Surface Mount

Directional Coupler

JDC-20-5+
JDC-20-5

50Ω 50 to 1500 MHz

Generic photo used for illustration purposes only

CASE STYLE: BH292

+RoHS Compliant

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

Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C

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

Pin Connections

INPUT	1
OUTPUT	6
COUPLED	3
GROUND	2,5
50 OHM TERM EXTERNAL	4

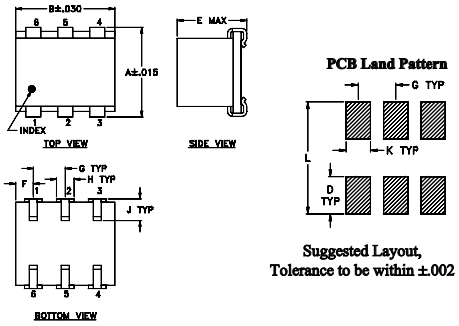
Features

- wideband, 50 to 1500 MHz
- low mainline loss, 0.5 dB typ.
- excellent solderability

Applications

- VHF/UHF
- satellite distribution
- cellular
- ISM/GSM

Outline Drawing



Outline Dimensions (inch / mm)

A	B	C	D	E	F	G
.280	.310	--	.100	.225	.055	.100
7.11	7.87	--	2.54	5.72	1.40	2.54

H	J	K	L	wt
.047	.065	.065	.300	grams
1.19	1.65	1.65	7.62	0.45

Directional Coupler Electrical Specifications

FREQ. (MHz)	COUPLING (dB)		MAINLINE LOSS[1] (dB)						DIRECTIVITY (dB)						VSWR (:1)	POWER INPUT, W	
			L		M		U		L		M		U			L	MU
f_L-f_U	Nom.	Flatness	Typ.	Max.	Typ.	Max.	Typ.	Max.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Max.	Max.
50-1500	20.5±0.5	±0.75	0.4	0.8	0.5	0.9	1.0	1.5	25	18	22	16	20	13	1.2	0.5	0.5

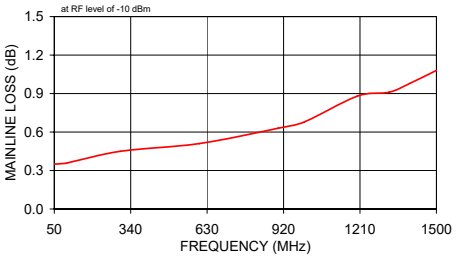
L = 50-500 MHz M = 500-750 MHz U = 750-1500 MHz

1. Mainline loss includes theoretical power loss at coupled port.

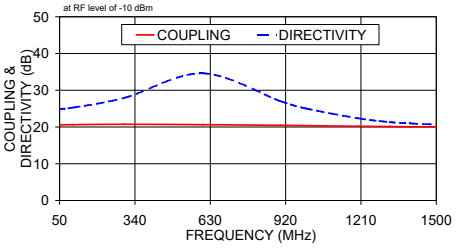
Typical Performance Data

Frequency (MHz)	Mainline Loss (dB) In-Out	Coupling (dB) In-Cpl	Directivity (dB)	Return Loss (dB) In	Return Loss (dB) Out	Return Loss (dB) Cpl
50.00	0.35	20.55	24.91	29.45	28.54	26.32
100.00	0.36	20.62	25.28	30.98	30.40	29.94
300.00	0.45	20.74	27.95	29.40	28.96	30.58
600.00	0.51	20.63	34.60	26.50	25.05	27.36
900.00	0.63	20.46	27.05	25.05	22.25	24.18
1000.00	0.68	20.37	25.02	24.77	21.36	22.99
1200.00	0.88	20.20	22.37	24.24	19.64	20.77
1320.00	0.91	20.12	21.35	24.06	18.68	19.46
1400.00	0.98	20.06	20.97	23.74	17.96	18.59
1500.00	1.08	20.07	20.69	23.62	17.22	17.51

