Surface Mount

Triplexer

TPLX-F2700+

50Ω (1-2700 MHz)
(1 - 512, 608-1000, 1400-2700 MHz)

CASE STYLE: HP1156

The Big Deal

- Low insertion loss
- 50Ω Impedance
- Miniature shielded package

Product Overview

TPLX-F2700+ is a high performance 50Ω triplexer with the lowpass channel-1 at 1-512 MHz, bandpass channel-2 at 608-1000 MHz and highpass channel-3 at 1400-2700 MHz. The channels are well isolated to minimize inter-channel interference and have minimal insertion loss through their respective bands. The triplexer is built in a shielded package, this triplexer finds its application in telecommunication and broadband.

Key Features

Feature	Advantages
Low passband insertion loss, 1 dB typical at lowpass and Band pass channel, 0.8 dB typical at the High pass channel	Very low insertion loss ensures less signal loss through all the channels.
Good co-channel rejection	Rejection of 20-30 dB ensures sufficient isolation between the channels
Miniature shielded package	Triplexer is designed into a surface mount package

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50Ω (1 to 2700 MHz)

(1-512, 608-1000, 1400-2700 MHz)

CASE STYLE: HP1156

Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	1 W

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

Pin Connections

COMMON PORT	2
CHANNEL-1	11
CHANNEL-2	9
CHANNEL-3	18
GROUND	1,3,4,5,6,7,8,10,12,13,14,15,16,17

Features

- Low insertion loss
- 50Ω Impedance
- Miniature shielded package

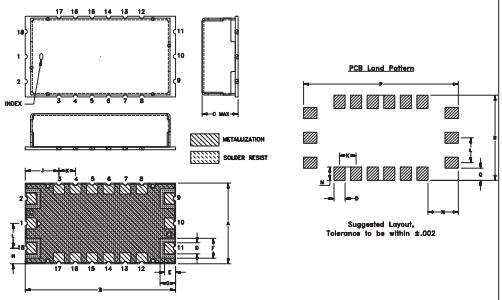
Applications

- Telecommunications and Broadband

+RoHS Compliant

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

Outline Drawing

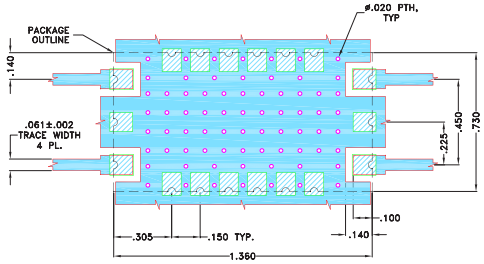


Outline Dimensions (inch / mm)

A	B	C	D	E	F	G	H	J
.730	1.360	.350	.100	.100	.180	.140	.140	.305
18.54	34.54	8.89	2.54	2.54	4.57	3.56	3.56	7.75

K	L	M	N	P	Q	R		Wt.
.150	.225	.120	.275	1.400	.110	.770		grams
3.81	5.72	3.05	6.99	35.56	2.79	19.56		6.0

Demo Board MCL P/N: TB-695+
Suggested PCB Layout (PL-418)



NOTES:
1. TRACE WIDTH IS SHOWN FOR OAK-602, WITH DIELECTRIC THICKNESS .022"±.0015", 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

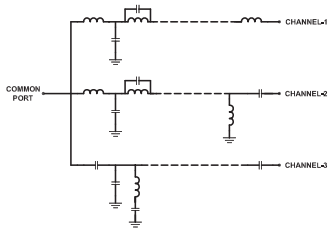
Electrical Specifications at 25°C

Parameter		Port	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Insertion Loss	Low Pass, Channel - 1	1-512	-	1.0	1.8	dB
		Band Pass, Channel - 2	608-1000	-	1.0	1.8	
		High Pass, Channel - 3	1400-2700	-	0.8	1.6	
	Return Loss	Low Pass, Channel - 1	1-512	9	14	-	dB
		Band Pass, Channel - 2	608-1000	8	13	-	
		High Pass, Channel - 3	1400-2700	9	14	-	
		Common	1-512	9	14	-	
			608-1000	8	13	-	
			1400-2700	9	14	-	
Stop Band Isolation		Low Pass, Channel - 1	608-2700	20	24	-	dB
		Band Pass, Channel - 2	1-512	15	20	-	
			1400-2700	20	27	-	
		High Pass, Channel - 3	1-512	25	31	-	
			608-1000	18	23	-	

Typical Performance Data at 25°C

FREQ. (MHz)	INSERTION LOSS (dB)				RETURN LOSS (dB)		
	Low Pass Chanel -1	Band Pass Chanel -2	High Pass Chanel -3	Common	Low Pass Chanel -1	Band Pass Chanel -2	High Pass Chanel -3
1.00	0.04	72.13	81.69	45.65	46.45	0.01	0.01
30.00	0.09	42.67	52.49	30.42	30.28	0.01	0.01
160.00	0.24	30.29	37.81	21.10	20.71	0.22	0.04
380.00	0.49	26.72	33.92	21.94	20.13	0.86	0.13
512.00	1.10	26.66	34.68	16.09	15.06	1.37	0.21
530.00	2.70	10.04	32.58	8.60	7.27	2.84	0.22
535.00	3.53	7.96	31.96	7.67	6.10	3.77	0.22
590.00	18.27	1.20	35.35	15.16	1.43	18.73	0.26
605.00	30.52	0.90	35.96	18.25	0.84	21.93	0.27
608.00	33.62	0.88	36.07	18.45	0.79	21.95	0.27
800.00	44.42	0.87	33.37	15.07	0.31	14.80	0.47
1000.00	42.80	1.11	27.30	13.74	0.25	15.34	1.29
1040.00	42.53	1.32	39.86	11.44	0.25	12.79	1.70
1100.00	42.91	2.19	12.54	8.66	0.25	8.77	2.42
1160.00	44.66	4.29	5.53	8.11	0.26	5.73	3.77
1300.00	49.10	9.53	1.68	14.05	0.27	9.69	14.72
1400.00	62.01	26.24	0.55	20.89	0.29	1.92	20.70
1800.00	63.41	36.60	0.57	15.05	0.36	2.10	14.48
2200.00	66.50	82.36	0.48	21.29	0.41	0.64	19.50
2700.00	48.89	51.42	0.80	13.07	0.46	0.55	12.97

