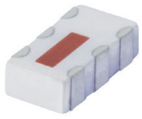
Ultra-Small Ceramic

Power Splitter/Combiner

2 Way-90° 50Ω 425 to 675 MHz

QCN-7



Generic photo used for illustration purposes only

CASE STYLE: FV1206-1

Available Tape and Reel at no extra cost

Reel Size	Devices/Reel
7"	20, 50, 100, 200, 500,1000, 3000

Maximum Ratings

Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C
Power Input (as a splitter)	15W* max.

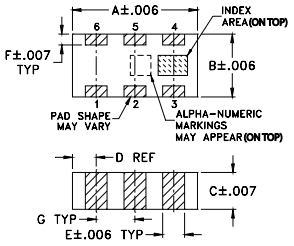
* Derate linearly to 7W at 100°C ambient.
Permanent damage may occur if any of these limits are exceeded.

Pin Connections

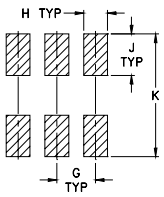
SUM PORT	1
PORT 1 (0°)	4
PORT 2 (+90°)	6
GROUND	2,5
50 OHM TERM EXTERNAL	3

Product Marking: D

Outline Drawing



PCB Land Pattern



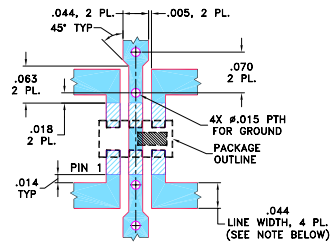
Suggested Layout,
Tolerance to be within ±.002

Outline Dimensions (inch / mm)

A	B	C	D	E	F
.126	.063	.035	.024	.022	.011
3.20	1.60	0.89	0.61	0.56	0.28

G	H	J	K	wt
.039	.024	.042	.123	grams
0.99	0.61	1.07	3.12	.020

Demo Board MCL P/N: TB-255+
Suggested PCB Layout (PL-131)



NOTES: 1.TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.020" ± 0.0015"; 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 SOLDER MASK

Features

- low insertion loss, 0.4 dB typ.
- wrap-around terminal for excellent solderability
- ultra small, 0.12"X0.06"X0.035"

Applications

- UHF
- balanced amplifiers
- modulators

Electrical Specifications

FREQ. RANGE (MHz)	ISOLATION (dB)		INSERTION LOSS (dB) Avg. of Coupled Outputs ABOVE 3 dB		PHASE UNBALANCE (Degrees)		AMPLITUDE UNBALANCE (dB)		VSWR (:1)
f_L-f_U	Typ.	Min.	Typ.	Max.	Typ.	Max.	Typ.	Max.	Typ.
425-675									
425-550	17	13	0.4	0.7	2	8	0.5	1.0	1.3
550-675	17	11	0.6	1.1	4	8	0.5	1.0	1.4

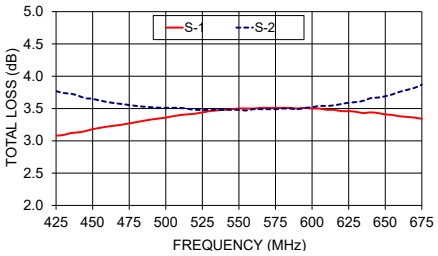
1. For applications requiring DC voltage to be applied to the RF ports, add suffix letter "D" to part no. DC resistance to ground is 100 Mohms min.

