

LTCC

Low Pass Filter

50Ω 2400 to 2500 MHz

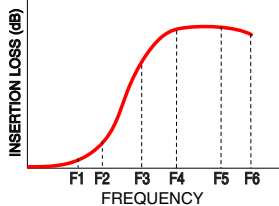
Features

- Miniature size 0402
- Low Insertion Loss and High stop band rejection.
- Low cost
- Aqueous washable

Applications

- ISM Band
- WLAN
- Bluetooth
- Zigbee

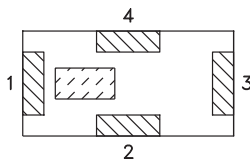
Specification Definition



Block Diagram



Top View



Pad Connections

Input	1
Output	3
Ground	2,4

LPNK-252R+



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



Available Tape and Reel
at no extra cost

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

Electrical Specifications at 25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Insertion Loss*	F1-F2	2400 - 2500	—	0.5	0.7	dB
	VSWR	F1-F2	2400 - 2500	—	1.4	1.9	:1
Stop Band	Rejection Loss	F3-F4	4800 - 5000	28	42	—	dB
		F5-F6	7200 - 7500	33	40	—	dB

* Tested on Evaluation Board TB-1038+

Maximum Ratings

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

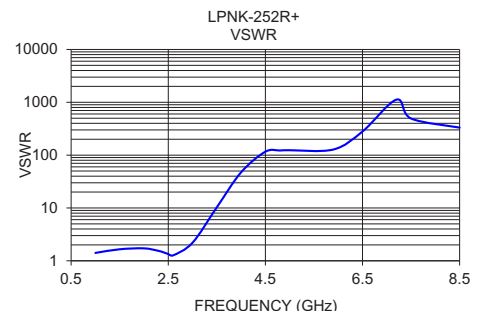
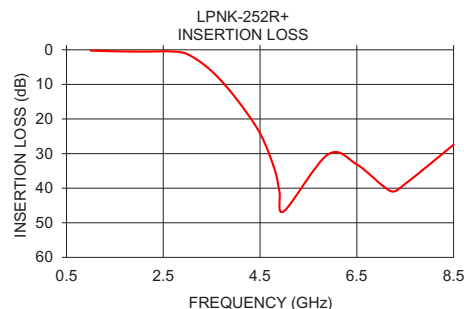
**Refer to product storage temperature after installation
Suggestion for T&R unused product storage condition:
+5 ~ +35 °C, Humidity 45~75%RH, 12 month Max.

†Derate linearly to 1.5W at 85°C

Typical Performance Data at 25°C***

Frequency (GHz)	Insertion Loss (dB)	VSWR (:1)
1.00	0.24	1.41
1.50	0.43	1.65
2.00	0.52	1.72
2.30	0.49	1.54
2.40	0.46	1.45
2.44	0.45	1.41
2.50	0.44	1.34
2.60	0.44	1.27
3.00	1.27	2.20
3.50	6.17	10.28
4.00	13.99	47.29
4.50	24.15	116.20
4.80	34.54	122.35
4.90	40.91	123.79
5.00	46.58	123.88
5.90	30.28	127.84
6.50	33.13	280.05
7.20	40.84	1124.55
7.50	38.75	493.11
8.50	27.43	332.01

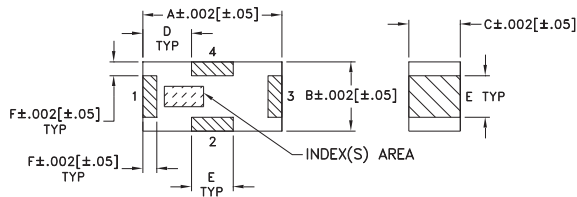
*** Measured with Agilent E5071B network analyzer using port extension.



