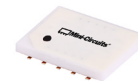


High Power Bi-Directional Coupler

BDCA-7-25+

50Ω 7dB Coupling DC Pass 1200 to 2500 MHz



Generic photo used for illustration purposes only

CASE STYLE: DZ944

+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 |
| 13" | 500, 1000 |

Maximum Ratings

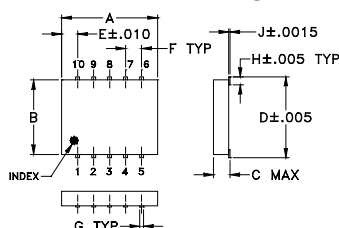
| | |
|-----------------------|----------------|
| Operating Temperature | -55°C to 100°C |
| Storage Temperature | -55°C to 100°C |
| DC Current | 0.25A |

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

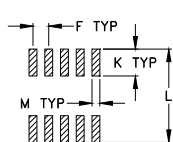
Pin Connections

| | |
|-------------------|-------------|
| INPUT | 1 |
| OUTPUT | 6 |
| COUPLED (forward) | 10 |
| COUPLED (reverse) | 5 |
| GROUND | 2,3,4,7,8,9 |

Outline Drawing



PCB Land Pattern

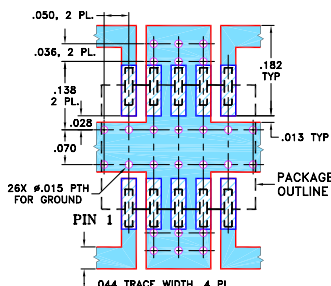


Suggested Layout, Tolerance to be within ±0.02

Outline Dimensions (inch/mm)

| | | | | | | |
|------|------|------|------|------|------|-------|
| A | B | C | D | E | F | G |
| .30 | .250 | .052 | .266 | .050 | .050 | .012 |
| 7.62 | 6.35 | 1.32 | 6.76 | 1.27 | 1.27 | 0.30 |
| H | J | K | L | M | | wt |
| .029 | .004 | .085 | .296 | .030 | | grams |
| 0.74 | 0.10 | 2.16 | 7.52 | 0.76 | | 0.25 |

Demo Board MCL P/N: TB-115+ Suggested PCB Layout (PL-004)



- NOTE: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .020 ± .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

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/MCLStore/terms.jsp

Features

- four-port coupler
- wideband, 1200 to 2500 MHz
- excellent VSWR, 1.05:1 typ. all ports
- good flatness, ±0.3 dB typ.
- excellent power handling capability, 35W (2100 MHz)
- hermetically sealed
- minimal variation with temperature variation
- low profile, 0.052" height
- protected by US Patent 7,049,905
- DC current through input to output 0.25A Max. at 1.0 watt RF input power

Applications

- PCS, PCN, UMTS
- ISM
- GPS
- defense

Bi-Directional Coupler Electrical Specifications

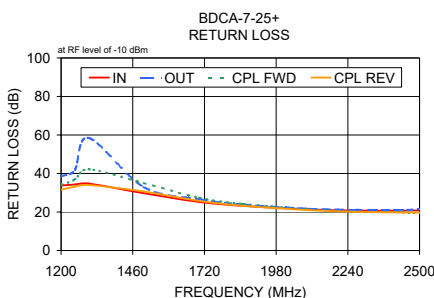
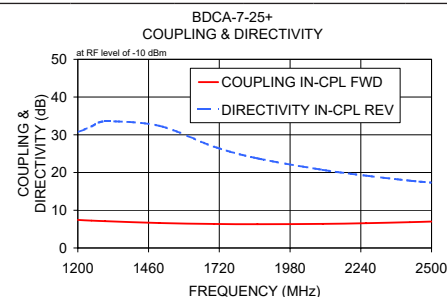
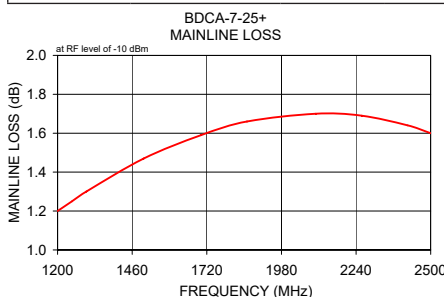
| FREQUENCY (MHz) | COUPLING (dB) | | MAINLINE LOSS ¹ (dB) | | DIRECTIVITY (dB) | | VSWR (:1) | POWER INPUT ² (W) |
|-----------------|---------------|---------------|---------------------------------|------|------------------|------|-----------|------------------------------|
| | Nom. | Max. Flatness | Typ. | Max. | Typ. | Min. | | |
| $f_c - f_u$ | | | | | | | | |
| 1200-2500 | | | | | | | | |
| 1200-1700 | 7.1±0.8 | ±0.8 | 1.5 | 1.9 | 22 | 19 | 1.08 | 35 |
| 1700-2100 | 6.5±0.5 | ±0.3 | 1.6 | 2.0 | 22 | 14 | 1.05 | 35 |
| 2100-2500 | 7.0±0.8 | ±1.0 | 1.5 | 2.0 | 22 | 12 | 1.10 | 27 |

1. Includes theoretical power loss of 1.0 dB at 7 dB coupling.

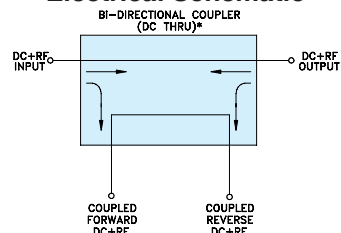
2. Derate linearly 1/3 at 100°C

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 | |
| 1200.00 | 1.20 | 7.44 | 7.44 | 28.71 | 30.67 | 33.76 | 38.52 | 34.05 | 31.62 | |
| 1250.00 | 1.25 | 7.25 | 7.26 | 28.83 | 32.19 | 34.26 | 41.86 | 36.87 | 33.16 | |
| 1300.00 | 1.30 | 7.10 | 7.09 | 28.92 | 33.55 | 34.75 | 58.50 | 42.17 | 34.02 | |
| 1500.00 | 1.47 | 6.62 | 6.62 | 26.70 | 32.36 | 29.75 | 32.95 | 35.05 | 30.66 | |
| 1700.00 | 1.59 | 6.36 | 6.37 | 23.78 | 26.87 | 25.23 | 26.63 | 27.37 | 25.76 | |
| 1860.00 | 1.66 | 6.30 | 6.30 | 21.94 | 23.76 | 23.19 | 23.89 | 24.17 | 23.22 | |
| 2100.00 | 1.70 | 6.39 | 6.38 | 19.67 | 20.71 | 21.34 | 21.69 | 21.28 | 20.95 | |
| 2260.00 | 1.69 | 6.57 | 6.56 | 18.53 | 19.15 | 20.76 | 21.18 | 20.21 | 20.12 | |
| 2420.00 | 1.64 | 6.84 | 6.84 | 17.58 | 17.85 | 20.67 | 21.04 | 19.83 | 19.80 | |
| 2500.00 | 1.60 | 7.01 | 7.00 | 17.10 | 17.32 | 20.88 | 21.37 | 19.63 | 19.70 | |



Electrical Schematic



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

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REV. G
M151107
ED-10880A/1
BDCA-7-25+
LC/TD/CP/AM
200512

