LTCC SURFACE MOUNT

Bandpass Filter & Balun

BBFCG2-252+

50Ω 2300 to 2690 MHz 1:2 Ratio

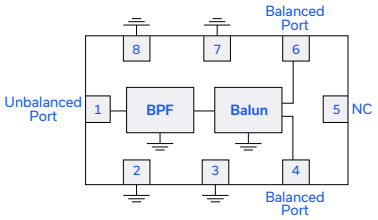
THE BIG DEAL

- Tiny Size, 0805
- Compact Design includes Balun and Filter in One Package
- Low Cost
- Temperature Stable
- Hermetically Sealed



Generic photo used for illustration purposes only

FUNCTIONAL DIAGRAM



APPLICATIONS

- Telecommunications
- 5G Sub-6GHz
- ISM band

PRODUCT OVERVIEW

Mini-Circuits' BBFCG2-252+ is a tiny ceramic RF balun filter with an impedance ratio of 1:2, covering a variety of wireless communications applications from 2300 to 2690 MHz. This model provides low insertion loss, low phase unbalance (relative to 180°), and 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

Features	Advantages
Compact Design	Integrates filter and balun in one tiny package.
Tiny Size, 0805	Accommodates tight space requirements for dense PCB layouts.
LTCC Construction	The use of LTCC technology allows for repeatable performance in a rugged ceramic package, well suited for tough environments such as high humidity and temperature extremes. See Mini-Circuits Environmental Rating ENV06T10 for more information.

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50Ω 2300 to 2690 MHz 1:2 Ratio

ELECTRICAL SPECIFICATIONS[1,2,3] AT +25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Units
Impedance Ratio					1:2		—
Passband	Center Frequency[4]	—	—	—	2495	—	MHz
	Insertion Loss	F2-F3	2300 - 2690	—	2.0	2.7	dB
	Return Loss - Unbalanced Port	F2-F3	2300 - 2690	9.5	14.5	—	dB
	Return Loss - Balanced Port[5]	F2-F3	2300 - 2690	9.5	14.5	—	dB
Stopband, Lower	Rejection	DC-F1	10 - 1500	—	25.0	—	dB
Stopband, Upper	Rejection	F4-F5	3300-5640	25	29.3	—	dB
			5640-6550	20	40.4	—	
			6550-9500	10	33.4	—	
Amplitude Unbalance (±)		F2-F3	2300 - 2690	-1.5	±0.6	+1.5	dB
Phase Unbalance (relative to 180°)		F2-F3	2300 - 2690	-13	±8	+13	Deg.
CMRR		F1-F2	2300 -2690	—	20	—	dB

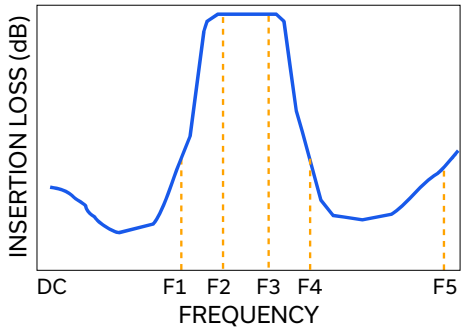
1. Tested on Evaluation Board P/N TB-BBFCG2-252+.
2. This component should not be used as a DC Block. In applications where DC voltage and/or current is present at either the input or output ports, external DC blocking capacitors are required.
3. Measured in mixed mode (Sds21).
4. Typical variation ±3%.
5. Measured in mixed mode (Sdd22).

ABSOLUTE MAXIMUM RATINGS[5]

Parameter	Ratings
Operating Temperature	-55 °C to +125 °C
Storage Temperature	-55 °C to +125 °C
RF Input Power[6]	2 W

6. Permanent damage may occur if any of these limits are exceeded.
7. Power rating applies only to signals within the passband. Power rating above +25°C operating temperature decreases linearly to 0.5 W at +125°C.

