

# LTCC Diplexer

## DPNK-252-492R+

50Ω 2400 to 2500 MHz (5150 to 5850 MHz)



Generic photo used for illustration purposes only  
CASE STYLE: NK0402C

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

**Available Tape and Reel at no extra cost**

Reel Size	Devices/Reel
7"	20, 50, 100, 200, 500, 1000, 4000

### Maximum Ratings

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

\*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.  
Permanent damage may occur if any of these limits are exceeded.  
\*\*Derate linearly to 1.5W at 85°C

### Pad Connections

Low Pass Port	4
Band Pass Port	3
Common Port	1
Ground	2

### Features

- low insertion loss
- miniature size 0402
- low cost
- aqueous washable

### Applications

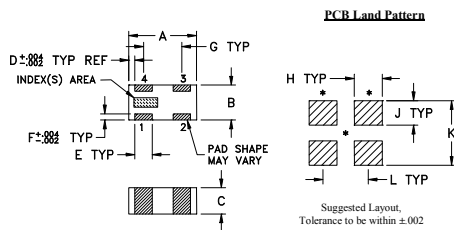
- ISM Band
- WLAN
- Bluetooth
- Zigbee

### Electrical Specifications<sup>1</sup> at 25°C

Parameter	Port	Frequency (MHz)	Min.	Typ.	Max.	Unit	
Pass Band	Insertion Loss	Low Pass	2400 - 2500	—	0.4	0.5	dB
		Band Pass	5150 - 5850	—	1.2	2	
	Return Loss	Low Pass	2400 - 2500	9.5	31	—	dB
		Band Pass	5150 - 5850	9.5	23	—	
		Common	2400 - 2500	9.5	31	—	
			5150 - 5850	9.5	27	—	
Stop Band Rejection	Band Pass	700 - 2025	27	30	—	dB	
		2400 - 2690	28	40	—		
		3500 - 3700	10	15	—		
	Low Pass	7250 - 7800	11	24	—	dB	
		10300 - 11700	20	30	—		
		4800 - 6000	16	26	—		
		7200 - 7500	14	22	—		

<sup>1</sup> Tested on Evaluation Board TB-1040+

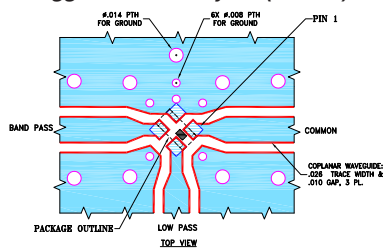
### Outline Drawing



### Outline Dimensions (inch mm)

A	B	C	D	E	F	G	H
.039	.020	.015	.004	.010	.004	.022	.016
1.0	0.51	0.38	0.10	0.25	0.10	0.56	0.41
J	K	L				wt	
.014	.037	.026				grams	
0.36	0.94	0.66				.0007	

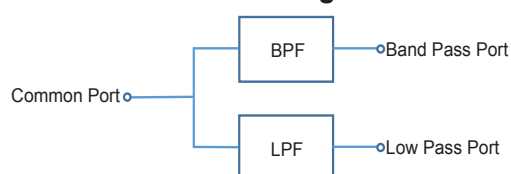
### Evaluation Board MCL P/N: TB-1040+ Suggested PCB Layout (PL-571)



### Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)			Return Loss (dB)	
	Low Pass Port	Band Pass Port	Common Port	Low Pass Port	Band Pass Port
500	0.11	35.41	26.09	26.14	0.03
700	0.14	32.78	23.44	23.57	0.03
1500	0.26	28.83	19.97	20.73	0.08
2025	0.31	29.63	21.72	23.06	0.06
2400	0.36	33.34	25.53	27.92	0.13
2450	0.36	34.36	26.33	28.90	0.17
2500	0.37	35.58	27.11	30.07	0.16
2690	0.40	46.92	30.97	36.54	0.23
3000	0.49	31.63	29.21	28.99	0.37
3500	0.89	17.49	19.25	17.35	0.79
3700	1.33	13.27	16.49	13.49	1.25
4000	2.99	7.53	13.12	7.74	2.83
4800	19.92	1.58	14.70	1.29	11.98
5150	33.11	1.21	20.20	1.06	16.01
5500	22.91	1.11	31.25	1.08	22.76
5850	19.85	1.20	34.56	1.15	24.82
6500	18.91	2.36	13.24	1.22	10.82
7200	15.88	11.70	2.16	1.27	1.75
7250	16.08	12.85	1.92	1.26	1.56
7500	17.70	19.74	1.15	1.24	1.02
7800	20.87	29.08	0.72	1.24	0.71
9000	30.25	20.83	0.12	1.32	0.18
10300	25.48	22.86	0.18	0.62	0.35
11700	38.18	29.16	0.12	0.09	0.50

