

LTCC

Bandpass Filter

50Ω 4900 to 5950 MHz

BPNK-542R+



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])
- Low Insertion Loss, 1.3 dB typ.
- Low cost
- Aqueous washable

Applications

- ISM Band
- WLAN
- Bluetooth
- Zigbee

Electrical Specifications at 25°C

Parameter		Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Center Frequency	—	—	5425	—	MHz
	Insertion Loss	4900 – 5950	—	1.3	1.6	dB
	Return Loss	4900 – 5950	10	14	—	dB
Stop Band, Lower	Rejection	2400 – 2500	—	23	—	dB
Stop Band, Upper	Rejection	9800 - 11900	—	32	—	dB
		14700 - 17850	—	38	—	dB

* Tested on Evaluation Board TB-1039+

Maximum Ratings

Operating Temperature	-40°C to +85°C
Storage Temperature*	-40°C to +85°C
RF Power Input**	3W at 25°C

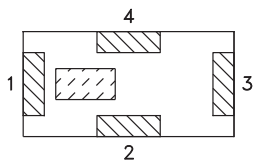
*Refer to product storage temperature after installation
Suggestion for T&R unused product storage condition:
+5 ~ +35 °C, Humidity 45-75%RH, 12 month Max

** Derate linearly to 1.5W at 85°C.

Block Diagram



Top View

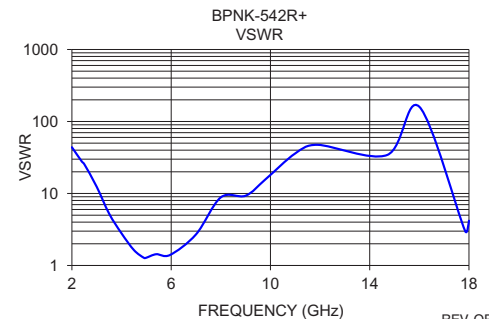
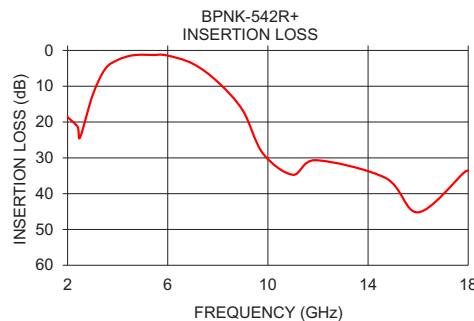


Pad Connections

Input	3
Output	1
Ground	2,4

Typical Performance Data at 25°C

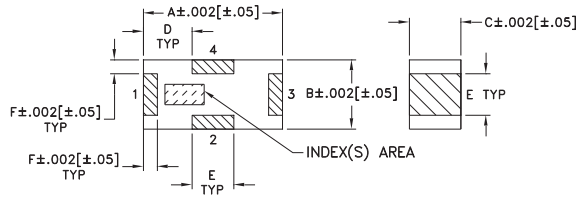
Frequency (GHz)	Insertion Loss (dB)	VSWR (:1)
2.00	18.63	43.86
2.40	21.32	27.79
2.50	24.26	25.50
3.00	12.51	12.38
3.50	5.19	5.25
4.00	2.67	2.79
4.90	1.20	1.28
5.00	1.19	1.28
5.95	1.37	1.40
7.00	3.70	2.70
8.00	8.82	8.83
9.00	16.79	9.32
9.80	28.76	15.72
11.00	34.73	36.02
11.90	30.65	47.41
14.70	35.63	34.20
16.00	45.22	160.16
17.85	34.00	2.99
18.00	33.53	4.18



