



# Bandpass Filter

## CBP4-2375Q+

50Ω 2150 to 2600 MHz

### THE BIG DEAL

- Low Insertion Loss, 2 dB Typ.
- High Rejection, 60 dB Typ.
- Fractional Bandwidth from <1 to 25%
- Power Handling: 5 Watts
- Compact Size, 34.54 x 9.27 mm

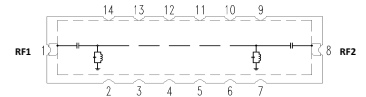


Generic photo used for illustration purposes only

### APPLICATIONS

- Radio Astronomy
- Test & Measurement
  - Industrial 2.45G ISM Band
- Telecom
  - Bluetooth
  - Wi-Fi 802.11n & 802.11g

### FUNCTIONAL DIAGRAM



### PRODUCT OVERVIEW

All our Surface Mount Ceramic Resonator filters are built with rugged construction, qualified to withstand multiple demanding reflow cycles. Excellent repeatability across units is achieved through precise tuning and process control.

### KEY FEATURES

Features	Advantages
Low Insertion Loss, 2 dB Typ.	Low signal loss results in better SNR in signal chain.
Fast roll-off (98%, 0.43dB/MHz at 20dB point)	Higher selectivity results in better adjacent channel rejection and dynamic range.
Excellent power handling, 5W	Well suited for transmitter applications.
Rugged Construction	These filter assemblies have been qualified over a wide range of thermal, mechanical and environmental conditions including withstanding the stress of extensive solder reflow cycles.
Compact Size, 34.54 X 9.27 mm	Very well suited for high performance applications where size is a constraint.



### ELECTRICAL SPECIFICATIONS<sup>1,2</sup> AT +25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Units
Passband	Center Frequency	—	—	—	2375	—	MHz
	Insertion Loss	F1-F3	2150 - 2600	—	2.0	2.6	dB
	Return Loss	F1-F2	2150 - 2180	7	14	—	dB
F2-F3		2180 - 2600	9	14	—	dB	
Stop Band, Lower	Rejection	DC-F4	DC - 1850	50	60	—	dB
		F4-F5	1850 - 2020	20	30	—	
Stop Band, Upper	Rejection	F6-F7	2800 - 2950	20	30	—	dB
		F7-F8	2950 - 3600	30	40	—	

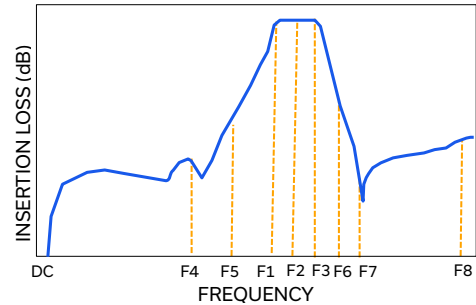
1. Tested in Evaluation Board P/N TB-CBP4-2375Q+.
2. Bi-directional RF1 and RF2 ports can be interchanged.

### ABSOLUTE MAXIMUM RATINGS<sup>3</sup>

Parameter	Ratings
Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +100°C
Input Power <sup>4</sup>	5W at 25°C

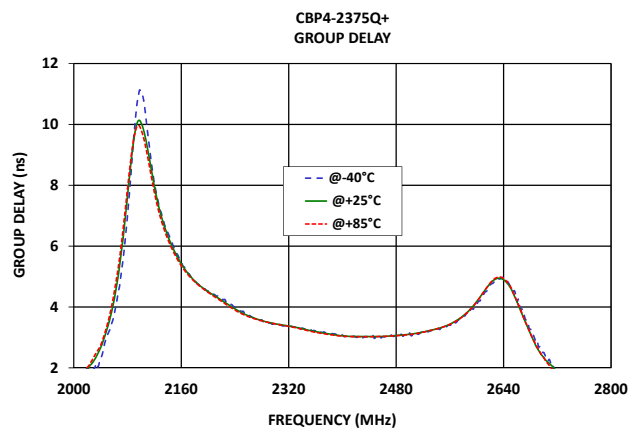
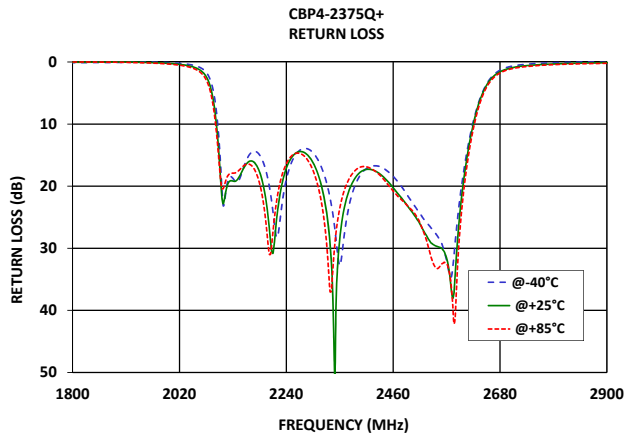
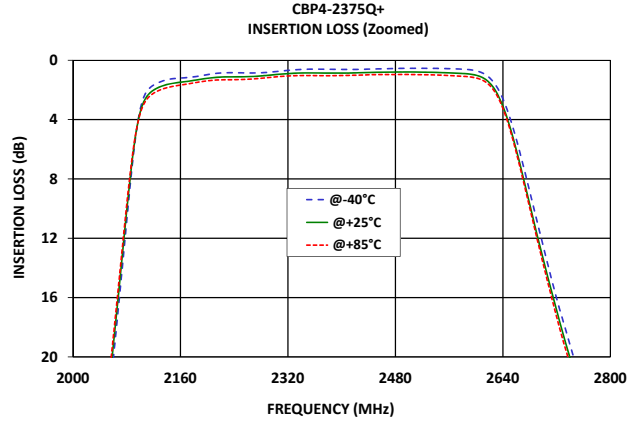
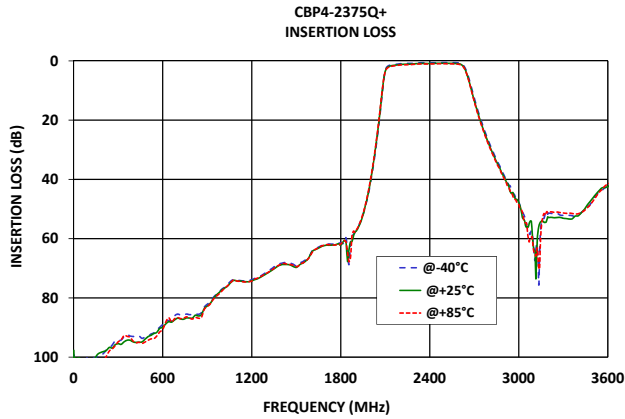
3. Permanent damage may occur if any of these limits are exceeded.
4. Passband rating

