

High Power Dual Directional Couplers

DC Series

Shinhom's wideband high-power dual-directional coupler, with frequency coverage of 9kHz to 18GHz and power up to 5000W, is widely used in amplifiers, broadcasting, laboratory testing and communications.

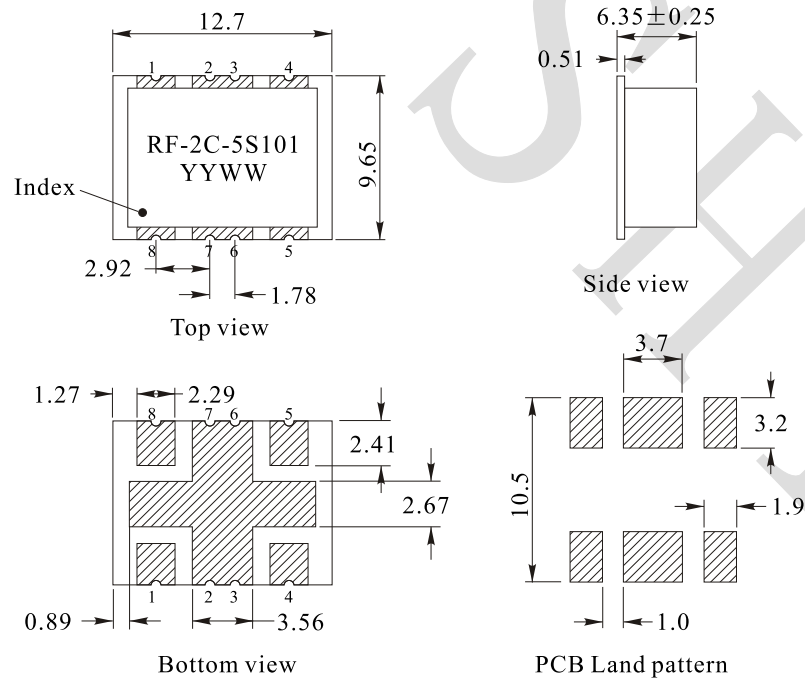


Part No.	Frequency	Power	Coupling	Insertion loss	Directional	Standing wave
	(GHz)	(W)	(dB)	(dB,max.)	(dB,min.)	(max.)
DC-0.5-32-5K-40-N7	500KHz-0.032	5000	40 ± 1	0.15	18	1.2
DC-10-170-5K-60-S7	0.01~0.17	5000	60 ± 1.5	0.2	16	1.2
DC-1-50-3K-58-NS	0.001~0.05	3000	58 ± 8	0.1	20	1.1
DC-1.6-30-2K5-50-N	0.0016~0.03	2500	50 ± 0.5	0.05	-	1.15
DC-2-30-2K-50-NS	0.002~0.03	2000	50 ± 1.5	0.3	18	1.2
DC-30-80-2K-60-NS	0.03~0.08	2000	60 ± 1	0.2	20	1.1
DC-80-1000-2K-40-7S	0.08~1	2000	40 ± 1.5	0.25	20	1.2
DC-80-1000-2K-50-7S	0.08~1	2000	50 ± 1	0.3	20	1.3
DC-80-1000-2K-60-7S	0.08~1	2000	60 ± 1.5	0.25	20	1.2
DC-30-80-1K5-50-NS	0.03~0.08	1500	50 ± 1	0.4	20	1.1
DC-80-1000-1K5-50-NS	0.08~1	1500	50 ± 1	0.3	20	1.15
DC-9K-260-1K-40-NS	9KHz~0.26	1000	40 ± 1.5	0.4	10	1.25
DC-0.25-300-1K-50-NS	250KHz~0.3	1000	50 ± 2	0.5	16	1.2
DC-0.25-300-1K-50-N	250KHz~0.3	1000	50 ± 2	0.5	16	1.2
DC-2-32-1K-40-NS	0.002~0.032	1000	40 ± 1	0.5	20	1.2
DC-2-32-1K-50-NS	0.002~0.032	1000	50 ± 1.5	0.3	20	1.2
DC-25-1000-1K-50-NS	0.025~1	1000	50 ± 1.5	0.5	15	1.2
DC-80-1000-1K-50-NS	0.08~1	1000	50 ± 1	0.3	20	1.3
DC-200-400-1K-40-NS	0.2-0.4	1000	40 ± 1	0.2	20	1.15
DC-300-2000-1K-50-N	0.3-2	1000	50 ± 2	0.5	16	1.15
DC-1270-1305-1K-30-7-1	1.27~1.305	1000	30 ± 1	0.15	30	1.15
DC-500-2000-K8-50-NS	0.5~2	800	50 ± 0.8	0.3	18	1.35
DC-600-2700-K8-50-NS	0.6~2.7	800	50 ± 1.2	0.3	20	1.3
DC-300-6000-K6-30-NS	0.3-6	600	30 ± 0.9	0.7	15	1.4
DC-300-6000-K6-40-NS	0.3-6	600	40 ± 1.0	0.7	15	1.4
DC-400-6000-K6-30-NS	0.4-6	600	30 ± 0.8	0.6	15	1.3
DC-400-6000-K6-40-NS	0.4-6	600	40 ± 0.9	0.6	15	1.3
DC-400-8000-K6-30-NS	0.4-8	600	30 ± 0.9	0.7	14	1.4
DC-400-8000-K6-40-NS	0.4-8	600	40 ± 1.0	0.7	14	1.4
DC-500-6000-K6-30-NS	0.5-6	600	30 ± 0.7	0.6	15	1.3