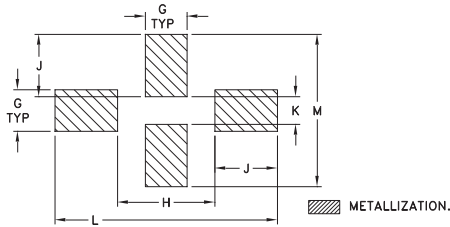
Bandpass Filter

BPNK-542R+

Outline Drawing



PCB Land Pattern

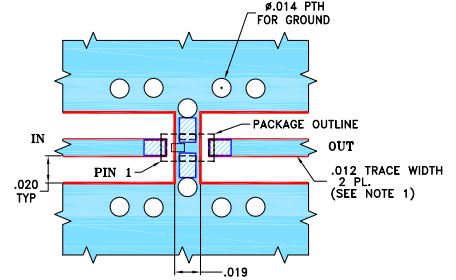


Suggested Layout,
Tolerance to be within .002



Pad Connections

Input	3
Output	1
Ground	2,4

Evaluation Board MCL P/N: TB-1039+ 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 .008±.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 Dimensions ($\frac{\text{inch}}{\text{mm}}$)

A	B	C	D	E	F	G
.039	.020	.015	.014	.012	.004	.012
0.99	0.51	0.38	0.36	0.30	0.10	0.30
H	J	K	L	M	wt	
.028	.018	.008	.063	.043	grams	
0.71	0.46	0.20	1.60	1.09	.0007	

