Surface Mount

Bandpass Filter

TBP-154+

50Ω 136 to 175 MHz

Generic photo used for illustration purposes only

CASE STYLE: GQ1018

The Big Deal

- Small size (0.25" x 0.25" x 0.10")
- High rejection
- Flat group delay, 17 ns typical
- Broad band filter (fractional bandwidth of 25%)
- Miniature shielded package

Product Overview

The TBP-154+ is a broad-band bandpass filter in a shielded package (size of 0.25" x 0.25" x .10") fabricated using SMT technology. These units offer good matching within the passband and high rejection. In addition it has repeatable performance across production lots and consistent performance across temperature.

Key Features

Feature	Advantages
Sharp shape factor	Sharp shape factor helps in adjacent rejection and increased selectivity.
High rejection	Achieving 70dB rejection at 700MHz; the TBP-154+ provides a versatile anti aliasing solution for high data rate receivers.
Flat group delay characteristics	The model has a group delay flatness of 17 ns which helps in reducing the signal distortion.
Shielded case	Reduced interference with the surrounding components.

Surface Mount

Bandpass Filter

50Ω 136 to 175 MHz

TBP-154+

Generic photo used for illustration purposes only
CASE STYLE: GQ1018

Features

- High rejection
- Flat group delay, 17 ns typical over passband
- Small size 0.25" x 0.25" x 0.10"
- Aqueous washable
- Miniature shielded package

Applications

- Harmonic rejection
- Transmitters / Receivers
- Public safety radio

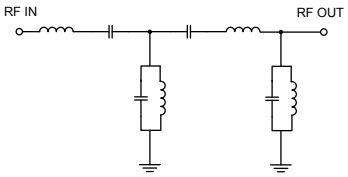
Electrical Specifications at 25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Center Frequency	—	—	—	154	—	MHz
	Insertion Loss	F1-F2	136-175	—	3.2	4.0	dB
	VSWR	F1-F2	136-175	—	1.8	2.5	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC-108	20	28	—	dB
	VSWR	DC-F3	DC-108	—	37	—	:1
Stop Band, Upper	Insertion Loss	F4-F5	220-3000	20	27	—	dB
	VSWR	F4-F5	220-3000	—	11	—	:1

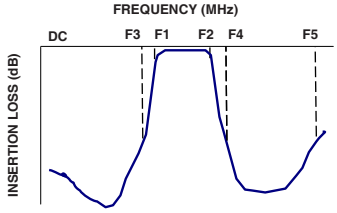
Maximum Ratings	
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	100mW max.

Permanent damage may occur if any of these limits are exceeded.

Functional Schematic



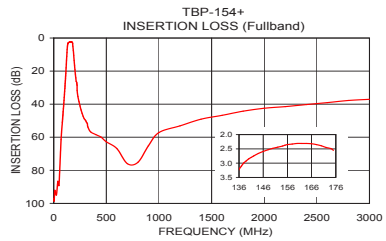
Typical Frequency Response

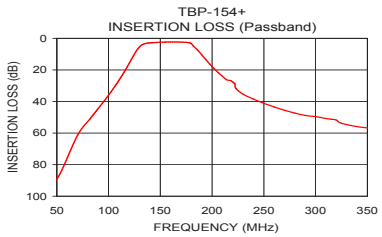


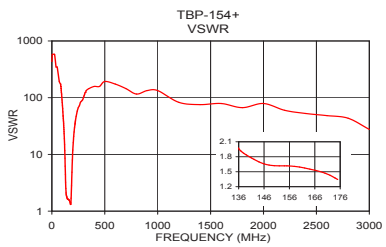
Typical Performance Data at 25°C

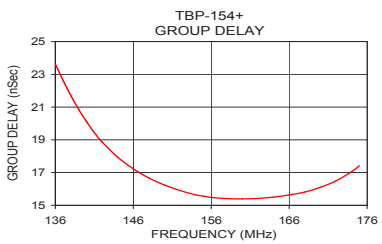
Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (nsec)
0.5	96.94	434.30	136	23.63
40.0	86.62	347.44	137	22.62
85.0	48.57	157.93	138	21.69
108.0	28.55	43.44	140	20.11
120.0	15.75	15.00	141	19.44
126.0	8.83	6.21	142	18.87
130.0	5.32	3.24	146	17.23
136.0	3.22	1.96	150	16.24
154.0	2.40	1.62	152	15.90
156.0	2.35	1.62	154	15.64
175.0	2.55	1.34	156	15.48
179.0	2.96	1.35	158	15.41
186.0	7.45	2.79	160	15.39
190.0	10.45	4.86	162	15.42
194.0	13.53	7.97	164	15.50
220.0	27.71	35.46	166	15.63
320.0	51.79	124.09	168	15.81
500.0	62.76	193.02	172	16.49
1000.0	57.17	133.63	174	17.05
3000.0	37.09	27.59	175	17.41

