LTCC SURFACE MOUNT

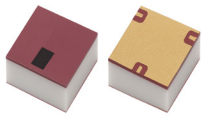
Diplexer

LDPV-11163+

50Ω DC to 19 GHz (DC - 11, 16.8 - 19 GHz)

THE BIG DEAL

- Low Insertion loss, 1.4 dB Typ
- Stopband Rejection, 55 dB Typ.
- 1210 Surface Mount Footprint
- Power Handling: 2.8 W

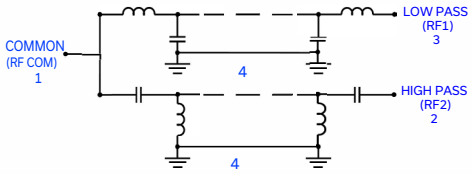


Generic photo used for illustration purposes only

APPLICATIONS

- Ku-Band Satellite Communication
- Radar and EW Systems
- Test and Measurement

FUNCTIONAL DIAGRAM



PRODUCT OVERVIEW

Mini-Circuits' LDPV-11163+ is a miniature low temperature co-fired ceramic (LTCC) diplexer with a low pass passband of DC-11 GHz and high pass passband of 16.8 - 19 GHz that supports a variety of applications. This model provides 1.4 dB typical insertion loss over a wide band due to its rugged monolithic construction. Housed in an 1210 ceramic form factor, it is ideal for dense signal chain PCB layouts where it complements MMIC size and performance. The LTCC fabrication process assures minimal RF performance variation while delivering a product that is well suited for environmental extremes of high humidity and temperature.

KEY FEATURES

Features	Advantages
Low Insertion Loss	The low insertion loss of low pass and high pass channels ensures less power dissipation in the diplexer.
LTCC Construction	The use of LTCC technology allows for repeatable performance in a rugged ceramic package, well suited for tough environments such as high humidity and temperature extremes. See Mini-Circuits Environmental Rating ENV06T10 for more information.
Small Size, 1210	1210 package allows for space to be saved in dense circuit board layouts, while also minimizing the effects of parasitics.
Good Power Handling, 2.8 W	Handles up to 2.8 Watts in a small 1210 package.

REV. OR
ECO-027800
EDU4873
LDPV-11163+
URJ
251209

Diplexer

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50Ω DC to 19 GHz (DC - 11, 16.8 - 19 GHz)

ELECTRICAL SPECIFICATIONS[1,2] AT +25°C

Parameter		Function (Port)	Frequency (GHz)	Min.	Typ.	Max.	Unit
Passband	Insertion Loss	Low Pass (RF COM-RF1)	DC - 11	—	1.4	2.5	dB
		High Pass (RF COM-RF2)	16.8 - 18	—	2.1	3.5	
			18 - 19	—	2.5	3.5	
	Return Loss	Low Pass (RF1)	DC - 11	—	11	—	dB
		High Pass (RF2)	16.8 - 18	—	10	—	
			18 - 19	—	7	—	
		Common (RF COM)	DC - 11	—	11	—	
			16.8 - 18	—	11	—	
			18 - 19	—	8	—	
Stopband	Rejection	Low Pass (RF COM-RF1)	16.5 - 19	25	36	—	dB
		High Pass (RF COM-RF2)	DC - 4.8	45	55	—	
			4.8 - 9	30	43	—	
			9 - 12.5	20	31	—	

1. Tested in Evaluation Board P/N TB-LDPV-11163+.
2. This component should not be used as a DC-block. In applications where DC voltage and/or current is present at either the input or output ports, external DC blocking capacitors are required.

ABSOLUTE MAXIMUM RATINGS[3]

Parameter	Ratings
Operating Temperature	-55°C to +125°C
Storage Temperature	-55°C to +125°C
Input Power (RF COM)[4]	2.8 W @ +25°C
Input Power (RF1)[5]	2.8 W @ +25°C
Input Power (RF2)[6]	2.8 W @ +25°C

3. Permanent damage may occur if any of these limits are exceeded.
4. Power rating applies only to signals within the passband. Power rating above +25°C operating temperature decreases linearly to 1 W at +125°C.
5. Power rating applies only to signals within the passband. Power rating above +25°C operating temperature decreases linearly to 1 W at +125°C.
6. Power rating applies only to signals within the passband. Power rating above +25°C operating temperature decreases linearly to 1 W at +125°C.

Diplexer

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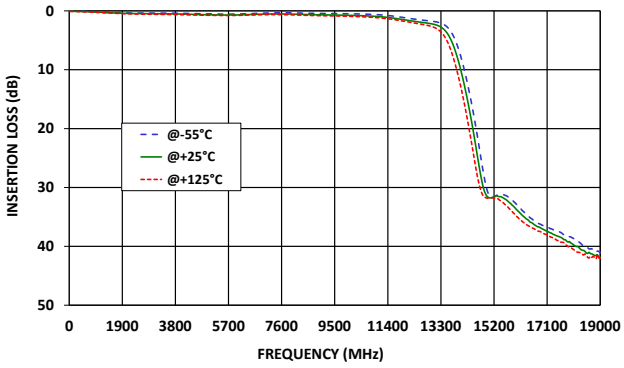
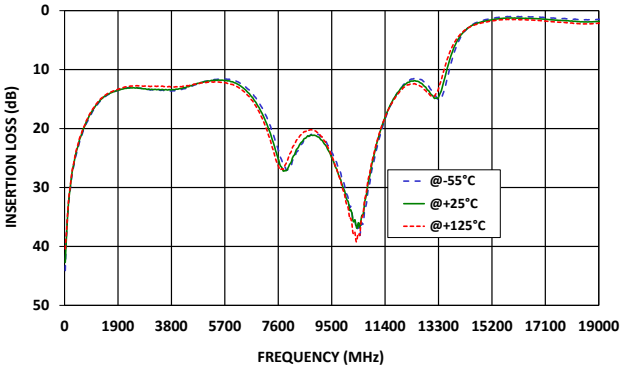
TYPICAL PERFORMANCE GRAPHS