### Block Diagram



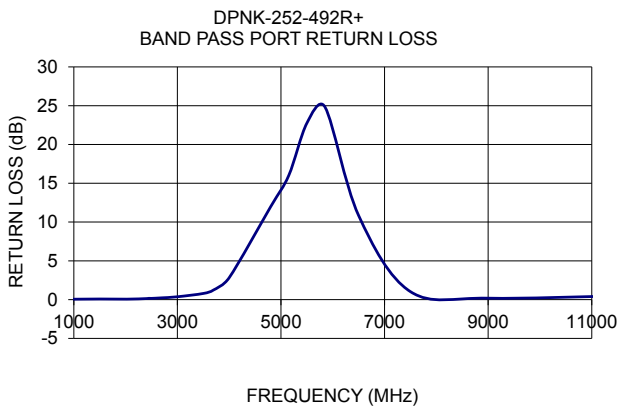
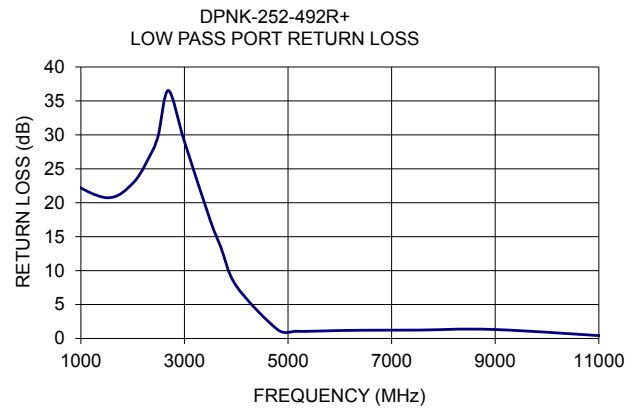
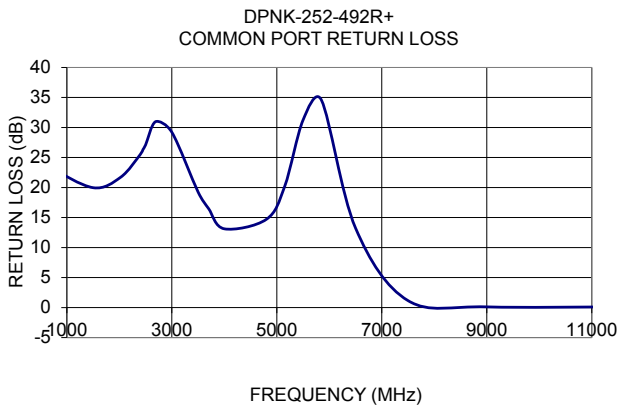
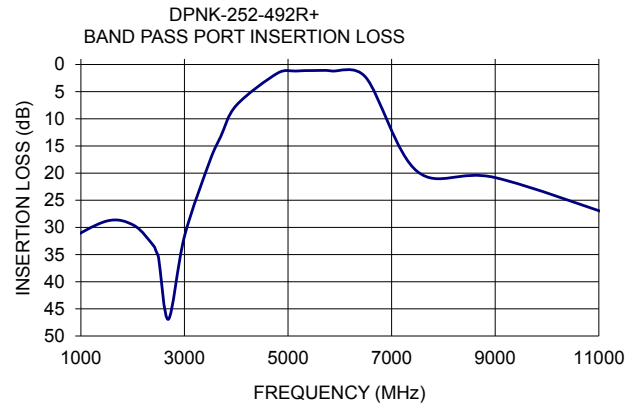
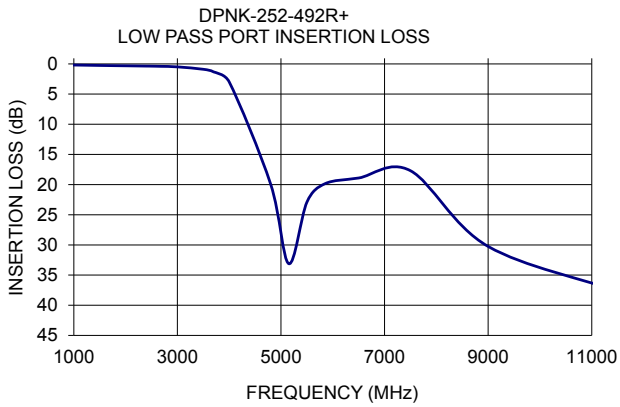
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REV. OR  
M172548  
DPNK-252-492R+  
AVB/CP/AM  
190514  
Page 1 of 2



