



Mini-Circuits®

SURFACE MOUNT 

# Directional Coupler

**DBTC-13-4X+****50Ω    13 dB    5 to 1000 MHz**

## FEATURES

- Very Flat Coupling
- Very Broadband, Multi Octave
- Temperature Stable, LTCC Base
- All Welded Construction
- Leads Attached for Better Solderability
- Micro Miniature Coupler
- Aqueous Washable
- Protected by US Patents 6,140,887 & 6,784,521

*Generic photo used for illustration purposes only*

CASE STYLE: AT1667-1

**+RoHS Compliant**The +Suffix identifies RoHS Compliance.  
See our website for methodologies and qualifications

## APPLICATIONS

- VHF/UHF Receivers/Transmitters
- Cellular

## ELECTRICAL SPECIFICATIONS AT +25°C

| Parameter                  | Condition (MHz) | Min. | Typ.     | Max. | Unit |
|----------------------------|-----------------|------|----------|------|------|
| Frequency Range            |                 | 5    |          | 1000 | MHz  |
| Mainline Loss <sup>1</sup> | 5-50            |      | 0.7      | 1.3  | dB   |
|                            | 50-500          |      | 0.7      | 1.3  |      |
|                            | 500-1000        |      | 1.1      | 1.6  |      |
| Nominal Coupling           | 5-1000          |      | 13.0±0.5 |      | dB   |
| Coupling Flatness          | 5-1000          |      |          | ±0.6 | dB   |
| Directivity                | 5-50            | 17   | 21       |      | dB   |
|                            | 50-500          | 13   | 18       |      |      |
|                            | 500-1000        |      | 13       |      |      |
| VSWR <sup>2</sup>          | 5-1000          |      | 1.2      |      | :1   |
| Input Power                | 5-50            |      |          | 0.5  | W    |
|                            | 50-500          |      |          | 1.0  |      |
|                            | 500-1000        |      |          | 1.0  |      |

1. Includes theoretical coupled power loss of 0.22 dB at 13 dB coupling.

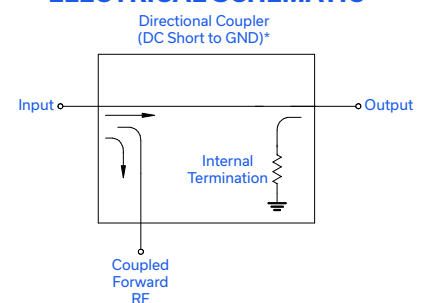
2. For coupled port VSWR above 500 MHz, 1.4:1 typ.

## ABSOLUTE 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.

## ELECTRICAL SCHEMATIC



\* Electrical schematic is for directional coupler with internal transformer(s) that routes DC from RF ports to ground.

 Mini-Circuits®

www.minicircuits.com P.O. Box 350166, Brooklyn, NY 11235-0003 (718) 934-4500 sales@minicircuits.com

REV. B  
ECO-027378  
DBTC-13-4X+  
MCL NY  
251017  
PAGE 1 OF 3



Mini-Circuits

SURFACE MOUNT 

## Directional Coupler

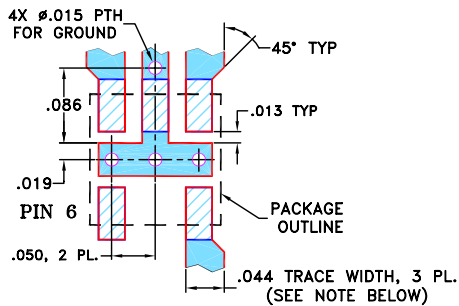
DBTC-13-4X+

50Ω 13 dB 5 to 1000 MHz

## PIN CONNECTIONS

|                      |   |
|----------------------|---|
| INPUT                | 3 |
| OUTPUT               | 4 |
| COUPLED              | 1 |
| GROUND               | 2 |
| ISOLATE (DO NOT USE) | 6 |

PRODUCT MARKING: EW

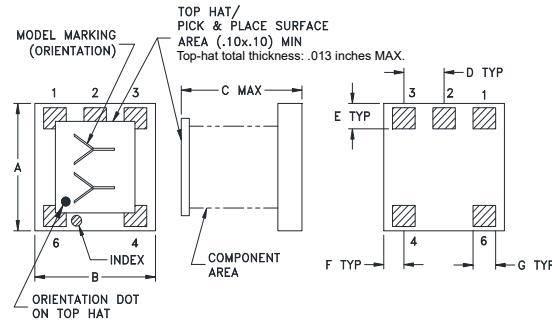
DEMO BOARD MCL P/N: TB-DBTC-13-4X+  
SUGGESTED PCB LAYOUT (PL-150)

- NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS  $0.020'' \pm 0.0015''$ ; 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.

