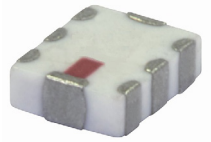
Ceramic

Dual Low Pass Filter

DLFCV-1600+

50Ω DC to 1600 MHz



Generic photo used for illustration purposes only
CASE STYLE: JV1210C-6

The Big Deal

- Differential operation
- Fast roll off
- Small size
- Very wide stopband, up to 10000 MHz

Product Overview

Mini-Circuits' DLFCV-1600+ is an LTCC dual low pass filter with a passband from DC to 1600 MHz. This can also operate as balanced input / output filter. This model is ideal for applications requiring filtering of balanced signals on dual 50Ω lines such as DACs/ADCs, systems with very low noise requirements and more. The filter provides low insertion loss in the passband, fast roll off in the transition, and a very wide stopband up to 10000 MHz, making it suitable for use in wideband systems with many harmonics and spurious products. The unit comes housed in a tiny, rugged 1210 ceramic package, with wraparound terminations for excellent solderability.

Key Features

Feature	Advantages
Dual filter	Allows filtering of balanced signals in a single, tiny component. Eliminates the need for binning and matching of separate discrete components.
Tiny size (0.126" x 0.098" x 0.039")	Saves space in dense circuit board layouts and minimizes the effects of parasitics.
Fast roll off	Provides sharp rejection at frequencies close to the passband.
Ultra-wide stopband	Provides excellent rejection over a wide band, ideal for blocking harmonics in wide-band communications systems.
Wrap-around terminations	Provides excellent solderability and easy visual inspection.

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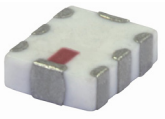


Generic photo used for illustration purposes only

CASE STYLE: JV1210C-6

+RoHS Compliant

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

Maximum Ratings

Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C
RF Power Input*	3 W Max. at 25°C

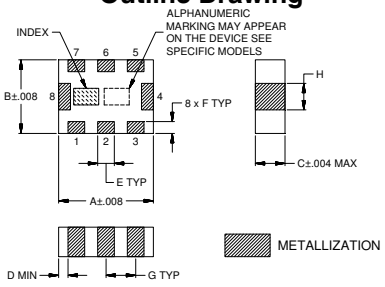
* Passband rating, derate linearly to 1.5W at 85°C ambient. Permanent damage may occur if any of these limits are exceeded.

Pin Connections

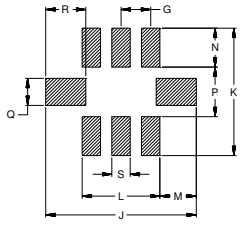
RF IN1, RF IN2	1, 3
RF OUT1, RF OUT2	7, 5
GROUND	2, 4 ,6, 8

Product Marking: KU

Outline Drawing



PCB LAND PATTERN



SUGGESTED LAYOUT

TOLERANCE TO BE WITHIN ±.002

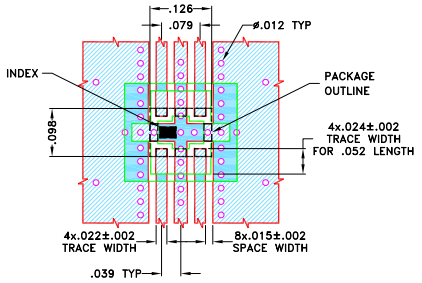
Outline Dimensions (inch / mm)

A	B	C	D	E	F	G	H	J
.126	.098	.039	.004	.022	.016	.039	.035	.200
3.20	2.50	1.00	0.10	0.56	0.40	1.00	0.90	5.08

K	L	M	N	P	Q	R	S	Wt.
.170	.103	.048	.052	.066	.036	.053	.024	grams
4.32	2.62	1.23	1.32	1.68	0.92	1.35	0.62	0.03

Note: Please refer to case style drawing for details

Demo Board MCL P/N: TB-1074+
Suggested PCB Layout (PL-600)



NOTES:
1. TRACE WIDTH IS SHOWN FOR ROGERS (RO4350B) WITH DIELECTRIC THICKNESS .010"±.001". COPPER: 1/2oz. 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

Features

- Low insertion loss
- Small size
- Excellent return loss
- High rejection

Applications

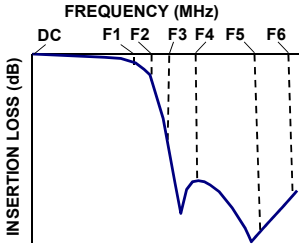
- Military Radio communication
- VHF/UHF transmitters/receivers
- Harmonic rejection
- Output of the A/D convertor

Electrical Specifications[1,2] at 25°C

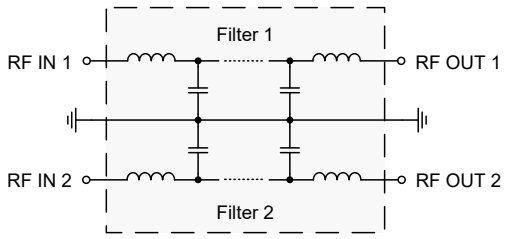
Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Insertion Loss	DC-F1	DC-1600	—	1.5	2.5	dB
	Freq. Cut-Off	F2 *	1800	—	3.0	—	dB
	Amp Unbalance	DC-F1	DC-1600	—	0.2	—	dB
	Pha Unbalance	DC-F1	DC-1600	—	3.0	—	deg
	VSWR	DC-F1	DC-1600	—	1.5	—	:1
Stop Band	Insertion Loss	F3-F4	2400-4900	35	50	—	dB
		F4-F5	4900-7000	—	33	—	dB
		F5-F6	7000-10000	—	25	—	dB
	Isolation(between filters)	F3-F4	2400-4900	—	50	—	dB
	VSWR	F3-F4	2400-4900	—	20	—	:1

1 In Applications where DC voltage and/or current is present at either input or output ports, DC de-coupling capacitors are required. If DC pass from IN-OUT is required, please contact Mini-Circuits for alternatives.
2 Measured on Mini-Circuits Characterization Test Board TB-1074+
* Typically, a ±5% frequency deviation from the stated value may occur on a unit-to-unit basis.

