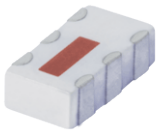
High Power

Bi-Directional Coupler

BDCN-14-22+

50Ω 14dB Coupling DC Pass 1930 to 2170 MHz



Generic photo used for illustration purposes only

CASE STYLE: FV1206-1

+RoHS Compliant

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

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
DC Current	0.5A

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

Pin Connections

INPUT	1
OUTPUT	4
COUPLED (forward)	6
COUPLED (reverse)	3
GROUND	2,5

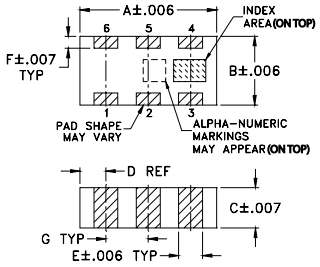
Features

- four-port coupler
- wideband, 1930 to 2170 MHz
- excellent return loss, all ports
- ultra small size, hermetically sealed
- minimal variation with temperature variation
- protected by US Patent 7,049,905
- DC current through input to output 0.5A Max. at 1.0 watt RF input power

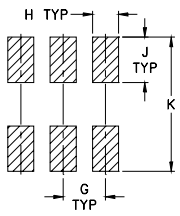
Applications

- UMTS
- PCS

Outline Drawing



PCB Land Pattern



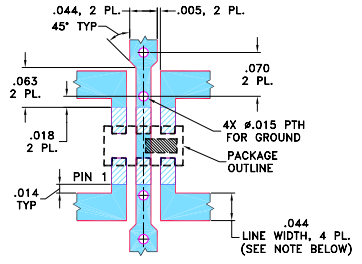
Suggested Layout,
Tolerance to be within ±.002

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

Electrical Specifications

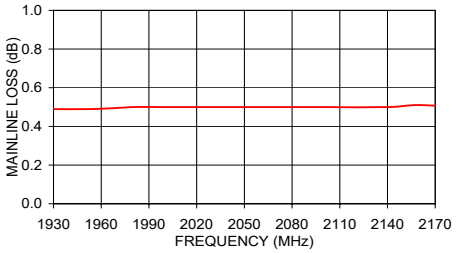
Parameter	Frequency (MHz)	Min.	Typ.	Max.	Units
Frequency Range		1930		2170	MHz
Coupling	1930 - 2170	—	13.8±1.0	—	dB
Coupling Flatness(±)	1930 - 2170	—	0.15	—	dB
Mainline Loss[1]	1930 - 1990	—	0.5	0.9	dB
	2110 - 2170	—	0.5	0.9	
Directivity	1930 - 1990	17	22	—	dB
	2110 - 2170	18	25	—	
Return Loss	1930 - 2170	—	19	—	dB
Input Power[1]	1930 - 2170	—	16	—	W

1. Derate linearly 8W at 100°C

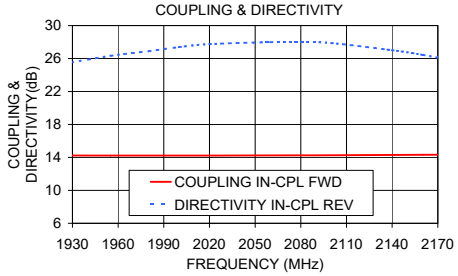
Typical Performance Data

Frequency (MHz)	Mainline Loss (dB)	Coupling (dB)		Directivity (dB)		Return Loss (dB)			
	In-Out	In-Cpl Fwd	Out-Cpl Rev	Out-Cpl Fwd	In-Cpl Rev	In	Out	Cpl Fwd	Cpl Rev
1920.00	0.49	14.23	14.24	25.80	25.24	23.29	23.14	28.62	26.21
1955.00	0.49	14.22	14.23	26.88	26.34	23.91	23.07	27.94	27.00
1980.00	0.50	14.22	14.23	27.42	26.89	23.65	22.78	28.32	26.92
2000.00	0.50	14.22	14.23	27.94	27.40	23.63	23.17	29.06	26.72
2020.00	0.50	14.22	14.23	28.29	27.76	24.05	23.66	29.13	26.91
2060.00	0.50	14.24	14.24	28.51	27.99	23.96	23.09	28.50	27.10
2080.00	0.50	14.25	14.25	28.49	28.01	23.90	23.40	28.97	26.80
2100.00	0.50	14.26	14.26	28.30	27.88	24.33	23.91	29.31	27.02
2140.00	0.50	14.30	14.30	27.21	27.01	24.32	23.29	28.51	27.63
2160.00	0.51	14.32	14.32	26.57	26.45	24.23	23.60	28.57	27.36