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







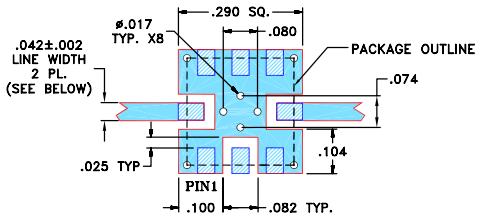


Notes
A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's 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	4
OUTPUT	8
NOT CONNECTED	2
GROUND	1,3,5,6,7

Demo Board MCL P/N: TB-540+
Suggested PCB Layout (PL-310)



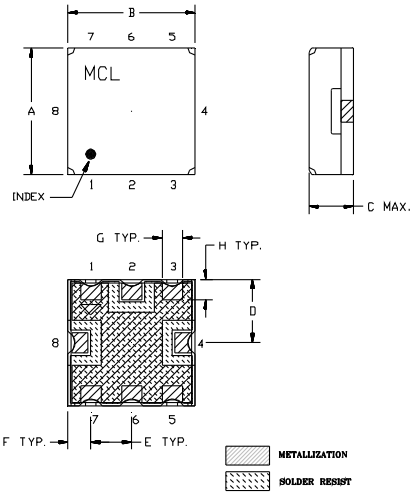
NOTES:

1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .020"±.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.

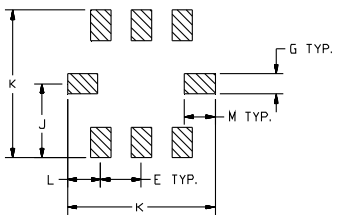
DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

Outline Drawing



PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

Outline Dimensions (inch / mm)