Typical Frequency Response



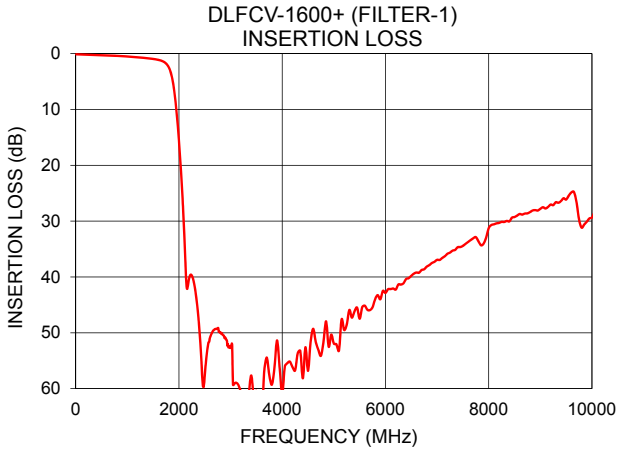
Functional Schematic

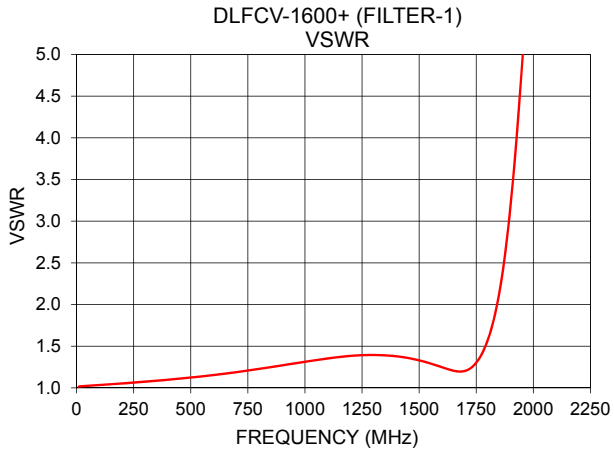


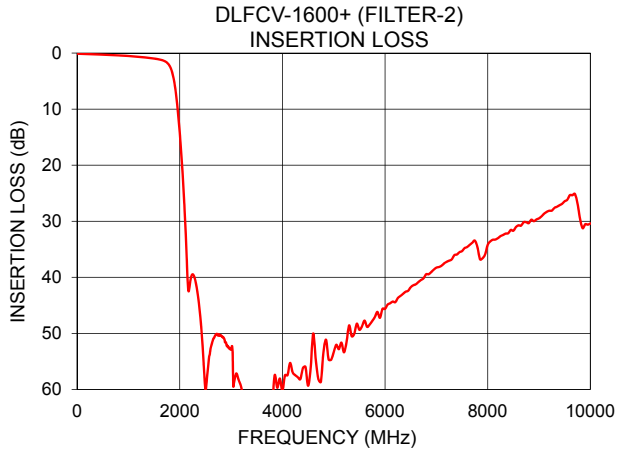
Typical Performance Data at 25°C

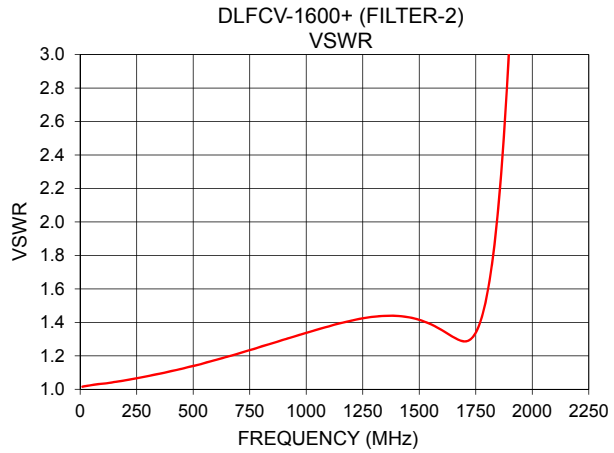
Freq. (MHz)	Insertion Loss Filter1 (dB)	Insertion Loss Filter2 (dB)	Isolation (between filters) (dB)	VSWR Filter1 (:1)	VSWR Filter2 (:1)	Freq. (MHz)	Amp Unbal. (dB)	Phase Unbal. (deg)	Group Delay Filter1 (ns)	Group Delay Filter2 (ns)
10.0	0.11	0.11	97.17	1.01	1.02	10.0	0.001	0.06	0.27	0.28
100.0	0.16	0.15	79.47	1.03	1.03	40.0	0.003	0.06	0.31	0.31
500.0	0.29	0.28	64.19	1.12	1.14	60.0	0.003	0.10	0.31	0.31
1000.0	0.51	0.52	54.46	1.31	1.34	100.0	0.009	0.11	0.31	0.30
1600.0	1.12	1.13	47.06	1.25	1.35	140.0	0.010	0.13	0.30	0.30
1750.0	1.77	1.69	48.55	1.30	1.34	200.0	0.009	0.15	0.30	0.30
1800.0	2.40	2.24	49.26	1.57	1.57	260.0	0.012	0.19	0.30	0.30
1850.0	3.66	3.35	49.31	2.13	2.09	300.0	0.011	0.20	0.31	0.30
2000.0	15.61	14.23	49.44	6.83	6.30	350.0	0.009	0.22	0.31	0.31
2030.0	19.63	17.93	49.95	8.02	7.17	400.0	0.008	0.26	0.31	0.31
2040.0	21.11	19.28	50.22	8.41	7.44	450.0	0.009	0.28	0.31	0.31
2100.0	31.81	28.91	52.86	10.69	8.88	500.0	0.007	0.31	0.32	0.32
2110.0	34.01	30.88	53.31	11.09	9.12	600.0	0.004	0.39	0.33	0.32
2200.0	40.13	41.07	59.35	14.81	11.38	700.0	0.001	0.47	0.34	0.34
2400.0	49.99	47.01	68.22	24.62	18.15	800.0	0.004	0.57	0.35	0.35
4000.0	60.95	60.23	62.51	166.94	94.53	900.0	0.005	0.69	0.37	0.37
4900.0	52.49	54.64	53.28	727.75	76.18	1000.0	0.006	0.82	0.39	0.39
6000.0	42.85	45.63	46.32	97.47	66.67	1250.0	0.011	1.21	0.47	0.47
7000.0	36.93	38.27	42.09	78.40	49.21	1300.0	0.015	1.32	0.50	0.49
8000.0	31.26	34.21	40.75	129.24	29.12	1400.0	0.022	1.61	0.56	0.55
9000.0	27.80	29.48	36.25	87.60	129.96	1500.0	0.027	2.02	0.65	0.64
10000.0	29.35	30.41	38.94	153.05	156.98	1600.0	0.019	2.65	0.79	0.76