Additional Notes

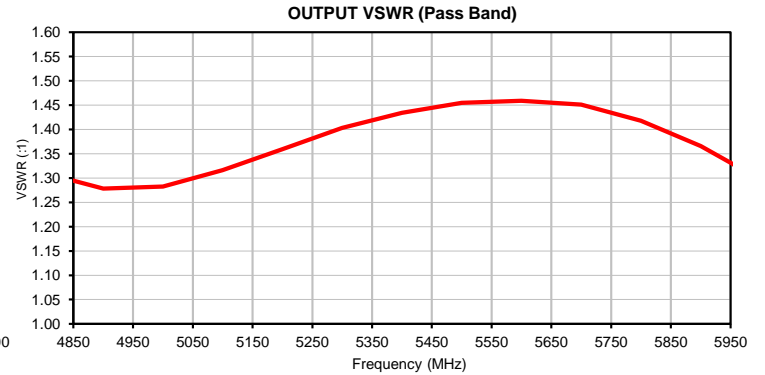
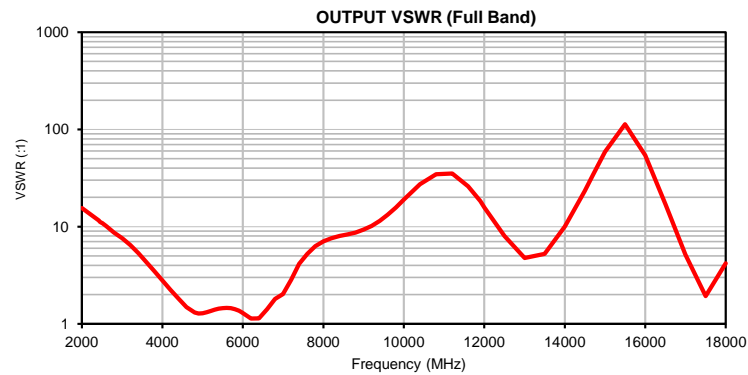
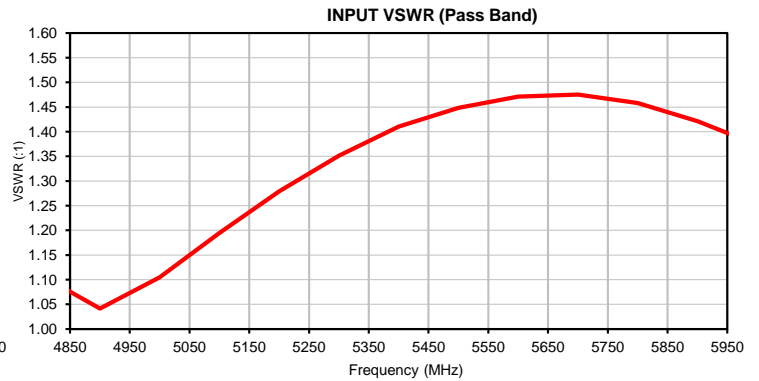
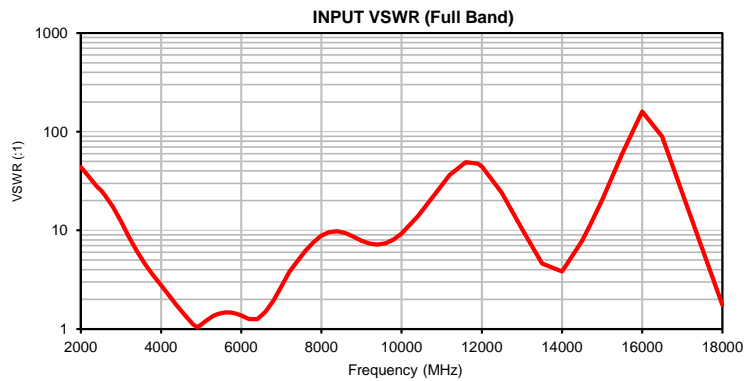
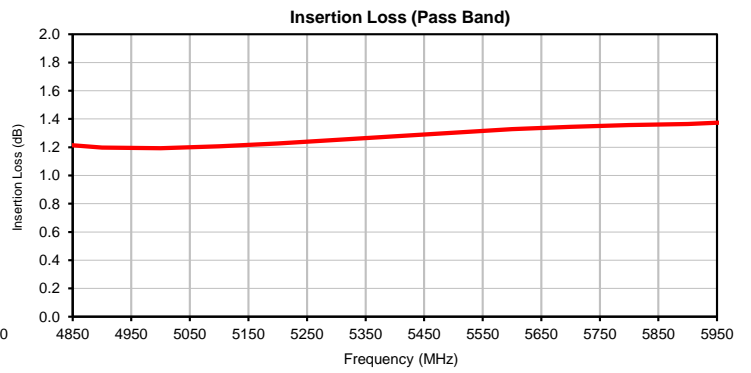
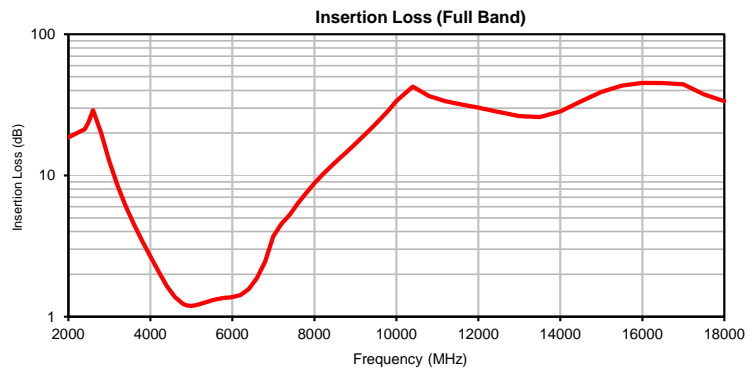
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Typical Performance Data