Part No.	Frequency	Power	Coupling	Insertion loss	Directional	Standing wave
	(GHz)	(W)	(dB)	(dB,max.)	(dB,min.)	(max.)
DC-500-6000-K6-40-NS	0.5-6	600	40 ± 0.8	0.6	15	1.3
DC-500-8000-K6-30-NS	0.5-8	600	30 ± 0.8	0.7	14	1.4
DC-500-8000-K6-40-NS	0.5-8	600	40 ± 0.9	0.7	14	1.4
DC-700-6000-K6-30-NS	0.7-6	600	30 ± 0.7	0.5	15	1.3
DC-700-6000-K6-40-NS	0.7-6	600	40 ± 0.7	0.5	15	1.3
DC-1000-6000-K6-30-NS	1-6	600	30 ± 0.7	0.5	15	1.3
DC-1000-6000-K6-40-NS	1-6	600	40 ± 0.7	0.5	15	1.3
DC-2000-6000-K6-30-NS	2-6	600	30 ± 0.7	0.4	15	1.3
DC-2000-6000-K6-40-NS	2-6	600	40 ± 0.7	0.4	15	1.3
DC-2000-8000-K6-30-NS	2-8	600	30 ± 0.8	0.4	14	1.4
DC-2000-8000-K6-40-NS	2-8	600	40 ± 0.8	0.4	14	1.4
DC-0.009-100-K5-50-NS	9KHz-0.1	500	50 ± 1	0.3	16	1.2
DC-0.01-100-K5-50-NS	10KHz-0.1	500	50 ± 1	0.5	16	1.3
DC-225-460-K5-30-N	0.225-0.46	500	30 ± 1	0.3	20	1.1
DC-400-2500-K5-50-NS	0.4-2.5	500	50 ± 1.2	0.3	18	1.3
DC-500-3000-K5-60-NS	0.5-3	500	60 ± 2	0.4	16	1.4
DC-700-6000-K5-35-NS	0.7-6	500	35 ± 1	0.5	12	1.7
DC-1000-2000-K5-30-N	1-2	500	30 ± 1	0.25	26	1.5
DC-1000-2000-K5-50-N	1-2	500	50 ± 1	0.25	26	1.5
DC-1000-6000-K5-40-NS	1-6	500	40 ± 1	0.5	12	1.7
DC-2000-4000-K5-50-NS	2-4	500	50 ± 1.5	0.4	20	1.25
DC-500-6000-K4-40-N	0.5-6	400	40 ± 2	0.5	15	1.5
DC-500-18000-K4-30-NS	0.5-18	400	30 ± 1.2	1	10	1.6
DC-500-18000-K4-30-NS	0.5-18	400	40 ± 1.2	1	10	1.6
DC-1000-18000-K4-30-NS	1-18	400	30 ± 1.2	0.8	10	1.6
DC-1000-18000-K4-40-NS	1-18	400	40 ± 1.2	0.8	10	1.6
DC-2000-5000-K4-45-NS	2-5	400	45 ± 1.5	0.5	10	1.5
DC-2000-6000-K4-40-8S	2-6	400	40 ± 1	0.3	15	1.5
DC-2000-18000-K4-30-NS	2-18	400	30 ± 1	0.6	10	1.6
DC-2000-18000-K4-40-NS	2-18	400	40 ± 1	0.6	10	1.6
DC-4000-6000-K4-40-NS	4-6	400	40 ± 1.5	0.6	10	1.3
DC-6000-18000-K4-30-NS	6-18	400	30 ± 1	0.5	10	1.6
DC-6000-18000-K4-40-NS	6-18	400	40 ± 1	0.5	10	1.6

Rev.	Description	Date
A0	New release	2016.05.17

1. PHYSICAL CHARACTERISTICS (mm)



3. ELECTRICAL SPECIFICATIONS

Frequency: 10-540MHz

Coupling: 19.8 ± 0.5 dB

Mainline loss: 0.6dB Max(0.2dB Typ.)

