Ceramic

Bandpass Filter

BFCO-552+

50Ω 4900 to 6100 MHz

The Big Deal

- Wide rejection band
- Rugged, ceramic construction
- Tiny size

CASE STYLE: NK0402C-1

Product Overview

Mini-Circuits' BFCO-552+ is a LTCC Bandpass Filter with a passband from 4900 to 6100 MHz, supporting a variety of applications. This model provides a very good stopband rejection due to strategically constructed layout with minimal interaction between components. It provides a wide operating temperature range from -55 to +125°C. Housed in a tiny 0402 ceramic form factor with wrap-around terminations, the filter is ideal for dense PCB layouts and with minimal performance variation due to parasitics.

Key Features

Feature	Advantages
Ultra-wide stopband	The LTCC lowpass filter provides a very good stopband rejection suitable for high end applications.
LTCC Construction	Provides repeatable performance in a rugged, ceramic package well suited for tough environments such as high humidity and temperature extremes.
Tiny size	Saves space in dense circuit board layouts and minimizes the effects of parasitics.
Wrap-around terminations	Provides excellent solderability and easy visual inspection

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Bandpass Filter

50Ω 4900 to 6100 MHz

BFCO-552+

Generic photo used for illustration purposes only

CASE STYLE: NK0402C-1

+RoHS Compliant

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

Features

- Miniature size 0402 (0.039"[1.0mm] x 0.020"[0.5mm] x 0.015"[0.37mm])
- Wide rejection band
- Aqueous washable

Applications

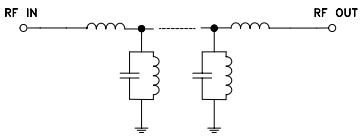
- WLAN/WIFI

Electrical Specifications at 25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Center Frequency	—		—	5500		MHz
	Insertion Loss	F1-F2	4900-6100	—	1.9	2.2	dB
	Return Loss	F1-F2	4900-6100	—	11	—	dB
Stop Band, Lower	Insertion Loss	DC-F3	DC-2600	—	22	—	dB
Stop Band, Upper	Insertion Loss	F4-F5	10200-18000	—	26	—	dB

1. Tested on Evaluation Board TB-BFCO-552+

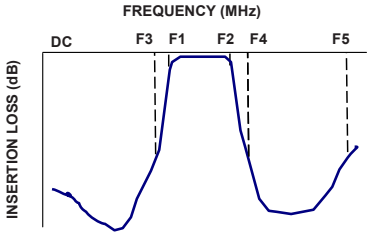
Functional Schematic



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

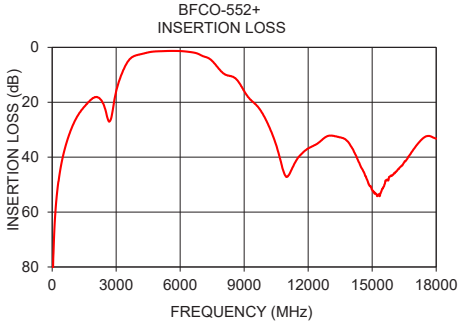
Permanent damage may occur if any of these limits exceeded.
*Refer to product storage temperature after installation
Suggestion for T&R unused product storage condition:
+5 ~ +35 °C, Humidity 45~75%RH, 12 month Max
** Derate linearly to 1W at 125°C