Bi-Directional Coupler

BDCA-7-25+

Typical Performance Data

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

| FREQ. (MHz) | INSERTION LOSS (dB) | | COUPLING (dB) | | DIRECTIVITY (dB) | | RETURN LOSS (dB) | | | |
|----------------|------------------------|---------|------------------|---------|---------------------|---------|---------------------|-------|-------|-------|
| | IN-OUT | FWD-REV | IN-FWD | OUT-REV | IN-REV | OUT-FWD | IN | OUT | FWD | REV |
| 500 | 0.41 | 0.39 | 13.17 | 13.18 | 22.71 | 22.74 | 26.96 | 26.98 | 29.95 | 29.88 |
| 600 | 0.51 | 0.49 | 11.82 | 11.83 | 23.25 | 23.28 | 25.86 | 26.16 | 29.16 | 29.54 |
| 700 | 0.62 | 0.60 | 10.74 | 10.75 | 23.83 | 24.02 | 25.34 | 25.39 | 29.09 | 29.29 |
| 800 | 0.74 | 0.72 | 9.85 | 9.86 | 24.67 | 24.89 | 25.29 | 25.37 | 29.28 | 29.80 |
| 900 | 0.85 | 0.83 | 9.12 | 9.13 | 25.51 | 25.88 | 25.59 | 25.54 | 30.44 | 31.01 |
| 1000 | 0.96 | 0.94 | 8.51 | 8.52 | 26.34 | 27.04 | 26.36 | 26.15 | 32.61 | 33.28 |
| 1100 | 1.07 | 1.05 | 8.01 | 8.01 | 26.79 | 27.99 | 27.55 | 27.07 | 35.74 | 36.54 |
| 1150 | 1.12 | 1.10 | 7.79 | 7.79 | 26.91 | 28.38 | 28.33 | 27.71 | 37.91 | 38.60 |
| 1200 | 1.16 | 1.15 | 7.58 | 7.60 | 26.89 | 28.53 | 29.63 | 28.52 | 39.57 | 40.14 |
| 1250 | 1.21 | 1.20 | 7.40 | 7.41 | 26.78 | 28.32 | 30.96 | 29.39 | 39.26 | 39.77 |
| 1300 | 1.26 | 1.25 | 7.24 | 7.25 | 26.46 | 28.23 | 32.75 | 30.36 | 36.34 | 37.52 |
| 1350 | 1.30 | 1.29 | 7.10 | 7.11 | 26.14 | 27.68 | 35.23 | 31.55 | 34.00 | 34.51 |
| 1400 | 1.34 | 1.34 | 6.98 | 6.98 | 25.60 | 27.04 | 38.48 | 32.22 | 31.63 | 32.02 |
| 1450 | 1.38 | 1.38 | 6.86 | 6.87 | 25.14 | 26.27 | 40.70 | 32.44 | 29.83 | 29.78 |
| 1500 | 1.42 | 1.42 | 6.77 | 6.77 | 24.49 | 25.51 | 38.47 | 31.84 | 28.04 | 28.13 |
| 1550 | 1.45 | 1.46 | 6.68 | 6.69 | 23.97 | 24.86 | 35.17 | 30.48 | 26.78 | 26.57 |
| 1600 | 1.48 | 1.49 | 6.61 | 6.62 | 23.36 | 24.12 | 32.28 | 29.04 | 25.59 | 25.31 |
| 1650 | 1.51 | 1.52 | 6.56 | 6.57 | 22.85 | 23.41 | 29.85 | 27.58 | 24.51 | 24.29 |
| 1700 | 1.54 | 1.55 | 6.51 | 6.52 | 22.15 | 22.69 | 27.83 | 26.21 | 23.64 | 23.44 |
| 1750 | 1.56 | 1.57 | 6.48 | 6.50 | 21.67 | 22.16 | 26.36 | 25.08 | 22.86 | 22.66 |
| 1800 | 1.59 | 1.59 | 6.47 | 6.48 | 21.17 | 21.49 | 24.96 | 24.04 | 22.09 | 21.97 |
| 1850 | 1.60 | 1.61 | 6.46 | 6.47 | 20.67 | 20.92 | 23.84 | 23.14 | 21.35 | 21.29 |
| 1900 | 1.61 | 1.63 | 6.47 | 6.48 | 20.08 | 20.30 | 22.78 | 22.21 | 20.61 | 20.56 |
| 1950 | 1.63 | 1.64 | 6.49 | 6.49 | 19.71 | 19.78 | 21.92 | 21.40 | 20.13 | 20.05 |
| 2000 | 1.63 | 1.65 | 6.51 | 6.52 | 19.22 | 19.30 | 21.12 | 20.72 | 19.51 | 19.58 |
| 2050 | 1.64 | 1.66 | 6.55 | 6.56 | 18.81 | 18.75 | 20.41 | 20.13 | 19.08 | 19.11 |
| 2100 | 1.65 | 1.66 | 6.60 | 6.60 | 18.42 | 18.34 | 19.78 | 19.55 | 18.69 | 18.72 |
| 2150 | 1.65 | 1.66 | 6.65 | 6.65 | 18.03 | 17.93 | 19.25 | 19.07 | 18.46 | 18.48 |
| 2200 | 1.64 | 1.65 | 6.72 | 6.73 | 17.68 | 17.54 | 18.80 | 18.71 | 18.23 | 18.27 |
| 2250 | 1.64 | 1.64 | 6.79 | 6.78 | 17.41 | 17.17 | 18.32 | 18.28 | 17.99 | 18.00 |
| 2300 | 1.63 | 1.64 | 6.87 | 6.86 | 17.05 | 16.81 | 18.00 | 18.01 | 17.82 | 17.86 |
| 2350 | 1.63 | 1.62 | 6.96 | 6.94 | 16.69 | 16.45 | 17.70 | 17.70 | 17.70 | 17.77 |
| 2400 | 1.62 | 1.61 | 7.05 | 7.05 | 16.33 | 16.11 | 17.51 | 17.55 | 17.61 | 17.71 |
| 2450 | 1.59 | 1.58 | 7.17 | 7.16 | 16.08 | 15.73 | 17.36 | 17.42 | 17.59 | 17.64 |
| 2500 | 1.58 | 1.58 | 7.28 | 7.27 | 15.74 | 15.33 | 17.21 | 17.29 | 17.52 | 17.60 |
| 2550 | 1.56 | 1.55 | 7.42 | 7.38 | 15.43 | 15.06 | 17.12 | 17.21 | 17.54 | 17.63 |
| 2600 | 1.53 | 1.52 | 7.54 | 7.52 | 15.18 | 14.76 | 17.08 | 17.26 | 17.46 | 17.59 |
| 2700 | 1.49 | 1.47 | 7.86 | 7.81 | 14.51 | 14.02 | 17.27 | 17.40 | 17.67 | 17.86 |
| 2800 | 1.42 | 1.41 | 8.24 | 8.20 | 13.90 | 13.40 | 17.51 | 17.74 | 18.06 | 18.22 |
| 2900 | 1.34 | 1.33 | 8.68 | 8.64 | 13.22 | 12.77 | 17.99 | 18.27 | 18.50 | 18.78 |
| 3000 | 1.26 | 1.26 | 9.18 | 9.13 | 12.71 | 12.26 | 18.66 | 18.93 | 19.00 | 19.28 |
| 3250 | 1.05 | 1.05 | 11.05 | 10.98 | 10.68 | 10.36 | 20.78 | 20.94 | 20.78 | 21.13 |
| 3500 | 0.88 | 0.92 | 14.07 | 13.98 | 7.31 | 7.20 | 21.91 | 21.68 | 20.14 | 20.71 |
| 3750 | 0.80 | 0.83 | 19.88 | 19.41 | 0.59 | 0.21 | 19.53 | 19.50 | 17.56 | 18.01 |
| 4000 | 0.90 | 0.97 | 30.34 | 26.86 | 8.04 | 11.55 | 15.14 | 15.24 | 13.82 | 14.02 |
| 4250 | 1.17 | 1.26 | 20.75 | 20.26 | 2.41 | 3.18 | 11.72 | 11.78 | 10.93 | 10.94 |
| 4500 | 1.55 | 1.63 | 16.38 | 16.18 | 1.30 | 0.70 | 9.46 | 9.51 | 8.96 | 8.97 |
| 4750 | 1.86 | 1.94 | 14.17 | 14.17 | 3.12 | 2.62 | 8.28 | 8.36 | 8.06 | 7.94 |
| 5000 | 2.04 | 2.11 | 12.81 | 12.87 | 4.57 | 4.12 | 7.93 | 7.97 | 7.80 | 7.67 |
| 5250 | 2.10 | 2.16 | 11.65 | 11.73 | 5.94 | 5.57 | 8.33 | 8.36 | 8.16 | 8.09 |
| 5500 | 2.06 | 2.12 | 10.52 | 10.51 | 7.54 | 7.19 | 9.48 | 9.43 | 9.23 | 9.18 |
| 5750 | 2.02 | 2.05 | 9.39 | 9.38 | 9.31 | 9.17 | 11.34 | 11.34 | 11.15 | 11.34 |
| 6000 | 2.02 | 2.04 | 8.43 | 8.33 | 10.96 | 11.04 | 14.18 | 14.43 | 14.20 | 15.09 |