Typical Performance Data

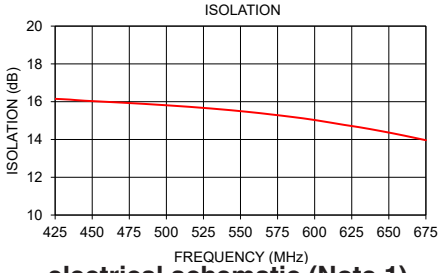
Frequency (MHz)	Total Loss[1] (dB)		Amplitude Unbalance (dB)	Isolation (dB)	Phase Unbalance (deg.)	VSWR S	VSWR 1	VSWR 2
	S-1	S-2						
425.00	3.08	3.77	0.69	16.15	85.67	1.32	1.30	1.26
435.00	3.12	3.73	0.60	16.11	85.69	1.32	1.30	1.26
445.00	3.15	3.66	0.51	16.05	85.67	1.32	1.29	1.26
470.00	3.25	3.57	0.31	15.95	85.82	1.32	1.29	1.26
500.00	3.36	3.51	0.15	15.81	85.95	1.32	1.28	1.26
530.00	3.46	3.48	0.02	15.64	86.13	1.32	1.28	1.26
555.00	3.50	3.47	0.03	15.46	86.29	1.33	1.29	1.27
570.00	3.51	3.49	0.02	15.33	86.45	1.34	1.29	1.27
585.00	3.51	3.50	0.00	15.19	86.51	1.35	1.29	1.28
600.00	3.50	3.52	0.02	15.03	86.83	1.35	1.30	1.29
620.00	3.46	3.57	0.11	14.77	87.07	1.37	1.31	1.30
630.00	3.45	3.60	0.15	14.65	87.17	1.38	1.32	1.31
645.00	3.43	3.67	0.24	14.44	87.49	1.40	1.33	1.33
660.00	3.38	3.76	0.38	14.21	87.82	1.42	1.34	1.35
675.00	3.34	3.87	0.53	13.96	88.21	1.44	1.36	1.37

1. Total Loss = Insertion Loss + 3dB splitter loss.

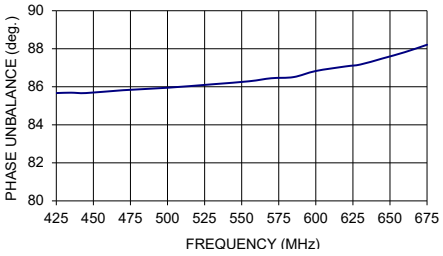
QCN-7+
TOTAL LOSS



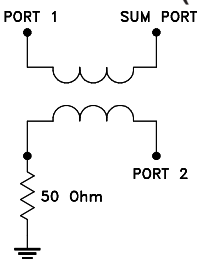
QCN-7+
ISOLATION



QCN-7+
PHASE UNBALANCE



electrical schematic (Note 1)



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.
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2 Way-90° Power Splitter/Combiner QCN-7

Typical Performance Data

TEST CONDITIONS: INPUT POWER = 0dBm @Temperature = +25°C

FREQ. (MHz)	TOTAL LOSS[1] (dB)		AMP. UNBAL. (dB)	PHASE UNBAL. From 90° (deg.)	ISOLATION (dB)	VSWR (:1)		
	S-1	S-2			1-2	S	1	2
150	0.94	8.51	7.57	2.99	20.51	1.24	1.25	1.22
200	1.41	6.73	5.32	3.50	19.06	1.29	1.30	1.26
250	1.88	5.56	3.68	3.85	18.27	1.32	1.33	1.29
300	2.32	4.75	2.43	4.07	17.80	1.33	1.34	1.30
325	2.52	4.46	1.94	4.15	17.67	1.33	1.34	1.30
350	2.69	4.20	1.50	4.17	17.57	1.32	1.34	1.30
375	2.86	3.98	1.12	4.20	17.48	1.32	1.34	1.30
400	3.01	3.80	0.79	4.20	17.41	1.32	1.34	1.30
425	3.15	3.66	0.51	4.16	17.34	1.31	1.33	1.30
450	3.26	3.54	0.28	4.12	17.26	1.31	1.33	1.30
475	3.36	3.46	0.10	4.05	17.21	1.30	1.33	1.31
500	3.43	3.39	0.04	3.95	17.13	1.30	1.33	1.31
525	3.49	3.36	0.13	3.82	17.03	1.30	1.34	1.32
550	3.52	3.35	0.17	3.67	16.90	1.30	1.34	1.33
575	3.53	3.38	0.15	3.44	16.75	1.31	1.35	1.35
600	3.52	3.43	0.09	3.15	16.55	1.32	1.37	1.38
625	3.50	3.52	0.02	2.76	16.31	1.33	1.39	1.41
650	3.44	3.65	0.21	2.25	16.01	1.36	1.42	1.45
675	3.37	3.84	0.47	1.59	15.64	1.39	1.46	1.50
700	3.28	4.08	0.80	0.68	15.21	1.43	1.51	1.56
725	3.18	4.40	1.21	0.55	14.72	1.48	1.57	1.65
750	3.08	4.80	1.72	2.27	14.16	1.56	1.65	1.75
775	2.98	5.33	2.34	4.71	13.53	1.65	1.76	1.88
800	2.91	5.97	3.07	8.21	12.86	1.76	1.88	2.04