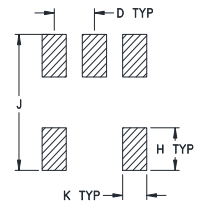
 DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

 DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

## OUTLINE DRAWING



## PCB Land Pattern



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

OUTLINE DIMENSIONS (Inches  
mm)

| A    | B    | C    | D    | E    | F     |
|------|------|------|------|------|-------|
| .150 | .150 | .150 | .050 | .030 | .025  |
| 3.81 | 3.81 | 3.81 | 1.27 | 0.76 | 0.64  |
| G    | H    | J    | K    |      | wt    |
| .028 | .050 | .160 | .030 |      | grams |
| 0.71 | 1.27 | 4.06 | 0.76 |      | 0.10  |

## TAPE &amp; REEL INFORMATION: F15

Mini-Circuits



Mini-Circuits

SURFACE MOUNT 

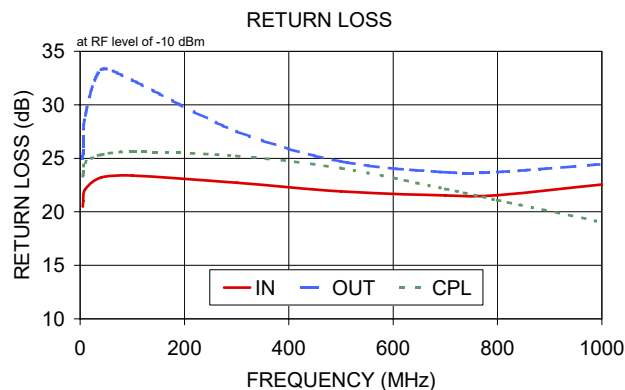
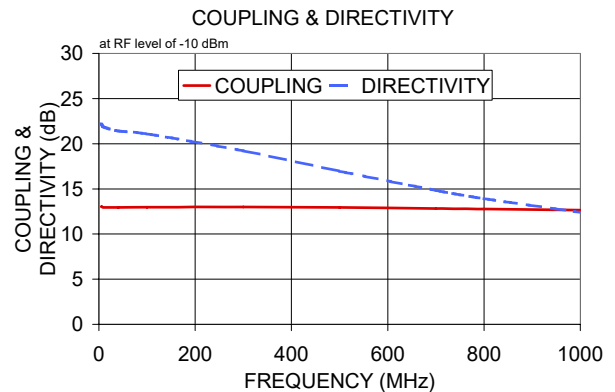
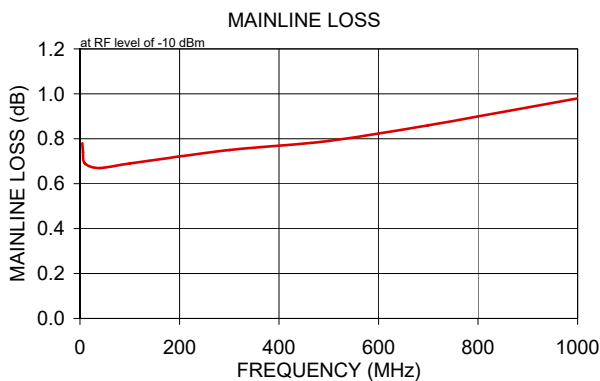
# Directional Coupler

DBTC-13-4X+

50Ω 13 dB 5 to 1000 MHz

## TYPICAL PERFORMANCE DATA

| Frequency<br>(MHz) | Mainline Loss<br>(dB) | Coupling<br>(dB) | Directivity<br>(dB) | Return Loss<br>(dB) |       |       |
|--------------------|-----------------------|------------------|---------------------|---------------------|-------|-------|
|                    | In-Out                |                  |                     | In                  | Out   | Cpl   |
| 5                  | 0.78                  | 13.04            | 22.16               | 20.49               | 25.01 | 23.33 |
| 6                  | 0.74                  | 13.01            | 22.09               | 21.00               | 26.08 | 23.73 |
| 10                 | 0.69                  | 12.95            | 21.86               | 22.12               | 28.99 | 24.60 |
| 40                 | 0.67                  | 12.95            | 21.41               | 23.19               | 33.26 | 25.33 |
| 100                | 0.69                  | 12.97            | 21.09               | 23.38               | 32.28 | 25.61 |
| 300                | 0.75                  | 13.00            | 19.21               | 22.72               | 27.51 | 25.22 |
| 500                | 0.79                  | 12.94            | 16.96               | 21.91               | 24.70 | 24.07 |
| 700                | 0.86                  | 12.83            | 14.84               | 21.53               | 23.69 | 22.13 |
| 800                | 0.90                  | 12.77            | 13.92               | 21.56               | 23.73 | 21.09 |
| 1000               | 0.98                  | 12.64            | 12.39               | 22.56               | 24.44 | 19.02 |



### 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/terms/viewterm.html](http://www.minicircuits.com/terms/viewterm.html)

