

Surface Mount

# Power Splitter/Combiner

SCPS-4-62+

4 Way-0° 50Ω 1 to 650 MHz

## The Big Deal

- Excellent matching VSWR, 1.1:1
- Low unbalance, 0.3 dB / 1°
- Good isolation, 26 dB



CASE STYLE: HF1485-1

## Product Overview

Mini-Circuits' SCPS-4-62+ is a surface-mount 4-way 0° splitter/combiner covering the 1 to 650 MHz frequency range, supporting bandwidth requirements for a wide range of RF/microwave systems. This model can handle up to 1W RF input power as a splitter and provides high isolation, excellent VSWR, low amplitude unbalance, and low phase unbalance. The unit comes housed in a miniature, shielded, 8-lead package (0.44 x 0.74 x 0.19") with wrap-around terminations for excellent solderability.

## Key Features

Feature	Advantages
Low insertion loss, 1.0 dB (above 6 dB theoretical loss)	The combination of 1W power handling and low insertion loss makes this model a suitable candidate for distributing signals while maintaining excellent transmission of signal power.
Excellent matching VSWR, 1.1:1	Provides excellent thru-path transmission with low signal reflection.
High isolation, 26 dB	Minimizes interference between ports.
Low unbalance, 0.3 dB / 1°	Low unbalance provides nearly equal output signals, ideal for parallel path/multichannel systems.
Small size, 0.44 x 0.74 x 0.19"	Saves space in dense PCB layouts.

### 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](http://www.minicircuits.com/MCLStore/terms.jsp)



# Surface Mount Power Splitter/Combiner

## SCPS-4-62+

4 Way-0° 50Ω 1 to 650 MHz

### Maximum Ratings

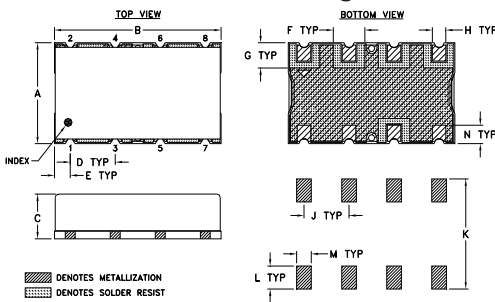
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
Power Input (as a splitter)	1W max.
Internal Dissipation	0.25W max.

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

### Pin Connections

SUM PORT	3
PORT 1	2
PORT 2	4
PORT 3	6
PORT 4	8
GROUND	1,5,7

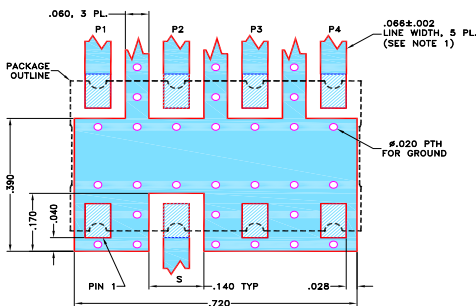
### Outline Drawing



### Outline Dimensions (inch)

A	B	C	D	E	F	G
.440	.740	.19	.200	.07	.140	.110
11.18	18.80	4.83	5.08	1.78	3.56	2.79
H	J	K	L	M	wt	
.060	.200	.480	.100	.065	grams	
1.52	5.08	12.19	2.54	1.65	3.00	

### Demo Board MCL P/N: TB-925 + Suggested PCB Layout (PL-492)



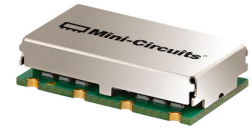
- NOTES:
- LINE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030"±.002" COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS LINE WIDTH MAY NEED TO BE MODIFIED.
  - BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
  - DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).
  - DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

### Features

- wideband, 1 to 650 MHz,
- excellent phase unbalance, 1 deg. typ.
- good isolation, 26 dB typ.
- excellent amplitude unbalance, 0.3 dB typ.
- excellent matching VSWR, 1.2:1 typ.
- rugged, shielded case

### Applications

- communication systems
- instrumentation
- cellular, GPS, PCS
- VHF/UHF/receivers/transmitters



Generic photo used for illustration purposes only

CASE STYLE: HF1485-1

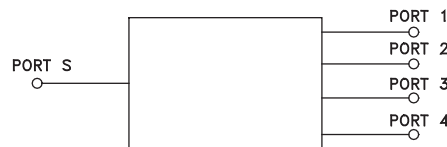
### +RoHS Compliant

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
<b>Frequency Range</b>		1	—	650	MHz
<b>Insertion Loss Above 6.0 dB</b>	1 - 280	—	0.6	0.9	dB
	280 - 600	—	1.0	1.5	
	600 - 650	—	1.4	1.8	
<b>Isolation</b>	1 - 280	21	30	—	dB
	280 - 600	21	26	—	
	600 - 650	18	24	—	
<b>Phase Unbalance</b>	1 - 280	—	1	3	dB
	280 - 600	—	2	4	
	600 - 650	—	3	6	
<b>Amplitude Unbalance</b>	1 - 280	—	0.1	0.2	dB
	280 - 600	—	0.3	0.5	
	600 - 650	—	0.4	0.7	
<b>VSWR (Port S)</b>	1 - 280	—	1.2	1.3	:1
	280 - 600	—	1.2	1.37	
	600 - 650	—	1.4	1.65	
<b>VSWR (Port 1-4)</b>	1 - 280	—	1.2	1.3	:1
	280 - 600	—	1.1	1.28	
	600 - 650	—	1.15	1.3	