[1] Total Loss = Insertion Loss + 3dB Splitter Loss

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2 Way-90° Power Splitter/Combiner QCN-7

Typical Performance Data

TEST CONDITIONS: INPUT POWER = 0dBm @Temperature = -55°C

FREQ. (MHz)	TOTAL LOSS[1] (dB)		AMP. UNBAL. (dB)	PHASE UNBAL. From 90° (deg.)	ISOLATION (dB)	VSWR (:1)		
	S-1	S-2			1-2	S	1	2
150	0.86	8.51	7.65	2.95	20.72	1.21	1.23	1.21
200	1.33	6.72	5.39	3.53	19.31	1.28	1.29	1.23
250	1.78	5.52	3.74	3.96	18.57	1.29	1.29	1.27
300	2.22	4.70	2.48	4.27	17.92	1.31	1.32	1.30
325	2.43	4.39	1.96	4.40	17.73	1.32	1.33	1.29
350	2.60	4.13	1.52	4.53	17.64	1.33	1.34	1.29
375	2.77	3.91	1.14	4.64	17.58	1.33	1.33	1.29
400	2.92	3.72	0.80	4.70	17.54	1.32	1.32	1.30
425	3.05	3.57	0.52	4.68	17.45	1.31	1.32	1.31
450	3.17	3.45	0.28	4.66	17.33	1.31	1.32	1.31
475	3.27	3.36	0.09	4.68	17.22	1.31	1.33	1.31
500	3.34	3.29	0.05	4.66	17.12	1.31	1.34	1.31
525	3.40	3.25	0.15	4.61	17.01	1.31	1.34	1.32
550	3.43	3.24	0.19	4.53	16.90	1.31	1.34	1.33
575	3.44	3.26	0.18	4.36	16.75	1.31	1.35	1.35
600	3.43	3.30	0.13	4.13	16.56	1.32	1.37	1.37
625	3.41	3.38	0.03	3.85	16.33	1.33	1.39	1.40
650	3.35	3.50	0.15	3.45	16.03	1.35	1.42	1.44
675	3.28	3.67	0.39	2.89	15.65	1.38	1.46	1.49
700	3.19	3.89	0.70	2.07	15.21	1.43	1.51	1.56
725	3.09	4.19	1.09	1.04	14.72	1.48	1.57	1.64
750	2.99	4.57	1.58	0.46	14.16	1.55	1.65	1.74
775	2.88	5.07	2.19	2.62	13.54	1.64	1.75	1.87
800	2.79	5.68	2.89	5.74	12.87	1.75	1.87	2.04

[1] Total Loss = Insertion Loss + 3dB Splitter Loss

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2 Way-90° Power Splitter/Combiner QCN-7

Typical Performance Data

TEST CONDITIONS: INPUT POWER = 0dBm @Temperature = +100°C

FREQ. (MHz)	TOTAL LOSS[1] (dB)		AMP. UNBAL. (dB)	PHASE UNBAL. From 90° (deg.)	ISOLATION (dB)	VSWR (:1)		
	S-1	S-2			1-2	S	1	2
150	0.99	8.49	7.50	3.08	20.20	1.27	1.29	1.23
200	1.47	6.73	5.26	3.53	18.70	1.30	1.31	1.29
250	1.96	5.59	3.63	3.83	17.80	1.35	1.37	1.32
300	2.39	4.80	2.41	3.94	17.48	1.36	1.38	1.30
325	2.59	4.50	1.91	3.97	17.44	1.35	1.37	1.31
350	2.75	4.24	1.48	3.93	17.39	1.33	1.36	1.32
375	2.92	4.03	1.11	3.87	17.30	1.32	1.35	1.33
400	3.07	3.85	0.79	3.76	17.20	1.32	1.36	1.32
425	3.20	3.72	0.52	3.66	17.13	1.32	1.36	1.31
450	3.32	3.60	0.29	3.55	17.08	1.32	1.36	1.31
475	3.40	3.52	0.11	3.44	17.08	1.31	1.35	1.31
500	3.47	3.45	0.02	3.27	17.06	1.30	1.34	1.33
525	3.52	3.43	0.09	3.04	17.00	1.29	1.34	1.34
550	3.55	3.43	0.12	2.76	16.88	1.29	1.34	1.36
575	3.57	3.46	0.11	2.44	16.71	1.30	1.36	1.37
600	3.56	3.52	0.04	2.05	16.49	1.32	1.38	1.39
625	3.54	3.62	0.08	1.60	16.26	1.34	1.40	1.42
650	3.48	3.76	0.28	0.99	15.96	1.36	1.43	1.47
675	3.41	3.96	0.55	0.18	15.61	1.39	1.46	1.52
700	3.32	4.21	0.89	0.93	15.16	1.43	1.51	1.59
725	3.23	4.54	1.31	2.34	14.69	1.49	1.58	1.67
750	3.13	4.97	1.84	4.27	14.11	1.56	1.66	1.77
775	3.04	5.51	2.47	6.95	13.48	1.65	1.76	1.89
800	2.97	6.18	3.21	10.80	12.80	1.76	1.88	2.05