TYPICAL FREQUENCY RESPONSE AT 25°C

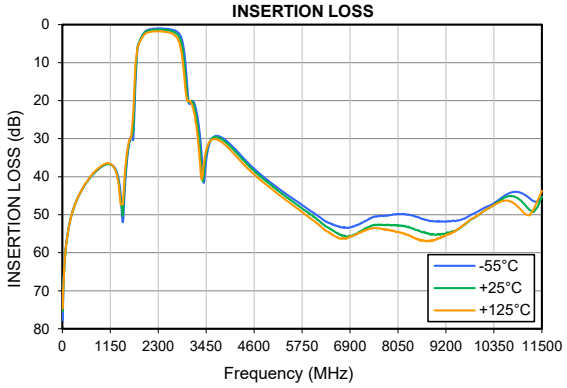


Bandpass Filter & Balun BBFCG2-252+

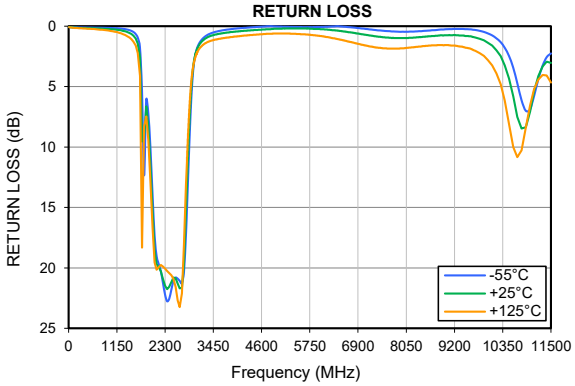
50Ω 2300 to 2690 MHz 1:2 Ratio

TYPICAL PERFORMANCE GRAPHS

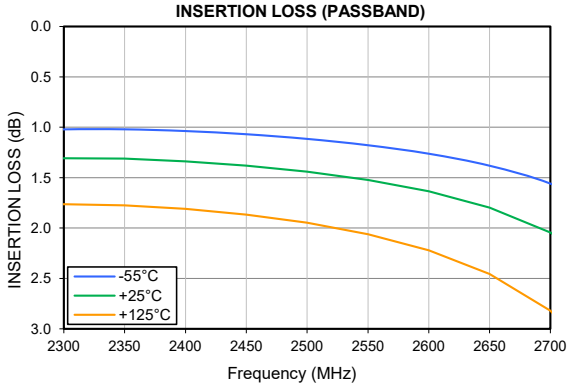
INSERTION LOSS



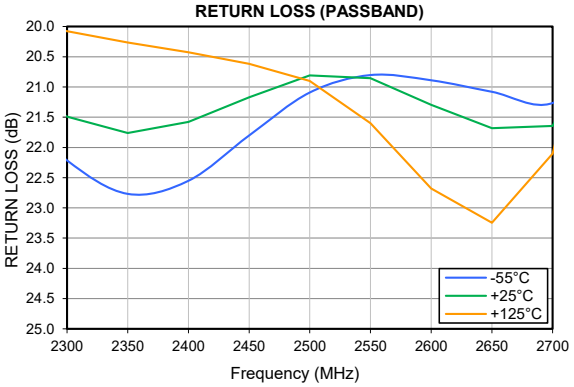
RETURN LOSS



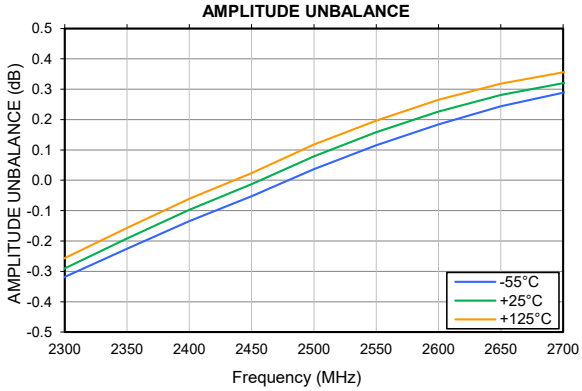
INSERTION LOSS (PASSBAND)



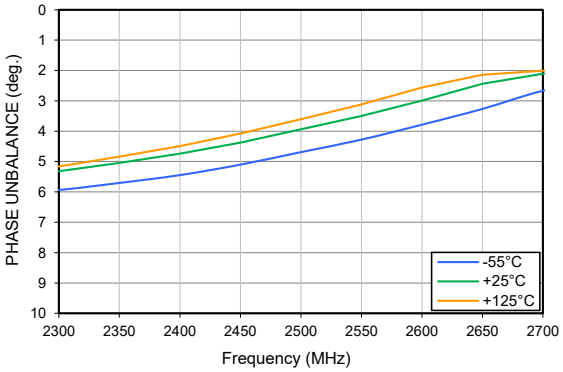
RETURN LOSS (PASSBAND)



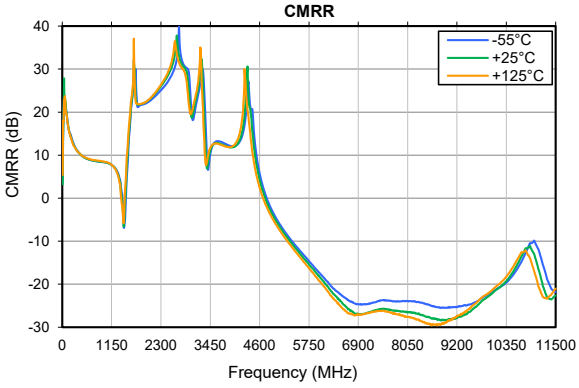
AMPLITUDE UNBALANCE



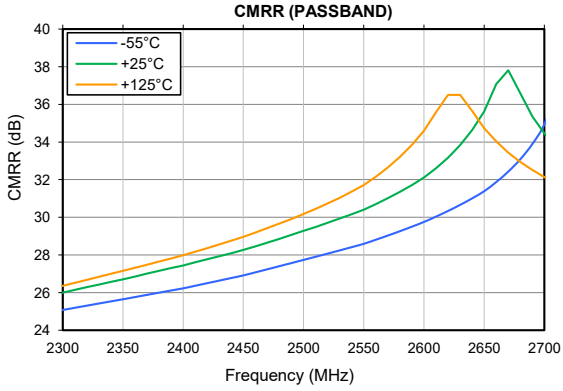
PHASE UNBALANCE



CMRR



CMRR (PASSBAND)