### TYPICAL FREQUENCY RESPONSE



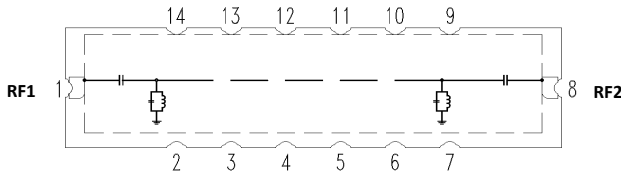


### TYPICAL PERFORMANCE GRAPHS





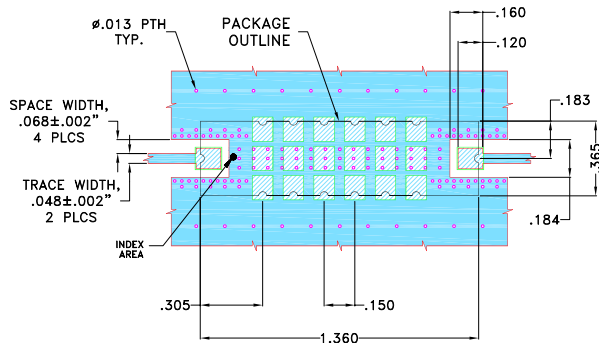
### FUNCTIONAL DIAGRAM



### PAD DESCRIPTION

Function	Pad Number	Description
RF1 (Note 2)	1	Connects to RF Input Port
RF2 (Note 2)	8	Connects to RF Output Port
GROUND	2,3,4,5,6,7,9,10,11,12,13,14	Connects to Ground on PCB, (See drawing PL-543)
NC	—	No connection, not used internally. See drawing PL-543 for connection to PCB

### SUGGESTED PCB LAYOUT (PL-543)

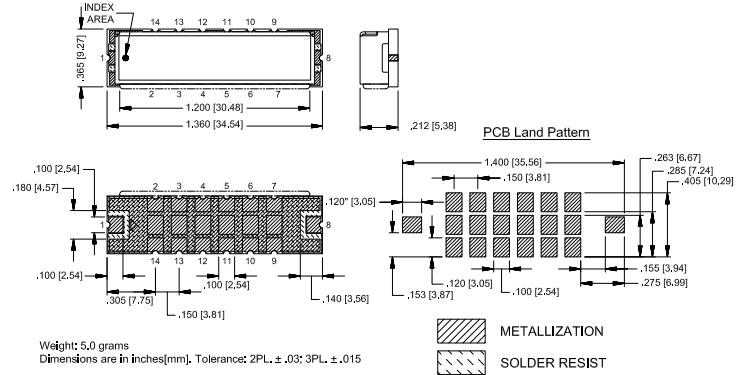


#### NOTES:

- TRACE WIDTH IS SHOWN FOR FR4, IT180A WITH DIELECTRIC THICKNESS .025"±.002". COPPER: 1/2 Oz EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH 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 SOLDERMASK

### CASE STYLE DRAWING



Weight: 5.0 grams  
Dimensions are in inches[mm], Tolerance: 2PL ± .03; 3PL ± .015

### PRODUCT MARKING\*: CBP4-2375Q

\*Marking may contain other features or characters for internal lot control.



CERAMIC RESONATOR SURFACE MOUNT

# Bandpass Filter

## CBP4-2375Q+

Mini-Circuits

50Ω 2150 to 2600 MHz

ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASH BOARD.