[1] Total Loss = Insertion Loss + 3dB Splitter Loss

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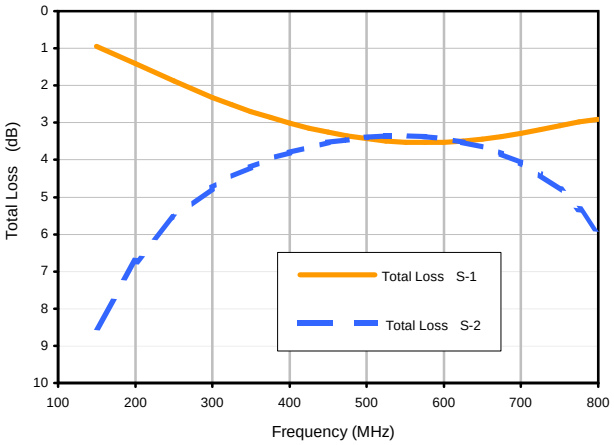
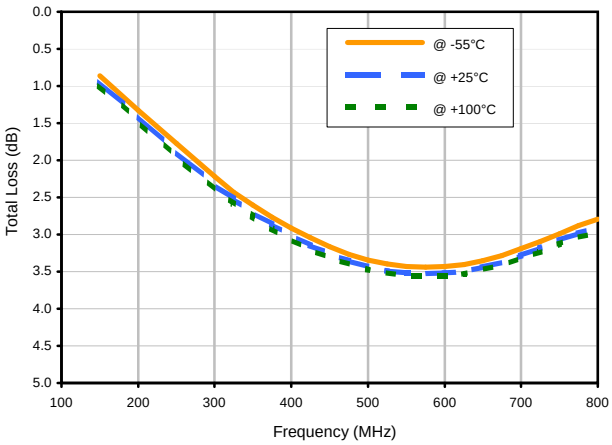
2 Way-90° Power Splitter/Combiner QCN-7

