

# Surface Mount Directional Coupler

## D19GA+

50Ω    21 dB    1400 to 1700 MHz

### The Big Deal

- Good Directivity, 17 dB typ.
- Excellent Power Handling, 4W
- Small Size, 3.1 x 3.0 x 1.6mm



CASE STYLE: CA531

### Product Overview

Mini-Circuits D19GA+ is a MMIC Directional Coupler designed for applications from 1400 to 1700 MHz. This model provides excellent power handling up to 4W in a tiny device package (3.1 x 3.0 x 1.6 mm). A built-in 50Ω termination on the isolated port simplifies circuit design and reduces component count. Manufactured using Silicon IPD technology, this model provides a high level of ESD protection and excellent reliability.

### Key Features

Feature	Advantages
Low insertion loss; 0.3 dB including coupling loss	Can be used for sampling power amplifier output with minimal loss.
Excellent power handling; 4W (IN-OUT)	Ideal for sampling transmitter output power.
Good directivity, 17 dB typ.	Good directivity minimizes coupling of reverse power and enables accurate sampling of the thru-signal.
High operating temperature -40 to 105°C	Operation up to 105°C allows the Coupler to be used near power amplifiers with minimal change in performance.
Excellent ESD Class 1B (500 to <1000V)-HBM Class M3 (200 to <400V)-MM	Rugged ESD design prevents ESD related failures.

# Surface Mount Directional Coupler

## D19GA+

50Ω 21 dB 1400 to 1700 MHz

### Features

- low mainline loss, 0.3 dB typ.
- excellent VSWR, 1.1:1 typ. at input / output
- excellent repeatability
- miniature low profile package
- aqueous washable

### Applications

- GPS



Generic photo used for illustration purposes only

CASE STYLE: CA531

#### +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, 1000

### Electrical Specifications at 25°C

Parameter	Condition (MHz)	Min.	Typ.	Max.	Unit
Frequency Range		1400		1700	MHz
Mainline Loss <sup>1</sup>	1400 - 1700	—	0.3	0.6	dB
Nominal Coupling	1400 - 1700	18.9	20.7	22.4	dB
Coupling Flatness(±)	1400 - 1700	—	0.8	—	dB
Directivity	1400 - 1700	13	17	—	dB
Return Loss (Input)	1400 - 1700	—	27	—	dB
Return Loss (Output)	1400 - 1700	—	27	—	dB
Return Loss (Coupling)	1400 - 1700	—	19	—	dB
Input Power <sup>2</sup>	1400 - 1700	—	—	4.0	W
Power at Internal Termination <sup>3</sup>	1400 - 1700	—	—	23	dBm

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

2. 4Watt CW to 85°C. Derate linearly to 3W at 105°C. Ground lead temperature.

3. 23 dBm to 85°C. Derate linearly to +22dBm at 105°C.

### Maximum Ratings<sup>4</sup>

Parameter	Ratings
Operating Temperature <sup>5</sup>	-40°C to 105°C
Storage Temperature	-65°C to 150°C

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

5. Ground lead temperature

### Pin Connections

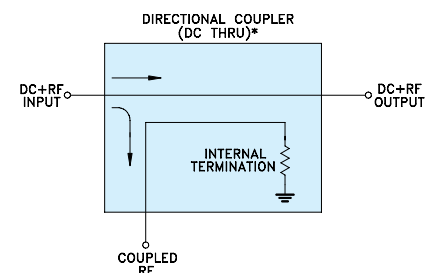
Function	Pin Number
INPUT	4
OUTPUT	6
COUPLED	3
GROUND	1,2,5

\* ESD rating

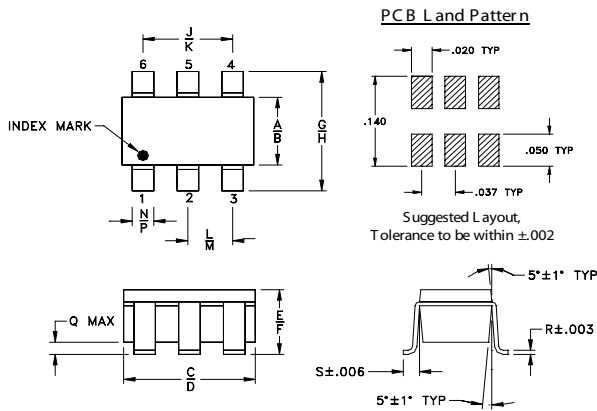
Human body model (HBM): Class 1B(500 to <1000 V) in accordance with ANSI/ESD 5.1-2007