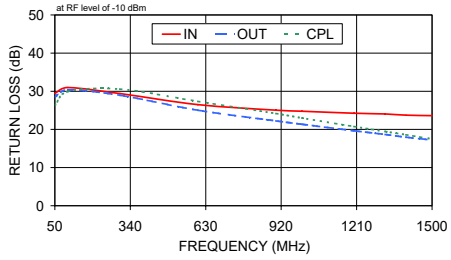
JDC-20-5
MAINLINE LOSS



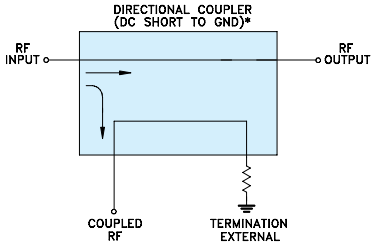
JDC-20-5
COUPLING & DIRECTIVITY



JDC-20-5
RETURN LOSS

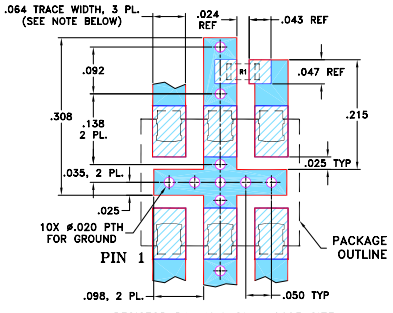


Electrical Schematic



* ELECTRICAL SCHEMATIC IS FOR DIRECTIONAL COUPLER WITH INTERNAL TRANSFORMER(S) AND EXTERNAL TERMINATION.

Demo Board MCL P/N: TB-176
Suggested PCB Layout (PL-041)



RESISTOR R1: 49.9 Ohm, 0603 SIZE.

NOTES: 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

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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REV. F
M151107
JDC-20-5
WZ/TD/CP/AM
200413

Directional Coupler JDC-20-5+

Typical Performance Data

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

FREQUENCY (MHz)	INSERTION LOSS (dB)	COUPLING LOSS (dB)	DIRECTIVITY (dB)	RETURN LOSS (dB)		
				IN	OUT	CPL
50	0.40	20.43	30.42	29.22	30.49	28.10
75	0.40	20.49	30.59	30.66	32.00	29.90
100	0.40	20.53	30.78	31.48	33.07	31.32
125	0.40	20.57	31.10	32.30	33.82	32.53
150	0.41	20.60	31.30	32.87	34.43	33.70
175	0.42	20.62	31.63	33.14	34.86	34.80
200	0.42	20.64	31.82	33.41	35.13	35.92
250	0.44	20.68	32.17	33.83	35.53	38.35
300	0.46	20.71	32.17	33.58	35.35	41.17
350	0.48	20.73	31.83	33.55	35.51	44.62
400	0.49	20.75	30.69	33.01	35.39	46.19
425	0.50	20.75	29.93	32.79	35.22	45.14
450	0.51	20.75	29.36	32.62	35.07	43.52
475	0.52	20.76	28.46	32.29	35.09	41.86
500	0.53	20.77	27.83	31.99	35.00	40.06
525	0.54	20.76	27.09	31.67	34.88	38.51
550	0.55	20.75	26.40	31.45	34.74	37.15
575	0.57	20.74	25.81	31.09	34.71	35.92
600	0.57	20.73	25.12	30.66	34.56	34.77
650	0.60	20.72	23.95	30.08	34.34	32.87
700	0.63	20.71	22.59	29.30	34.15	31.22
725	0.63	20.69	22.33	29.11	34.54	30.46
750	0.64	20.69	21.69	28.93	34.40	29.72
775	0.66	20.65	21.46	28.63	34.51	29.04
800	0.67	20.62	21.21	28.41	34.74	28.43
850	0.69	20.59	20.25	27.71	34.54	27.23
900	0.71	20.51	19.96	27.30	34.98	26.20
950	0.74	20.48	19.26	26.80	34.93	25.19
1000	0.76	20.42	18.83	26.42	35.34	24.26
1050	0.79	20.36	18.56	26.02	35.31	23.40
1100	0.81	20.30	18.35	25.70	35.58	22.57
1150	0.84	20.25	18.13	25.33	35.68	21.80
1200	0.87	20.21	17.87	25.03	35.85	21.03
1250	0.90	20.15	17.89	24.75	36.16	20.31
1300	0.93	20.09	18.11	24.37	36.23	19.65
1350	0.96	20.10	18.00	24.16	36.56	18.98
1400	0.99	20.06	18.10	23.89	36.97	18.31
1425	1.00	20.04	18.29	23.82	37.20	17.98
1450	1.02	20.05	18.48	23.70	37.11	17.69
1475	1.03	20.01	18.79	23.53	37.06	17.37
1500	1.05	20.02	18.88	23.38	36.54	17.06