### Electrical Schematic



### Notes

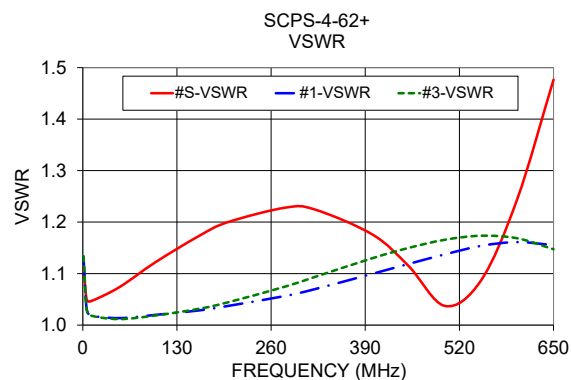
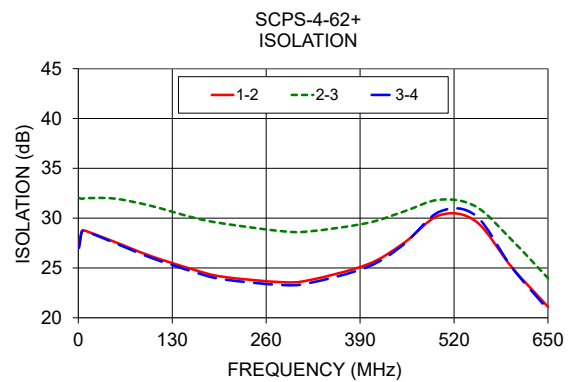
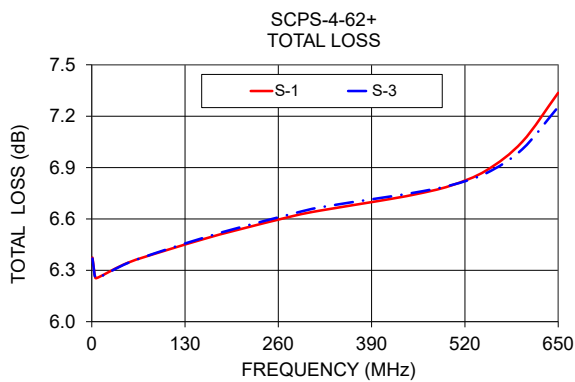
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## Typical Performance Data

Freq. (MHz)	Total Loss <sup>1</sup> (dB)				Amp. Unbal. (dB)	Isolation (dB)			Phase Unbal. (deg.)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
	S-1	S-2	S-3	S-4		1-2	2-3	3-4						
1	6.37	6.36	6.37	6.38	0.01	27.24	32.03	27.02	0.04	1.12	1.13	1.13	1.13	1.13
5	6.26	6.25	6.25	6.26	0.01	28.71	31.94	28.67	0.02	1.05	1.03	1.03	1.03	1.04
10	6.26	6.26	6.26	6.26	0.00	28.72	32.00	28.69	0.04	1.05	1.02	1.02	1.02	1.02
50	6.34	6.34	6.34	6.34	0.00	27.62	31.96	27.52	0.08	1.07	1.01	1.01	1.01	1.01
100	6.41	6.41	6.42	6.41	0.01	26.21	31.24	26.04	0.19	1.12	1.02	1.02	1.02	1.02
160	6.49	6.49	6.50	6.48	0.02	24.83	30.04	24.60	0.33	1.17	1.03	1.03	1.03	1.03
200	6.53	6.53	6.54	6.52	0.02	24.12	29.47	23.87	0.40	1.20	1.04	1.04	1.04	1.04
280	6.62	6.62	6.63	6.59	0.04	23.58	28.71	23.30	0.55	1.23	1.06	1.07	1.07	1.07
320	6.65	6.66	6.67	6.62	0.05	23.78	28.67	23.49	0.66	1.22	1.07	1.09	1.09	1.08
400	6.71	6.71	6.72	6.65	0.07	25.35	29.51	25.09	0.86	1.18	1.10	1.13	1.13	1.12
450	6.74	6.76	6.75	6.67	0.09	27.48	30.65	27.34	0.97	1.11	1.12	1.15	1.15	1.14
500	6.79	6.81	6.80	6.69	0.12	30.30	31.85	30.65	1.11	1.04	1.14	1.17	1.17	1.16
550	6.88	6.91	6.87	6.75	0.16	29.69	31.17	30.25	1.29	1.09	1.15	1.18	1.17	1.18
600	7.05	7.08	7.01	6.87	0.21	25.07	27.80	25.06	1.47	1.25	1.16	1.18	1.17	1.18
650	7.34	7.37	7.25	7.09	0.27	21.11	23.98	20.83	1.67	1.48	1.16	1.15	1.15	1.17