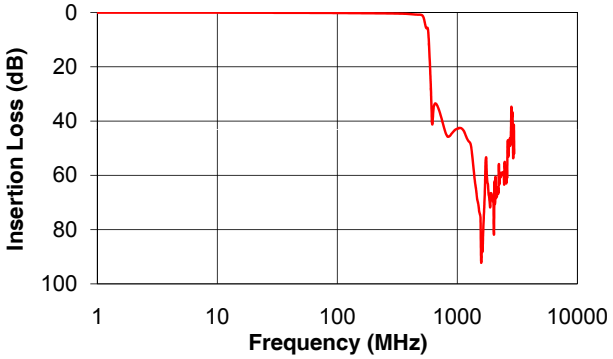
Functional Schematic



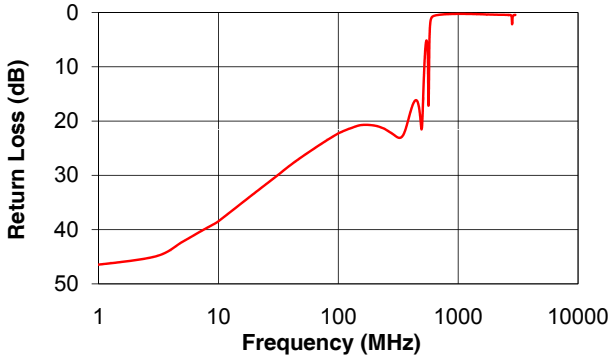
Notes

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

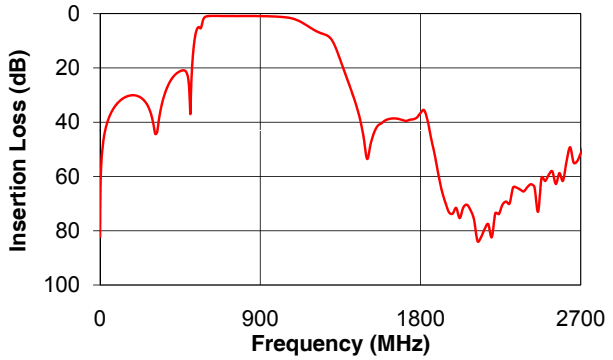
TPLX-F2700+ LOW PASS PORT
INSERTION LOSS (P_{in}=0dBm)



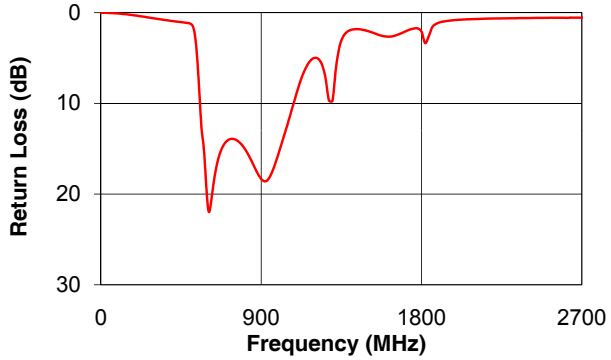
TPLX-F2700+ LOW PASS PORT
RETURN LOSS (P_{in}=0dBm)



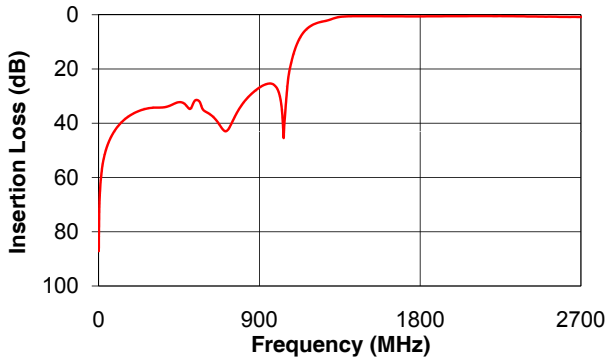
TPLX-F2700+ BAND PASS PORT
INSERTION LOSS (P_{in}=0dBm)



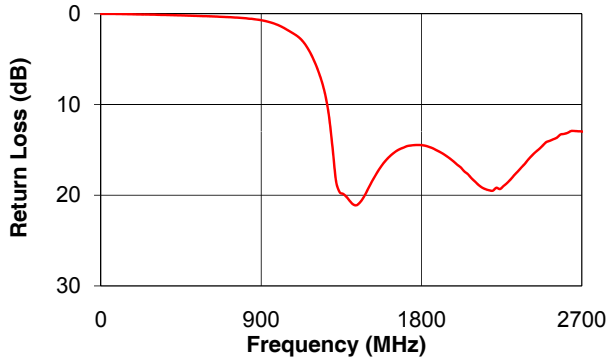
TPLX-F2700+ BAND PASS PORT
RETURN LOSS (P_{in}=0dBm)

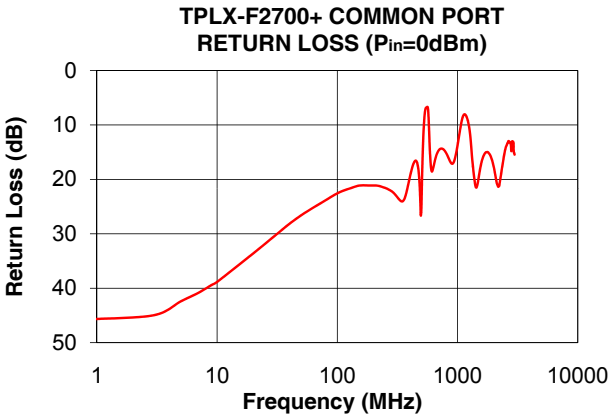


TPLX-F2700+ HIGH PASS PORT
INSERTION LOSS (P_{in}=0dBm)



TPLX-F2700+ HIGH PASS PORT
RETURN LOSS (P_{in}=0dBm)