Notes

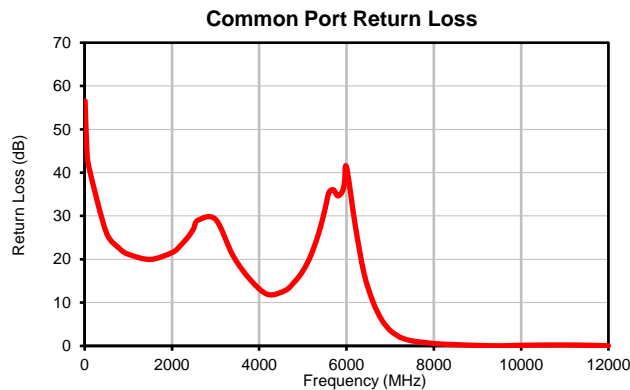
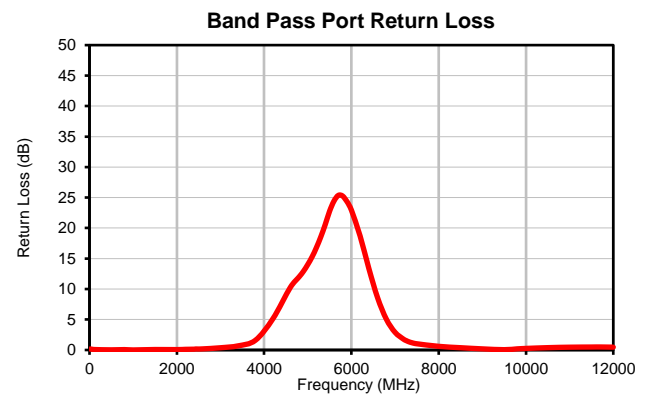
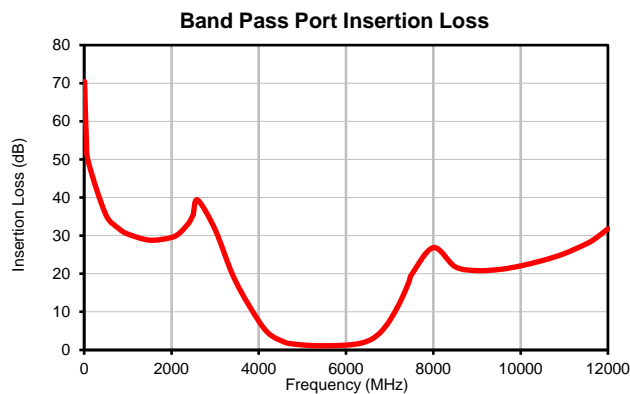
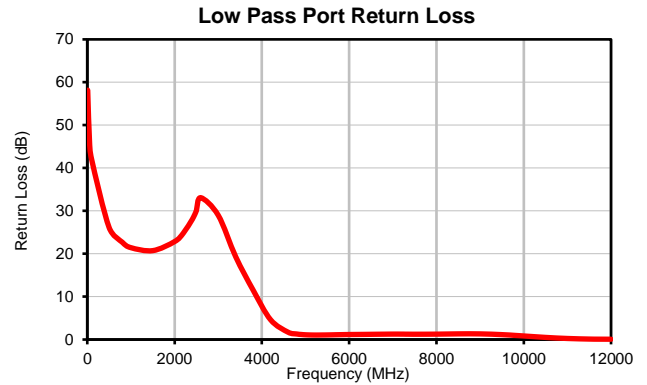
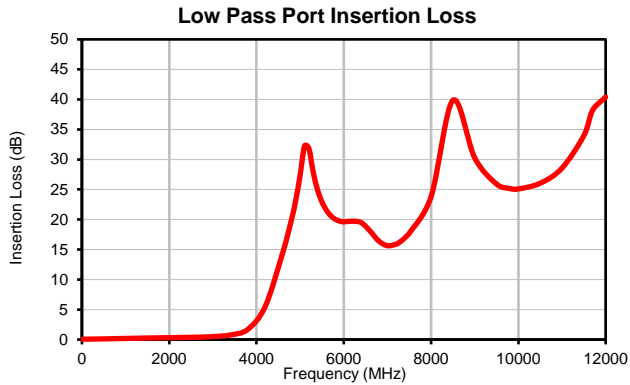
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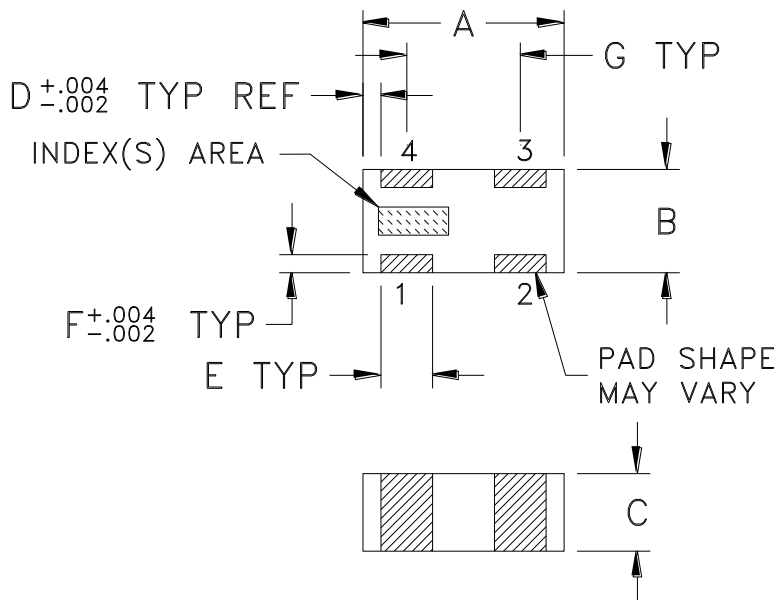
## Typical Performance Data

