

Surface Mount

Power Splitter/Combiner

2 Way-0° 50Ω 10 to 540 MHz 15 Watt

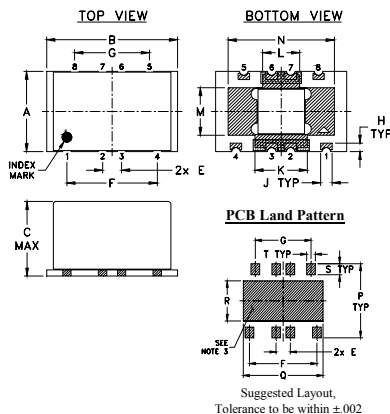
Maximum Ratings

Operating Temperature	-40°C to 65°C
Storage Temperature	-55°C to 100°C
Power Input (as a splitter) ¹	15W max.
Internal Dissipation	6W max.
Permanent damage may occur if any of these limits are exceeded.	

Pin Connections

SUM PORT	1
OUTPUT PORT 1	4
OUTPUT PORT 2	5
GROUND	2,3,6,7
ISOLATION (NOT USED)	8

Outline Drawing

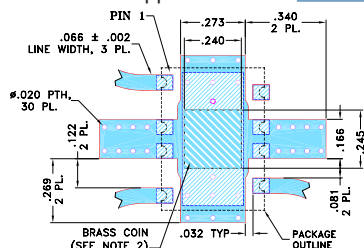


Outline Dimensions (inch mm)

A	B	C	E	F	G	H	J	K
.433	.690	.415	.100	.476	.394	.045	.060	.276
11.00	17.53	10.54	2.54	12.09	10.01	1.14	1.52	7.01
L	M	N	P	Q	R	S	T	wt
.194	.257	.560	.475	.561	.258	.069	.061	grams
4.93	6.53	14.22	12.07	14.25	6.55	1.75	1.55	2.80

Demo Board MCL P/N: TB-655+ Suggested PCB Layout (PL-359)

Refer to Application Note: [AN-00-017](#)



NOTES:

- 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.
 - 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.
 - 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.

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/MCLStore/terms.jsp

Features

- wideband, 10 to 540 MHz
- low insertion loss, 0.5 dB typ.
- excellent amplitude unbalance, 0.1 dB typ.
- high power input, 15 Watt
- high power combiner, 3 Watt each port
- good isolation, 20 dB typ.

Applications

- VHF/UHF
- communications systems
- receivers & transmitters
- instrumentation
- military mobile

SYPS-2-52HP+



Generic photo used for illustration purposes only

CASE STYLE: AH1647

+RoHS Compliant

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

Electrical Specifications at 25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Frequency Range		10		540	MHz
Insertion Loss Above 3.0 dB	10-30	—	0.2	0.5	dB
	30-250	—	0.3	0.7	
	250-540	—	0.5	1.1	
Isolation	10-30	14	19	—	dB
	30-250	18	25	—	
	250-540	15	19	—	
Phase Unbalance	10-30	—	2	5	Degree
	30-250	—	1	4	
	250-540	—	1.5	5	
Amplitude Unbalance	10-30	—	0.15	0.4	dB
	30-250	—	0.1	0.4	
	250-540	—	0.1	0.4	
VSWR (Port S)	10-30	—	1.2	1.4	:1
	30-250	—	1.25	1.45	
	250-540	—	1.35	1.65	
VSWR (Port 1-2)	10-30	—	1.4	1.9	:1
	30-250	—	1.1	1.3	
	250-540	—	1.1	1.3	
IP3	10-30	45	50	—	dBm
	30-540	52	60	—	

1. The user must provide adequate means of heat removal to limit the temperature of ground connections under the PCB to 70°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 8°C/W.