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FUNCTIONAL DIAGRAM

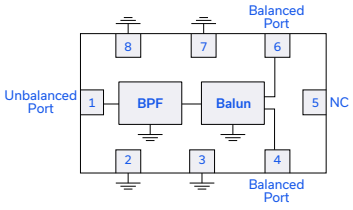


Figure 1. BBFCG2-252+ Functional Diagram

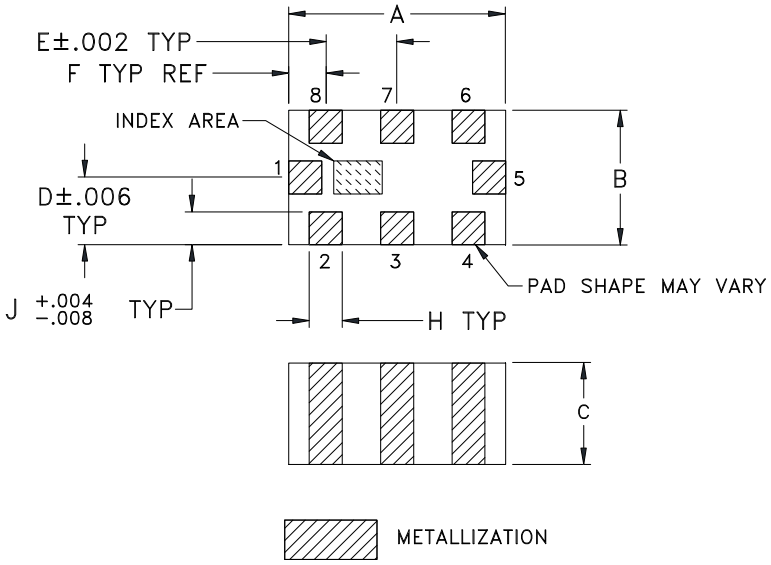
PAD DESCRIPTION

Function	Pad Number	Description
Unbalanced Port	1	Unbalanced Input Port
Balanced Port	4,6	Balanced Output Ports
Ground	2, 3, 7, 8	Connects to Ground on PCB, (See drawing PL-724)
NC	5	No connection, not used internally. See drawing PL-724 for connection to PCB

DC RESISTANCE PORT-PORT

Function	Pad Number
Unbalanced Port to Ground	DC Short
Unbalanced Port to Balanced Port	DC Open
Balanced Port to Ground	DC Open

CASE STYLE DRAWING



OUTLINE DIMENSIONS (Inches / mm)

A	B	C	D	E	F	G	H	J	wt
.079	.049	.037	.025	.026	.014	.110	.012	.012	grams
2.01	1.24	0.94	0.64	0.66	0.36	2.79	0.30	0.30	.008

PRODUCT MARKING*: No Marking

*Marking may contain other features or characters for internal lot control.

SUGGESTED PCB LAYOUT (PL-724)

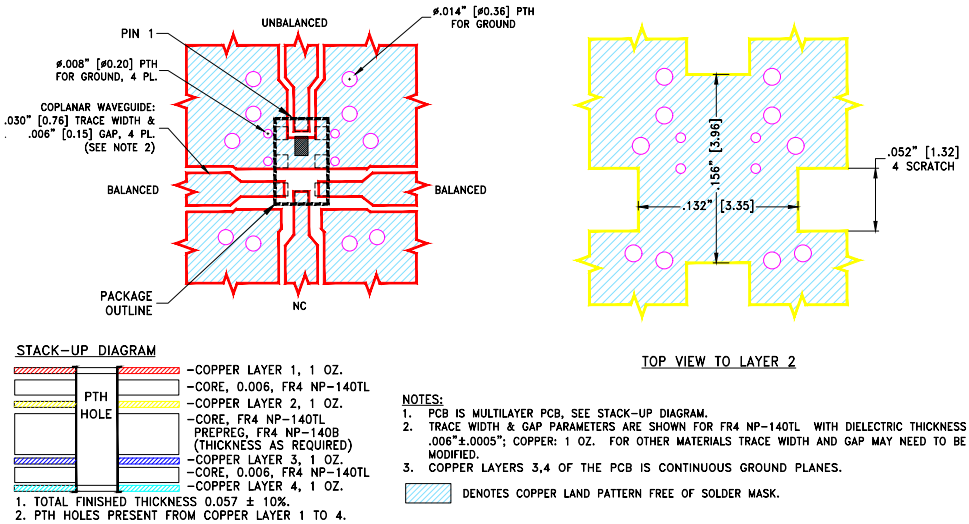


Figure 2. Suggested PCB Layout PL-724

LTCC SURFACE MOUNT

Bandpass Filter & Balun BBFCG2-252+

50Ω 2300 to 2690 MHz 1:2 Ratio

ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASH BOARD. CLICK HERE

Performance Data & Graphs	Data Graphs S-Parameter (S3P Files) Data Set (.zip file) De-embedded to device pads
Case Style	GE0805C-15 Lead Finish: Tin over Nickel plating
RoHS Status	Compliant
Tape and Reel	F114
Suggested Layout for PCB Design	PL-724
Evaluation Board	TB-BBFCG2-252+
	Gerber File
Environmental Rating	ENV06T10