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Bi-Directional Coupler

BDCA-7-25+

Typical Performance Data

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

| 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 |
| 500 | 0.34 | 0.33 | 13.17 | 13.14 | 23.66 | 23.65 | 28.33 | 28.28 | 31.94 | 31.83 |
| 600 | 0.43 | 0.42 | 11.80 | 11.77 | 24.16 | 24.12 | 27.08 | 27.41 | 30.71 | 31.20 |
| 700 | 0.54 | 0.52 | 10.71 | 10.68 | 24.82 | 24.89 | 26.40 | 26.41 | 30.80 | 30.90 |
| 800 | 0.64 | 0.63 | 9.82 | 9.78 | 25.44 | 25.77 | 25.95 | 25.95 | 30.84 | 31.40 |
| 900 | 0.75 | 0.73 | 9.08 | 9.04 | 26.61 | 26.81 | 26.53 | 26.46 | 32.00 | 32.58 |
| 1000 | 0.85 | 0.84 | 8.47 | 8.42 | 27.21 | 27.87 | 26.65 | 26.42 | 34.86 | 35.61 |
| 1100 | 0.95 | 0.93 | 7.96 | 7.91 | 27.68 | 28.48 | 27.68 | 27.32 | 38.38 | 39.03 |
| 1150 | 1.00 | 0.99 | 7.73 | 7.68 | 27.95 | 28.67 | 28.47 | 28.22 | 40.09 | 40.81 |
| 1200 | 1.04 | 1.03 | 7.53 | 7.48 | 27.52 | 28.56 | 29.50 | 28.72 | 42.04 | 41.54 |
| 1250 | 1.09 | 1.08 | 7.34 | 7.29 | 27.07 | 28.26 | 31.50 | 29.82 | 42.62 | 40.14 |
| 1300 | 1.13 | 1.13 | 7.17 | 7.12 | 26.93 | 28.19 | 34.59 | 31.97 | 39.39 | 38.80 |
| 1350 | 1.17 | 1.17 | 7.03 | 6.97 | 26.58 | 27.54 | 36.94 | 33.20 | 36.54 | 36.01 |
| 1400 | 1.21 | 1.20 | 6.90 | 6.84 | 25.62 | 26.89 | 40.96 | 33.21 | 33.06 | 33.07 |
| 1450 | 1.25 | 1.25 | 6.78 | 6.72 | 25.25 | 26.20 | 41.25 | 34.01 | 30.34 | 30.47 |
| 1500 | 1.28 | 1.28 | 6.68 | 6.62 | 24.50 | 25.38 | 40.72 | 32.74 | 28.20 | 28.17 |
| 1550 | 1.31 | 1.32 | 6.59 | 6.53 | 23.75 | 24.51 | 37.41 | 30.38 | 26.78 | 26.16 |
| 1600 | 1.34 | 1.35 | 6.52 | 6.46 | 23.27 | 23.65 | 32.96 | 29.11 | 25.60 | 24.83 |
| 1650 | 1.37 | 1.38 | 6.46 | 6.40 | 22.92 | 22.99 | 29.96 | 27.70 | 24.68 | 24.05 |
| 1700 | 1.39 | 1.40 | 6.42 | 6.35 | 22.30 | 22.40 | 27.82 | 26.43 | 23.95 | 23.45 |
| 1750 | 1.41 | 1.42 | 6.38 | 6.31 | 21.83 | 22.05 | 26.70 | 25.51 | 23.14 | 22.81 |
| 1800 | 1.43 | 1.44 | 6.35 | 6.28 | 21.23 | 21.59 | 25.53 | 24.51 | 22.34 | 22.23 |
| 1850 | 1.44 | 1.46 | 6.34 | 6.27 | 20.65 | 21.06 | 24.47 | 23.57 | 21.59 | 21.55 |
| 1900 | 1.46 | 1.48 | 6.34 | 6.27 | 20.00 | 20.31 | 23.15 | 22.41 | 20.82 | 20.75 |
| 1950 | 1.47 | 1.48 | 6.36 | 6.28 | 19.78 | 19.76 | 22.20 | 21.67 | 20.44 | 20.23 |
| 2000 | 1.47 | 1.49 | 6.38 | 6.30 | 19.45 | 19.15 | 21.51 | 21.11 | 19.78 | 19.54 |
| 2050 | 1.48 | 1.50 | 6.42 | 6.34 | 18.81 | 18.41 | 20.61 | 20.21 | 19.06 | 18.77 |
| 2100 | 1.48 | 1.50 | 6.46 | 6.38 | 18.27 | 17.91 | 19.95 | 19.60 | 18.39 | 18.19 |
| 2150 | 1.48 | 1.50 | 6.52 | 6.42 | 17.79 | 17.60 | 19.35 | 19.02 | 18.14 | 17.98 |
| 2200 | 1.48 | 1.49 | 6.58 | 6.49 | 17.35 | 17.33 | 18.79 | 18.49 | 18.02 | 17.97 |
| 2250 | 1.47 | 1.47 | 6.64 | 6.54 | 17.31 | 17.01 | 18.31 | 18.16 | 17.97 | 17.84 |
| 2300 | 1.47 | 1.46 | 6.71 | 6.61 | 17.03 | 16.59 | 17.72 | 17.66 | 17.97 | 17.80 |
| 2350 | 1.46 | 1.45 | 6.79 | 6.69 | 16.68 | 16.20 | 17.28 | 17.25 | 17.89 | 17.74 |
| 2400 | 1.44 | 1.44 | 6.88 | 6.79 | 16.49 | 15.73 | 17.21 | 17.36 | 17.68 | 17.57 |
| 2450 | 1.43 | 1.41 | 7.00 | 6.88 | 16.19 | 15.33 | 17.03 | 17.17 | 17.53 | 17.39 |
| 2500 | 1.41 | 1.40 | 7.09 | 6.97 | 15.71 | 15.15 | 17.01 | 17.01 | 17.34 | 17.32 |
| 2550 | 1.38 | 1.37 | 7.22 | 7.08 | 15.53 | 14.97 | 17.28 | 17.26 | 17.56 | 17.51 |
| 2600 | 1.34 | 1.34 | 7.34 | 7.22 | 15.31 | 14.84 | 17.19 | 17.14 | 17.67 | 17.66 |
| 2700 | 1.29 | 1.28 | 7.61 | 7.48 | 14.92 | 14.13 | 17.32 | 17.48 | 17.68 | 17.54 |
| 2800 | 1.24 | 1.21 | 8.00 | 7.86 | 14.05 | 13.40 | 17.02 | 17.01 | 18.03 | 18.16 |
| 2900 | 1.14 | 1.14 | 8.42 | 8.27 | 13.28 | 12.78 | 17.76 | 18.00 | 18.27 | 18.47 |
| 3000 | 1.06 | 1.06 | 8.90 | 8.73 | 13.02 | 12.05 | 18.09 | 18.65 | 18.57 | 18.84 |
| 3250 | 0.83 | 0.84 | 10.68 | 10.51 | 10.94 | 10.56 | 20.93 | 20.99 | 21.11 | 21.36 |
| 3500 | 0.63 | 0.66 | 13.55 | 13.34 | 7.86 | 7.57 | 22.60 | 22.71 | 19.92 | 20.48 |
| 3750 | 0.55 | 0.58 | 19.06 | 18.64 | 1.17 | 0.90 | 19.65 | 19.55 | 17.43 | 17.92 |
| 4000 | 0.64 | 0.68 | 30.57 | 26.85 | 8.08 | 11.86 | 15.14 | 15.13 | 14.22 | 14.26 |
| 4250 | 0.87 | 0.93 | 21.37 | 20.82 | 3.09 | 3.90 | 11.93 | 11.76 | 11.34 | 11.13 |
| 4500 | 1.21 | 1.29 | 16.48 | 16.19 | 1.09 | 0.37 | 9.50 | 9.41 | 9.02 | 8.79 |
| 4750 | 1.49 | 1.56 | 14.13 | 13.95 | 3.04 | 2.59 | 8.41 | 8.26 | 8.02 | 7.88 |
| 5000 | 1.66 | 1.78 | 12.67 | 12.56 | 4.58 | 3.93 | 7.93 | 7.77 | 7.58 | 7.28 |
| 5250 | 1.73 | 1.86 | 11.50 | 11.39 | 5.91 | 5.51 | 8.22 | 7.99 | 7.71 | 7.50 |
| 5500 | 1.73 | 1.78 | 10.38 | 10.21 | 7.38 | 7.05 | 8.94 | 8.74 | 8.80 | 8.61 |
| 5750 | 1.68 | 1.74 | 9.33 | 9.13 | 8.92 | 8.63 | 10.52 | 10.31 | 10.18 | 10.13 |
| 6000 | 1.68 | 1.68 | 8.34 | 8.04 | 10.50 | 10.14 | 12.79 | 12.94 | 13.16 | 13.77 |