[CLICK HERE](#)

Performance Data and Graphs	Data
	Graphs
	S-Parameter (S2P Files) Data Set (.zip file) De-embedded to device pads
Case Style	HQ2299-1 Lead Finish: Electroless Nickel Immersion Gold
RoHs Status	Compliant
Tape and Reel	TR-F121
Suggested Layout for PCB Design	PL-543
Evaluation Board	TB-CBP4-2375Q+
	Gerber File
Environmental Rating	ENV54

### 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-Circuits' 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/terms/viewterm.html](http://www.minicircuits.com/terms/viewterm.html)



Typical Performance Data

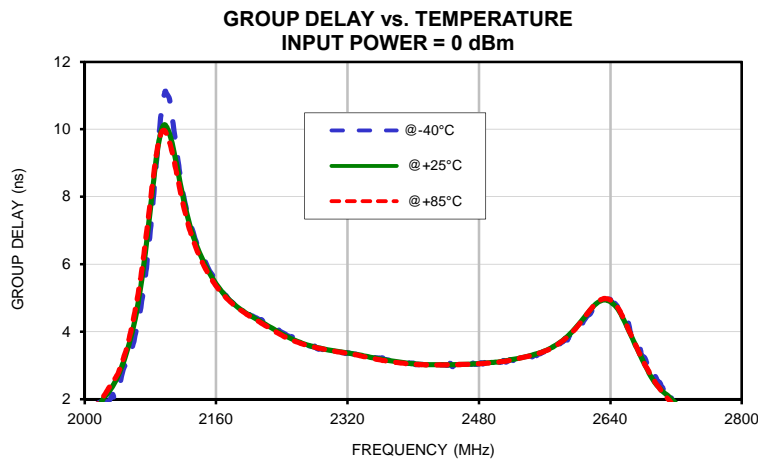
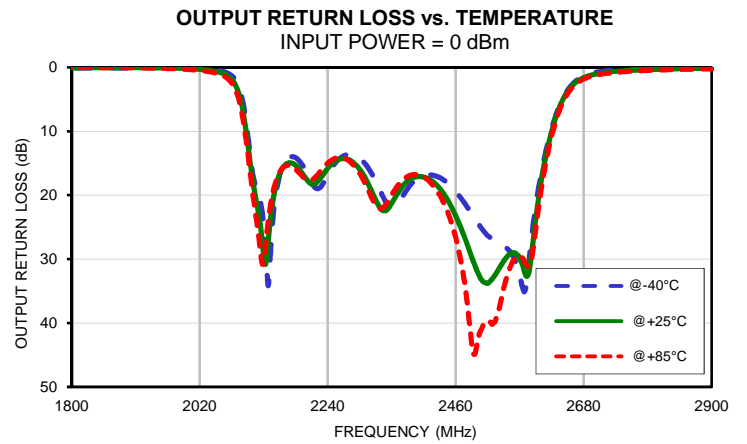
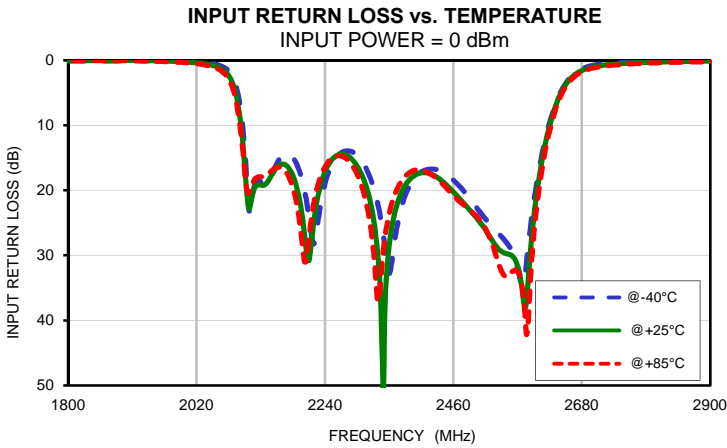
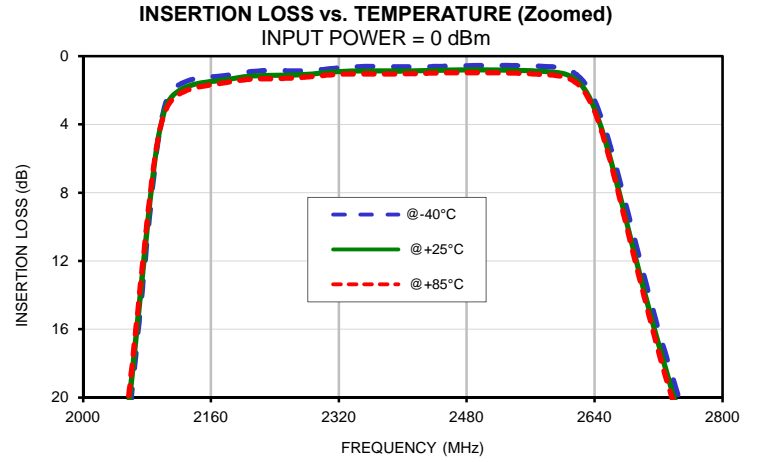
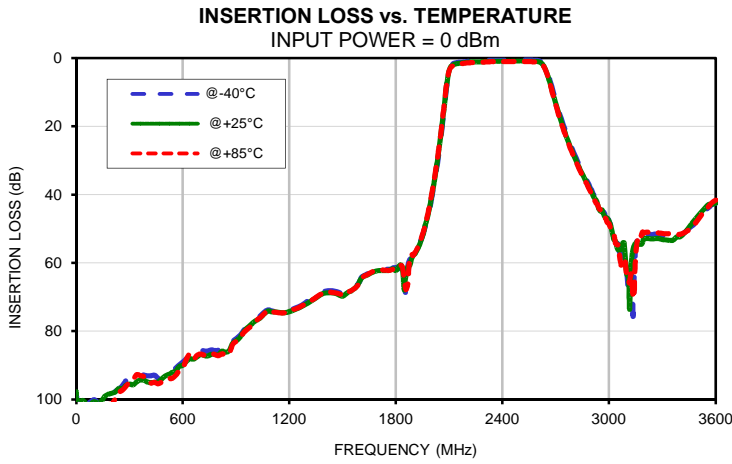
FREQ.  (MHz)	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
	(dB)			(dB)			(dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
10	101.49	100.62	103.02	0.00	0.00	0.00	0.01	0.01	0.00
20	101.53	100.46	104.09	0.02	0.02	0.01	0.02	0.02	0.02
40	101.56	100.36	104.36	0.04	0.04	0.03	0.04	0.04	0.04
60	101.42	101.57	104.69	0.05	0.05	0.04	0.06	0.05	0.05
80	100.71	101.32	104.93	0.06	0.06	0.05	0.07	0.06	0.06
100	100.03	100.63	104.71	0.07	0.07	0.06	0.08	0.07	0.06
200	98.79	98.15	101.41	0.10	0.08	0.07	0.10	0.09	0.07
300	94.38	95.46	94.83	0.11	0.08	0.06	0.11	0.08	0.06
400	93.04	94.86	94.55	0.11	0.07	0.05	0.11	0.07	0.05
500	93.03	93.12	94.36	0.11	0.07	0.04	0.12	0.07	0.04
600	89.00	89.94	90.67	0.11	0.06	0.03	0.12	0.06	0.03
700	85.48	86.83	86.65	0.11	0.05	0.01	0.11	0.05	0.01
800	85.59	86.83	87.14	0.10	0.04	0.00	0.10	0.04	0.00
900	82.16	82.76	82.95	0.10	0.04	0.01	0.11	0.04	0.01
1000	77.01	77.28	77.62	0.09	0.03	0.02	0.09	0.03	0.02
1100	74.03	74.30	74.33	0.08	0.02	0.02	0.09	0.02	0.03
1200	73.86	74.20	74.33	0.08	0.02	0.02	0.09	0.02	0.02
1400	68.33	68.81	68.60	0.08	0.03	0.01	0.09	0.03	0.02
1536	67.94	68.42	68.38	0.09	0.05	0.01	0.09	0.04	0.00
1666	62.50	62.79	62.59	0.10	0.05	0.02	0.10	0.05	0.01
1850	66.38	66.02	65.88	0.08	0.03	0.01	0.09	0.04	0.02
2020	35.18	34.50	33.99	0.21	0.38	0.51	0.14	0.29	0.46
