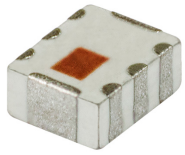
Ceramic

Bandpass Filter & Balun BBFCQ2-252+

50Ω 2400 to 2600 MHz

The Big Deal

- Tiny size, (1008)
- Compact design includes Balun & Filter in one package
- Low cost



CASE STYLE: NL1008C-2

Product Overview

Mini-Circuits' BBFCQ2-252+ is a tiny ceramic RF balun filter with an impedance ratio of 1:2 covering a variety of wireless communications applications from 2400 to 2600 MHz. This model provides low insertion loss, low phase unbalance (relative to 180°), low amplitude unbalance, and RF input power handling up to 1W. It provides DC isolation from input to output allowing it to be used for DC biasing of external circuits at the output. Fabricated using LTCC technology, the unit comes housed in a tiny, rugged ceramic package (0.098" x 0.047" x 0.043") suitable for harsh operating environments.

Key Features

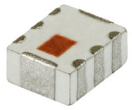
Feature	Advantages
Compact Design	Integrates fiter and balun in one tiny package
1W power handling	Supports a wide range of power requirements
DC Isolated from input to output	Can be used to DC bias external circuits at the output.
Tiny size, 1008	Accommodates tight space requirements for dense PCB layouts.
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.

LTCC

Bandpass Filter & Balun

BBFCQ2-252+

50Ω 2400 to 2600 MHz



Generic photo used for illustration purposes only

CASE STYLE: NL1008C-2

+RoHS Compliant

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

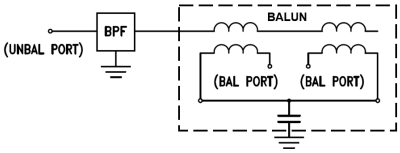
Features

- Small size (0.098"x0.079"x0.043")
- Temperature stable
- Hermetically sealed

Applications

- ISM Band
- Bluetooth
- Zigbee
- WiFi / WLAN

Functional Schematic



Electrical Specifications at 25°C

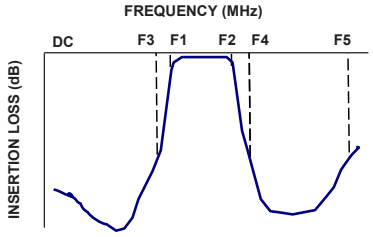
Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Impedance Ratio					2		
Pass Band	Insertion Loss[1]	F1-F2	2400 - 2600	—	—	2.5	dB
	Return Loss	F1-F2	2400 - 2600	—	12	—	dB
Stop Band, Lower	Rejection	DC - F3	10 - 1800	30	—	—	dB
Stop Band, Upper	Rejection	F4-F5	4100 - 7400	20	—	—	dB
Amplitude Unbalance		F1-F2	2400 - 2600	—	—	1.3	dB
Phase Unbalance		F1-F2	2400 - 2600	—	—	10	degree

1. Tested on Evaluation Board TB-BBFCQ2-252+

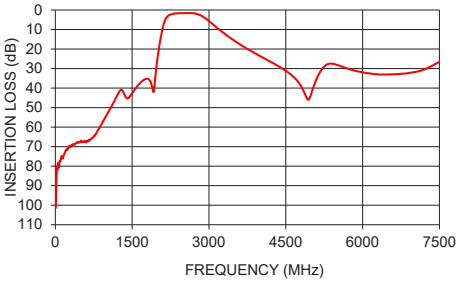
Maximum Ratings	
Operating Temperature	-55°C to 125°C
Storage Temperature[2]	-55°C to 125°C
RF Power Input[3]	1W at 25°C

2. 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
3. Derate linearly to 0.5W at 125°C.
   Permanent damage may occur if any of these limits exceeded.

