

DC Pass, High Power

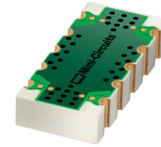
Bi-Directional Coupler

SCBD-10-63HP+

50Ω Up to 100W 50 to 6000 MHz

The Big Deal

- Wideband, 50 to 6000 MHz
- High power handling, up to 100W
- Low mainline loss, 0.5 dB
- Good return loss, up to 20 dB (input/output/coupling)



CASE STYLE: JB1233-1

Product Overview

Mini-Circuits' SCBD-10-63HP+ high-power bi-directional coupler provides high power handling up to 100W, low mainline loss and good return loss over wideband. Covering frequencies from 50 to 6000 MHz, it supports a wide variety of applications from base station transmit paths to lab use and more. The coupler is designed into an open printed laminate (0.70 x 0.32 x 0.20") with wrap-around terminations for good solderability and easy visual inspection.

Key Features

Feature	Advantages
Wideband, 50 to 6000 MHz	SCBD-10-63HP+ supports a wide range of system and lab applications.
Low mainline loss, 0.5 dB	Provides excellent through-path signal power transmission.
High power handling, 100W	Usable in systems with a wide range of power requirements.
Excellent return loss, 14-20 dB typ. (input/output/coupling)	Provides excellent matching for 50Ω systems with minimal signal reflection.
Good directivity, up to 18 dB	High directivity allows accurate signal sampling through the coupled port with minimal measurement error.
DC current passing up to 2A	Suitable for use in systems where DC power is needed through the RF line.

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



50Ω Up to 100W 50 to 6000 MHz

Maximum Ratings

Operating Temperature, case -55°C to 85°C

Storage Temperature -55°C to 100°C

DC Current 2A

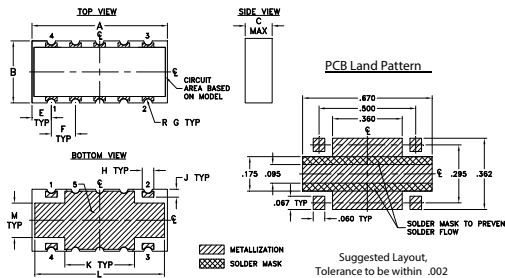
*Case temperature is defined as temperature on ground leads.
Permanent damage may occur if any of these limits are exceeded.

Pad Connections

INPUT	1,2,3,4
OUTPUT	2,1,4,3
COUPLED IN	4,3,2,1
COUPLED OUT	3,4,1,2
GROUND	5

Product Marking: SCBD-02+

Outline Drawing



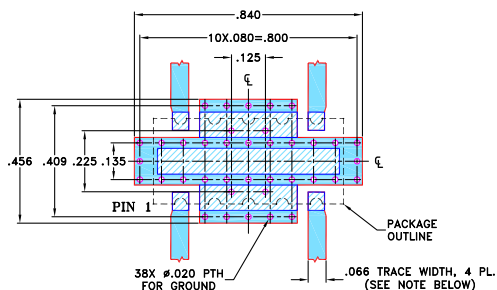
Outline Dimensions (inch mm)

A	B	C	E	F	G
.70	.32	.14	.100	.125	.022
17.78	8.13	3.56	2.54	3.18	0.56
H	J	K	L	M	wt
.060	.040	.360	.670	.175	grams
1.52	1.02	9.14	17.02	4.45	0.80

Demo Board MCL P/N: TB-774A+

Suggested PCB Layout (PL-423)**

** Wraparound solder on ground pins may not be shown



NOTE: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030"±.002"; 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

Notes

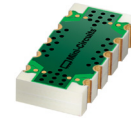
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Features

- wide frequency range, 50 to 6000 MHz
- low insertion loss 0.4dB typ. exclude the coupling loss
- good return loss
- high power, up to 100W
- DC current pass through input to output