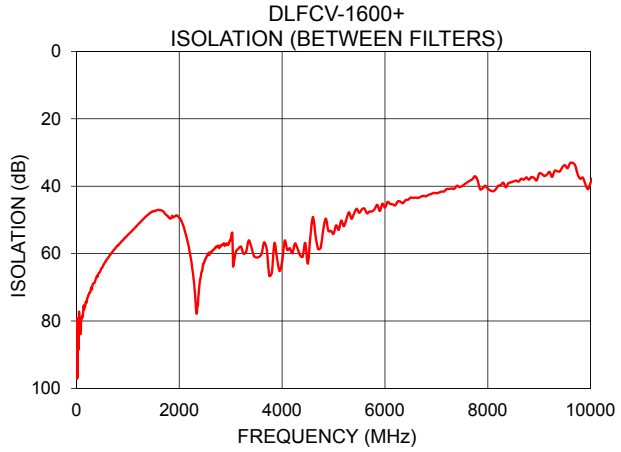
Notes
A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's 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

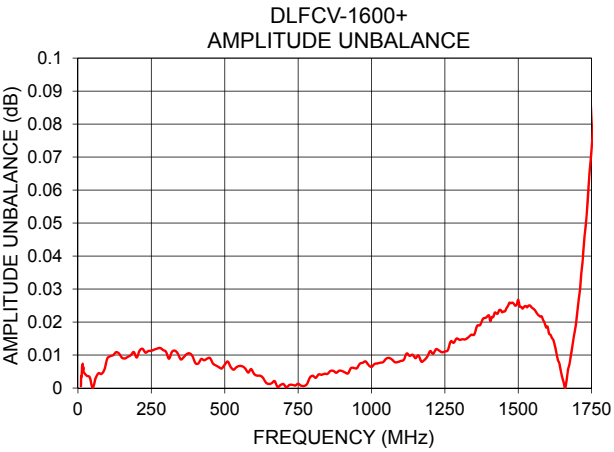












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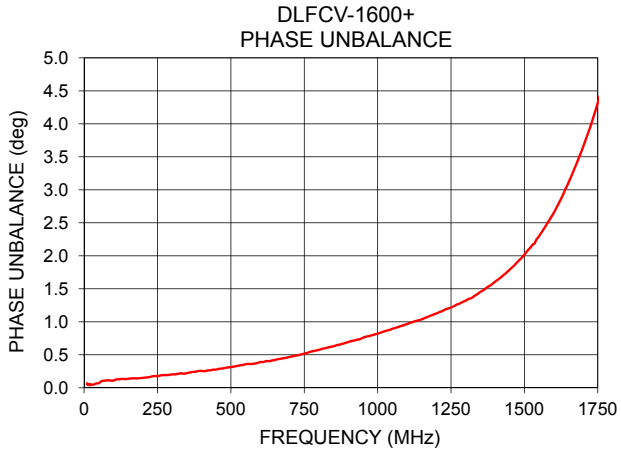
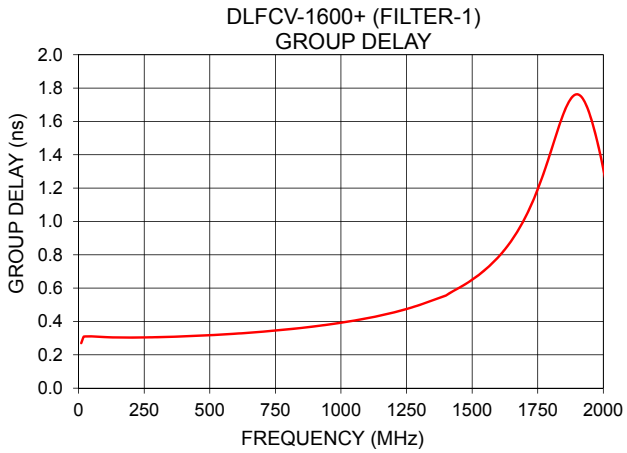
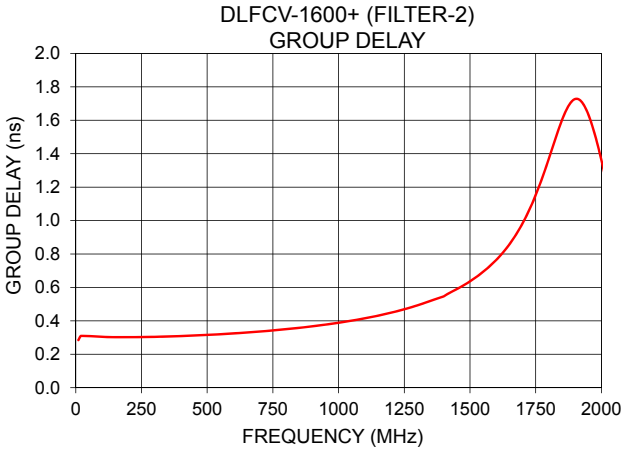






