

Surface Mount ^{top hat} Directional Coupler

RDC-20-232-75X+

75Ω 20dB 5 to 2350 MHz

The Big Deal

- Wideband 5-2350 MHz
- Low mainline loss, 0.8 dB typ. at 1800 MHz
- Good Directivity, 16 dB typ. at 1800 MHz
- Excellent Return Loss, 27 dB typ.
- Supports DOCSIS® 3.1 / 4.0 Systems



CASE STYLE: TT2315

Product Overview

Mini-Circuits RDC-20-232-75X+ surface-mount directional coupler provides 20 dB coupling with high directivity, low mainline loss, and good return loss for 75Ω applications from 5 to 2350 MHz, supporting a variety of broadband applications including DOCSIS 3.1/4.0 systems and equipment. This model features core and wire construction with wrap-around terminations for good solderability and easy visual inspection.

Key Features

| Feature | Advantages |
|---------------------------------------|---|
| Broadband, 5 to 2350 MHz | Supports bandwidth requirements for DOCSIS 3.1/4.0 systems and equipment. |
| Low mainline loss, 0.8 dB at 1800 MHz | Provides excellent through-path signal transmission and maintains low heat dissipation, avoiding the need for special heat sinking methods. |
| Power handling, up to 1W | Usable in systems with a variety of signal power requirements. |
| Excellent return loss, 27 dB typ. | Provides excellent matching for 75Ω systems. |
| Top Hat® feature | Improves speed and accuracy of pick and place assembly. |

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Features

- wideband, 5-2350 MHz
- excellent return loss, 27 dB typ.
- low mainline loss, 0.8 dB typ. at 1800 MHz
- good directivity 16 dB typ. at 1800 MHz
- aqueous washable

Applications

- DOCSIS 3.1 / 4.0
- L-Band



Generic photo used for illustration purposes only

CASE STYLE: TT2315

+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. | Unit |
|----------------------------|-----------------|------|----------|------|------|
| Frequency Range | | 5 | | 2350 | MHz |
| Mainline Loss ¹ | 5 | — | 0.95 | 1.3 | dB |
| | 40 | — | 0.55 | 0.9 | |
| | 1218 | — | 0.65 | 1.0 | |
| | 1800 | — | 0.85 | 1.1 | |
| Nominal Coupling | 5-1218 | — | 21±1.5 | — | dB |
| | 40-1800 | — | 20.5±1.0 | — | |
| | 40-2350 | — | 20.2±1.3 | — | |
| Coupling Flatness (±) | 5-1218 | — | 1.2 | 1.9 | dB |
| | 40-1800 | — | 1.0 | 2.0 | |
| | 40-2350 | — | 1.0 | 2.4 | |
| Directivity | 5 | 8 | 11 | — | dB |
| | 40 | 18 | 22 | — | |
| | 1218 | 15 | 22 | — | |
| | 1800 | 10 | 16 | — | |
| Return Loss (Input) | 5-40 | 10 | 14 | — | dB |
| | 40-1800 | 14 | 26 | — | |
| | 1800-2350 | 12 | 20 | — | |
| Return Loss (Output) | 5-40 | 11 | 14 | — | dB |
| | 40-1800 | 19 | 24 | — | |
| | 1800-2350 | 15 | 22 | — | |
| Return Loss (Coupling) | 5-40 | 10 | 20 | — | dB |
| | 40-1800 | 12 | 26 | — | |
| | 1800-2350 | 10 | 24 | — | |
| Input Power | 5 - 2350 | — | — | 1 | W |

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

Maximum Ratings

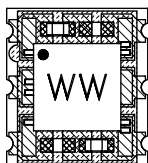
| Parameter | Ratings |
|-----------------------|----------------|
| Operating Temperature | -40°C to 85°C |
| Storage Temperature | -55°C to 100°C |

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

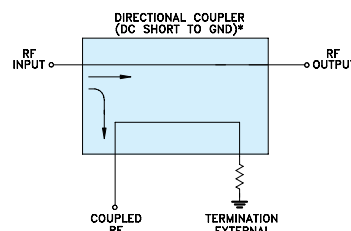
Pin Connections

| Function | Pin Number |
|----------------------|------------|
| INPUT | 1 |
| OUTPUT | 6 |
| COUPLED | 3 |
| GROUND | 2 |
| 75Ω TERM EXTERNAL | 4 |
| ISOLATE (DO NOT USE) | 5 |