electrical schematic



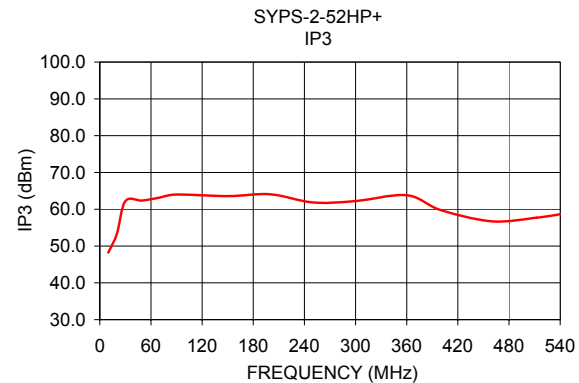
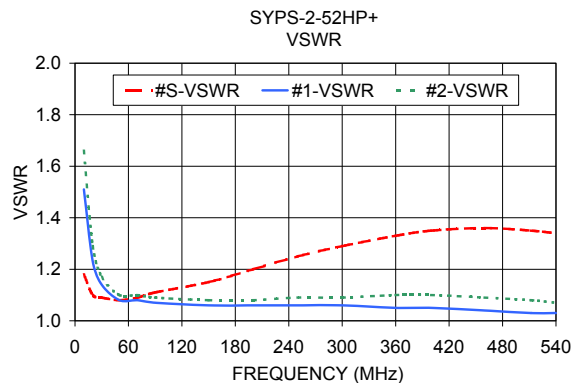
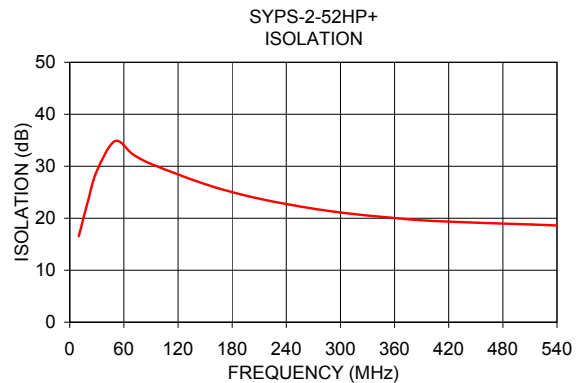
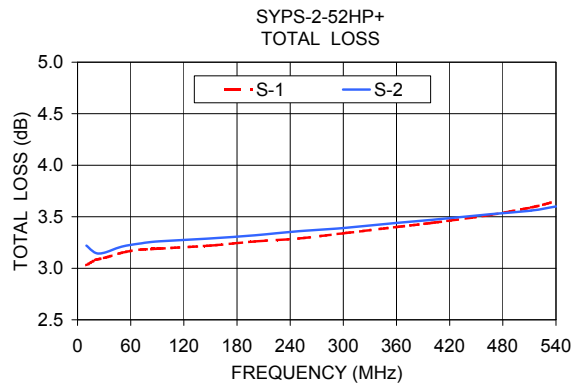
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M151107
SYPS-2-52HP+
ED-14605/2
WP/TD/AM
151006
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Typical Performance Data

Frequency (MHz)	Total Loss ¹ (dB)		Amplitude Unbalance (dB)	Isolation (dB)	Phase Unbalance (deg.)	VSWR S	VSWR 1	VSWR 2
	S-1	S-2						
10.00	3.03	3.22	0.19	16.55	2.42	1.18	1.51	1.66
20.00	3.08	3.15	0.07	23.20	1.28	1.10	1.23	1.29
30.00	3.10	3.15	0.05	29.09	0.74	1.09	1.14	1.17
50.00	3.15	3.21	0.05	34.84	0.20	1.08	1.08	1.10
70.00	3.18	3.24	0.07	32.29	0.03	1.09	1.08	1.10
90.00	3.19	3.26	0.06	30.46	0.09	1.11	1.07	1.09
150.00	3.22	3.29	0.06	26.57	0.36	1.15	1.06	1.08
200.00	3.26	3.32	0.06	24.16	0.49	1.20	1.06	1.08
250.00	3.29	3.36	0.06	22.43	0.64	1.25	1.06	1.09
300.00	3.34	3.39	0.05	21.11	0.76	1.29	1.06	1.09
360.00	3.40	3.44	0.04	20.03	0.87	1.33	1.05	1.10
400.00	3.44	3.47	0.03	19.52	0.96	1.35	1.05	1.10
460.00	3.51	3.52	0.01	19.08	1.07	1.36	1.04	1.09
512.00	3.59	3.56	0.02	18.80	1.16	1.35	1.03	1.08
540.00	3.65	3.60	0.05	18.61	1.22	1.34	1.03	1.07