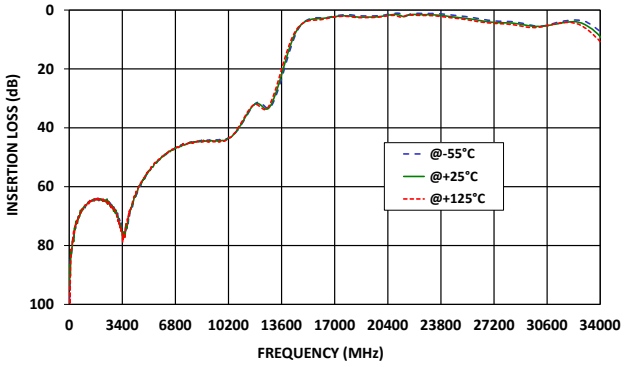
LDPV-11163+ LOW PASS
INSERTION LOSS



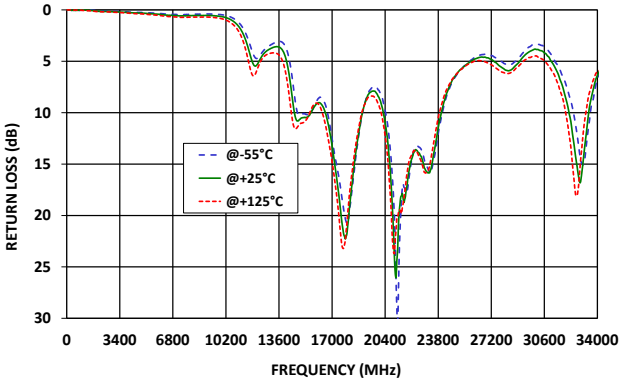
LDPV-11163+ LOW PASS
RETURN LOSS



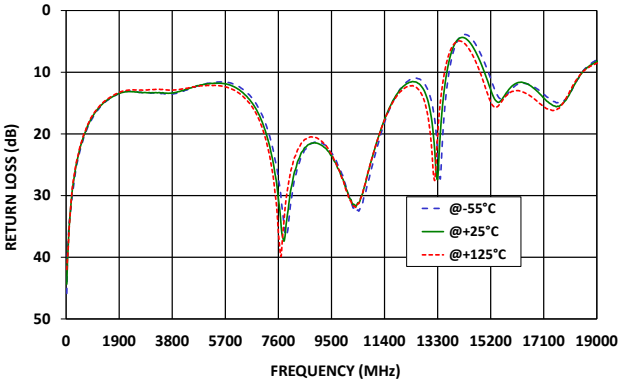
LDPV-11163+ HIGH PASS
INSERTION LOSS



LDPV-11163+ HIGH PASS
RETURN LOSS



LDPV-11163+ COMMON PORT
RETURN LOSS



Diplexer

LDPV-11163+

50Ω DC to 19 GHz (DC - 11, 16.8 - 19 GHz)

FUNCTIONAL DIAGRAM

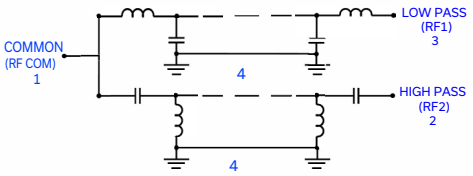
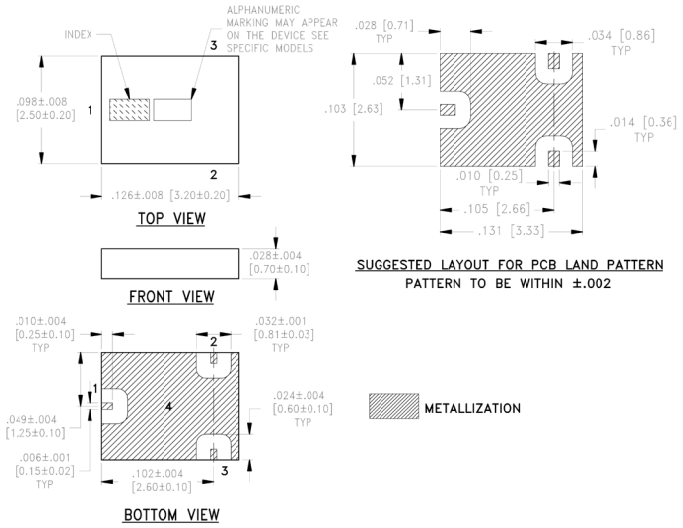


Figure 1.LDPV-11163+ Functional Diagram

PAD DESCRIPTION

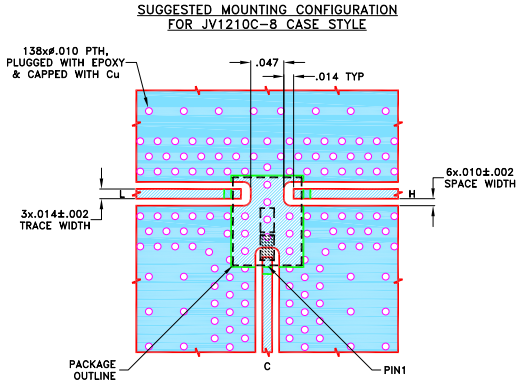
Function	Pad Number	Description
RF COM	1	Connects to RF COM Port
RF1	3	Connects to Low Pass Port
RF2	2	Connects to High Pass Port
GND	4	Connects to Ground on PCB, (See drawing PL-841)