Directivity: 16dB Min(28dB Typ.)

VSWR: 1.1:1

Input power: 25W Max

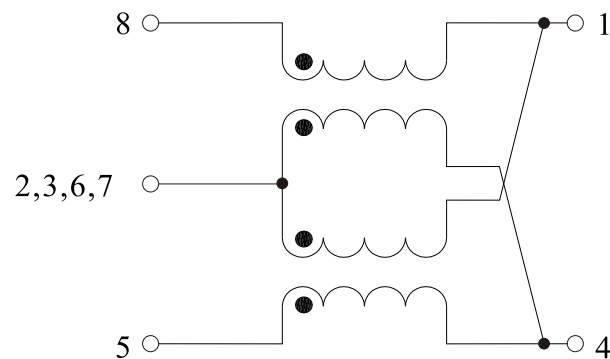
Operating temperature: -40°C to $+85^{\circ}\text{C}$

Storage temperature: -55°C to $+100^{\circ}\text{C}$

Note:

- 1.Solderability: leads shall meet MIL-STD-202, Method 208D for solderability.
- 2.Flammability: UL94V-0
- 3.ASTM oxygen index: >28%

2. ELECTRICAL SCHEMATIC



NAME:	Bi-Directional coupler		
CUSTOMER P/N:		DATE:	2016-05-17
SHINHOM P/N:	RF-2C-5S101	REV: A0	PAGE
DRAWN BY	CHECKED BY	APPROVE BY	



SHINHOM

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Double Directional Coupler

The double directional coupler is a radio frequency four-port device. It is a standard device commonly used in microwave measurement and a key device in reflectometer, radio frequency network analyzer and other instruments. It can be used to monitor the output power, output spectrum and test of transmitter. The reflected power from the transmitter to the antenna end, monitoring the match of the antenna feed system, can also be used for the power control of the transmitter. It can be used as power meter with detector and level indicator.



FEATURE

Broad Band
High Power
Low Insertion Loss

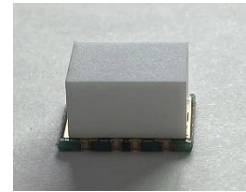
APPLICATION

Amplifier
Radio
Communication
Laboratory Tests

ELECTRICAL CHARACTERISTICS:

Model	Freq (GHz)	Power (W)	Coupling (dB)	Insertion Loss (dB,max.)	Directivity (dB,min.)	VSWR (max.)	Connector	Dimensions (mm)
SHD-2000-4000-K4-40-NS	2-4	400	40 ± 1.5	0.5	10	1.3	SMA,N	50*50*22.6
SHD-4000-6000-K4-40-NS	4-6	400	40 ± 1.5	0.6	10	1.3	SMA,N	50*50*22.6
SHD-400-450-20-40-S	0.4-0.45	20	40 ± 1	0.3	20	1.3	SMA	288*27*15
SHD-400-2000-K3-40-N	0.4-2	300	40 ± 1	0.4	20	1.3	N	410*102*36
SHD-700-6000-50-10-S	0.7-6	50	10 ± 1.2	2.2	12	1.4	SMA	202*16*11
SHD-700-6000-50-30-S	0.7-6	50	30 ± 1.5	1.2	10	1.4	SMA	202*16*11
SHD-1000-6000-40-10-S	1-6	40	10 ± 1	2.0	18	1.3	SMA	150*18*12
SHD-1000-6000-50-10-NS	1-6	50	10 ± 1	2.0	18	1.3	SMA,N	140*20*20
SHD-1900-2200-50-10-NS	1.9-2.2	50	10 ± 1	1.5	20	1.2	SMA,N	140*20*20
SHD-2000-4000-10-10-S	2-4	10	10 ± 1	0.8	18	1.2	SMA	86*15*11
SHD-2000-18000-20-40-S	2-18	20	40 ± 1.5	2.0	7	1.7	SMA	86*18*11
SHD-4000-6000-10-10-S	4-6	10	10 ± 1	0.8	18	1.2	SMA	86*15*11
SHD-6000-18000-70-40-S	6-18	70	40 ± 2.5	0.5	15	1.4	SMA	45*32*14

*Dimensions do not include connectors.



