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SURFACE MOUNT

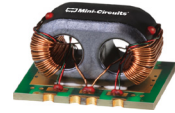
Bi-Directional Coupler

SYDC-20-31HP+

50Ω 20 dB Coupling 1 to 30 MHz 50 Watt

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.



Generic photo used for illustration purposes only

CASE STYLE: AH1596

APPLICATIONS

- Military mobile
- Signal monitoring

+RoHS Compliant

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

ELECTRICAL SPECIFICATIONS AT 25°C¹

Parameter	Condition (MHz)	Min.	Typ.	Max.	Unit
Frequency Range		1.5	—	30	MHz
Mainline Loss (above theoretical 0.044 dB)	1.5-30	—	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 ²	1.5-30	—	—	50	W

1. Tested on Evaluation Board TB-SYDC20-31HP+

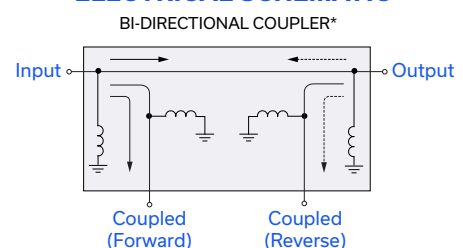
2. The user must provide adequate means of heat removal to limit the temperature of ground connections 2,3,6,7, to 65°C, in order to ensure proper performance. At 25°C ambient temperature this requires thermal resistance of the user's PC board heat sink to be 10°C/W or less when the unit is driven at maximum specified RF input power, 50 watt. At higher ambient temperature, with the same heat sink. Input power in watts must not exceed 50W (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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REV. C
ECO-015468
ED-14256
SYDC-20-31HP+
YQ/CP/AM
221026

PAGE 1 OF 3



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SURFACE MOUNT

Bi-Directional Coupler

SYDC-20-31HP+

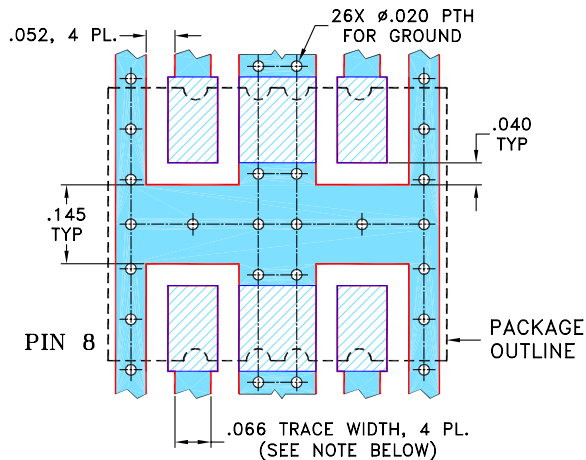
50Ω 20 dB Coupling 1 to 30 MHz 50 Watt

PAD CONNECTIONS

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

PRODUCT MARKING: N/A

SUGGESTED PCB LAYOUT (PL-339)



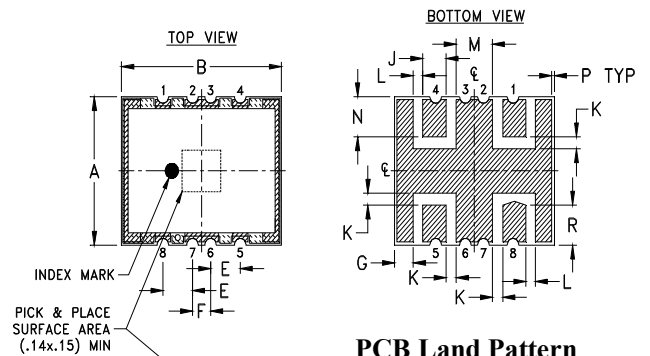
NOTES:

- TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" $\pm$.002"; 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.