2030	31.87	31.11	30.53	0.29	0.48	0.64	0.21	0.38	0.57
2060	20.11	19.23	18.66	0.80	1.19	1.49	0.62	0.93	1.29
2080	10.83	10.14	9.72	2.27	3.16	3.83	1.81	2.51	3.21
2100	3.33	3.50	3.60	11.25	13.59	14.75	8.81	10.25	11.68
2150	1.24	1.54	1.75	17.45	17.40	16.86	20.21	18.82	18.02
2180	1.12	1.36	1.53	14.55	16.84	18.31	13.96	15.03	15.56
2250	0.85	1.12	1.30	16.31	15.47	15.18	15.27	14.82	14.31
2300	0.77	0.98	1.13	15.10	17.02	18.58	14.65	16.62	17.38
2375	0.61	0.86	1.04	21.36	19.59	18.08	19.24	17.96	17.20
2450	0.59	0.82	0.97	17.69	19.32	19.83	18.44	21.41	23.64
2500	0.54	0.79	0.96	22.69	24.27	23.98	24.61	32.55	41.81
2550	0.56	0.83	1.01	27.91	29.69	33.26	28.48	29.43	32.08
2600	0.71	1.00	1.20	20.37	22.34	24.70	20.18	21.91	23.57
2640	2.60	3.09	3.24	5.63	5.84	6.31	5.62	5.82	6.28
2680	8.86	9.72	9.96	1.32	1.57	1.77	1.33	1.58	1.80
2740	19.20	20.09	20.48	0.32	0.55	0.70	0.32	0.57	0.72
2800	27.57	28.32	28.74	0.10	0.28	0.40	0.10	0.30	0.43
2850	33.33	34.04	34.49	0.01	0.18	0.28	0.01	0.19	0.30
2900	38.54	39.14	39.60	0.05	0.10	0.20	0.05	0.11	0.21
2950	43.38	44.74	44.43	0.09	0.05	0.15	0.11	0.04	0.14
3000	47.80	47.83	48.54	0.12	0.01	0.10	0.13	0.01	0.10
3020	49.69	51.69	50.52	0.12	0.02	0.10	0.15	0.01	0.08
3040	52.68	54.17	54.50	0.14	0.01	0.08	0.16	0.03	0.06
3060	57.16	56.24	58.52	0.15	0.03	0.07	0.16	0.03	0.05
3080	57.91	54.00	59.59	0.16	0.03	0.06	0.17	0.04	0.04
3100	62.99	63.35	64.03	0.17	0.05	0.06	0.18	0.03	0.03
3120	62.02	66.61	63.83	0.18	0.05	0.03	0.17	0.05	0.02
3140	65.34	54.99	70.29	0.18	0.06	0.04	0.17	0.06	0.04
3160	53.33	54.01	53.16	0.19	0.07	0.03	0.19	0.07	0.03
3200	51.39	52.87	51.06	0.19	0.07	0.02	0.18	0.08	0.03
3240	51.68	52.95	51.12	0.18	0.06	0.05	0.19	0.06	0.01
3280	52.08	52.85	51.23	0.14	0.06	0.11	0.19	0.08	0.03
3320	52.31	53.23	51.47	0.19	0.06	0.04	0.21	0.10	0.00
3360	52.26	53.32	51.52	0.17	0.06	0.05	0.19	0.08	0.01
3400	52.26	52.31	51.60	0.18	0.04	0.04	0.21	0.09	0.00
3440	50.42	50.26	50.62	0.16	0.05	0.08	0.19	0.06	0.03
3500	46.74	46.25	47.32	0.15	0.02	0.00	0.14	0.00	0.08
3600	42.44	42.48	41.61	0.07	0.06	0.20	0.08	0.07	0.22



