SURFACE MOUNT, HIGH POWER

Bi-Directional Coupler SYDC-10-52VHP+

50Ω 10 dB Coupling 30 to 512 MHz 35 Watt

THE BIG DEAL

- High power handling, 35W
- Very low mainline loss, 0.5 dB
- Excellent VSWR, 1.18

Generic photo used for illustration purposes only

CASE STYLE: PD1647-1

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

APPLICATIONS

- Military mobile

PRODUCT OVERVIEW

Mini-Circuits' SYDC-10-52VHP+ surface mount bi-directional coupler provides high power handling up to 35W and low mainline loss of 0.5 dB for applications from 30 to 512 MHz. This model features a unique heat sinking design that enables reliable operation at high power without overheating, making it an ideal choice for systems where high power capability and small size are desired. The coupler features core and wire construction mounted on an 8 -lead printed laminate base with wraparound terminations for excellent solderability. The unit measures 0.75 x 0.52 x 0.43", accommodating dense circuit board layouts.

KEY FEATURES

Feature	Advantages
High power handling • 35W, 2.0 VSWR max. • 10W, output open or short	Usable in many systems with high-power requirements
Low mainline loss, 0.5 dB	Provides excellent through-path signal power transmission.
Good directivity, up to 22 dB	High directivity allows accurate signal sampling through the coupled port with minimal measurement error.
Excellent return loss, up to 25 dB (input/output/coupling)	Provides excellent matching in 50Ω systems with minimal signal reflection.
Small size, 0.75 x 0.52 x 0.43"	Provides high power capability while saving space in systems with tight layouts.

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ELECTRICAL SPECIFICATIONS AT 25°C[1]

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range		30		512	MHz
Mainline Loss (above theoretical loss 0.5 dB)	30 450 512	— — —	0.3 0.45 0.65	0.5 0.8 0.9	dB
Coupling	30-512	—	10±0.8	—	dB
Coupling Flatness(±)	30-512	—	0.4	0.6	dB
Directivity	30-250 250-450 450-512	18 16 14	22 20 18	— — —	dB
Return Loss (Input)	30-250 250-450 450-512	18 20 17	20 25 23	— — —	dB
Return Loss (Output)	30-250 250-450 450-512	18 20 18	20 26 25	— — —	dB
Return Loss (Coupling)	30-250 250-450 450-512	18 16 15	20 20 18	— — —	dB
Input Power[2]	30-512	—	—	35	W

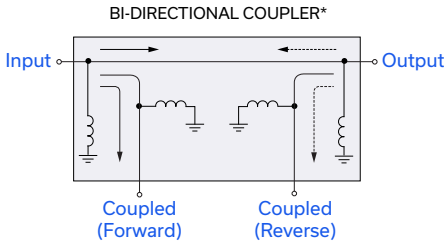
1. Tested on Evaluation Board TB-SYDC1052VHP+
2. The user must provide adequate means of heat removal to limit the temperature of ground under the PCB to 65°C, in order to ensure proper performance. At 25°C ambient temperature this requires thermal resistance of the user's PC board heat sink to be 3.5°C/W or less when the unit is driven at maximum specified RF input power, 35W. At higher ambient temperature, with the same heat sink. Input power in watts must not exceed 35W x (65° C -Tambient)÷40°C.

MAXIMUM RATINGS

Parameter	Ratings
Operating Temperature	-40°C to 65°C
Storage Temperature	-55°C to 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

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PAD CONNECTIONS

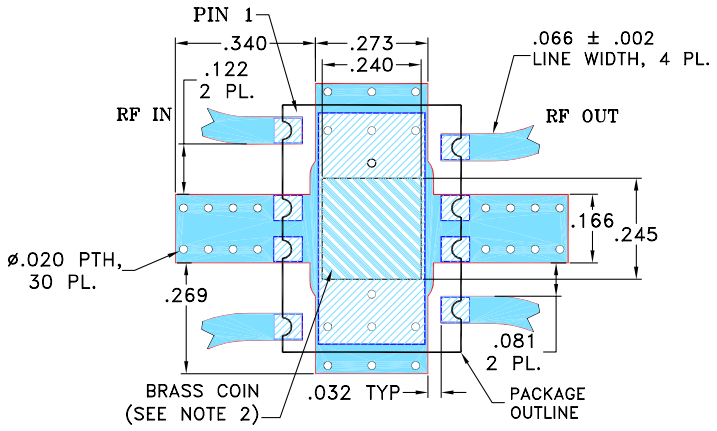
INPUT	1
OUTPUT	8
COUPLED (FORWARD)	4
COUPLED (REVERSE)	5
GROUND	2, 3, 6, 7

*PRODUCT MARKING: SYDC-10-52VHP

*Marking may contain other features or characters for internal lot control

SUGGESTED PCB LAYOUT (PL-351)

REFER TO APPLICATION NOTE: AN-00-017



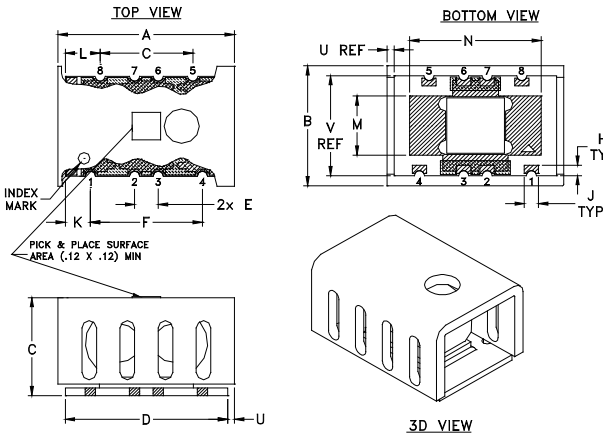
NOTES:
1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. SUGGEST TO PROVIDE BRASS COIN FOR BETTER HEAT TRANSFER FROM THE UNIT. OTHERWISE PROVIDE ARRAY OF THERMAL VIAS ADEQUATE TO LIMIT TEMPERATURE OF GROUND CONNECTIONS UNDER THE UNIT TO 65°C.
3. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

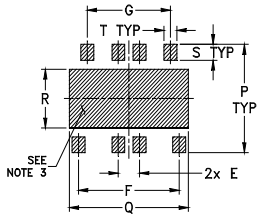
DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

DENOTES BRASS COIN.