NOTES

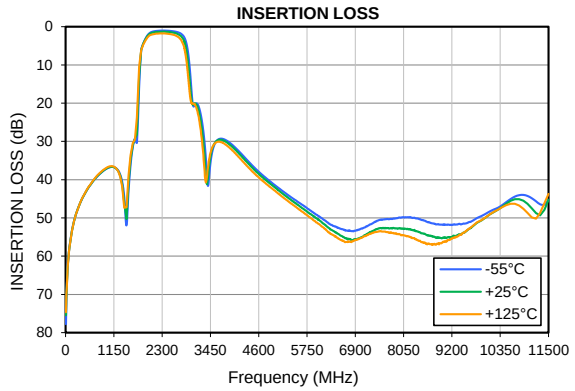
A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuits' applicable established test performance criteria and measurement instructions.
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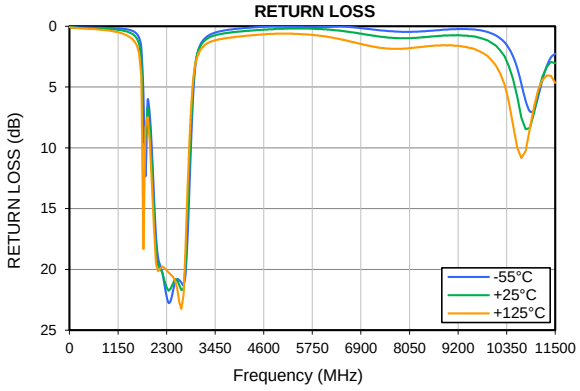
Low Pass Filter BBFCG2-252+

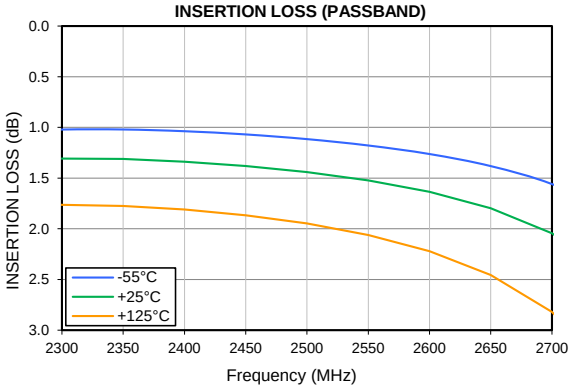
Typical Performance Data

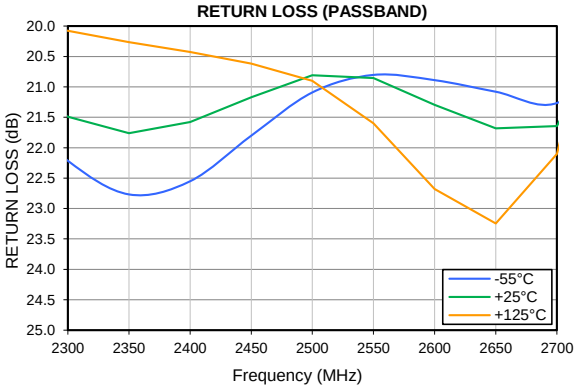
FREQUENCY (MHz)	INSERTION LOSS (dB)	RETURN LOSS (dB)
10.00	77.60	0.06
1000.0	38.04	0.10
1360.0	56.37	0.34
1550.0	37.64	1.39
1600.0	22.79	3.71
2300.0	0.83	24.74
2490.0	0.90	25.90
2690.0	1.27	22.97
3000.0	10.37	3.08
3320.0	50.12	0.40
4000.0	33.54	0.11
4500.0	41.76	0.01
5000.0	38.17	0.01
5500.0	48.61	0.00
6000.0	47.18	0.00
6500.0	44.42	0.09
7000.0	41.91	0.31
7500.0	40.05	0.60
8000.0	38.25	0.93
8500.0	37.33	1.30
9000.0	47.39	0.73
9500.0	41.14	0.98
10000.0	40.39	2.95

