

Surface Mount

Power Splitter/Combiner

SCQA-4-162+

4 Way Quadrifilar 50Ω 1200 to 1600 MHz

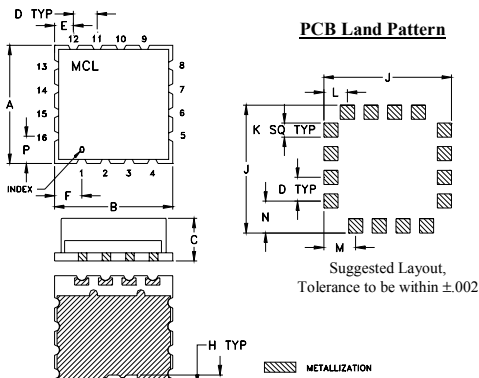
Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
Power Input (as a splitter)	1W max.
Internal Dissipation	0.20W max.
Permanent damage may occur if any of these limits are exceeded.	

Pin Connections

SUM PORT	10
PORT 1 (0°)	1
PORT 2 (90°)	2
PORT 3 (180°)	3
PORT 4 (270°)	4
GROUND	5,6,7,8,9,11,12

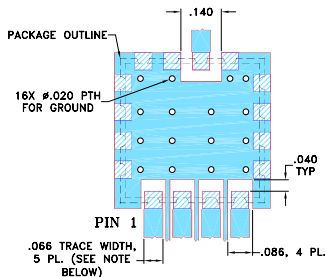
Outline Drawing



Outline Dimensions (inch/mm)

	A	B	C	D	E	F	G	H	J
	.500	.500	.180	.100	.080	.115	.060	.040	.540
	12.70	12.70	4.57	2.54	2.03	2.92	1.52	1.02	13.72
	K	L	M	N	P	Q	T		
	.060	.100	.135	.135	.115	.140	.080		
	1.52	2.54	3.43	3.43	2.92	3.56	2.03		
								wt.	
								grams	1.0

Demo Board MCL P/N: TB-652+ Suggested PCB Layout (PL-368+)



- 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.
3. DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
4. DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

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

- good isolation, 22 dB typ.
- good phase unbalance, 3 deg.
- good matching VSWR, 1.15:1 typ.

Applications

- GPS phase array antenna



Generic photo used for illustration purposes only

CASE STYLE: CK1704

+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		1200	—	1600	MHz
Insertion Loss Above 6.0 dB	1200-1600	—	1.5	2.8	dB
Isolation	1200-1600	18	22	—	dB
Phase Unbalance	1200-1600	—	3.0	10	Degree
Amplitude Unbalance	1200-1600	—	0.6	1.0	dB
VSWR (Port S)	1200-1600	—	1.2	—	:1
VSWR (Port 1-4)	1200-1600	—	1.4	—	:1

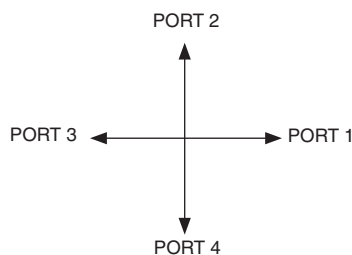
*Phase Unbalance is referenced insertion phase at 0° port.