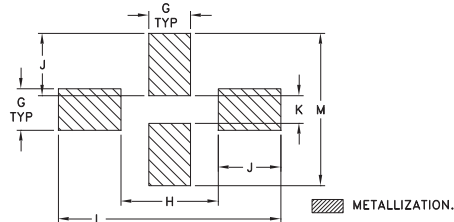
Low Pass Filter

LPNK-252R+

Outline Drawing



PCB Land Pattern



Suggested Layout,
Tolerance to be within .002

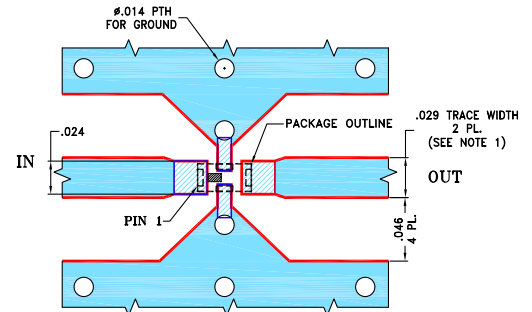
Pad Connections

Input	1
Output	3
Ground	2,4

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	

Evaluation Board MCL P/N: TB-1038+ Suggested PCB Layout (PL-568)



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.

Additional Notes

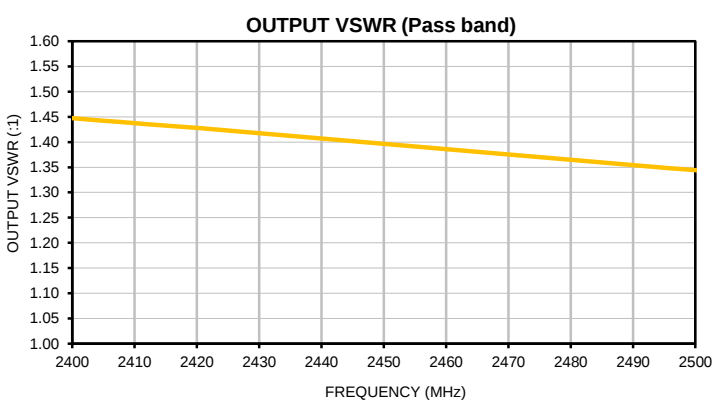
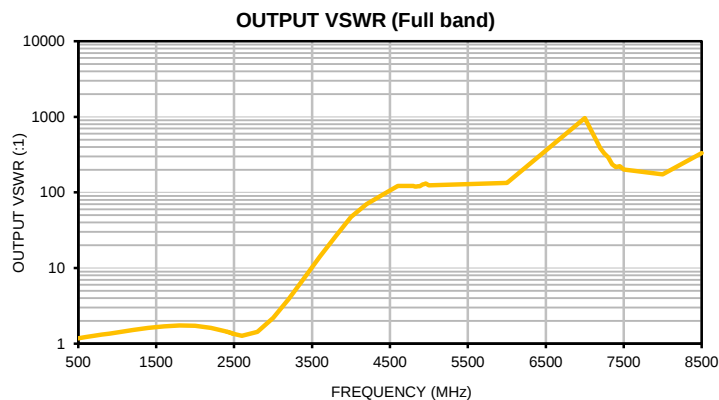
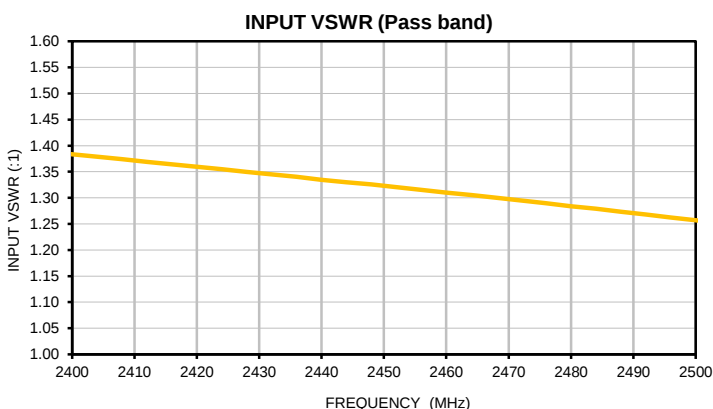
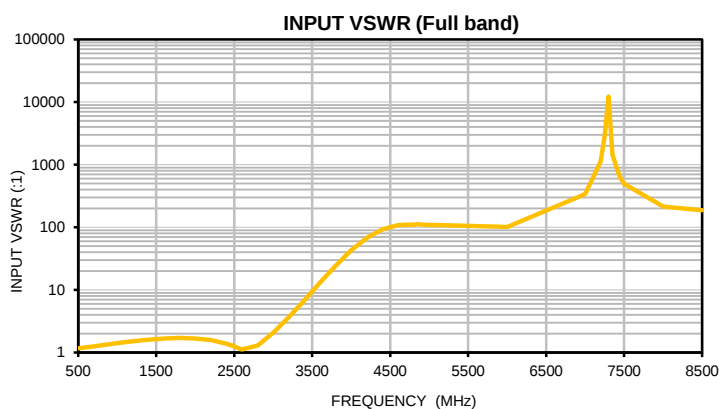
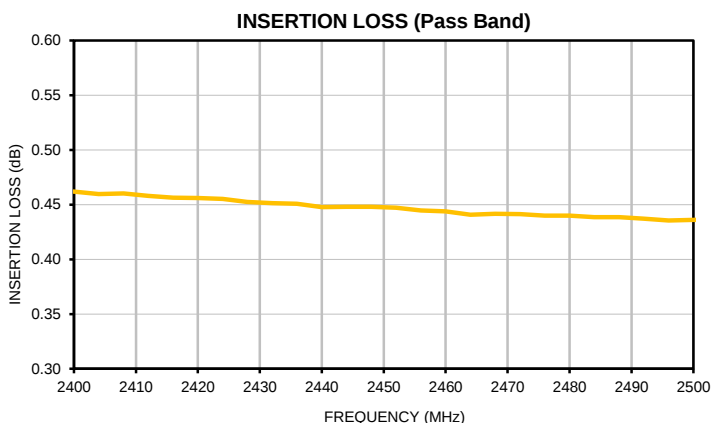
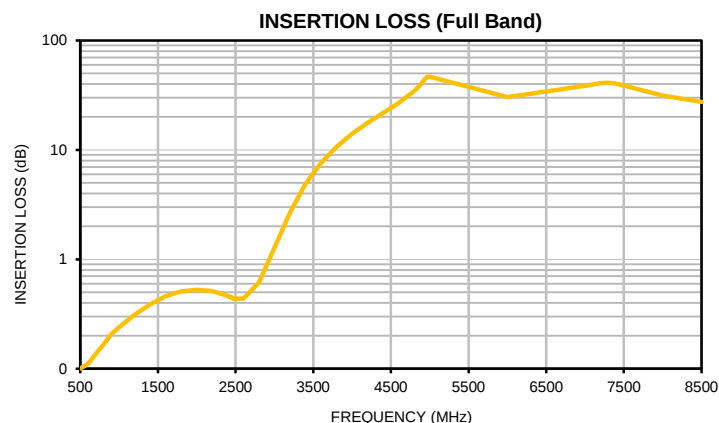
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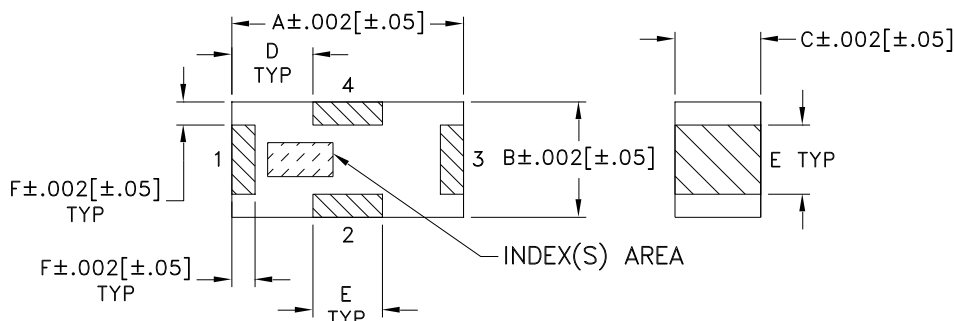
Typical Performance Data