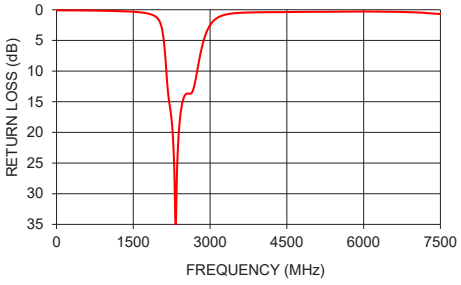
Typical Frequency Response



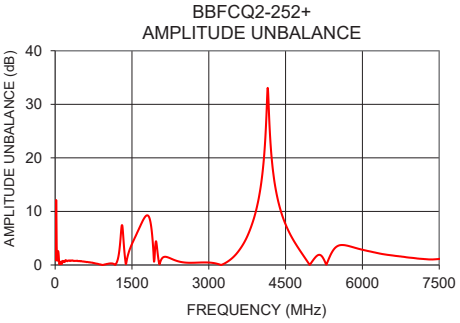
BBFCQ2-252+
INSERTION LOSS



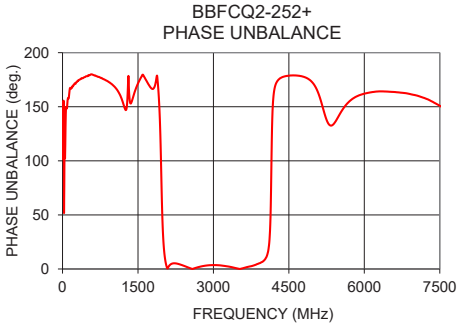
BBFCQ2-252+
RETURN LOSS



BBFCQ2-252+
AMPLITUDE UNBALANCE



BBFCQ2-252+
PHASE UNBALANCE



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

Typical Performance Data

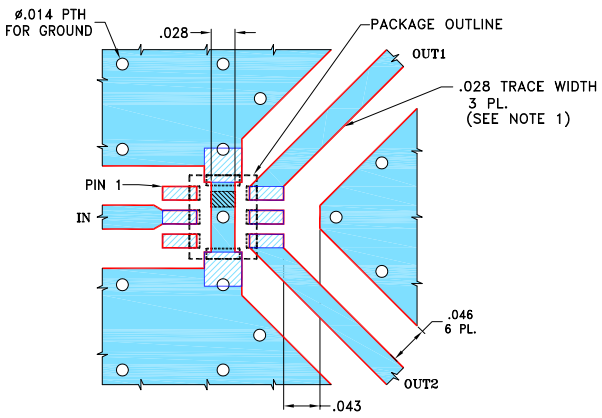
Frequency (GHz)	Insertion Loss (dB)	Return Loss (dB)	Amplitude Unbalance (dB)	Phase Unbalance (Deg,)
10	101.40	0.10	0.90	101.65
1000	53.83	0.13	0.17	170.02
1800	35.25	0.21	9.27	166.48
2400	1.67	0.34	0.69	3.15
2600	1.58	0.39	0.42	0.29
3000	5.69	0.54	0.46	3.60
4000	23.64	2.21	13.78	7.63
4100	25.07	3.58	23.02	20.20
5000	42.65	19.95	0.40	170.49
6000	31.92	19.91	2.85	162.07
7000	31.86	1.23	1.30	160.82
7400	27.95	0.80	1.05	153.45

Pad Connections

UNBALANCED PORT	2
BALANCED PORT	5,7
GROUND	4,8
NC	1,6
NC or DC Feed	3

Product Marking: N/A

Evaluation Board MCL P/N: TB-BBFCQ2-252+
Suggested PCB Layout (PL-550)

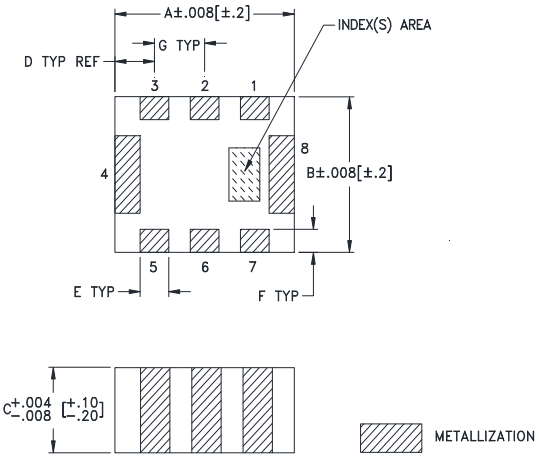


NOTES:
1. TRACE WIDTH IS SHOWN FOR FR4, GRADE IT-180TC (ITEQ CORP.) WITH DIELECTRIC THICKNESS .016±.0015. COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

Outline Drawing



Outline Dimensions (inch / mm)