OUTLINE DRAWING



PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

OUTLINE DIMENSIONS (Inches / mm)

A	B	C	D	E	F	G	H	J	K	L
.750	.520	.43	.690	.100	.476	.394	.045	.060	.107	.148
19.05	13.21	10.92	17.53	2.54	12.09	10.01	1.14	1.52	2.72	3.76

M	N	P	Q	R	S	T	U	V		wt
.257	.560	.475	.561	.258	.069	.061	.03	.433		grams
6.53	14.22	12.07	14.25	6.55	1.75	1.55	0.76	11.00		3.00

TAPE & REEL INFORMATION: F115

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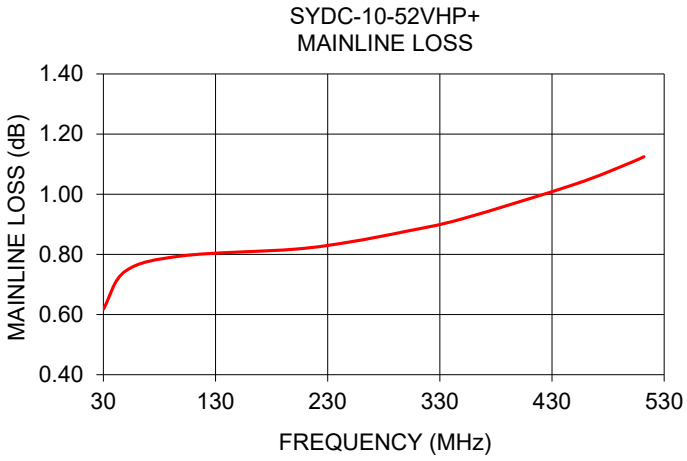
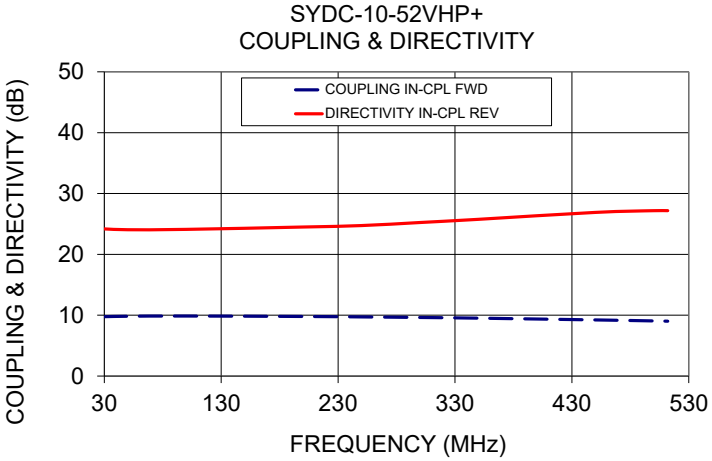
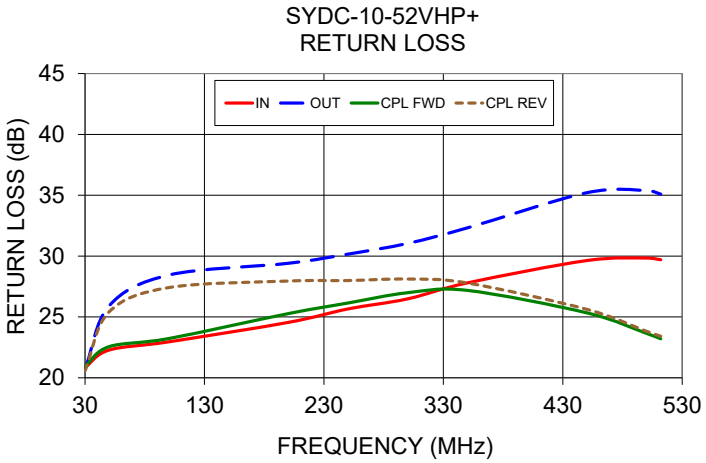
TYPICAL PERFORMANCE DATA

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
30.0	0.62	9.8	9.8	22.4	24.2	20.8	20.7	21.0	20.6
50.0	0.75	9.8	10.0	22.7	24.0	22.3	25.9	22.5	25.4
100.0	0.79	9.9	10.0	22.2	24.1	22.9	28.4	23.2	27.4
200.0	0.82	9.8	9.9	21.5	24.5	24.5	29.4	25.3	27.9
250.0	0.84	9.7	9.8	21.1	24.7	25.7	30.2	26.1	28.0
300.0	0.88	9.6	9.7	20.8	25.2	26.5	31.0	27.0	28.1
350.0	0.92	9.5	9.6	20.3	25.8	27.8	32.3	27.2	27.8
450.0	1.03	9.2	9.3	19.6	26.9	29.6	35.2	25.3	25.6
500.0	1.10	9.1	9.1	19.2	27.2	29.8	35.4	23.6	23.8
512.0	1.12	9.0	9.1	19.1	27.2	29.7	35.1	23.2	23.4







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.

C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the standard. Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/terms/viewterm.html