Typical Performance Data

Freq. (MHz)	Total Loss ¹ (dB)	Amp. Unbal. (dB)	Insertion Phase (deg)	Phase Unbalance (deg.)				Isolation (dB)			VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
				S-1	S-1	0°	90°	180°	270°	1-2					
1150.00	6.98	0.32	160.79	0.00	88.03	179.66	267.65	22.35	31.34	25.42	1.09	1.03	1.04	1.07	1.02
1200.00	7.10	0.18	144.77	0.00	88.25	179.80	267.68	22.07	30.71	25.20	1.10	1.03	1.06	1.07	1.02
1225.00	7.16	0.26	136.76	0.00	88.37	179.89	267.72	21.94	30.39	25.11	1.11	1.03	1.06	1.07	1.03
1250.00	7.21	0.33	128.75	0.00	88.49	179.96	267.76	21.82	30.06	25.02	1.11	1.03	1.07	1.07	1.03
1275.00	7.26	0.38	120.75	0.00	88.62	180.02	267.82	21.72	29.69	24.95	1.11	1.03	1.07	1.08	1.04
1300.00	7.31	0.43	112.75	0.00	88.76	180.07	267.88	21.65	29.32	24.90	1.11	1.04	1.08	1.08	1.04
1350.00	7.38	0.51	96.73	0.00	89.04	180.18	268.04	21.54	28.55	24.88	1.11	1.04	1.09	1.09	1.05
1400.00	7.44	0.54	80.72	0.00	89.32	180.28	268.21	21.52	27.81	24.98	1.12	1.05	1.10	1.10	1.06
1450.00	7.48	0.54	64.73	0.00	89.60	180.32	268.38	21.59	27.08	25.19	1.12	1.06	1.10	1.11	1.07
1500.00	7.50	0.53	48.73	0.00	89.83	180.35	268.57	21.73	26.33	25.50	1.14	1.06	1.11	1.12	1.07
1525.00	7.50	0.51	40.73	0.00	89.96	180.35	268.67	21.83	26.00	25.70	1.15	1.07	1.11	1.13	1.08
1550.00	7.50	0.48	32.73	0.00	90.07	180.33	268.76	21.94	25.67	25.91	1.16	1.07	1.11	1.13	1.08
1575.00	7.49	0.44	24.73	0.00	90.18	180.30	268.87	22.07	25.33	26.16	1.18	1.07	1.11	1.14	1.08
1600.00	7.48	0.39	16.75	0.00	90.28	180.25	268.98	22.23	25.02	26.43	1.20	1.08	1.11	1.14	1.09
1650.00	7.46	0.30	0.72	0.00	90.48	180.20	269.22	22.57	24.40	26.99	1.23	1.08	1.11	1.14	1.10