Features

- high power handling
- low mainline loss
- good return loss

Applications

- military mobile

50Ω 20 dB Coupling 1.5 to 60 MHz 15 Watt

Electrical Specifications at 25°C					
Parameter	Condition (MHz)	Min.	Typ.	Max.	Unit
Frequency Range		1.5		60	MHz
Mainline Loss	1.5-60	-	0.1	0.4	dB
Nominal Coupling	1.5-60	-	20±0.5	-	dB
Coupling Flatness (±)	1.5-60	-	±0.3	-	dB
Directivity	1.5-60	20	35	-	dB
Return Loss	1.5-60	-	32	-	dB
Input Power	1.5-60	-	-	15	W

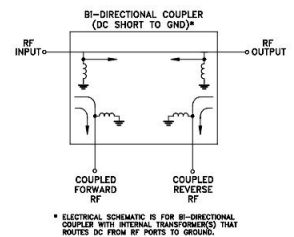
Maximum Ratings

*Operating Temperature, Case -40°C to 65°C

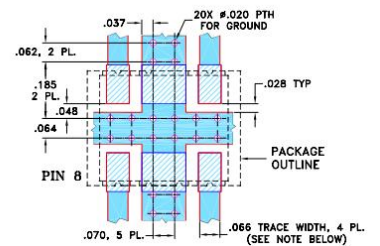
Storage Temperature -55°C to 100°C

* Case temperature is defined as temperature on ground leads.
Permanent damage may occur if any of these limits are exceeded.

Electrical Schematic



Suggested PCB Layout

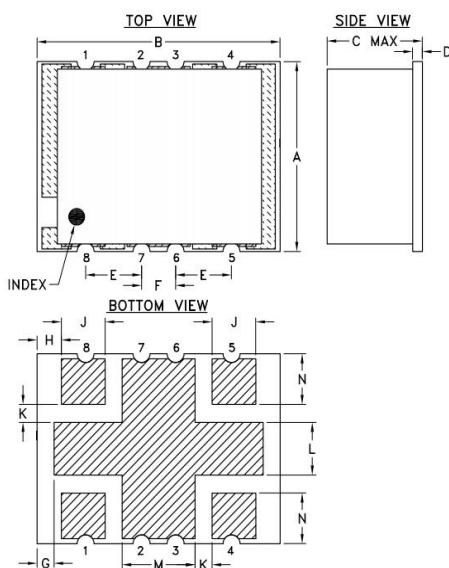


NOTES:

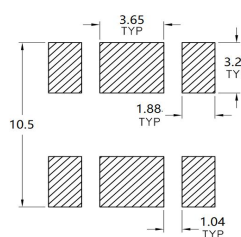
1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .002", COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

- 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 L ayout, Tolerance to be within ±0.5mm

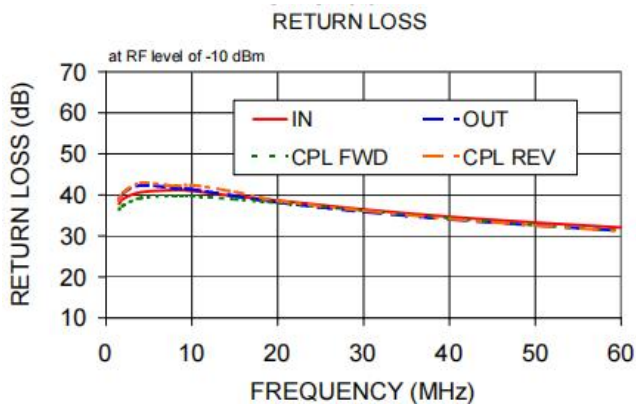
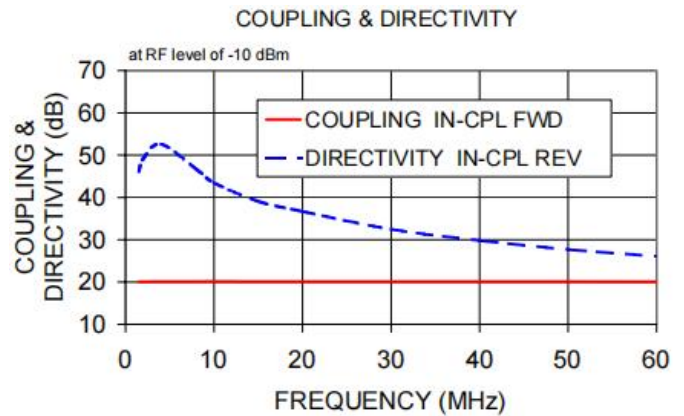
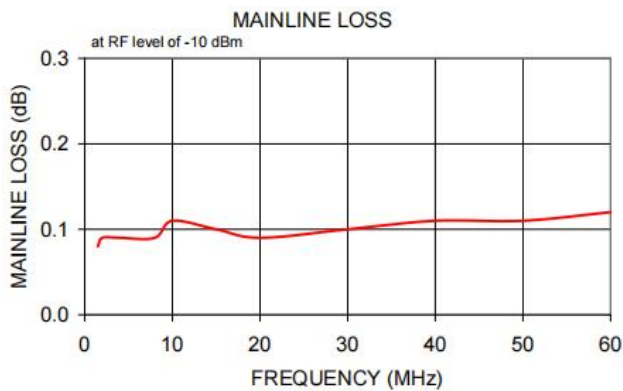
Outline Dimensions: Unit (mm)