1. Total Loss = Insertion Loss + 6dB splitter loss.



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# 4 Way-0° Power Splitter/Combiner

# SCPS-4-62+

## Typical Performance Data

FREQ. (MHz)	TOTAL LOSS <sup>1</sup> (dB)				AMP. UNBAL. (dB)	ISOLATION (dB)			PHASE UNBAL. (deg.)	FREQ. (MHz)	VSWR (:1)				
	S-1	S-2	S-3	S-4		1-2	2-3	3-4			S	1	2	3	4
0.3	6.58	6.57	6.56	6.57	0.01	24.85	31.94	24.39	0.16	0.3	1.26	1.32	1.32	1.33	1.33
0.5	6.49	6.48	6.48	6.49	0.01	25.98	32.07	25.65	0.09	0.5	1.18	1.22	1.22	1.22	1.22
0.7	6.43	6.42	6.42	6.43	0.01	26.60	32.10	26.32	0.07	0.7	1.15	1.17	1.17	1.17	1.17
0.9	6.39	6.38	6.38	6.39	0.01	27.04	32.03	26.82	0.05	0.9	1.12	1.14	1.14	1.14	1.15
1	6.37	6.36	6.37	6.38	0.01	27.24	32.03	27.02	0.04	1	1.12	1.13	1.13	1.13	1.13
2	6.29	6.30	6.30	6.30	0.00	28.10	31.94	27.98	0.06	2	1.08	1.08	1.08	1.08	1.08
3	6.27	6.27	6.27	6.27	0.01	28.51	32.02	28.41	0.03	3	1.06	1.05	1.05	1.05	1.06
4	6.26	6.25	6.26	6.26	0.01	28.64	31.96	28.59	0.02	4	1.06	1.04	1.04	1.04	1.04
5	6.26	6.25	6.25	6.26	0.01	28.71	31.94	28.67	0.02	5	1.05	1.03	1.03	1.03	1.04
6	6.25	6.25	6.25	6.26	0.01	28.74	32.00	28.69	0.02	6	1.05	1.03	1.03	1.03	1.03
7	6.25	6.25	6.25	6.25	0.00	28.76	31.96	28.71	0.03	7	1.05	1.03	1.03	1.03	1.03
8	6.25	6.25	6.25	6.26	0.00	28.75	31.94	28.71	0.03	8	1.05	1.02	1.02	1.02	1.02
9	6.26	6.25	6.25	6.26	0.00	28.77	31.97	28.69	0.03	9	1.05	1.02	1.02	1.02	1.02
10	6.26	6.26	6.26	6.26	0.00	28.72	32.00	28.69	0.04	10	1.05	1.02	1.02	1.02	1.02
20	6.28	6.28	6.28	6.28	0.00	28.48	32.10	28.43	0.05	20	1.05	1.01	1.01	1.01	1.01
30	6.31	6.31	6.31	6.30	0.00	28.22	32.09	28.15	0.06	30	1.05	1.01	1.01	1.01	1.01
40	6.32	6.32	6.32	6.32	0.00	27.93	32.06	27.84	0.06	40	1.06	1.01	1.01	1.01	1.01
50	6.34	6.34	6.34	6.34	0.00	27.62	31.96	27.52	0.08	50	1.07	1.01	1.01	1.01	1.01
60	6.36	6.36	6.36	6.36	0.01	27.32	31.89	27.21	0.11	60	1.08	1.01	1.01	1.01	1.01
70	6.37	6.37	6.37	6.37	0.01	27.03	31.78	26.90	0.15	70	1.09	1.02	1.01	1.01	1.01
80	6.39	6.39	6.39	6.38	0.01	26.76	31.62	26.62	0.17	80	1.10	1.02	1.01	1.02	1.01
90	6.40	6.40	6.40	6.40	0.01	26.48	31.45	26.33	0.18	90	1.11	1.02	1.01	1.02	1.02
100	6.41	6.41	6.42	6.41	0.01	26.21	31.24	26.04	0.19	100	1.12	1.02	1.02	1.02	1.02
120	6.44	6.44	6.44	6.44	0.01	25.67	30.90	25.48	0.24	120	1.14	1.02	1.02	1.02	1.02
140	6.46	6.46	6.47	6.46	0.01	25.23	30.43	25.02	0.30	140	1.16	1.03	1.02	1.03	1.02
160	6.49	6.49	6.50	6.48	0.02	24.83	30.04	24.60	0.33	160	1.17	1.03	1.03	1.03	1.03
180	6.51	6.51	6.52	6.50	0.01	24.41	29.78	24.17	0.33	180	1.19	1.03	1.04	1.04	1.03
200	6.53	6.53	6.54	6.52	0.02	24.12	29.47	23.87	0.40	200	1.20	1.04	1.04	1.04	1.04
240	6.58	6.58	6.59	6.56	0.03	23.72	28.98	23.44	0.49	240	1.22	1.05	1.06	1.06	1.05
280	6.62	6.62	6.63	6.59	0.04	23.58	28.71	23.30	0.55	280	1.23	1.06	1.07	1.07	1.07
320	6.65	6.66	6.67	6.62	0.05	23.78	28.67	23.49	0.66	320	1.22	1.07	1.09	1.09	1.08
360	6.68	6.69	6.70	6.64	0.06	24.35	28.97	24.06	0.77	360	1.21	1.08	1.11	1.11	1.10
400	6.71	6.71	6.72	6.65	0.07	25.35	29.51	25.09	0.86	400	1.18	1.10	1.13	1.13	1.12
425	6.72	6.73	6.74	6.66	0.08	26.28	30.02	26.06	0.92	425	1.15	1.11	1.14	1.14	1.13
450	6.74	6.76	6.75	6.67	0.09	27.48	30.65	27.34	0.97	450	1.11	1.12	1.15	1.15	1.14
475	6.77	6.78	6.77	6.68	0.10	28.90	31.34	28.94	1.03	475	1.08	1.13	1.16	1.16	1.15
500	6.79	6.81	6.80	6.69	0.12	30.30	31.85	30.65	1.11	500	1.04	1.14	1.17	1.17	1.16
550	6.88	6.91	6.87	6.75	0.16	29.69	31.17	30.25	1.29	550	1.09	1.15	1.18	1.17	1.18
600	7.05	7.08	7.01	6.87	0.21	25.07	27.80	25.06	1.47	600	1.25	1.16	1.18	1.17	1.18
650	7.34	7.37	7.25	7.09	0.27	21.11	23.98	20.83	1.67	650	1.48	1.16	1.15	1.15	1.17