A	B	C	D	E	F	G
.25	.25	.10	.065	.080	.045	.040
6.35	6.35	2.54	1.65	2.03	1.14	1.02

H	J	K	L	M		wt
.040	.145	.290	.065	.060		grams
1.02	3.68	7.37	1.65	1.52		0.25

Note: Please refer to case style drawing for details

Typical Performance Data

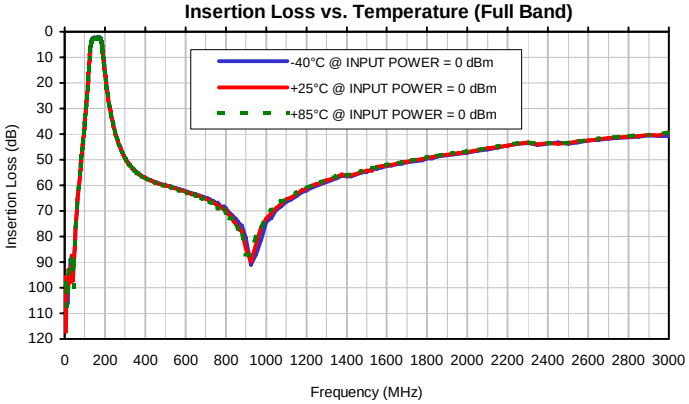
FREQ.	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
(MHz)	(dB)			(dB)			(dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
0.5	98.83	95.66	101.87	0.03	0.04	0.05	0.01	0.01	0.01
10.0	106.96	98.61	107.07	0.05	0.06	0.07	0.00	0.00	0.00
40.0	95.99	97.24	89.99	0.13	0.15	0.16	0.01	0.01	0.01
50.0	82.65	84.53	82.73	0.15	0.18	0.19	0.01	0.02	0.02
80.0	52.37	52.23	52.09	0.26	0.30	0.33	0.07	0.09	0.10
85.0	48.21	48.11	47.96	0.29	0.33	0.36	0.09	0.11	0.13
90.0	44.09	43.96	43.82	0.33	0.37	0.41	0.12	0.14	0.16
95.0	39.89	39.75	39.61	0.38	0.43	0.47	0.15	0.19	0.21
100.0	35.54	35.39	35.24	0.44	0.51	0.55	0.20	0.25	0.28
105.0	30.99	30.82	30.66	0.54	0.62	0.68	0.28	0.33	0.38
108.0	28.11	27.93	27.77	0.62	0.72	0.78	0.34	0.41	0.46
110.0	26.13	25.94	25.77	0.69	0.80	0.88	0.40	0.48	0.54
114.0	21.96	21.76	21.58	0.90	1.04	1.15	0.56	0.67	0.75
118.0	17.50	17.30	17.11	1.27	1.49	1.64	0.84	1.00	1.12
120.0	15.16	14.97	14.80	1.59	1.86	2.07	1.08	1.28	1.43
126.0	8.17	8.14	8.08	4.07	4.80	5.37	2.83	3.22	3.55
128.0	6.21	6.29	6.31	6.09	7.15	8.00	4.11	4.57	4.95
130.0	4.70	4.89	5.00	9.24	10.78	12.09	5.85	6.28	6.65
136.0	2.82	3.16	3.38	14.50	14.20	13.96	10.03	9.94	9.99
138.0	2.66	3.00	3.22	12.64	12.31	12.08	10.43	10.34	10.38
140.0	2.56	2.89	3.11	11.51	11.23	11.05	10.72	10.68	10.73
142.0	2.49	2.81	3.03	10.89	10.67	10.52	11.01	11.01	11.07
144.0	2.43	2.74	2.96	10.58	10.41	10.28	11.26	11.30	11.35
146.0	2.38	2.68	2.90	10.46	10.34	10.24	11.41	11.47	11.51
148.0	2.34	2.64	2.84	10.46	10.41	10.33	11.44	11.52	11.54
150.0	2.31	2.60	2.80	10.55	10.58	10.55	11.36	11.47	11.50
152.0	2.28	2.56	2.76	10.74	10.87	10.90	11.24	11.40	11.43
154.0	2.25	2.52	2.71	11.02	11.28	11.38	11.14	11.35	11.41
156.0	2.23	2.49	2.68	11.42	11.82	12.02	11.10	11.36	11.46
158.0	2.20	2.45	2.64	11.93	12.49	12.81	11.15	11.48	11.62
160.0	2.17	2.42	2.61	12.54	13.28	13.74	11.30	11.69	11.88
162.0	2.15	2.40	2.58	13.22	14.14	14.75	11.55	11.99	12.23
164.0	2.13	2.39	2.57	13.93	15.00	15.76	11.89	12.38	12.66
166.0	2.12	2.38	2.57	14.63	15.79	16.68	12.34	12.87	13.19
168.0	2.11	2.39	2.58	15.32	16.51	17.48	12.94	13.49	13.84
170.0	2.12	2.41	2.62	16.14	17.35	18.38	13.76	14.33	14.68
172.0	2.15	2.46	2.68	17.33	18.57	19.70	14.97	15.52	15.78
174.0	2.19	2.53	2.78	19.32	20.59	21.84	16.73	17.04	16.98
175.0	2.23	2.59	2.85	20.75	21.90	23.01	17.79	17.76	17.35
179.0	2.60	3.06	3.40	19.29	17.93	17.06	16.49	14.95	13.77
180.0	2.78	3.27	3.64	16.47	15.39	14.68	14.40	13.13	12.15
186.0	5.16	5.83	6.33	6.18	6.05	5.93	5.48	5.29	5.09
190.0	7.92	8.61	9.13	3.40	3.44	3.45	2.94	2.96	2.93
194.0	11.06	11.71	12.20	2.06	2.14	2.19	1.74	1.83	1.86
200.0	15.66	16.22	16.66	1.17	1.25	1.31	0.97	1.07	1.11
208.0	21.05	21.53	21.89	0.71	0.77	0.81	0.58	0.66	0.71
210.0	22.27	22.72	23.08	0.64	0.70	0.74	0.52	0.60	0.65
220.0	27.65	28.02	28.32	0.44	0.49	0.52	0.36	0.42	0.46
240.0	35.82	36.09	36.32	0.28	0.31	0.33	0.22	0.26	0.29
250.0	38.99	39.23	39.44	0.24	0.27	0.29	0.18	0.22	0.25
260.0	41.71	41.93	42.09	0.22	0.25	0.26	0.15	0.19	0.22
300.0	49.34	49.44	49.56	0.17	0.20	0.21	0.10	0.13	0.16
320.0	51.80	51.98	51.95	0.16	0.19	0.20	0.08	0.12	0.14
360.0	55.09	55.15	55.18	0.15	0.18	0.19	0.06	0.10	0.12
400.0	57.03	57.11	57.19	0.15	0.18	0.19	0.05	0.09	0.11
500.0	59.85	60.09	60.19	0.15	0.18	0.20	0.04	0.08	0.10
600.0	62.22	62.56	62.62	0.15	0.19	0.21	0.04	0.08	0.11
700.0	64.91	65.30	65.52	0.15	0.19	0.22	0.05	0.09	0.12
800.0	69.09	69.82	70.97	0.15	0.20	0.22	0.05	0.11	0.13
900.0	80.58	84.68	86.88	0.15	0.20	0.23	0.06	0.12	0.15
1000.0	74.32	73.09	72.24	0.14	0.20	0.24	0.07	0.13	0.17
2000.0	47.24	46.95	46.86	0.15	0.26	0.34	0.15	0.24	0.30
3000.0	40.76	39.37	39.19	0.32	0.47	0.57	1.36	1.12	1.00