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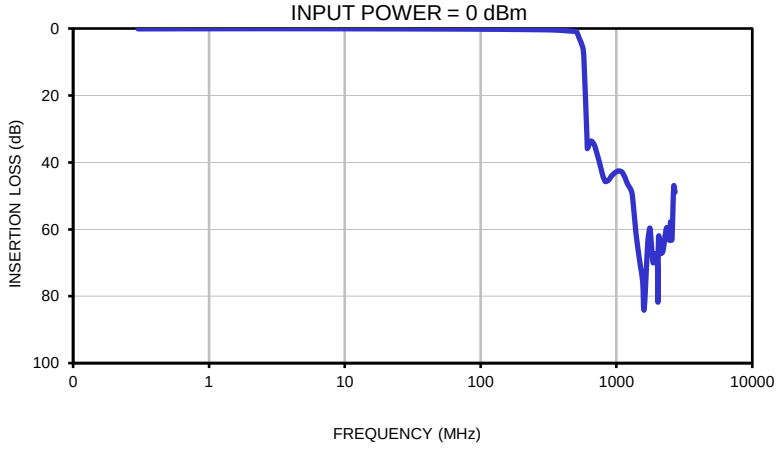
Triplexer TPLX-F2700+

Typical Performance Data

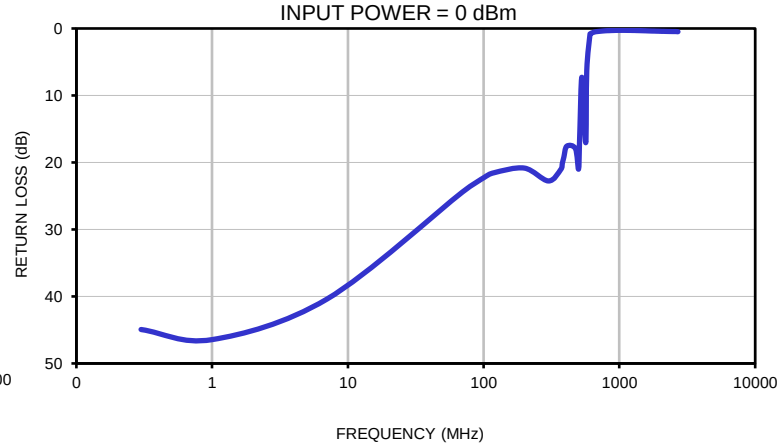
FREQUENCY (MHz)	INSERTION LOSS (dB)			Cross over isolation (dB)			RETURN LOSS (dB)			
	Lowpass port	Bandpass port	Highpass port	(between LPF and HPF)	(between BPF and HPF)	(between LPF and BPF)	Common port	Lowpass port	Bandpass port	Highpass port
0.3	0.08	82.25	87.15	87.68	92.20	82.27	44.63	44.94	0.00	0.01
1	0.04	72.13	81.69	81.81	103.45	72.25	45.65	46.45	0.00	0.00
7	0.04	55.26	65.27	65.15	118.46	55.29	40.84	40.41	0.00	0.00
70	0.14	35.55	44.94	45.46	80.67	35.74	24.60	24.39	0.05	0.01
100	0.18	32.84	41.74	42.46	75.12	33.14	22.57	22.28	0.09	0.02
120	0.20	31.63	40.17	40.98	72.58	32.00	21.85	21.51	0.13	0.03
200	0.27	30.14	36.20	37.09	67.13	30.71	21.13	20.83	0.32	0.06
300	0.36	40.82	34.28	34.61	75.34	42.84	22.69	22.75	0.63	0.09
370	0.46	28.32	34.06	33.85	61.25	29.18	22.94	21.04	0.83	0.13
380	0.49	26.72	33.92	33.81	59.89	27.43	21.94	20.13	0.86	0.13
390	0.52	25.37	33.72	33.79	58.40	25.91	20.82	19.21	0.89	0.14
410	0.59	23.33	33.17	33.79	56.51	23.41	18.69	17.55	0.94	0.15
475	0.77	20.95	32.57	34.19	54.73	20.38	18.66	17.93	1.10	0.19
500	0.85	26.95	34.22	34.58	62.11	27.64	25.51	21.00	1.19	0.20
508	0.97	35.96	34.67	34.82	67.47	35.08	18.86	17.31	1.28	0.21
512	1.10	26.66	34.68	35.01	59.04	27.97	16.09	15.06	1.37	0.21
530	2.70	10.04	32.58	36.99	43.92	12.64	8.60	7.27	2.84	0.22
565	5.63	5.39	32.07	40.98	40.28	5.09	6.75	17.04	12.83	0.24
575	8.30	3.17	33.71	43.92	38.50	7.57	8.98	6.27	14.46	0.25
608	33.62	0.88	36.07	68.09	37.72	34.19	18.45	0.79	21.95	0.27
610	35.89	0.87	36.14	70.20	37.81	37.17	18.53	0.76	21.87	0.27
650	33.59	0.82	38.25	73.40	40.36	33.20	16.42	0.52	16.82	0.30
695	35.25	0.85	42.27	71.96	44.56	35.13	14.71	0.42	14.41	0.34
785	43.27	0.87	34.87	74.12	37.73	43.74	14.79	0.32	14.44	0.44
800	44.42	0.87	33.37	76.68	36.10	44.19	15.07	0.31	14.80	0.47
815	45.18	0.87	32.01	75.99	34.66	43.99	15.40	0.30	15.24	0.49
830	45.73	0.87	30.85	64.96	33.41	43.76	15.77	0.30	15.76	0.53
875	45.30	0.87	28.04	72.16	30.22	43.02	16.85	0.28	17.55	0.63
935	43.70	0.93	25.64	70.42	27.80	43.19	16.70	0.26	18.46	0.85
1000	42.80	1.11	27.30	67.39	30.01	43.24	13.74	0.25	15.34	1.29
1014	42.66	1.17	29.96	69.49	32.71	42.83	12.93	0.25	14.45	1.42
1040	42.53	1.32	39.86	80.91	38.77	41.63	11.44	0.25	12.79	1.70
1100	42.91	2.19	12.54	55.55	16.92	38.49	8.66	0.25	8.77	2.42
1160	44.66	4.29	5.53	50.01	11.30	37.17	8.11	0.26	5.73	3.77
1200	46.27	5.91	3.64	49.14	10.05	38.24	8.75	0.26	4.98	5.32
1260	47.71	7.63	2.39	49.28	8.84	44.97	11.00	0.27	7.12	9.00
1300	49.10	9.53	1.68	51.20	9.55	39.81	14.05	0.27	9.69	14.72
1320	51.21	12.00	1.22	54.01	11.69	37.51	15.98	0.28	5.99	18.47
1390	60.89	24.44	0.57	67.19	23.56	38.88	20.43	0.29	2.01	20.46
1400	62.01	26.24	0.55	68.45	25.34	39.43	20.89	0.29	1.92	20.70
1435	65.42	32.96	0.51	70.90	31.59	41.48	21.51	0.30	1.81	21.10
1500	70.96	53.52	0.49	74.53	42.54	46.24	19.60	0.31	2.03	19.29
1560	75.64	41.28	0.51	74.17	41.06	52.39	17.48	0.32	2.45	17.20
1600	83.91	39.39	0.53	85.31	40.40	63.94	16.46	0.33	2.63	16.15
1700	63.97	39.23	0.56	65.81	40.37	59.84	15.13	0.35	2.15	14.74
1760	59.60	38.89	0.57	60.45	40.41	53.95	14.98	0.36	1.73	14.47
1800	63.41	36.60	0.57	65.06	38.53	56.61	15.05	0.36	2.10	14.48
1860	69.95	46.12	0.55	69.70	48.09	51.13	15.48	0.37	1.60	14.80
1940	67.34	69.68	0.52	68.56	71.34	53.18	16.52	0.38	0.92	15.68
2000	69.22	71.58	0.50	90.78	79.93	53.34	17.70	0.39	0.79	16.63
2020	81.80	75.30	0.49	76.53	77.55	53.63	18.14	0.39	0.77	16.94
2040	62.45	71.42	0.49	62.47	68.77	53.06	18.70	0.40	0.75	17.37
2120	67.19	83.79	0.47	67.53	98.03	51.77	20.69	0.40	0.69	18.87
2200	66.50	82.36	0.48	70.01	77.26	50.15	21.29	0.41	0.64	19.50
2340	59.49	64.11	0.53	58.61	64.46	47.23	17.98	0.42	0.60	17.39
2460	63.29	72.98	0.65	65.29	67.37	43.51	15.16	0.43	0.57	14.91
2500	57.74	61.64	0.68	64.82	62.86	44.43	14.44	0.43	0.57	14.15
2560	62.97	62.74	0.71	65.95	66.57	41.95	13.73	0.43	0.56	13.65
2640	47.09	49.22	0.79	47.31	49.27	42.35	13.01	0.44	0.55	12.92
2700	48.89	51.42	0.80	50.20	51.23	39.71	13.07	0.46	0.55	12.97

