

DC Pass, High Power

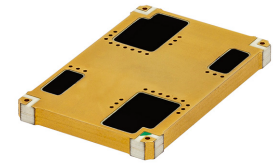
Dual-Directional Coupler

DDCH-50-13+

50Ω 50dB Coupling 120W* 20 to 1000 MHz

The Big Deal

- High power handling, up to 120W
- Low insertion loss, 0.15 dB
- Excellent return loss, 30 dB (In/Out)
- High directivity, 24.5 dB



CASE STYLE: PQ2100

Product Overview

Mini-Circuits DDCH-50-13+ is a high-power (120W), wide band (20-1000MHz) dual-directional coupler which features low insertion loss (0.15 dB), 50 dB coupling and excellent mainline return loss (30 dB). The Dual directional design allows monitoring forward and reverse power and guarantees good directivity, flatness and coupling accuracy.

The DDCH-50-13+ supports a wide variety of applications from military to VHF/UHF radio, various cellular base station applications and more.

The coupler is fabricated using laminated PCB process (1.5 x 1.0 x 0.128") and includes wrap-around terminations for good solderability and easy visual inspection.

Key Features

Feature	Advantages
High power handling*: 120W @ 85°C 80W @ 105°C	Usable in many systems with high-power requirements such as antenna feeds, power amplifiers, and others that require sampling a high power RF signal.
Dual-Directional Coupler	Ideally suited for simultaneous monitoring of both forward and reverse power of a system, and reflectometer measurements. The Directivity is not affected by coupling ports mismatch.
Low insertion loss, 0.15 dB	Used primarily in high power transmission applications, the excellent through-path signal loss maximizes the power transmitted to the antenna.
High directivity, 24.5 dB	High directivity with 50 dB coupling allows accurate signal sampling through the coupled port with minimal measurement error.
Excellent return loss, 30 dB. (input and output)	Provides excellent matching for 50Ω systems.
DC current passing, up to 4 A	Suitable for use in systems requiring DC voltage on the RF line, such as supplying bias to remote circuit via the antenna cable.

*See power derating on page 2



DC Pass, High Power Dual-Directional Coupler

DDCH-50-13+

50Ω 50dB Coupling 120W* 20 to 1000 MHz

Maximum Ratings

Operating Temperature, case** -55°C to 105°C

Storage Temperature -55°C to 105°C

DC Current 4A

RF power * 120W @ +85°C, case

* Derates to 100W at 95°C and 80W@105°C case temperature.

Power derates linearly from 520 MHz to 50% at 1000MHz.

**Case temperature is defined as temperature on base plate.

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

Pad Connections***

INPUT 4

OUTPUT 2

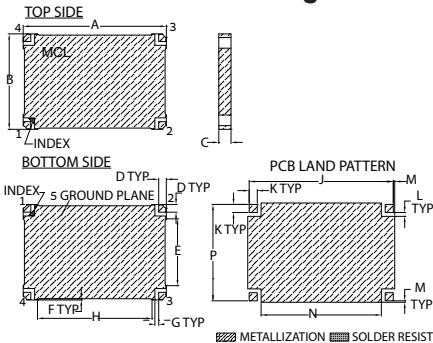
COUPLED FORWARD 1

COUPLED REVERSE 3

GROUND 5

***Model is Dual-directional, input and output are interchangeable.

Outline Drawing



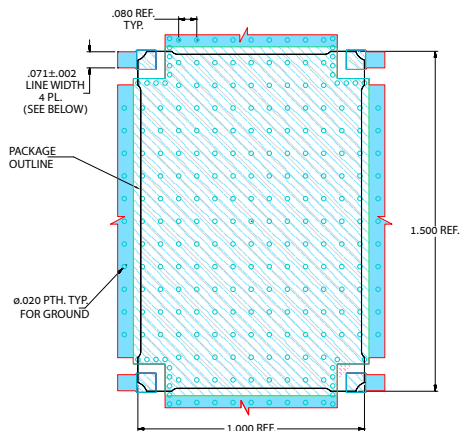
Base material: Printed wiring laminate.