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Bi-Directional Coupler

BDCA-7-25+

Typical Performance Data

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

| FREQ. (MHz) | INSERTION LOSS (dB) | | COUPLING (dB) | | DIRECTIVITY (dB) | | RETURN LOSS (dB) | | | |
|----------------|------------------------|---------|------------------|---------|---------------------|---------|---------------------|-------|-------|-------|
| | IN-OUT | FWD-REV | IN-FWD | OUT-REV | IN-REV | OUT-FWD | IN | OUT | FWD | REV |
| 500 | 0.46 | 0.44 | 13.15 | 13.17 | 21.73 | 21.76 | 25.86 | 25.91 | 28.33 | 28.43 |
| 600 | 0.57 | 0.55 | 11.80 | 11.83 | 22.35 | 22.41 | 24.92 | 25.21 | 27.82 | 28.23 |
| 700 | 0.69 | 0.67 | 10.73 | 10.76 | 22.91 | 23.10 | 24.38 | 24.44 | 27.79 | 28.02 |
| 800 | 0.80 | 0.79 | 9.86 | 9.88 | 23.89 | 24.03 | 24.54 | 24.64 | 28.19 | 28.72 |
| 900 | 0.92 | 0.91 | 9.13 | 9.16 | 24.81 | 25.14 | 24.93 | 24.92 | 29.51 | 30.08 |
| 1000 | 1.04 | 1.02 | 8.53 | 8.57 | 25.85 | 26.54 | 26.03 | 25.86 | 31.77 | 32.48 |
| 1100 | 1.15 | 1.13 | 8.03 | 8.07 | 26.46 | 27.88 | 27.42 | 26.90 | 35.18 | 36.11 |
| 1150 | 1.20 | 1.19 | 7.82 | 7.85 | 26.72 | 28.49 | 28.20 | 27.47 | 37.58 | 38.34 |
| 1200 | 1.25 | 1.24 | 7.62 | 7.66 | 26.82 | 28.85 | 29.54 | 28.21 | 39.00 | 39.60 |
| 1250 | 1.30 | 1.30 | 7.44 | 7.48 | 26.93 | 28.79 | 30.99 | 29.18 | 38.06 | 38.88 |
| 1300 | 1.35 | 1.34 | 7.29 | 7.33 | 26.79 | 28.85 | 32.76 | 30.15 | 35.26 | 36.35 |
| 1350 | 1.39 | 1.39 | 7.15 | 7.19 | 26.60 | 28.43 | 35.37 | 31.28 | 32.93 | 33.43 |
| 1400 | 1.44 | 1.44 | 7.03 | 7.07 | 26.23 | 27.93 | 38.91 | 32.05 | 30.92 | 31.42 |
| 1450 | 1.48 | 1.48 | 6.92 | 6.96 | 25.94 | 27.14 | 40.53 | 32.23 | 29.53 | 29.44 |
| 1500 | 1.52 | 1.52 | 6.83 | 6.87 | 25.36 | 26.40 | 37.77 | 31.75 | 27.90 | 27.95 |
| 1550 | 1.56 | 1.56 | 6.74 | 6.79 | 24.83 | 25.89 | 34.81 | 30.44 | 26.81 | 26.80 |
| 1600 | 1.59 | 1.60 | 6.68 | 6.73 | 24.07 | 25.18 | 32.07 | 28.85 | 25.72 | 25.74 |
| 1650 | 1.62 | 1.63 | 6.63 | 6.68 | 23.55 | 24.37 | 29.77 | 27.60 | 24.55 | 24.62 |
| 1700 | 1.64 | 1.66 | 6.59 | 6.64 | 22.86 | 23.60 | 27.92 | 26.43 | 23.65 | 23.67 |
| 1750 | 1.67 | 1.69 | 6.57 | 6.62 | 22.41 | 23.09 | 26.53 | 25.41 | 22.97 | 22.98 |
| 1800 | 1.69 | 1.71 | 6.55 | 6.61 | 21.97 | 22.32 | 25.22 | 24.38 | 22.32 | 22.31 |
| 1850 | 1.71 | 1.73 | 6.55 | 6.61 | 21.45 | 21.65 | 24.04 | 23.41 | 21.61 | 21.60 |
| 1900 | 1.73 | 1.74 | 6.56 | 6.61 | 20.86 | 21.10 | 23.04 | 22.53 | 20.97 | 21.04 |