Applications

- cellular
- lab use
- WiMax
- PCN
- GSM
- ISM



Generic photo used for illustration purposes only

CASE STYLE: JB1233-1

+RoHS Compliant

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



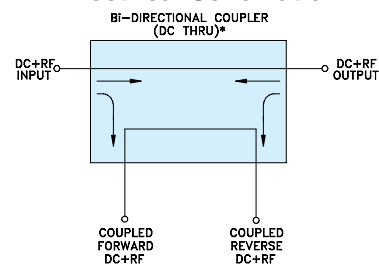
Electrical Specifications at 25°C

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range		50		6000	MHz
Mainline Loss ¹	50 - 3500 3500 - 6000	— —	0.5 0.9	0.7 1.2	dB
Coupling	50 - 400 400 - 800 800 - 1000 1000 - 1700 1700 - 2000 2000 - 2700 2700 - 3500 3500 - 6000	— — — — — — — —	36±12 24.0±4 19.6±1.5 17±2.8 14±1.3 13±1.5 11.2±1.3 10±1	— — — — — — — —	dB
Coupling Flatness (±)	1700 - 2000 2700 - 3500 3500 - 6000	— — —	0.4 0.7 0.5	0.9 1.0 0.9	dB
Directivity	50 - 2000 2000 - 3500 3500 - 4200 4200 - 6000	16 15 12 9	18 17 15 12	— — — —	dB
Return Loss (Input)	50 - 3500 3500 - 6000	20 14	30 20	— —	dB
Return Loss (Output)	50 - 3500 3500 - 6000	20 14	30 20	— —	dB
Return Loss (Coupling)	50 - 3500 3500 - 6000	20 14	30 20	— —	dB
Input Power ² (up to +65°C case temp.)	50 - 1000 1000 - 2700 2700 - 6000	— — —	— — —	100 75 50	W
Input Power (up to +85°C case temp.)	50 - 2700 2700 - 3500 3500 - 6000	— — —	— — —	64 50 40	

1. Include coupling loss.

2. At 65°C with no DC. Derate linearly to 75W (50-1000 MHz), 50W (1000-2700 MHz) and 25W (2700-6000 MHz) at 65°C with 2A DC current.

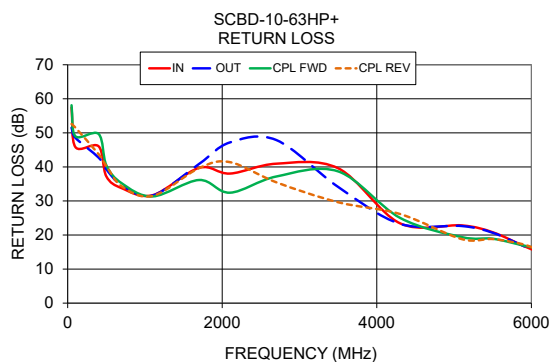
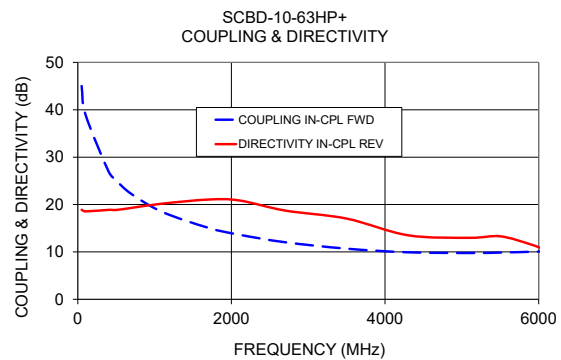
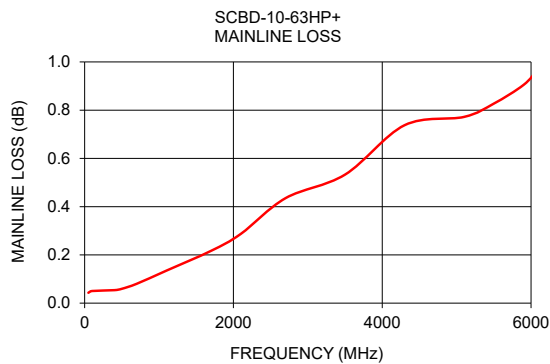
Electrical Schematic



* ELECTRICAL SCHEMATIC IS FOR BI-DIRECTIONAL COUPLER WITHOUT INTERNAL TRANSFORMERS AND RESISTORS.

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
50.0	0.04	45.01	45.00	18.73	18.90	57.49	51.49	58.12	52.62
100.0	0.05	38.99	38.98	18.60	18.56	45.83	48.55	49.01	51.54
400.0	0.05	26.99	26.99	18.87	18.88	46.06	42.73	49.68	43.75
500.0	0.06	25.07	25.07	18.86	18.86	37.23	39.30	40.50	40.32
700.0	0.08	22.21	22.21	19.12	19.29	33.75	34.64	35.19	34.30
1100.0	0.13	18.44	18.45	19.67	20.19	31.70	31.61	31.33	31.47
1700.0	0.22	15.09	15.08	21.45	21.05	39.73	40.87	36.16	39.65
2100.0	0.29	13.64	13.63	21.76	20.87	38.05	47.20	32.43	41.40
2700.0	0.44	12.04	12.08	18.39	18.73	40.95	47.89	37.19	35.47
3500.0	0.53	10.69	10.72	16.14	17.03	39.60	34.12	38.68	29.62
4300.0	0.74	9.92	9.92	14.02	13.51	23.44	23.29	25.04	26.17
5100.0	0.77	9.77	9.80	12.78	12.98	22.83	22.64	19.39	18.80
5500.0	0.83	9.86	9.99	12.86	13.30	20.81	20.66	18.91	18.82
5900.0	0.90	10.03	10.20	11.13	11.57	16.78	16.75	16.91	17.23
6100.0	0.97	10.15	10.30	10.22	10.30	14.91	14.86	15.95	15.37