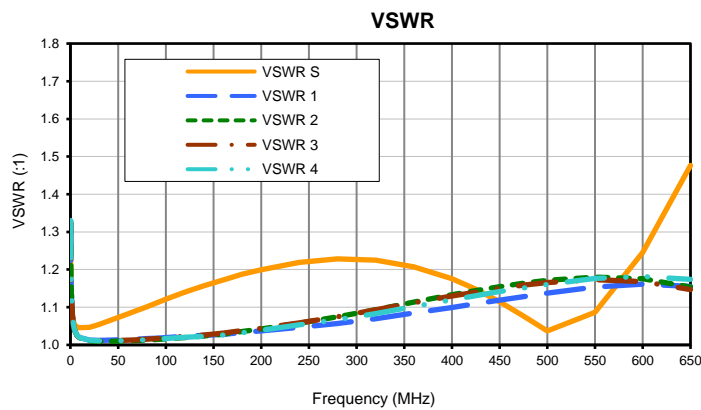
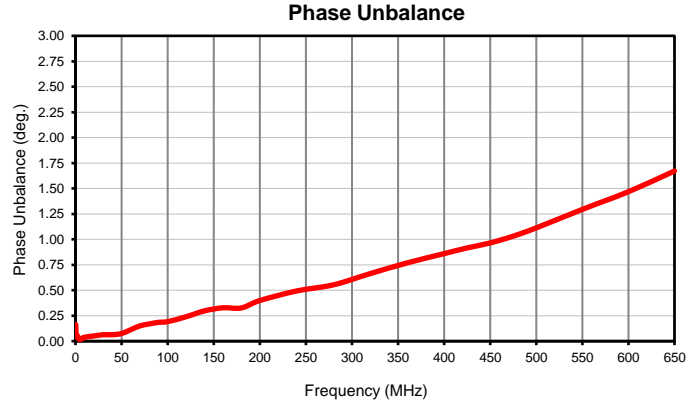
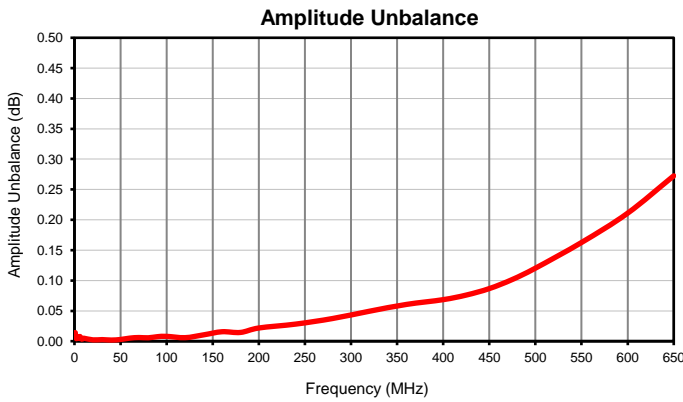
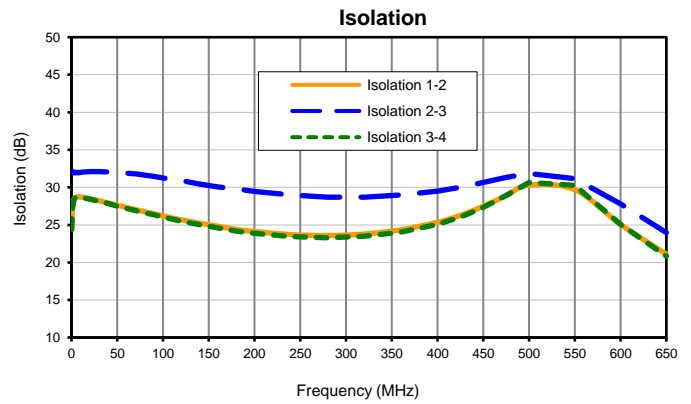
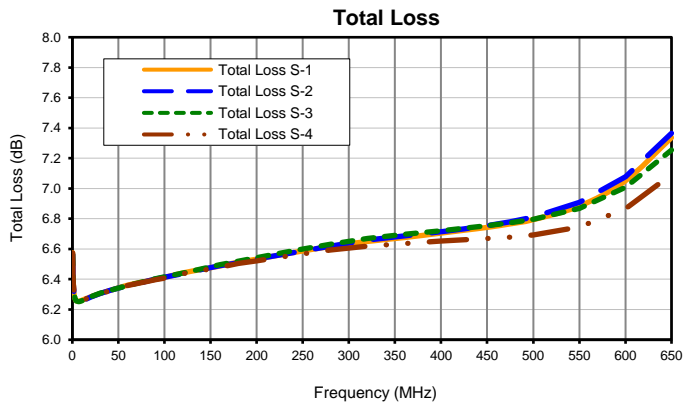
<sup>1</sup>Total Loss = Insertion Loss+ 6dB Splitter Loss



