

# Surface Mount Directional Coupler

75Ω 16.5 dB 5 to 1218 MHz

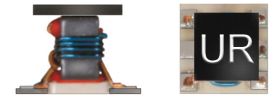
## TCD-16-12W-75X+

### Features

- wideband, 5 to 1218 MHz
- low mainline loss, 0.7 dB typ.
- aqueous washable
- leads for excellent solderability
- protected by US Patent 6,140,887

### Applications

- DOCSIS® 3.1 Systems
- VHF/UHF
- CATV
- cellular



CASE STYLE: DB1627

#### +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 |  |
| 13"                                      | 1000, 2000            |  |

### Electrical Specifications at 25°C

| Parameter                                | Condition (MHz) | Min. | Typ.     | Max. | Unit |
|--|-----------------|------|----------|------|------|
| Frequency Range                          |                 | 5    |          | 1218 | MHz  |
| Mainline Loss (above theoretical 0.1 dB) | 5 - 50          | —    | 0.65     | 0.9  | dB   |
|  | 50 - 870        | —    | 0.5      | 0.8  |      |
|  | 870 - 1218      | —    | 0.70     | 1.0  |      |
| Nominal Coupling                         | 5 - 1218        | —    | 16.0±0.5 | —    | dB   |
| Coupling Flatness(±)                     | 5 - 1218        | —    | 0.8      | 1.2  | dB   |
| Directivity                              | 5 - 50          | 25   | 35       | —    | dB   |
|  | 50 - 870        | 11   | 16       | —    |      |
|  | 870 - 1218      | 8    | 12       | —    |      |
| Return Loss (Input)                      | 5 - 50          | 18   | 22       | —    | dB   |
|  | 50 - 870        | 14   | 18       | —    |      |
|  | 870 - 1218      | 16   | 19       | —    |      |
| Return Loss (Output)                     | 5 - 50          | 20   | 25       | —    | dB   |
|  | 50 - 870        | 17   | 19       | —    |      |
|  | 870 - 1218      | 18   | 22       | —    |      |
| Return Loss (Coupling)                   | 5 - 50          | 18   | 22       | —    | dB   |
|  | 50 - 870        | 15   | 17       | —    |      |
|  | 870 - 1218      | 14   | 16       | —    |      |
| Input Power                              | 5 - 1218        | —    | —        | 1.0  | W    |

### Maximum Ratings

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

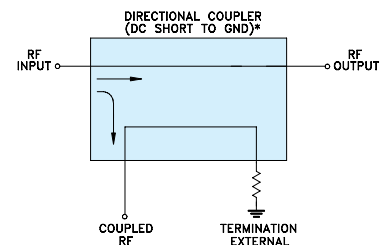
Permanent damage may occur if any of these limits are exceeded.

\* Case temperature is defined as temperature on ground leads.

### Pin Connections

| Function          | Pin Number |
|-------------------|------------|
| INPUT             | 3          |
| OUTPUT            | 4          |
| COUPLED           | 1          |
| GROUND            | 2          |
| 75Ω TERM EXTERNAL | 6          |
| NOT USED          | 5          |

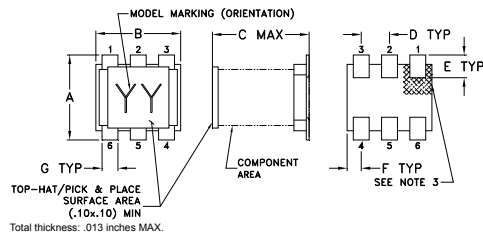
### Electrical Schematic



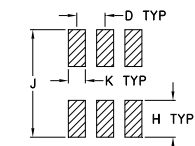
\* ELECTRICAL SCHEMATIC IS FOR DIRECTIONAL COUPLER WITH INTERNAL TRANSFORMER(S) AND EXTERNAL TERMINATION.