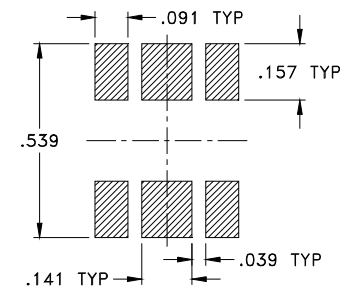
 DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

 DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

OUTLINE DRAWING



PCB Land Pattern



Suggested Layout,
Tolerance to be within $\pm .002$

OUTLINE DIMENSIONS (Inches)
mm

A	B	C	E	F	G	H	J
.50	.62	.36	.115	.070	.073	--	.090
12.70	15.75	9.14	2.92	1.78	1.85	--	2.29
K	L	M	N	P	Q	R	wt
.040	.037	.140	.135	.010	--	.135	grams
1.02	0.94	3.56	3.43	0.25	--	3.43	3.00



Mini-Circuits

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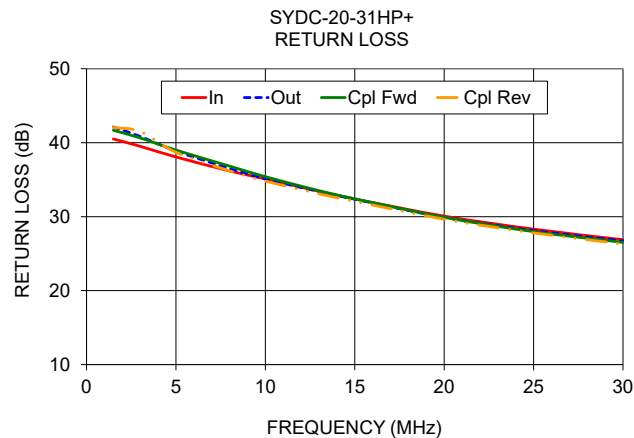
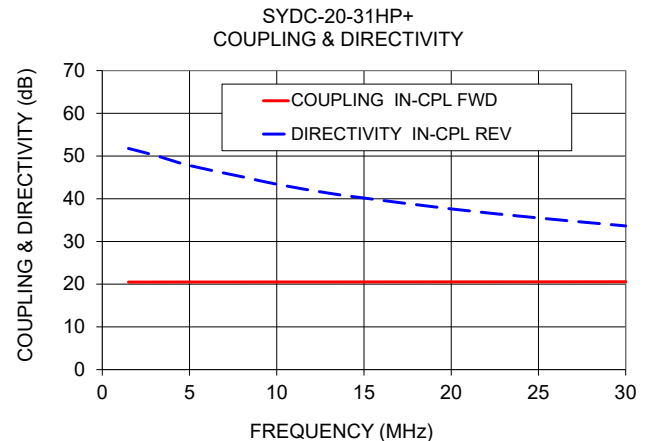
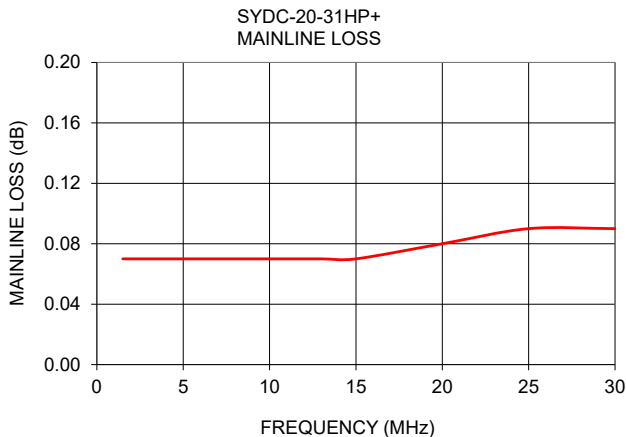
Bi-Directional Coupler