CASE STYLE DRAWING



Weight: .024 grams
Dimensions are in inches (mm). Tolerances: 3Pl. ± .005

SUGGESTED PCB LAYOUT



NOTES:
1. TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR ROGERS (RO4835 Lo Pro), DIELECTRIC THICKNESS: .0073±.0007. 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 SOLDERMASK

Figure 2. Suggested PCB Layout

PRODUCT MARKING*: YB

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

Diplexer

LDPV-11163+

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ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASHBOARD. CLICK HERE

Performance Data & Graphs	Data Graphs S-Parameter (S3P Files) Data Set (.zip file) De-embedded to device pads (if applicable)
Case Style	JV1210C-8 Lead Finish: Gold over Nickel Plate.
RoHS Status	Compliant
Tape and Reel	F74
Suggested Layout for PCB Design	PL-841
Evaluation Board	TB-LDPV-11163+ Gerber File
Environmental Rating	ENV06T10

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

Ceramic Diplexer LDPV-11163+

Typical Performance Data

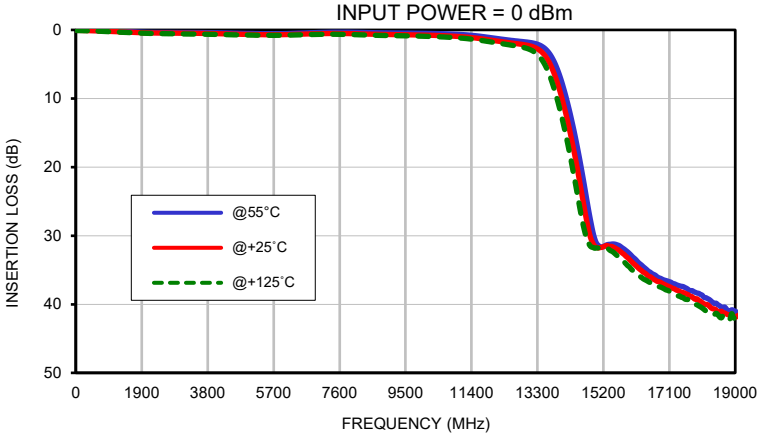
FREQUENCY (MHz)	INSERTION LOSS (dB)					
	Lowpass port			Highpass port		
	@-55°C	@+25°C	@+125°C	@-55°C	@+25°C	@+125°C
25	0.04	0.06	0.09	97.92	94.08	93.72
50	0.05	0.07	0.09	91.25	86.54	101.08
75	0.05	0.07	0.10	84.28	90.33	87.96
100	0.04	0.07	0.09	83.15	81.32	84.79
125	0.05	0.08	0.10	83.21	83.48	83.26
150	0.05	0.08	0.10	82.58	82.05	81.25
175	0.05	0.08	0.10	80.74	80.75	80.96
500	0.07	0.12	0.15	71.72	71.58	71.48
1000	0.15	0.22	0.27	66.37	66.50	66.89
1500	0.25	0.33	0.38	64.85	64.64	64.57
2000	0.34	0.42	0.49	64.34	64.21	64.35
2500	0.37	0.46	0.54	65.10	65.46	65.83
3000	0.38	0.48	0.58	68.19	67.98	69.00
3500	0.38	0.50	0.61	75.40	75.70	76.63
4000	0.41	0.54	0.65	67.50	66.77	66.27
4500	0.46	0.60	0.71	60.09	59.65	59.64
4800	0.50	0.64	0.74	57.52	57.47	56.90
5000	0.51	0.66	0.75	55.59	55.48	55.13
6000	0.54	0.69	0.77	49.75	49.81	49.57
6500	0.46	0.62	0.71	47.87	47.86	47.70
7000	0.37	0.55	0.65	46.55	46.66	46.60
7500	0.33	0.52	0.64	45.36	45.54	45.50
8000	0.34	0.56	0.68	44.69	44.76	44.81
8500	0.39	0.62	0.76	44.40	44.60	44.84
9000	0.44	0.67	0.82	44.08	44.41	44.65
9500	0.46	0.71	0.86	44.09	44.32	44.66
10000	0.49	0.75	0.92	43.92	44.13	44.35
10500	0.55	0.83	1.01	42.50	42.41	42.34
11000	0.64	0.95	1.15	39.14	38.87	38.43
11500	0.83	1.17	1.40	34.70	34.44	34.00
12000	1.16	1.52	1.78	31.49	31.79	32.10
12500	1.49	1.87	2.19	32.60	33.35	33.82
13000	1.77	2.23	2.70	32.08	31.30	30.10
13500	2.64	3.63	4.93	25.01	23.70	21.89
14000	7.56	9.85	12.65	15.97	14.63	13.15
14500	18.38	21.65	25.33	8.26	7.61	7.02
15000	31.08	31.68	31.78	4.24	4.31	4.35
15250	31.44	31.52	31.85	3.35	3.56	3.76
15500	31.21	31.70	32.46	2.85	3.15	3.50
15750	31.79	32.55	33.62	2.63	2.96	3.41
16000	32.85	33.73	34.86	2.61	2.89	3.33
16250	34.08	34.90	35.93	2.61	2.80	3.15
16500	35.18	35.91	36.71	2.52	2.64	2.87
16800	36.14	36.71	37.44	2.26	2.39	2.54
17000	36.54	37.21	37.90	2.04	2.24	2.36
17250	37.02	37.76	38.45	1.80	2.08	2.21
17500	37.42	38.30	39.02	1.65	1.99	2.13
17750	37.99	38.88	39.70	1.58	1.96	2.15
18000	38.58	39.57	40.38	1.62	2.04	2.26
18100	39.01	39.93	40.75	1.68	2.11	2.33
18200	39.17	40.04	40.99	1.74	2.18	2.41
18300	39.50	40.50	41.10	1.82	2.26	2.47
18400	39.89	40.69	41.47	1.88	2.33	2.53
18500	40.08	41.12	41.51	1.94	2.38	2.56
18600	40.44	41.01	41.98	1.97	2.41	2.57
18700	40.41	41.28	41.88	1.98	2.41	2.57
18800	40.93	41.52	41.90	1.99	2.40	2.57
18900	40.80	41.43	41.37	1.99	2.39	2.57
18950	40.89	41.82	41.96	1.99	2.40	2.56
19000	41.03	41.91	42.00	1.99	2.39	2.56