1. Total Loss = Insertion Loss + 3dB splitter theoretical loss.



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2 Way-0° Power Splitter/Combiner

SYPS-2-52HP+

Typical Performance Data

FREQUENCY (MHz)	INSERTION LOSS (dB)		AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	PHASE UNBALANCE (deg.)	IP3 (dBm)	FREQUENCY (MHz)	VSWR (:1)		
	S-1	S-2						S	1	2
10.0	3.03	3.22	0.19	16.55	2.42	48.24	10.0	1.18	1.51	1.66
20.0	3.08	3.15	0.07	23.20	1.28	53.28	20.0	1.10	1.23	1.29
30.0	3.10	3.15	0.05	29.09	0.74	62.21	30.0	1.09	1.14	1.17
50.0	3.15	3.21	0.05	34.84	0.20	62.37	50.0	1.08	1.08	1.10
70.0	3.18	3.24	0.07	32.29	0.03	63.17	70.0	1.09	1.08	1.10
90.0	3.19	3.26	0.06	30.46	0.09	64.01	90.0	1.11	1.07	1.09
150.0	3.22	3.29	0.06	26.57	0.36	63.57	150.0	1.15	1.06	1.08
200.0	3.26	3.32	0.06	24.16	0.49	64.08	200.0	1.20	1.06	1.08
250.0	3.29	3.36	0.06	22.43	0.64	61.84	250.0	1.25	1.06	1.09
300.0	3.34	3.39	0.05	21.11	0.76	62.24	300.0	1.29	1.06	1.09
360.0	3.40	3.44	0.04	20.03	0.87	63.82	360.0	1.33	1.05	1.10
400.0	3.44	3.47	0.03	19.52	0.96	59.76	400.0	1.35	1.05	1.10
460.0	3.51	3.52	0.01	19.08	1.07	56.71	460.0	1.36	1.04	1.09
512.0	3.59	3.56	0.02	18.80	1.16	57.70	512.0	1.35	1.03	1.08
540.0	3.65	3.60	0.05	18.61	1.22	58.65	540.0	1.34	1.03	1.07