A	9.65	H	1.27
B	12.70	N	2.41
C	7.00	M	3.56
D	1.00	J	2.29
E	2.92	K	1.02
F	1.78	L	2.67
G	0.89	WT	0.8g

Pan Connections

Input	8
Output	1
Forward	5
Reverse	4
Ground	2,3,6,7

Typical Performance Data (TEST CONDITIONS: INPUT POWER = 0dBm @Temperature = +25°C)									
Freq.(MHz)	Mainline Loss (dB)	Coupling (dB)		Directivity (dB)		Return Loss (dB)			
		In-Cpl Fwd	Out-Cpl Rev	Out-Cpl Fwd	In-Cpl Rev	In	Out	Cpl Fwd	Cpl Rev
1.5	0.08	20.06	19.94	43.29	46.09	37.74	38.71	36.46	38.64
2.0	0.09	20.07	19.94	45.39	49.18	39.02	40.51	37.41	40.45
4.0	0.09	20.10	19.96	47.26	52.62	40.63	42.30	39.20	42.92
8.0	0.09	20.10	19.98	43.88	46.67	41.17	41.69	39.76	42.18
10.0	0.11	20.12	20.02	41.51	43.47	40.96	41.34	39.70	42.36
15.0	0.10	20.11	20.04	38.56	39.06	39.69	39.72	38.91	40.69
20.0	0.09	20.10	20.05	36.40	36.70	38.63	38.17	38.03	38.54
30.0	0.10	20.10	20.11	32.62	32.46	36.47	35.84	36.17	36.17
40.0	0.11	20.10	20.13	29.91	29.79	34.69	34.03	34.31	34.17
50.0	0.11	20.09	20.10	27.59	27.69	33.23	32.55	32.59	32.55
60.0	0.12	20.07	20.03	25.78	26.07	32.03	31.24	31.36	31.12



RF - 2C - ADCB - 20 - 82



50Ω, 20dB Coupling, 1 to 800 MHz

THE BIG DEAL

- Very Flat Coupling, 0.2 dB
- Very Low Loss, 0.3 dB
- Small Size
- Aqueous washable

APPLICATIONS

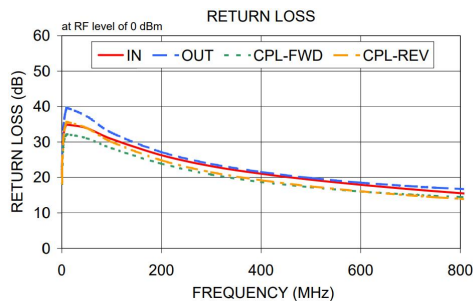
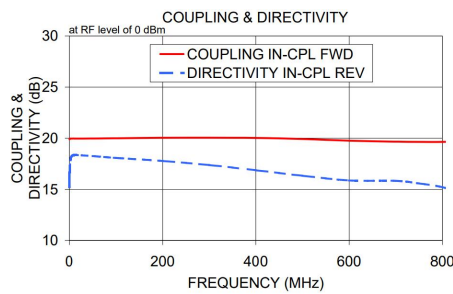
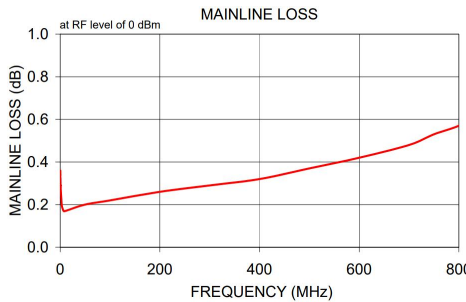
- Cable TV
- Communications