# 4 Way-0° Power Splitter/Combiner

# SCPS-4-62+

## Typical Performance Curves



P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 • Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



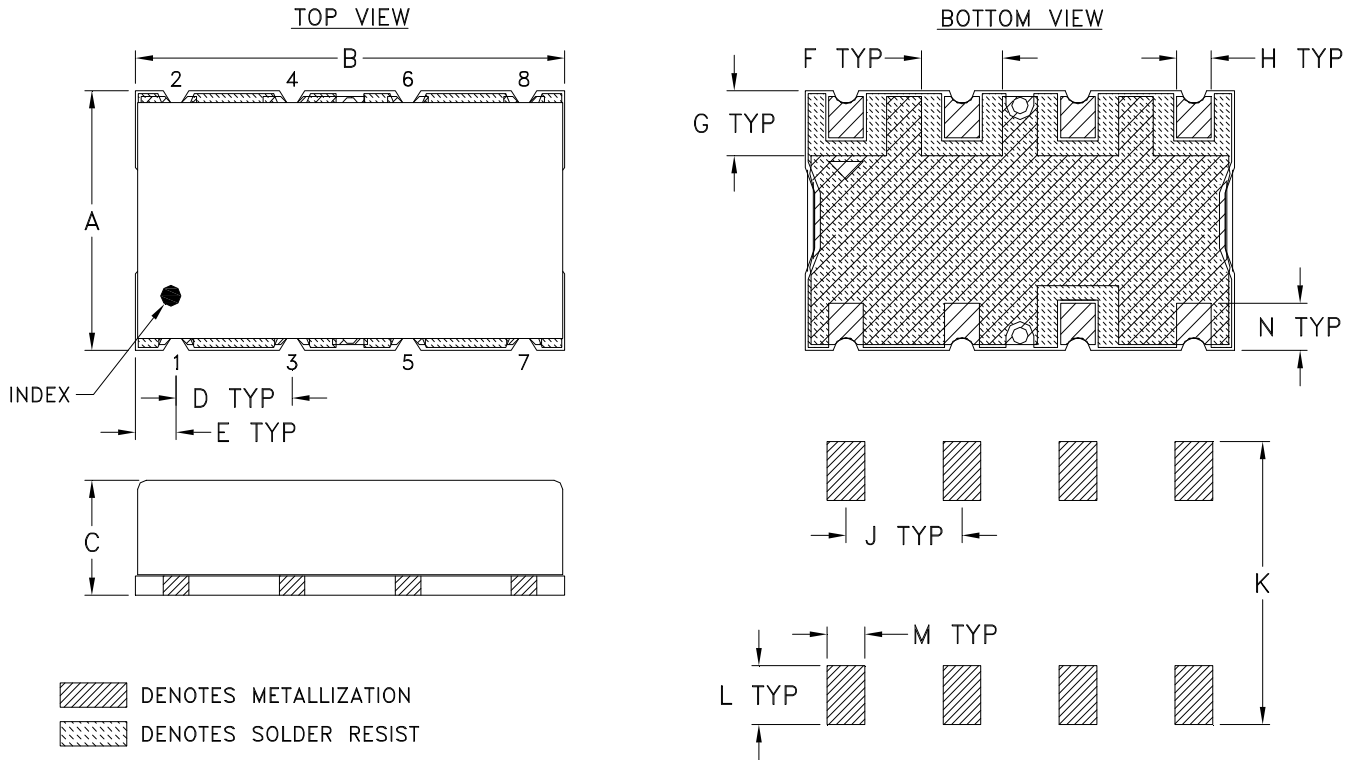
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IF/RF MICROWAVE COMPONENTS