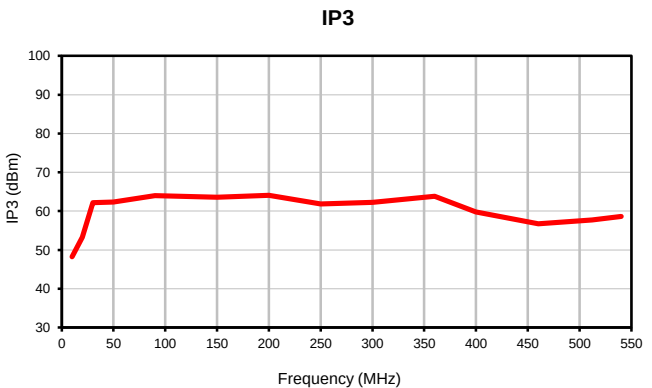
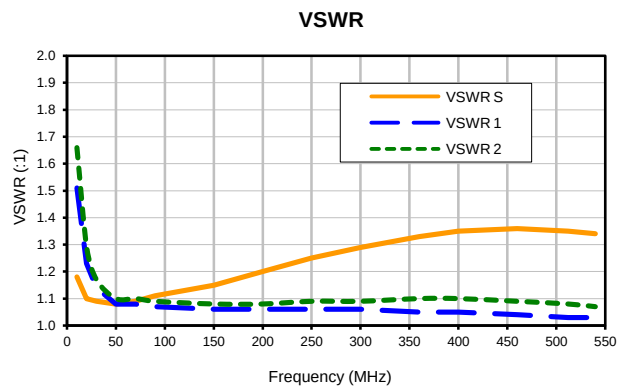
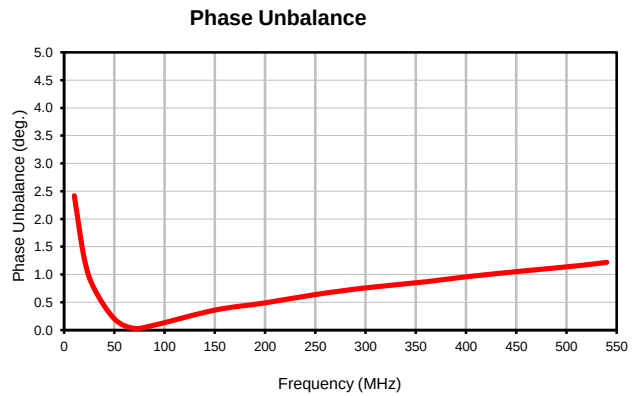
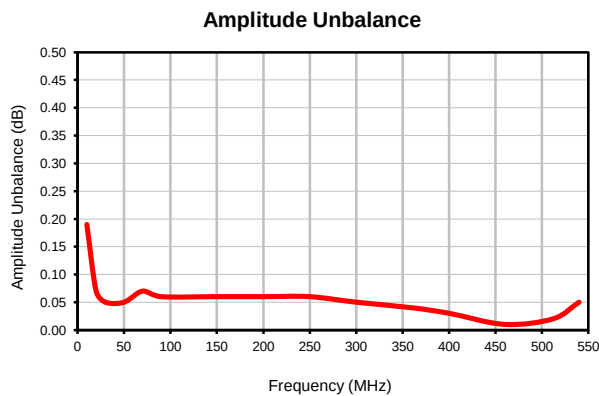
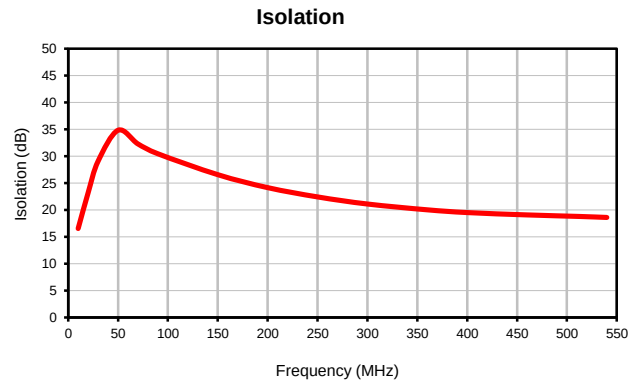
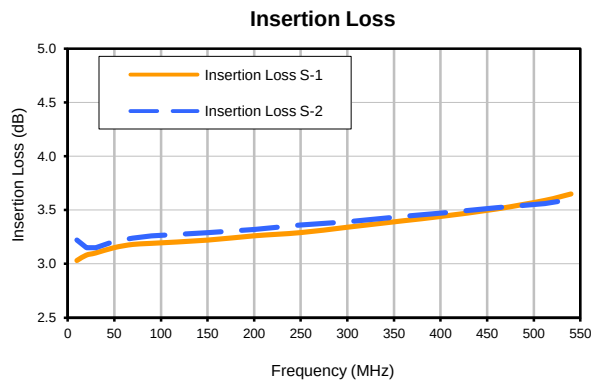
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IF/RF MICROWAVE COMPONENTS