Typical Performance Curves

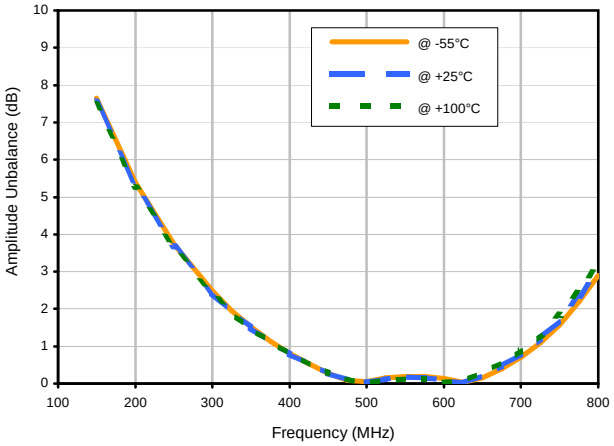
Total Loss



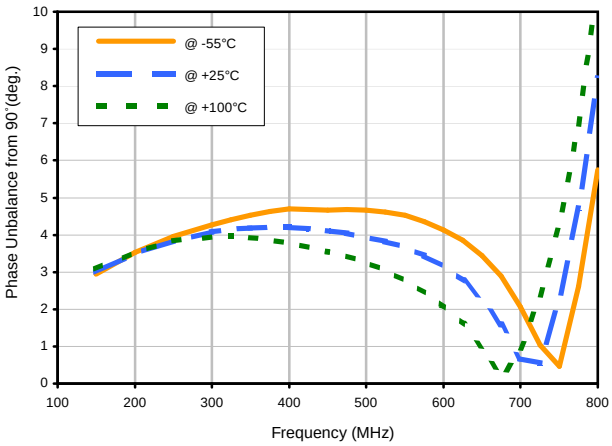
Total Loss S-1 vs. TEMPERATURE



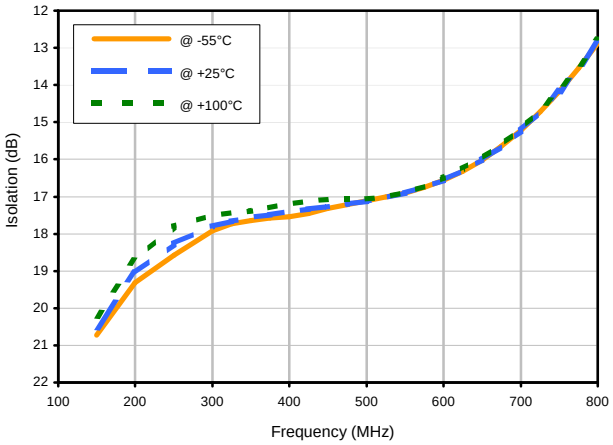
Amplitude Unbalance vs. TEMPERATURE



Phase Unbalance vs. TEMPERATURE



Isolation 1-2 vs. TEMPERATURE



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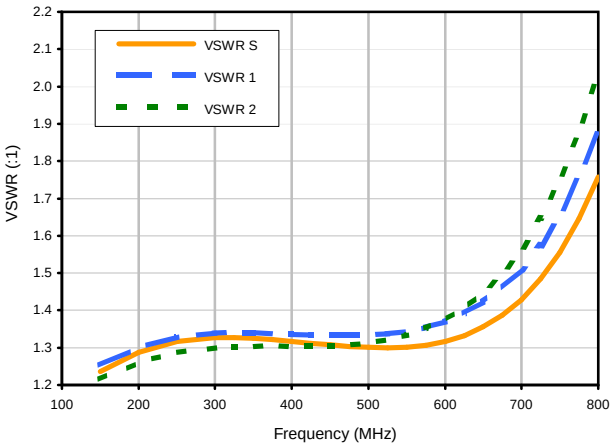
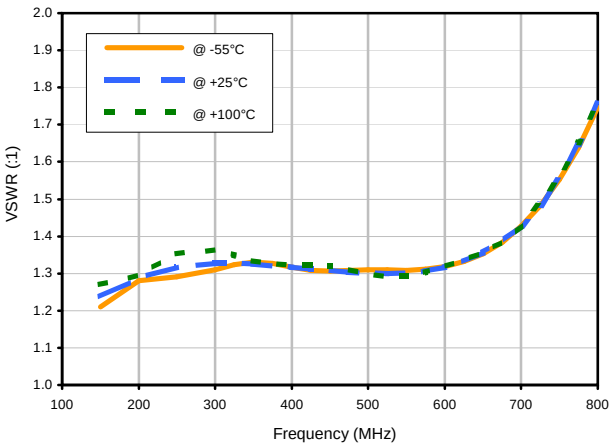
Typical Performance Curves