SYDC-20-31HP+

50Ω 20 dB Coupling 1 to 30 MHz 50 Watt

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
1.50	0.07	20.49	20.45	51.77	45.19	40.50	42.13	41.68	42.07
3.00	0.07	20.50	20.46	50.18	45.85	39.51	40.84	40.64	41.51
5.00	0.07	20.51	20.47	47.78	44.28	38.07	38.87	39.00	38.71
8.00	0.07	20.51	20.47	45.16	42.62	36.18	36.50	36.83	36.19
10.00	0.07	20.52	20.48	43.40	41.50	35.11	35.11	35.40	34.81
13.00	0.07	20.52	20.48	41.29	39.87	33.42	33.40	33.51	33.09
15.00	0.07	20.53	20.49	40.17	39.01	32.39	32.36	32.41	32.07
20.00	0.08	20.54	20.50	37.62	36.63	30.07	29.90	29.91	29.65
25.00	0.09	20.55	20.52	35.50	34.74	28.31	28.12	27.98	27.80
30.00	0.09	20.57	20.54	33.64	33.09	26.88	26.72	26.52	26.31



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



Bi-Directional Coupler

SYDC-20-31HP+

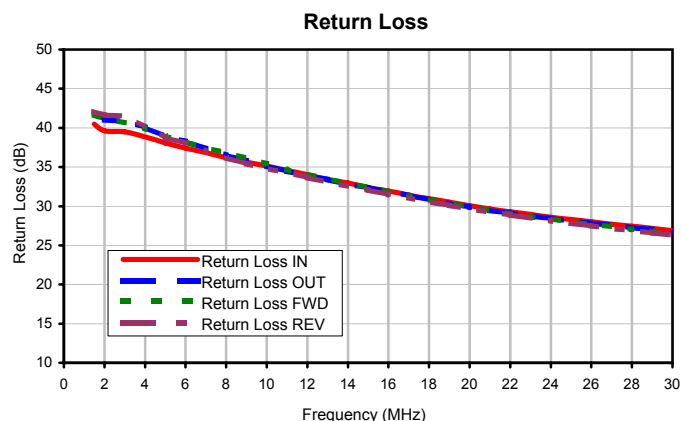
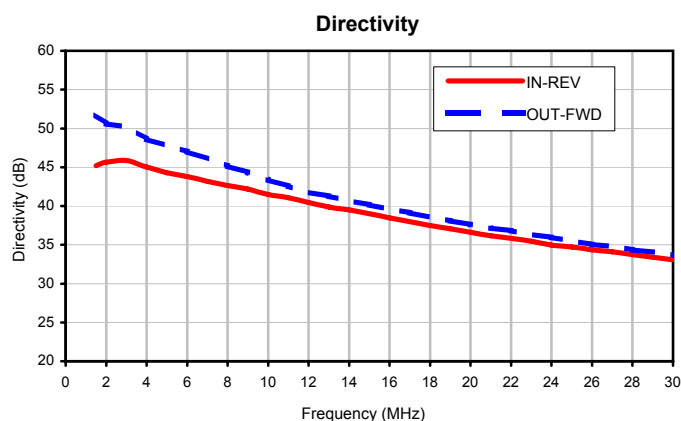
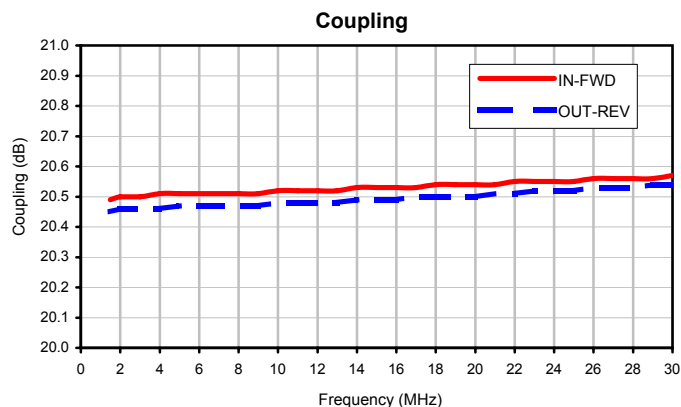
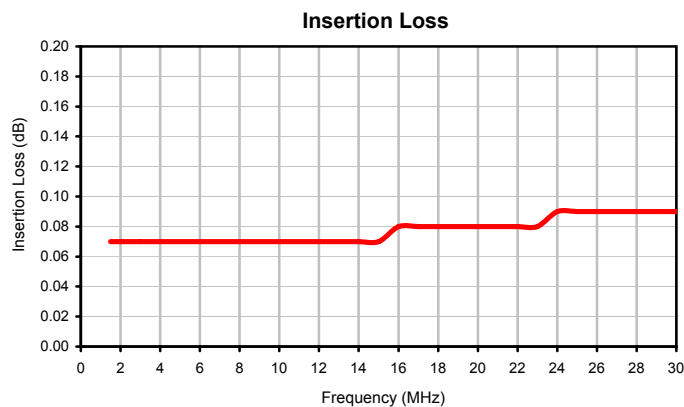
Typical Performance Data