Dual Low Pass Filter DLFCV-1600+

Typical Performance Data

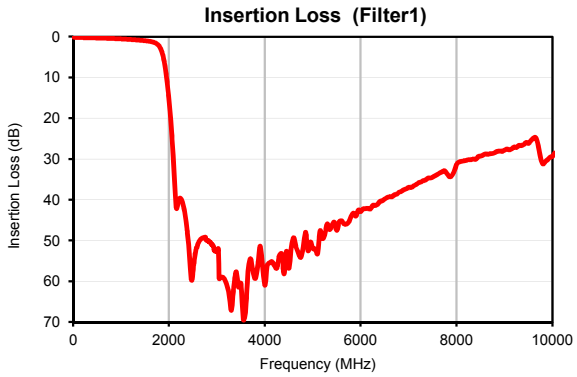
FREQUENCY (MHz)	INSERTION LOSS (dB)		Isolation (between filters) (dB)	RETURN LOSS (dB)	
	Filter1	Filter2		Filter1	Filter2
10	0.11	0.11	94.56	39.26	42.21
50	0.13	0.13	80.77	38.35	39.63
100	0.16	0.15	80.20	36.92	37.90
150	0.18	0.17	76.32	36.95	38.30
250	0.21	0.20	72.02	40.46	43.15
500	0.29	0.28	63.90	33.41	30.81
750	0.38	0.38	58.50	22.88	21.76
1000	0.51	0.52	54.46	17.85	17.26
1250	0.70	0.71	50.55	15.68	15.06
1500	0.95	0.98	47.35	17.22	15.67
1600	1.12	1.13	47.05	20.59	17.73
1800	2.40	2.24	49.27	14.21	15.85
1850	3.66	3.35	49.31	9.24	10.13
1900	6.09	5.53	49.08	5.77	6.23
2000	15.61	14.23	49.49	2.65	2.66
2035	20.36	18.60	50.15	2.24	2.20
2095	30.76	27.98	52.51	1.81	1.74
2100	31.81	28.91	52.85	1.78	1.71
2150	41.86	39.88	55.64	1.55	1.48
2200	40.13	41.07	59.38	1.36	1.30
2250	39.76	39.46	63.82	1.20	1.15
2300	41.50	40.44	70.50	1.06	1.02
2350	44.81	42.99	76.22	0.94	0.91
2400	49.99	47.01	68.27	0.84	0.82
2500	57.64	59.97	61.77	0.68	0.66
2750	49.19	50.33	57.80	0.43	0.40
3000	52.60	52.86	55.73	0.29	0.25
3250	62.95	62.49	59.90	0.22	0.17
3500	60.50	63.73	61.19	0.17	0.12
3750	57.56	62.30	66.10	0.15	0.08
4000	60.95	60.23	62.44	0.13	0.07
4250	56.73	57.46	57.16	0.10	0.04
4500	56.81	59.33	62.96	0.06	0.01
4900	52.49	54.64	53.28	0.01	0.04
5000	51.93	53.36	54.14	0.04	0.07
5250	48.55	51.52	49.81	0.10	0.10
5500	47.48	49.36	47.87	0.18	0.14
5750	45.42	47.79	47.47	0.24	0.19
6000	42.85	45.63	46.34	0.31	0.22
6200	42.25	44.43	45.67	0.33	0.23
6400	40.37	42.58	44.13	0.32	0.23
6600	39.21	41.25	43.38	0.29	0.23
6800	38.15	39.46	42.99	0.22	0.20
7000	36.93	38.27	42.08	0.14	0.16
7200	35.85	37.22	40.87	0.04	0.13
7400	34.67	35.93	39.88	0.04	0.08
7600	33.74	34.59	38.88	0.07	0.06
7800	33.58	34.62	38.18	0.05	0.03
8000	31.26	34.21	40.75	0.07	0.10
8200	30.33	33.01	39.91	0.25	0.18
8400	30.05	32.14	39.12	0.42	0.30
8600	28.72	30.73	38.64	0.51	0.48
8800	28.39	30.34	38.06	0.50	0.65
9000	27.80	29.48	36.26	0.39	0.80
9200	27.03	28.13	35.78	0.26	0.89
9400	26.41	27.14	35.64	0.11	0.90
9600	24.87	25.36	33.18	0.42	0.51
9800	31.16	29.62	37.78	0.37	0.00
9900	30.10	30.53	39.55	0.14	0.53
10000	29.35	30.41	38.96	0.04	0.60