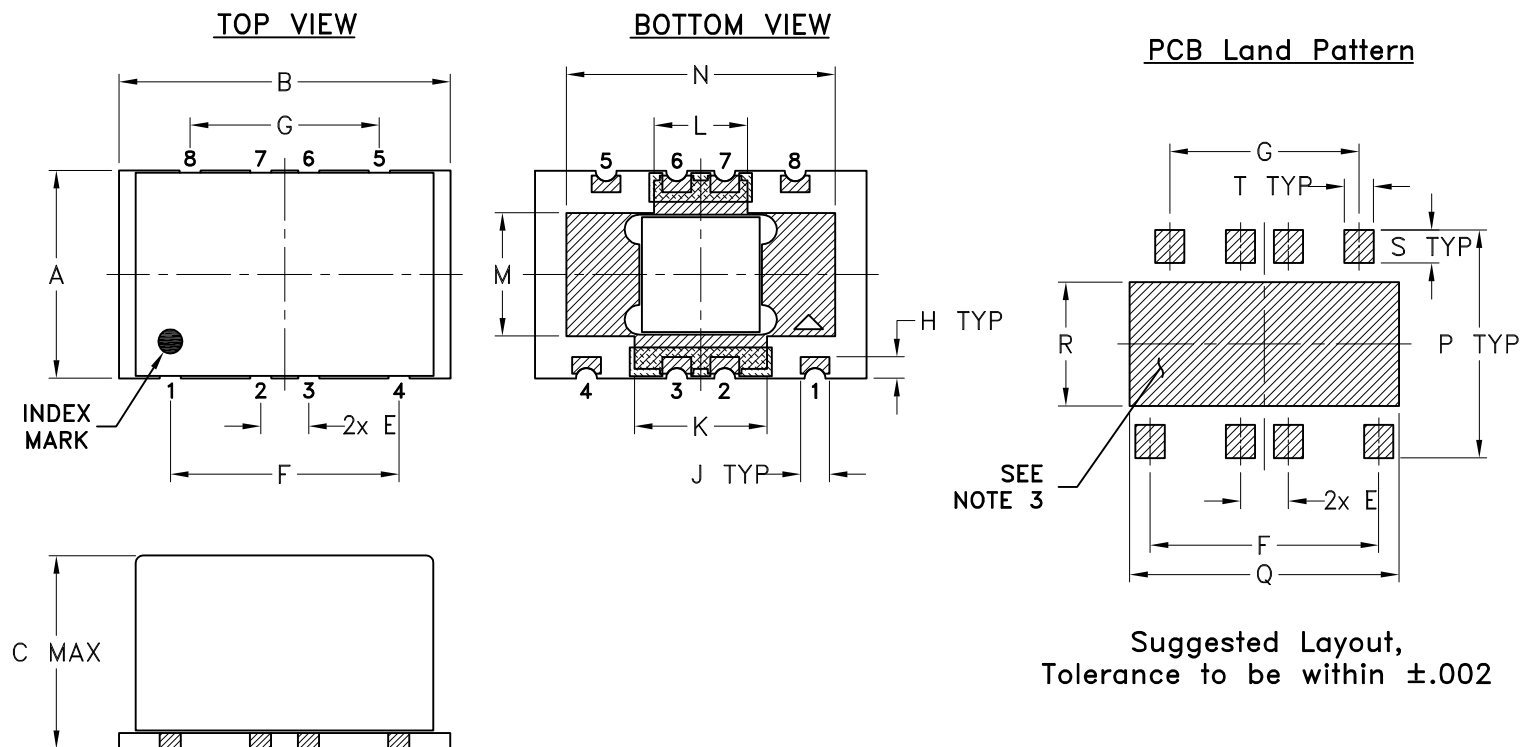
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Typical Performance Curves



Outline Dimensions

AH1647



CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N
AH1647	.433 (11.00)	.690 (17.53)	.415 (10.54)	- -	.100 (2.54)	.476 (12.09)	.394 (10.01)	.045 (1.14)	.060 (1.52)	.276 (7.01)	.194 (4.93)	.257 (6.53)	.560 (14.22)
CASE #	P	Q	R	S	T	WT, GRAM							
AH1647	.475 (12.07)	.561 (14.25)	.258 (6.55)	.069 (1.75)	.061 (1.55)	2.80							

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

Notes:

- Case material: Nickel Silver alloy.
- Base material: Printed wiring laminate.
- Termination finish: Tin copper solder alloy up to 0.07% Nickel. All models, (+) suffix.

