



**SURFACE MOUNT**

# Directional Coupler

## TCD-9-1W+

Mini-Circuits

50Ω

5 to 2000 MHz

### FEATURES

- Wideband, 5 to 2000 MHz
- Low mainline loss, 1.2 dB typ. (5-1000 MHz)
- Aqueous washable
- Leads for excellent solderability
- Protected by US Patent 6,140,887



Generic photo used for illustration purposes only

CASE STYLE: DB714

### APPLICATIONS

- GPS
- Cellular
- Satellite distribution
- CABLE TV

#### +RoHS Compliant

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

### ELECTRICAL SPECIFICATIONS AT 25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Frequency Range	—	5	—	2000	MHz
Mainline Loss <sup>1</sup> (above theoretical 0.1 dB)	5-50	—	1.2	2.1	dB
	50-500	—	1.2	1.8	
	500-1000	—	1.5	2.1	
	1000-2000	—	2.5	—	
Coupling	5-1000	—	8.9±0.5	—	dB
	1000-2000	—	8.9±0.5	—	
Coupling Flatness (±)	5-2000	—	±0.6	—	
Directivity	5-50	17	21	—	dB
	50-500	13	17	—	
	500-1000	10	13	—	
	1000-2000	—	10	—	
VSWR	5-1000	—	1.30	—	:1
	1000-2000	—	1.60	—	
Input Power	5-1000	—	—	0.5	W
	1000-2000	—	—	1.0	

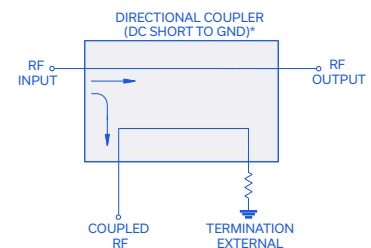
1. Mainline loss includes theoretical power loss at coupled port.

### 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.

### ELECTRICAL SCHEMATIC



\*Electrical schematic is for Directional coupler with internal transformer(s) and external termination





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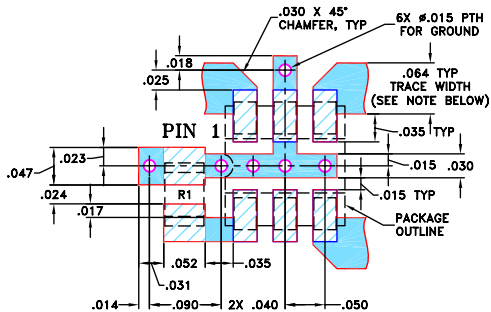
5 to 2000 MHz

### PIN CONNECTIONS

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

PRODUCT MARKING: N/A

### DEMO BOARD MCL P/N: TB-71 SUGGESTED PCB LAYOUT (PL-009)



RESISTOR R1: 49.9 ± 1% Ohm, 0805 SIZE

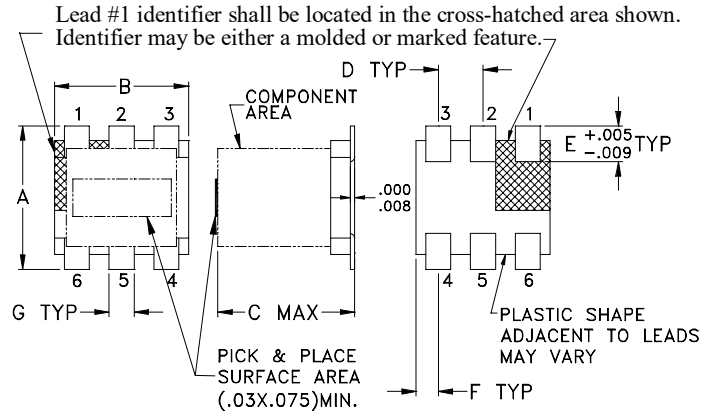
NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.030" ± 0.002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.