FREQUENCY (MHz)	INSERTION LOSS (dB)		RETURN LOSS (dB)		
	Low Pass port	Band Pass port	Common port	Low Pass port	Band Pass port
	10	0.04	70.45	56.56	58.15
50	0.08	55.54	45.75	46.53	0.14
100	0.06	49.20	41.19	42.00	0.08
500	0.11	35.41	26.09	26.14	0.03
800	0.16	31.82	22.49	22.71	0.07
1000	0.18	30.43	21.17	21.42	0.01
1500	0.26	28.83	19.97	20.73	0.08
2000	0.31	29.52	21.54	22.84	0.07
2200	0.33	30.83	23.20	24.81	0.11
2400	0.36	33.34	25.53	27.92	0.13
2410	0.36	33.52	25.70	28.09	0.14
2420	0.36	33.73	25.84	28.30	0.16
2430	0.36	33.94	26.01	28.48	0.16
2440	0.36	34.15	26.15	28.68	0.17
2450	0.36	34.36	26.33	28.90	0.17
2460	0.36	34.59	26.48	29.09	0.16
2470	0.37	34.81	26.59	29.35	0.16
2480	0.37	35.02	26.78	29.55	0.16
2490	0.37	35.32	26.94	29.83	0.16
2500	0.37	35.58	27.11	30.07	0.16
2600	0.39	39.36	29.03	33.08	0.19
3000	0.49	31.63	29.21	28.99	0.37
3400	0.76	19.77	20.83	19.32	0.68
3800	1.69	11.25	15.23	11.53	1.59
4200	5.52	4.64	11.88	4.62	5.11
4600	14.45	2.03	12.83	1.72	10.26
4800	19.92	1.58	14.70	1.29	11.98
4900	23.24	1.44	15.85	1.18	12.89
5000	27.40	1.33	17.31	1.11	14.02
5100	32.23	1.25	19.08	1.07	15.28
5200	31.83	1.18	21.32	1.05	16.82
5300	27.85	1.13	24.08	1.05	18.58
5400	24.91	1.11	27.31	1.06	20.56
5500	22.91	1.11	31.25	1.08	22.76
5600	21.56	1.12	35.46	1.10	24.42
5700	20.63	1.14	36.04	1.12	25.36
5800	20.05	1.17	34.64	1.14	25.25
5900	19.73	1.22	35.57	1.16	24.33
5950	19.65	1.25	37.45	1.16	23.71
6000	19.61	1.29	41.28	1.17	22.94
6200	19.71	1.50	27.82	1.19	18.68
6400	19.48	1.97	16.82	1.21	13.37
6600	18.08	2.93	10.35	1.23	8.57
6800	16.42	4.76	6.13	1.25	5.06
7000	15.63	7.70	3.57	1.27	2.90
7200	15.88	11.70	2.16	1.27	1.75
7250	16.08	12.85	1.92	1.26	1.56
7300	16.33	14.07	1.72	1.25	1.40
7350	16.62	15.36	1.54	1.25	1.27
7400	16.94	16.73	1.40	1.24	1.17
7450	17.31	18.18	1.27	1.24	1.08
7500	17.70	19.74	1.15	1.24	1.02
8000	23.80	26.88	0.55	1.26	0.60
8500	39.86	21.85	0.29	1.32	0.38
9000	30.25	20.83	0.12	1.32	0.18
9500	25.90	21.12	0.03	1.15	0.05
9800	25.16	21.63	0.10	0.97	0.19
10000	25.09	22.08	0.13	0.84	0.26
10500	26.04	23.47	0.20	0.50	0.39
11000	28.56	25.29	0.22	0.25	0.46
11500	33.98	27.83	0.16	0.11	0.49
11700	38.18	29.16	0.12	0.09	0.50
12000	40.40	31.81	0.03	0.07	0.47