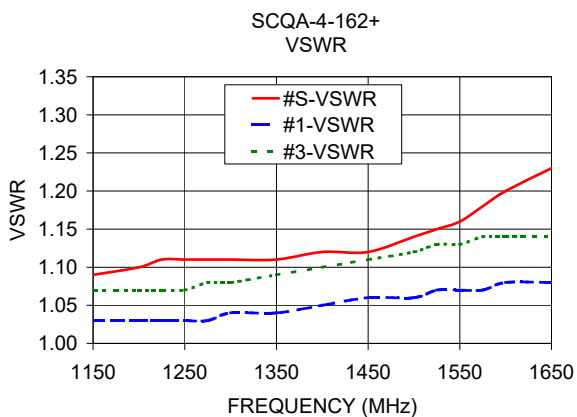
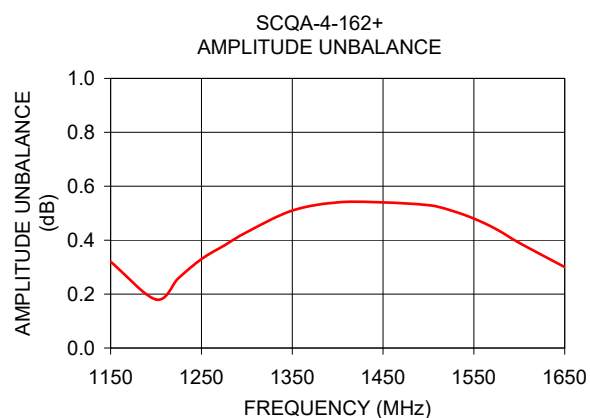
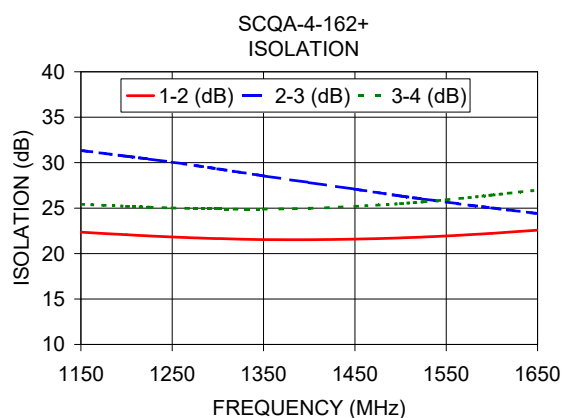
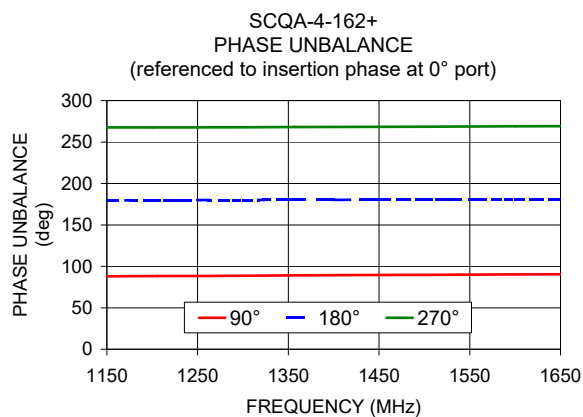
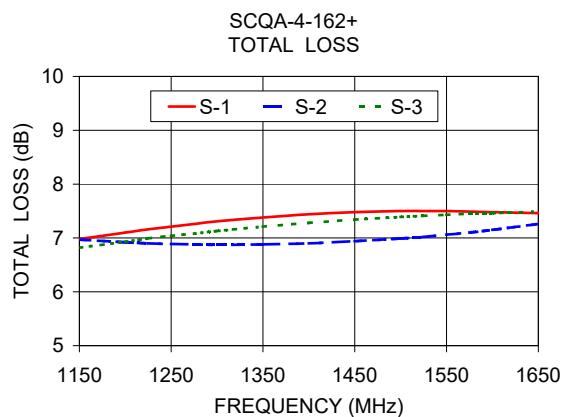
1. Total Loss = Insertion Loss + 6dB splitter loss.

Phase Diagram



Electrical Configuration





Notes

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- 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