Notes

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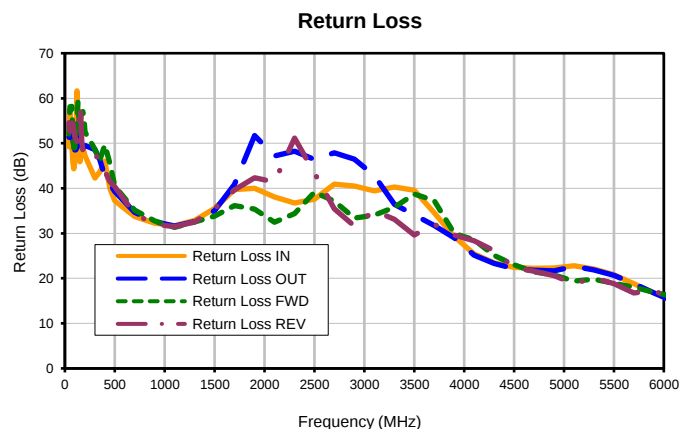
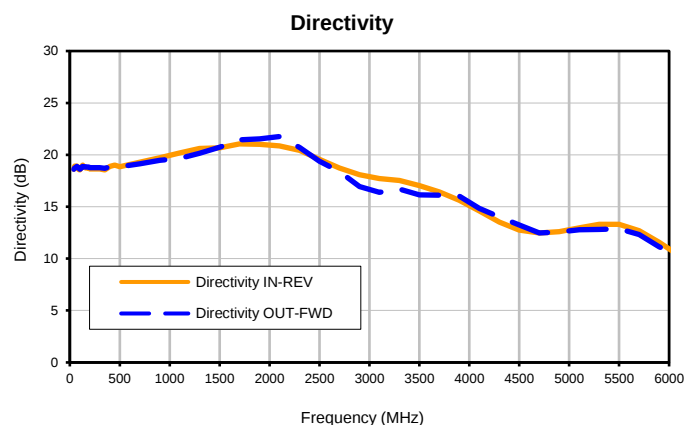
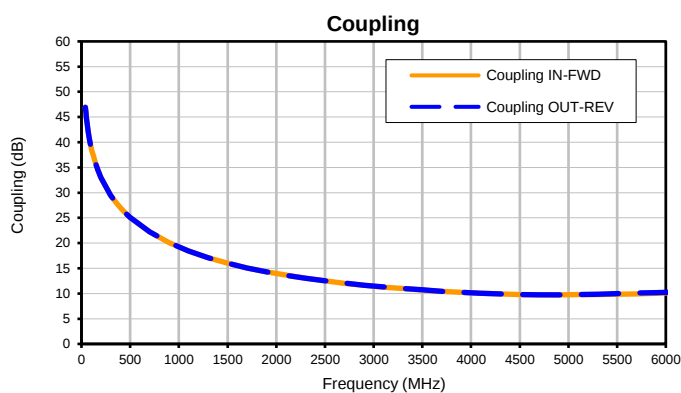
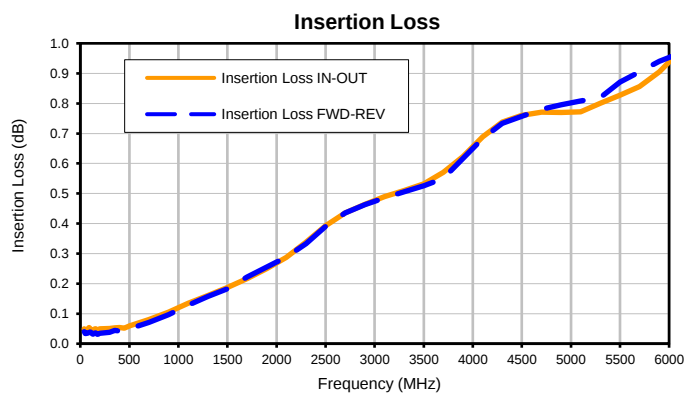
Typical Performance Data