FREQ. (MHz)	INSERTION LOSS (dB) IN-OUT	COUPLING		DIRECTIVITY		RETURN LOSS			
		(dB)		(dB)		(dB)			
		IN-FWD	OUT-REV	IN-REV	OUT-FWD	IN	OUT	FWD	REV
1.5	0.07	20.49	20.45	45.19	51.77	40.50	42.13	41.68	42.07
2.0	0.07	20.50	20.46	45.65	50.60	39.62	41.02	41.10	41.61
3.0	0.07	20.50	20.46	45.85	50.18	39.51	40.84	40.64	41.51
4.0	0.07	20.51	20.46	45.03	48.62	38.86	40.07	39.95	40.12
5.0	0.07	20.51	20.47	44.28	47.78	38.07	38.87	39.00	38.71
6.0	0.07	20.51	20.47	43.80	47.02	37.43	38.29	38.21	38.07
7.0	0.07	20.51	20.47	43.19	46.05	36.83	37.33	37.45	37.02
8.0	0.07	20.51	20.47	42.62	45.16	36.18	36.50	36.83	36.19
9.0	0.07	20.51	20.47	42.19	44.31	35.61	35.79	36.10	35.41
10.0	0.07	20.52	20.48	41.50	43.40	35.11	35.11	35.40	34.81
11.0	0.07	20.52	20.48	41.08	42.55	34.55	34.47	34.66	34.28
12.0	0.07	20.52	20.48	40.45	41.79	34.01	33.89	34.09	33.67
13.0	0.07	20.52	20.48	39.87	41.29	33.42	33.40	33.51	33.09
14.0	0.07	20.53	20.49	39.49	40.66	32.95	32.81	32.94	32.53
15.0	0.07	20.53	20.49	39.01	40.17	32.39	32.36	32.41	32.07
16.0	0.08	20.53	20.49	38.48	39.58	31.94	31.84	31.83	31.51
17.0	0.08	20.53	20.50	37.97	39.13	31.42	31.35	31.31	31.08
18.0	0.08	20.54	20.50	37.47	38.52	30.94	30.84	30.82	30.57
19.0	0.08	20.54	20.50	37.07	38.11	30.51	30.31	30.38	30.09
20.0	0.08	20.54	20.50	36.63	37.62	30.07	29.90	29.91	29.65
21.0	0.08	20.54	20.51	36.18	37.15	29.66	29.46	29.45	29.23
22.0	0.08	20.55	20.51	35.85	36.82	29.29	29.13	29.05	28.88
23.0	0.08	20.55	20.52	35.47	36.32	28.94	28.75	28.65	28.46
24.0	0.09	20.55	20.52	34.97	35.97	28.61	28.43	28.37	28.14
25.0	0.09	20.55	20.52	34.74	35.50	28.31	28.12	27.98	27.80
26.0	0.09	20.56	20.53	34.35	35.07	28.00	27.83	27.70	27.50
27.0	0.09	20.56	20.53	34.11	34.81	27.70	27.57	27.37	27.17
28.0	0.09	20.56	20.53	33.75	34.36	27.44	27.26	27.05	26.88
29.0	0.09	20.56	20.54	33.42	34.07	27.15	27.02	26.80	26.58
30.0	0.09	20.57	20.54	33.09	33.64	26.88	26.72	26.52	26.31