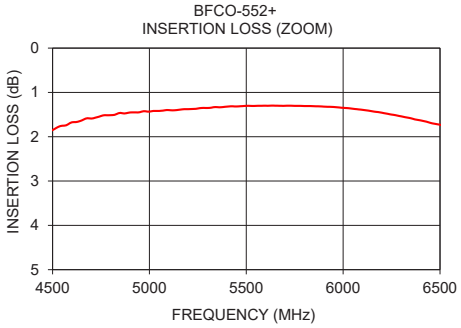
Typical Frequency Response

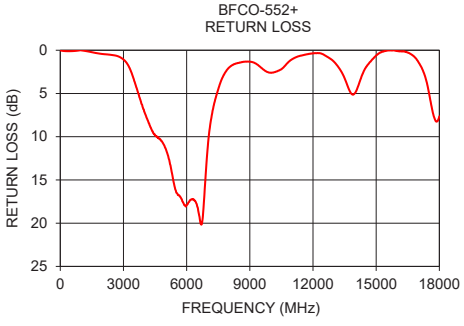


Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	Return Loss (dB)
10	84.96	0.00
100	66.68	0.07
1000	27.77	0.01
2600	25.69	0.61
3000	15.78	1.07
4900	1.45	10.86
5000	1.51	11.36
6100	1.39	17.57
7000	2.92	11.27
8000	9.82	2.03
10200	29.39	2.52
12000	36.93	0.36
14000	34.89	4.93
16000	46.52	0.09
17000	36.39	1.35
18000	33.54	7.65







Notes

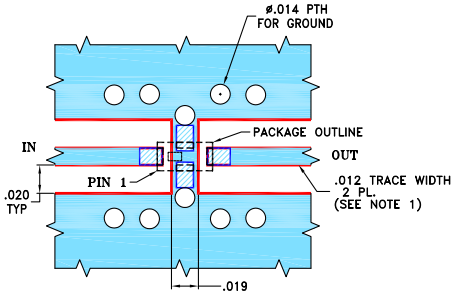
A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's 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

Pad Connections

INPUT	3
OUTPUT	1
GROUND	2,4

Product Marking: N/A

Evaluation Board MCL P/N: TB-BFCO-552+
Suggested PCB Layout (PL-569)

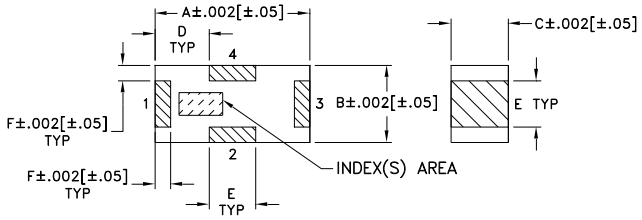


NOTES:
1. PCB IS MULTILAYER PCB, SEE STACK-UP DIAGRAM.
2. TRACE WIDTH IS SHOWN FOR FR4
   WITH DIELECTRIC THICKNESS .006±.0005. COPPER: 1/2 OZ. EACH SIDE.
   FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
3. LAYERS 2,3,4 OF THE PCB ARE CONTINUOUS GROUND PLANES.

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	wt
.039	.020	.015	.014	.012	.004	grams
0.99	0.51	0.38	0.36	0.30	0.10	.0007