| 1950 | 1.74 | 1.76 | 6.58 | 6.63 | 20.48 | 20.65 | 22.26 | 21.80 | 20.58 | 20.67 |
| 2000 | 1.75 | 1.77 | 6.61 | 6.66 | 19.96 | 20.14 | 21.53 | 21.20 | 19.94 | 20.17 |
| 2050 | 1.76 | 1.77 | 6.65 | 6.70 | 19.62 | 19.60 | 20.88 | 20.71 | 19.61 | 19.78 |
| 2100 | 1.77 | 1.78 | 6.69 | 6.74 | 19.27 | 19.20 | 20.26 | 20.15 | 19.40 | 19.56 |
| 2150 | 1.76 | 1.78 | 6.76 | 6.80 | 18.91 | 18.73 | 19.73 | 19.73 | 19.26 | 19.35 |
| 2200 | 1.76 | 1.77 | 6.83 | 6.88 | 18.58 | 18.32 | 19.30 | 19.36 | 18.93 | 19.05 |
| 2250 | 1.76 | 1.76 | 6.90 | 6.95 | 18.13 | 17.96 | 18.89 | 18.92 | 18.59 | 18.75 |
| 2300 | 1.75 | 1.76 | 6.98 | 7.03 | 17.73 | 17.67 | 18.70 | 18.73 | 18.33 | 18.61 |
| 2350 | 1.75 | 1.75 | 7.08 | 7.13 | 17.27 | 17.36 | 18.47 | 18.50 | 18.22 | 18.52 |
| 2400 | 1.73 | 1.74 | 7.18 | 7.23 | 17.01 | 17.01 | 18.26 | 18.34 | 18.20 | 18.46 |
| 2450 | 1.72 | 1.72 | 7.32 | 7.35 | 16.70 | 16.51 | 18.02 | 18.16 | 18.27 | 18.43 |
| 2500 | 1.71 | 1.70 | 7.44 | 7.48 | 16.34 | 16.08 | 17.72 | 17.91 | 18.18 | 18.37 |
| 2550 | 1.70 | 1.68 | 7.60 | 7.63 | 15.92 | 15.59 | 17.50 | 17.77 | 18.15 | 18.33 |
| 2600 | 1.67 | 1.66 | 7.73 | 7.76 | 15.59 | 15.28 | 17.43 | 17.68 | 17.85 | 18.11 |
| 2700 | 1.62 | 1.62 | 8.07 | 8.08 | 14.79 | 14.62 | 17.69 | 17.83 | 18.00 | 18.44 |
| 2800 | 1.55 | 1.56 | 8.48 | 8.49 | 14.06 | 13.82 | 17.94 | 18.26 | 18.16 | 18.45 |
| 2900 | 1.48 | 1.49 | 8.96 | 8.97 | 13.39 | 13.12 | 18.36 | 18.64 | 18.62 | 19.05 |
| 3000 | 1.43 | 1.42 | 9.53 | 9.52 | 12.67 | 12.51 | 19.05 | 19.10 | 19.30 | 19.50 |
| 3250 | 1.23 | 1.24 | 11.46 | 11.45 | 10.45 | 10.25 | 20.23 | 20.21 | 19.97 | 20.28 |
| 3500 | 1.09 | 1.13 | 14.79 | 14.69 | 6.39 | 6.24 | 20.72 | 20.32 | 19.34 | 19.81 |
| 3750 | 1.03 | 1.08 | 20.81 | 20.30 | 0.21 | 0.77 | 18.46 | 18.46 | 16.85 | 17.30 |
| 4000 | 1.16 | 1.24 | 29.81 | 26.52 | 7.63 | 11.00 | 14.72 | 14.90 | 13.38 | 13.67 |
| 4250 | 1.45 | 1.55 | 20.28 | 19.80 | 1.75 | 2.56 | 11.42 | 11.74 | 10.61 | 10.80 |
| 4500 | 1.83 | 1.92 | 16.11 | 16.13 | 1.50 | 1.05 | 9.50 | 9.72 | 9.02 | 9.11 |
| 4750 | 2.15 | 2.25 | 14.08 | 14.27 | 3.20 | 2.79 | 8.34 | 8.53 | 8.10 | 8.07 |
| 5000 | 2.35 | 2.42 | 12.84 | 13.07 | 4.52 | 4.24 | 8.09 | 8.22 | 8.05 | 7.99 |
| 5250 | 2.42 | 2.48 | 11.77 | 11.95 | 5.95 | 5.61 | 8.57 | 8.67 | 8.47 | 8.46 |
| 5500 | 2.38 | 2.46 | 10.65 | 10.75 | 7.59 | 7.20 | 9.90 | 9.93 | 9.70 | 9.64 |
| 5750 | 2.36 | 2.36 | 9.49 | 9.60 | 9.35 | 9.15 | 11.93 | 11.97 | 12.15 | 12.18 |
| 6000 | 2.36 | 2.38 | 8.55 | 8.61 | 10.83 | 11.35 | 15.43 | 15.48 | 15.52 | 16.40 |