FREQUENCY (MHz)	INSERTION LOSS (dB)	INPUT VSWR (:1)	OUTPUT VSWR (:1)
500	0.10	1.17	1.18
600	0.11	1.21	1.23
700	0.14	1.26	1.27
800	0.17	1.30	1.31
900	0.21	1.36	1.36
1000	0.24	1.41	1.41
1200	0.31	1.51	1.52
1400	0.39	1.60	1.62
1600	0.46	1.68	1.70
1800	0.51	1.71	1.74
2000	0.52	1.68	1.72
2200	0.51	1.58	1.62
2400	0.46	1.38	1.45
2404	0.46	1.38	1.44
2408	0.46	1.37	1.44
2412	0.46	1.37	1.44
2416	0.46	1.36	1.43
2420	0.46	1.36	1.43
2424	0.46	1.36	1.42
2428	0.45	1.35	1.42
2432	0.45	1.34	1.42
2436	0.45	1.34	1.41
2440	0.45	1.33	1.41
2444	0.45	1.33	1.40
2448	0.45	1.33	1.40
2452	0.45	1.32	1.39
2456	0.44	1.32	1.39
2460	0.44	1.31	1.39
2464	0.44	1.31	1.38
2468	0.44	1.30	1.38
2472	0.44	1.29	1.37
2476	0.44	1.29	1.37
2480	0.44	1.28	1.36
2484	0.44	1.28	1.36
2488	0.44	1.27	1.36
2492	0.44	1.27	1.35
2496	0.44	1.26	1.35
2500	0.44	1.26	1.34
2600	0.44	1.12	1.27
2800	0.61	1.30	1.44
3000	1.27	2.06	2.20
3200	2.68	3.64	3.89
3400	4.86	6.84	7.38
3600	7.60	13.03	14.07
3800	10.67	24.17	26.12
4000	13.99	42.79	47.29
4200	17.64	67.66	69.91
4400	21.77	92.63	92.32
4600	26.91	108.36	122.08
4800	34.54	110.28	122.35
4820	35.60	109.94	119.23
4840	36.76	111.44	119.19
4860	38.02	111.40	120.49
4880	39.38	111.07	120.61
4900	40.91	110.74	123.79
4920	42.60	111.31	128.06
4940	44.34	109.67	128.38
4960	45.95	109.49	131.45
4980	46.72	108.66	127.30
5000	46.58	109.75	123.88
6000	30.45	101.04	133.59
7000	38.61	338.81	962.64
7200	40.84	1124.53	383.04
7250	41.05	2803.71	329.50
7300	41.00	12268.21	292.42
7350	40.72	1454.31	234.92
7400	40.22	916.96	216.85
7450	39.52	624.59	222.06
7500	38.75	493.11	201.07
8000	31.47	214.05	172.90
8500	27.43	188.37	332.01

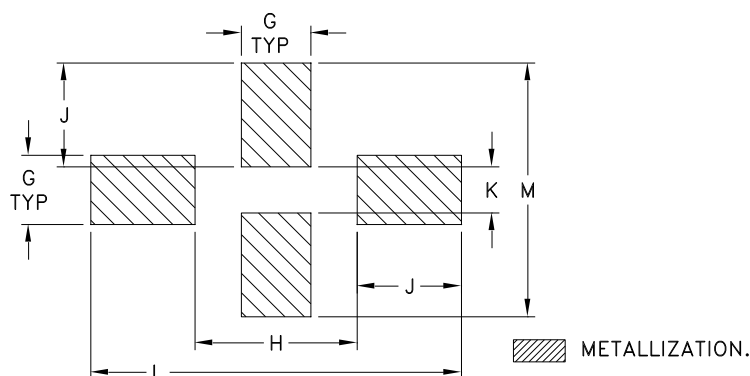
Typical Performance Curves



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	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.