4 Way-Quadrifilar Power Splitter/Combiner

SCQA-4-162+

Typical Performance Data

FREQ. (MHz)	TOTAL LOSS ¹				AMP. UNBAL. (dB)	INSERTION PHASE (Deg.) S-1	ISOLATION			PHASE UNBALANCE				FREQ. (MHz)	VSWR				
	(dB)						(dB)			(Deg.)					(:1)				
	S-1	S-2	S-3	S-4				1-2	2-3	3-4	@ 0° Port	@ 90° Port	@ 180° Port		@ 270° Port	S	1	2	3
1150.0	6.98	6.97	6.82	7.14	0.32	160.79	22.35	31.34	25.42	0.00	88.03	179.66	267.65	1150.0	1.09	1.03	1.04	1.07	1.02
1200.0	7.10	6.92	6.93	7.06	0.18	144.77	22.07	30.71	25.20	0.00	88.25	179.80	267.68	1200.0	1.10	1.03	1.06	1.07	1.02
1225.0	7.16	6.90	6.99	7.03	0.26	136.76	21.94	30.39	25.11	0.00	88.37	179.89	267.72	1225.0	1.11	1.03	1.06	1.07	1.03
1250.0	7.21	6.89	7.04	7.01	0.33	128.75	21.82	30.06	25.02	0.00	88.49	179.96	267.76	1250.0	1.11	1.03	1.07	1.07	1.03
1275.0	7.26	6.88	7.08	6.98	0.38	120.75	21.72	29.69	24.95	0.00	88.62	180.02	267.82	1275.0	1.11	1.03	1.07	1.08	1.04
1300.0	7.31	6.87	7.13	6.97	0.43	112.75	21.65	29.32	24.90	0.00	88.76	180.07	267.88	1300.0	1.11	1.04	1.08	1.08	1.04
1350.0	7.38	6.88	7.21	6.94	0.51	96.73	21.54	28.55	24.88	0.00	89.04	180.18	268.04	1350.0	1.11	1.04	1.09	1.09	1.05
1400.0	7.44	6.90	7.28	6.93	0.54	80.72	21.52	27.81	24.98	0.00	89.32	180.28	268.21	1400.0	1.12	1.05	1.10	1.10	1.06
1450.0	7.48	6.94	7.34	6.94	0.54	64.73	21.59	27.08	25.19	0.00	89.60	180.32	268.38	1450.0	1.12	1.06	1.10	1.11	1.07
1500.0	7.50	6.99	7.39	6.97	0.53	48.73	21.73	26.33	25.50	0.00	89.83	180.35	268.57	1500.0	1.14	1.06	1.11	1.12	1.07
1525.0	7.50	7.02	7.41	6.99	0.51	40.73	21.83	26.00	25.70	0.00	89.96	180.35	268.67	1525.0	1.15	1.07	1.11	1.13	1.08
1550.0	7.50	7.06	7.43	7.02	0.48	32.73	21.94	25.67	25.91	0.00	90.07	180.33	268.76	1550.0	1.16	1.07	1.11	1.13	1.08
1575.0	7.49	7.10	7.45	7.05	0.44	24.73	22.07	25.33	26.16	0.00	90.18	180.30	268.87	1575.0	1.18	1.07	1.11	1.14	1.08
1600.0	7.48	7.15	7.46	7.09	0.39	16.75	22.23	25.02	26.43	0.00	90.28	180.25	268.98	1600.0	1.20	1.08	1.11	1.14	1.09
1650.0	7.46	7.26	7.49	7.19	0.30	0.72	22.57	24.40	26.99	0.00	90.48	180.20	269.22	1650.0	1.23	1.08	1.11	1.14	1.10