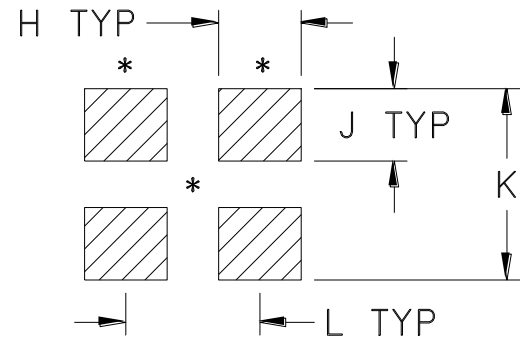
## Typical Performance Curves



### 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	WT.GRAMS
NK0402C	.039 (1.00)	.020 (.50)	.015 (0.37)	.004 (0.10)	.010 (0.25)	.004 (0.10)	.022 (0.55)	.016 (0.41)	.014 (0.36)	.037 (0.94)	.026 (0.65)	.0007

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

### 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 50 $\Omega$  characteristic impedance, depending on PCB material and thickness.



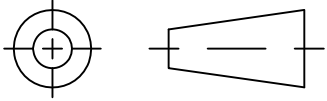
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RF/IF MICROWAVE COMPONENTS

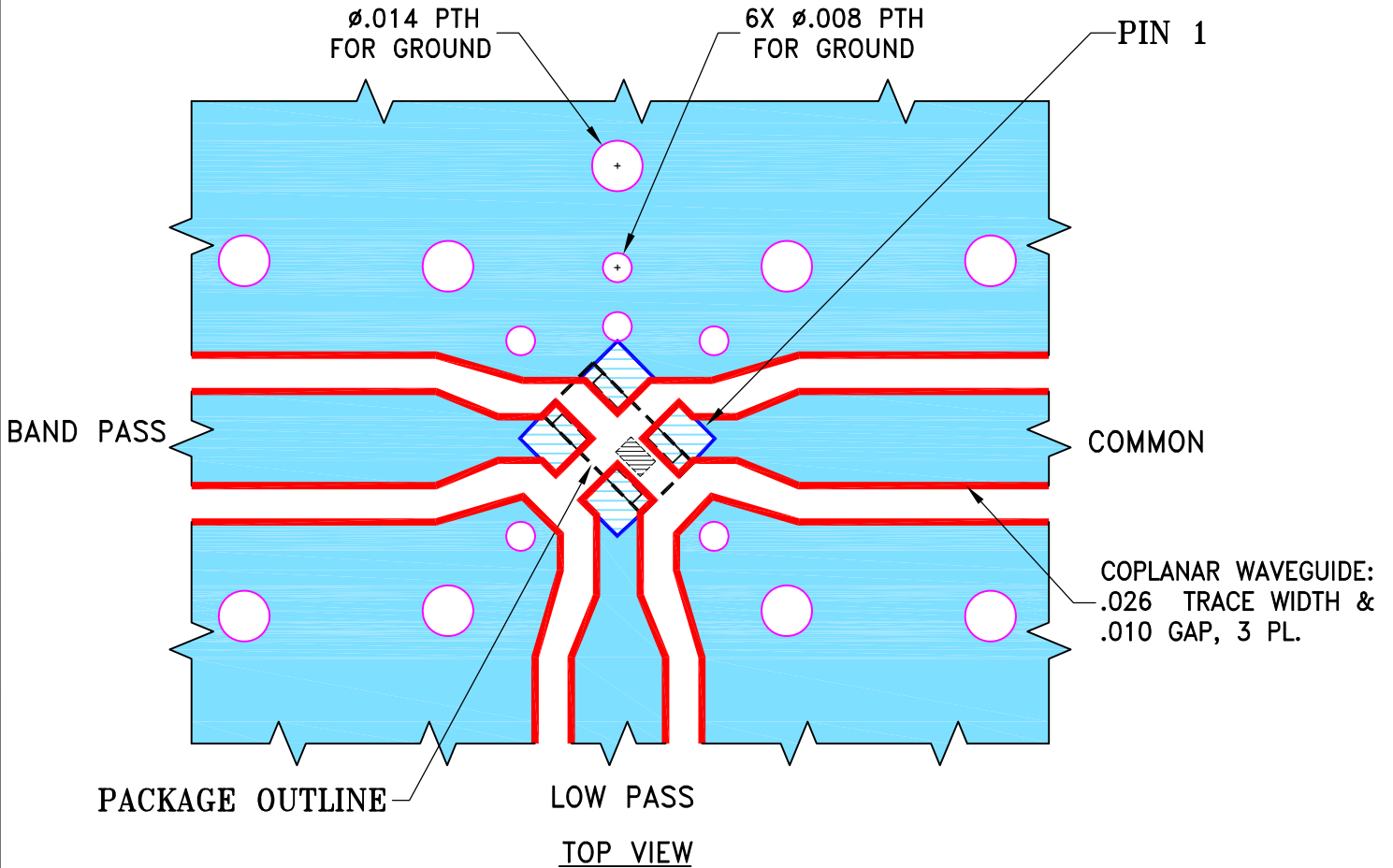
THIRD ANGLE PROJECTION



REVISIONS


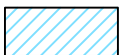
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M168200	NEW RELEASE	05/31/18	NP	SL