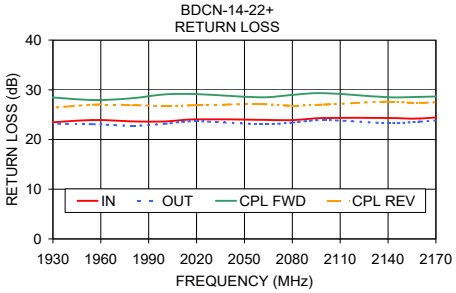
BDCN-14-22+
MAINLINE LOSS



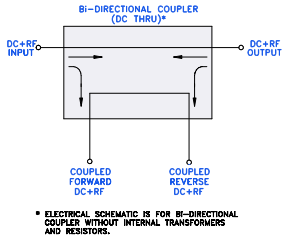
BDCN-14-22+
COUPLING & DIRECTIVITY



BDCN-14-22+
RETURN LOSS



Electrical 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

Bi-Directional Coupler BDCN-14-22+

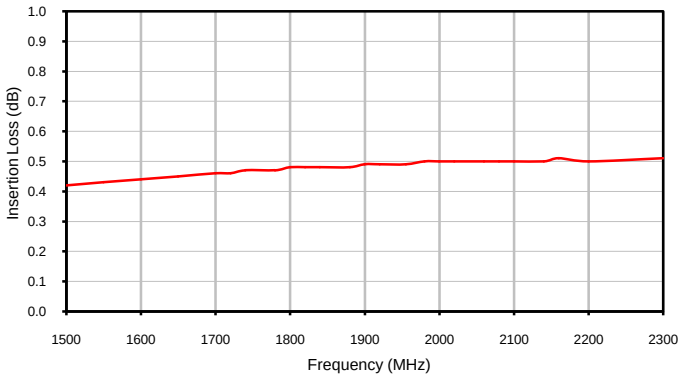
Typical Performance Data

FREQ. (MHz)	INSERTION LOSS (dB)	COUPLING (dB)		DIRECTIVITY (dB)		RETURN LOSS (dB)			
	IN-OUT	IN-FWD	OUT-REV	IN-REV	OUT-FWD	IN	OUT	FWD	REV
1500.0	0.42	14.87	14.88	17.63	17.67	23.35	23.34	25.52	25.99
1550.0	0.43	14.75	14.75	18.23	18.33	23.79	22.95	25.58	26.74
1600.0	0.44	14.63	14.65	18.91	19.07	23.34	23.58	25.98	26.07
1650.0	0.45	14.53	14.54	19.59	19.81	23.33	22.75	26.38	26.18
1700.0	0.46	14.45	14.46	20.43	20.65	23.72	23.26	26.46	26.58
1720.0	0.46	14.42	14.43	20.78	21.01	23.62	22.75	26.68	26.71
1740.0	0.47	14.39	14.40	21.18	21.40	23.21	22.77	27.05	26.28
1780.0	0.47	14.34	14.35	21.97	22.28	23.47	23.26	27.19	26.48
1800.0	0.48	14.32	14.33	22.36	22.72	23.44	22.72	27.48	26.58
1820.0	0.48	14.30	14.31	22.76	23.19	23.16	22.60	27.94	26.24
1840.0	0.48	14.28	14.29	23.20	23.68	23.27	23.11	27.99	26.14
1880.0	0.48	14.25	14.26	24.13	24.64	23.72	22.87	27.72	26.82
1900.0	0.49	14.24	14.25	24.64	25.18	23.31	22.68	28.26	26.46
1920.0	0.49	14.23	14.24	25.24	25.80	23.29	23.14	28.62	26.21
1955.0	0.49	14.22	14.23	26.34	26.88	23.91	23.07	27.94	27.00
1980.0	0.50	14.22	14.23	26.89	27.42	23.65	22.78	28.32	26.92
2000.0	0.50	14.22	14.23	27.40	27.94	23.63	23.17	29.06	26.72
2020.0	0.50	14.22	14.23	27.76	28.29	24.05	23.66	29.13	26.91
2060.0	0.50	14.24	14.24	27.99	28.51	23.96	23.09	28.50	27.10
2080.0	0.50	14.25	14.25	28.01	28.49	23.90	23.40	28.97	26.80
2100.0	0.50	14.26	14.26	27.88	28.30	24.33	23.91	29.31	27.02
2140.0	0.50	14.30	14.30	27.01	27.21	24.32	23.29	28.51	27.63
2160.0	0.51	14.32	14.32	26.45	26.57	24.23	23.60	28.57	27.36
2200.0	0.50	14.36	14.36	25.10	25.16	24.93	24.26	28.76	27.98
2300.0	0.51	14.54	14.53	21.71	21.69	25.09	24.22	28.13	28.67