Bi-Directional Coupler

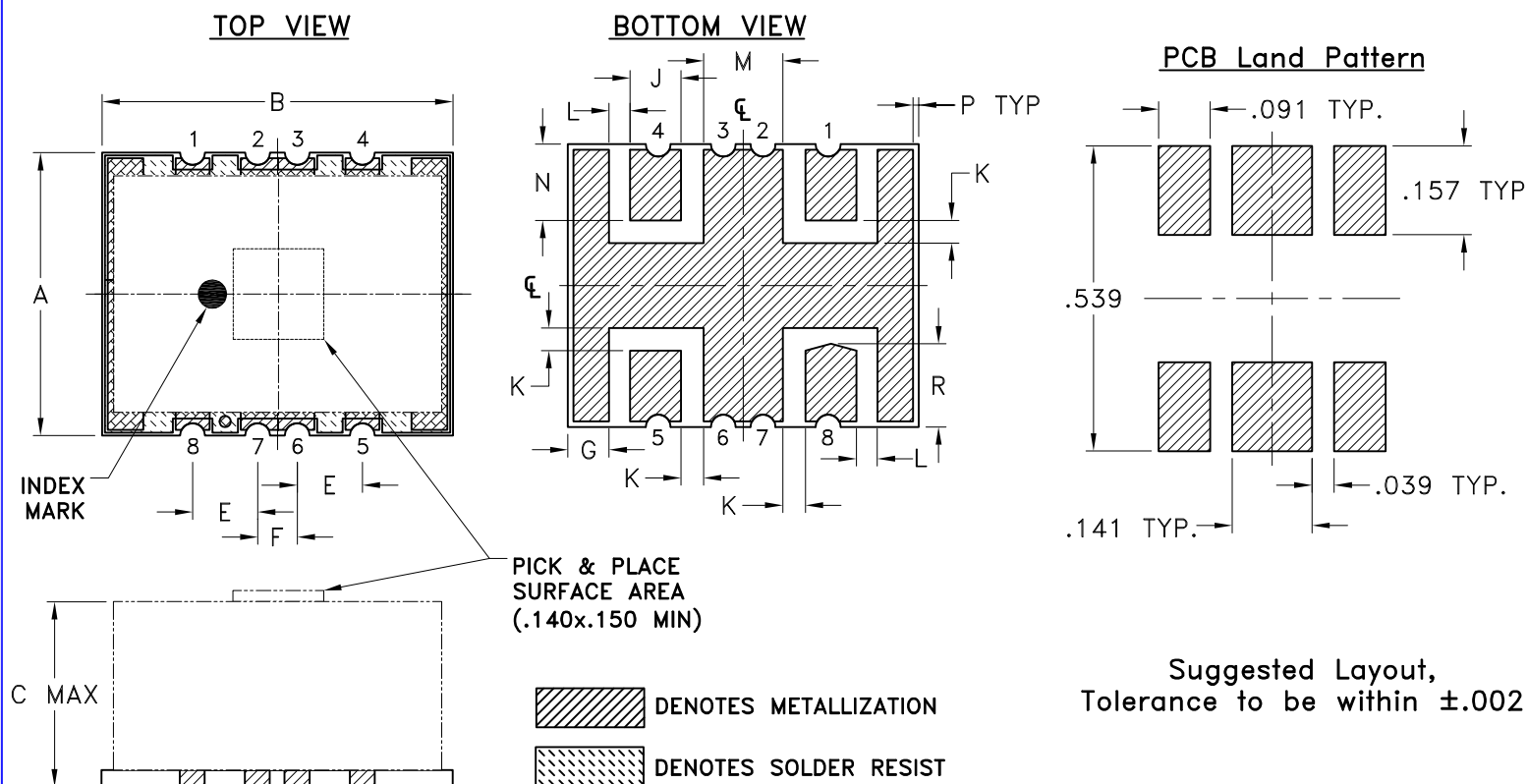
Typical Performance Curves

SYDC-20-31HP+



Outline Dimensions

AH1596



Suggested Layout,
Tolerance to be within $\pm .002$

CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N
AH1596	.50 (12.70)	.62 (15.75)	.36 (9.14)	- -	.115 (2.92)	.070 (1.78)	.073 (1.85)	- -	.090 (9.65)	.040 (1.02)	.037 (0.94)	.140 (3.56)	.135 (3.43)