A	B	C	D	E	F	G	wt
.098	.079	.043	.022	.016	.012	.028	grams
2.49	2.01	1.09	0.56	0.41	0.30	0.71	.019

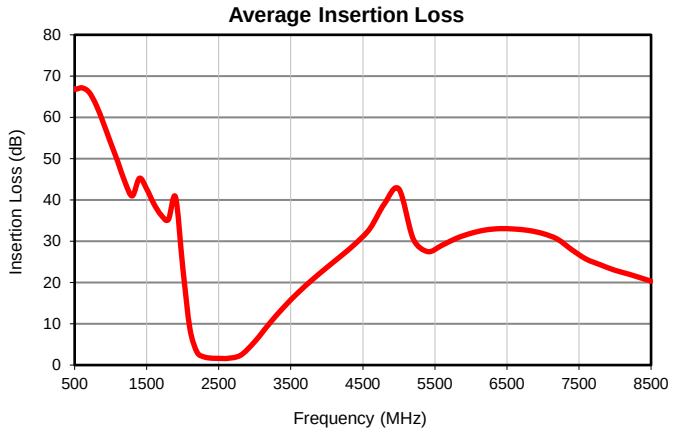
Ceramic Balance Filter BBFCQ2-252+

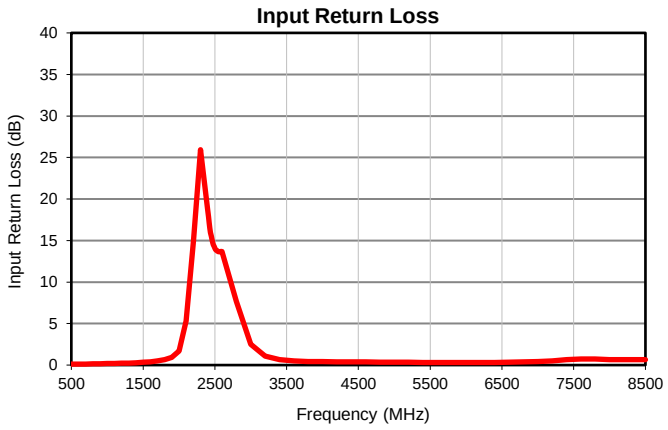
Typical Performance Data

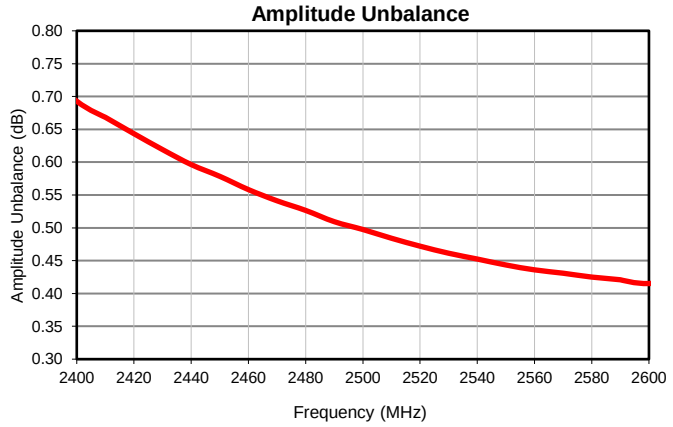
FREQUENCY (MHz)	INSERTION LOSS (dB)	RETURN LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE (deg.)
10	101.40	0.09	0.90	101.65
50	78.39	0.10	2.41	102.35
100	77.30	0.11	0.14	155.58
200	72.30	0.11	0.90	169.28
300	70.22	0.11	0.76	174.05
400	68.24	0.11	0.76	176.37
500	66.86	0.11	0.75	178.36
600	67.16	0.13	0.60	179.66
700	66.10	0.13	0.45	177.79
800	62.96	0.15	0.27	175.85
900	58.58	0.16	0.06	173.49
1000	53.83	0.18	0.17	170.02
1100	49.20	0.20	0.29	164.55
1200	44.24	0.22	0.43	154.01
1300	40.98	0.25	7.36	168.03
1400	45.27	0.28	0.96	158.37
1500	42.65	0.33	3.93	171.45
1600	39.05	0.40	6.00	179.55
1700	36.35	0.49	8.05	171.38
1800	35.25	0.65	9.27	166.48
1900	40.68	0.94	4.97	168.80
2000	23.74	1.70	2.31	30.21
2100	8.79	5.33	1.37	1.46
2200	3.07	14.97	1.43	5.20
2300	1.96	25.93	1.03	4.70
2400	1.67	18.81	0.69	3.15
2410	1.66	17.90	0.67	2.99
2420	1.65	17.13	0.64	2.81
2430	1.65	16.49	0.62	2.62
2440	1.64	15.94	0.60	2.45