*Typical Performance Data*

FREQ.  (MHz)	GROUP DELAY		
	(nsec)		
	@-40°C	@+25°C	@+85°C
2150	5.90	5.82	5.74
2160	5.50	5.42	5.36
2170	5.12	5.10	5.06
2180	4.86	4.85	4.83
2190	4.64	4.66	4.64
2200	4.53	4.50	4.48
2210	4.40	4.36	4.33
2220	4.28	4.22	4.19
2230	4.13	4.08	4.04
2240	3.99	3.94	3.90
2250	3.85	3.81	3.78
2260	3.73	3.71	3.68
2270	3.65	3.62	3.61
2280	3.57	3.55	3.54
2290	3.47	3.49	3.49
2300	3.42	3.45	3.44
2310	3.39	3.41	3.40
2320	3.38	3.37	3.36
2330	3.34	3.33	3.32
2340	3.31	3.29	3.27
2350	3.24	3.23	3.21
2360	3.21	3.19	3.17
2375	3.15	3.13	3.11
2390	3.11	3.08	3.06
2400	3.08	3.05	3.04
2410	3.04	3.03	3.03
2420	3.01	3.03	3.02
2430	2.99	3.03	3.02
2440	3.01	3.03	3.02
2450	3.02	3.03	3.03
2460	3.03	3.03	3.03
2470	3.02	3.04	3.04
2480	3.05	3.06	3.06
2490	3.04	3.08	3.07
2500	3.14	3.10	3.09
2510	3.15	3.13	3.12
2520	3.17	3.18	3.17
2530	3.21	3.23	3.22
2540	3.25	3.28	3.28
2550	3.30	3.34	3.34
2600	4.09	4.18	4.17

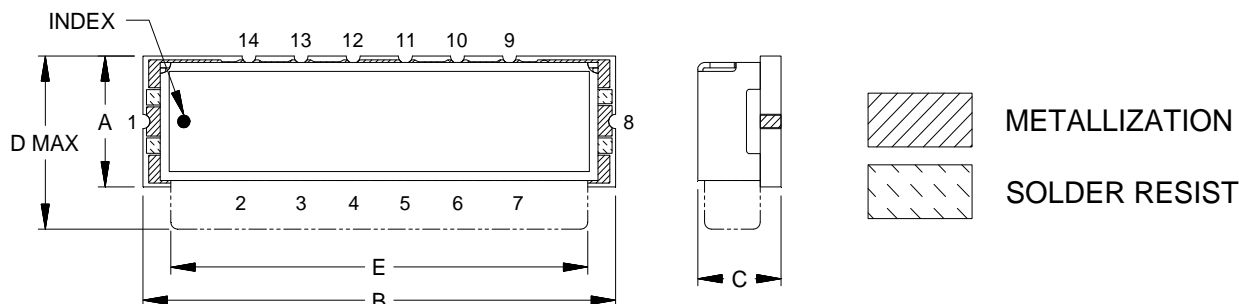
## Typical Performance Curves



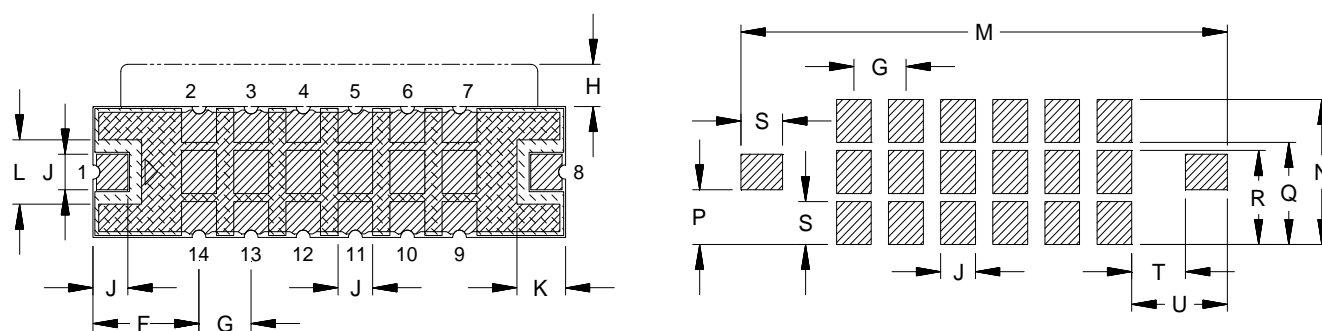


## Outline Dimensions

HQ2299-1



### PCB Land Pattern



CASE#	A	B	C		D	E	F	G	H	J	K	L
			MIN 1*	MIN 2*								
HQ2299-1	.365 (9.27)	1.360 (34.54)	.212 (5.38)	.240 (6.10)	.483 (12.27)	1.200 (30.48)	.305 (7.75)	.150 (3.81)	.118 (3.00)	.100 (2.54)	.140 (3.56)	.180 (4.57)

