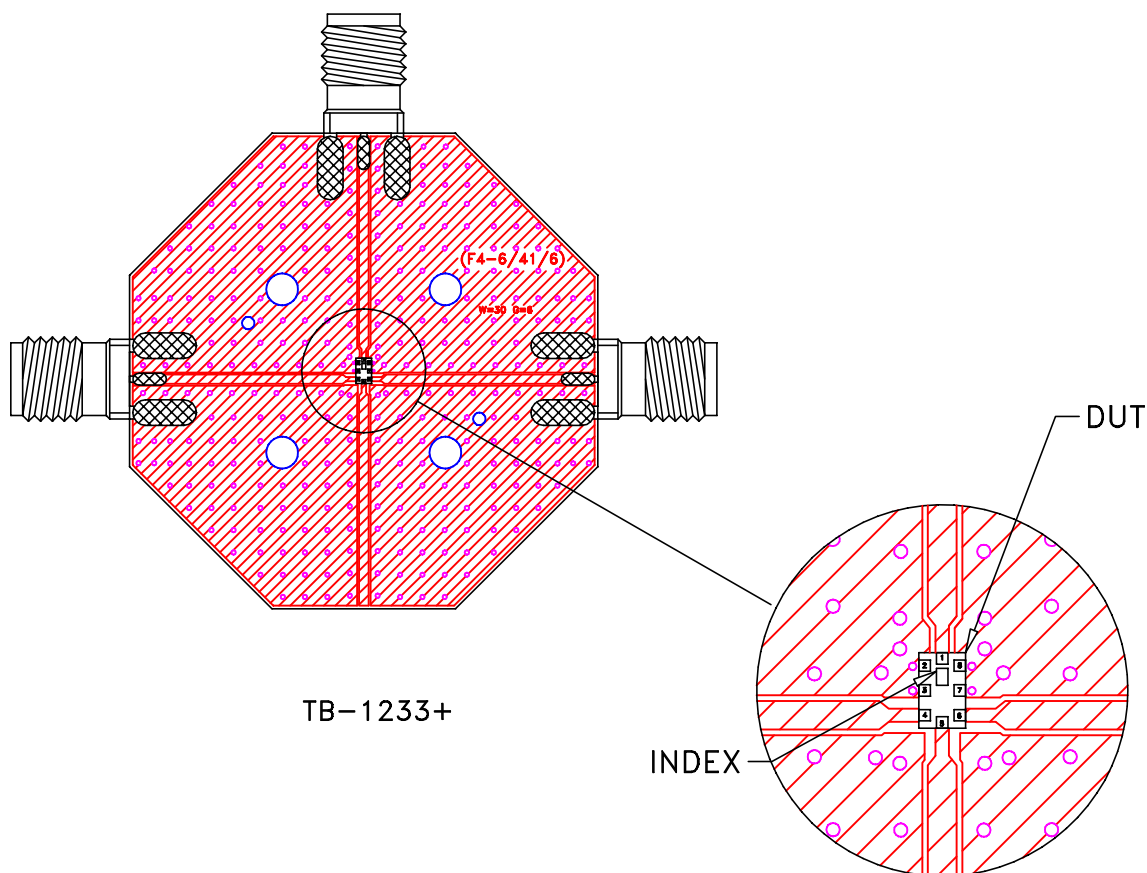
SIZE	CODE IDENT	DRAWING NO:	REV:
B	15542	98-PL-724	OR
FILE:	98PL724	SCALE:	15:1
		SHEET:	1 OF 1

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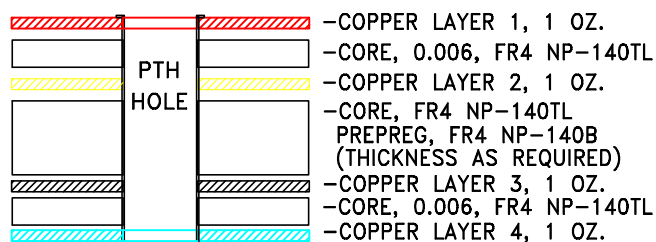
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# Evaluation Board and Circuit



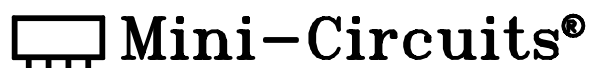
Schematic Diagram



Stack-up Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: FR4 or equivalent, Dielectric Constant=4.5, Total finished Thickness = .057 inch.





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	-55° to 125° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 125° 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
Solder Reflow Heat	Sn-Pb Eutectic Process: 225°C peak Pb-Free Process: 250°C peak	J-STD-020C, 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