Typical Performance Data

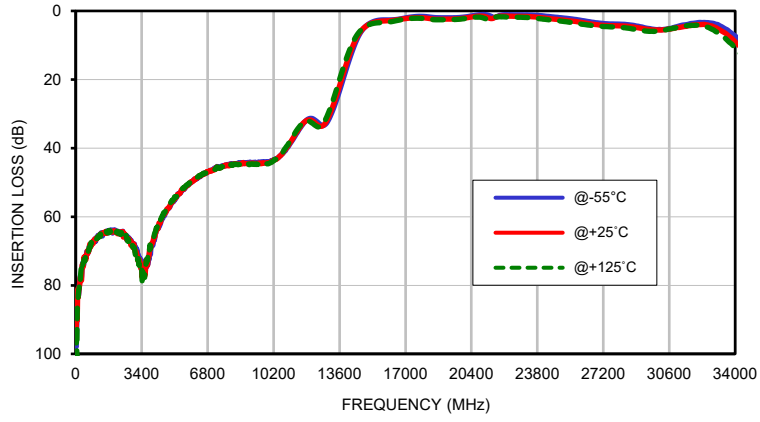
FREQUENCY (MHz)	RETURN LOSS (dB)								
	Common port			Lowpass port			Highpass port		
	@-55°C	@+25˚C	@+125˚C	@-55°C	@+25˚C	@+125˚C	@-55°C	@+25˚C	@+125˚C
25	45.86	44.36	41.99	44.09	42.70	40.42	0.00	0.00	0.00
50	39.73	40.57	40.02	40.02	40.01	38.61	0.00	0.00	0.00
75	37.26	38.28	38.50	37.46	37.73	36.97	0.00	0.00	0.00
100	35.01	35.71	36.01	35.38	35.47	35.08	0.00	0.00	0.00
125	33.87	34.13	34.31	33.78	33.60	33.26	0.00	0.00	0.01
150	32.87	32.70	32.68	32.40	32.09	31.74	0.01	0.00	0.00
175	31.88	31.35	31.18	31.41	31.01	30.69	0.02	0.01	0.00
500	22.67	22.25	22.00	22.93	22.52	22.24	0.07	0.05	0.02
1000	17.02	16.79	16.61	17.07	16.85	16.69	0.02	0.01	0.05
1500	14.50	14.43	14.28	14.39	14.31	14.16	0.01	0.05	0.09
2000	13.25	13.29	13.10	13.34	13.37	13.17	0.09	0.13	0.17
2500	13.18	13.21	12.87	13.09	13.13	12.77	0.11	0.15	0.19
3000	13.35	13.32	12.84	13.38	13.32	12.82	0.14	0.19	0.23
3500	13.47	13.37	12.83	13.49	13.39	12.83	0.17	0.22	0.27
4000	13.31	13.17	12.80	13.50	13.33	12.92	0.22	0.27	0.33
4500	12.57	12.50	12.46	12.82	12.71	12.60	0.25	0.30	0.37
4800	12.07	12.07	12.20	12.31	12.29	12.35	0.25	0.31	0.39
5000	11.88	11.95	12.18	11.99	12.02	12.18	0.26	0.33	0.41
6000	11.93	12.33	12.87	11.80	12.13	12.59	0.35	0.44	0.55
6500	13.43	14.11	14.71	13.23	13.79	14.31	0.42	0.52	0.64
7000	16.79	17.86	18.76	16.30	17.22	17.99	0.45	0.56	0.69
7500	24.56	26.99	30.28	22.23	23.67	25.09	0.46	0.58	0.73
8000	32.93	30.48	27.07	26.49	26.12	24.38	0.43	0.56	0.70
8500	23.04	22.58	21.16	22.10	21.87	20.64	0.41	0.54	0.69
9000	21.27	21.53	20.72	21.02	21.40	20.70	0.40	0.54	0.69
9500	23.09	23.54	23.24	24.11	24.97	24.69	0.42	0.57	0.75
10000	28.21	28.63	28.81	30.75	31.50	32.30	0.48	0.67	0.89
10500	32.34	31.06	31.03	38.15	36.85	38.13	0.69	0.95	1.24
11000	24.40	23.16	23.15	25.62	24.65	24.29	1.20	1.58	2.05
11500	16.91	16.56	16.69	17.16	16.90	16.98	2.39	3.09	4.07
12000	12.55	12.67	13.04	12.96	13.06	13.38	4.48	5.40	6.42
12500	10.97	11.57	12.35	11.53	11.96	12.51	4.18	4.52	4.79
13000	13.49	15.52	18.59	13.22	13.97	14.36	3.47	3.81	4.24
13500	19.07	14.35	11.28	13.58	11.81	10.00	3.09	3.59	4.28
14000	5.01	4.81	5.01	5.34	4.83	4.44	3.52	4.53	5.91
14500	4.46	5.45	6.79	2.37	2.48	2.58	7.23	9.13	11.07
15000	8.65	10.30	12.35	1.49	1.72	1.91	10.20	10.55	11.02
15250	11.68	13.46	15.28	1.26	1.50	1.71	10.09	10.45	10.85
15500	14.16	14.86	15.31	1.09	1.33	1.55	10.19	10.32	10.25
15750	13.77	13.41	13.82	0.99	1.24	1.48	9.70	9.70	9.39
16000	12.50	12.12	13.10	0.98	1.24	1.49	8.90	9.15	9.07
16250	11.81	11.64	13.05	1.00	1.27	1.53	8.50	9.08	9.48
16500	11.89	11.88	13.51	1.03	1.31	1.57	8.96	9.71	10.70
16800	12.51	12.82	14.46	1.09	1.36	1.64	10.70	11.45	12.94
17000	13.17	13.69	15.21	1.12	1.42	1.72	12.54	13.22	14.77
17250	14.10	14.81	15.96	1.20	1.52	1.83	14.76	15.87	17.51
17500	14.79	15.48	16.15	1.27	1.61	1.93	16.89	18.90	21.12
17750	14.86	15.20	15.26	1.34	1.68	2.01	19.50	21.86	23.18
18000	13.77	13.76	13.42	1.42	1.77	2.10	20.66	21.03	19.81
18100	12.94	12.88	12.53	1.48	1.83	2.16	19.80	19.43	18.10
18200	12.07	12.02	11.71	1.48	1.84	2.18	18.59	18.01	16.81
18300	11.25	11.21	11.01	1.47	1.84	2.20	17.33	16.70	15.61
18400	10.51	10.50	10.41	1.50	1.87	2.21	15.96	15.35	14.41
18500	9.84	9.91	9.91	1.55	1.92	2.25	14.57	14.08	13.31
18600	9.33	9.46	9.54	1.56	1.92	2.25	13.36	12.96	12.35
18700	8.95	9.10	9.26	1.54	1.90	2.23	12.30	12.01	11.50
18800	8.58	8.80	8.98	1.52	1.88	2.20	11.32	11.12	10.73
18900	8.27	8.53	8.77	1.52	1.86	2.18	10.40	10.30	10.05
18950	8.10	8.38	8.64	1.48	1.83	2.14	9.98	9.94	9.77
19000	7.98	8.27	8.56	1.48	1.82	2.13	9.68	9.66	9.58