ELECTRICAL SPECIFICATIONS AT 25°C

Parameter	Condition(MHz)	Min	Typ.	Max	Units
Frequency Range		1		800	MHz
Mainline Loss ¹ (above theoretical 0.05 dB)	1	-	0.2	0.4	dB
	400	-	0.3	0.6	
	800	-	0.6	0.9	
Coupling	1	19.5	20.2	20.9	dB
	400	19.5	20.4	21.6	
	800	18.5	20.2	21.8	
Coupling Flatness(±n;)	1-400	-	0.2	0.6	dB
	400-800	-	0.2	0.7	
Directivity	1	15	20	-	dB
	400	14	24.4	-	
	800	10	15	-	
Return Loss (Input)	1	21	28	-	dB
	400	15	21	-	
	800	11	16	-	
Return Loss (Output)	1	21	27	-	dB
	400	15	22	-	
	800	11	17	-	
Return Loss(Coupled)	1	18	24	-	dB
	400	14	19	-	
	800	11	15	-	
Input Power ²	1-10	-	-	0.5	W
	10-800	-	-	1.0	

1. Mainline loss includes theoretical power loss at coupled port.
2. Over -40 to 85 deg C

TYPICAL PERFORMANCE CURVES

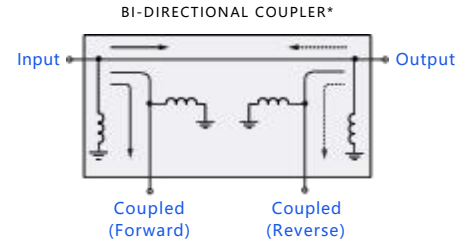


MAXIMUM RATINGS

Parameter	Ratings
Operating temperature	-40°C-85°C
Storage temperature	-50°C-100°C

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

ELECTRICAL SCHEMATIC

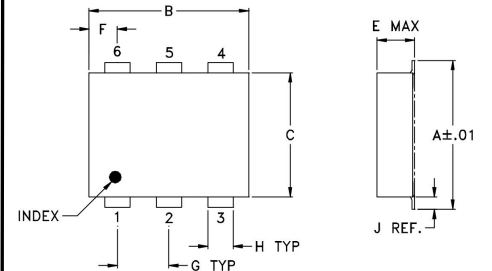


*Electrical schematic is for Bi-Directional coupler with internal transformer(s) that routes DC from all ports to ground

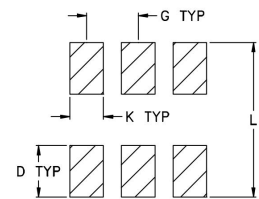
PIN CONNECTIONS

RF INPUT	1
RF OUTPUT	6
COUPLED (FORWARD) RF	3
COUPLED (REVERSE) RF	4
GROUND	2, 5

OUTLINE DRAWING



PBC Land Pattern



Suggested Layout.

OUTLINE DIMENSIONS, Unit(mm)

A	6.91	G	2.54
B	7.87	H	0.76
C	5.59	L	0.66
D	2.54	K	1.65
E	4.11	L	7.62
F	1.4		
WT	0.25G		

Bi-Directional Coupler

Http://www.shinohm.com www.shinohmtech.com

RF-2C-SYDC-10-62HP

50Ω 10 dB Coupling 10 to 600 MHz



The Big Deal

- High power handling, 20 W
- Multi-octave bandwidth
- Very low mainline loss, 0.5 dB
- Excellent VSWR, 1.10:1

Applications

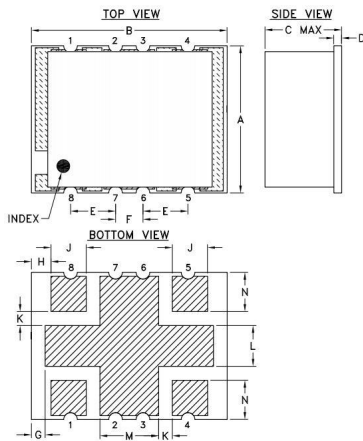
- VHF/UHF
- signal monitoring
- communications
- military mobile

Electrical Specifications at 25°C

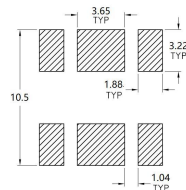
Parameter	Condition (MHz)	Min.	Typ.	Max.	Unit
Frequency Range		10	—	600	MHz
Mainline Loss (above theoretical 0.5 dB)	10	—	0.2	0.8	dB
	50	—	0.2	0.6	
	340	—	0.3	0.7	
	600	—	0.5	0.9	
Coupling	10 - 600	—	9.6	—	dB
	10	9.2	9.7	10.2	
	50	9.3	9.8	10.5	
	340	9.2	9.7	10.2	
	600	8.6	9.4	10.4	
Coupling Flatness(±)	10 - 340	—	0.2	0.4	dB
	340 - 600	—	0.3	0.5	
Directivity	10	15	21	—	dB
	50	18	22.8	—	
	340	16	24.5	—	
	600	14	25.6	—	
Return Loss (Input)	10	12	15	—	dB
	50	20	23	—	
	340	19	25	—	
	600	13	17	—	
Return Loss (Output)	10	12	15	—	dB
	50	20	26	—	
	340	19	28	—	
	600	15	19	—	
Return Loss (Coupling)	10	12	15	—	dB
	50	20	23	—	
	340	19	27	—	
	600	15	30	—	
Input Power**	10 - 600	—	—	20	W