REV. X1

BDCA-7-25+

081006

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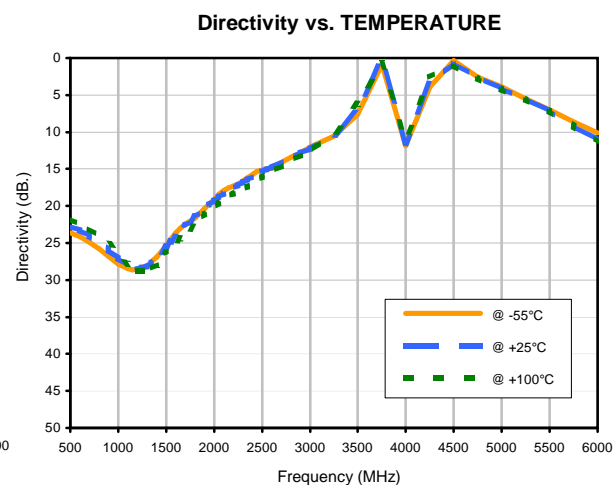
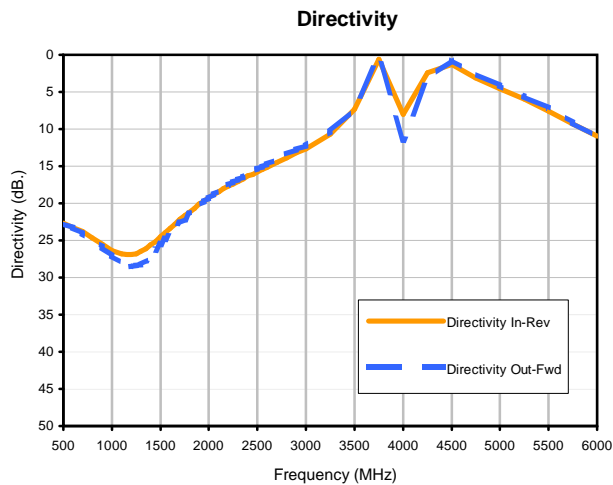
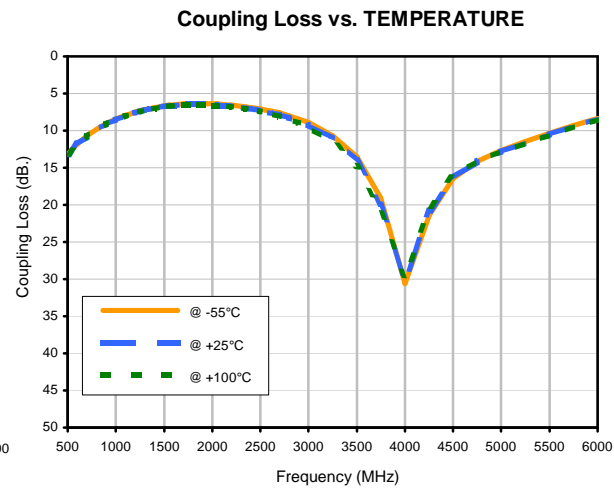
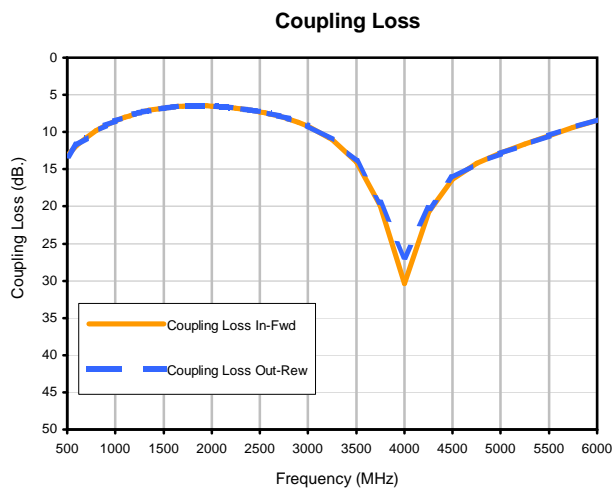
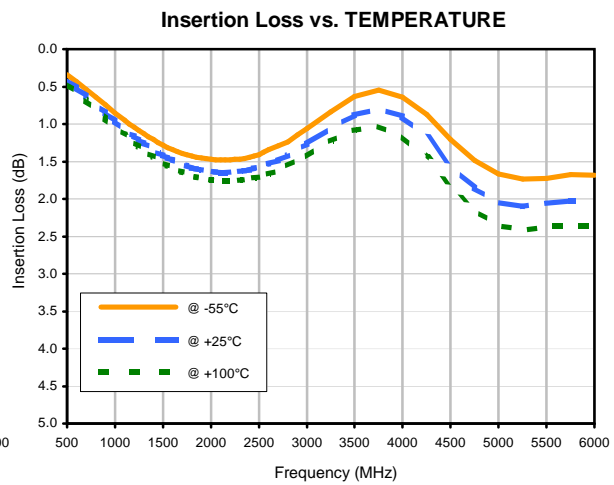
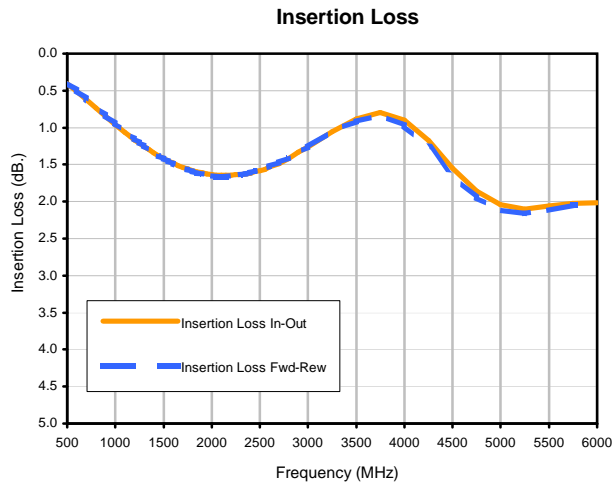
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Bi-Directional Coupler

BDCA-7-25+

Typical Performance Curves



REV. X1
BDCA-7-25+
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Page 1 of 2



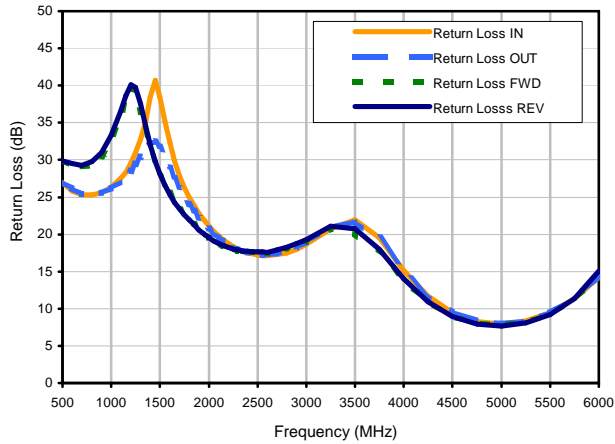
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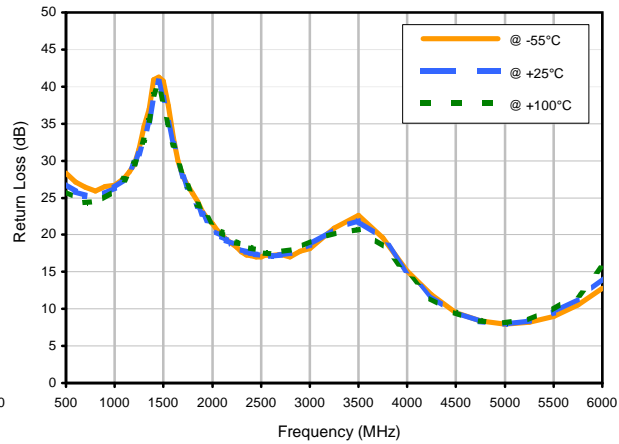
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Typical Performance Curves