Typical Performance Curves

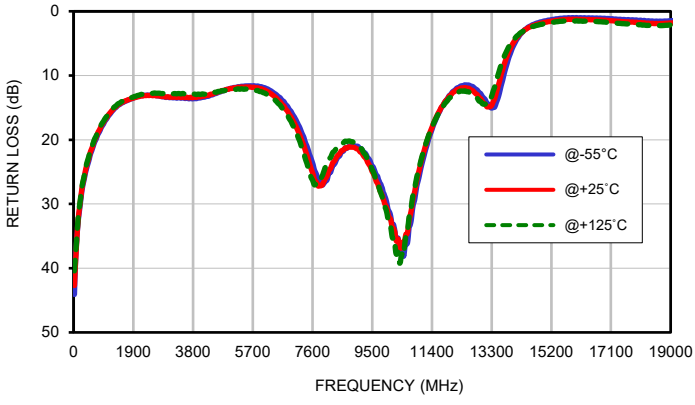
LOW PASS INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



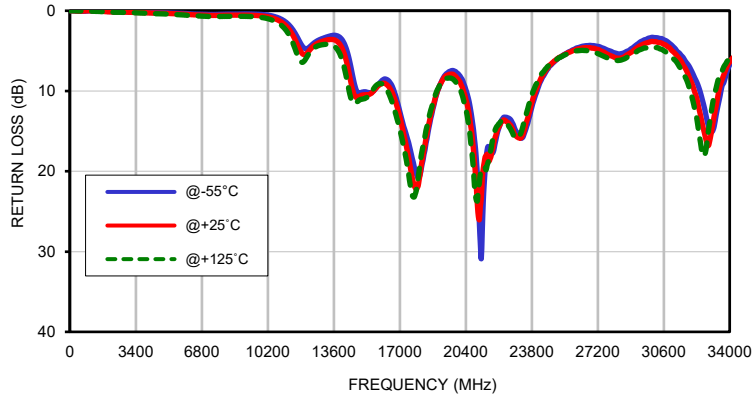
HIGH PASS INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



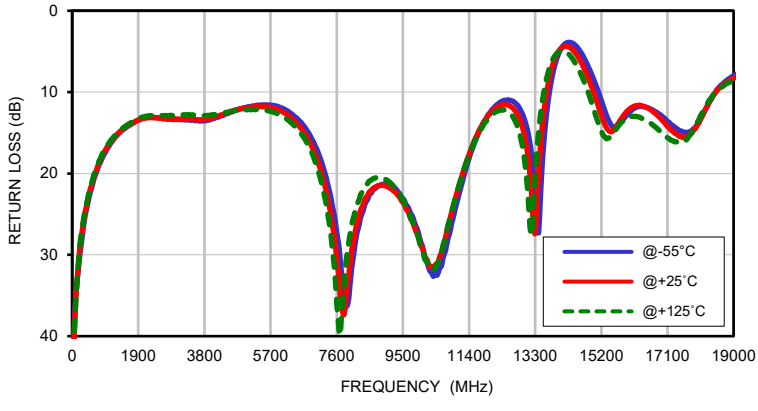
LOW PASS RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