Machine model (MM): Class M3 (200 to <400 V) in accordance with ANSI/ESD SMT 5.2 1999

### Electrical Schematic



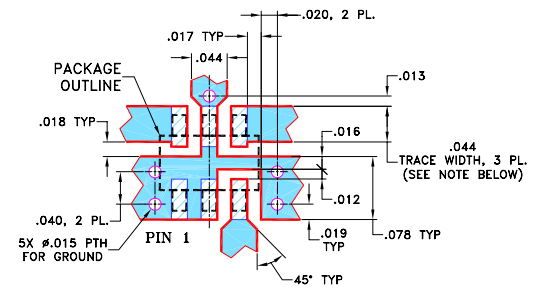
## Outline Drawing



## Outline Dimensions (inch/mm)

A	B	C	D	E	F	G	H	J
.052	.067	.106	.122	.035	.064	.087	.118	.067
1.32	1.70	2.69	3.10	0.89	1.63	2.21	3.00	1.70
K	L	M	N	P	Q	R	S	wt
.083	.033	.042	.012	.020	.012	.006	.018	grams
2.11	0.84	1.07	0.30	0.51	0.30	0.15	0.46	0.020

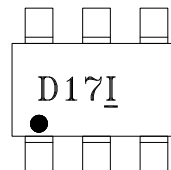
## Demo Board MCL P/N: TB-396+ Suggested PCB Layout (PL-270)



- NOTES:**
- 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.
  - 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

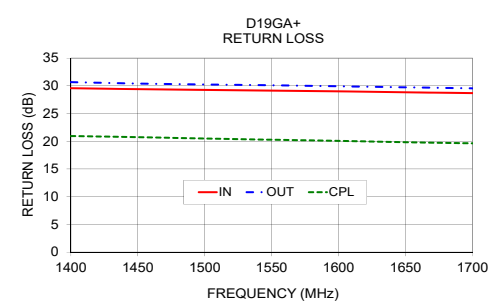
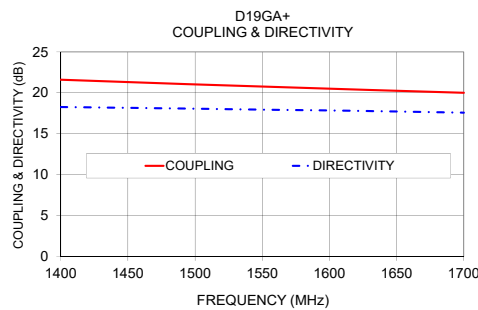
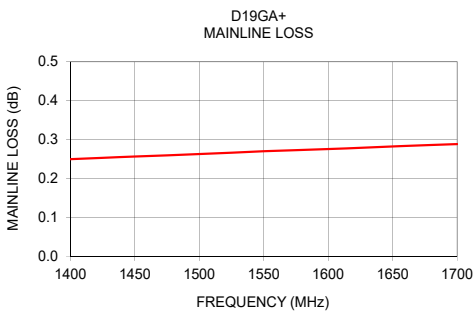
## Product Marking



← Family marking

## Typical Performance Data

Frequency (MHz)	Mainline Loss (dB) In-Out	Coupling (dB) In-Cpl	Directivity (dB)	Return Loss (dB)		
				In	Out	Cpl
1400	0.25	21.61	18.27	29.57	30.67	20.94
1450	0.26	21.32	18.17	29.39	30.41	20.74
1500	0.26	21.04	18.07	29.27	30.24	20.49
1550	0.27	20.77	17.95	29.14	30.10	20.28
1600	0.28	20.51	17.85	29.01	29.92	20.07
1650	0.28	20.26	17.72	28.83	29.73	19.82
1700	0.29	20.01	17.58	28.69	29.55	19.63



## 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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