2450	1.64	15.48	0.58	2.27
2460	1.63	15.09	0.56	2.09
2470	1.63	14.76	0.54	1.90
2480	1.63	14.48	0.53	1.73
2490	1.62	14.26	0.51	1.54
2500	1.62	14.07	0.50	1.35
2510	1.62	13.93	0.48	1.20
2520	1.61	13.82	0.47	1.01
2530	1.61	13.74	0.46	0.83
2540	1.60	13.69	0.45	0.68
2550	1.60	13.66	0.44	0.51
2560	1.59	13.66	0.44	0.33
2570	1.59	13.66	0.43	0.17
2580	1.58	13.67	0.42	0.01
2590	1.58	13.69	0.42	0.14
2600	1.58	13.70	0.42	0.29
2800	2.34	7.66	0.45	2.75
3000	5.69	2.51	0.46	3.60
3200	9.99	1.07	0.13	2.95
3400	13.98	0.64	0.85	1.30
3600	17.53	0.50	2.84	0.87
3800	20.70	0.44	6.45	3.26
4000	23.64	0.41	13.78	7.63
4200	26.48	0.40	23.55	162.35
4400	29.47	0.38	10.29	177.85
4600	33.12	0.37	5.53	178.96
4800	39.10	0.35	2.42	177.58
5000	42.65	0.34	0.40	170.49
5200	30.54	0.33	1.71	145.05
5400	27.49	0.32	2.29	134.59
5600	29.03	0.31	3.73	149.54
5800	30.73	0.30	3.36	158.35
6000	31.92	0.29	2.85	162.07
6200	32.72	0.30	2.42	163.78
6400	33.05	0.32	2.03	164.10
6600	32.95	0.34	1.76	163.61
6800	32.61	0.38	1.53	162.68
7000	31.86	0.42	1.30	160.82
7200	30.51	0.51	1.11	157.95
7400	27.95	0.65	1.05	153.45
7600	25.67	0.72	1.27	148.24
7800	24.27	0.73	1.74	142.56
8000	22.96	0.66	2.56	135.59
8200	21.98	0.64	4.81	132.84
8500	20.32	0.67	5.59	130.88