FREQUENCY (MHz)	INSERTION LOSS (dB)	INPUT VSWR (:1)	OUTPUT VSWR (:1)
2000	18.63	43.86	15.55
2400	21.32	27.79	11.73
2420	21.77	27.33	11.52
2440	22.29	26.81	11.29
2460	22.88	26.36	11.11
2480	23.53	25.94	11.01
2500	24.26	25.50	10.91
2600	28.96	22.70	10.17
2800	19.91	17.32	8.67
3000	12.51	12.38	7.62
3200	8.46	8.57	6.50
3400	6.04	6.11	5.34
3600	4.50	4.56	4.33
3800	3.44	3.53	3.49
4000	2.67	2.78	2.79
4200	2.09	2.18	2.24
4400	1.65	1.72	1.81
4600	1.38	1.37	1.49
4800	1.23	1.11	1.31
4900	1.20	1.04	1.28
5000	1.19	1.10	1.28
5100	1.21	1.19	1.32
5200	1.23	1.28	1.36
5300	1.25	1.35	1.40
5400	1.28	1.41	1.43
5500	1.30	1.45	1.45
5600	1.33	1.47	1.46
5700	1.34	1.48	1.45
5800	1.36	1.46	1.42
5900	1.36	1.42	1.37
5950	1.37	1.40	1.33
6000	1.38	1.37	1.29
6200	1.43	1.26	1.13
6400	1.57	1.26	1.14
6600	1.87	1.49	1.42
6800	2.44	1.93	1.81
7000	3.70	2.70	2.02
7200	4.55	3.81	2.84
7400	5.25	4.86	4.13
7600	6.34	6.17	5.26
7800	7.54	7.59	6.31
8000	8.82	8.83	7.07
8200	10.16	9.61	7.59
8400	11.57	9.77	8.01
8600	13.12	9.37	8.34
8800	14.83	8.63	8.70
9000	16.79	7.87	9.32
9200	19.06	7.35	10.17
9400	21.73	7.16	11.48
9600	24.90	7.39	13.30
9800	28.76	8.08	15.72
10000	33.62	9.30	19.03
10400	42.53	13.88	27.28
10800	36.46	22.42	34.69
11200	33.51	36.46	35.31
11600	31.80	49.08	26.06
11900	30.65	47.41	18.35
12000	30.28	44.46	15.86
12500	28.21	24.02	8.01
13000	26.29	10.37	4.75
13500	25.92	4.61	5.24
14000	28.41	3.84	10.06
14500	33.38	7.82	23.33
14700	35.63	11.35	34.20
15000	38.97	20.44	58.93
15500	43.29	59.77	113.04
16000	45.22	160.16	54.11
16500	45.06	89.21	16.99
17000	44.26	23.79	5.15
17500	37.61	6.50	1.93
18000	33.53	1.75	4.18

Typical Performance Curves

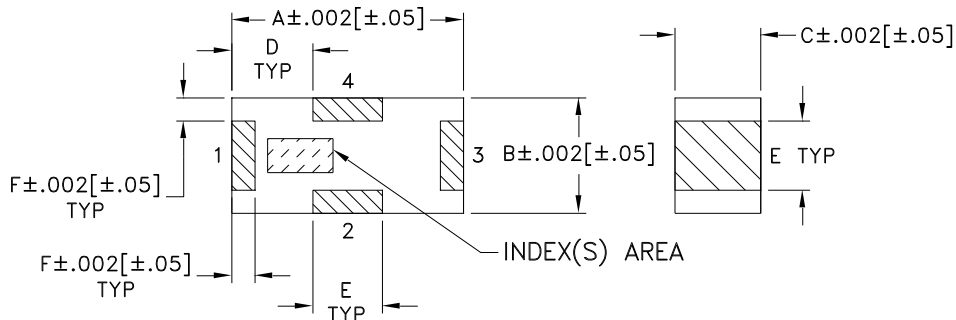


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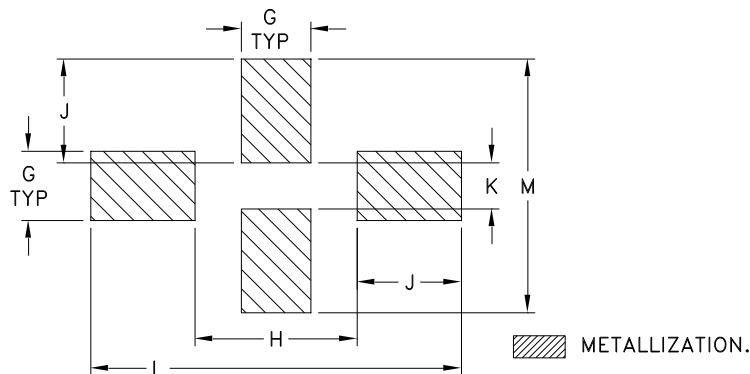


IF/RF MICROWAVE COMPONENTS

Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within $\pm.002$

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. $\pm .01$; 3 Pl. $\pm .005$

Notes:

- Open style, ceramic base.
- Termination finish:
For RoHS Case Styles: Matte Tin over Nickel plating. Models with (+) suffix.
- *Line width should be designed to match 50 Ω characteristic impedance, depending on PCB material and thickness.