¹Total Loss = Insertion Loss + 6dB Splitter Loss



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

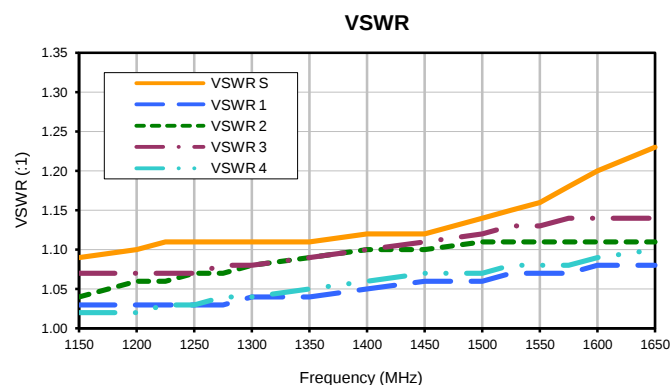
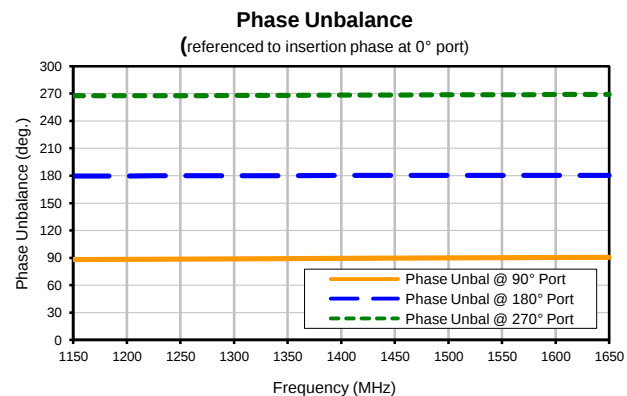
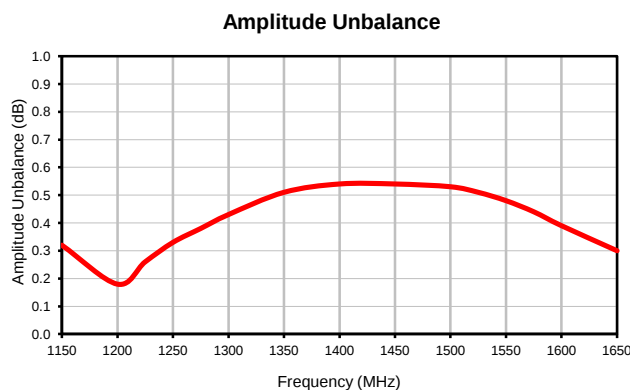
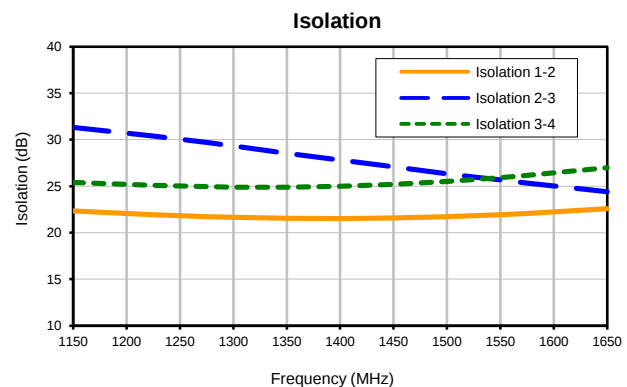
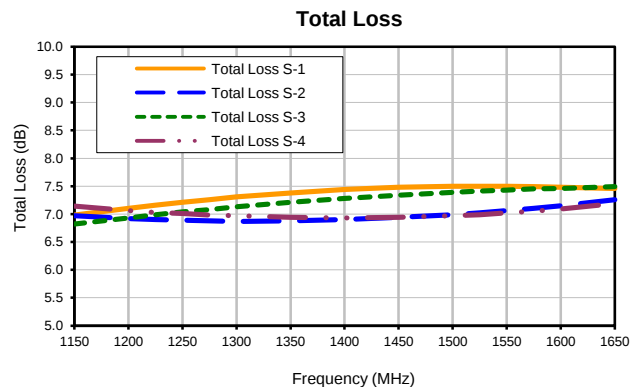
IF/RF MICROWAVE COMPONENTS