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Directional Coupler JDC-20-5+

Typical Performance Data

TEST CONDITIONS: INPUT POWER =0 dBm @Temperature = -40°C

FREQUENCY (MHz)	INSERTION LOSS (dB)	COUPLING LOSS (dB)	DIRECTIVITY (dB)	RETURN LOSS (dB)		
				IN	OUT	CPL
50	0.35	20.41	28.99	30.42	31.63	29.65
75	0.35	20.47	28.87	32.08	33.20	31.33
100	0.36	20.50	28.87	32.78	33.90	32.19
125	0.36	20.53	28.87	33.11	33.85	33.28
150	0.37	20.55	28.88	32.93	33.46	35.00
175	0.37	20.57	28.89	32.45	33.02	36.85
200	0.38	20.57	28.91	32.09	32.60	37.92
250	0.39	20.59	28.95	31.86	32.34	39.23
300	0.41	20.59	28.89	31.66	32.30	42.82
350	0.42	20.59	28.62	31.71	32.56	44.47
400	0.44	20.57	27.97	31.07	32.33	46.11
425	0.45	20.56	27.52	30.70	32.02	45.84
450	0.46	20.54	27.16	30.38	31.75	44.11
475	0.47	20.54	26.59	29.99	31.55	42.66
500	0.48	20.53	26.21	29.62	31.28	41.67
525	0.49	20.51	25.90	29.37	31.12	40.55
550	0.50	20.49	25.40	29.17	30.91	39.06
575	0.51	20.48	24.96	28.88	30.90	37.64
600	0.52	20.45	24.54	28.56	30.78	36.53
650	0.54	20.42	23.74	28.02	30.46	35.18
700	0.56	20.36	22.99	27.44	30.25	33.33
725	0.57	20.33	22.69	27.10	30.24	32.48
750	0.59	20.31	22.05	26.90	30.03	31.82
775	0.61	20.31	21.00	26.60	29.78	31.14
800	0.62	20.29	21.32	26.29	30.07	30.42
850	0.63	20.19	21.04	26.09	30.11	29.05
900	0.65	20.13	20.57	25.63	30.21	27.85
950	0.68	20.06	20.15	25.26	30.23	26.78
1000	0.71	20.01	19.81	24.83	30.34	25.70
1050	0.74	19.95	19.47	24.43	30.14	24.71
1100	0.77	19.89	19.24	24.21	30.16	23.76
1150	0.80	19.84	19.07	23.97	30.17	22.96
1200	0.82	19.79	19.06	23.66	30.13	22.16
1250	0.86	19.72	19.09	23.34	30.12	21.32
1300	0.89	19.68	19.42	22.91	30.08	20.57
1350	0.93	19.67	19.44	22.37	29.72	19.83
1400	0.96	19.79	19.15	22.40	31.34	19.01
1425	0.96	19.70	19.98	22.35	31.62	18.75
1450	0.98	19.69	20.31	22.25	31.43	18.43
1475	1.00	19.66	20.52	22.10	31.38	18.09
1500	1.01	19.66	20.96	22.02	31.21	17.77

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Directional Coupler JDC-20-5+