Ceramic Bandpass Filter BFCO-552+

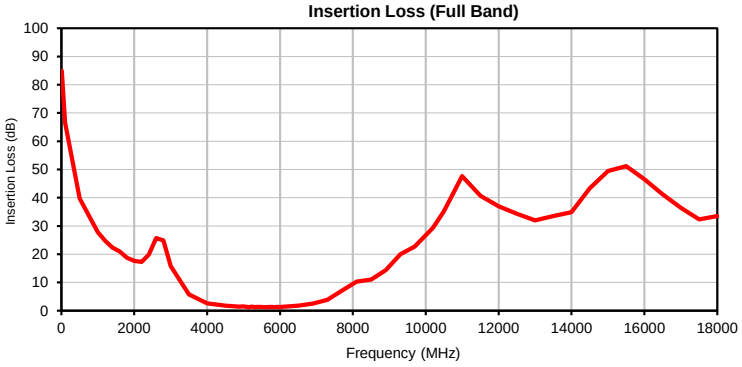
Typical Performance Data

FREQUENCY (MHz)	INSERTION LOSS (dB)	INPUT RETURN LOSS (dB)	OUTPUT RETURN LOSS (dB)
10	84.96	0.00	0.13
100	66.68	0.07	0.19
500	39.78	0.10	0.42
1000	27.77	0.01	0.63
1200	24.73	0.09	0.71
1400	22.32	0.18	0.79
1600	21.04	0.28	0.91
1800	18.71	0.36	1.06
2000	17.62	0.44	1.25
2200	17.25	0.48	1.44
2400	19.82	0.53	1.58
2600	25.69	0.61	1.64
2800	24.91	0.76	1.68
3000	15.78	1.07	1.84
3500	5.75	3.43	3.62
4000	2.64	7.15	6.59
4500	1.78	9.82	8.27
4900	1.45	10.86	9.43
4950	1.47	11.07	9.68
5000	1.51	11.36	9.92
5050	1.38	11.71	10.29
5100	1.35	12.07	10.63
5150	1.28	12.53	11.05
5200	1.43	13.01	11.49
5250	1.42	13.55	11.98
5300	1.28	14.18	12.46
5350	1.36	14.84	13.05
5400	1.33	15.44	13.68
5450	1.33	15.97	14.26
5500	1.35	16.38	14.82
5550	1.27	16.55	15.38
5600	1.27	16.74	15.91
5650	1.28	16.80	16.36
5700	1.30	16.95	16.73
5750	1.29	17.19	17.04
5800	1.33	17.49	17.17
5850	1.28	17.69	17.15
5900	1.30	17.92	16.83
5950	1.35	18.07	16.34
6000	1.35	17.93	15.81
6050	1.36	17.79	15.24
6100	1.39	17.57	14.73
6500	1.81	18.04	12.31
6900	2.46	14.55	10.45
7300	3.88	6.25	5.58
7700	7.14	3.17	2.89
8100	10.31	1.82	2.16
8500	11.06	1.44	2.15
8900	14.37	1.31	2.21
9300	20.02	1.56	1.85
9700	22.69	2.33	1.26
10200	29.39	2.52	0.64
10500	35.26	2.21	0.42
11000	47.62	1.05	0.26
11500	40.66	0.59	0.39
12000	36.93	0.36	0.95
12500	34.35	0.49	2.42
13000	31.97	1.34	3.91
13500	33.48	3.24	2.42
14000	34.89	4.93	0.86
14500	43.41	2.02	0.19
15000	49.46	0.60	0.07
15500	51.14	0.05	0.01
16000	46.52	0.09	0.50
16500	41.25	0.27	2.21
17000	36.39	1.35	6.81
17500	32.32	4.85	4.44
18000	33.54	7.65	1.37

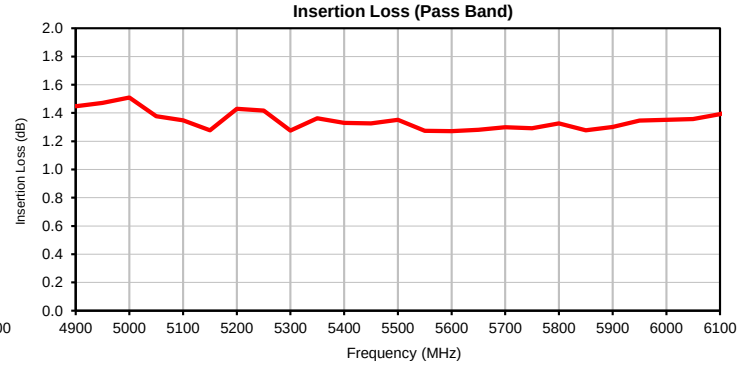
Ceramic Bandpass Filter BFCO-552+

Typical Performance Curves

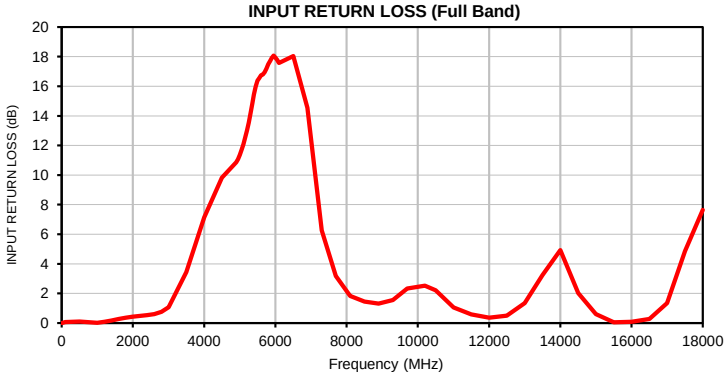
Insertion Loss (Full Band)