HIGH PASS RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm

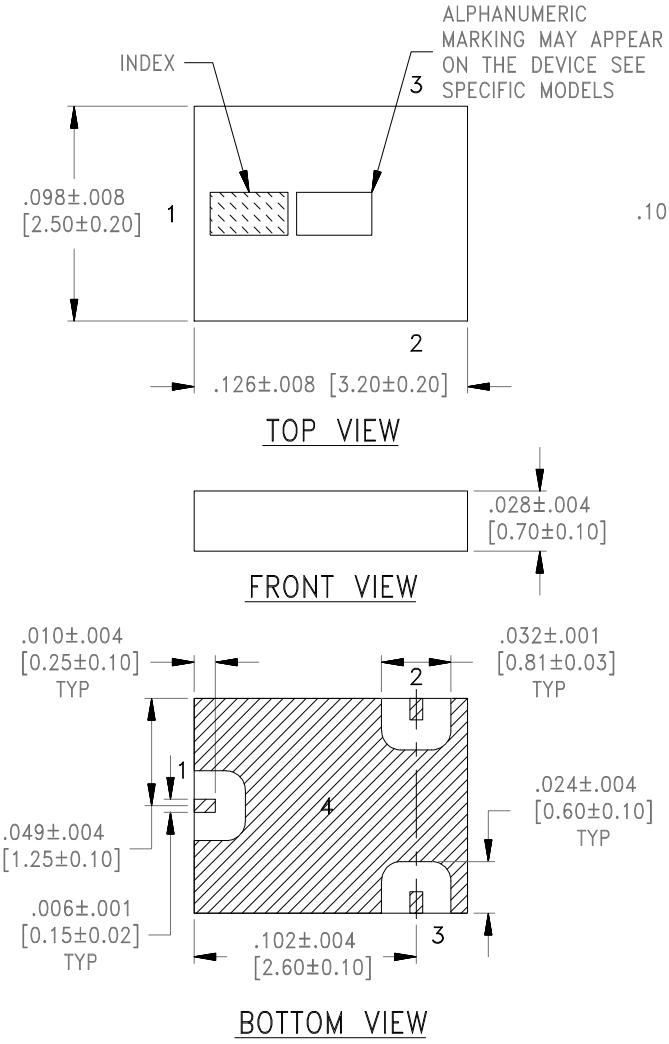


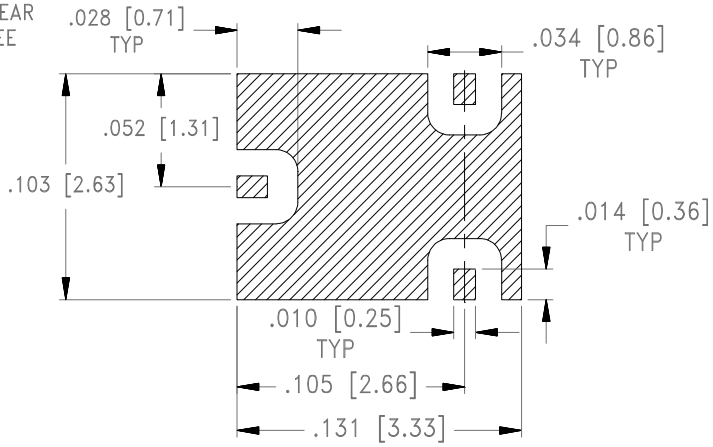
COMMON PORT vs. TEMPERATURE
INPUT POWER = 0 dBm



Case Style JV

Outline Dimensions JV1210C-8





SUGGESTED LAYOUT FOR PCB LAND PATTERN
PATTERN TO BE WITHIN ± .002

METALLIZATION

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

Notes:

1. Open style, Ceramic base.
2. Termination finish: **as shown below or indicated on Data sheet.**
   For RoHS Case Styles: Gold plate over nickel plate. All models, (+) suffix.
3. Weight: .024 grams.
4. Pad tolerance is non-cumulative.