Typical Performance Curves

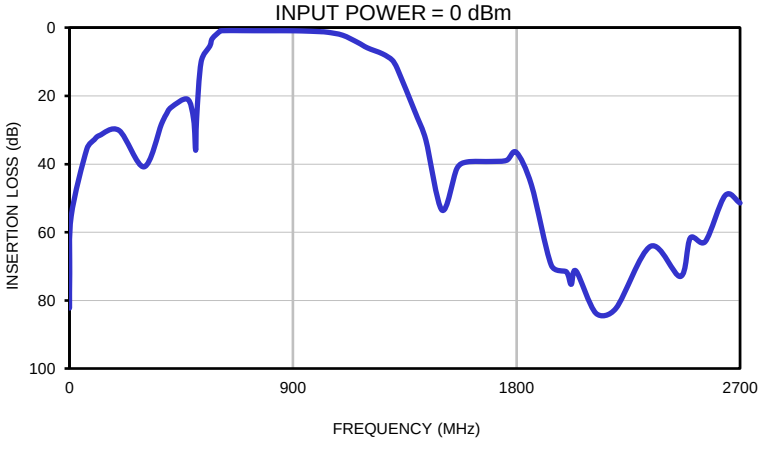
LOWPASS INSERTION LOSS
INPUT POWER = 0 dBm



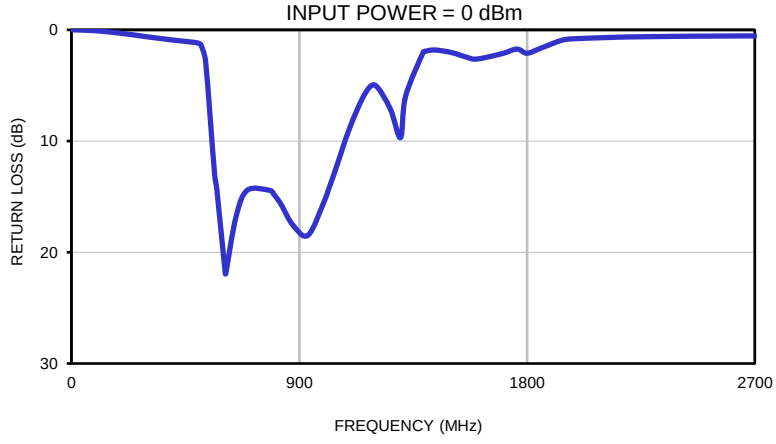
LOWPASS RETURN LOSS
INPUT POWER = 0 dBm



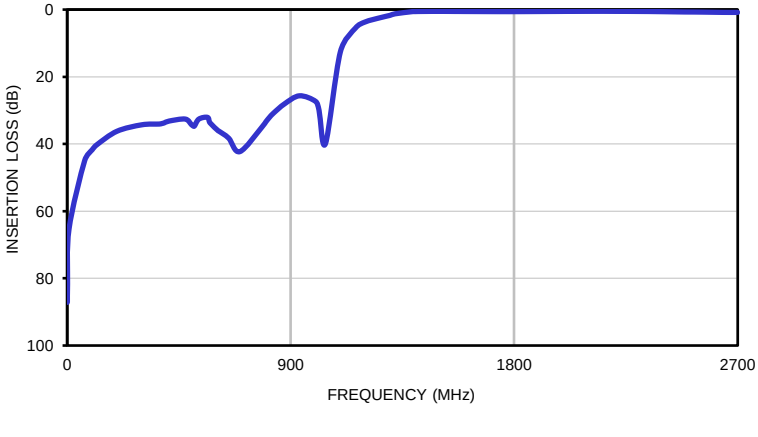
BANDPASS INSERTION LOSS
INPUT POWER = 0 dBm