CASE #	P	Q	R	WT, GRAM
AH1596	.010 (0.25)	- -	.135 (3.43)	3.00

Dimensions are in inches (mm). Tolerances: 2 Pl. $\pm .01$; 3 Pl. $\pm .005$

Notes:

- Open style, Base material: Printed wiring laminate.
- Termination finish: 3-5 μ inch (.08-.13 microns) Gold over 120-240 μ inch (3.05-6.10 microns) Nickel plate.
All models, (+) suffix.

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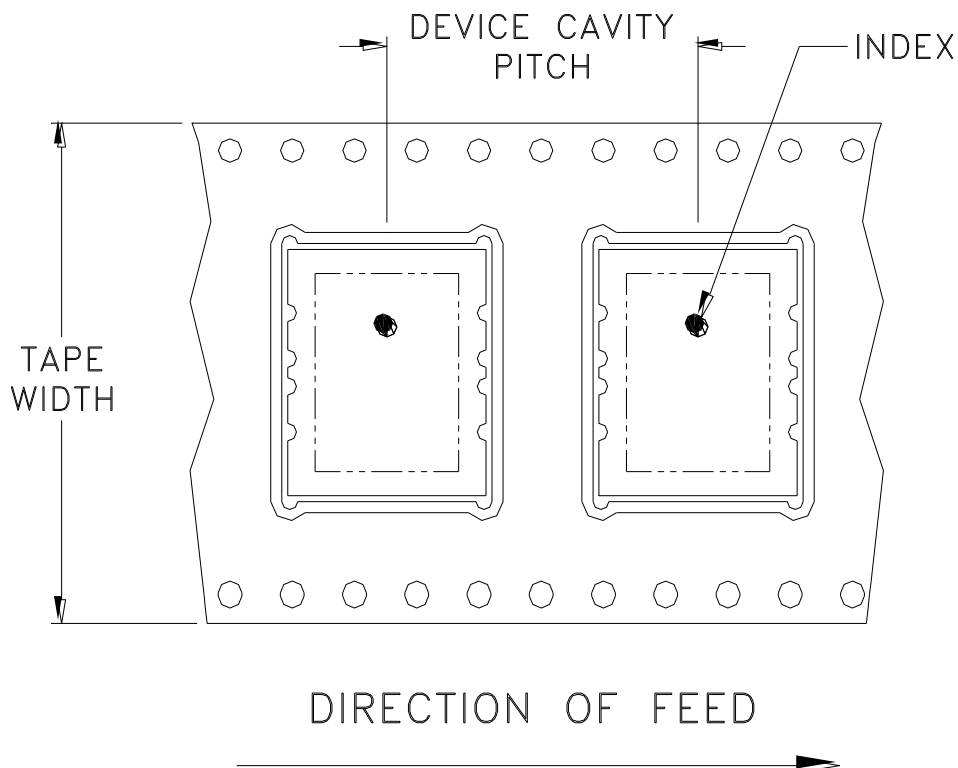


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RF/IF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F107

DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
32	20	7	Small quantity standards (see note)	10
				20
				50
				100
		13	Standard	200

Note: Please consult individual model data sheet to determine device per reel availability.