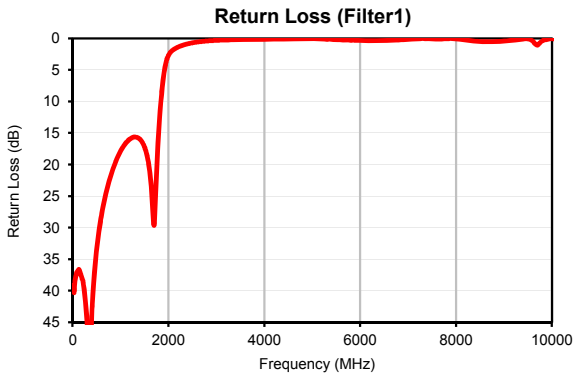
Typical Performance Data

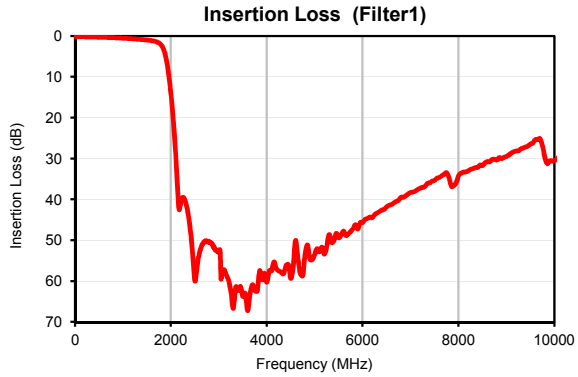
FREQUENCY (MHz)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE (deg)	GROUP DELAY (ns)	
			Filter1	Filter2
10	0.00	0.00	0.27	0.28
20	0.01	0.05	0.31	0.31
30	0.00	0.05	0.31	0.31
40	0.00	0.05	0.31	0.31
60	0.00	0.09	0.31	0.31
80	0.00	0.10	0.31	0.31
100	0.01	0.10	0.31	0.30
120	0.01	0.12	0.30	0.30
140	0.01	0.13	0.30	0.30
160	0.01	0.14	0.30	0.30
180	0.01	0.15	0.30	0.30
200	0.01	0.16	0.30	0.30
220	0.01	0.16	0.30	0.30
240	0.01	0.17	0.30	0.30
260	0.01	0.17	0.30	0.30
280	0.01	0.18	0.30	0.30
300	0.01	0.20	0.31	0.30
320	0.01	0.20	0.31	0.30
340	0.01	0.22	0.31	0.31
360	0.01	0.22	0.31	0.31
380	0.01	0.24	0.31	0.31
400	0.01	0.25	0.31	0.31
450	0.01	0.28	0.31	0.31
500	0.01	0.30	0.32	0.32
550	0.01	0.35	0.32	0.32
600	0.01	0.37	0.33	0.32
650	0.00	0.41	0.33	0.33
700	0.00	0.46	0.34	0.34
750	0.00	0.50	0.35	0.34
800	0.00	0.56	0.35	0.35
850	0.00	0.61	0.36	0.36
900	0.01	0.67	0.37	0.37
950	0.01	0.74	0.38	0.38
1000	0.01	0.80	0.39	0.39
1050	0.01	0.88	0.41	0.40
1100	0.01	0.96	0.42	0.42
1150	0.01	1.02	0.44	0.43
1200	0.01	1.10	0.45	0.45
1250	0.01	1.20	0.47	0.47
1300	0.02	1.30	0.50	0.49
1350	0.02	1.42	0.53	0.52
1400	0.02	1.57	0.56	0.55
1420	0.02	1.65	0.58	0.57
1440	0.02	1.73	0.59	0.58
1460	0.02	1.80	0.61	0.60
1480	0.03	1.89	0.63	0.62
1500	0.03	1.99	0.65	0.64
1520	0.02	2.09	0.67	0.66
1540	0.02	2.22	0.70	0.68
1560	0.02	2.32	0.72	0.71
1580	0.02	2.45	0.75	0.73
1600	0.02	2.61	0.79	0.76