Tape & Reel Packaging TR-F74

DEVICE ORIENTATION IN T&R

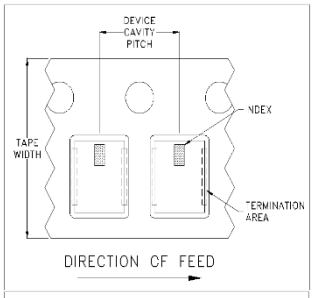


ILLUSTRATION 1

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

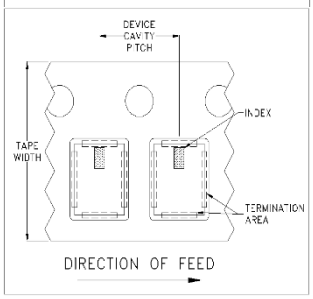


ILLUSTRATION 2

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

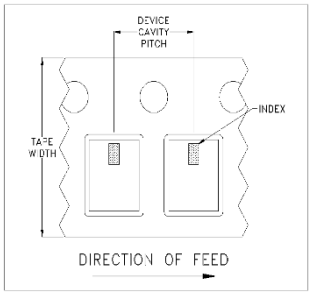


ILLUSTRATION 3

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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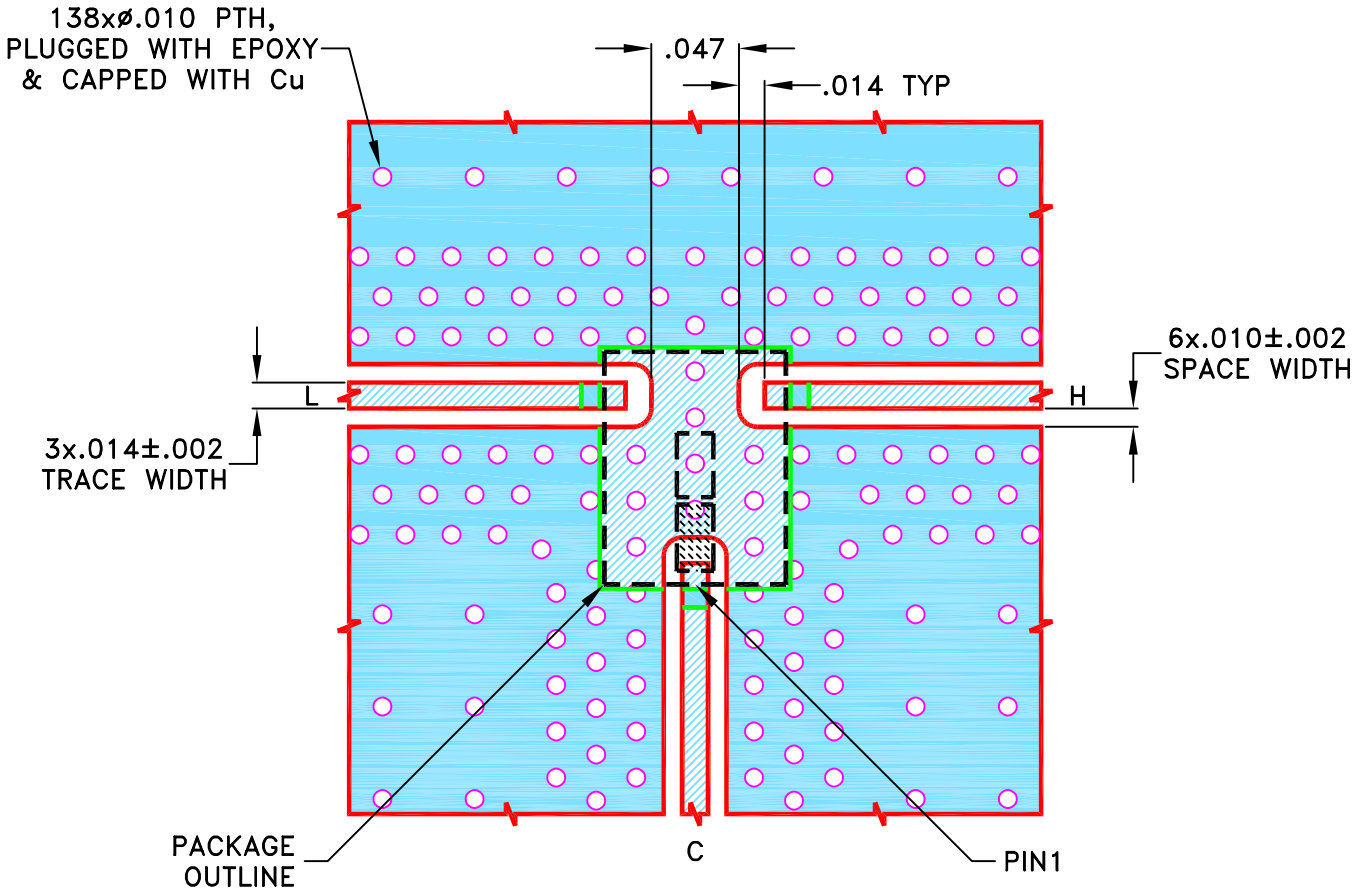
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	ECO-027258	NEW RELEASE	OCT 25	DDR	VC

SUGGESTED MOUNTING CONFIGURATION FOR JV1210C-8 CASE STYLE



NOTES:

1. TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR ROGERS (RO4835 Lo Pro), DIELECTRIC THICKNESS: .0073±.0007. 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 SOLDERMASK

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	DDR	08 OCT 25
TOLERANCES ON:	CHECKED	GTP	08 OCT 25
2 PL DECIMALS ±	APPROVED	RKS	08 OCT 25
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