Typical Performance Data

TEST CONDITIONS: INPUT POWER =0 dBm @Temperature = -85°C

FREQUENCY (MHz)	INSERTION LOSS (dB)	COUPLIN LOSS (dB)	DIRECTIVITY (dB)	RETURN LOSS (dB)		
				IN	OUT	CPL
50	0.45	20.46	31.45	27.75	28.97	26.22
75	0.45	20.53	31.86	28.96	30.31	27.57
100	0.45	20.58	32.45	29.74	31.42	28.78
125	0.45	20.63	33.12	30.59	32.39	29.88
150	0.46	20.67	33.78	31.38	33.33	30.68
175	0.47	20.71	34.64	32.03	34.31	31.25
200	0.47	20.76	35.48	32.71	35.19	31.77
250	0.49	20.83	37.77	33.97	36.80	33.36
300	0.51	20.90	39.53	34.46	37.63	35.17
350	0.52	20.97	38.05	34.93	38.31	36.57
400	0.54	21.02	34.09	34.78	38.73	37.49
425	0.55	21.04	32.51	34.84	38.80	37.69
450	0.56	21.05	31.03	34.88	38.96	37.62
475	0.57	21.07	29.60	34.85	39.66	37.30
500	0.59	21.10	28.29	34.64	40.16	36.56
525	0.59	21.10	27.33	34.57	40.77	35.71
550	0.61	21.11	26.35	34.52	41.25	34.85
575	0.62	21.12	25.49	34.28	41.87	33.90
600	0.63	21.12	24.61	33.91	42.26	33.01
650	0.66	21.13	23.22	33.30	42.10	31.37
700	0.67	21.12	21.96	32.83	42.09	29.87
725	0.69	21.11	21.39	32.30	42.12	29.17
750	0.71	21.16	20.43	31.96	41.81	28.37
775	0.71	21.08	20.44	31.94	42.60	27.78
800	0.72	21.05	20.14	31.55	43.07	27.20
850	0.73	21.01	19.37	30.67	43.23	26.11
900	0.75	20.95	18.84	29.93	43.76	25.13
950	0.77	20.90	18.32	29.44	43.53	24.20
1000	0.80	20.84	17.87	29.02	43.88	23.31
1050	0.83	20.78	17.53	28.64	42.32	22.51
1100	0.85	20.72	17.28	28.39	42.22	21.73
1150	0.88	20.65	17.07	28.03	42.19	21.00
1200	0.90	20.60	17.01	27.68	43.35	20.32
1250	0.92	20.50	16.89	27.31	43.68	19.64
1300	0.95	20.44	17.04	26.72	43.92	19.03
1350	1.01	20.60	15.90	25.79	41.18	18.35
1400	0.99	20.39	16.51	26.18	49.85	17.72
1425	1.00	20.36	16.93	26.10	50.31	17.45
1450	1.01	20.31	16.99	25.98	48.29	17.12
1475	1.03	20.29	17.17	25.79	47.20	16.83
1500	1.04	20.26	17.30	25.72	45.00	16.52

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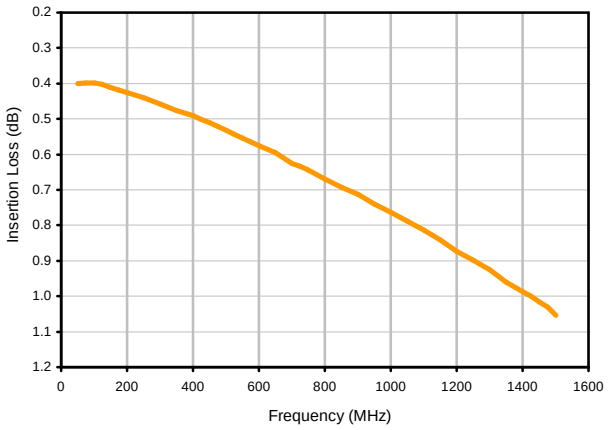
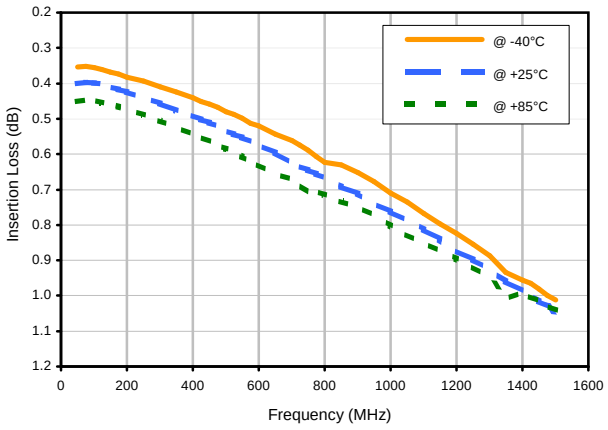
Directional Coupler JDC-20-5+