Typical Performance Data

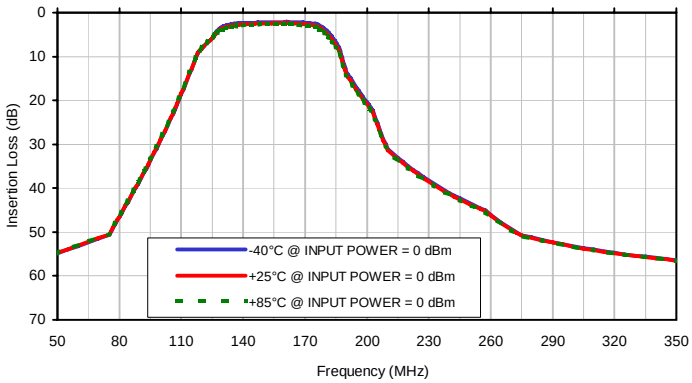
FREQ. (MHz)	GROUP DELAY (nsec)		
	@-40°C	@+25°C	@+85°C
136.0	23.45	22.94	22.58
136.5	23.07	22.57	22.21
137.0	22.69	22.20	21.85
138.0	21.90	21.44	21.11
139.0	21.12	20.70	20.40
140.0	20.39	20.02	19.75
141.0	19.73	19.40	19.16
142.0	19.14	18.85	18.64
143.0	18.62	18.37	18.18
144.0	18.16	17.94	17.78
145.0	17.77	17.57	17.43
146.0	17.42	17.25	17.12
147.0	17.11	16.97	16.85
148.0	16.85	16.72	16.62
149.0	16.61	16.51	16.41
150.0	16.40	16.31	16.24
151.0	16.22	16.15	16.08
152.0	16.06	16.01	15.96
153.0	15.92	15.88	15.85
154.0	15.81	15.78	15.76
155.0	15.71	15.71	15.70
156.0	15.64	15.65	15.65
157.0	15.59	15.62	15.63
158.0	15.55	15.60	15.62
159.0	15.54	15.60	15.63
160.0	15.54	15.61	15.66
161.0	15.57	15.65	15.70
162.0	15.61	15.70	15.77
163.0	15.66	15.77	15.84
164.0	15.74	15.85	15.94
165.0	15.84	15.96	16.05
166.0	15.96	16.09	16.19
167.0	16.11	16.24	16.35
168.0	16.28	16.42	16.53
169.0	16.48	16.63	16.75
170.0	16.72	16.87	16.99
171.0	16.99	17.14	17.26
172.0	17.31	17.45	17.57
173.0	17.65	17.78	17.89
174.0	18.02	18.13	18.23
175.0	18.42	18.50	18.58