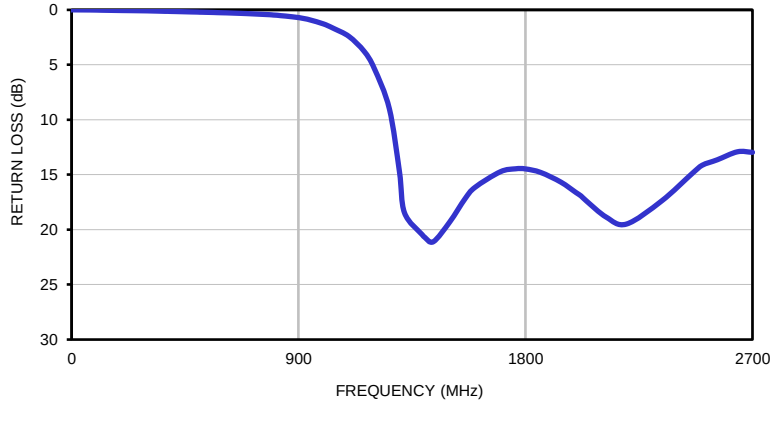
BANDPASS RETURN LOSS
INPUT POWER = 0 dBm



HIGHPASS INSERTION LOSS
INPUT POWER = 0 dBm

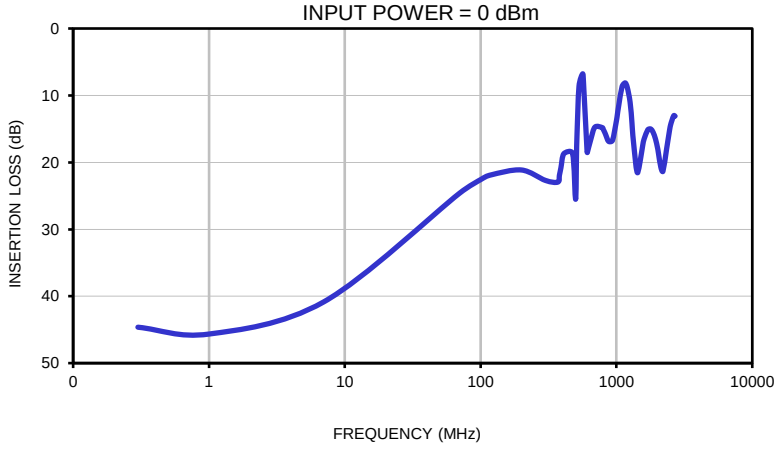


HIGHPASS RETURN LOSS
INPUT POWER = 0 dBm

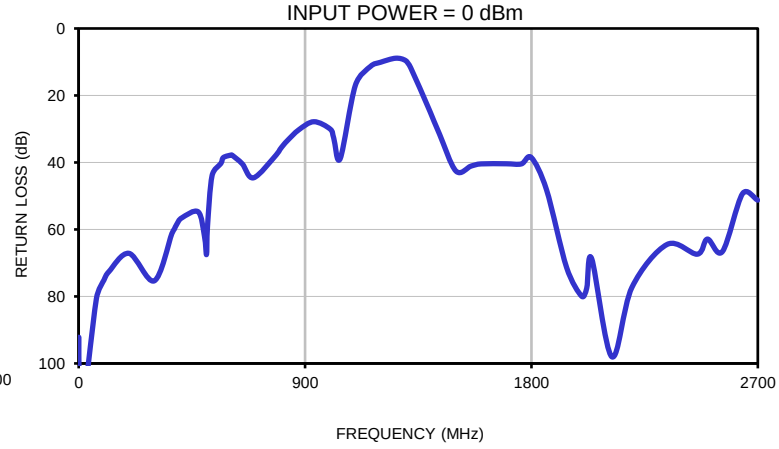


Typical Performance Curves

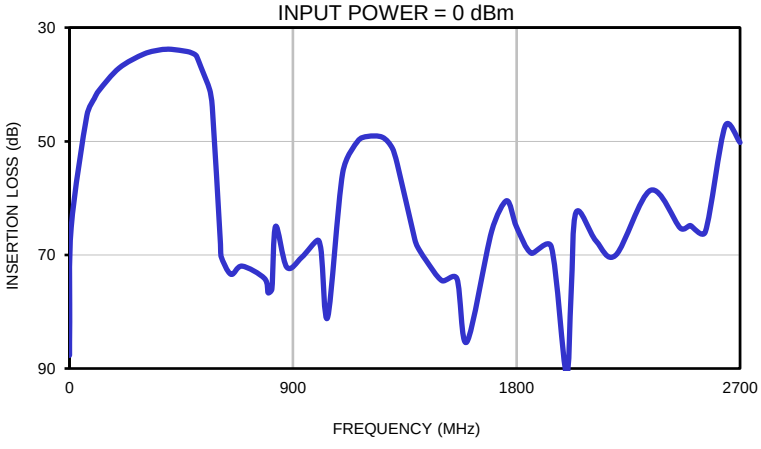
COMMONPORT RETURN LOSS
INPUT POWER = 0 dBm



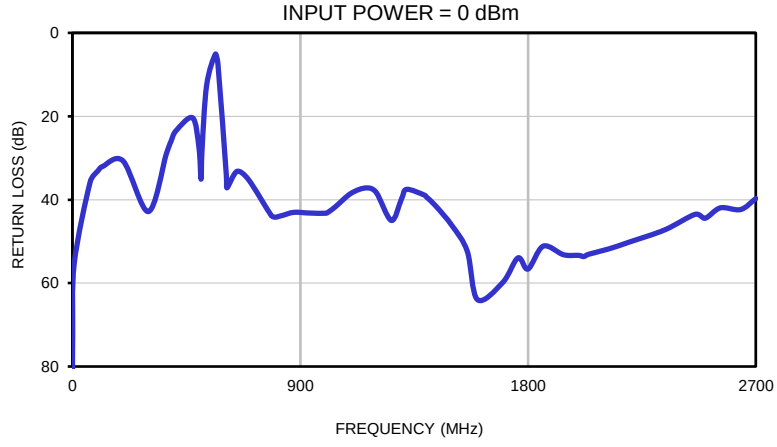
CROSSOVER ISOLATION BETWEEN BPF & HPF
INPUT POWER = 0 dBm