Typical Performance Curves

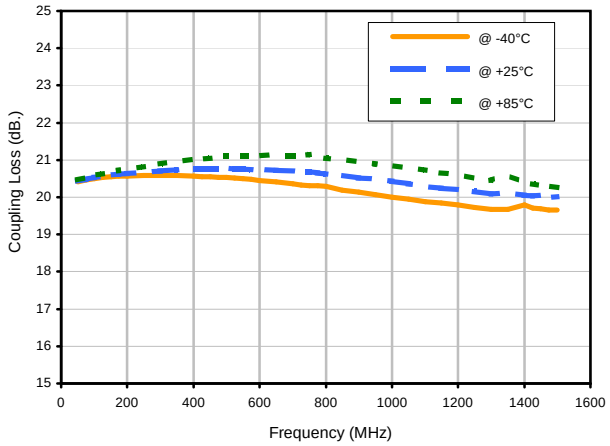
Insertion Loss



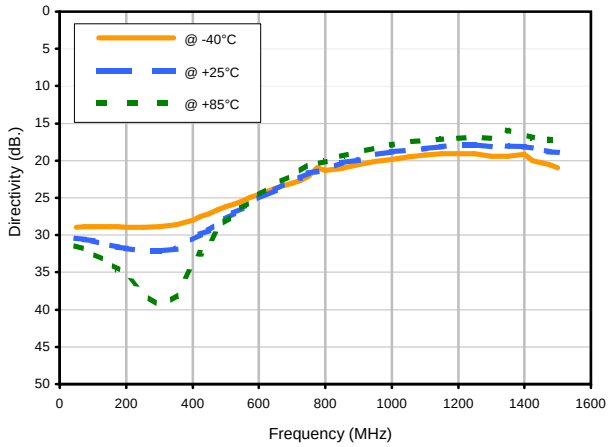
Insertion Loss vs. TEMPERATURE



Coupling Loss vs. TEMPERATURE



Directivity vs. TEMPERATURE



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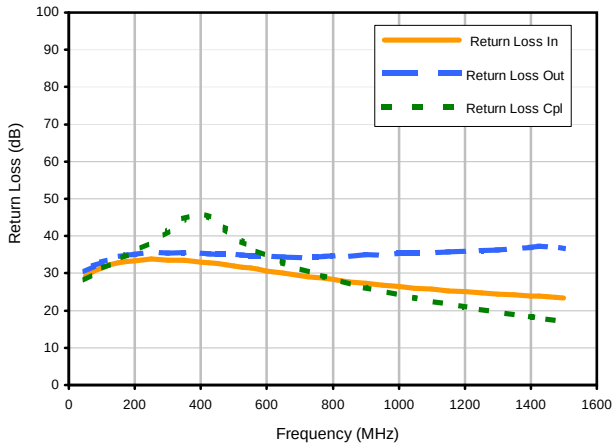
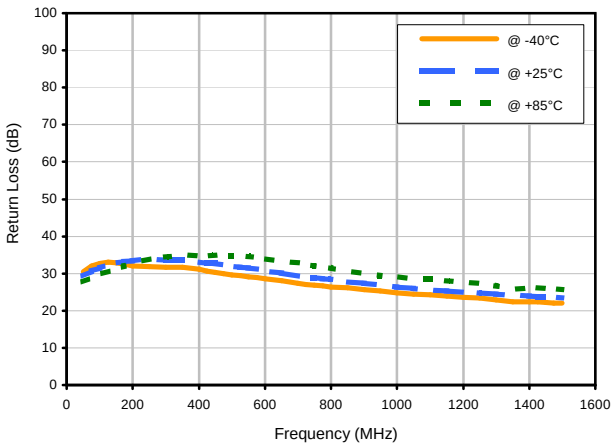
Typical Performance Curves