FREQ. (MHz)	INSERTION LOSS		COUPLING		DIRECTIVITY		RETURN LOSS			
	(dB)		(dB)		(dB)		(dB)			
	IN-OUT	FWD-REV	IN-FWD	OUT-REV	IN-REV	OUT-FWD	IN	OUT	FWD	REV
40	0.05	0.04	46.95	46.94	18.60	18.61	49.27	51.38	52.05	54.56
45	0.05	0.04	45.92	45.92	18.77	18.71	53.45	51.32	54.51	53.52
50	0.04	0.03	45.01	45.00	18.90	18.73	57.49	51.49	58.12	52.62
70	0.04	0.03	42.09	42.08	18.92	18.88	49.43	52.01	58.17	54.51
80	0.05	0.04	40.93	40.92	18.66	18.75	45.74	50.87	51.42	54.35
90	0.05	0.04	39.91	39.90	18.58	18.71	44.36	49.59	48.98	53.32
100	0.05	0.04	38.99	38.98	18.56	18.60	45.83	48.55	49.01	51.54
110	0.05	0.04	38.17	38.16	18.70	18.67	47.86	48.50	50.45	51.06
120	0.04	0.03	37.41	37.40	18.87	18.81	61.64	49.04	55.19	50.35
130	0.04	0.03	36.72	36.71	18.99	18.88	55.64	49.76	59.28	51.05
140	0.05	0.03	36.07	36.06	18.90	18.86	51.35	50.92	55.87	55.35
150	0.05	0.04	35.47	35.46	18.77	18.83	45.90	52.20	53.76	58.38
160	0.05	0.04	34.91	34.90	18.74	18.85	47.30	53.06	55.94	55.67
170	0.05	0.03	34.39	34.38	18.74	18.83	49.86	50.07	56.80	50.47
180	0.05	0.03	33.90	33.89	18.75	18.83	48.68	49.06	57.07	48.62
190	0.05	0.03	33.43	33.42	18.72	18.82	48.38	49.10	56.26	49.02
200	0.05	0.04	32.98	32.97	18.63	18.76	47.24	49.54	52.52	49.32
300	0.05	0.04	29.47	29.46	18.65	18.77	42.24	48.59	48.64	48.58
350	0.05	0.04	28.13	28.14	18.55	18.71	43.62	46.37	46.20	44.47
400	0.05	0.04	26.99	26.99	18.88	18.87	46.06	42.73	49.68	43.75
450	0.05	0.05	25.98	25.98	19.01	18.92	39.96	40.90	45.48	41.52
500	0.06	0.05	25.07	25.07	18.86	18.86	37.23	39.30	40.50	40.32
700	0.08	0.07	22.21	22.21	19.29	19.12	33.75	34.64	35.19	34.30
900	0.11	0.10	20.10	20.10	19.73	19.46	32.26	32.61	32.76	32.06
1100	0.13	0.13	18.44	18.45	20.19	19.67	31.70	31.61	31.33	31.47
1300	0.16	0.16	17.11	17.11	20.61	20.15	32.88	32.61	32.56	32.54
1500	0.19	0.18	15.99	15.98	20.68	20.74	35.53	35.05	33.81	35.44
1700	0.22	0.22	15.09	15.08	21.05	21.45	39.73	40.87	36.16	39.65
1900	0.25	0.26	14.30	14.29	21.00	21.55	39.98	51.74	35.38	42.35
2100	0.29	0.29	13.64	13.63	20.87	21.76	38.05	47.20	32.43	41.40
2300	0.34	0.33	13.05	13.06	20.42	20.70	36.71	48.23	34.41	51.13
2500	0.39	0.39	12.51	12.54	19.57	19.37	37.58	46.40	39.15	43.44
2700	0.44	0.44	12.04	12.08	18.73	18.39	40.95	47.89	37.19	35.47
2900	0.46	0.46	11.61	11.66	18.09	16.95	40.51	46.46	33.35	31.64
3100	0.49	0.49	11.24	11.29	17.72	16.40	39.45	42.84	34.01	35.00
3300	0.51	0.51	10.98	11.03	17.54	16.69	40.28	36.44	35.84	33.12
3500	0.53	0.53	10.69	10.72	17.03	16.14	39.60	34.12	38.68	29.62
3700	0.57	0.55	10.44	10.45	16.42	16.10	34.58	31.73	37.31	32.02
3900	0.62	0.62	10.25	10.25	15.63	16.03	29.28	28.96	30.00	29.62
4100	0.69	0.68	10.06	10.07	14.61	14.84	25.41	25.14	28.58	28.33
4300	0.74	0.73	9.92	9.92	13.51	14.02	23.44	23.29	25.04	26.17
4500	0.76	0.76	9.82	9.80	12.75	13.25	22.43	22.18	23.02	22.36
4700	0.77	0.78	9.74	9.74	12.48	12.49	22.22	21.79	21.48	21.58
4900	0.77	0.80	9.75	9.74	12.60	12.58	22.33	21.68	20.72	20.60
5100	0.77	0.81	9.77	9.80	12.98	12.78	22.83	22.64	19.39	18.80
5300	0.80	0.82	9.79	9.86	13.31	12.81	22.07	21.91	19.80	20.11
5500	0.83	0.87	9.86	9.99	13.30	12.86	20.81	20.66	18.91	18.82
5700	0.86	0.90	9.94	10.11	12.68	12.32	18.83	18.83	18.07	16.73
5900	0.90	0.94	10.03	10.20	11.57	11.13	16.78	16.75	16.91	17.23
6100	0.97	0.97	10.15	10.30	10.30	10.22	14.91	14.86	15.95	15.37