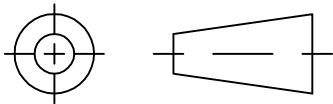
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RF/IF MICROWAVE COMPONENTS

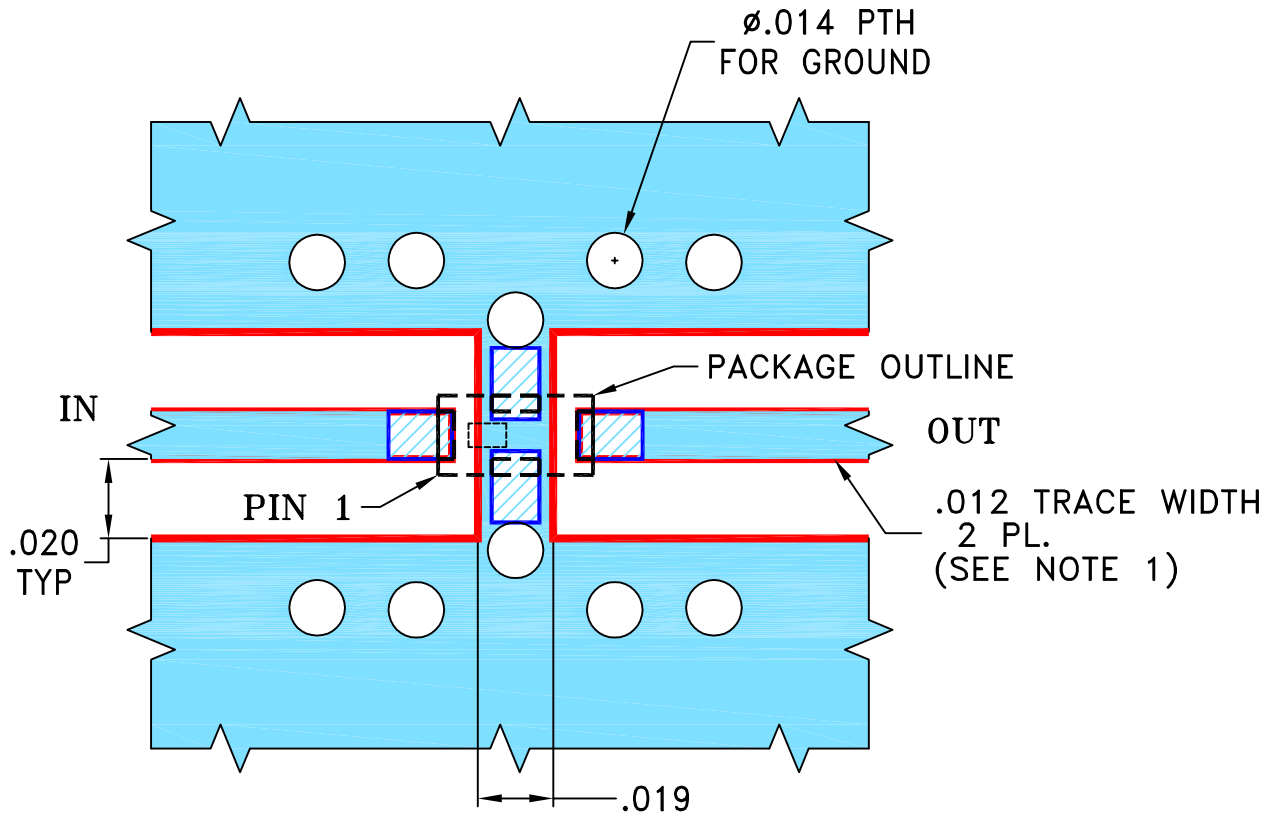
THIRD ANGLE PROJECTION



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 $.006 \pm .0005$. 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
DRAWN	NP	05/30/18
CHECKED	GF	05/31/18
APPROVED	SL	05/31/18