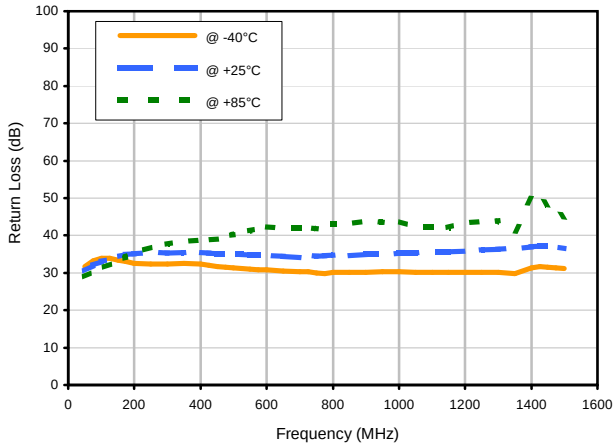
Return Loss



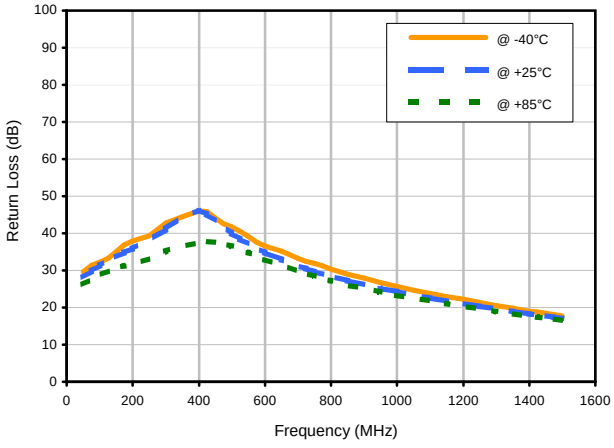
Return Loss In vs. TEMPERATURE



Return Loss Out vs. TEMPERATURE



Return Loss Cpl vs. TEMPERATURE



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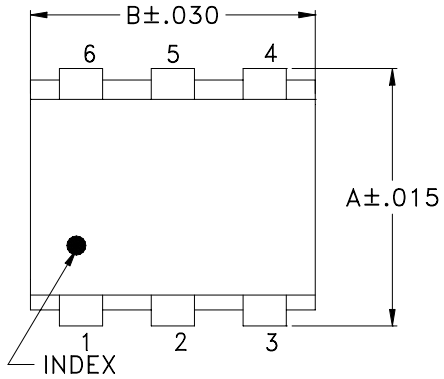
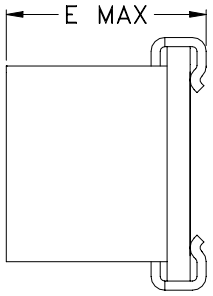
Case Style BH

BH292

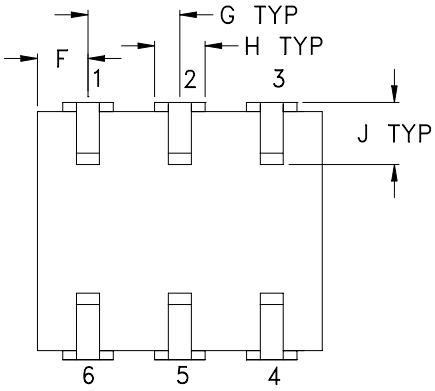
Outline Dimensions



TOP VIEW

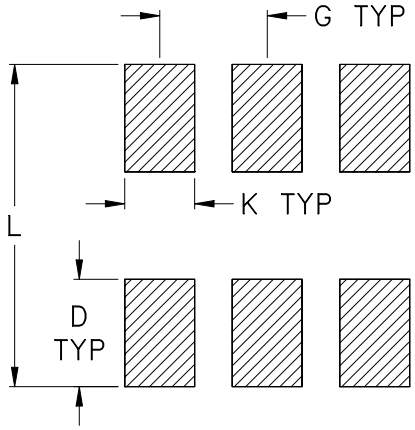


SIDE VIEW



BOTTOM VIEW

PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

CASE #	A	B	C	D	E	F	G	H	J	K	L	WT. GRAM
BH292	.280 (7.11)	.310 (7.87)	- -	.100 (2.54)	.225 (5.72)	.055 (1.40)	.100 (2.54	.047 (1.19)	.065 (1.65)	.065 (1.65)	.300 (7.62)	.45