A	M174015	UPDATED DESCRIPTION OF THE PORTS	04/25/19	ITG	SL

**SUGGESTED MOUNTING CONFIGURATION  
FOR NK0402C CASE STYLE, "04DP02" PIN CODE**



**NOTES:**

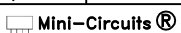
1. PCB IS MULTILAYER PCB, SEE STACK-UP DIAGRAM.
2. TRACE WIDTH AND GAP ARE SHOWN FOR FR4, GRADE IT-180TC (ITEQ CORP.) WITH DIELECTRIC THICKNESS  $.003 \pm .0005$ . COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
3. LAYERS 3 & 4 OF THE PCB ARE CONTINUOUS GROUND PLANES.

-  DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).
-  DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

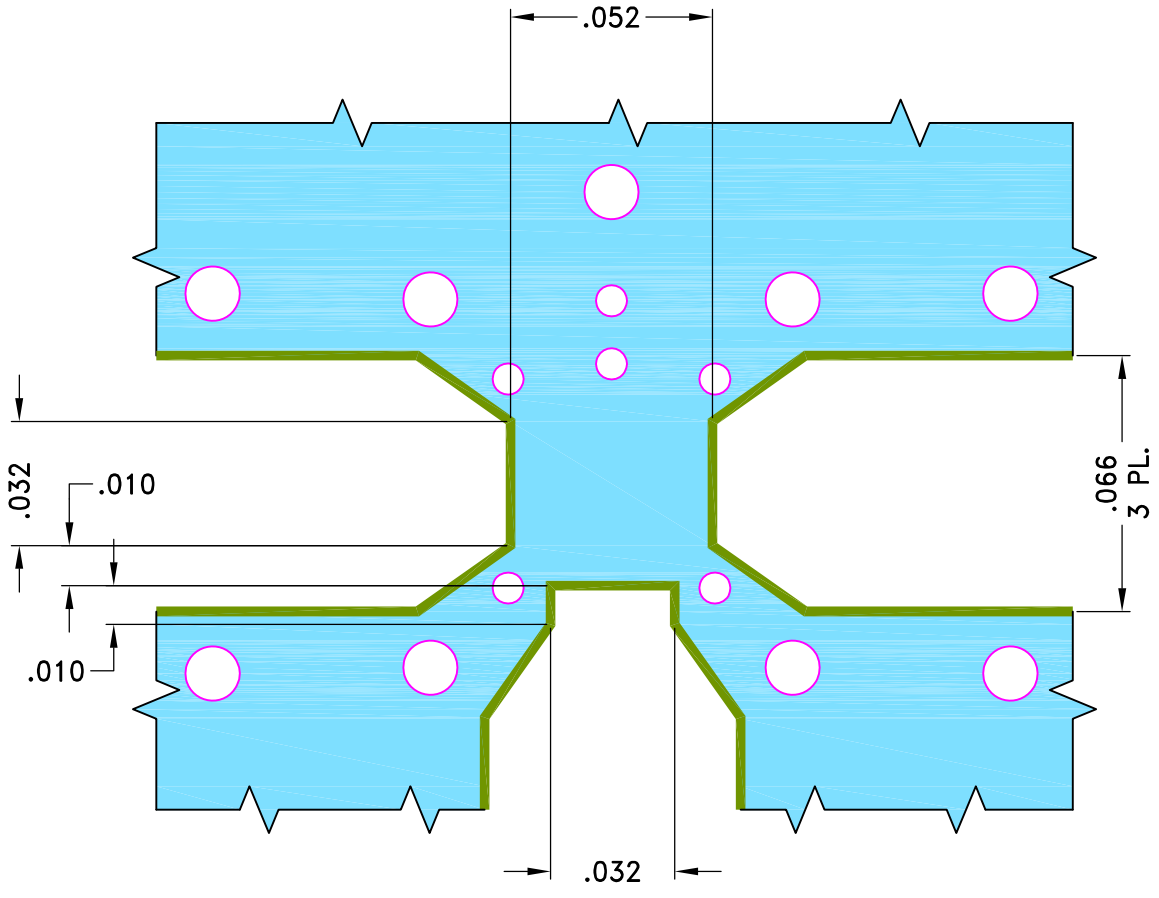
UNLESS OTHERWISE SPECIFIED	INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN NP	05/30/18
TOLERANCES ON:	CHECKED GF	05/30/18
2 PL DECIMALS ±	APPROVED SL	05/31/18
3 PL DECIMALS ± .005		
ANGLES ±		
FRACTIONS ±		