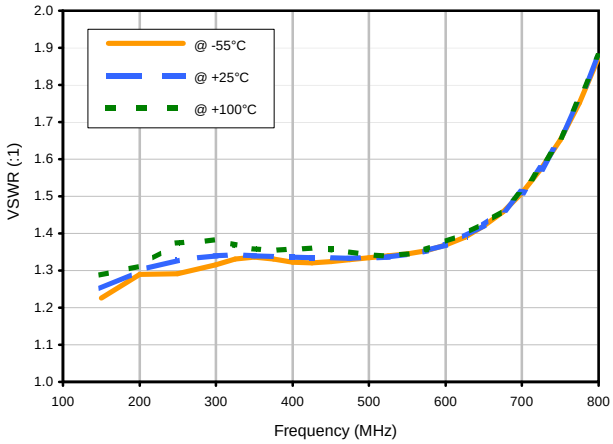
VSWR



VSWR SUM vs. TEMPERATURE



VSWR OUT1 vs. TEMPERATURE



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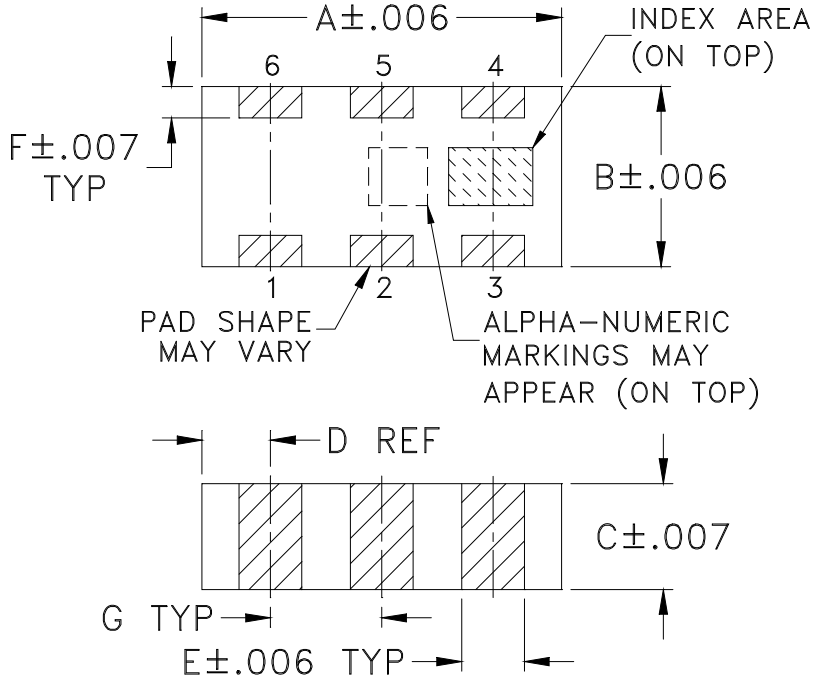
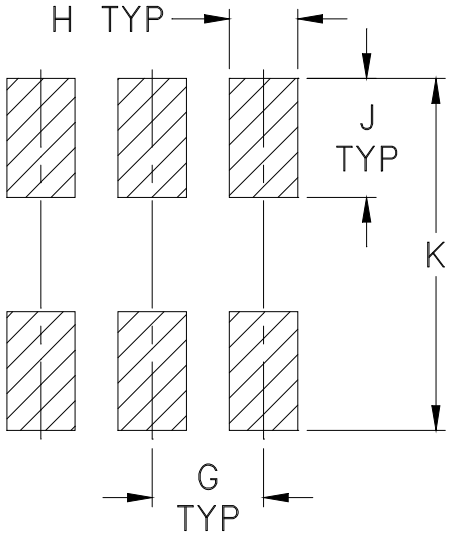
Case Style FV

FV1206-1

Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

CASE #	A	B	C	D	E	F	G	H	J	K	L	M	N	P	WT. GRAM
FV1206-1	.126 (3.20)	.063 (1.60)	.035 (0.89)	.024 (0.61)	.022 (0.56)	.011 (0.28)	.039 (0.99)	.024 (0.61)	.042 (1.07)	.123 (3.12)	-- --	-- --	-- --	-- --	.020

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.

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Tape & Reel Packaging TR-F75