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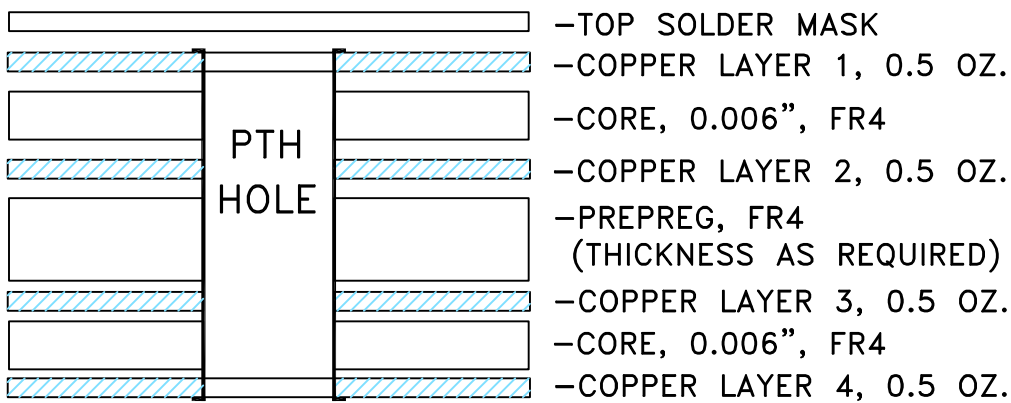
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SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-569	REV: OR
FILE: 98PL569	SCALE: 20:1	SHEET: 1 OF 2	