REV. OR  
SCPS-4-62+  
7/18/2017  
Page 1 of 1

## Outline Dimensions

HF1485-1



CASE #	A	B	C	D	E	F	G	H	J	K	L	M
HF1485-1	.44 (11.18)	.74 (18.80)	.19 (4.83)	.200 (5.08)	.07 (1.78)	.140 (3.56)	.110 (2.79)	.060 (1.52)	.200 (5.08)	.480 (12.19)	.100 (2.54)	.065 (1.65)

CASE #	N	WT. GRAMS
HF1485-1	.080 (2.03)	3.0

Dimensions are in inches (mm). Tolerances: 2 Pl.  $\pm 0.015$ "; 3 Pl.  $\pm 0.01$ "

### Notes:

- Case material: Nickel-Silver alloy.
- Base: Printed wiring laminate.
- Termination finish:
  - For RoHS Case Styles: 2-5  $\mu$  inch (.05-.13 microns) Gold over 120-240  $\mu$  inch (3.05-6.10 microns) Nickel plate.
  - For RoHS-5 Case Styles: Tin-Lead plate.



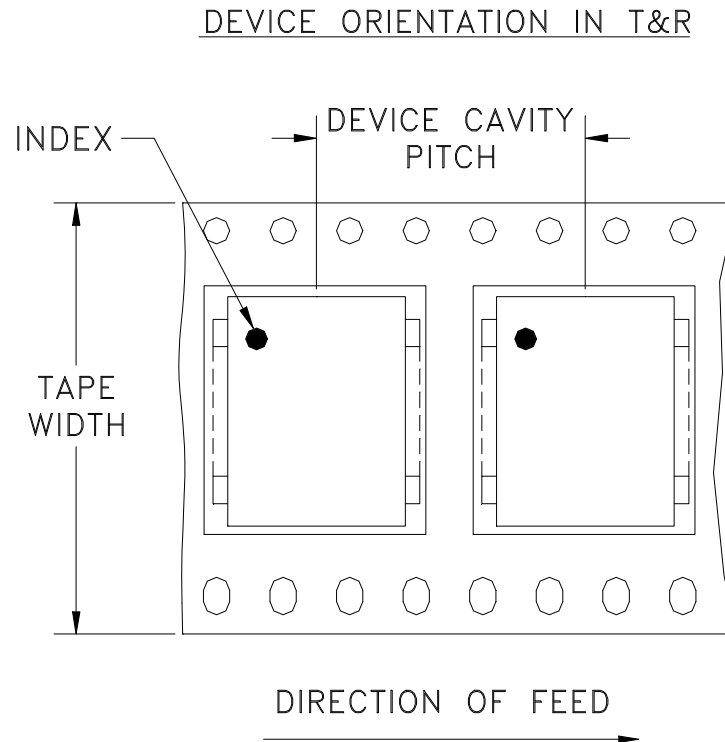
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

RFIIF MICROWAVE COMPONENTS

# Tape & Reel Packaging TR-F5



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
32	16	13	500

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](http://www.minicircuits.com/pages/pdfs/tape.pdf)