DEVICE ORIENTATION IN T&R

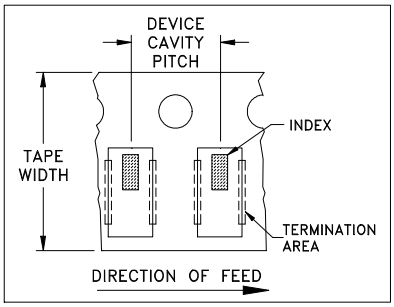

ILLUSTRATION 1

Applicable Case Styles
FV1206-1
FV1206-3

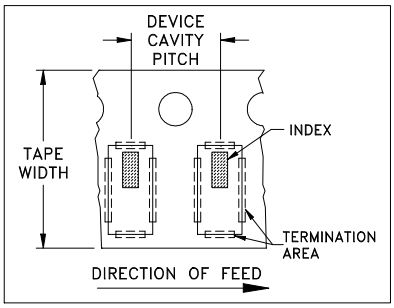

ILLUSTRATION 2

Applicable Case Styles
FV1206-4
FV1206-5
FV1206-6
FV1206-7
FV1206-9

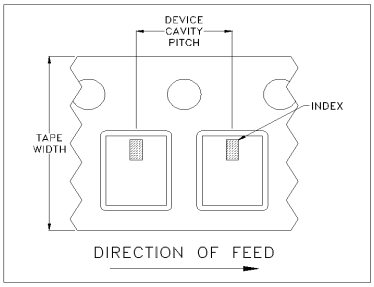

ILLUSTRATION 3

Applicable Case Styles
FV1206-11
FV1206-12
GE0805C-18
NL1008C-6
NL1008C-7
NL1008C-9
NL1008C-10
NL1008C-12

Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
8	4	7	Small quantity standards (see note)	20
				50
				100
				200
				500
				1000
			Standard	3000

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

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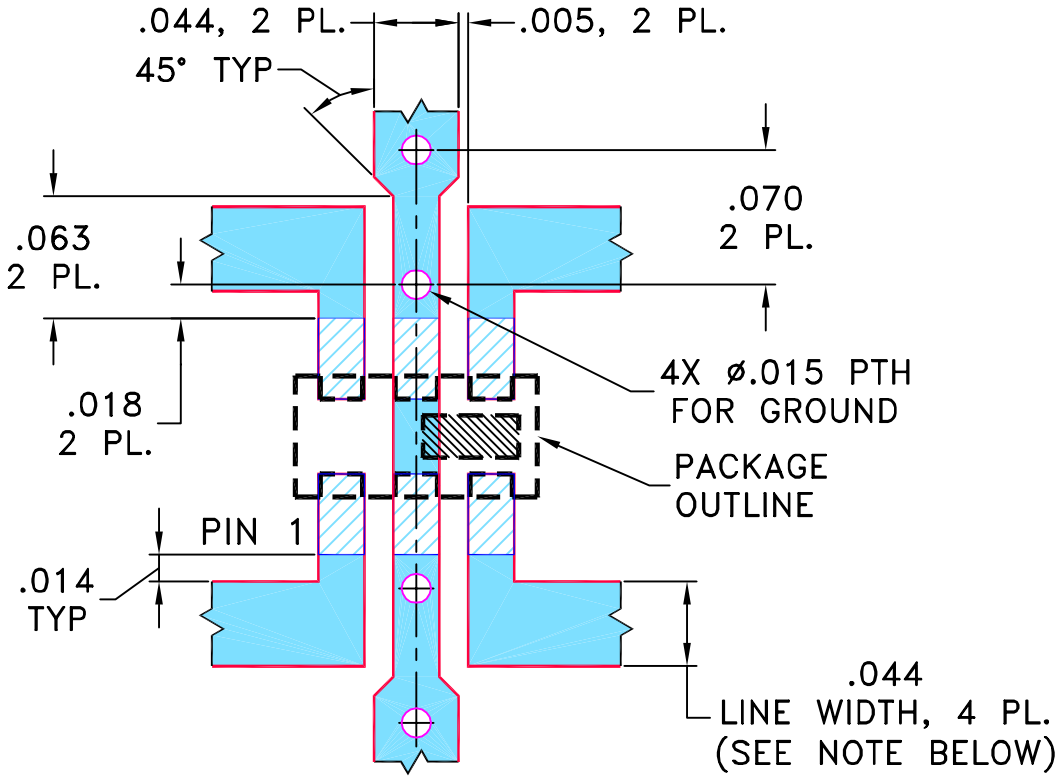
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M87001	NEW RELEASE	05/20/03	MMG	ABD
A	M87231	CORRECTED DWG.	05/28/03	MMG	ABD
B	M91636	ADDED "pn" PIN CONNECTION	04/07/04	AV	ABD
C	M102713	ADDED"...WITH SMOBC"	01/16/06	GF	IL