STACK-UP DIAGRAM



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

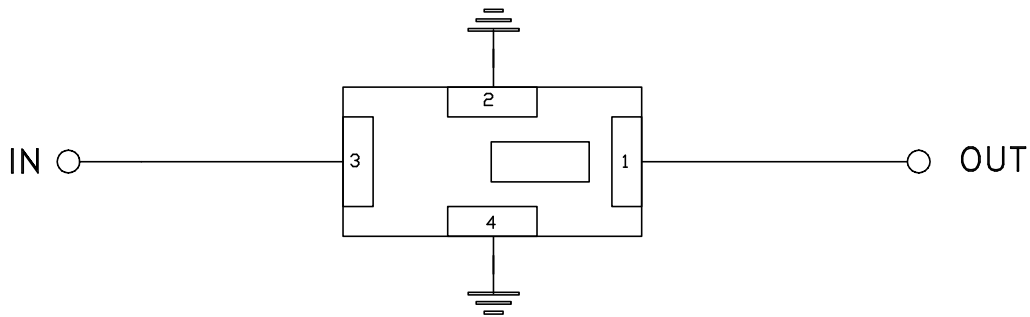
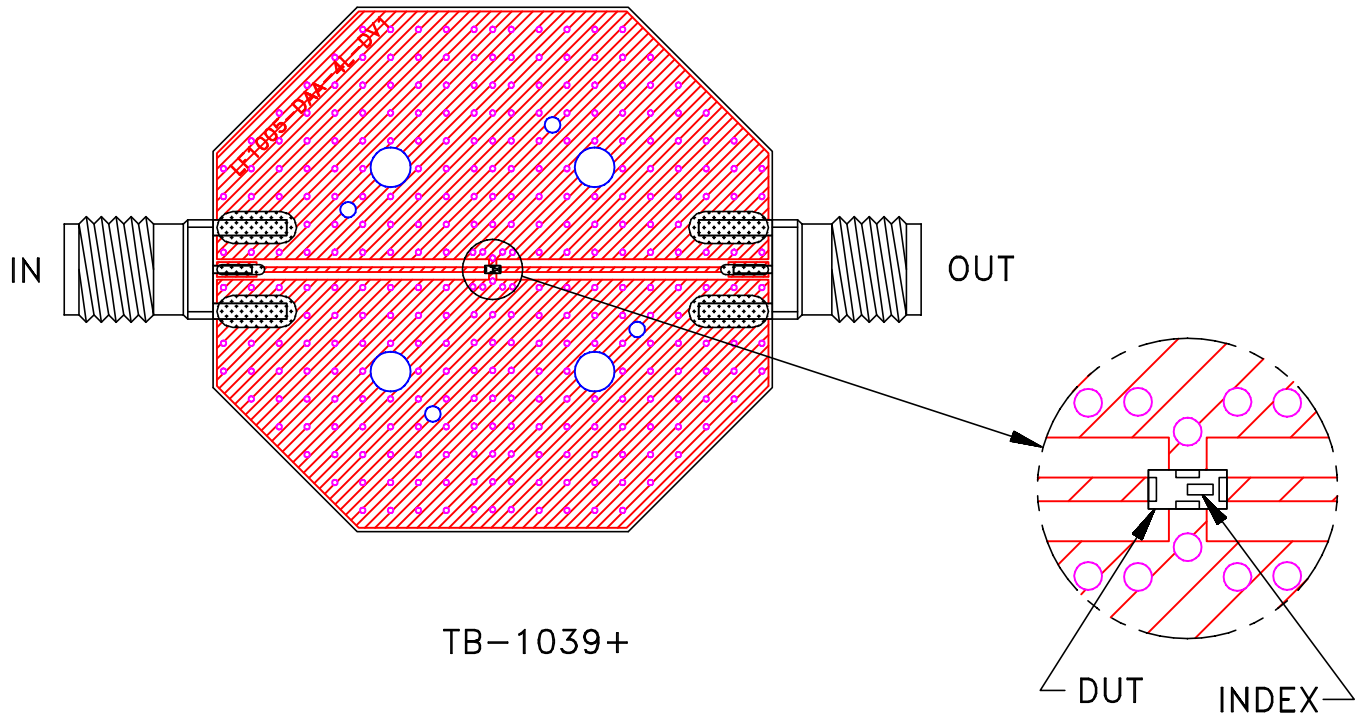
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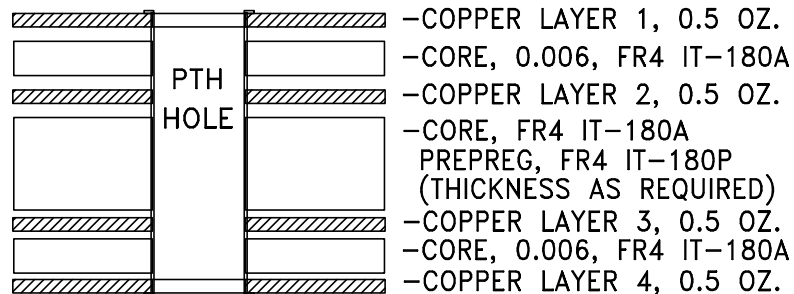
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SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-569	REV: OR
FILE: 98PL569	SCALE: 20:1	SHEET: 2 OF 2	

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 = .058 inch.

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Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-40° to 85° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-40° to 85° C Ambient Environment	Individual Model Data Sheet
Thermal Shock	-40° to 125°C, 100 cycles	MIL-STD-202 Method 107, Condition A-3 except -40°C instead of -55° C and +125° C instead of -85° C
Solder Reflow Heat	Pb-Free Process 245° -250°C peak,	J-STD-020, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, Para 4.2.5, Test S, 95% Coverage
Shelf Life	Shelf life is 12 months when kept in sealed bags. Unused parts are to be resealed to preserve shelf life for proper solderability.	