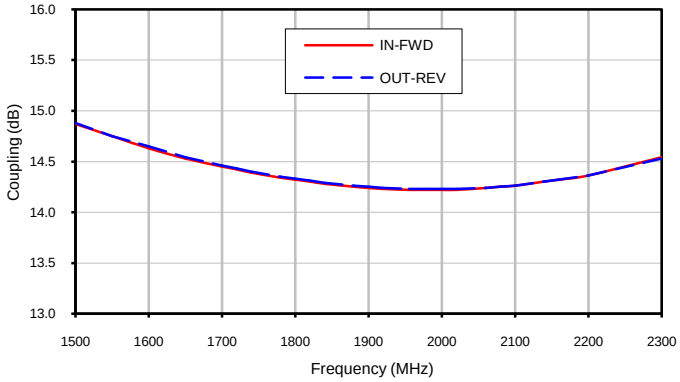
Bi-Directional Coupler BDCN-14-22+

Typical Performance Curves

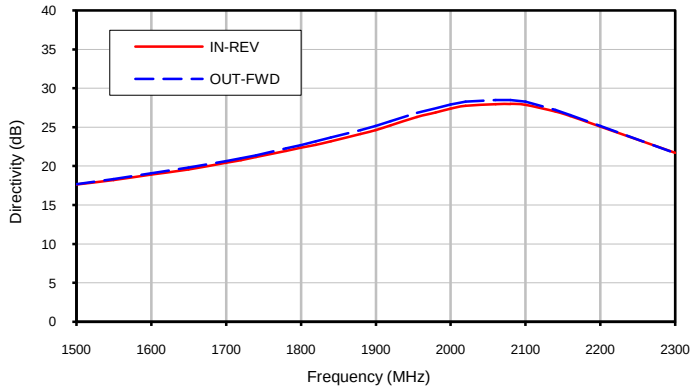
Insertion Loss



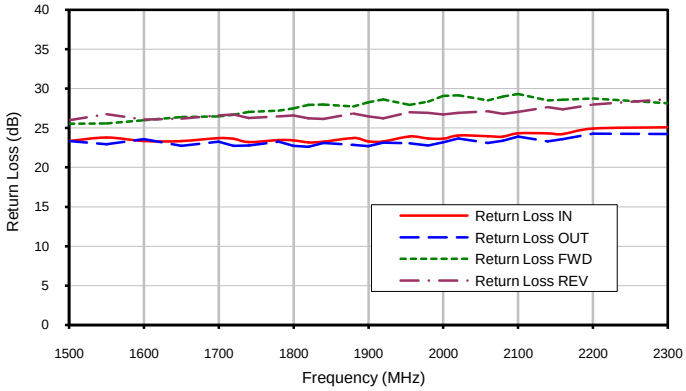
Coupling



Directivity



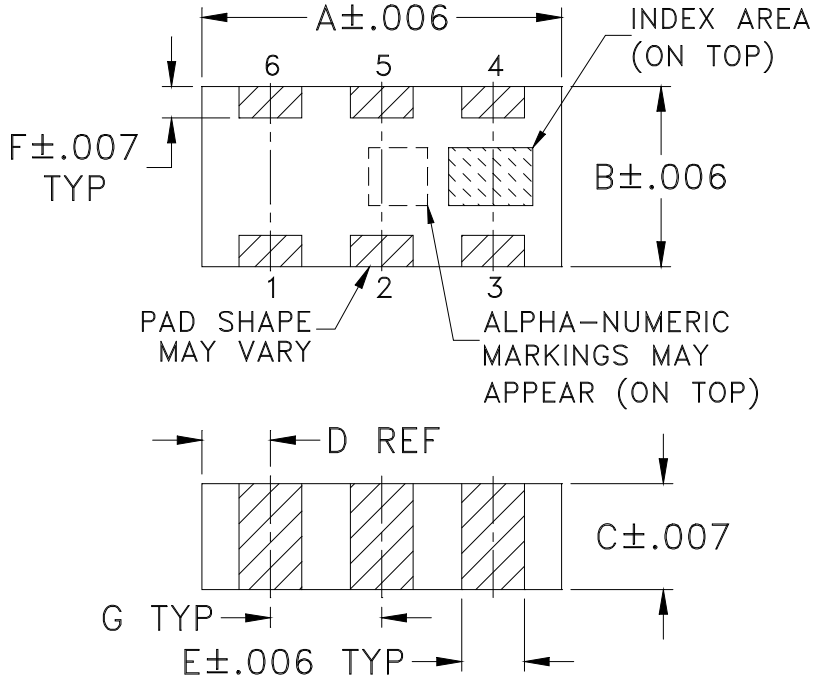
Return Loss



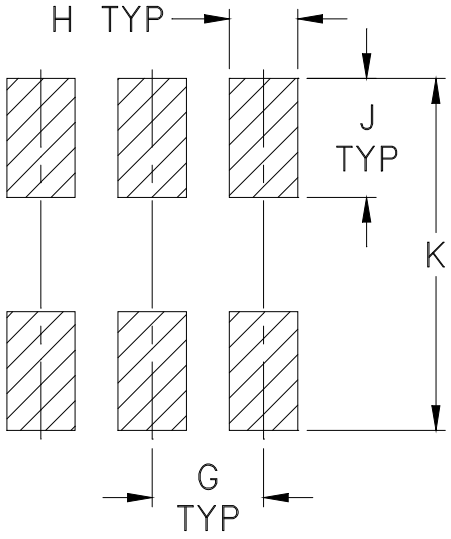
Case Style FV

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.

Tape & Reel Packaging TR-F75

DEVICE ORIENTATION IN T&R