CASE#	M	N	P	Q	R	S	T	U	WT.GRAMS
HQ2299-1	1.400 (35.56)	.405 (10.29)	.153 (3.87)	.285 (7.24)	.263 (6.67)	.120 (3.05)	.155 (3.94)	.275 (6.99)	5.0

Dimensions are in inches (mm). Tolerances: 2Pl.  $\pm .03$ ; 3Pl.  $\pm .015$

### Notes:

- Case material: Nickel-Silver alloy.
- Base: Printed wiring laminate.
- Termination finish:
  - For RoHS Case Styles: 3-5  $\mu$  inch Gold over 120-240  $\mu$  inch Nickel plate.
  - For RoHS-5 Case Styles: Tin-Lead plate.

\* MIN 1/MIN 2 Values are concerning to the PCB thickness



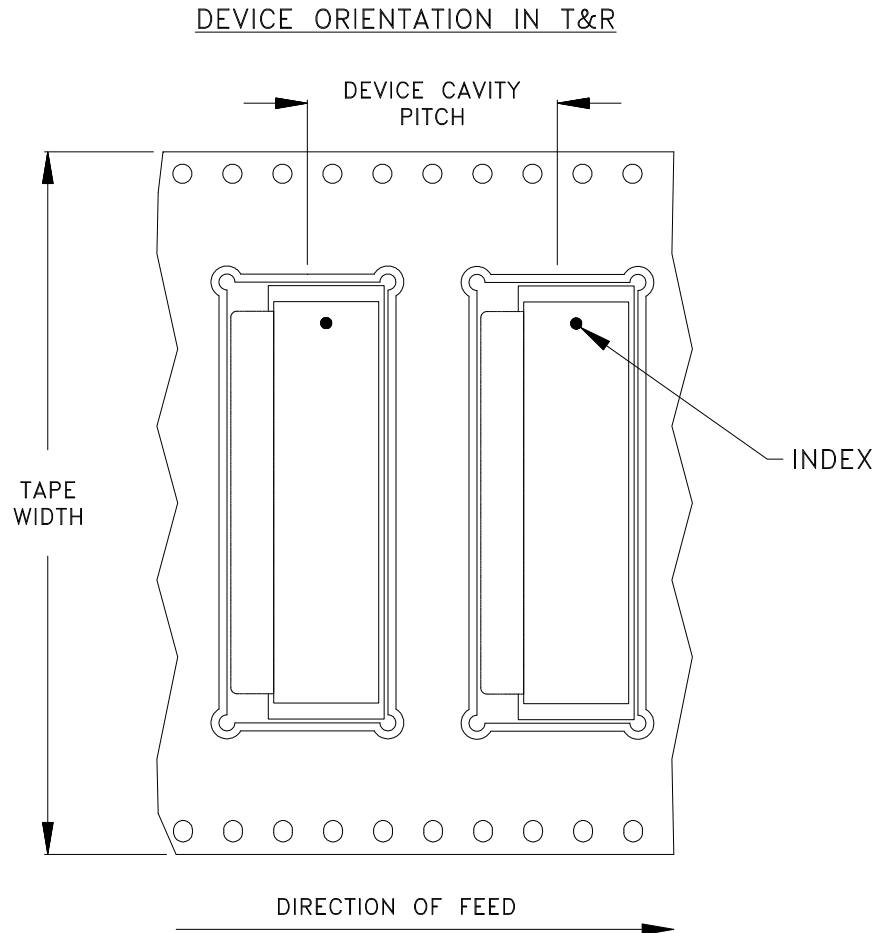
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

RF/IF MICROWAVE COMPONENTS

# Tape & Reel Packaging TR-F121



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
56	20	13	100

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](http://www.minicircuits.com/pages/pdfs/tape.pdf)