CROSSOVER ISOLATION BETWEEN LPF & HPF
INPUT POWER = 0 dBm

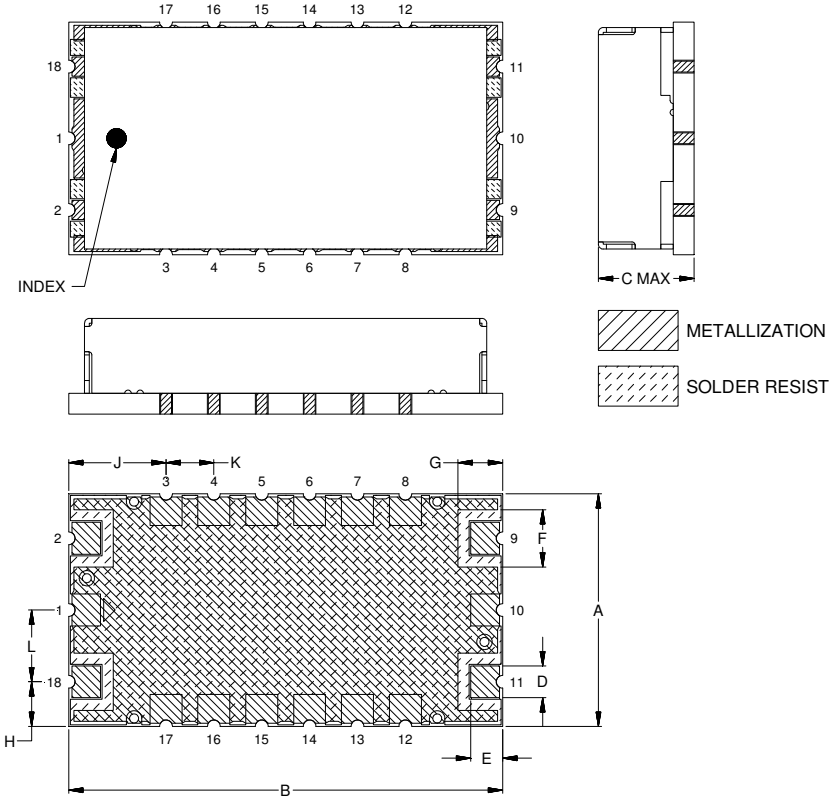


CROSSOVER ISOLATION BETWEEN LPF & BPF
INPUT POWER = 0 dBm

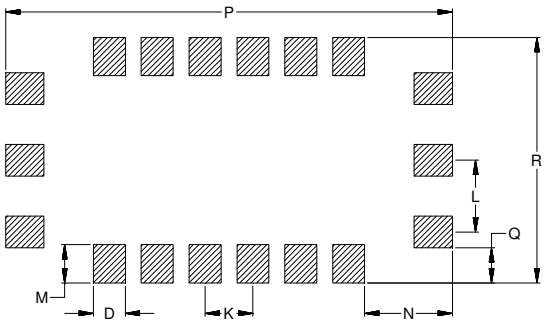


Case Style HP

Outline Dimensions HP1156



PCB Land Pattern



Suggested Layout,
Tolweance to be within ±.002

CASE#	A	B	C	D	E	F	G	H	J	K	L	M
HP1156	.730 (18.54)	1.360 (34.54)	.350 (8.89)	.100 (2.54)	.100 (2.54)	.180 (4.57)	.140 (3.56)	.140 (3.56)	.305 (7.75)	.150 (3.81)	.225 (5.72)	.120 (3.05)

CASE#	N	P	Q	R	WT.GRAM
HP1156	.275 (6.99)	1.400 (35.56)	.110 (2.79)	.770 (19.56)	6.0

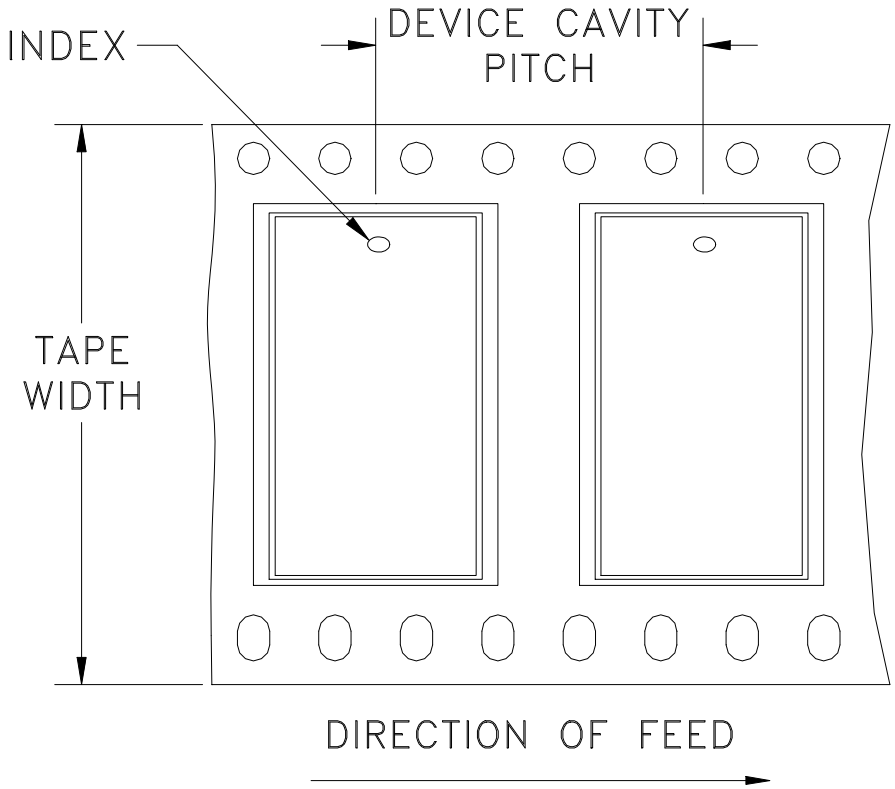
Dimensions are in inches (mm). Tolerances: 2Pl. ± .03; 3Pl. ± .015

Notes:

1. Case material: Nickel-Silver alloy.
2. Base: Printed wiring laminate.
3. Termination finish:
   For RoHS Case Styles: 3-5µinch (.08-.13microns) Gold over 120-240µinch (3.05-6.10microns) Nickel plate.
   For RoHS-5 Case Styles: Tin-Lead plate.