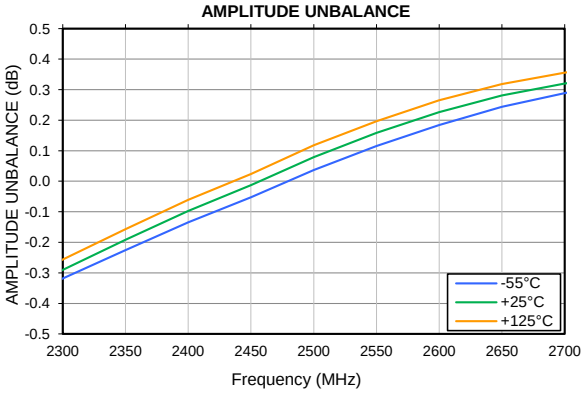
Typical Performance Curves

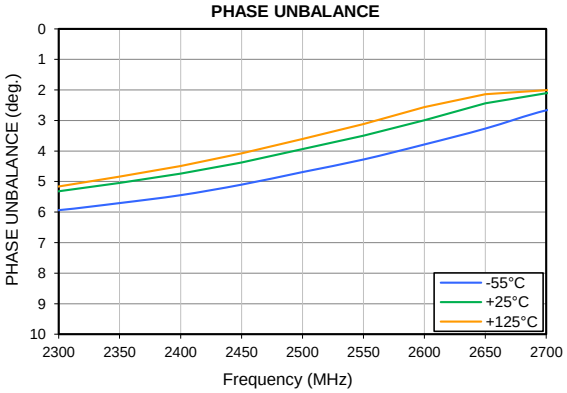


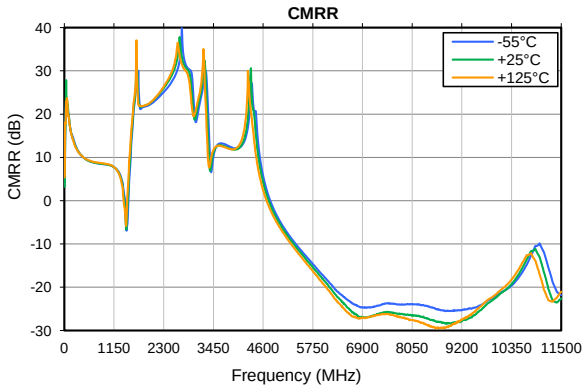


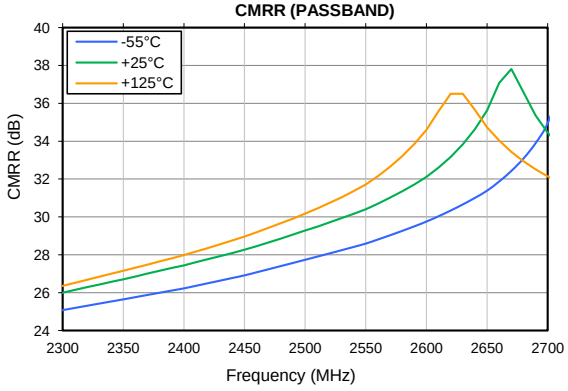










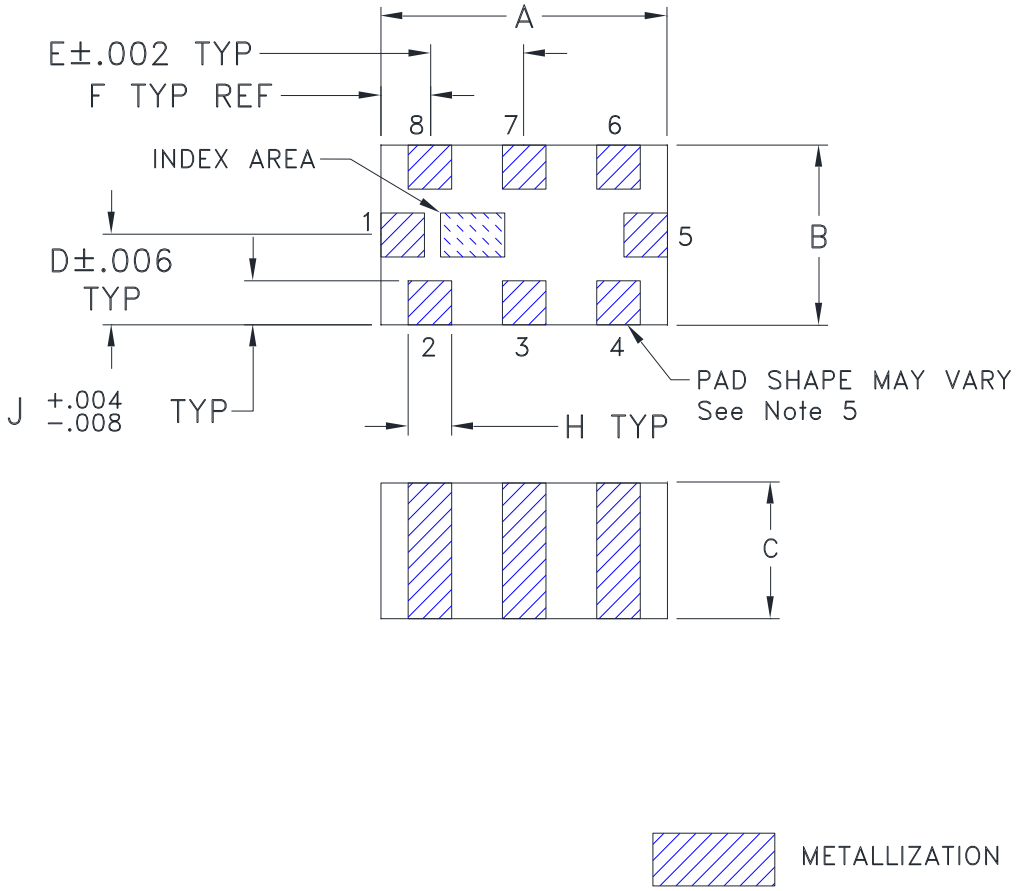


Case Style GE

GE0805C-15

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. ± .01(.25); 3 Pl. ± .005(.100)

Notes:

1. Open style, ceramic base
2. 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.
3. Pad tolerance to be non-cumulative. Minimum spacing between each pad is .004(0.1).
4. Pin numbers do not appear on unit. For reference only.
5. 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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Tape & Reel Packaging TR-F114

DEVICE ORIENTATION IN T&R

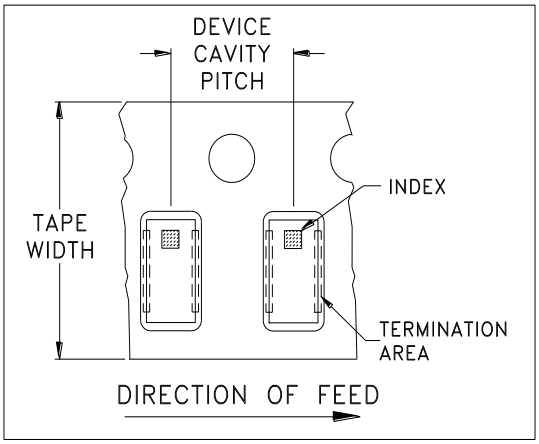


ILLUSTRATION 1

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

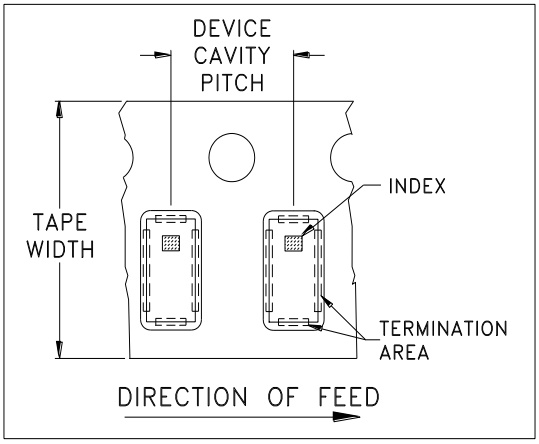


ILLUSTRATION 2

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.

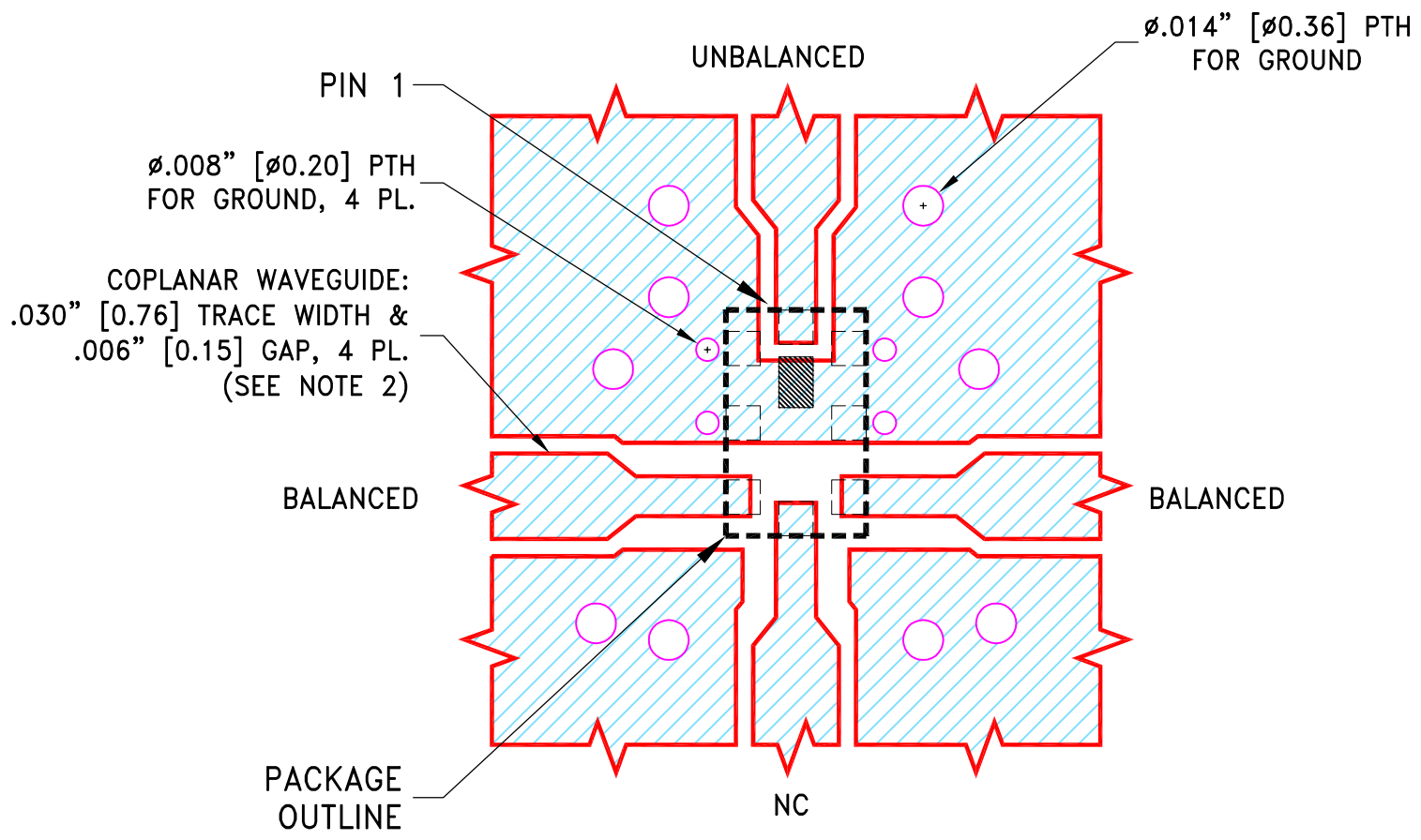
Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