REV. OR
 SCQA-4-162+
 1/22/2013
 Page 1 of 1

4 Way-Quadrifilar Power Splitter/Combiner

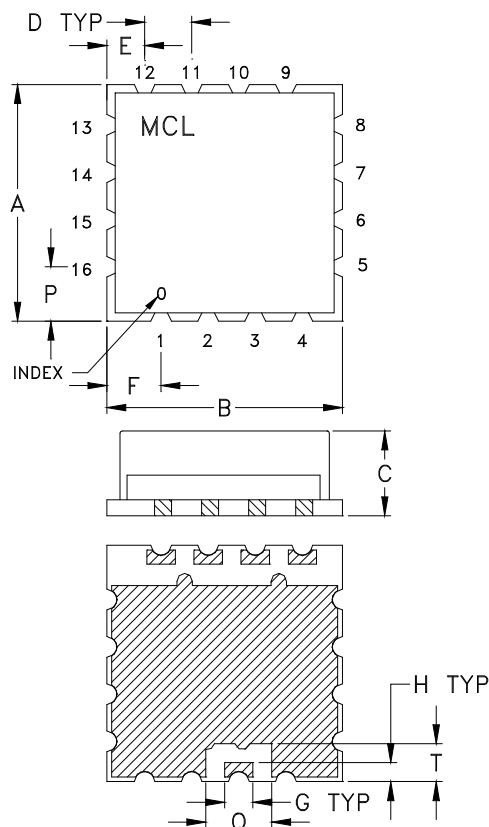
SCQA-4-162+

Typical Performance Curves

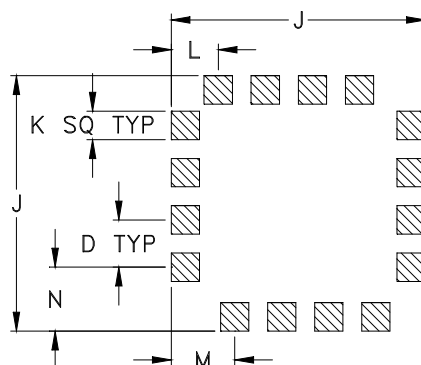


Outline Dimensions

CK1704



PCB Land Pattern



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

CASE #	A	B	C	D	E	F	G	H	J	K
CK1704	.500 (12.70)	.500 (12.70)	.180 (4.57)	.100 (2.54)	.080 (2.03)	.115 (2.92)	.060 (1.52)	.040 (1.02)	.540 (13.72)	.060 (1.52)

CASE #	L	M	N	P	Q	R	S	T	WT. GRAM
CK1704	.100 (2.54)	.135 (3.43)	.135 (3.43)	.115 (2.92)	.140 (3.56)	-	-	.080 (2.03)	1.0

Dimensions are in inches (mm). Tolerances: 2 Pl. $\pm .03$; 3Pl. $\pm .015$

Notes:

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



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



Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

RF/IF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F37



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
24	16	7	Small quantity standards (see note)	10
				20
				50
				100
		13	Standard	200
				500

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

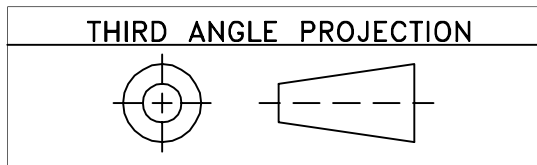


INTERNET <http://www.minicircuits.com>

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

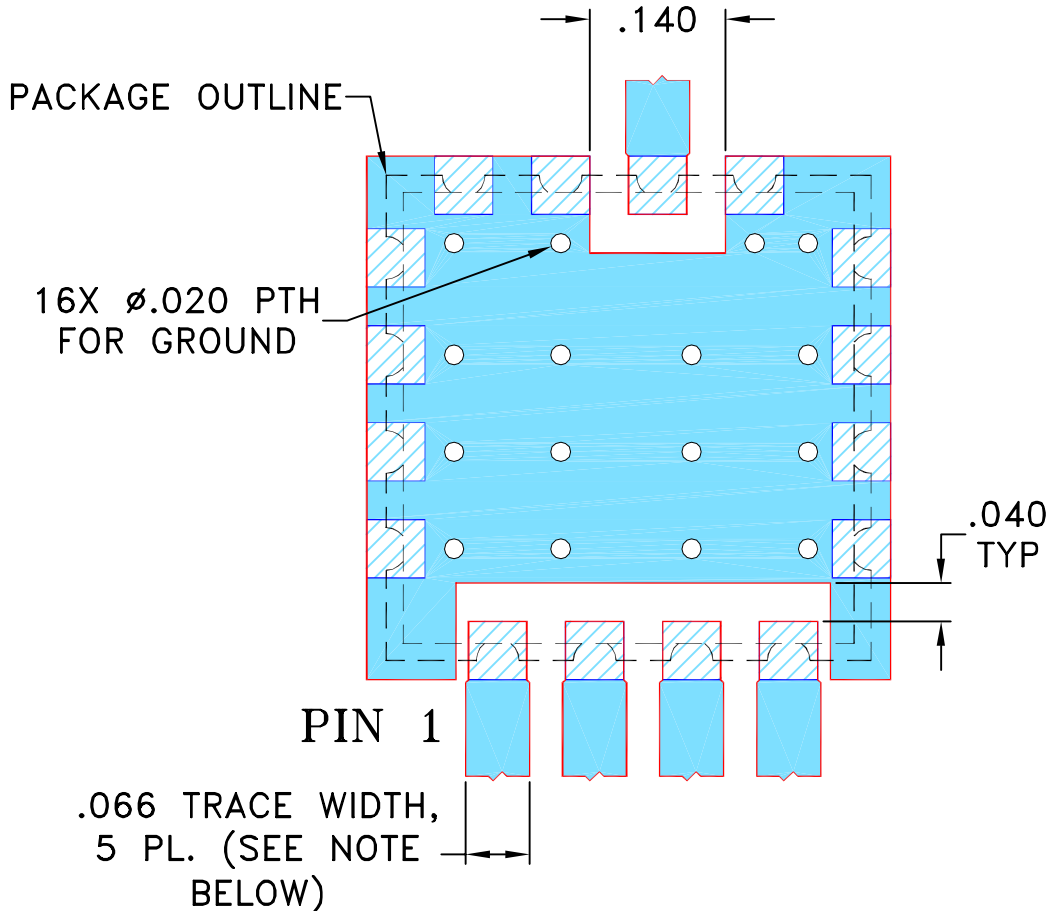
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010