Tape & Reel Packaging TR-F89

DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
56	32	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

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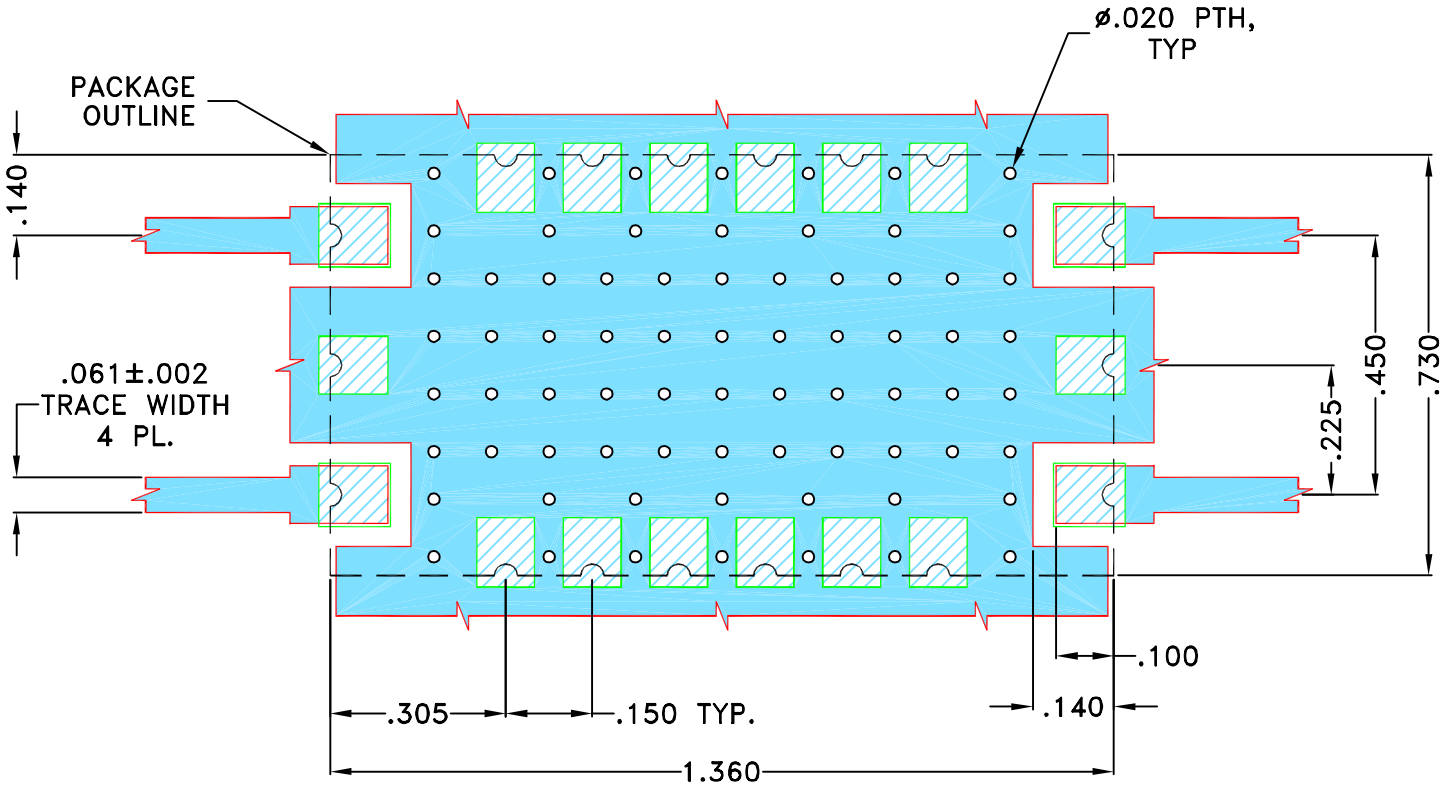
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M145648	NEW RELEASE	MAR 14	DDR	MD

SUGGESTED MOUNTING CONFIGURATION FOR HP1156 CASE STYLE "18FL01" PIN CODE



NOTES:

1. TRACE WIDTH IS SHOWN FOR OAK-602, WITH DIELECTRIC THICKNESS .022"±.0015". 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	DDR	14 MAR 14
TOLERANCES ON:	CHECKED	MD	14 MAR 14
2 PL DECIMALS ±	APPROVED	MD	14 MAR 14
3 PL DECIMALS ± .005"			
ANGLES ±			
FRACTIONS ±			