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

Notes:
1. Case material: Ceramic.
2. Termination finish:
   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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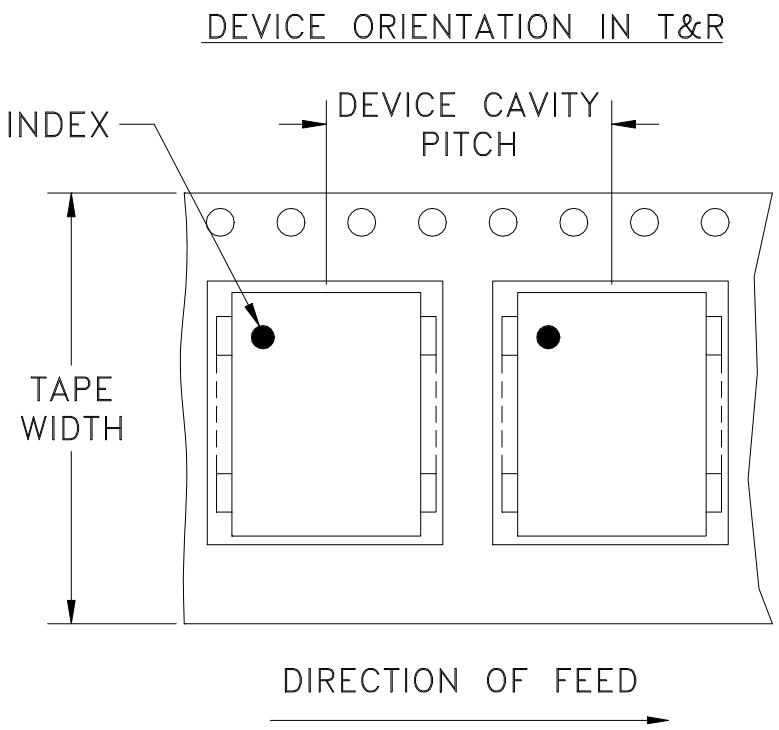
Tape & Reel Packaging TR-F24



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
16	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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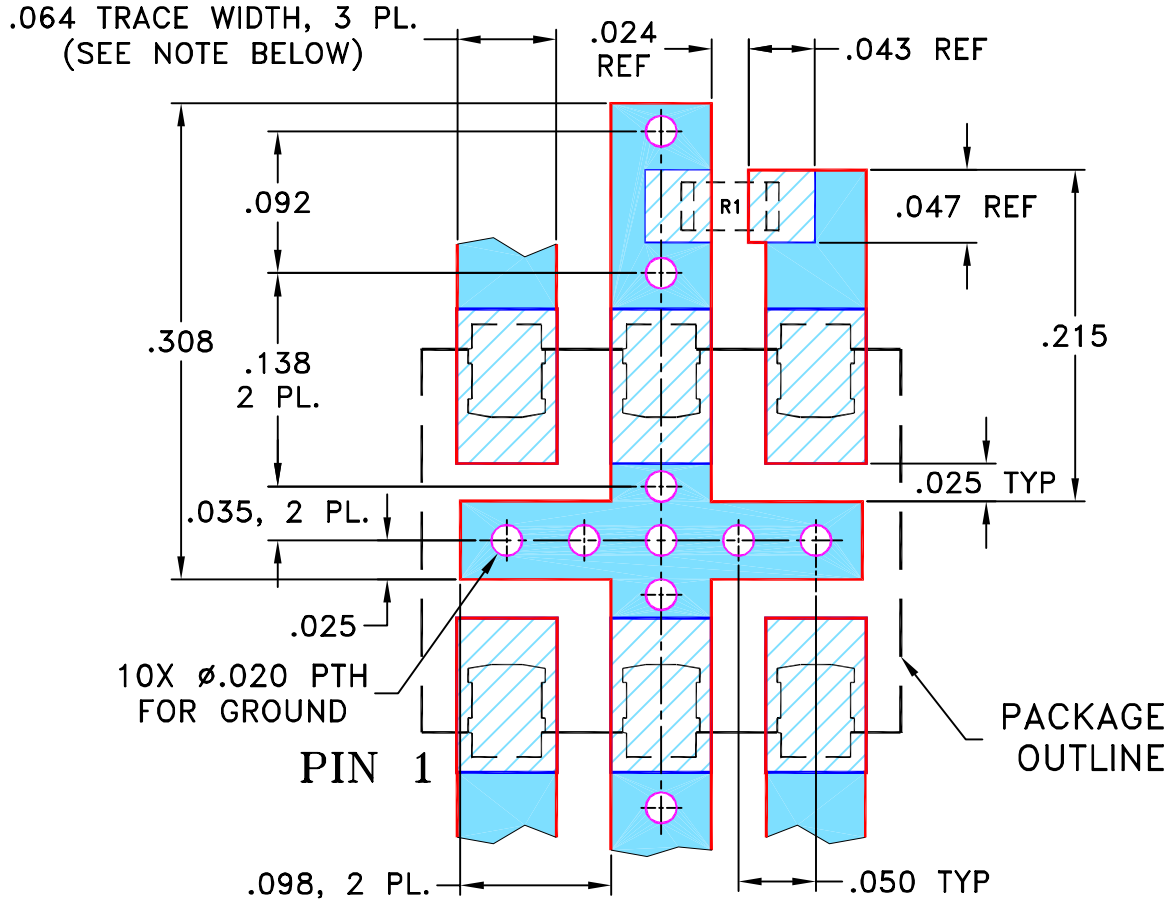
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M81002	NEW RELEASE	08/05/02	MMG	LC
A	M102713	ADDED NOTE 2 & "...WITH SMOBC"	01/17/06	MMG	IL