Termination Finish: 2-5 μinch (0.05-0.13 microns) Gold over 120-240 μinch (3.05-6.10 microns) Nickel

Outline Dimensions (inch/mm)

A	B	C	D	E	F	G	H
1.500	1.000	.128	.080	.700	.013	.040	1.200
38.10	25.40	3.25	2.03	17.78	0.33	1.02	30.48
J	K	L	M	N	P	wt.	
1.510	.085	.040	.015	1.260	1.010	grams	
38.35	2.16	1.02	0.38	32.00	25.65	12.0	

Demo Board MCL P/N: TB-865 Suggested PCB Layout (PL-471)



NOTES:
1. TRACE WIDTH IS SHOWN FOR ROGERS RO4003C WITH DIELECTRIC THICKNESS. 0.032±.0015". COPPER: 1 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)

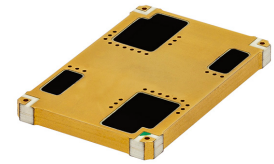
■ DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

Features

- high power, up to 120W
- ultra wide band 20 to 1000 MHz
- low insertion loss, 0.15 dB Typ.
- excellent in/out return loss, 30 dB Typ
- high directivity, 24.5 dB Typ.
- DC current pass through input to output

Applications

- UHF/VHF high power radio
- transmission signal monitoring
- simultaneous monitoring of forward and reverse power
- antenna reflection monitoring
- defense and military



CASE STYLE: PQ2100

+RoHS Compliant

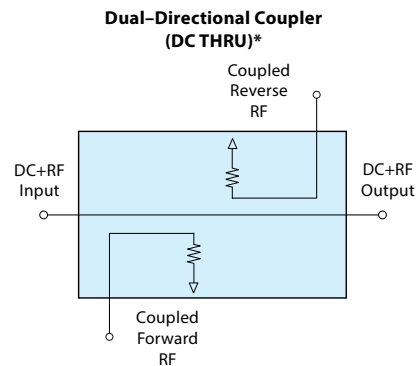
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Electrical Specifications @ +25°C

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range		20		1000	MHz
Insertion Loss	20 - 520	—	0.1	0.2	dB
	20 - 1000	—	0.15	0.35	
Coupling	20 - 1000	—	50 ± 1.5	—	dB
Coupling Flatness	20 - 520	—	±0.9	—	dB
	30 - 1000	—	±0.65	—	
Directivity	20 - 1000	20	24.5	—	dB
Return Loss (Input)	20 - 1000	27	30	—	dB
Return Loss (Output)	20 - 1000	27	30	—	dB
Return Loss (Coupling)	20 - 1000	—	12.5	—	dB
Input RF Power *	@+85°C, case	20 - 520	—	120	W
		1000	—	60	
	@+95°C, case	20 - 520	—	100	
		1000	—	50	
	@+105°C, case	20 - 520	—	80	
		1000	—	40	
Thermal Resistance	20 - 1000	—	0.5	—	°C/W

* Power derates linearly from 520 MHz to 50% at 1000MHz.

Electrical Schematic



*Mainline is DC coupled.

*Coupling ports are DC coupled to internal terminations.

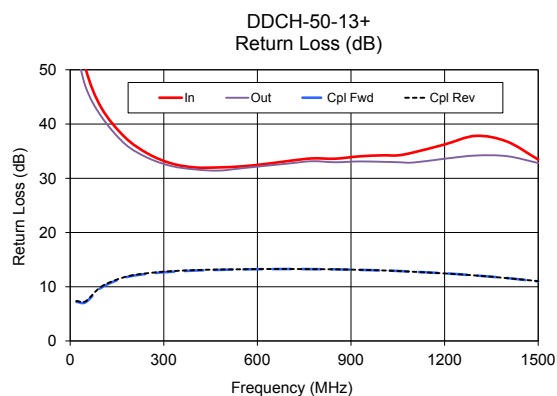
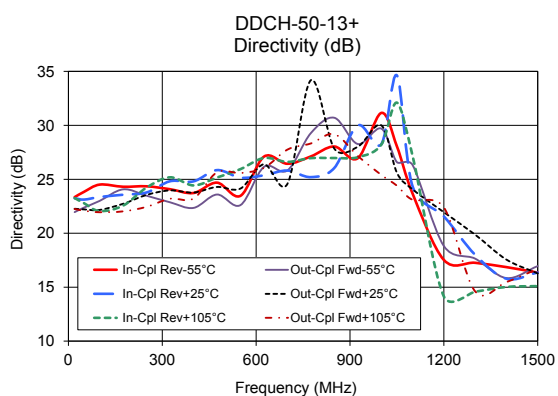
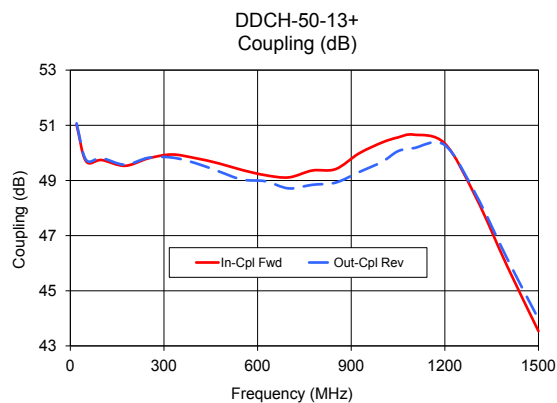
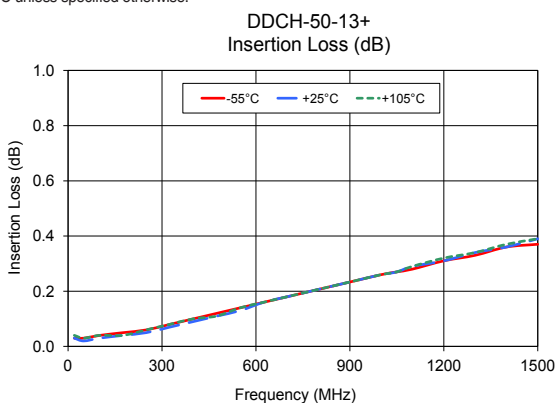