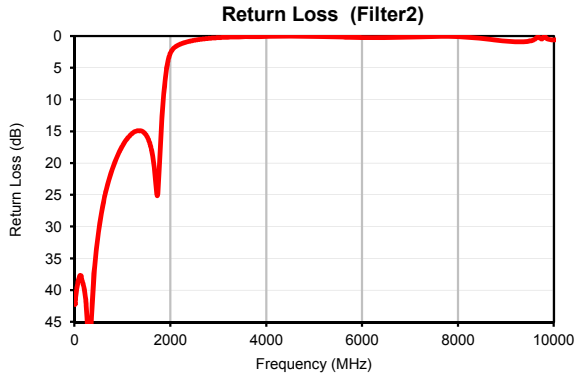
Dual Low Pass Filter DLFCV-1600+

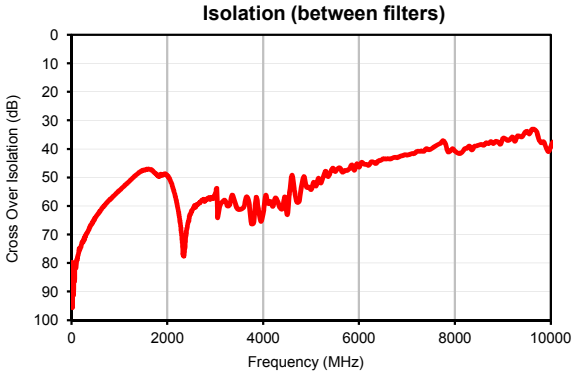
Typical Performance Curves

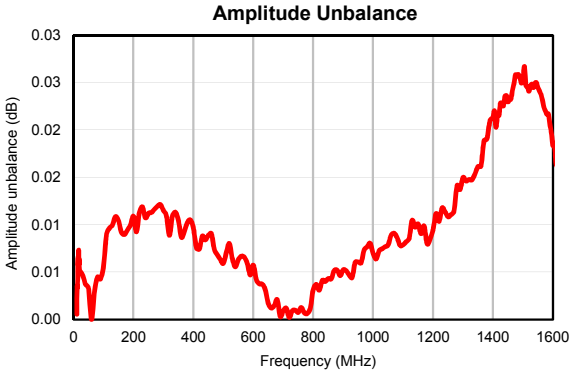






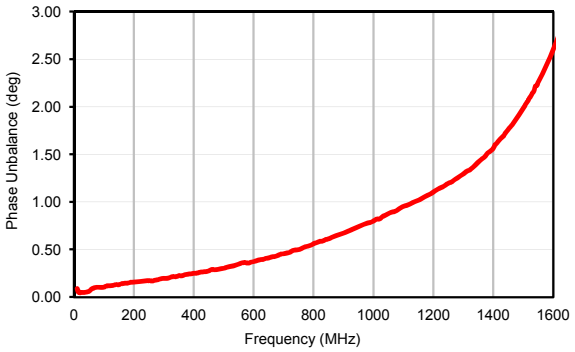




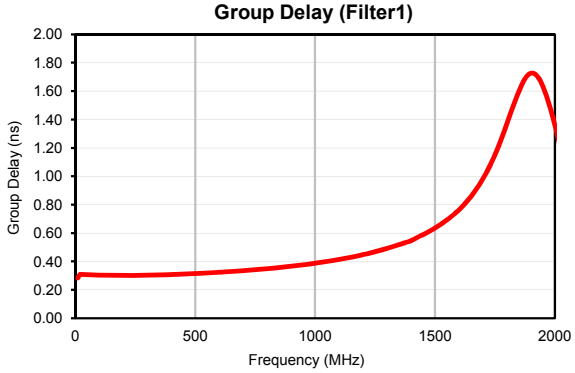


Typical Performance Curves

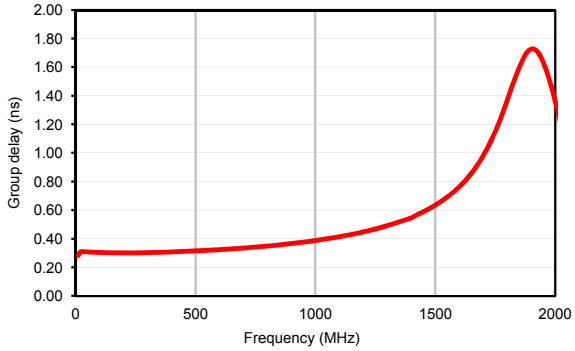
Phase Unbalance



Group Delay (Filter1)

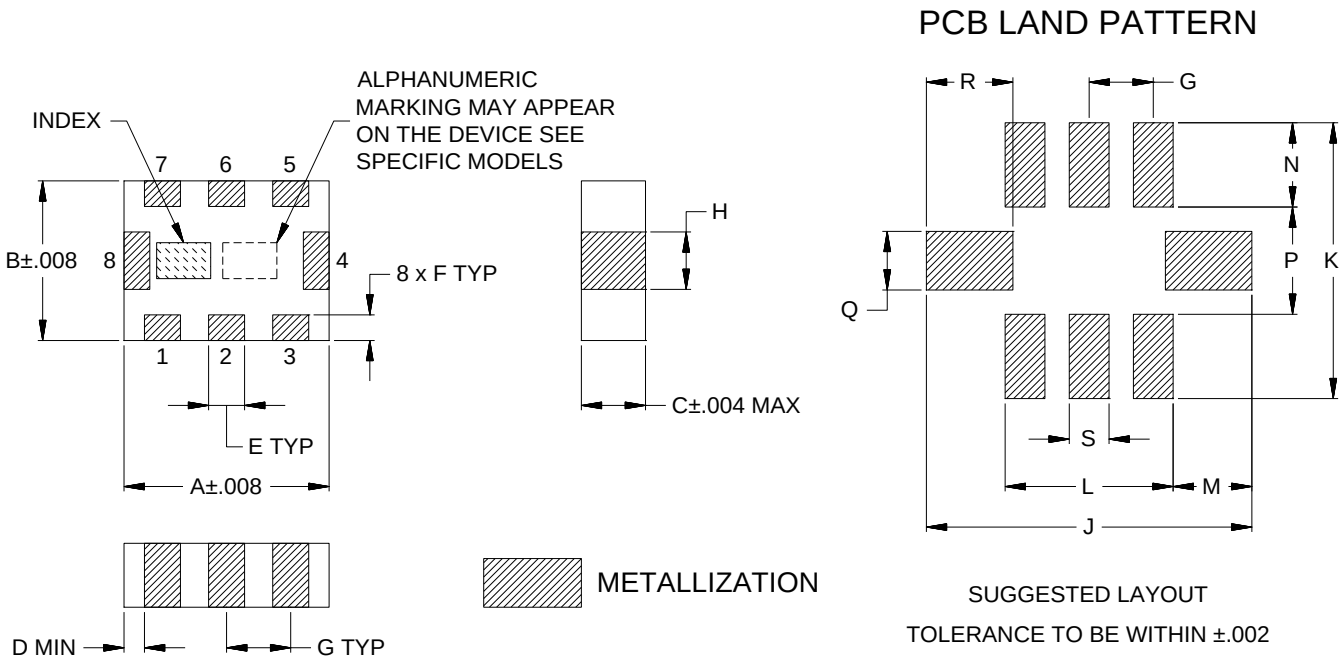


Group Delay (Filter2)



Case Style JV

Outline Dimensions JV1210C-6



CASE#	A	B	C	D	E	F	G	H	J	K	L	M
JV1210C-6	.126 (3.20)	.098 (2.50)	.039 (1.00)	.004 (0.10)	.022 (0.56)	.016 (0.40)	.039 (1.00)	.035 (0.90)	.200 (5.08)	.170 (4.32)	.103 (2.62)	.048 (1.23)

CASE#	N	P	Q	R	S	WT.GRAM
JV1210C-6	.052 (1.32)	.066 (1.68)	.036 (0.92)	.053 (1.35)	.024 (0.62)	0.03

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

Notes:

1. Open style, Ceramic base.
2. Termination finish: **as shown below or indicated on Data Sheet.**
   For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.
   For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.
3. Pad tolerance is non-cumulative. Minimum spacing between each pad is .004.