# TCD-16-12W-75X+

## Outline Drawing



### PCB Land Pattern

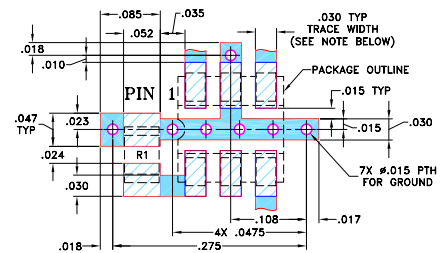


Suggested Layout,  
Tolerance to be within .002

### Outline Dimensions (inch)

| A    | B    | C    | D    | E     | F    |
|------|------|------|------|-------|------|
| .160 | .150 | .160 | .050 | .040  | .025 |
| 4.06 | 3.81 | 4.06 | 1.27 | 1.02  | 0.64 |
| G    | H    | J    | K    | wt    |      |
| .028 | .065 | .190 | .030 | grams |      |
| 0.71 | 1.65 | 4.83 | 0.76 | 0.15  |      |

## Demo Board MCL P/N: TB-72 Suggested PCB Layout (PL-010)



RESISTOR R1: 75  $\pm$  1% Ohm, 0805 SIZE

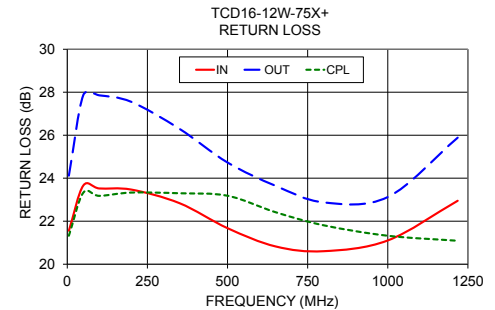
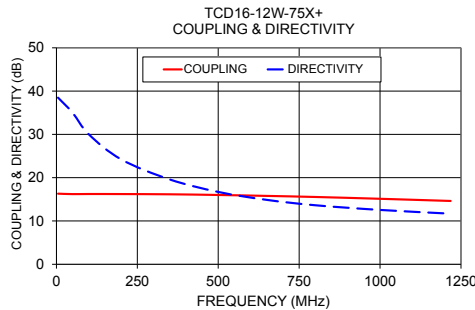
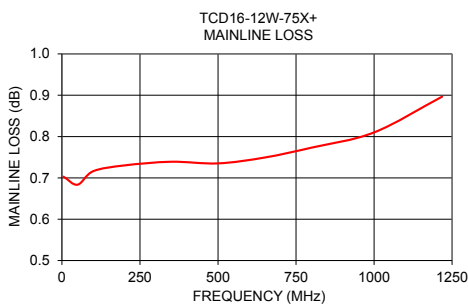
NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS 0.030"  $\pm$  0.002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.

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

## Typical Performance Data

| Frequency (MHz) | Mainline Loss (dB) In-Out | Coupling (dB) In-Cpl | Directivity (dB) | In    | Return Loss (dB) Out | Cpl   |
|-----------------|---------------------------|----------------------|------------------|-------|----------------------|-------|
| 5               | 0.70                      | 16.30                | 38.48            | 21.56 | 24.12                | 21.32 |
| 50              | 0.68                      | 16.20                | 34.99            | 23.66 | 27.86                | 23.32 |
| 100             | 0.72                      | 16.23                | 30.01            | 23.52 | 27.85                | 23.18 |
| 200             | 0.73                      | 16.21                | 24.23            | 23.47 | 27.55                | 23.33 |
| 350             | 0.74                      | 16.16                | 19.59            | 22.84 | 26.30                | 23.30 |
| 500             | 0.74                      | 16.00                | 16.71            | 21.68 | 24.73                | 23.18 |
| 650             | 0.75                      | 15.79                | 14.87            | 20.83 | 23.65                | 22.42 |
| 800             | 0.77                      | 15.54                | 13.63            | 20.61 | 22.88                | 21.81 |
| 1000            | 0.81                      | 15.12                | 12.55            | 21.11 | 23.12                | 21.32 |
| 1218            | 0.90                      | 14.62                | 11.68            | 22.95 | 25.89                | 21.09 |



## 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.
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