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf

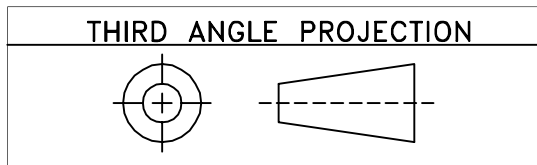


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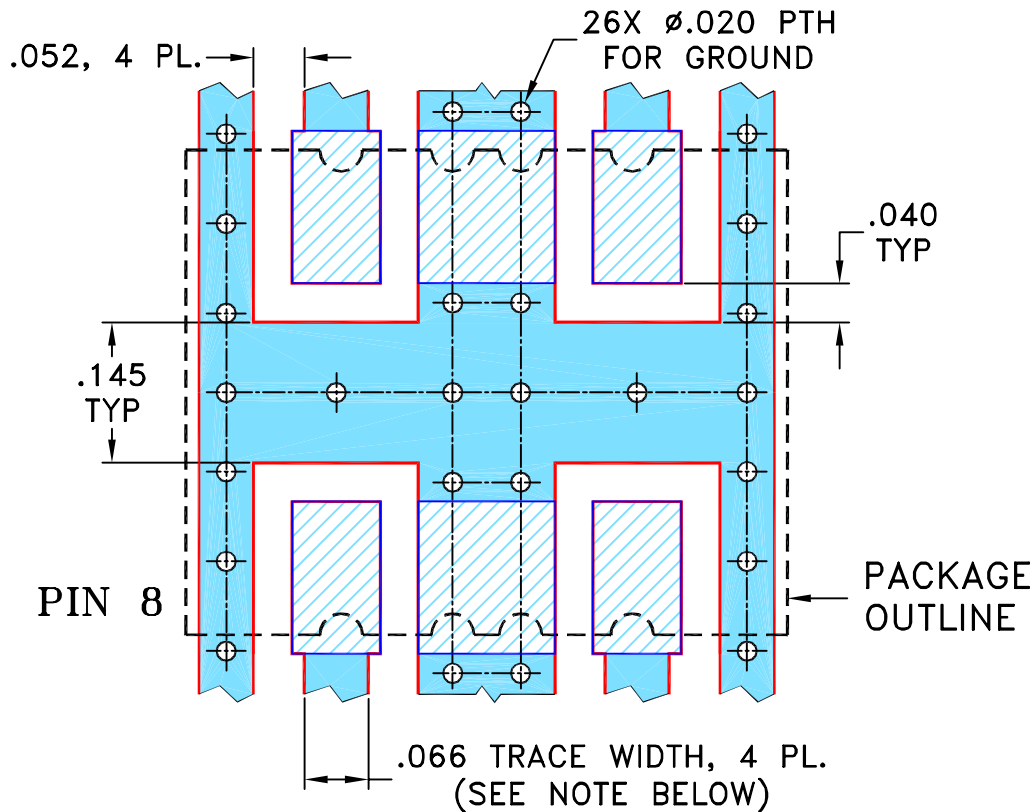
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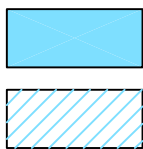
REVISIONS					
REV OR	ECN No.	DESCRIPTION	DATE	DR	AUTH
	M130233	NEW RELEASE	05/11/11	AV	YQ

SUGGESTED MOUNTING CONFIGURATION FOR
AH1596 CASE STYLE, "08DC03" PIN CODE



NOTES:

- TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" $\pm$.002"; 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

UNLESS OTHERWISE SPECIFIED	INITIALS		DATE
DIMENSIONS ARE IN INCHES TOLERANCES ON: 2 PL DECIMALS $\pm$ 3 PL DECIMALS $\pm$.005 ANGLES $\pm$ FRACTIONS $\pm$	DRAWN	AV	04/27/11
	CHECKED	IL	05/11/11
	APPROVED	YQ	05/11/11



