

Surface Mount Directional Coupler

D17W+

50Ω 16-26 dB 700 to 3500 MHz

The Big Deal

- Excellent Power Handling, 4W
- Wide Bandwidth, 700-3500 MHz
- Small Size, 3.1 x 3.0 x 1.6mm



CASE STYLE: CA531

Product Overview

Mini-Circuits D17W+ is a MMIC Directional Coupler designed for applications from 700 to 3500 MHz. This model provides excellent power handling up to 4W in a tiny device package (3.1 x 3.0 x 1.6 mm). A built-in 50Ω termination on the isolated port simplifies circuit design and reduces component count. Manufactured using Silicon IPD technology, this model provides a high level of ESD protection and excellent reliability.

Key Features

| Feature | Advantages |
|---|---|
| Wide bandwidth 700-3500 MHz | Allows a single component to be used in multiple narrowband applications reducing component count. |
| Low insertion loss, 0.2 - 0.6 dB including coupling loss | Can be used for sampling power amplifier output with minimal loss. |
| Excellent power handling; 4W (IN-OUT) | Ideal for sampling transmitter output power. |
| Good directivity, 14 dB typ. | Good directivity minimizes coupling of reverse power and enables accurate sampling of the thru-signal. |
| High operating temperature -40 to 105°C | Operation up to 105°C allows the Coupler to be used near power amplifiers with minimal change in performance. |
| Excellent ESD Class 1B (500 to <1000V)-HBM Class M3 (200 to <400V)-MM | Rugged ESD design prevents ESD related failures. |

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Features

- Excellent VSWR, 1.25:1 typ. at input / output
- Miniature low profile package
- Aqueous washable

Applications

- WLAN
- WMAX
- Aeronautical



Generic photo used for illustration purposes only

CASE STYLE: CA531

+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 |

Electrical Specifications at 25°C

| Parameter | Condition (MHz) | Min. | Typ. | Max. | Unit |
|--|-----------------|------|-------|------|------|
| Frequency Range | | 700 | | 3500 | MHz |
| Mainline Loss ¹ | 700 - 1000 | — | 0.2 | 0.5 | dB |
| | 1000 - 2000 | — | 0.3 | 0.6 | |
| | 2000 - 2600 | — | 0.4 | 0.7 | |
| | 2600 - 3500 | — | 0.6 | 0.9 | |
| Nominal Coupling | 700 - 1000 | — | 25.9 | — | dB |
| | 1000 - 1400 | — | 22.9 | — | |
| | 1400 - 1700 | 18.9 | 20.7 | 22.4 | |
| | 1700 - 2000 | 17.9 | 19.3 | 20.8 | |
| | 2000 - 2300 | — | 18.1 | — | |
| | 2300 - 2600 | 15.9 | 17.1 | 18.3 | |
| Coupling Flatness(±) | 1400 - 1700 | — | 0.8 | — | dB |
| | 1700 - 2000 | — | 0.7 | — | |
| | 2300 - 2600 | — | 0.5 | — | |
| Directivity | 700 - 2000 | 13 | 16 | — | dB |
| | 2000 - 2300 | 11 | 15 | — | |
| | 2300 - 2600 | 9 | 14 | — | |
| | 2600 - 3500 | — | 11 | — | |
| Return Loss (Input) | 700 - 3500 | — | 19 | — | dB |
| Return Loss (Output) | 700 - 3500 | — | 19 | — | dB |
| Return Loss (Coupling) | 700 - 3500 | — | 13-18 | — | dB |
| Input Power ² | 700 - 3500 | — | — | 4.0 | W |
| Power at Internal Termination ³ | 700 - 3500 | — | — | 23 | dBm |

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

2. 4Watt at 85°C. Derate linearly to 3W at 105°C ground lead temperature.

3. 23 dBm to 85°C. Derate linearly to +22dBm at 105°C.

Maximum Ratings⁴

| Parameter | Ratings |
|------------------------------------|----------------|
| Operating Temperature ⁵ | -40°C to 105°C |
| Storage Temperature | -65°C to 150°C |

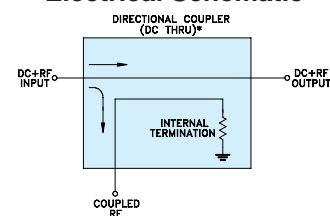
4. Permanent damage may occur if any of these limits are exceeded.