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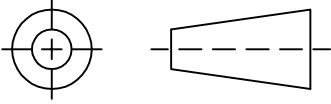
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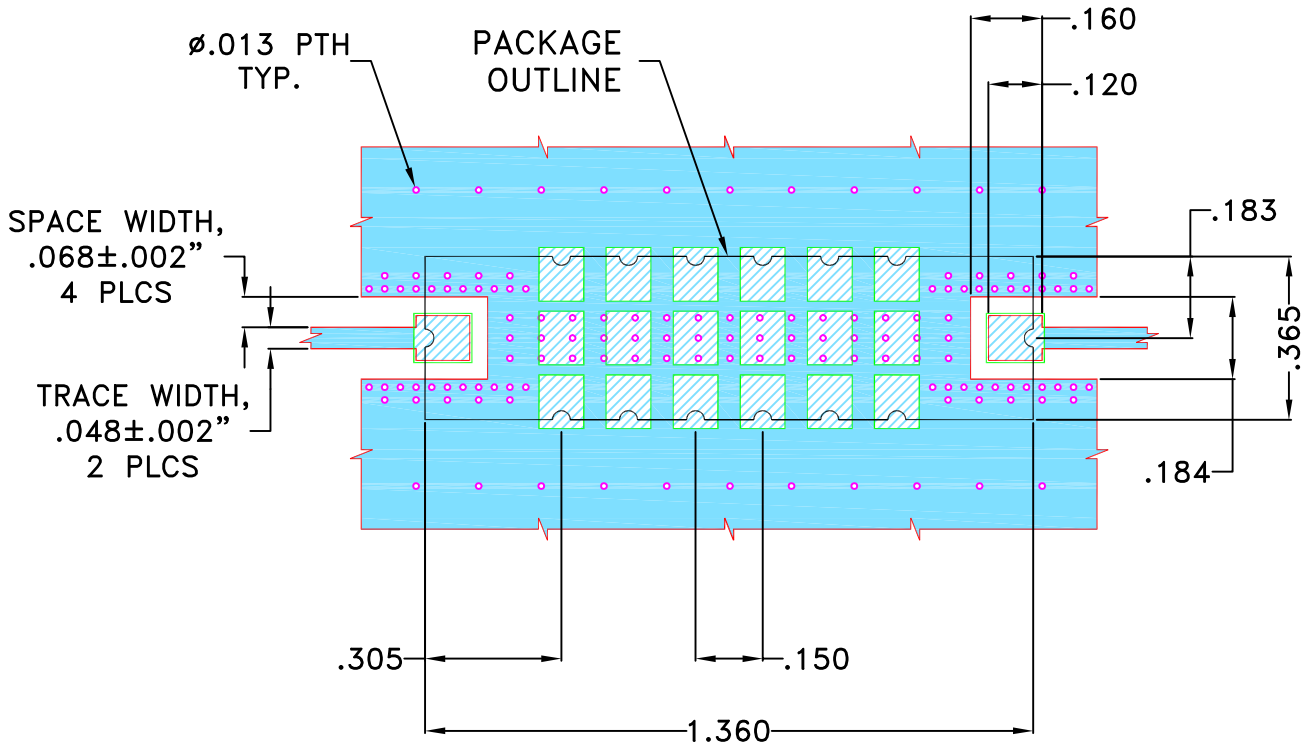
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M165612	NEW RELEASE	MAR 18	TM	MD

**SUGGESTED MOUNTING CONFIGURATION FOR  
HQ2218 & HQ2299 CASE STYLE "14FL01" PIN CODE**



**NOTES:**

1. TRACE WIDTH IS SHOWN FOR FR4, IT180A WITH DIELECTRIC THICKNESS .025"±.002". COPPER: 1/2 Oz EACH SIDE.  
FOR OTHER MATERIALS TRACE WIDTH 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 SOLDERMASK

UNLESS OTHERWISE SPECIFIED	INITIALS	DATE
DIMENSIONS ARE IN INCHES TOLERANCES ON: 2 PL DECIMALS ± 3 PL DECIMALS ± .005" ANGLES ± FRACTIONS ±	DRAWN	12 MAR 18
	CHECKED	12 MAR 18
	APPROVED	12 MAR 18



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Brooklyn NY 11235

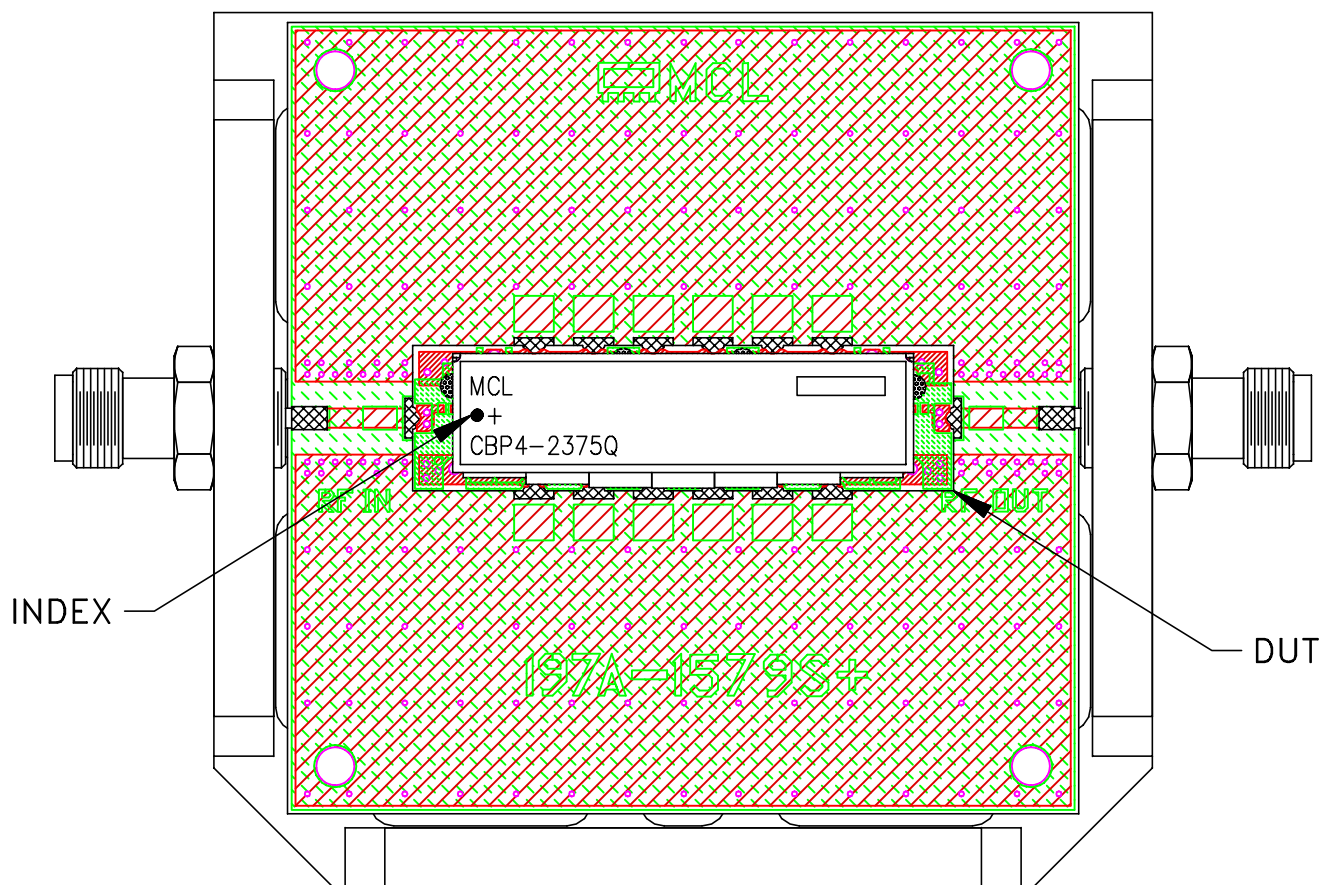
**PL,14FL01,HQ2218, HQ2299,CBP  
TB-1006+, 50 Ohm**