2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

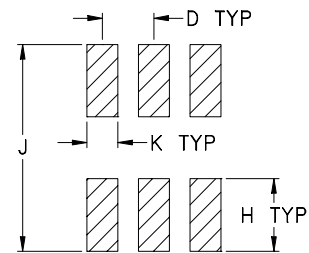
DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

### OUTLINE DRAWING



### PCB Land Pattern



Suggested Layout,  
Tolerance to be within ±.002

### OUTLINE DIMENSIONS (Inches/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	

### TAPE & REEL INFORMATION: F47



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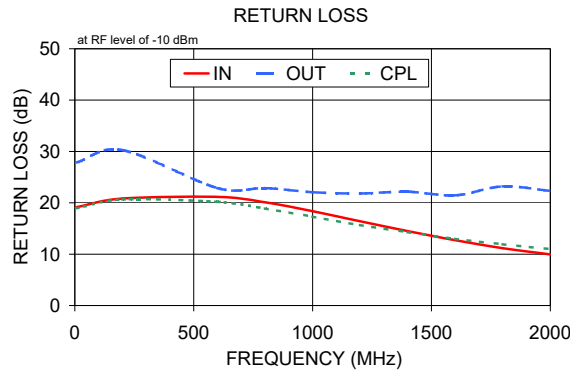
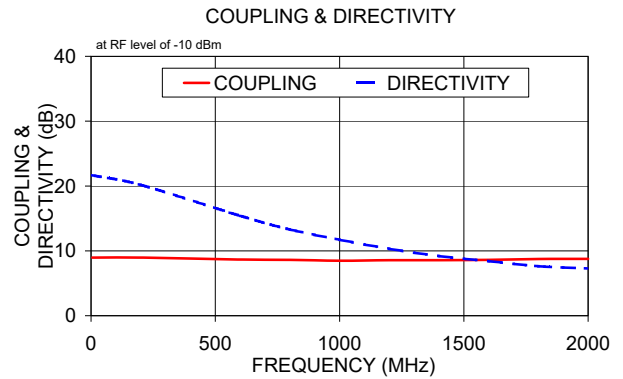
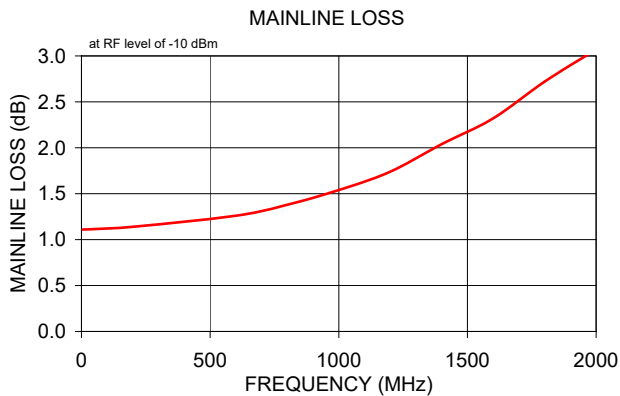
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### TYPICAL PERFORMANCE DATA

Frequency (MHz)	Mainline Loss (dB)		Coupling (dB)	Directivity (dB)	Return Loss (dB)		
	In-Out	In-Cpl			In	Out	Cpl
5.00	1.11	8.96	21.65	19.14	27.81	18.92	
200.00	1.14	8.97	20.18	20.84	30.26	20.66	
600.00	1.26	8.67	15.41	21.16	22.87	20.18	
800.00	1.38	8.61	13.30	20.11	22.87	18.90	
1000.00	1.54	8.48	11.72	18.37	22.07	17.30	
1200.00	1.74	8.57	10.31	16.42	21.82	15.67	
1400.00	2.04	8.57	9.19	14.49	22.16	14.29	
1600.00	2.32	8.61	8.42	12.72	21.46	12.97	
1800.00	2.72	8.75	7.63	11.17	23.19	11.93	
2000.00	3.07	8.76	7.28	9.96	22.33	10.99	



- NOTES**
- A. 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.
  - B. 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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