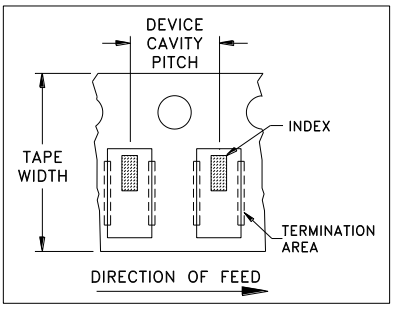


ILLUSTRATION 1

Applicable Case Styles
FV1206-1
FV1206-3

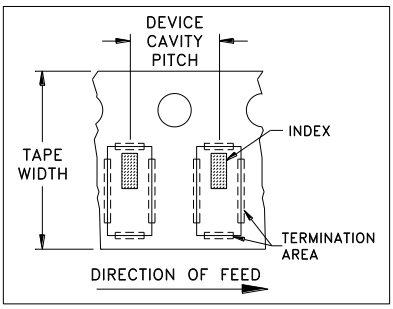


ILLUSTRATION 2

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

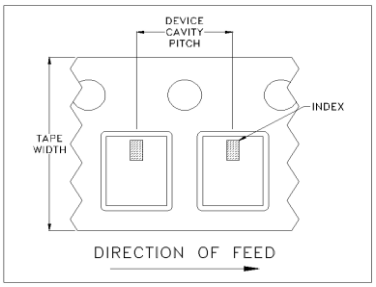


ILLUSTRATION 3

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

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.

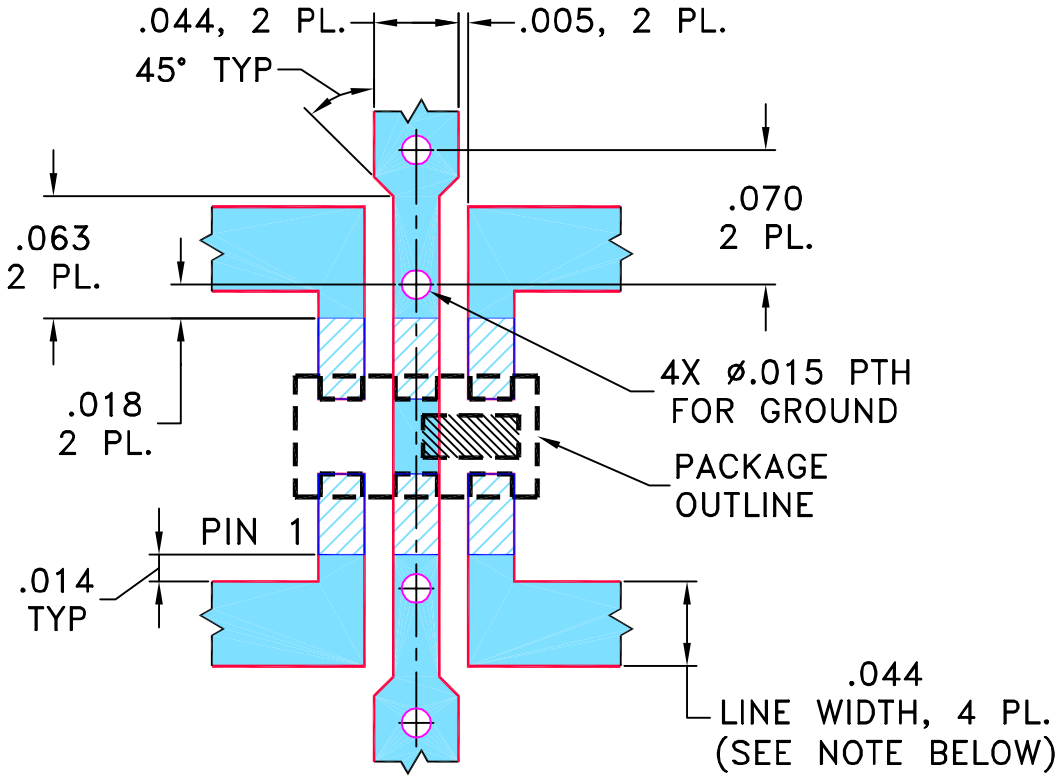
Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf

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 ±			

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

Mini-Circuits®
13 Neptune Avenue
Brooklyn NY 11235

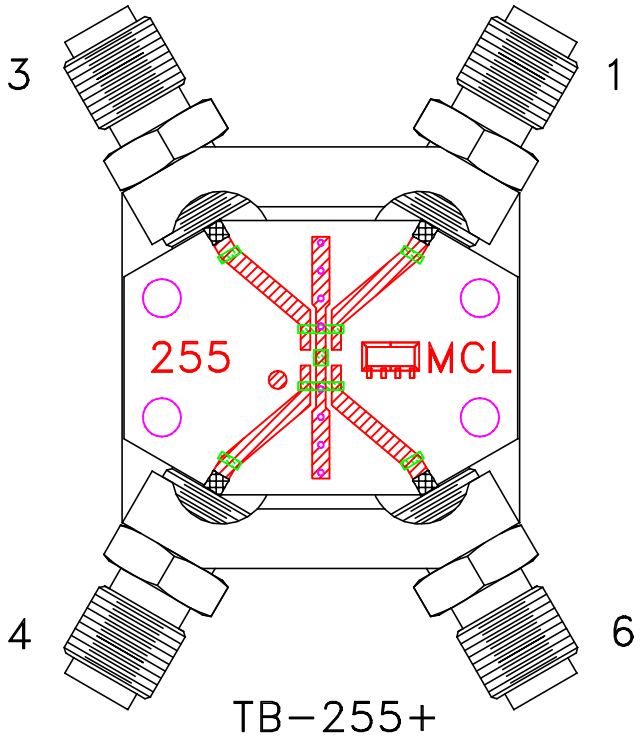
PL, pb/pn, FV1206-1, QCN/BDCN, TB-255

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

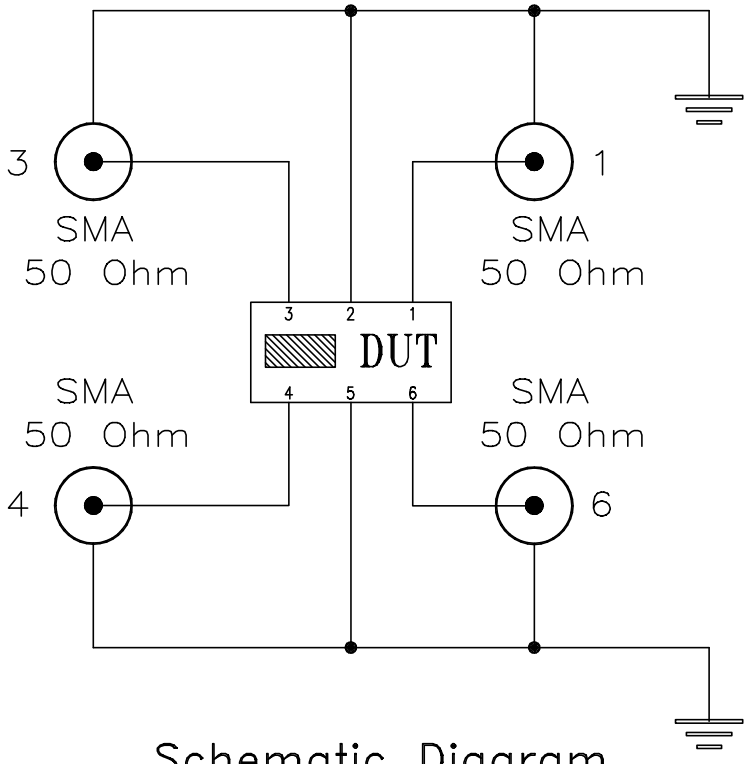
FILE:	SCALE:	SHEET:
98PL131	10:1	1 OF 1

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.

Mini-Circuits®

Mini-Circuits

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