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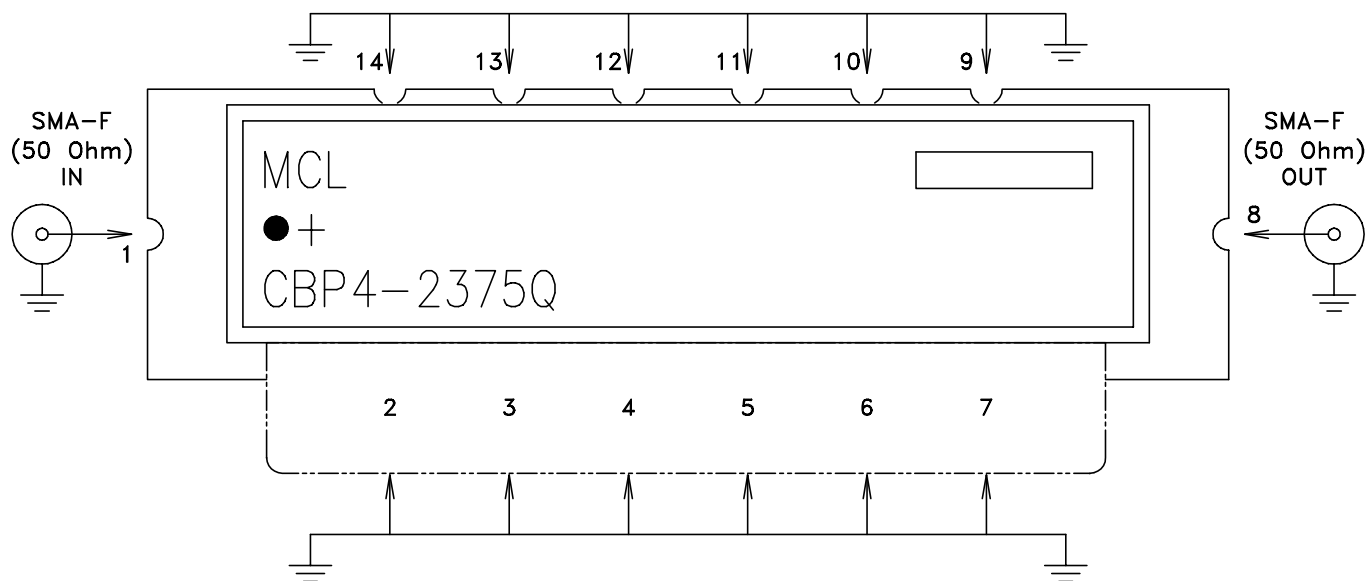
SIZE <b>A</b>	CODE IDENT <b>15542</b>	DRAWING NO: <b>98-PL-543</b>	REV: <b>OR</b>
FILE: <b>98PL543</b>	SCALE: <b>2.25:1</b>	SHEET: <b>1 OF 1</b>	

# Evaluation Board and Circuit

TB-CBP4-2375Q+

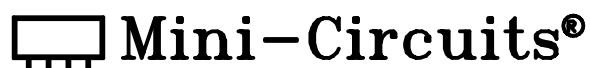


Schematic diagram



**Notes:**

1. PCB Material: FR4 (IT-180A) OR Equivalent, Dielectric Constant=4.7  
Dielectric Thickness: .025±.002
2. 50 Ohm SMA Female Connectors.



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	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Humidity	90 to 95% RH, 96 hours, 40°C	MIL-STD-202, Method 103B, Condition B, Except 50°C
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Solder Reflow Heat	Sn-Pb Eutectic Process: 225°C peak Pb-Free Process, 245°C peak	J-STD-020, 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, 4 times in each of three axes (total 12)	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