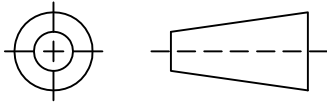
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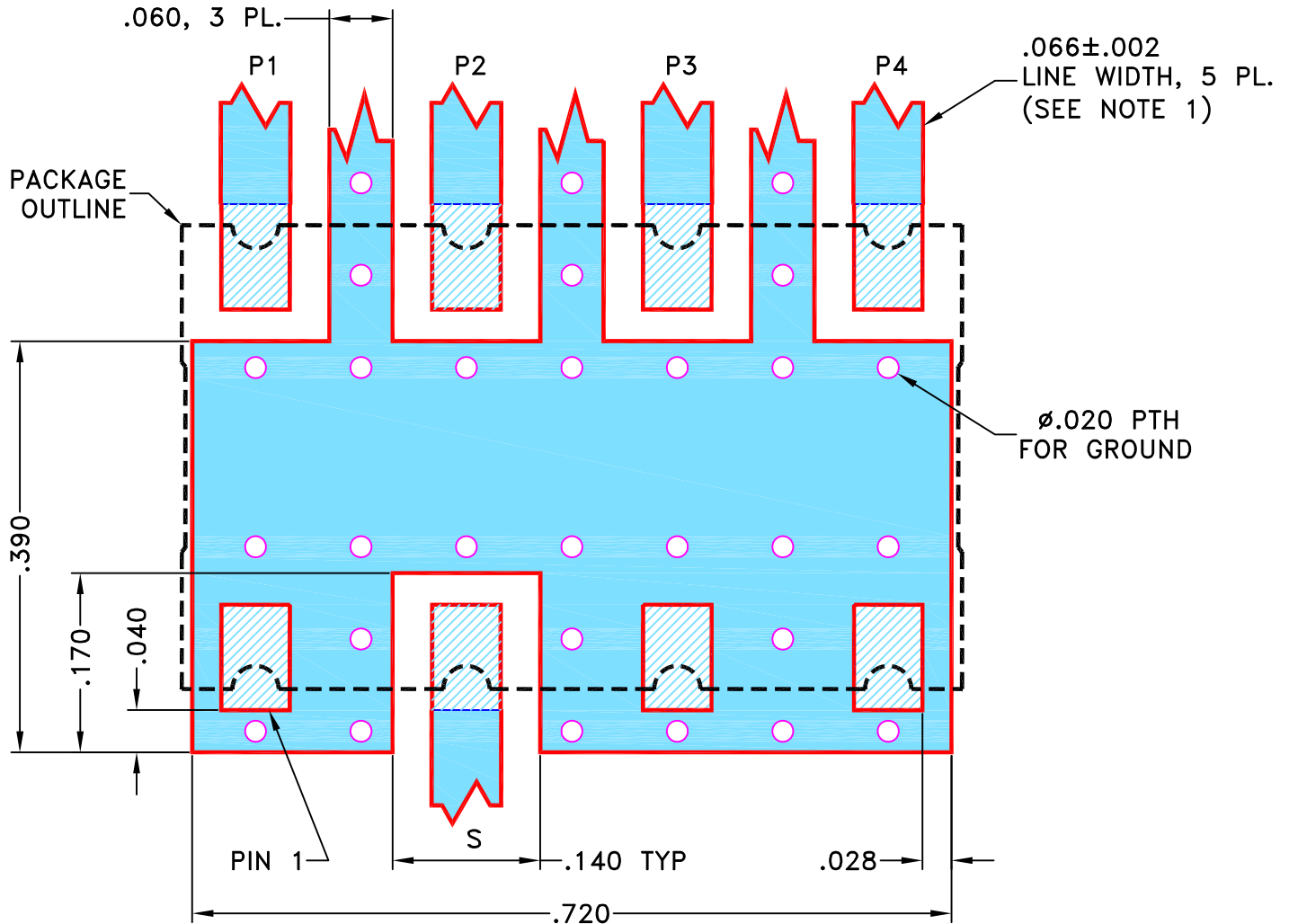
THIRD ANGLE PROJECTION



REVISIONS

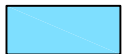
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M157861	NEW RELEASE	01/03/17	ITG	PW

SUGGESTED MOUNTING CONFIGURATION  
FOR HF1485-1 CASE STYLE, "08SP09" PIN CODE

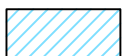


NOTES:

1. LINE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS  $.030 \pm .002$ ". COPPER: 1/2 OZ. EACH SIDE.  
FOR OTHER MATERIALS LINE WIDTH MAY NEED TO BE MODIFIED.
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.

UNLESS OTHERWISE SPECIFIED	INITIALS		DATE
DIMENSIONS ARE IN INCHES	DRAWN	ITG	12/28/16
TOLERANCES ON:	CHECKED	GF	01/03/17
2 PL DECIMALS ±	APPROVED	PW	01/03/17
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			