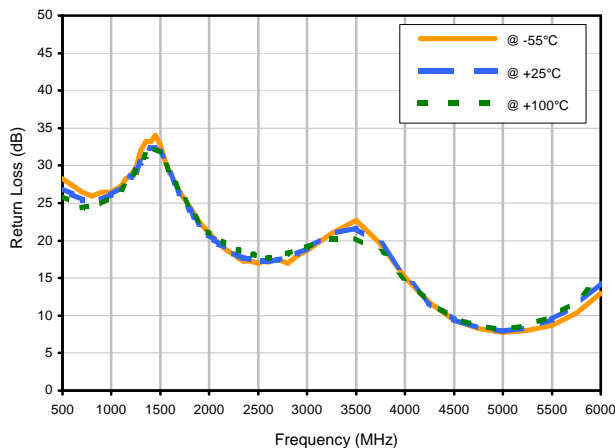
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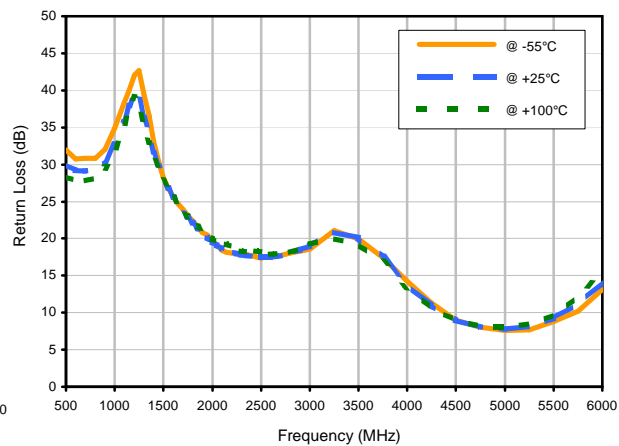
Return Loss In vs. TEMPERATURE



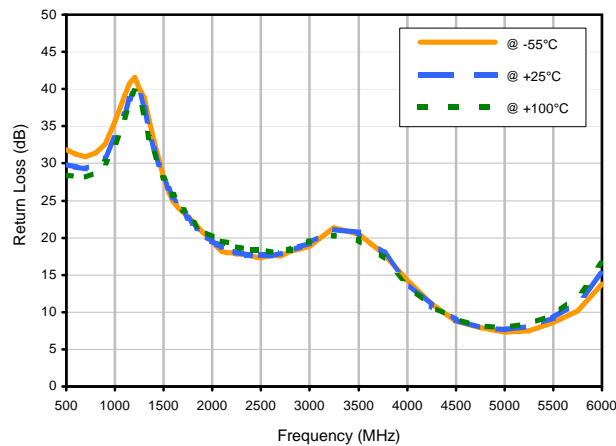
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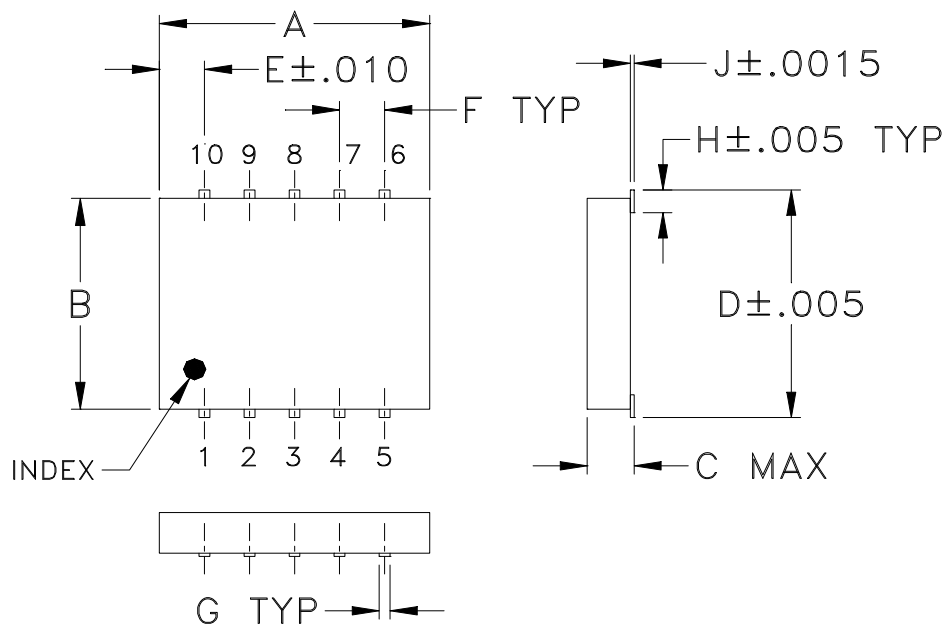
Return Loss Fwd vs. TEMPERATURE



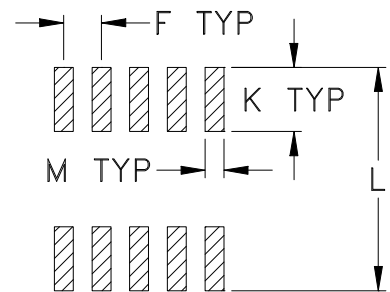
Return Loss Rev vs. TEMPERATURE



Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within $\pm.002$

| CASE# | A | B | C | D | E | F | G | H | J | K | L | M | WT. GRAMS |
|-------|---------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|--------------|
| DZ944 | .30 (7.62) | .250 (6.35) | .052 (1.32) | .266 (6.76) | .050 (1.27) | .050 (1.27) | .012 (0.30) | .029 (0.74) | .004 (0.10) | .085 (2.16) | .296 (7.52) | .030 (0.76) | 0.25 |

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

Notes:

- Case material: Ceramic.
- Termination finish:
 - For RoHS Case Styles: Tin plate. All models, (+) suffix.
 - For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

Tape & Reel Packaging TR-F34



| Tape Width, mm | Device Cavity Pitch, mm | Reel Size, inches | Devices per Reel see note | |
|----------------|-------------------------|-------------------|------------------------------------|------|
| 16 | 12 | 7 | Small quantity standard (see note) | 20 |
| | | | | 50 |
| | | | Standard | 100 |
| | | | | 200 |
| | | 13 | Standard | 500 |
| | | | | 1000 |

Note: Availability of small reel quantity 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