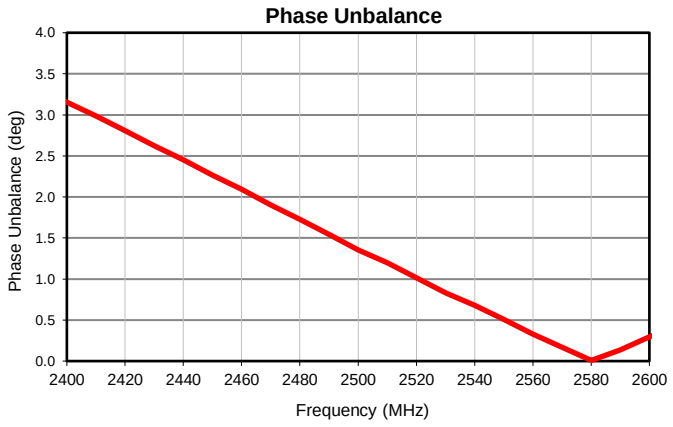
Ceramic Balance Filter BBFCQ2-252+

Typical Performance Data







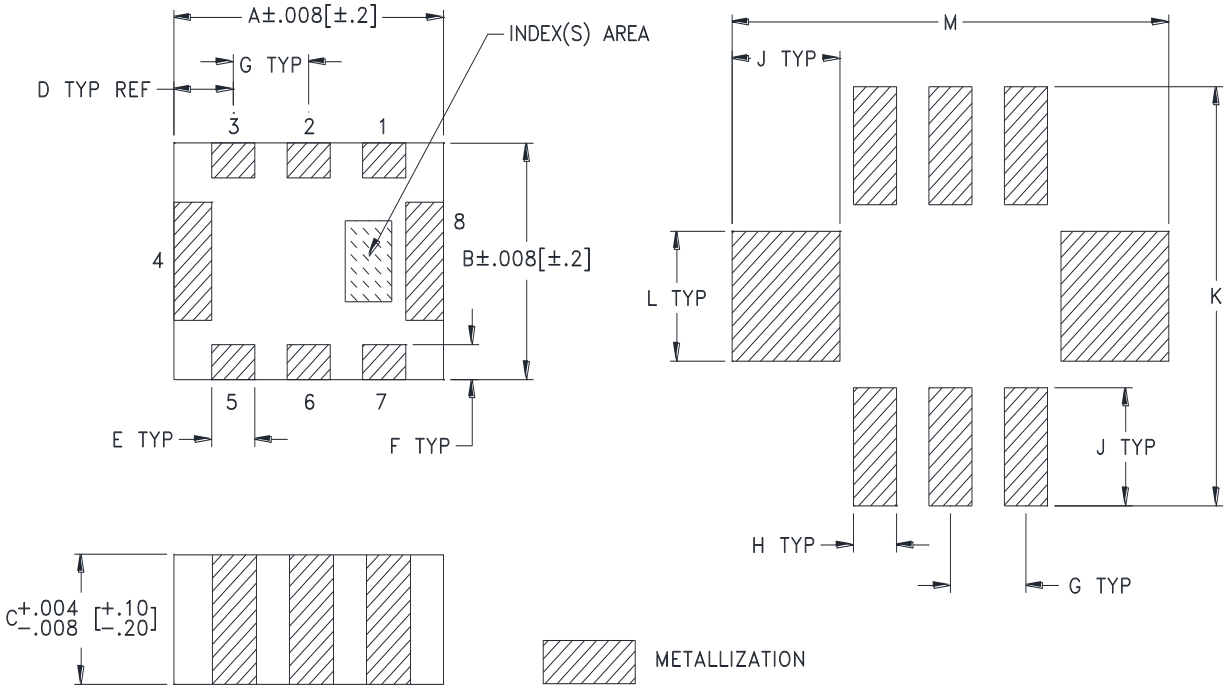


Case Style NL

Outline Dimensions

NL1008C-2

PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

CASE #	A	B	C	D	E	F	G	H	J	K	L	M	WT. GRAM
NL1008C-2	.098 (2.50)	.079 (2.00)	.043 (1.10)	.022 (.55)	.016 (.40)	.012 (.30)	.028 (.70)	.016 (.40)	.039 (1.00)	.140 (3.55)	.043 (1.10)	.159 (4.05)	.019