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 Brooklyn NY 11235

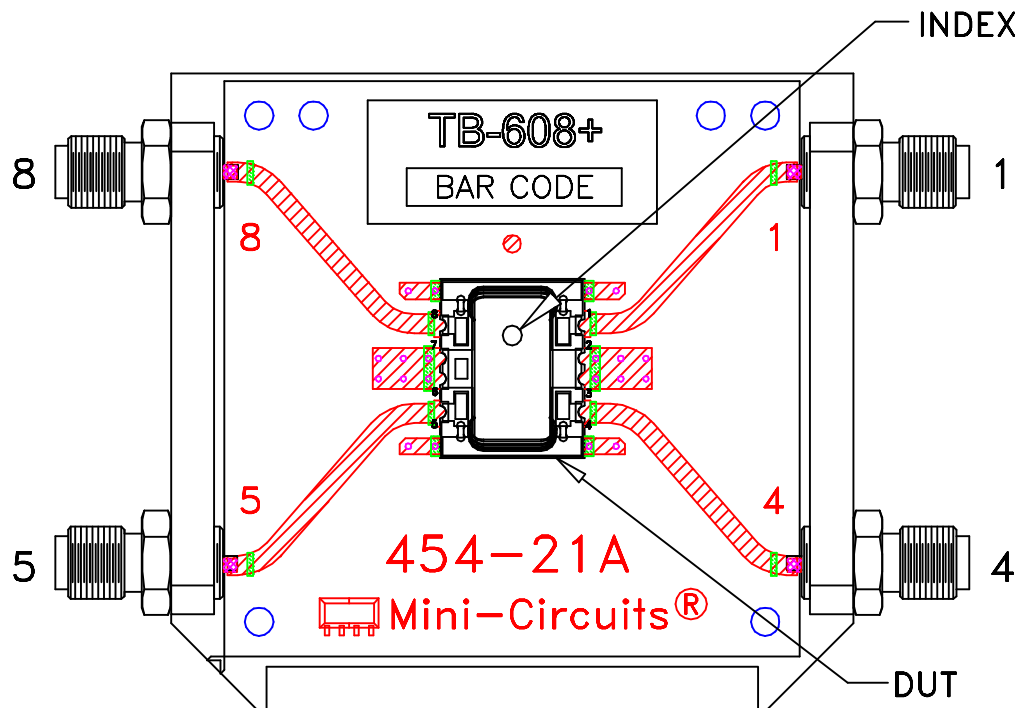
PL, 08DC03, AH1596, TB-608+

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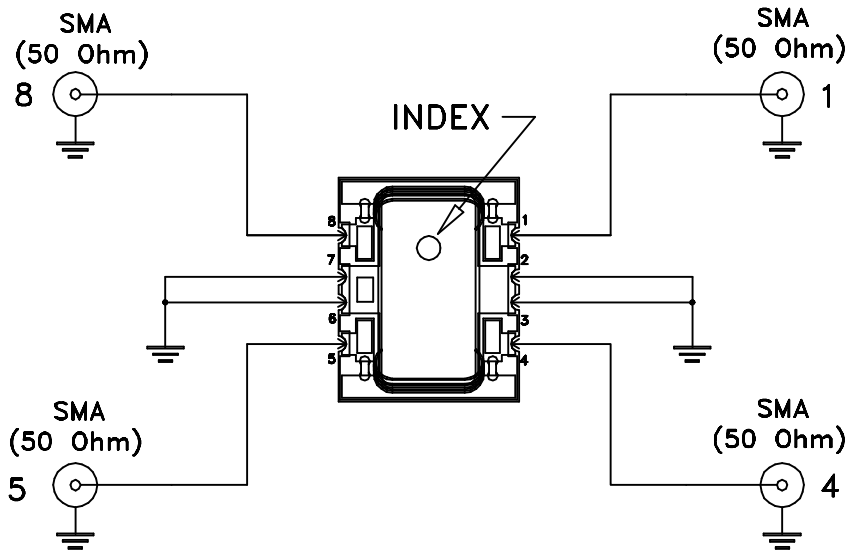
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-339	OR
FILE:	98PL339	SCALE:	SHEET: 1 OF 1

Evaluation Board and Circuit

For Pin Connection Refer to
Data Sheet of the DUT



TB-608+



Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: R04350 or equivalent.
Dielectric Constant=3.5, Thickness=.030 inch.

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All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-40° to 65° C Case Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Humidity	90 to 95% RH, 240 hours, 50°C	MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Solder Reflow Heat	Sn-Pb Eutetic Process: 225°C peak Pb-Free Process 245° - 250°C peak	J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, Para 4.2.5, Test S, 95% Coverage
Vibration (High Frequency)	20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)	MIL-STD-202, Method 204, Condition D
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215