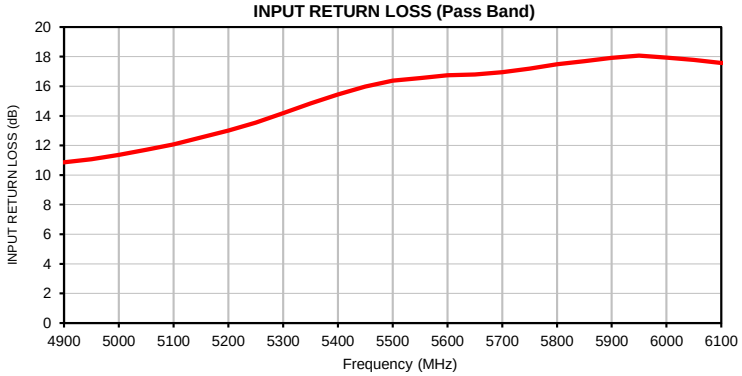
Insertion Loss (Pass Band)



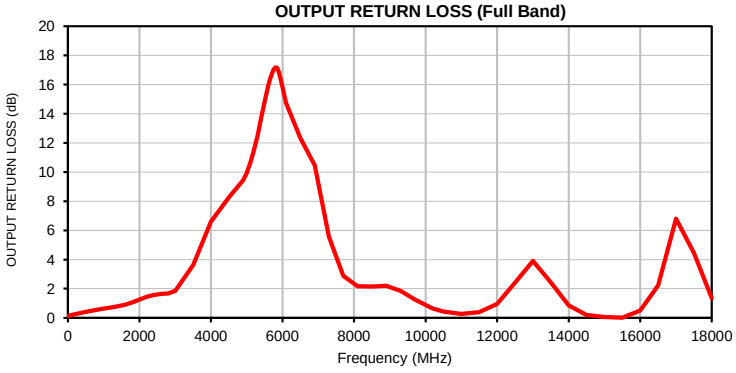
INPUT RETURN LOSS (Full Band)



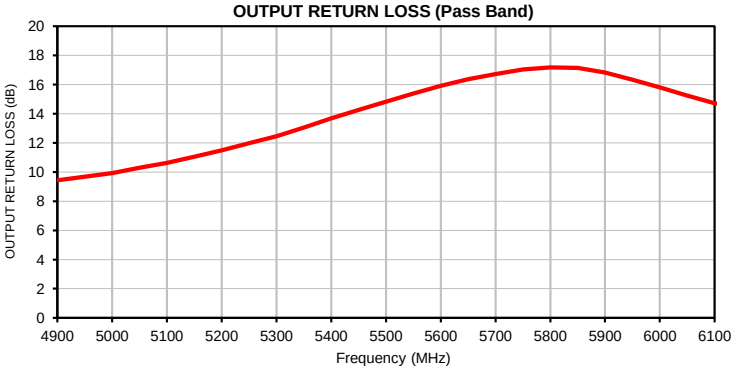
INPUT RETURN LOSS (Pass Band)



OUTPUT RETURN LOSS (Full Band)



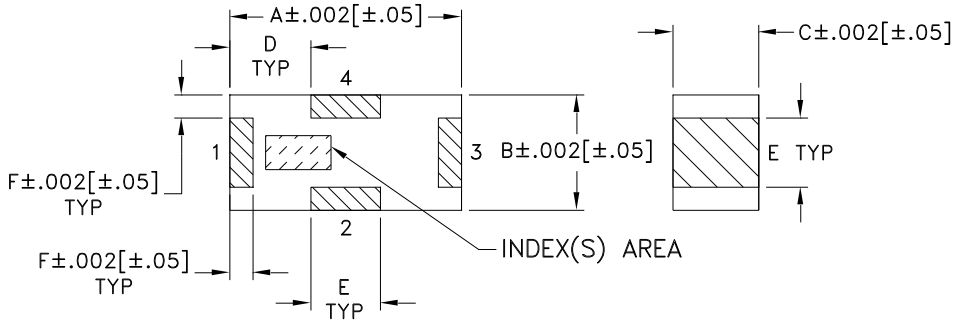
OUTPUT RETURN LOSS (Pass Band)