Dimensions are in inches (mm). Tolerances: 2 Pl. ± .01; 3 Pl. ± .005

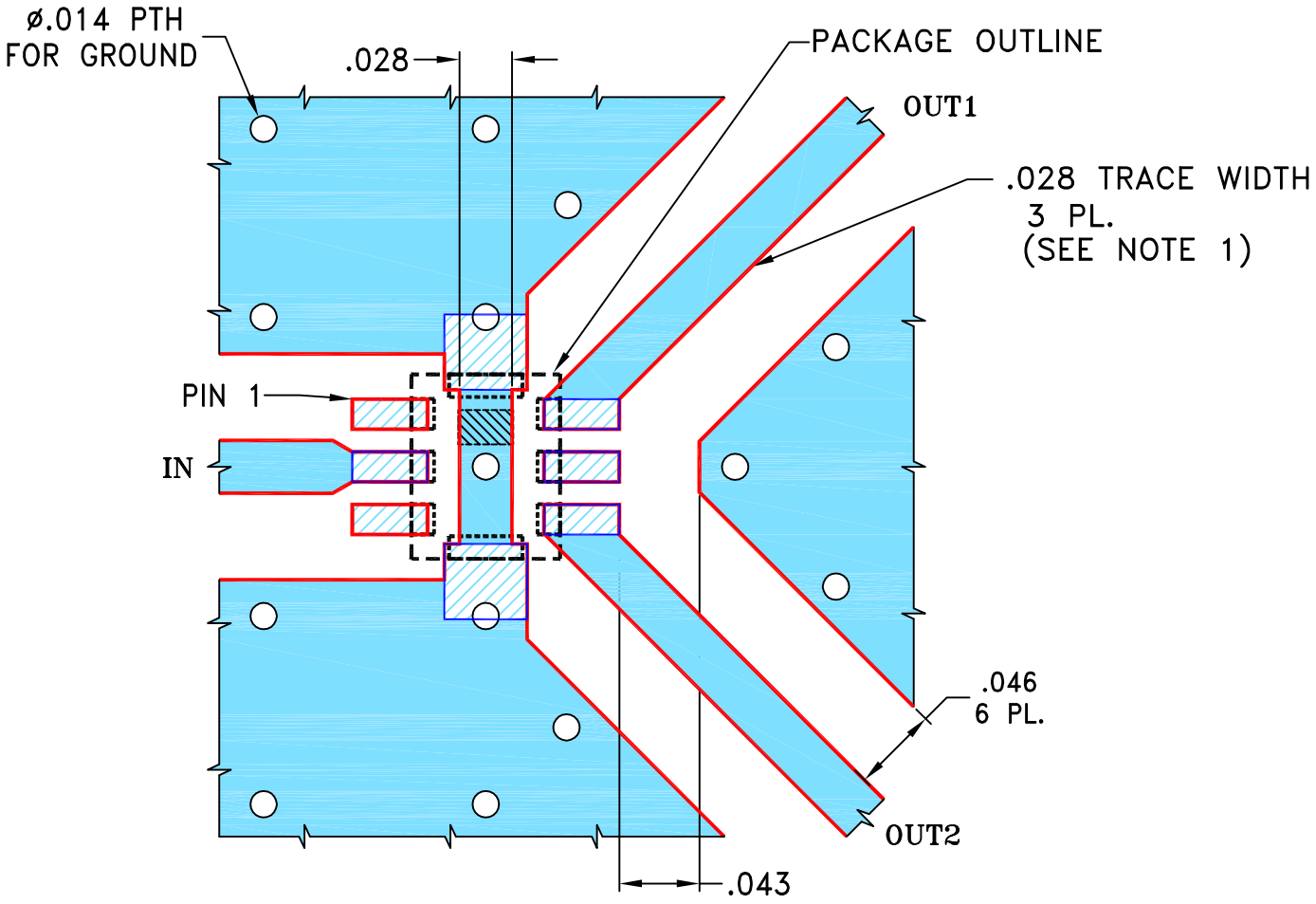
Notes:

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. All models, no (+) suffix.
3. Line width should be designed to match 50Ω characteristic depending on PCB material and thickness.

THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M168200	NEW RELEASE	05/31/18	NP	SL

SUGGESTED MOUNTING CONFIGURATION
FOR NL1008C-2 CASE STYLE, "08TJ02" PIN CODE



NOTES:

1. TRACE WIDTH IS SHOWN FOR FR4, GRADE IT-180TC (ITEQ CORP.) WITH DIELECTRIC THICKNESS .016±.0015. COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & 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	NP	05/30/18
TOLERANCES ON:	CHECKED	GF	05/30/18
2 PL DECIMALS ±	APPROVED	SL	05/31/18
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