Typical Performance Curves

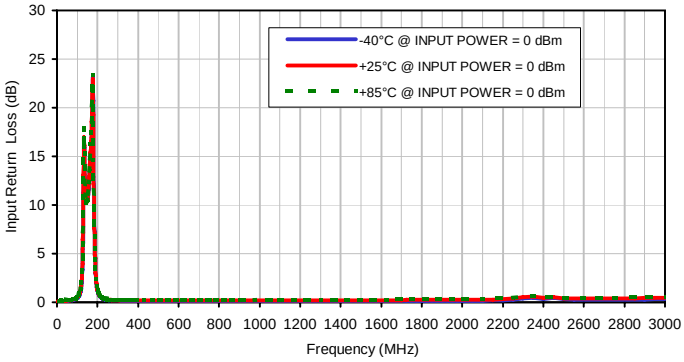
Insertion Loss vs. Temperature (Full Band)



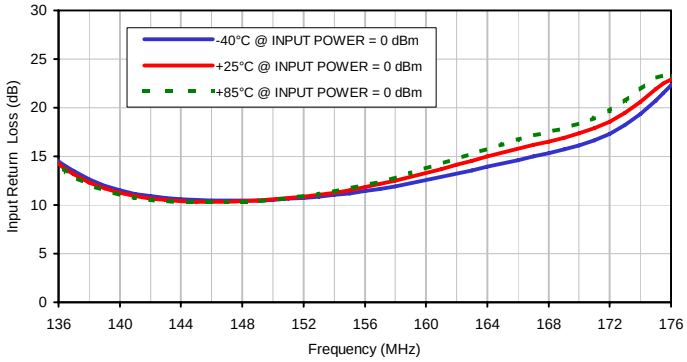
Insertion Loss vs. Temperature (Pass band)