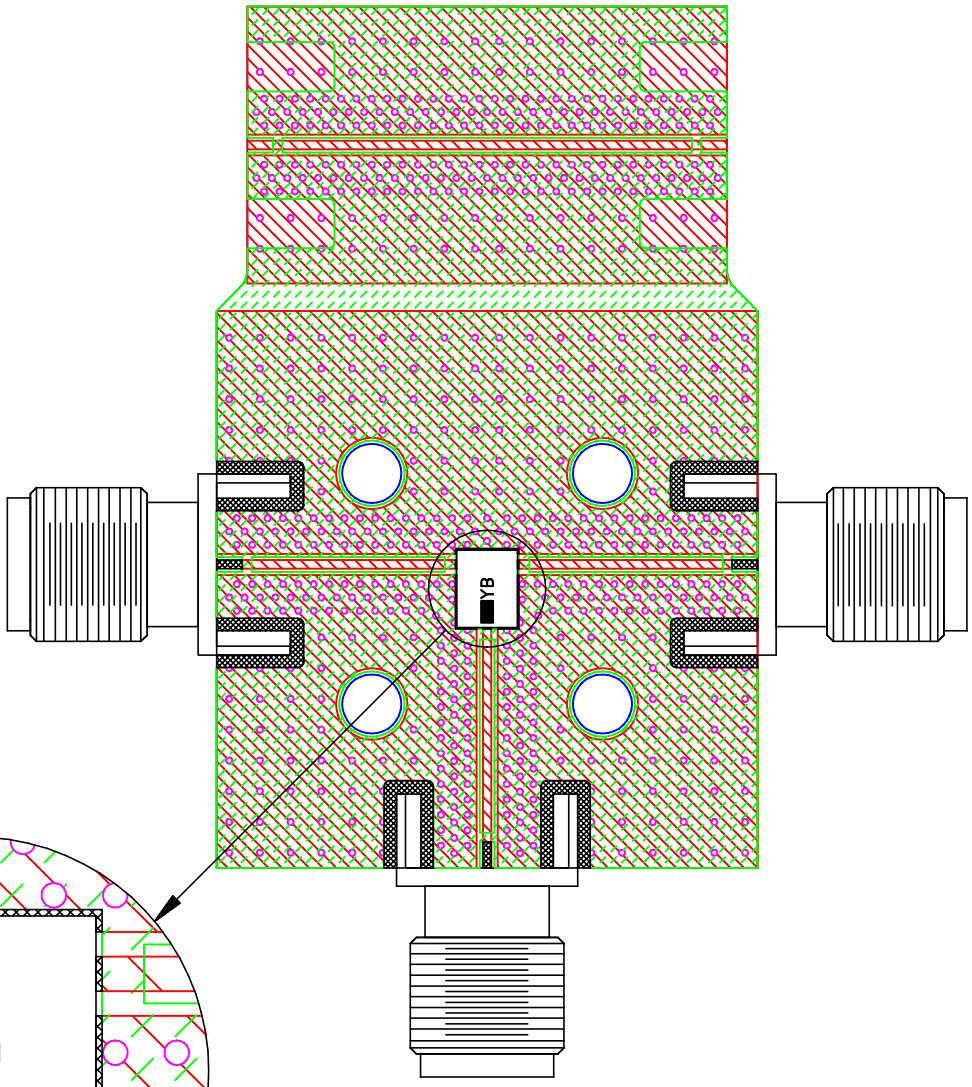
Mini-Circuits®
13 Neptune Avenue
Brooklyn NY 11235

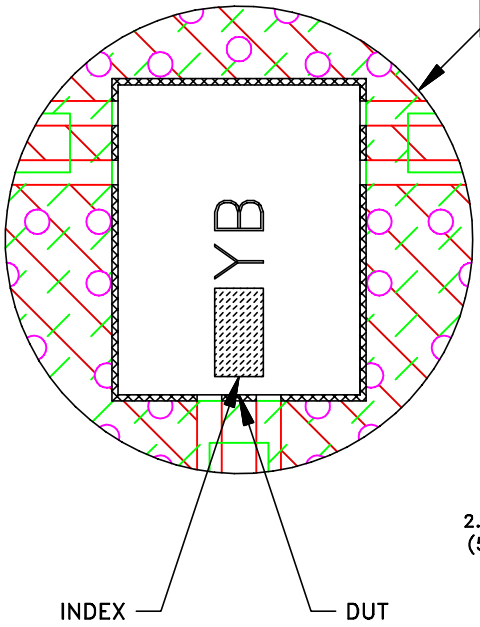
PL, JV1210C-8, TB-LDPV-11163+

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-841	OR
FILE: 98-PL-841	SCALE: 9:1	SHEET: 1 OF 1	

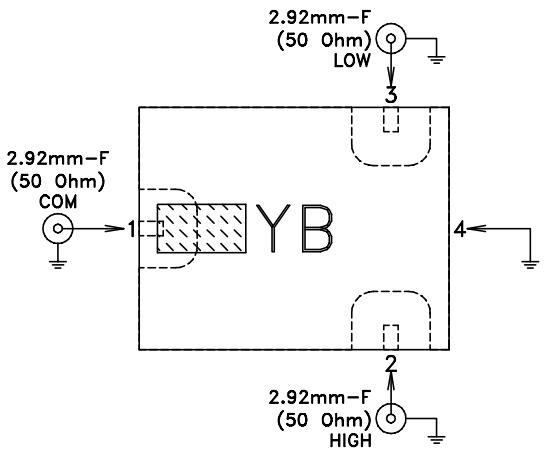
Evaluation Board and Circuit

TB-LDPV-11163+





Schematic diagram



Notes:

1. PCB Material: ROGERS (RO4835 Lo Pro) OR Equivalent, Dielectric Constant=3.48±.05 Dielectric Thickness: .0073±.0007
2. 50 Ohm 2.92mm Female Connectors.
3. Connectors on the test board shall not be subjected to temperature greater than 200°C to avoid permanent damage to the connectors.

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Environmental Specifications ENV06T10

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 125° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 125° 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 Eutectic Process 225°C peak Pb-Free Process 245° - 250°C peak	J-STD-020C, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, Test B,B1, 95% Coverage
Thermal Shock	-55° to +125°C, 15 min dwell,250 cycles	MIL-STD-202, Method 107
Bend Test	1mm, deflection for 5 seconds Span of bending: 2.75"	--
High Temp Storage	125°C to 1000 Hrs	---