

# Surface Mount <sup>top hat</sup> Directional Coupler

## TCD-20-4X+

50Ω

5 to 1000 MHz



Generic photo used for illustration purposes only

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

### Features

- wideband, 5 to 1000 MHz
- low mainline loss, 0.4 dB typ.
- aqueous washable
- leads for excellent solderability
- protected by US Patent 6,140,887

### Applications

- VHF/UHF
- communications
- cellular
- signal processing

### Electrical Specifications at 25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Frequency Range		5		1000	MHz
Mainline Loss <sup>1</sup>	5 - 50	—	0.3	0.9	dB
	50 - 500	—	0.4	0.8	
	500 - 1000	—	0.7	1.1	
Nominal Coupling	5 - 1000	—	20±0.5	—	dB
Coupling Flatness(±)	5 - 1000	—	±0.8	—	dB
Directivity	5 - 50	11	20	—	dB
	50 - 500	15	21	—	
	500 - 1000	—	15	—	
VSWR	5 - 1000	—	1.20	—	:1
Input Power	5 - 1000	—	—	1.0	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

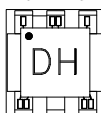
Permanent damage may occur if any of these limits are exceeded.

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

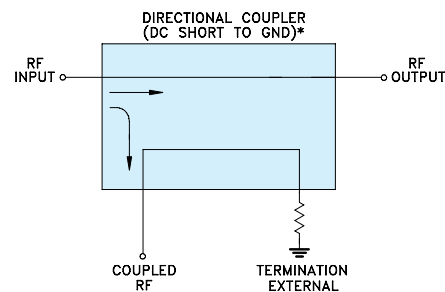
### Pin Connections

Function	Pin Number
INPUT	3
OUTPUT	4
COUPLED	1
GROUND	2
50Ω TERM EXTERNAL	6
NOT USED	5

### Product Marking

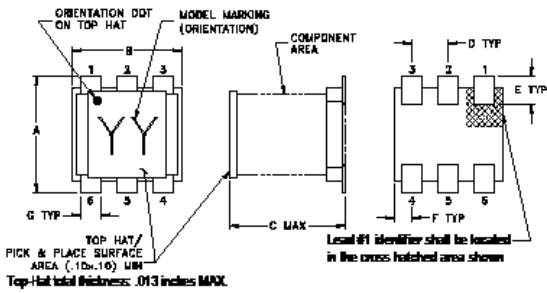


### Electrical Schematic



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

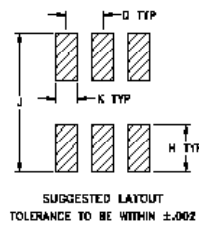
## Outline Drawing



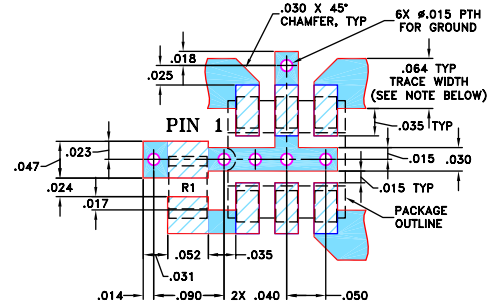
## Outline Dimensions (inch / mm)

A	B	C	D	E	F	
.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

## PCB Land Pattern



Demo Board MCL P/N: TB-71  
Suggested PCB Layout (PL-009)



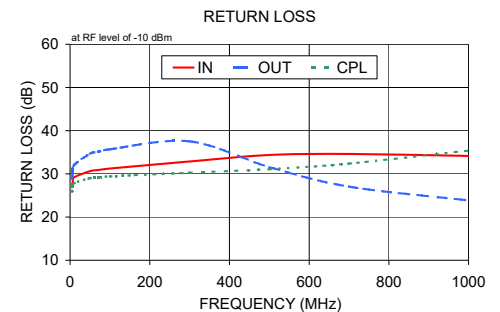
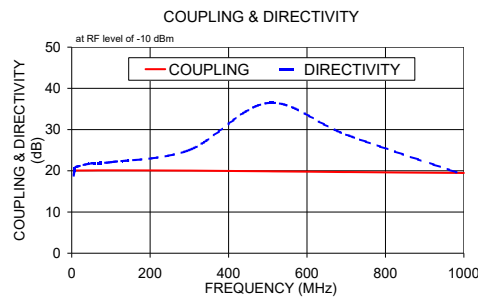
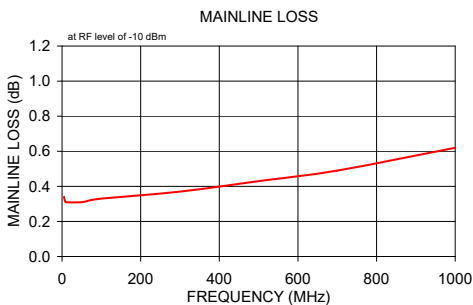
RESISTOR R1: 49.9 ± 1% Ohm, 0805 SIZE

- NOTES:**
- TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS 0.030" ± 0.002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
  - 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
5.00	0.34	20.10	18.84	27.09	28.80	25.84
7.00	0.32	20.07	20.01	28.28	30.52	26.99
10.00	0.31	20.06	20.88	29.20	32.01	27.84
50.00	0.31	20.09	21.80	30.62	34.67	28.98
70.00	0.32	20.10	21.88	30.88	35.14	29.17
100.00	0.33	20.10	22.10	31.23	35.70	29.43
300.00	0.37	20.04	25.05	32.86	37.54	30.26
500.00	0.43	19.88	36.45	34.37	31.56	31.08
700.00	0.49	19.70	28.77	34.61	27.04	32.38
1000.00	0.62	19.48	19.03	34.14	23.85	35.39



## 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-Circuits' applicable established test performance criteria and measurement instructions.
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