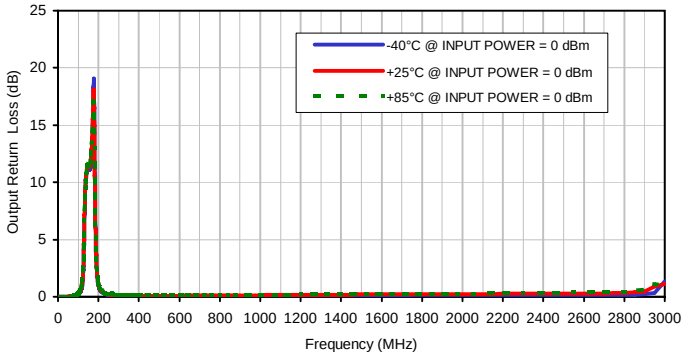
Input Return Loss vs. Temperature



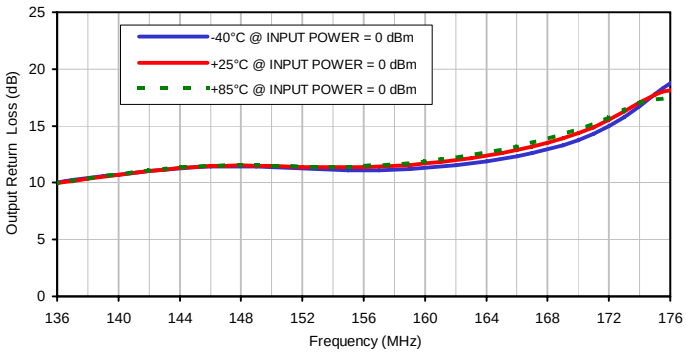
Input Return Loss vs. Temperature



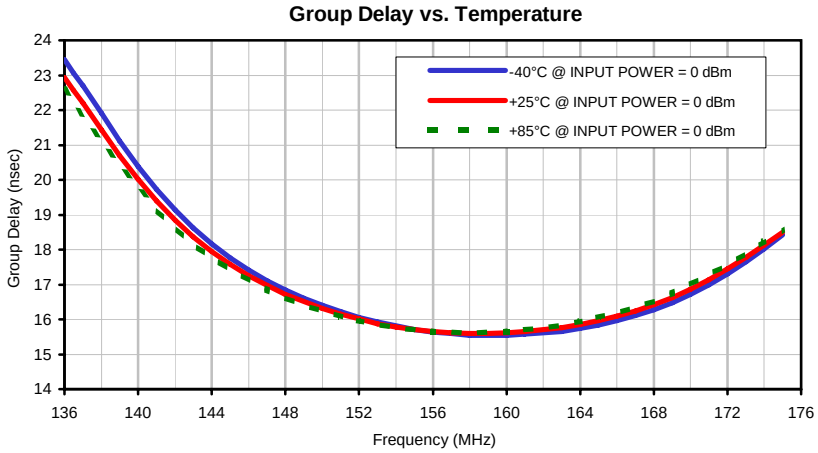
Output Return Loss vs. Temperature



Output Return Loss vs. Temperature



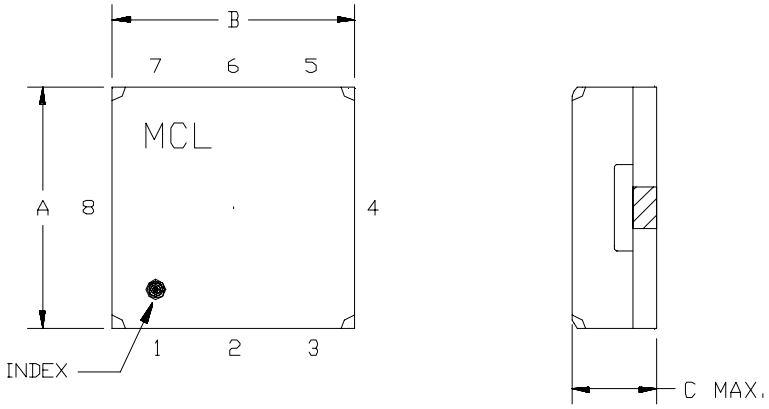
Typical Performance Curves

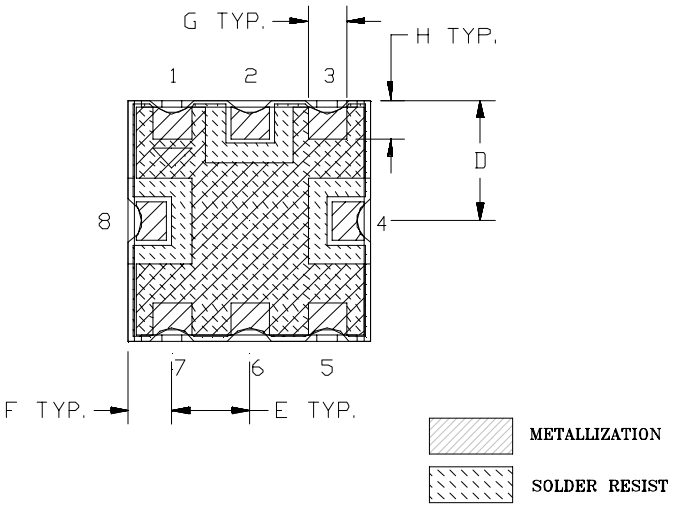


Case Style GQ

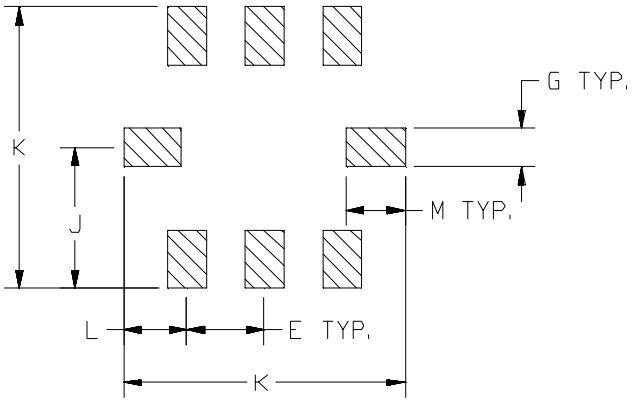
Outline Dimensions

GQ1018





PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

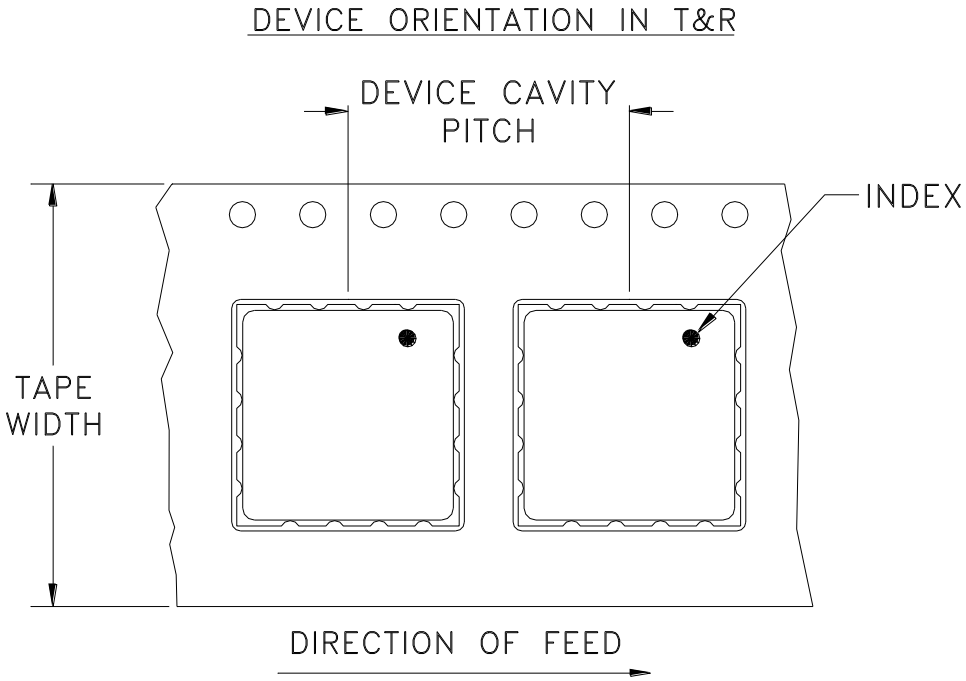
CASE #	A	B	C	D	E	F	G	H	J	K	L	M	WT. GRAMS
GQ1018	.25 (6.35)	.25 (6.35)	.10 (2.54)	.125 (3.18)	.080 (2.03)	.045 (1.14)	.040 (1.02)	.040 (1.02)	.145 (3.68)	.290 (7.37)	.065 (1.65)	.060 (1.52)	.25

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

Notes:

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

Tape & Reel Packaging TR-F78



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel see note
16	12	7	10
			20
			50
			100
			200
		13	500, 1000

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

Mini-Circuits®
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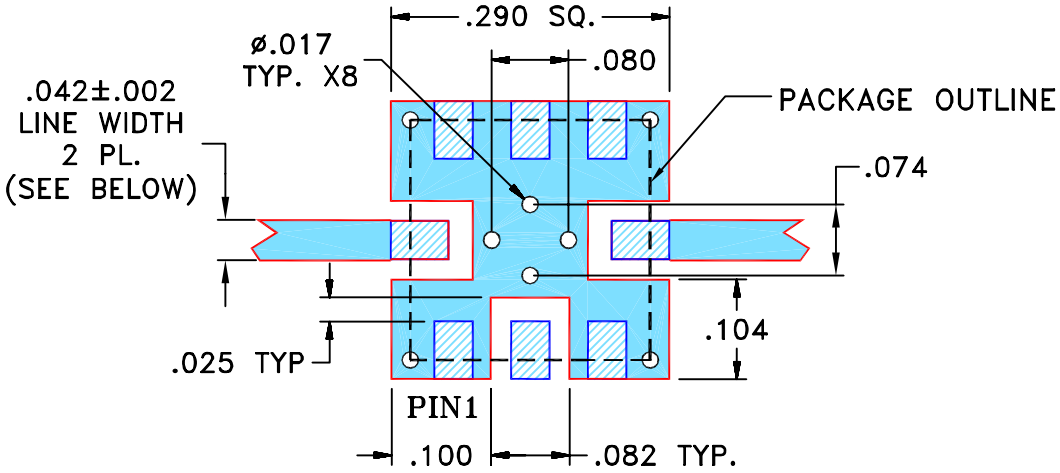
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M123534	NEW RELEASE (FROM RAVON)	07/09	EM	KN
OR	R76741	NEW RELEASE (FROM RAVON)	07/09	EM	KN

SUGGESTED MOUNTING CONFIGURATION
FOR GQ1018 CASE STYLE, "08FL04" PIN CONNECTION



NOTES:

1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .020"±.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	DRAWN	EM	14.07.09
TOLERANCES ON:	CHECKED	HH	15.07.09
2 PL DECIMALS ±	APPROVED	KN	22.07.09
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