Tape & Reel Packaging TR-F74

DEVICE ORIENTATION IN T&R

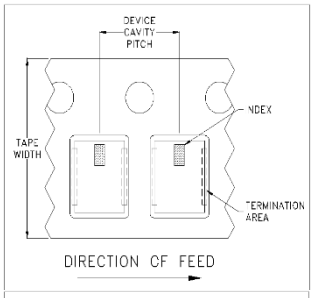


ILLUSTRATION 1

Applicable Case Styles
GE0805C-1
GE0805C-1AP
JV1210C-1
GU2939

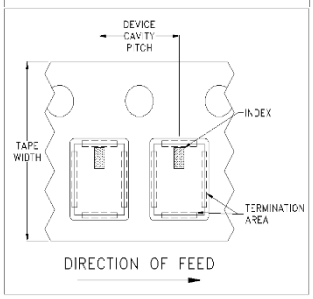


ILLUSTRATION 2

Applicable Case Styles
JV1210C
JV1210C-2
JV1210C-3
JV1210C-4
JV1210C-5
JV1210C-6
JV1210C-11

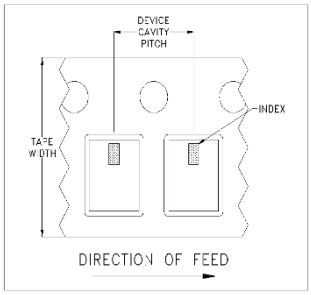


ILLUSTRATION 3

Applicable Case Styles
JC0603C-8
JC0603C-9
JV1210C-7
JV1210C-8
JV1210C-9
JV1210C-10
JV1210C-13
GE0805C-13
GE0805C-19
GE0805C-20

Tape Width, mm	Device Cavity Pitch, mm	Real Size, inches	Devices per Reel	
8	4	7	Small quantity standards **(see note)**	20
				50
				100
				200
				500
				1000
			Standard	2000
				4000

Note: Small reel availability varies by model. Refer to pricing and availability on individual model dashboard.

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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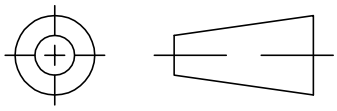
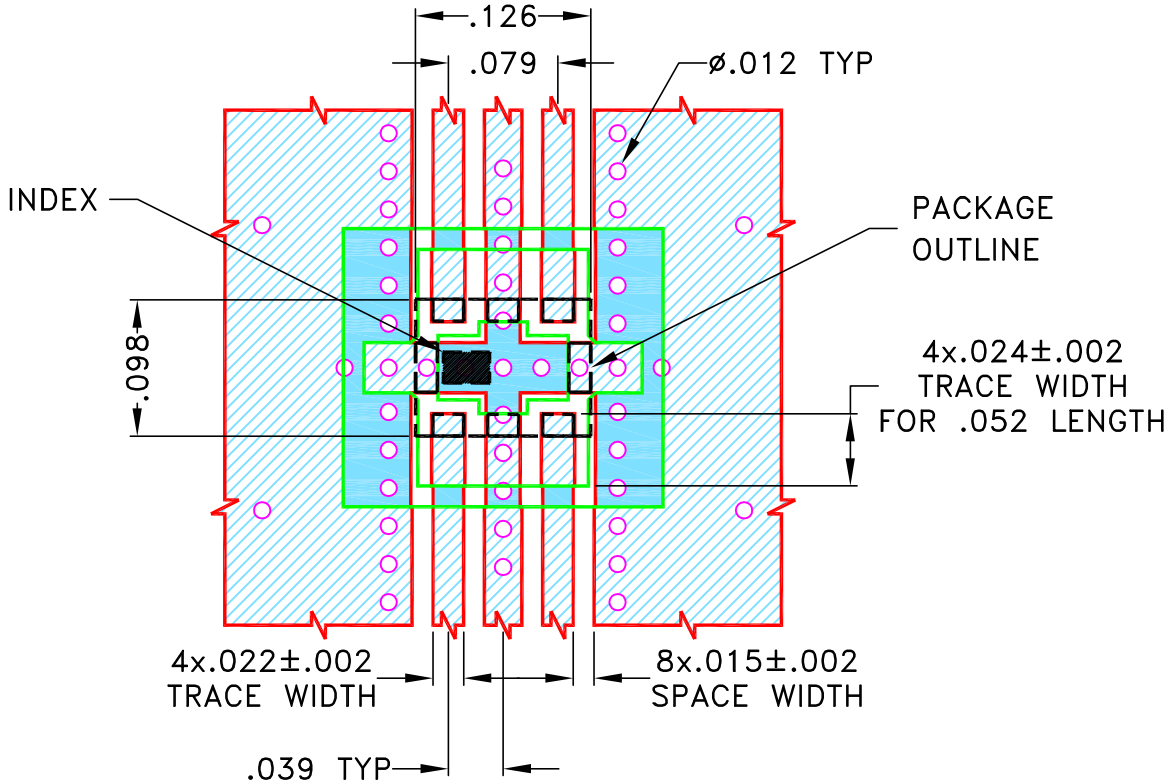
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M169000	NEW RELEASE	AUG 18	DDR	VC

SUGGESTED MOUNTING CONFIGURATION FOR JV1210C-6 CASE STYLE "08FL08" PIN CODE



NOTES:

1. TRACE WIDTH IS SHOWN FOR ROGERS (RO4350B) WITH DIELECTRIC THICKNESS .010"±.001". COPPER: 1/2Oz. 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	18 AUG 18
TOLERANCES ON:	CHECKED	MD	18 AUG 18
2 PL DECIMALS ±	APPROVED	RKS	18 AUG 18
3 PL DECIMALS ± .005"			
ANGLES ±			
FRACTIONS ±			