Mini-Circuits ISO 9001 & ISO 14001 Certified



REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M136731	NEW RELEASE	05/14/12	AV	ABD
A	M145165	UPDATED PCB PATTERN	02/28/14	AV	JC

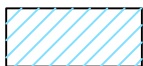
SUGGESTED MOUNTING CONFIGURATION FOR
CK1704 CASE STYLE, "16SP01" PIN CONNECTION



- NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .030" $\pm$.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

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	04/17/12
	CHECKED	IL	05/14/12
	APPROVED	ABD	05/14/12



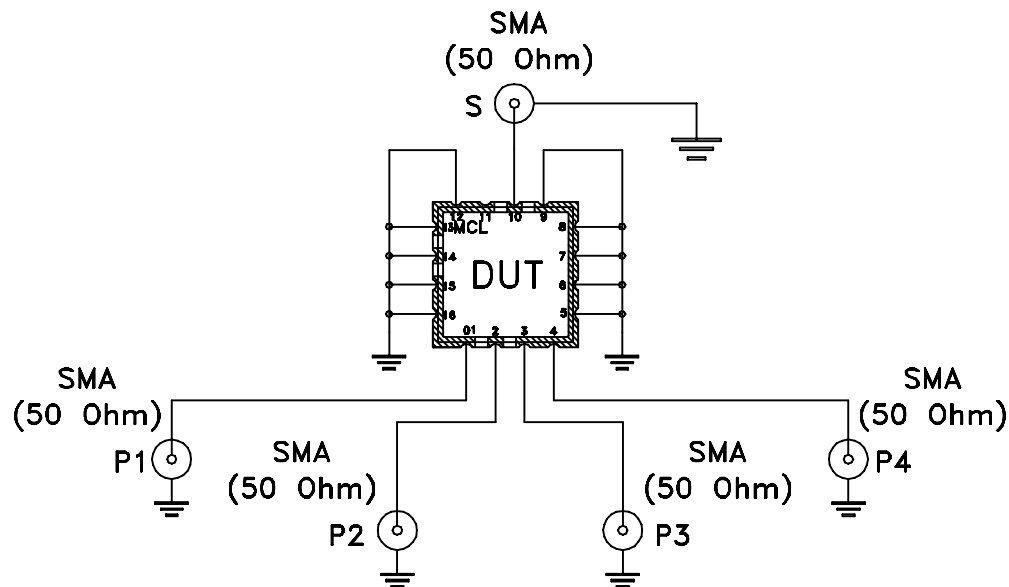
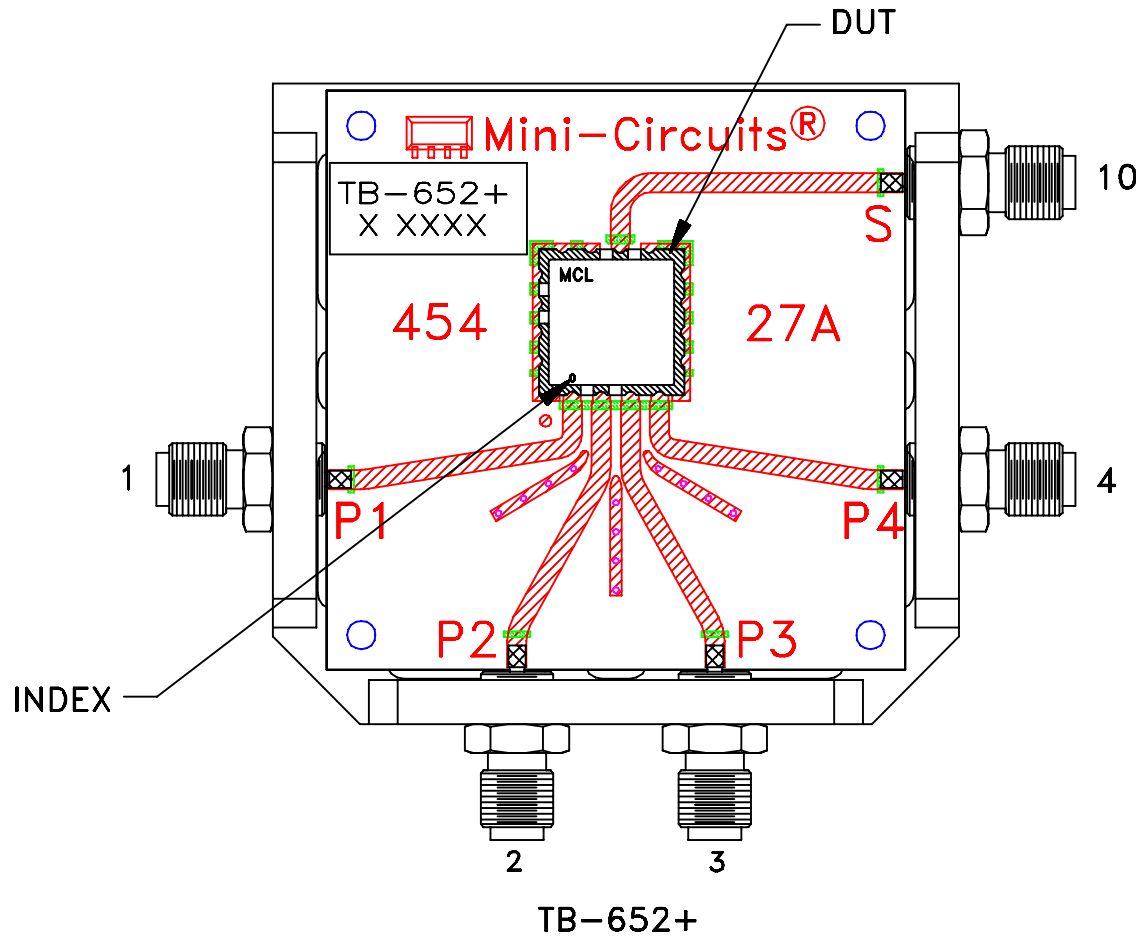
Mini-Circuits® 13 Neptune Avenue
 Brooklyn NY 11235

PL, 16SP01, CK1704, TB-652+

Mini-Circuits® THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF MINI-CIRCUITS. EXCEPT FOR USE EXPRESSLY GRANTED, IN WRITING, TO ITS VENDORS, VENDEE AND THE UNITED STATES GOVERNMENT, MINI-CIRCUITS RESERVES ALL PROPRIETARY DESIGN, USE, MANUFACTURING AND REPRODUCTION RIGHTS THERETO. THESE CONTENTS SHALL NOT BE USED, DUPLICATED OR DISCLOSED TO ANY OUTSIDE PARTY, IN WHOLE OR IN PART, WITHOUT WRITTEN PERMISSION OF MINI-CIRCUITS.	
ASHEETA1.DWG REV:A	DATE:01/12/95

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-368	A
FILE:	98PL368	SCALE: 5:1	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.

 **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	-55° 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 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