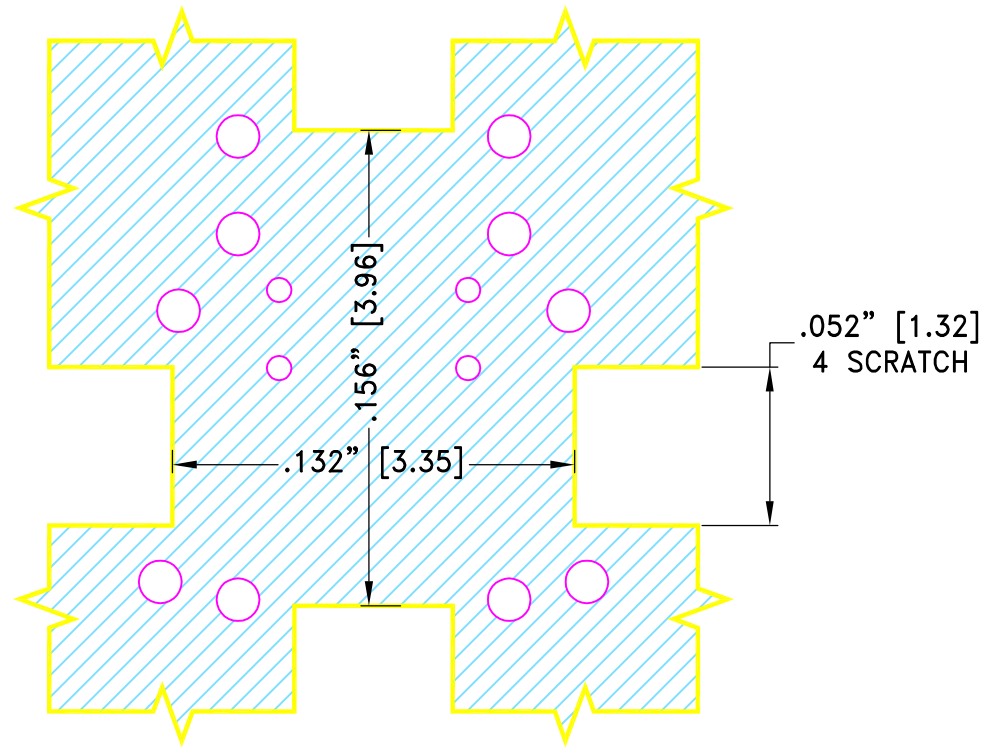
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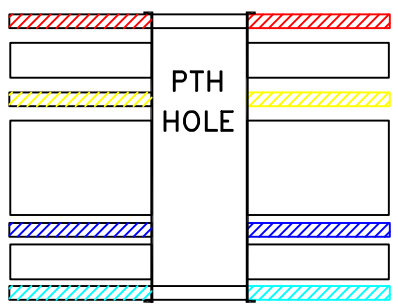
SUGGESTED MOUNTING CONFIGURATION
FOR GE0805C-15 CASE STYLE





TOP VIEW TO LAYER 2

STACK-UP DIAGRAM



- COPPER LAYER 1, 1 OZ.
- CORE, 0.006, FR4 NP-140TL
- COPPER LAYER 2, 1 OZ.
- CORE, FR4 NP-140TL PREPREG, FR4 NP-140B (THICKNESS AS REQUIRED)
- COPPER LAYER 3, 1 OZ.
- CORE, 0.006, FR4 NP-140TL
- COPPER LAYER 4, 1 OZ.

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.

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
0R	ECO-010908	NEW RELEASE	12/02/21	ITG	IL

REVISIONS

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES TOLERANCES ON: 2 PL DECIMALS ± 3 PL DECIMALS ± .005 ANGLES ± 1° FRACTIONS ±	DRAWN	ITG	12/02/21
	CHECKED	GF	12/02/21
	APPROVED	IL	12/02/21