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Brooklyn NY 11235

PL, 04DP02, NK0402C, TB-1040+

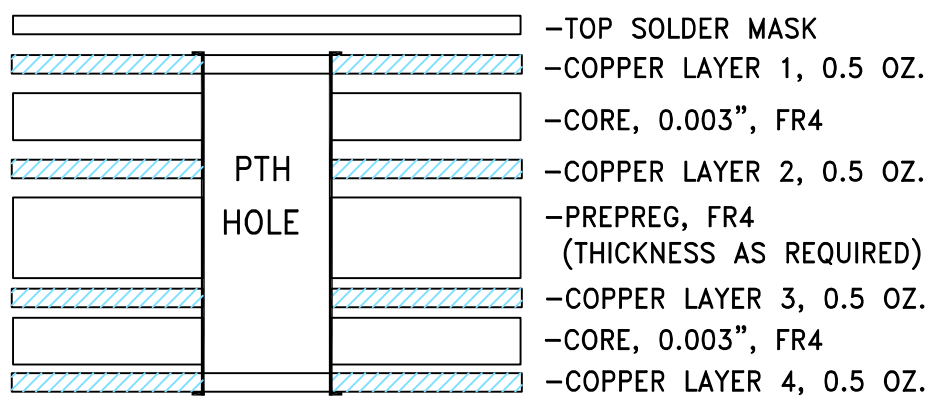
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SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-571	A
FILE:	98PL571	SCALE: 20:1	SHEET: 1 OF 2