SUGGESTED MOUNTING CONFIGURATION
FOR BH292/CD542 CASE STYLE, "lt" PIN CONNECTION



RESISTOR R1: 49.9 Ohm, 0603 SIZE.

NOTES: 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

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	MMG	08/05/02
TOLERANCES ON:	CHECKED	AV	08/05/02
2 PL DECIMALS ±	APPROVED	LC	08/05/02
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

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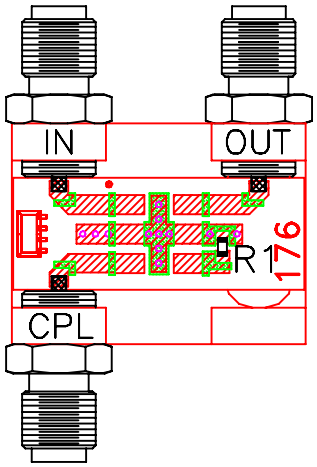
Brooklyn NY 11235

PL, lt, BH292/CD542, JDC/ADC, TB-176

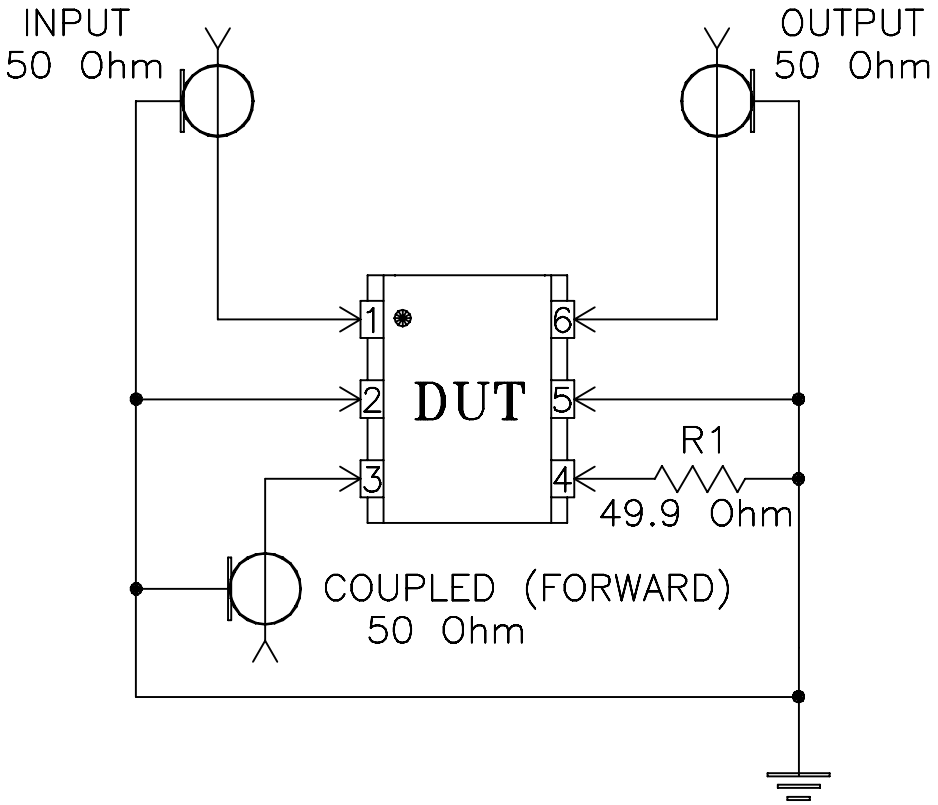
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-041	A

FILE:	SCALE:	SHEET:
98PL041	8:1	1 OF 1

Evaluation Board and Circuit



TB-176



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.030 inch.

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Environmental Specifications ENV02T1

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	-40° to 85°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
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, 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

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