Product Marking

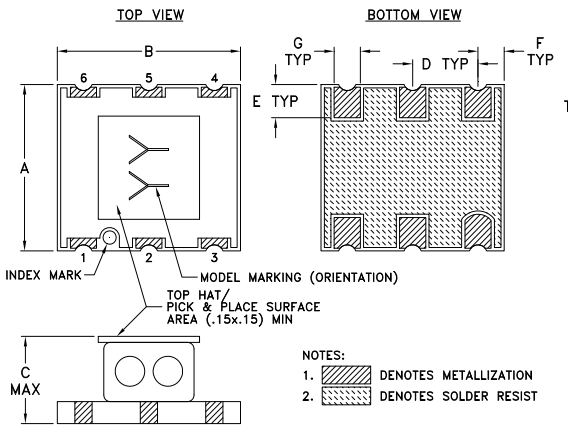


Electrical Schematic



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

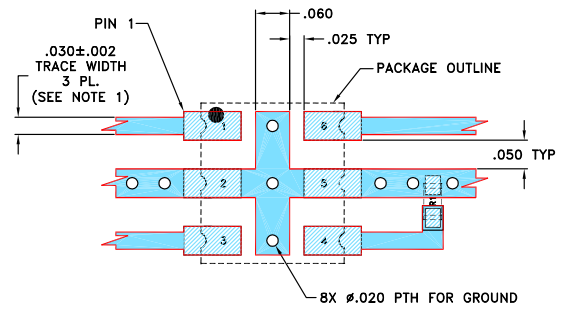
Outline Drawing



Outline Dimensions (inch/mm)

| A | B | C | D | E | F |
|------|------|------|------|-------|------|
| .250 | .280 | .140 | .100 | .050 | .040 |
| 6.35 | 7.11 | 3.56 | 2.54 | 1.27 | 1.02 |
| G | H | J | K | wt. | |
| .040 | .100 | .310 | .050 | grams | |
| 1.02 | 2.54 | 7.87 | 1.27 | 0.35 | |

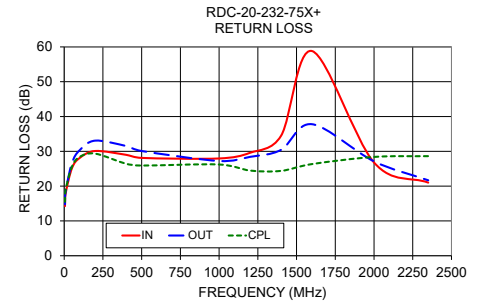
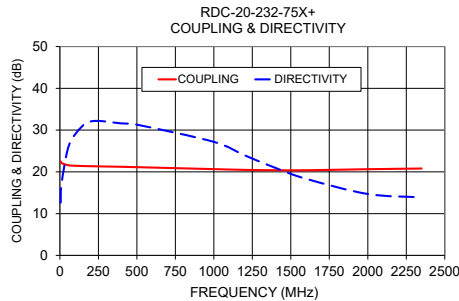
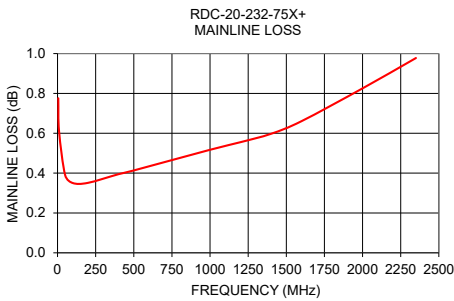
Demo Board MCL P/N: TB-917+ Suggested PCB Layout (PL-452)



- NOTES:**
- TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
 - 0603 SIZE CHIP RESISTOR FOOT PRINT SHOWN FOR REFERENCE. FOR RESISTOR VALUE REFER TO TB-917+.
 - 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

Typical Performance Data

| Frequency (MHz) | Mainline Loss (dB) In-Out | Coupling (dB) In-Cpl | Directivity (dB) | Return Loss (dB) | | |
|-----------------|---------------------------|----------------------|------------------|------------------|-------|-------|
| | | | | In | Out | Cpl |
| 5 | 0.78 | 22.51 | 12.63 | 14.26 | 14.78 | 15.48 |
| 10 | 0.61 | 22.13 | 16.96 | 18.04 | 18.71 | 19.06 |
| 50 | 0.39 | 21.61 | 25.27 | 25.14 | 26.62 | 25.59 |
| 100 | 0.35 | 21.46 | 29.03 | 28.09 | 30.33 | 28.41 |
| 200 | 0.35 | 21.35 | 32.08 | 30.10 | 33.07 | 29.34 |
| 400 | 0.39 | 21.21 | 31.60 | 28.99 | 31.52 | 26.42 |
| 500 | 0.41 | 21.12 | 31.30 | 28.11 | 30.09 | 25.91 |
| 1000 | 0.52 | 20.65 | 27.18 | 27.95 | 27.23 | 26.22 |
| 1200 | 0.56 | 20.48 | 23.96 | 29.58 | 28.41 | 24.47 |
| 1400 | 0.60 | 20.39 | 20.95 | 34.48 | 30.42 | 24.38 |
| 1600 | 0.66 | 20.38 | 18.33 | 58.81 | 37.79 | 26.34 |
| 2000 | 0.83 | 20.63 | 14.70 | 26.78 | 27.12 | 28.39 |
| 2350 | 0.98 | 20.80 | 13.88 | 21.01 | 21.68 | 28.61 |



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