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Typical Performance Data *

FREQUENCY (MHz)	Insertion Loss (dB)			Coupling (dB)		Directivity (dB)						Return Loss (dB)			
	In - Out			In - Cpl Fwd	Out - Cpl Rev	In-Cpl Rev			Out-Cpl Fwd			In	Out	Cpl Fwd	Cpl Rev
	-55°C	+25°C	+105°C			-55°C	+25°C	+105°C	-55°C	+25°C	+105°C				
20.0	0.03	0.03	0.04	51.02	51.07	23.35	23.24	23.26	21.96	22.27	22.25	59.74	54.06	7.22	7.37
50.0	0.03	0.02	0.03	49.70	49.75	23.84	23.12	22.78	22.38	22.21	22.09	50.13	46.80	7.17	7.33
100.0	0.04	0.03	0.04	49.74	49.81	24.51	23.36	22.05	23.00	22.16	21.95	42.98	41.38	9.85	10.02
175.0	0.05	0.04	0.04	49.53	49.57	24.31	23.57	22.56	24.07	22.73	22.03	37.59	36.36	11.69	11.79
250.0	0.06	0.05	0.06	49.80	49.82	24.35	23.78	24.23	23.48	23.55	22.45	34.51	33.73	12.41	12.51
325.0	0.08	0.07	0.08	49.94	49.83	24.08	24.82	25.18	22.87	23.97	23.20	32.73	32.25	12.77	12.87
400.0	0.10	0.09	0.10	49.81	49.63	23.73	24.81	24.43	22.35	23.77	23.22	32.00	31.63	13.00	13.07
475.0	0.12	0.11	0.11	49.62	49.33	24.69	25.85	25.16	23.59	24.29	25.65	32.00	31.41	13.12	13.17
520.0	0.13	0.13	0.13	49.48	49.16	24.12	25.35	25.53	23.52	24.40	25.14	32.14	31.69	13.17	13.19
600.0	0.16	0.15	0.15	49.20	48.83	24.79	31.74	25.92	28.70	24.47	27.42	32.51	32.29	13.25	13.27
675.0	0.17	0.17	0.17	49.16	48.78	26.24	25.65	26.77	25.38	24.61	25.93	33.15	32.49	13.28	13.27
750.0	0.19	0.19	0.19	48.95	48.74	26.33	27.44	27.15	23.25	25.08	28.06	33.39	32.98	13.26	13.26
825.0	0.21	0.21	0.22	49.31	48.88	27.26	25.54	26.90	28.78	26.44	28.69	33.87	33.18	13.24	13.22
900.0	0.23	0.23	0.24	49.93	49.02	26.36	28.00	26.91	29.28	28.39	27.92	33.96	33.21	13.16	13.15
975.0	0.25	0.25	0.25	50.14	49.52	27.51	26.78	26.45	28.27	29.06	26.32	34.10	32.88	13.05	13.05
1000.0	0.26	0.26	0.26	50.38	49.68	31.15	28.24	28.20	29.70	30.00	25.41	34.23	33.03	13.02	13.01
1100.0	0.28	0.29	0.29	50.66	50.17	23.69	24.36	27.19	26.33	24.07	23.10	34.76	32.90	12.77	12.76
1200.0	0.31	0.31	0.32	50.34	50.28	17.53	21.57	14.15	18.82	21.95	22.40	36.23	33.60	12.49	12.45
1300.0	0.33	0.34	0.34	48.38	48.48	17.26	18.01	14.58	17.65	19.87	14.62	37.82	34.19	12.08	12.07
1400.0	0.36	0.36	0.37	45.89	46.16	16.86	15.79	15.02	15.85	17.56	15.48	36.77	34.07	11.61	11.58
1500.0	0.37	0.39	0.39	43.54	43.98	16.35	16.36	15.10	16.96	16.28	16.70	33.46	32.81	10.99	11.03

* Data at +25°C unless specified otherwise.



Additional 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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