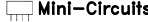


LAYER 2

STACK-UP DIAGRAM



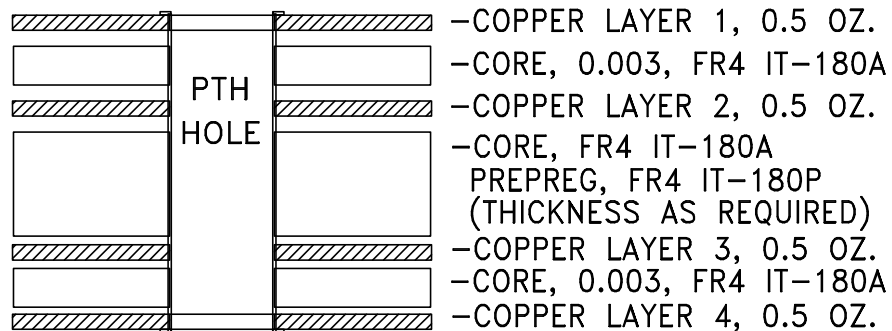
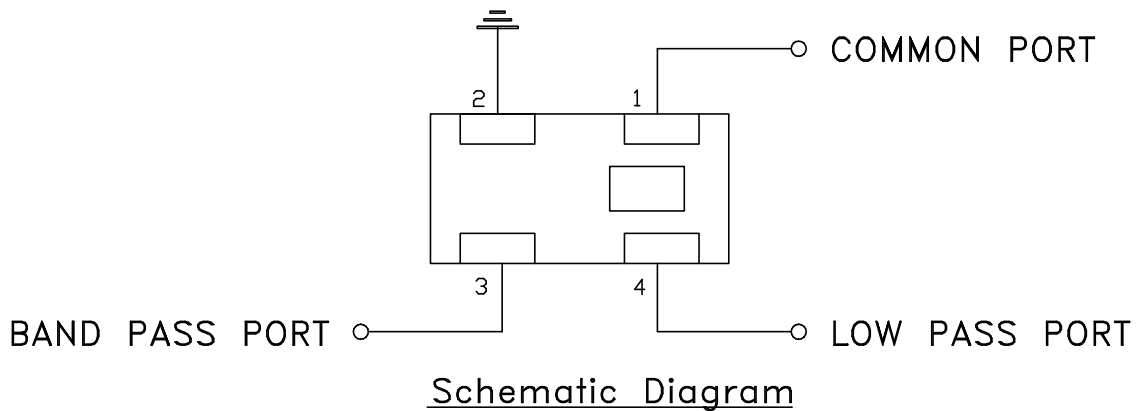
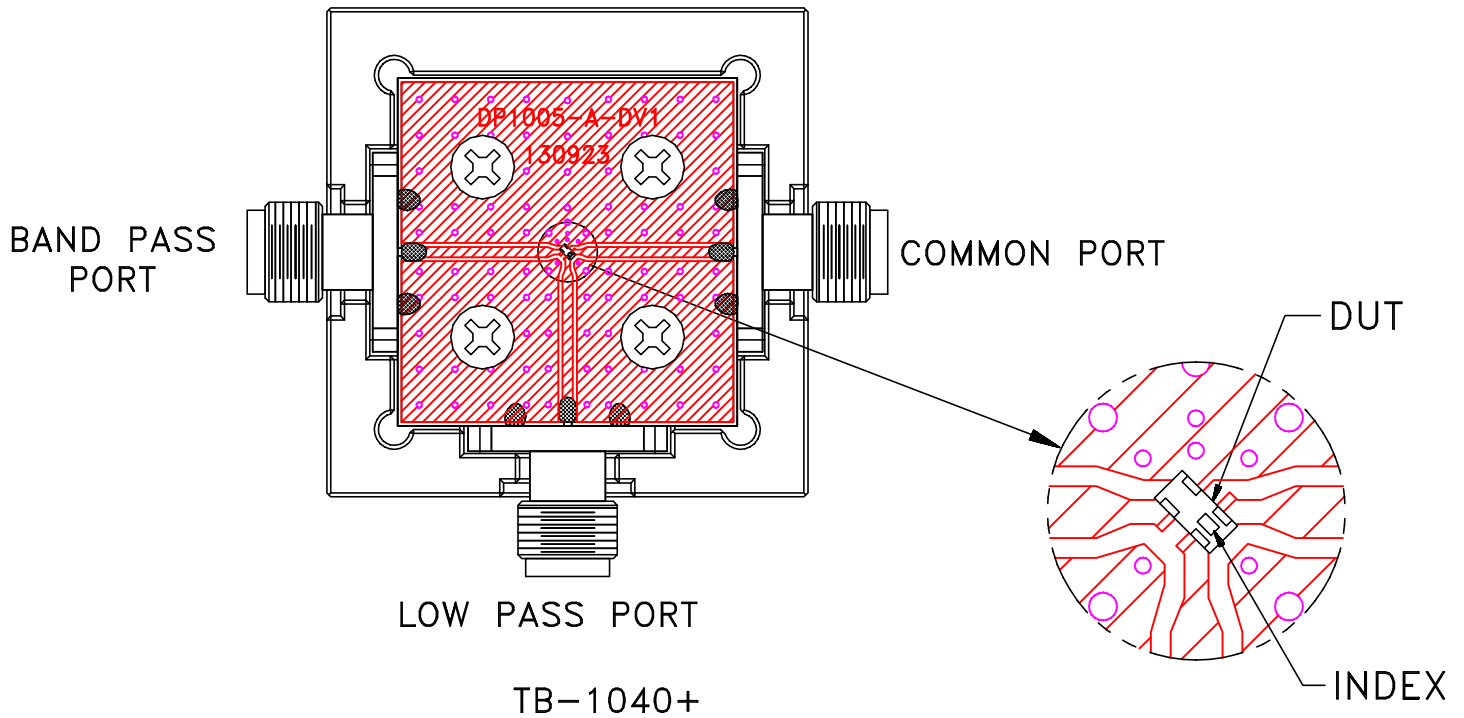
1. TOTAL FINISHED THICKNESS 0.020" ± 10%.
2. PTH HOLES PRESENT FROM COPPER LAYER 1 TO 4.

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

ALL DIMENSIONS ARE IN INCHES EXCEPT OTHERWISE SPECIFIED

SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-571	REV: A
FILE: 98PL571	SCALE: 20:1	SHEET: 2 OF 2	


# Evaluation Board and Circuit



Stack-up Diagram

## Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: FR4 or equivalent, Dielectric Constant=4.5, Total finished Thickness = .025 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	-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.	