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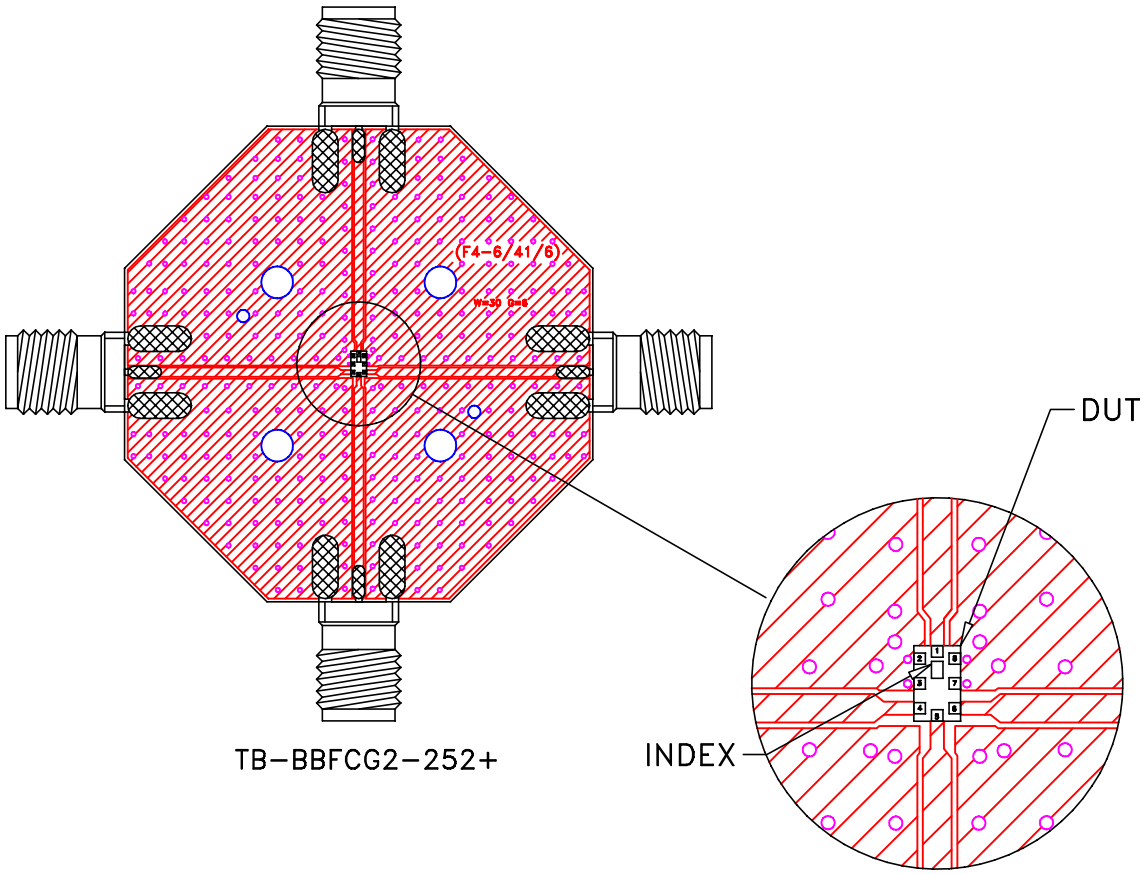
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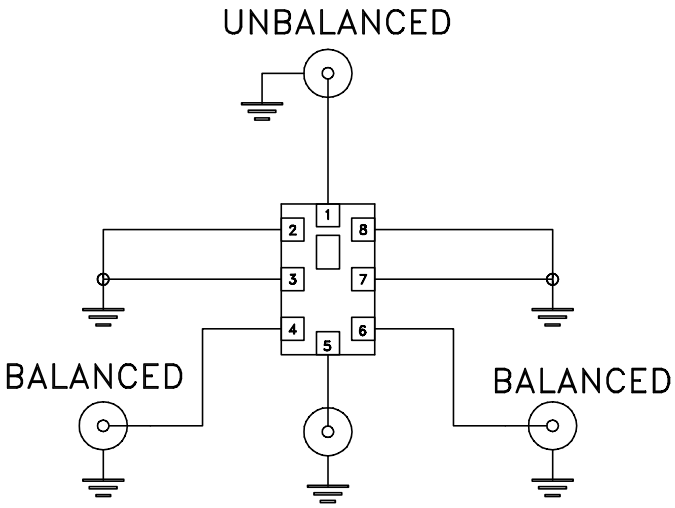
PL, GE0805C-15, TB-1233+

SIZE	CODE IDENT	DRAWING NO:	REV:
B	15542	98-PL-724	0R
FILE: 98PL724		SCALE: 15:1	SHEET: 1 OF 1

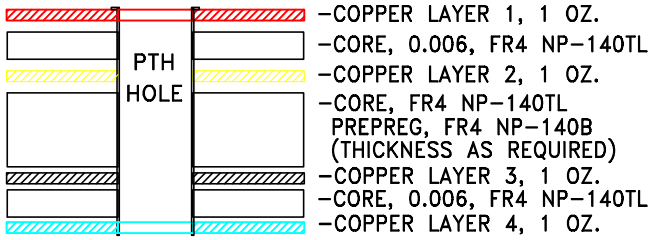
THIRD ANGLE PROJECTION

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.

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Mini-Circuits

Environmental Specifications ENV06T10

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 245° - 250°C peak	J-STD-020C, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, Test B,B1, 95% Coverage
Thermal Shock	-55° to +125°C, 15 min dwell,250 cycles	MIL-STD-202, Method 107
Bend Test	1mm, deflection for 5 seconds Span of bending: 2.75"	--
High Temp Storage	125°C to 1000 Hrs	---

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