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

Mini-Circuits®
13 Neptune Avenue
Brooklyn NY 11235

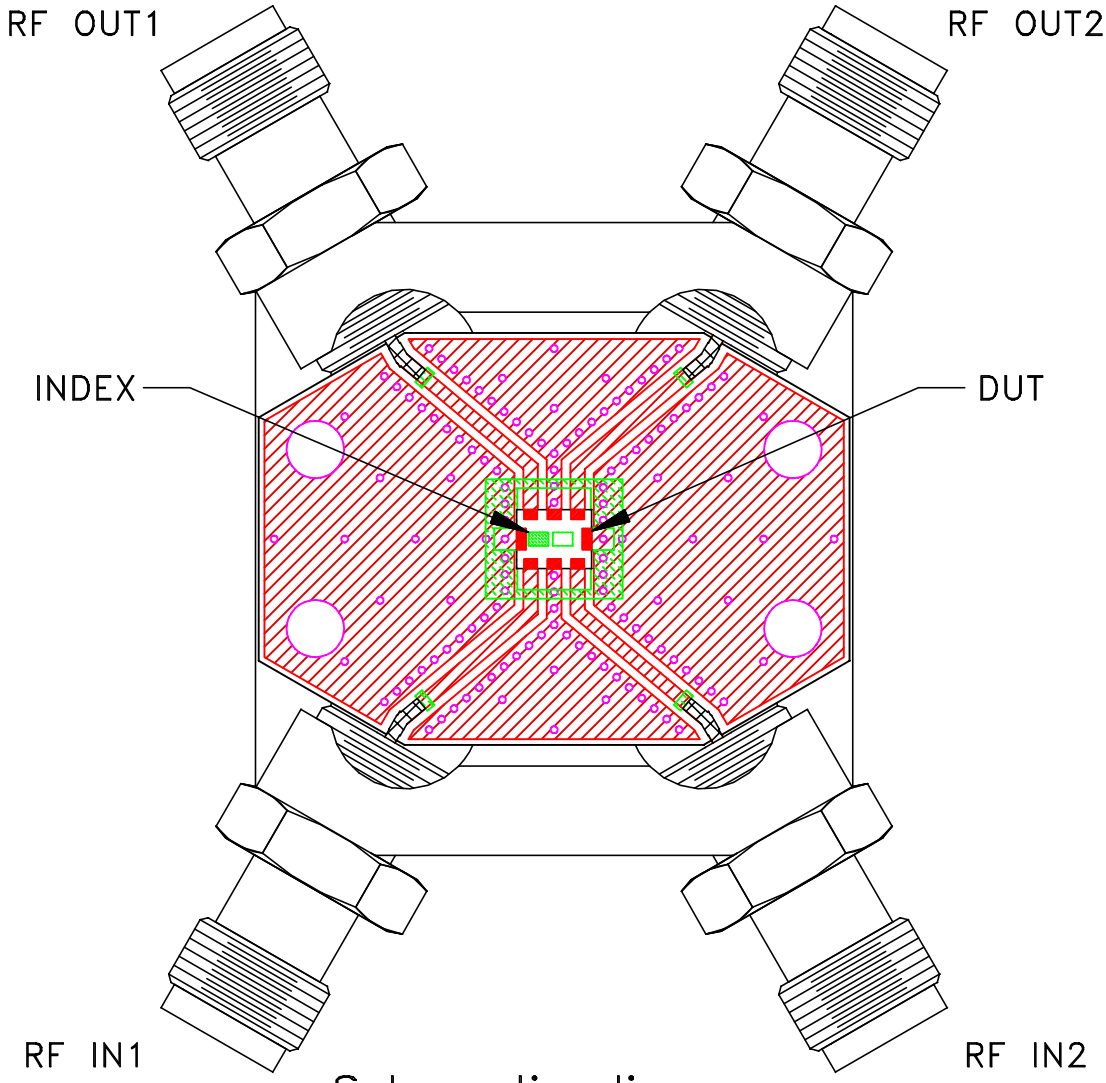
PL, 08FL08, JV1210C-6
DLFCV, TB-1074+, 50 OHM

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-600	OR

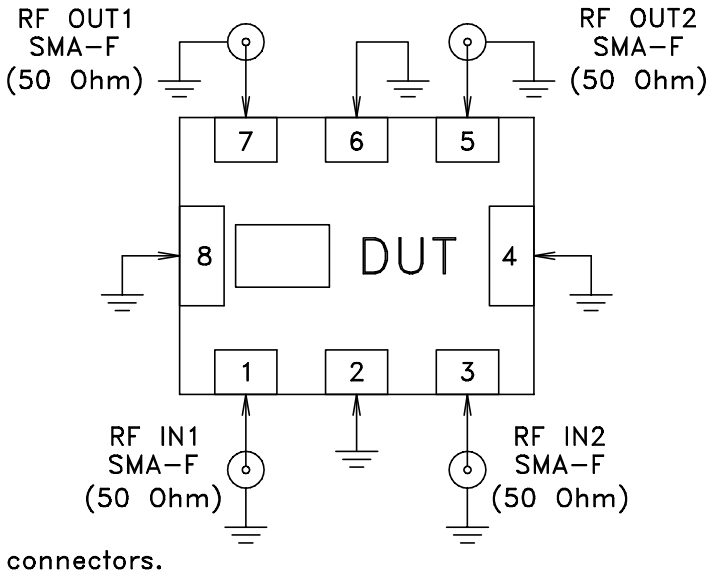
FILE:	SCALE:	SHEET:
98PL600	7:1	1 OF 1

Evaluation Board and Circuit

TB-1074+



Schematic diagram



Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: ROGERS (RO4350B), OR Equivalent
   Dielectric Constant=3.48, Thickness=.010inch.

Mini-Circuits®

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Environmental Specifications ENV06

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	-55° to 100°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
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
Solder Reflow Heat	Sn-Pb Eutetic Process: 225°C peak Pb-Free Process 245° - 250°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, 12 times in each of three perpendicular directions (total 36)	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