DC PASS Bi-Directional Coupler

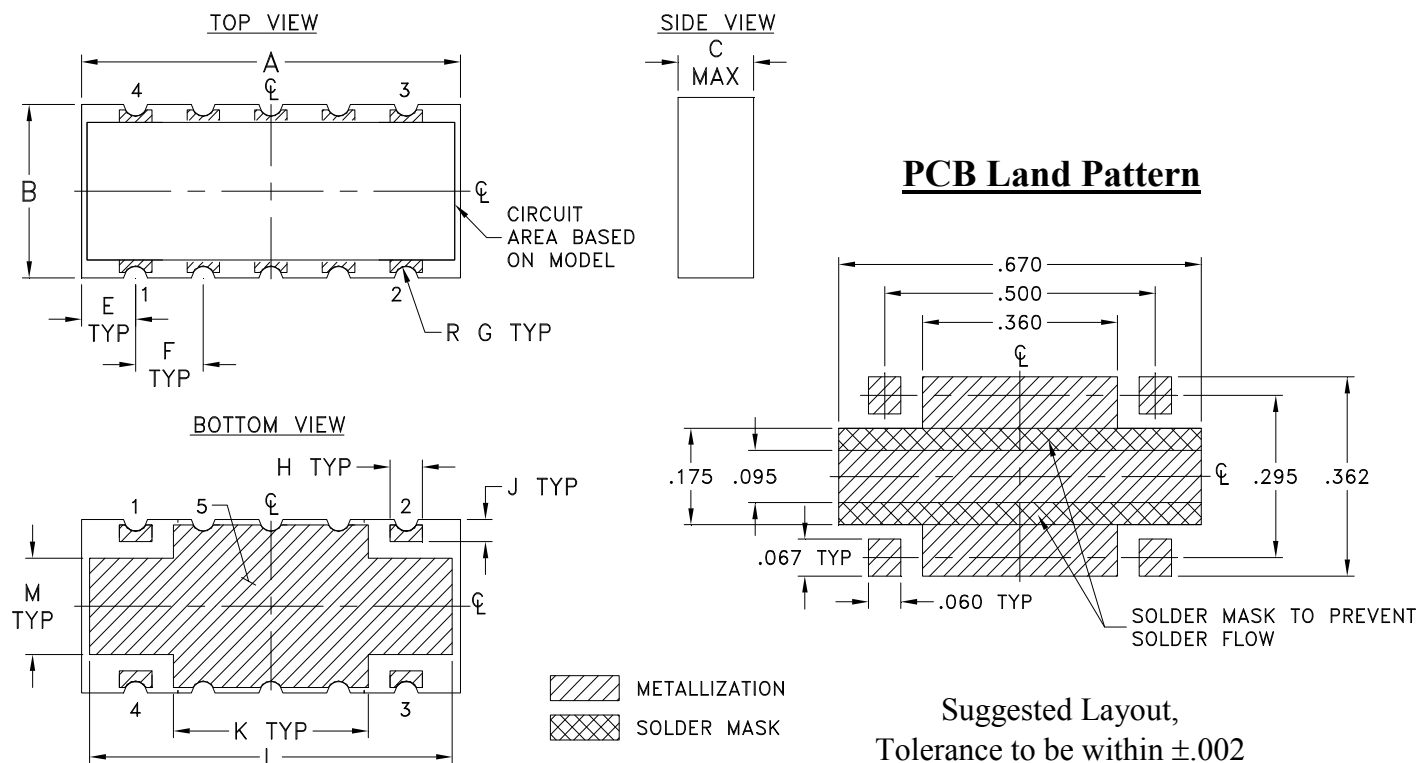
SCBD-10-63HP+

Typical Performance Curves



Outline Dimensions

JB1233-1



CASE #.	A	B	C	D	E	F	G	H	J	K	L	M	WT, GRAM
JB1233-1	.70 (17.78)	.32 (8.13)	.14 (3.56)	-- --	.100 (2.54)	.125 (3.17)	.022 (0.56)	.060 (1.52)	.040 (1.02)	.360 (9.14)	.670 (17.02)	.175 (4.45)	0.8

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

Notes:

- Open style, Base material: Printed wiring laminate.
- Termination finish: 3-5 μ inch (.08-.13 microns) Gold over 120-240 μ inch (3.05-6.10 microns) Nickel plate.
All models, (+) suffix.