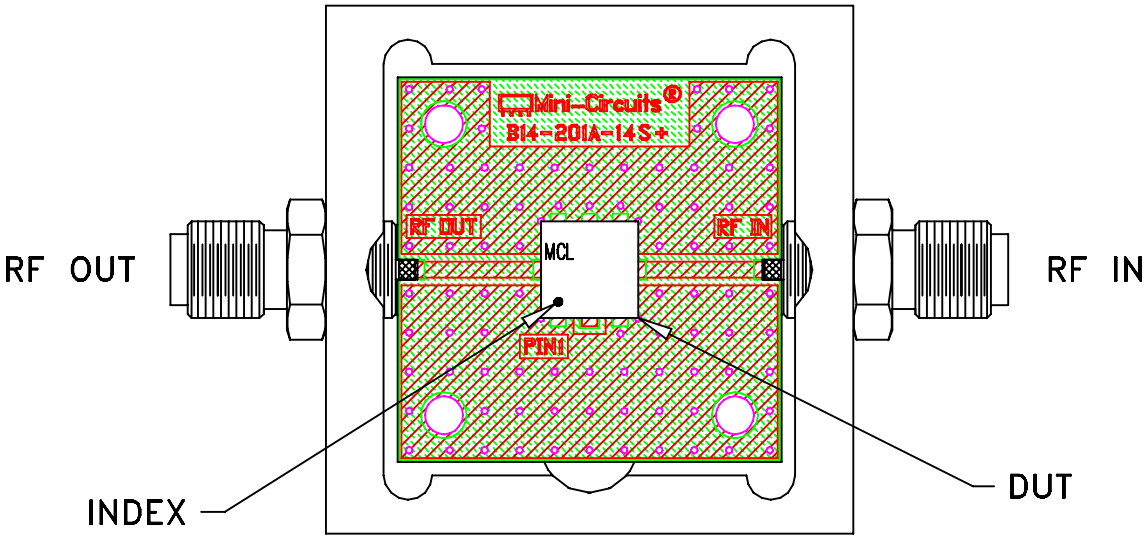
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, 08FL04, GQ1018, BPF, TB-540+

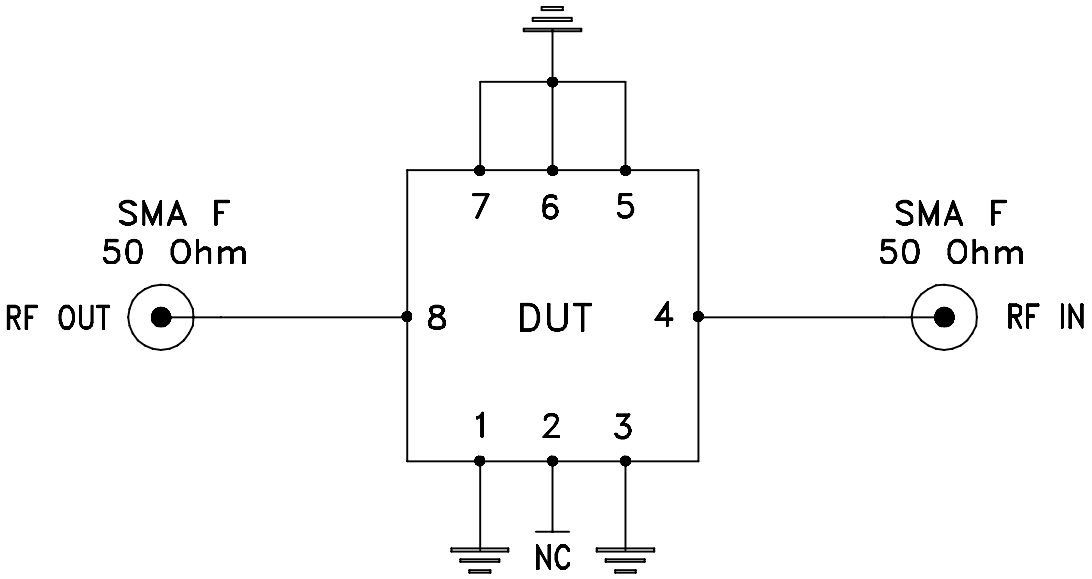
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-310	OR

FILE:	SCALE:	SHEET:
98PL310	5:1	1 OF 1

Evaluation Board and Circuit



TB-540+



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.020 inch.

Mini-Circuits®

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Environmental Specifications ENV03T2

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
HAST	130°C, 85% RH, 96 hours	JESD22-A110
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
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, 20-2000 Hz, 4 times in each of three axes (total 12)	MIL-STD-883, Method 2007.3, Condition A
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215