Mini-Circuits® 13 Neptune Avenue  
Brooklyn NY 11235

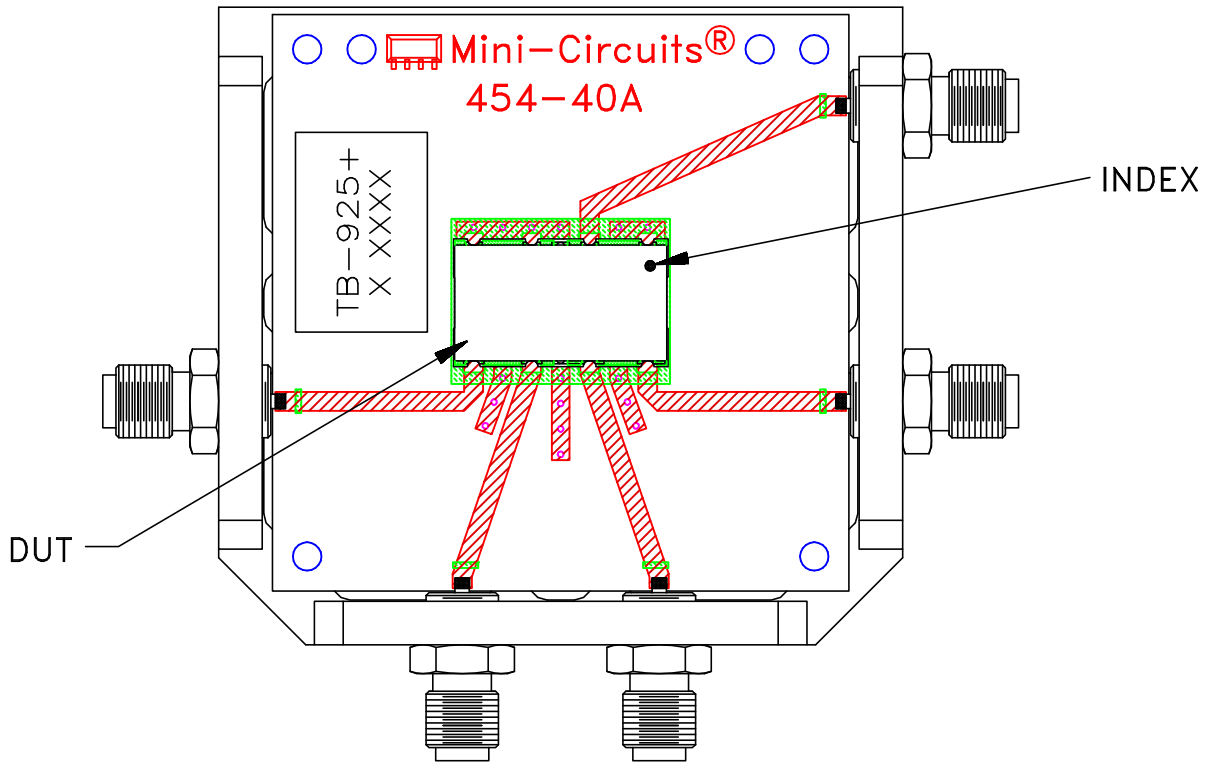
PL, 08SP09, HF1485-1, TB-925+

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SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-492	REV: OR
FILE: 98PL492	SCALE: 6:1	SHEET: 1 OF 1	

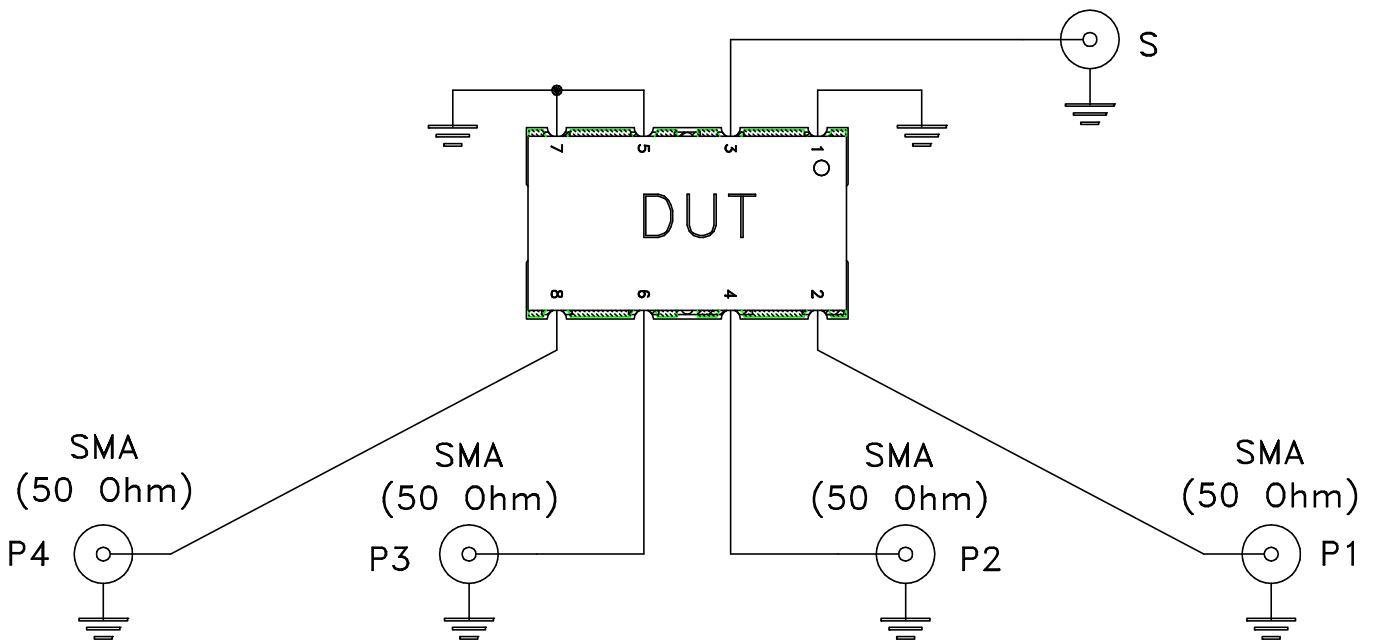


# Evaluation Board and Circuit



TB-925+


SMA  
(50 Ohm)



Schematic Diagram

## Notes:

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

 **Mini-Circuits®**

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 85°C Ambient 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, 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