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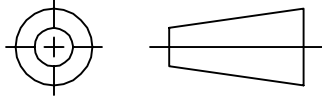
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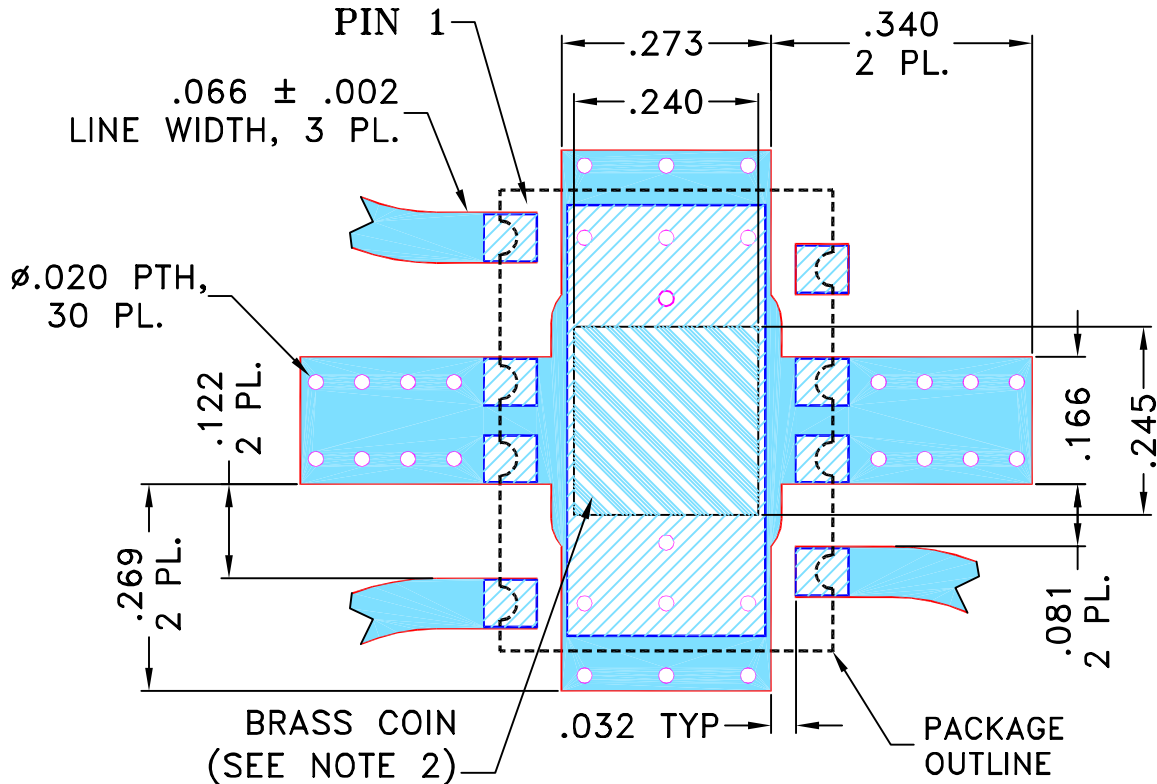
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M134975	NEW RELEASE	12/19/11	AV	SZ

**SUGGESTED MOUNTING CONFIGURATION FOR
AH1647 CASE STYLE, "08SP11" PIN CODE**

**NOTES:**

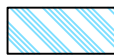
1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. SUGGEST TO PROVIDE BRASS COIN FOR BETTER HEAT TRANSFER FROM THE UNIT. OTHERWISE PROVIDE ARRAY OF THERMAL VIAS ADEQUATE TO LIMIT TEMPERATURE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

UNLESS OTHERWISE SPECIFIED

INITIALS

DATE

DIMENSIONS ARE IN INCHES

TOLERANCES ON:

2 PL DECIMALS ±

3 PL DECIMALS ± .005

ANGLES ±

FRACTIONS ±

DRAWN

AV

12/14/11

CHECKED

GF

12/19/11

APPROVED

SZ

12/19/11

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PL, 08SP11, AH1647, TB-655+

SIZE
A

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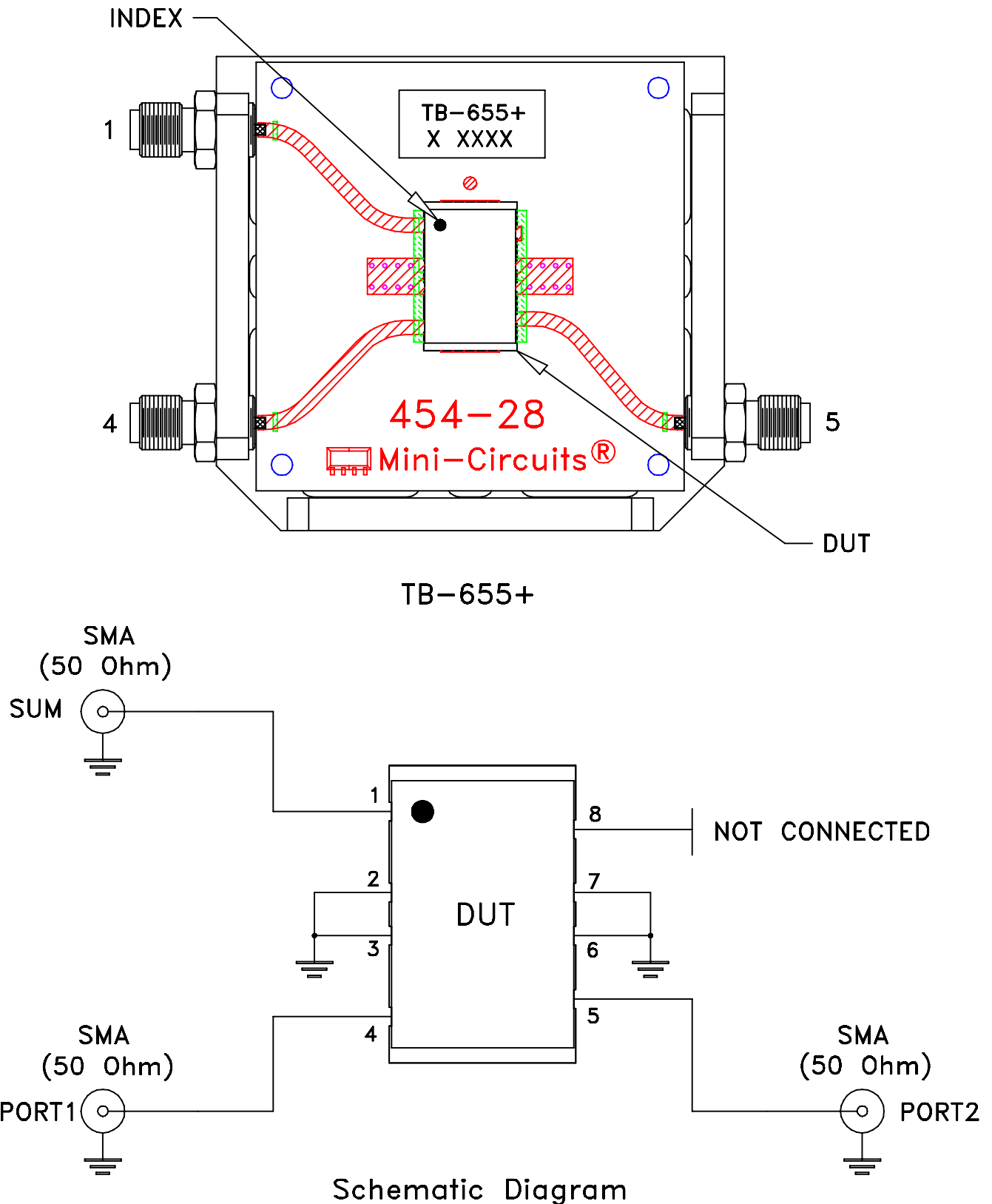
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OR

FILE: 98PL359

SCALE: 4:1

SHEET: 1 OF 1

Evaluation Board and Circuit



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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Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-40° to 85° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
HAST	130°C, 85% RH, 96 hours	JESD22-A110
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 Eutectic Process: 225°C peak Pb-Free Process, 245°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, 20-2000 Hz, 4 times in each of three axes (total 12)	MIL-STD-883, Method 2007.3, Condition A
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