**The user must provide adequate means of heat removal to limit the temperature of ground connections 2,3,6,7 to 85°C, in order to ensure proper performance. At 25°C ambient temperature this requires thermal resistance of the user's PC board heat sink to be 20°C/W or less when the unit is driven at maximum specified RF input power, 20W. At higher ambient temperature, with the same heat sink, input power in watts must not exceed 20W x (85°C - T_{AMBIENT}) / 60°C.

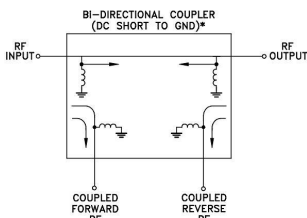
Outline Drawing



PCB Land Pattern



Suggested Layout, Tolerance to be within ± 0.05 mm



Pin Connections	
Input	8
Output	1
Forward	5
Reverse	4
Ground	2,3,6,7

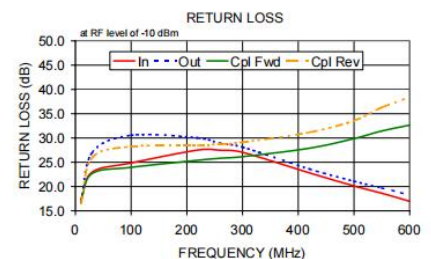
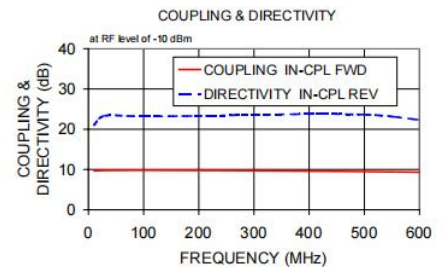
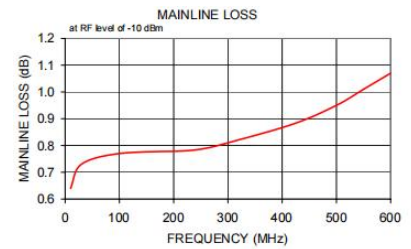
Maximum Ratings

Operating Temperature	-20 °C to 85 °C
Storage Temperature	-55 °C to 100 °C
Power Input (as a splitter)	20 W max.

Case temperature is defined as temperature on ground leads.
Permanent damage may occur if any of these limits are exceeded.

Typical Performance Data

Frequency (MHz)	Mainline Loss (dB)		Coupling (dB)		Directivity (dB)		Return Loss (dB)		
	In-Out	In-Cpl Fwd	Out-Cpl Rev	Out-Cpl Fwd	In-Cpl Rev	In	Out	Cpl Fwd	Cpl Rev
10.00	0.64	9.66	9.81	21.07	21.37	17.37	16.72	17.18	16.46
30.00	0.73	9.75	9.89	23.34	23.55	22.96	26.98	22.68	25.93
100.00	0.77	9.81	9.91	23.17	23.76	24.86	30.56	23.95	28.23
220.00	0.78	9.76	9.81	23.33	24.25	27.52	30.01	25.41	28.47
260.00	0.79	9.74	9.77	23.47	24.44	27.47	28.89	25.83	28.73
300.00	0.81	9.70	9.72	23.60	24.43	27.05	28.11	26.16	29.10
420.00	0.88	9.58	9.55	23.76	25.83	22.81	23.61	27.89	31.16
500.00	0.95	9.47	9.43	23.62	26.73	20.12	21.09	29.87	33.58
550.00	1.01	9.39	9.34	23.15	27.81	18.62	19.71	31.45	36.30
600.00	1.07	9.31	9.23	22.30	28.25	16.96	18.25	32.64	38.36



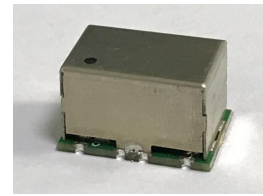
RF-2C-SYDC-20-31HP

Features

- high power, 50W max. with output load VSWR 2.0 max
- high power, 20W max. with output open or short
- low mainline loss, 0.1 dB typ.
- high directivity, 33 dB typ.
- excellent flatness, 0.1 dB typ.