SUGGESTED MOUNTING CONFIGURATION
FOR FV1206-1 CASE STYLE, "pb/pn" PIN CONNECTIONS



NOTES: 1.TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.020" ± 0.0015"; 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 SOLDER MASK

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	MMG	05/14/03
TOLERANCES ON:	CHECKED	AV	05/19/03
2 PL DECIMALS ±	APPROVED	ABD	05/20/03
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

Mini-Circuits®
13 Neptune Avenue
Brooklyn NY 11235

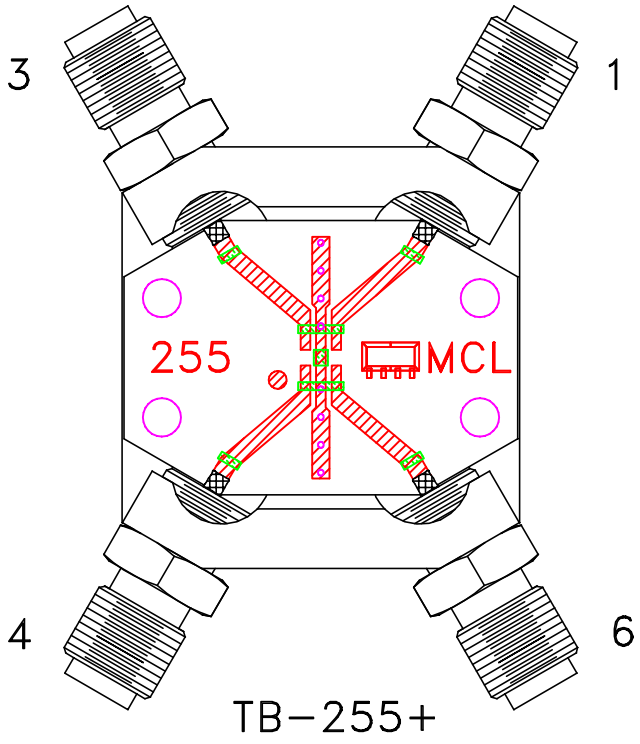
PL, pb/pn, FV1206-1, QCN/BDCN, TB-255

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-131	C

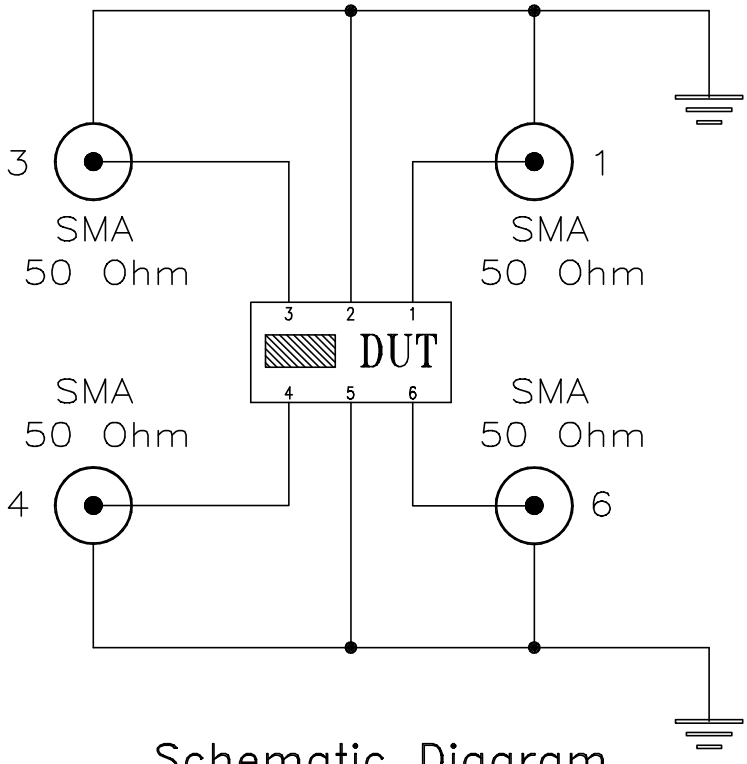
FILE:	SCALE:	SHEET:
98PL131	10:1	1 OF 1

Evaluation Board and Circuit

For Pin Connections refer to Data Sheet of the DUT



TB-255+



Schematic Diagram

Notes:

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

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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

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