INTERNET <http://www.minicircuits.com>

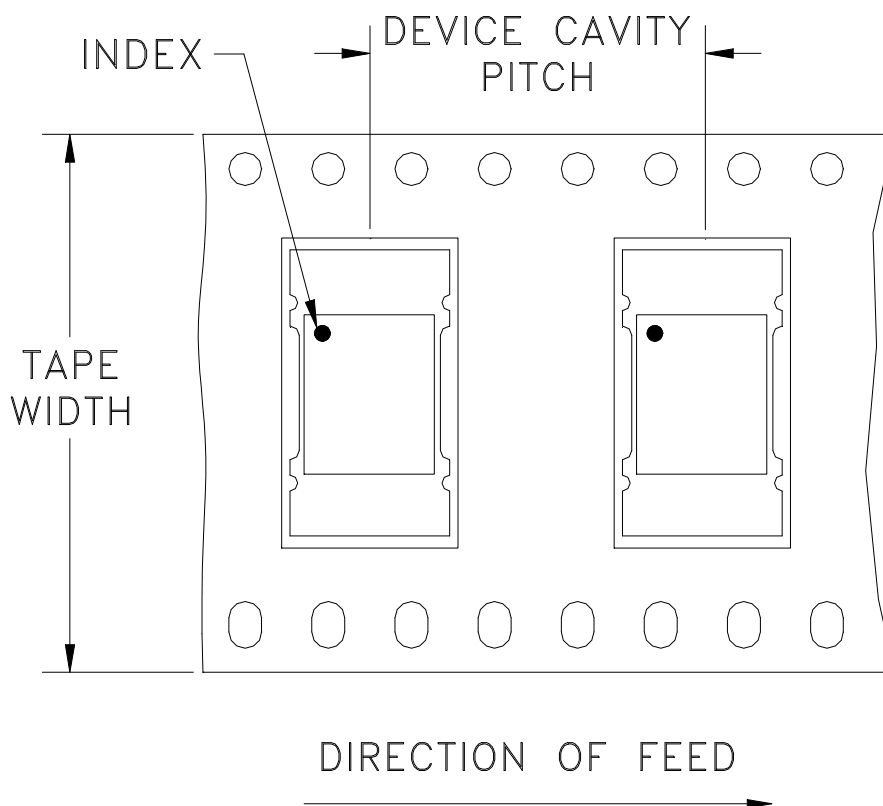
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Tape & Reel Packaging TR-F84

DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
32	12	13	500

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



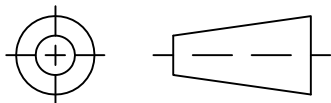
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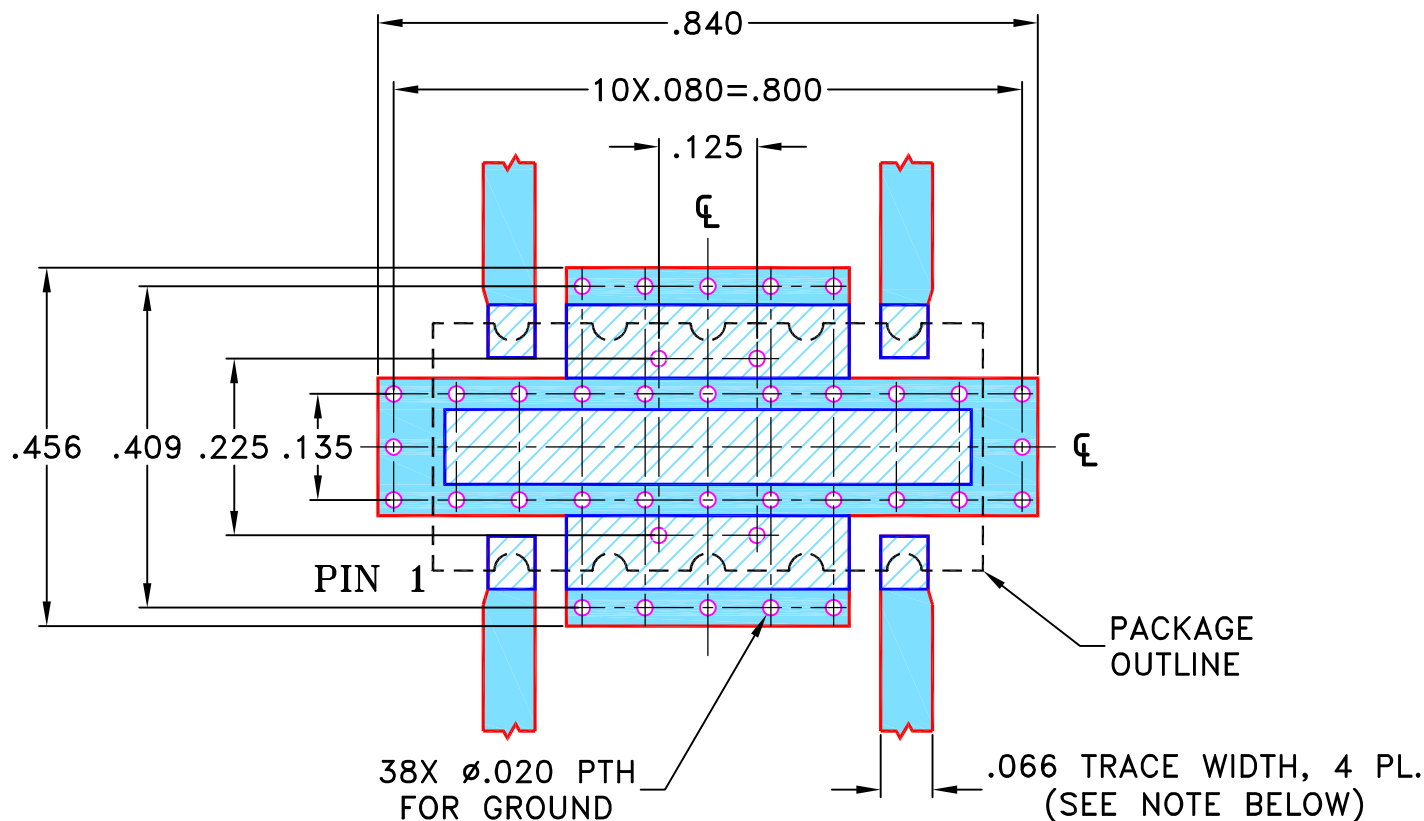
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
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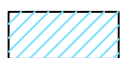
SUGGESTED MOUNTING CONFIGURATION FOR
JB1233-1 CASE STYLE, "05DC02" PIN CODE



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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

TOLERANCES ON:

2 PL DECIMALS $\pm$ 3 PL DECIMALS $\pm$.005ANGLES $\pm$ FRACTIONS $\pm$

DRAWN

ITG

07/30/14

CHECKED

GF

07/31/14

APPROVED

CH

07/31/14



Mini-Circuits®

13 Neptune Avenue
Brooklyn NY 11235

PL, 05DC02, JB1233-1, TB-774+

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 SIZE
A

 CODE IDENT
15542

 DRAWING NO:
98-PL-423

 REV:
OR

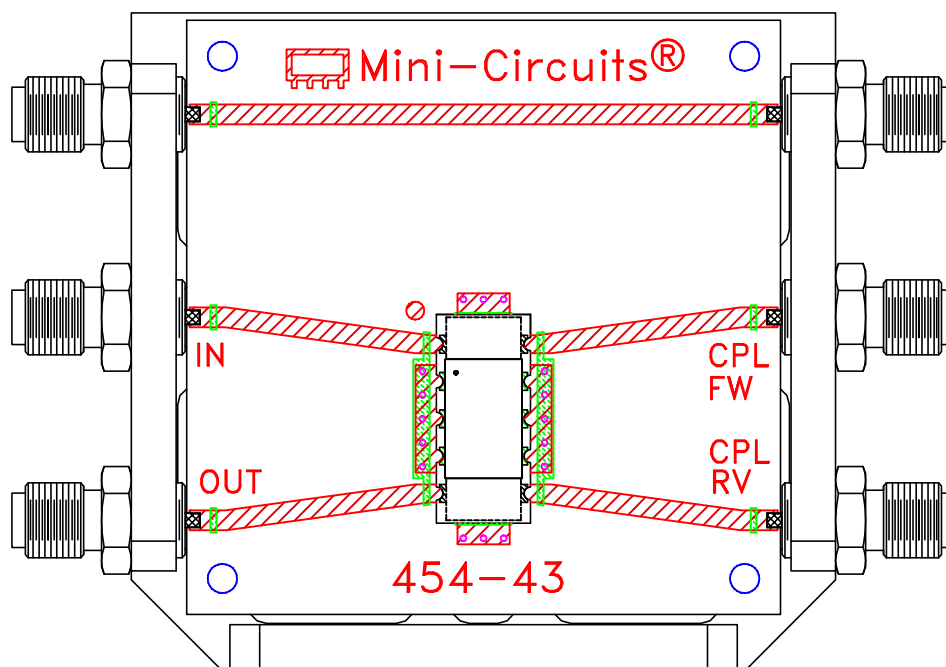
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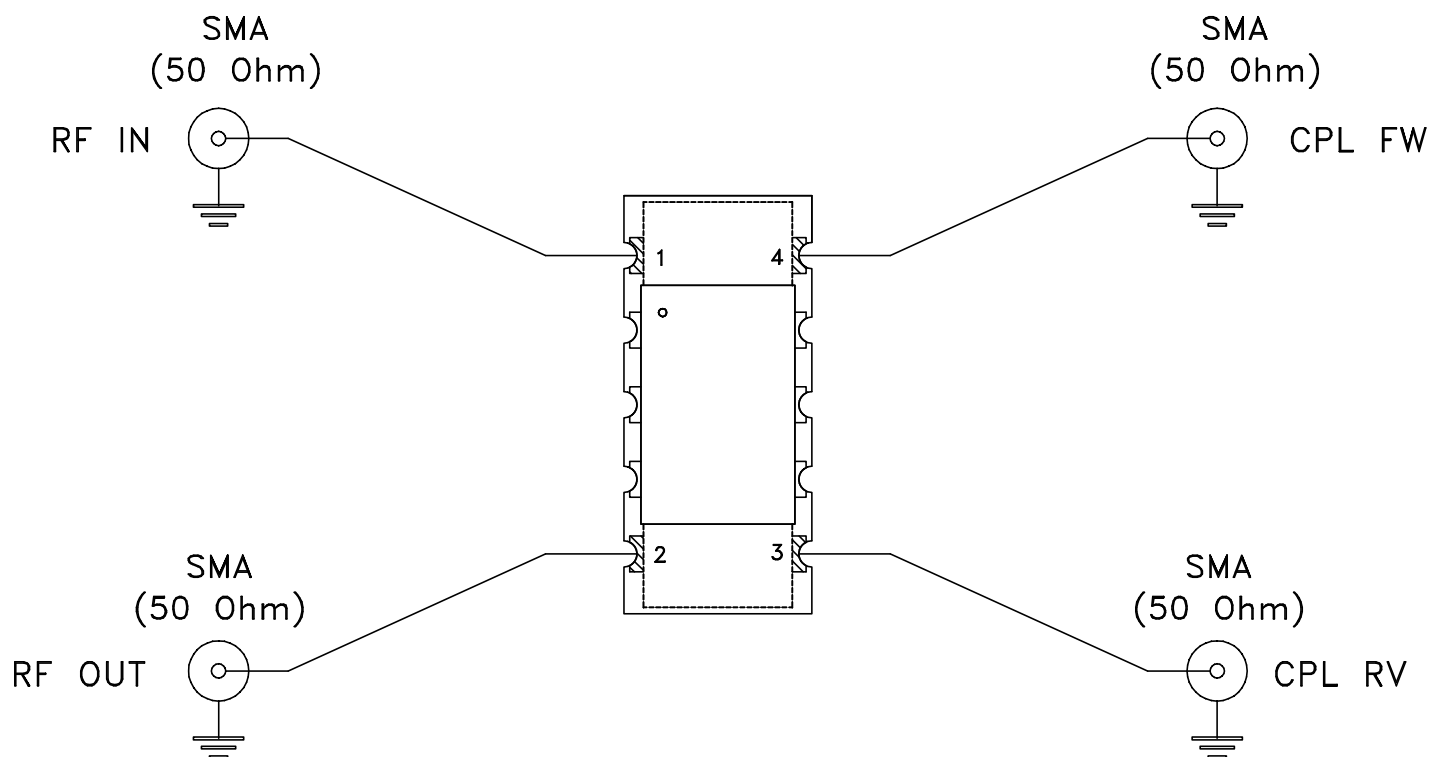
SHEET: 1 OF 1

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

Evaluation Board and Circuit



TB-774A+



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: R04350 or equivalent.
Dielectric Constant=3.5, Thickness=.030 inch.

 **Mini-Circuits®**



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 65° C Case 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
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
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
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215