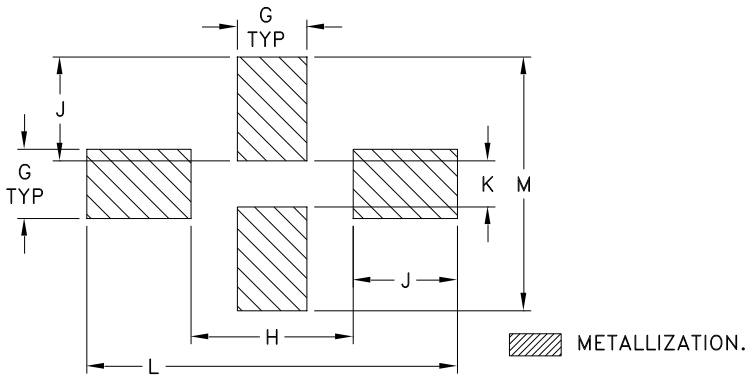
Case Style NK

NK0402C-1

Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

CASE#	A	B	C	D	E	F	G	H	J	K	L	M	WT.GRAMS
NK0402C-1	.039 (1.00)	.020 (.50)	.015 (.37)	.014 (.35)	.012 (.30)	.004 (.10)	.012 (.30)	.028 (.70)	.018 (.45)	.008 (.20)	.063 (1.60)	.043 (1.10)	.0007

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

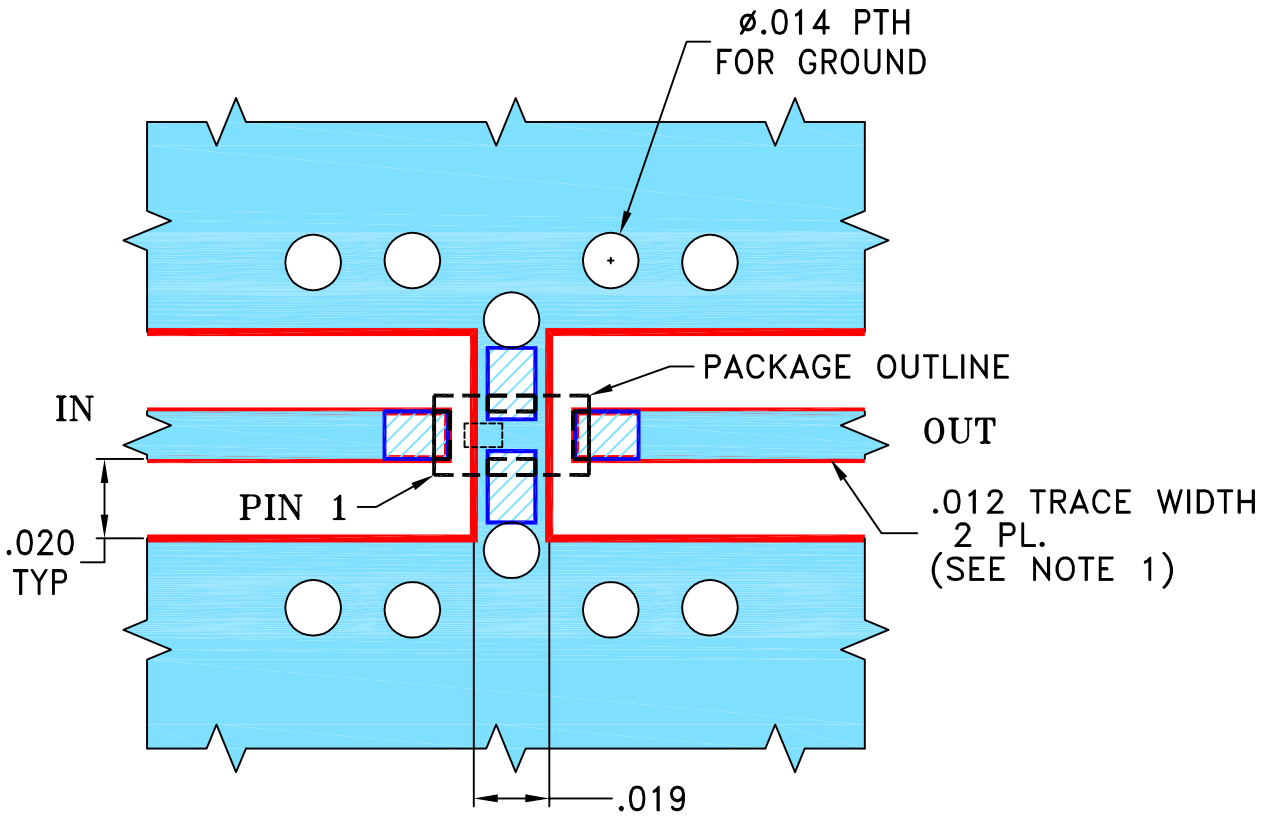
Notes:

1. Open style, ceramic base.
2. Termination finish:
   For RoHS Case Styles: Matte Tin over Nickel plating. Models with (+) suffix.
3. *Line width should be designed to match 50Ω characteristic impedance, 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 NK0402C-1 CASE STYLE, "04FL04" PIN CODE



NOTES:

1. PCB IS MULTILAYER PCB, SEE STACK-UP DIAGRAM.
2. TRACE WIDTH IS SHOWN FOR FR4
   WITH DIELECTRIC THICKNESS .006±.0005. COPPER: 1/2 OZ. EACH SIDE.
   FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
3. LAYERS 2,3,4 OF THE PCB ARE CONTINUOUS GROUND PLANES.

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	05/31/18
2 PL DECIMALS ±	APPROVED	SL	05/31/18
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

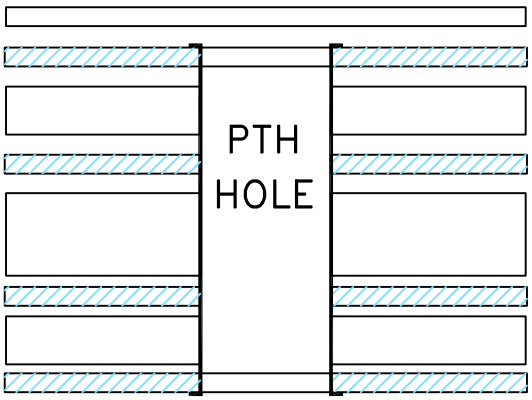
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, 04FL04, NK0402C-1, TB-1039+

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-569	OR

FILE:	SCALE:	SHEET:
98PL569	20:1	1 OF 2

STACK-UP DIAGRAM



-TOP SOLDER MASK
-COPPER LAYER 1, 0.5 OZ.
-CORE, 0.006", FR4
-COPPER LAYER 2, 0.5 OZ.
-PREPREG, FR4
(THICKNESS AS REQUIRED)
-COPPER LAYER 3, 0.5 OZ.
-CORE, 0.006", FR4
-COPPER LAYER 4, 0.5 OZ.