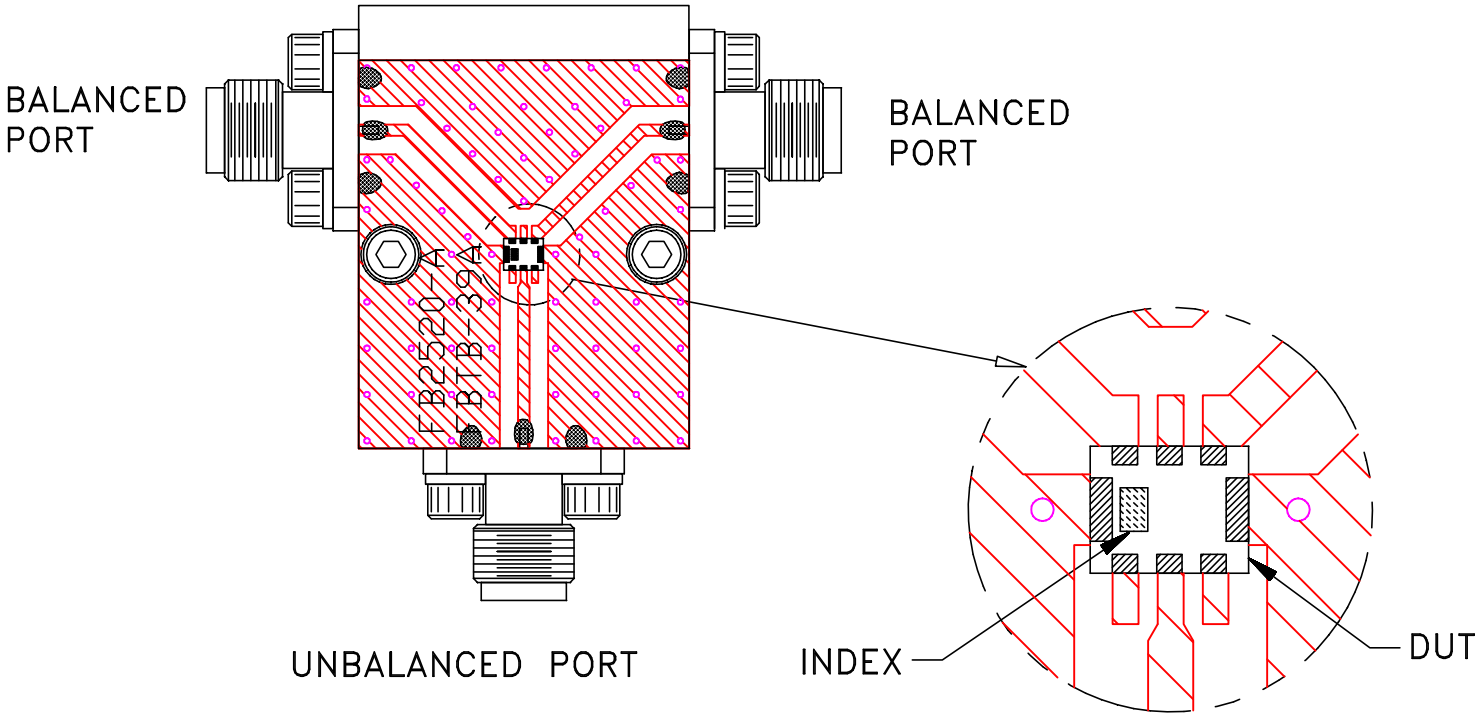
ASHEETA1.DWG REV:A DATE:01/12/95

Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

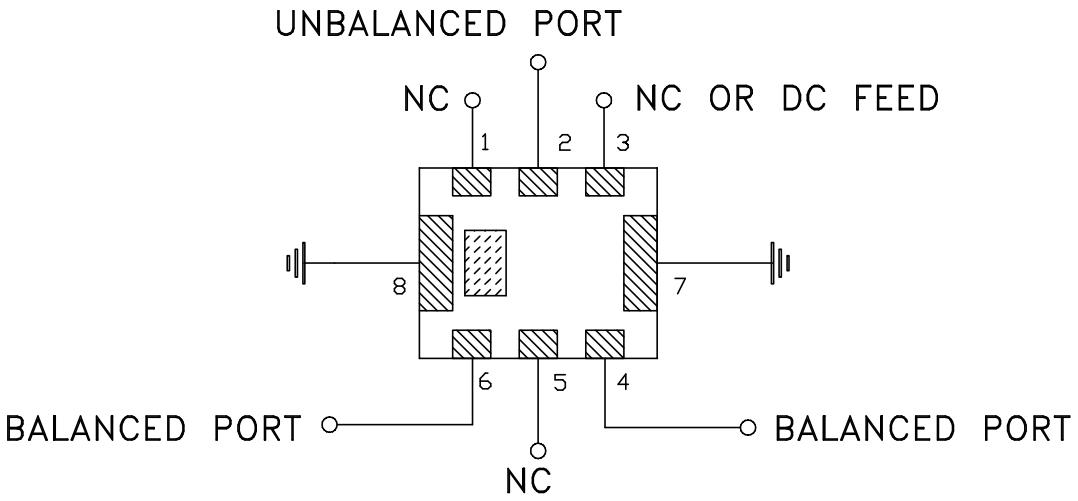
PL, 08TJ02, NL1008C-2, TB-1037+

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-550	OR
FILE: 98PL550		SCALE: 10:1	SHEET: 1 OF 1

Evaluation Board and Circuit



TB-BBFCQ2-252+



Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: FR4 or equivalent,
   Dielectric Constant=4.5, Thickness=.016 inch.

Mini-Circuits®

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