P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



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RF/IF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F114-1

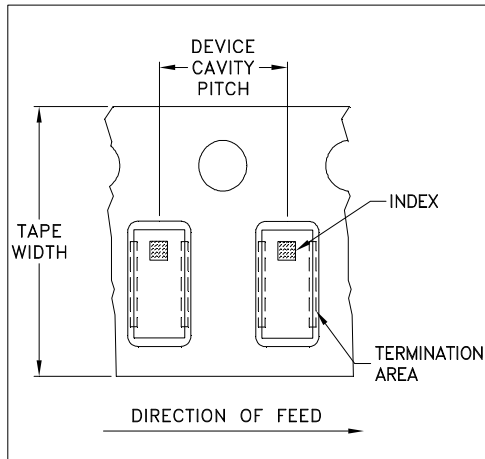


ILLUSTRATION 1

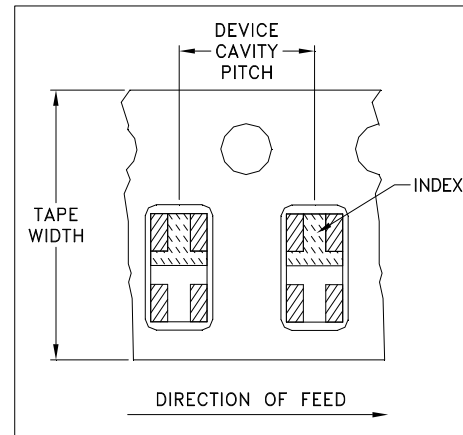


ILLUSTRATION 3

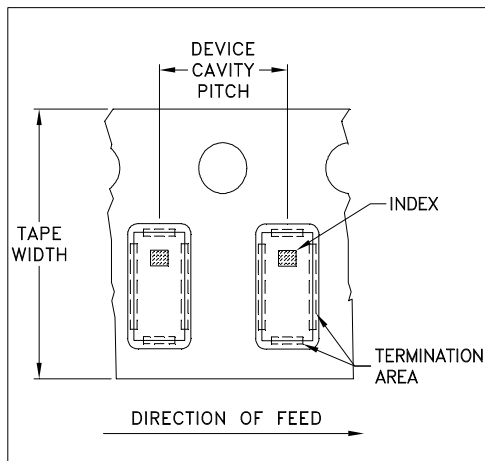


ILLUSTRATION 2

Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
8	2	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.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf



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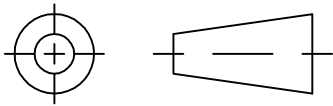
RF/IF MICROWAVE COMPONENTS