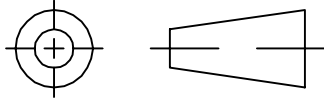
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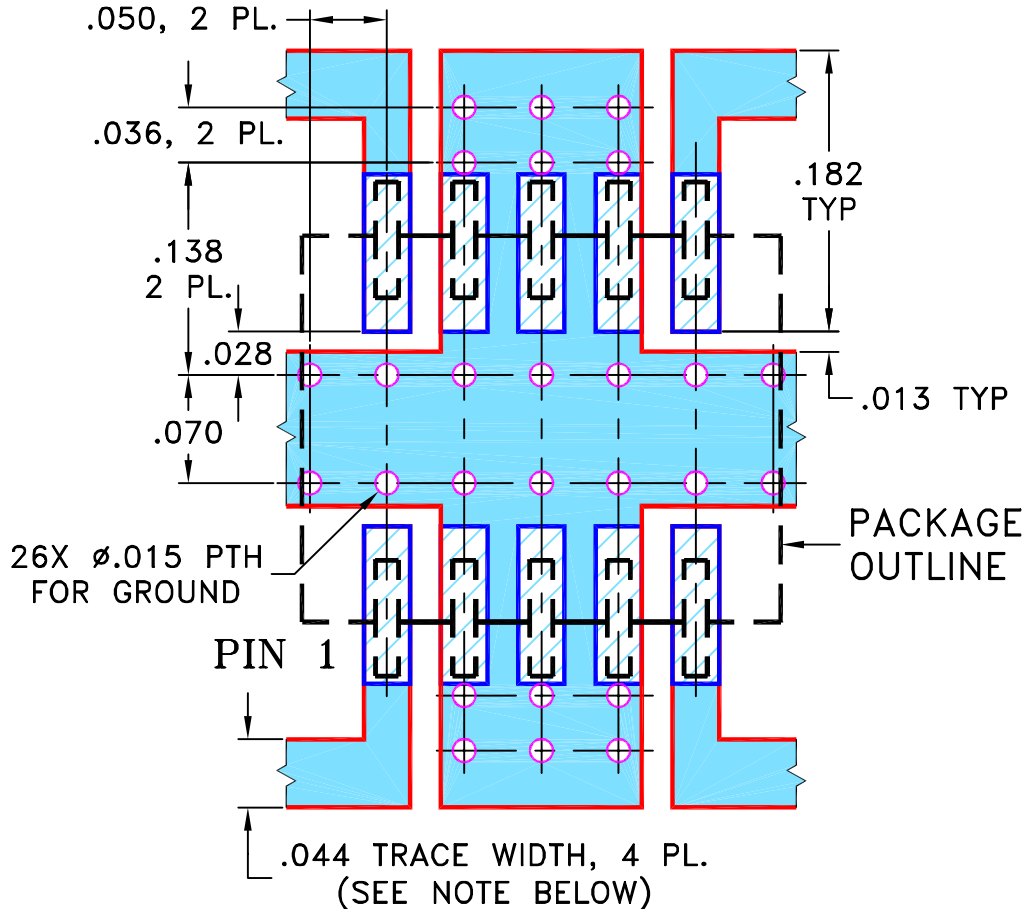
THIRD ANGLE PROJECTION



REVISIONS

| REV | ECN No. | DESCRIPTION | DATE | DR | AUTH |
|-----|---------|---|----------|-----|------|
| A | M82377 | UPDATED DRAWING | 07/31/02 | AV | DB |
| B | M101085 | UPDATED DRAWING, ADDED DZ944 CASE STYLE & NOTE 2 | 10/06/05 | MMG | HY |
| C | M102713 | UPDATED NOTES | 01/10/06 | MMG | ABD |

**SUGGESTED MOUNTING CONFIGURATION FOR
SM1L/SM33/DZ944 CASE STYLES, "lf/nl" PIN CONNECTIONS**



- NOTE: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS $.020 \pm .0015$; 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 | MMG | 04/12/00 |
| TOLERANCES ON: | WP | 04/27/00 |
| 2 PL DECIMALS \pm | DB | 04/27/00 |
| 3 PL DECIMALS \pm .005 | | |
| ANGLES \pm | | |
| FRACTIONS \pm | | |

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Brooklyn NY 11235

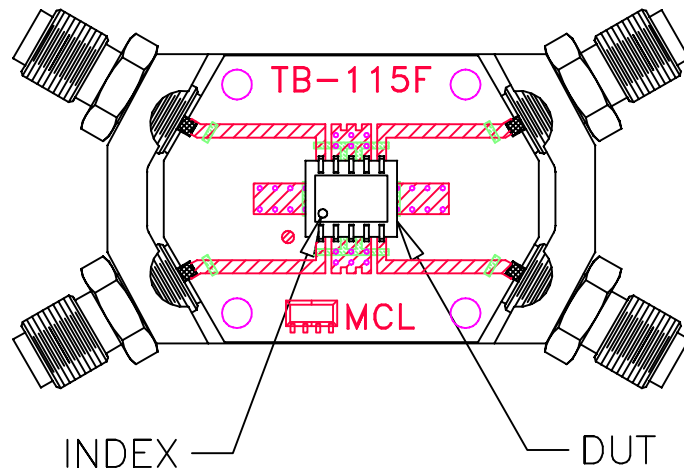
PL, lf/nl, SM1L/SM33/DZ944, BDCA/QBA, TB-115

| | | | |
|---------------|---------------------|--------------------------|-----------|
| SIZE A | CODE IDENT 15542 | DRAWING NO: 98-PL-004 | REV: C |
| FILE: 98PL004 | SCALE: 8:1 | SHEET: 1 OF 1 | |

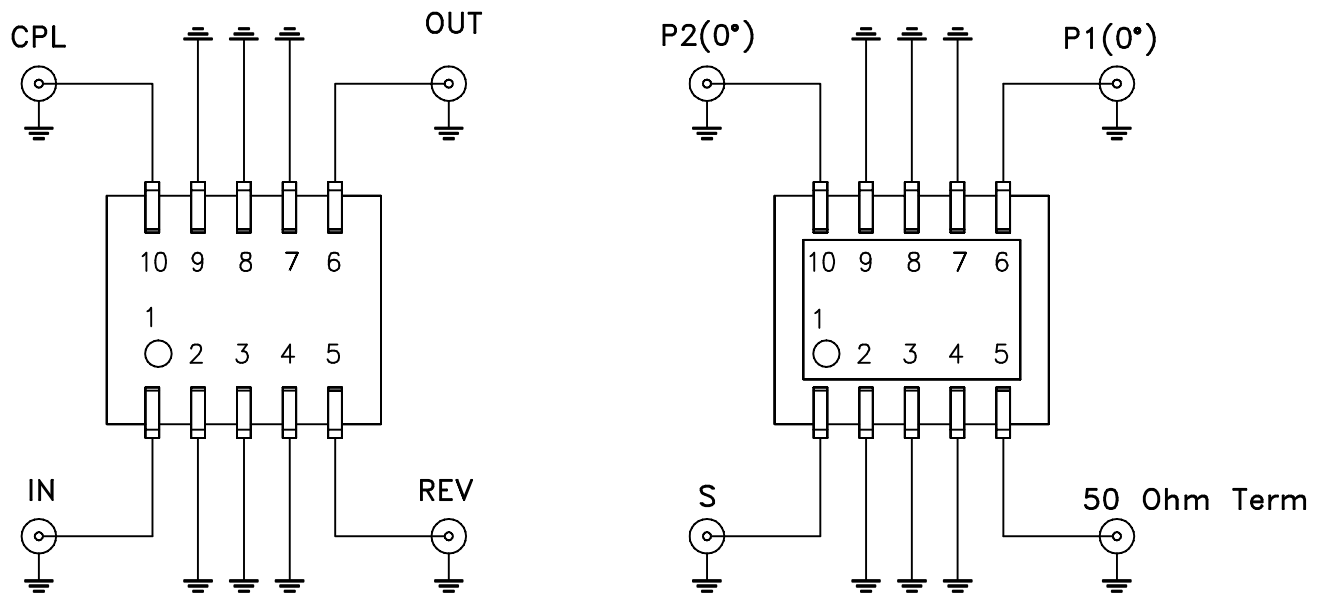
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ASHEETA1.DWG REV:A DATE:01/12/95

Evaluation Board and Circuit



TB-115+



BDCA MODELS

QBA MODELS

SCHEMATIC DIAGRAM

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent, Dielectric Constant=3.5, Thickness=.020 inch.



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 |
| 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 |