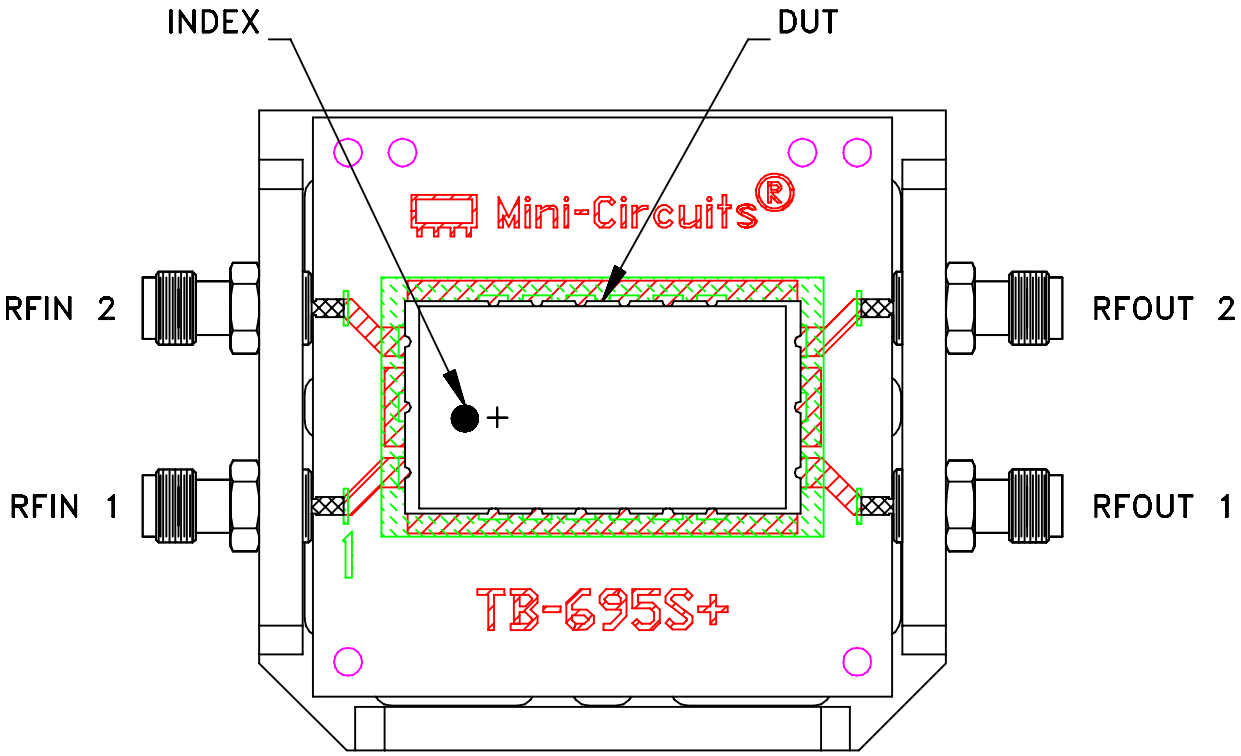
ASHEETA1.DWG REV:A DATE:01/12/95

Mini-Circuits®
13 Neptune Avenue
Brooklyn NY 11235

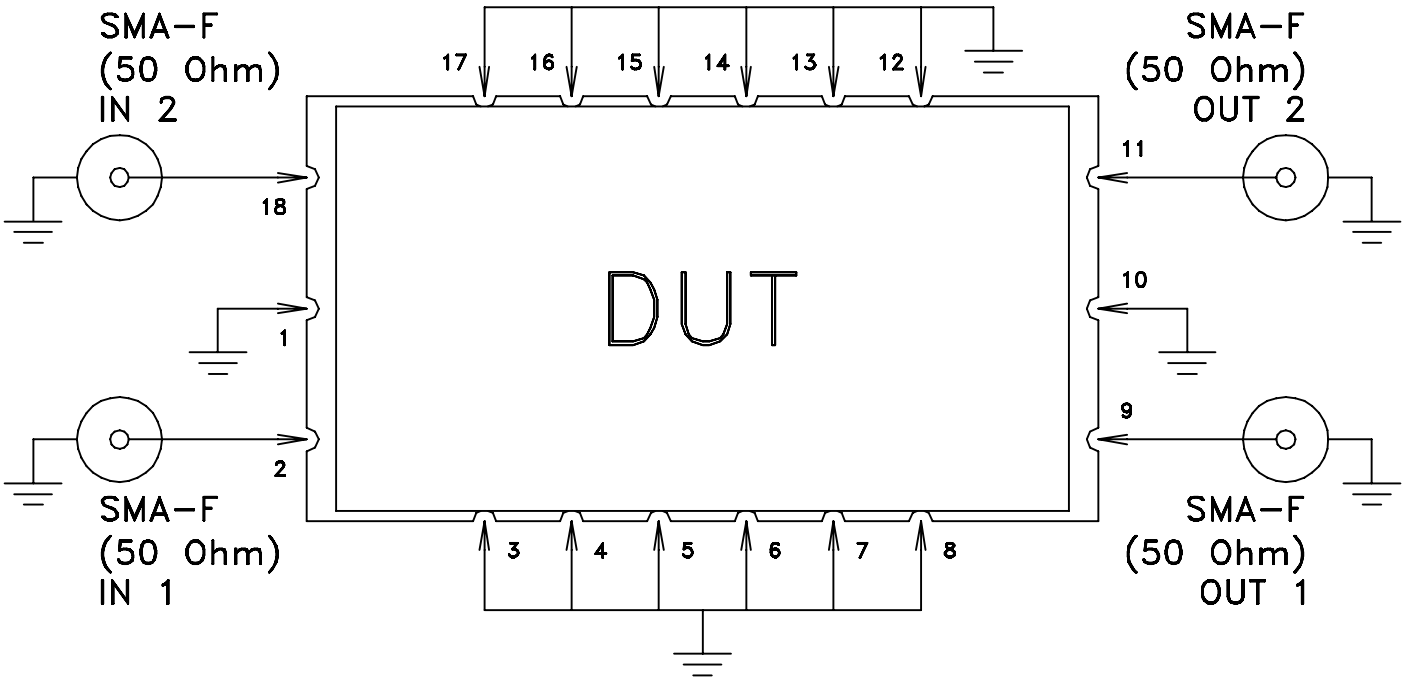
PL, 18FL01, HP1156, BPF TB-695+, 50 Ohm

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-418	OR
FILE: 98PL418	SCALE: 3:1	SHEET: 1 OF 1	

Evaluation Board and Circuit



TB-695+



Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: OAK-602 OR Equivalent
   Dielectric Constant=2.50±.04, Thickness=.022 inch.

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Environmental Specifications ENV12

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	-65° to 150° C Ambient Environment	Individual Model Data Sheet
Autoclave	15 psig, 100% RH, 121°C, 96 hours	JESD22-A102-C, Condition C
Temperature Cycling	-65° to 150°C, 100 cycles	JESD22-A104
Temperature Humidity	85°C/ 85% RH, 168 hours	JESD22-113
Solder Reflow Heat	Sn-Pb Eutetic Process: 240°C peak Pb-Free Process: 260°C peak	J-STD-020, Table 4-1, 4-2 and 5-2; Figure 5-1
Moisture Sensitivity: Level 1	Bake at 125°C for 24 hours Soak at 85°C/85% RH for 168 hours, Reflow 3 cycles at 240°C peak (Non-RoHS) or 260°C (RoHS)	J-STD-020
Solderability	10X magnification, 95% coverage	JESD22-B102, Method 1: Dip and Look Test
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
Vibration (High Frequency)	20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)	MIL-STD-202, Method 204, Condition D