1. TOTAL FINISHED THICKNESS 0.063" ± 10%.
2. PTH HOLES PRESENT FROM COPPER LAYER 1 TO 4.

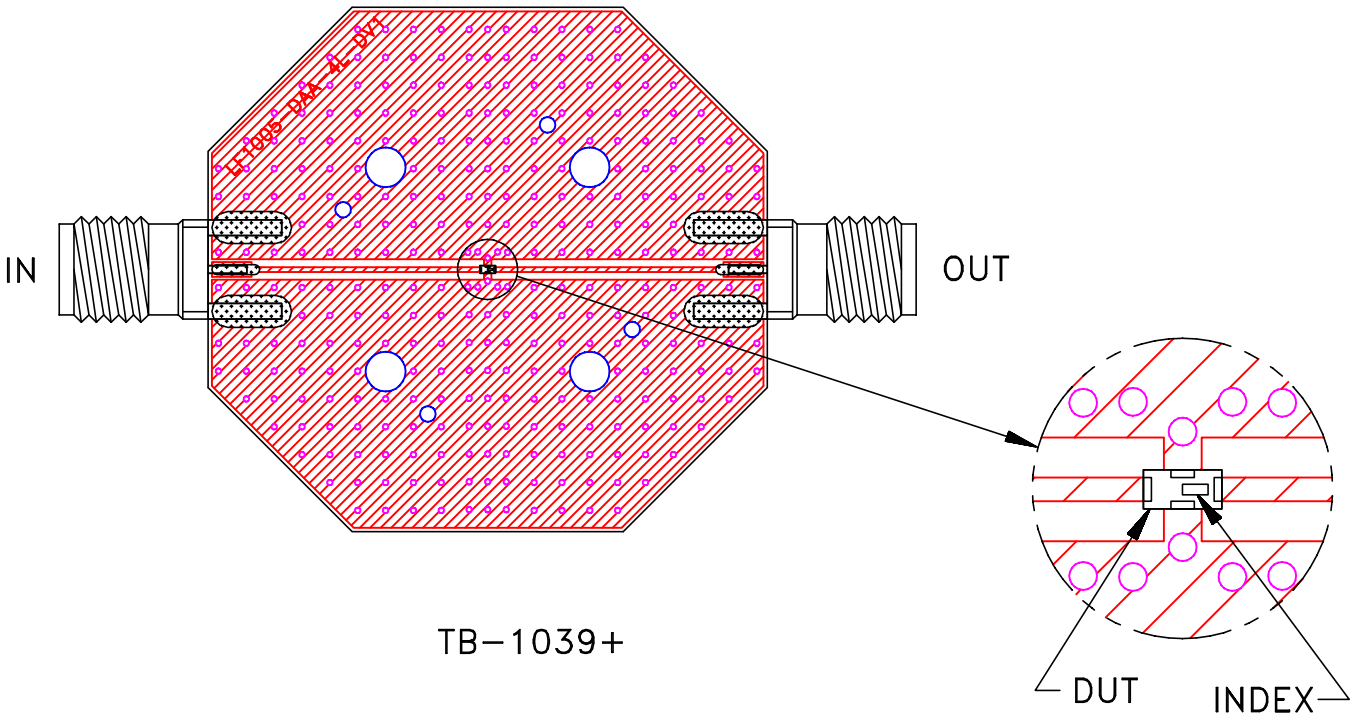
ASHEETA2.DWG REV:A DATE: 01/12/94

ALL DIMENSIONS ARE IN INCHES EXCEPT OTHERWISE SPECIFIED

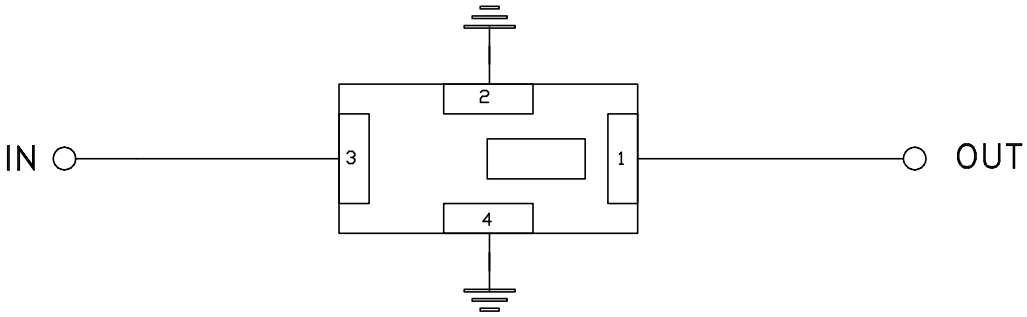
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-569	OR

FILE:	SCALE:	SHEET:
98PL569	20:1	2 OF 2

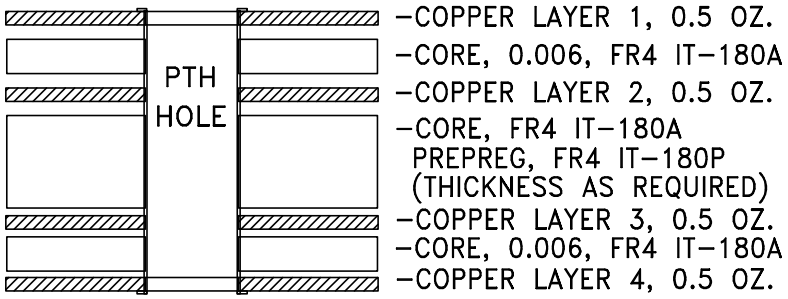
Evaluation Board and Circuit



TB-1039+



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 = .058 inch.

Mini-Circuits®

Environmental Specifications ENV06T9

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