Applications

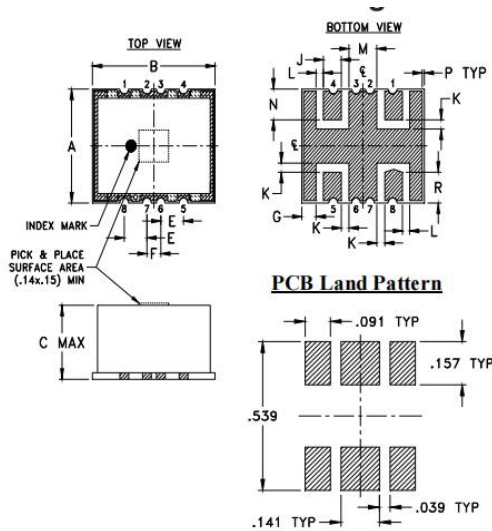
- military mobile
- signal monitoring



50Ω 20 dB Coupling 1.5 to 30 MHz 50 Watt

Electrical Specifications at 25°C					
Parameter	Condition (MHz)	Min.	Typ.	Max.	Unit
Frequency Range		1.5	-	30	MHz
Mainline Loss (above theoretical loss, 0.044 dB)	15-30	-	0.06	0.25	dB
Coupling	1.5-30	19.5	20.5	21.5	dB
Coupling Flatness (±)	1.5-30	-	0.05	0.2	dB
Directivity	1.5-30	22	33	-	dB
Return Loss (Input)	1.5-30	20	25	-	dB
Return Loss (Output)	1.5-30	20	25	-	dB
Return Loss (Coupling)	1.5-30	18	24	-	dB
Input Power	1.5-30	-	-	50	W

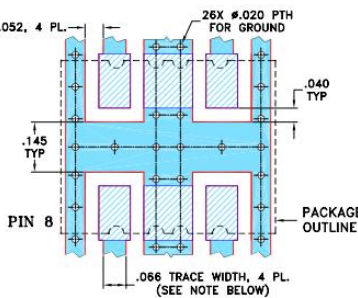
Outline Drawing



PCB Land Pattern

Pad Connections	
Input	8
Output	1
Coupled(Forward)	5
Coupled(Reverse)	4
Ground	2,3,6,7

Suggested PCB Layout

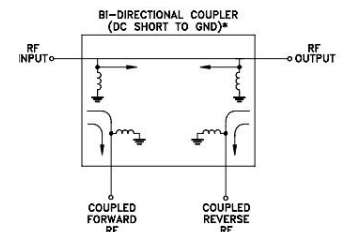


NOTES:

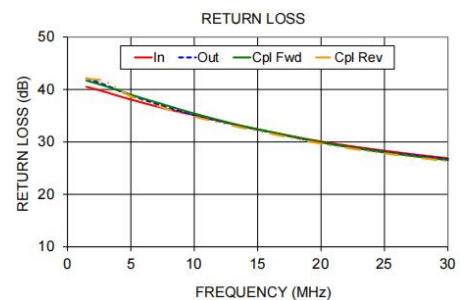
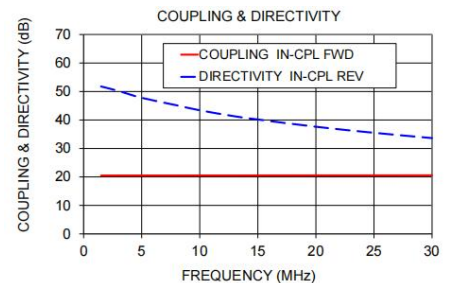
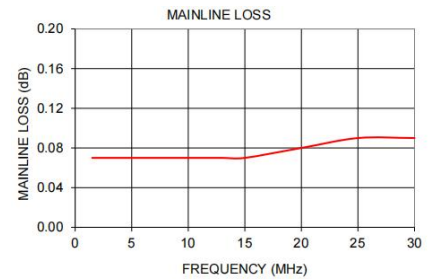
1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
 2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
-

Maximum Ratings	
*Operating Temperature, Case	-40°C to 65°C
Storage Temperature	-55°C to 100°C

*Case temperature is defined as temperature on ground leads. Permanent damage may occur if any of these limits are exceeded.



* ELECTRICAL SCHEMATIC IS FOR BI-DIRECTIONAL COUPLER WITH INTERNAL TRANSFORMER(S) THAT ROUTES DC FROM RF PORTS TO GROUND.



Suggested L ayout, Tolerance to be within ±0.05mm

Outline Dimensions: Unit (mm)					
A	B	C	E	F	G
12.70	15.7 5	9.14	2.92	1.78	1.85
H	J	K	L	M	N
-	2.29	1.02	0.94	3.56	3.43
P	Q	R	wt		
0.25	-	3.43	3.0g		