5. Ground lead temperature

Pin Connections

| Function | Pin Number |
|----------|------------|
| INPUT | 4 |
| OUTPUT | 6 |
| COUPLED | 3 |
| GROUND | 1,2,5 |

Electrical Schematic



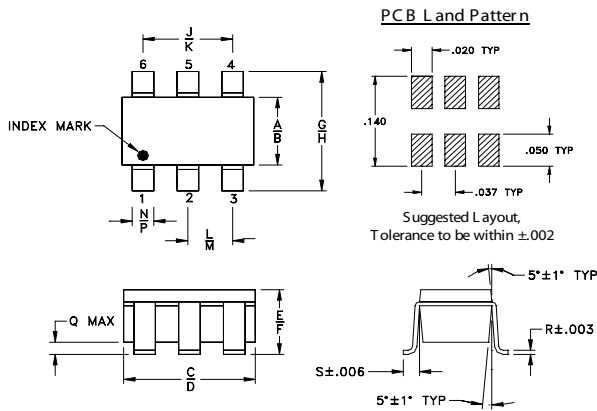
* ESD rating

Human body model (HBM): Class 1B(500 to <1000 V) in accordance with ANSI/ESD 5.1-2007

Machine model (MM): Class M3 (200 to <400 V) in accordance with ANSI/ESD SMT 5.2 1999



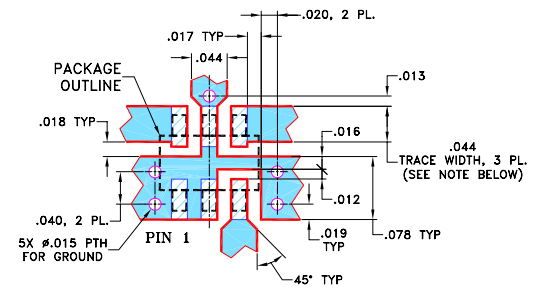
Outline Drawing



Outline Dimensions (inch/mm)

| A | B | C | D | E | F | G | H | J |
|------|------|------|------|------|------|------|------|-------|
| .052 | .067 | .106 | .122 | .035 | .064 | .087 | .118 | .067 |
| 1.32 | 1.70 | 2.69 | 3.10 | 0.89 | 1.63 | 2.21 | 3.00 | 1.70 |
| K | L | M | N | P | Q | R | S | wt |
| .083 | .033 | .042 | .012 | .020 | .012 | .006 | .018 | grams |
| 2.11 | 0.84 | 1.07 | 0.30 | 0.51 | 0.30 | 0.15 | 0.46 | 0.020 |

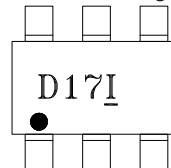
Demo Board MCL P/N: TB-396+ Suggested PCB Layout (PL-270)



- 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

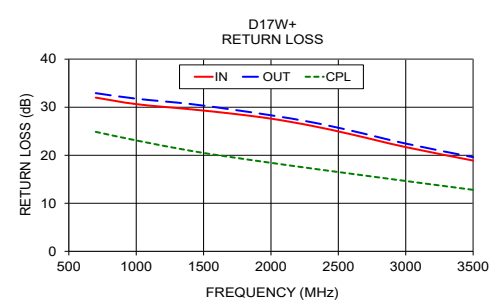
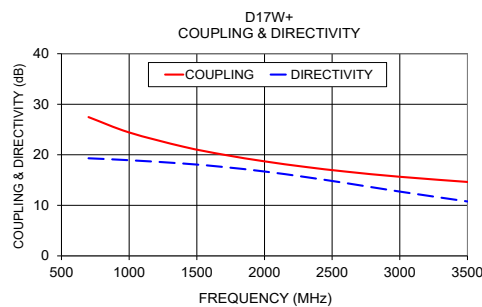
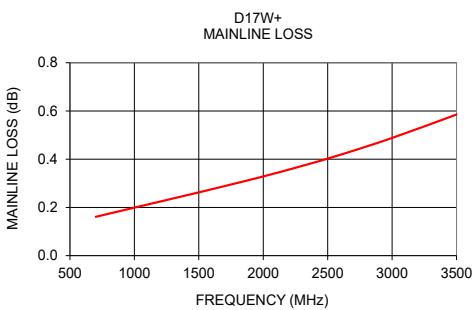
Product Marking



← Family marking

Typical Performance Data

| Frequency (MHz) | Mainline Loss (dB) In-Out | Coupling (dB) In-Cpl | Directivity (dB) | Return Loss (dB) | | |
|-----------------|---------------------------|----------------------|------------------|------------------|-------|-------|
| | | | | In | Out | Cpl |
| 700 | 0.16 | 27.45 | 19.31 | 31.99 | 32.92 | 24.86 |
| 1000 | 0.20 | 24.42 | 18.93 | 30.64 | 31.77 | 23.08 |
| 1400 | 0.25 | 21.61 | 18.27 | 29.57 | 30.67 | 20.94 |
| 1700 | 0.29 | 20.01 | 17.58 | 28.69 | 29.55 | 19.63 |
| 2000 | 0.33 | 18.71 | 16.70 | 27.62 | 28.31 | 18.42 |
| 2300 | 0.37 | 17.61 | 15.61 | 26.14 | 26.88 | 17.26 |
| 2600 | 0.42 | 16.68 | 14.41 | 24.32 | 25.09 | 16.13 |
| 3000 | 0.49 | 15.65 | 12.72 | 21.69 | 22.43 | 14.64 |
| 3500 | 0.59 | 14.63 | 10.77 | 18.89 | 19.60 | 12.80 |



Additional Notes

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- 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