98-TR-F114-1 Rev.: OR (01/24/19) M172100 File: 98-TR-F114-1.docx

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Sheet 1 of 1

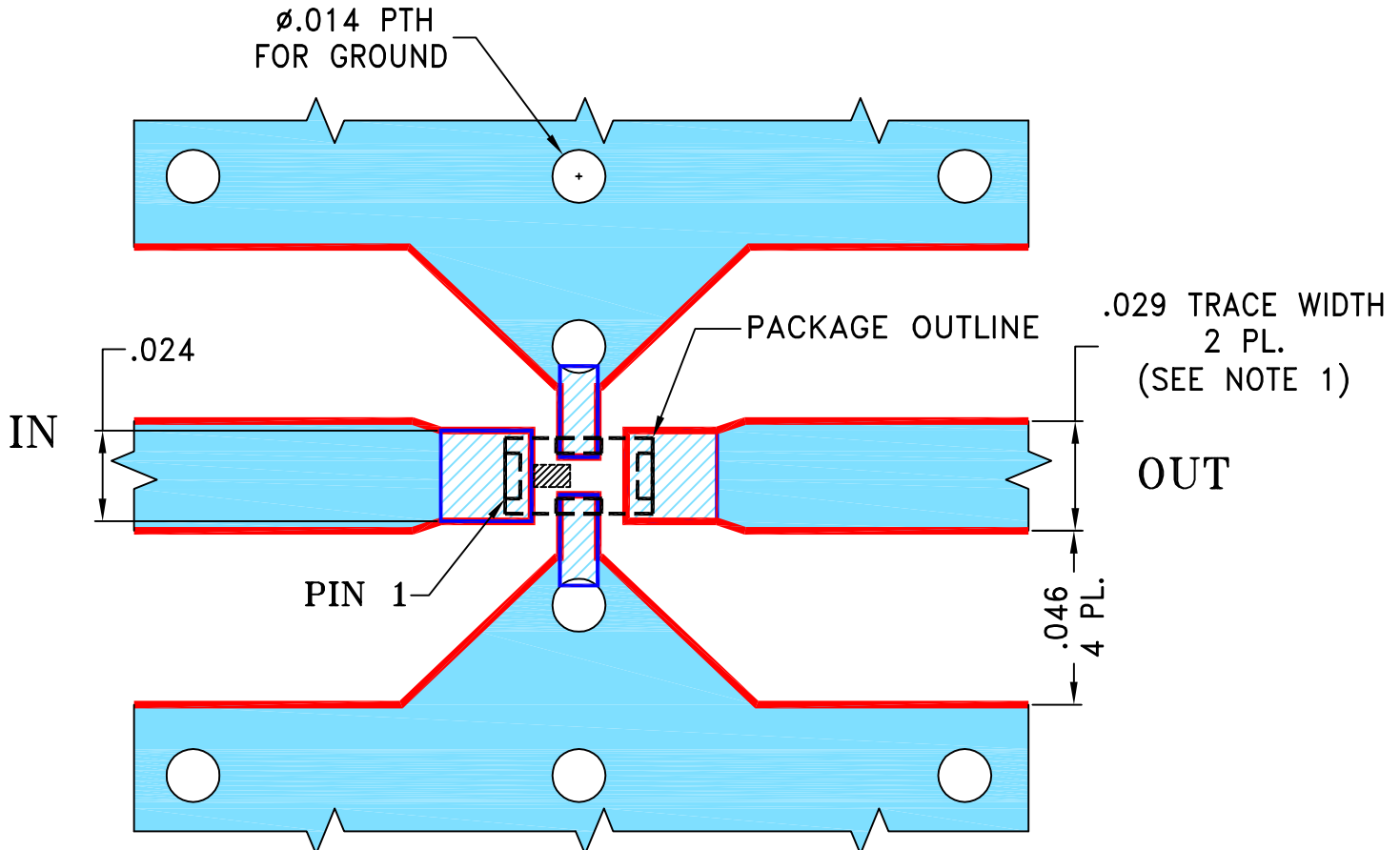
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M168200	NEW RELEASE	05/31/18	NP	SL
A	M172925	CHANGED PIN 1 LOCATION	03/05/19	NP	CM

SUGGESTED MOUNTING CONFIGURATION
FOR NK0402C-1 CASE STYLE, "04FL01" PIN CODE



NOTES:

- TRACE WIDTH IS SHOWN FOR FR4, GRADE IT-180TC (ITEQ CORP.) WITH DIELECTRIC THICKNESS $.016 \pm .0015$. COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
- 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

DIMENSIONS ARE IN INCHES

TOLERANCES ON:
 2 PL DECIMALS $\pm$
 3 PL DECIMALS $\pm$.005
 ANGLES $\pm$
 FRACTIONS $\pm$



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	INITIALS	DATE
DRAWN	NP	05/30/18
CHECKED	GF	05/30/18
APPROVED	SL	05/31/18



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13 Neptune Avenue
 Brooklyn NY 11235

PL, 04FL01, NK0402C-1, TB-1038+

SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-568	REV: A
FILE:	98PL568	SCALE: 15:1	SHEET: 1 OF 1

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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.	