



Mini-Circuits

SURFACE MOUNT

Power Splitter/Combiner **TCP-2-33+**

2 Way-0° 50Ω 1000 to 3000 MHz

FEATURES

- Low insertion, 0.8 dB typ.
- Excellent amplitude unbalance, 0.3 dB typ.
- Very good phase unbalance, 1.0 deg. typ.
- External resistor required
- Aqueous washable
- Leads for excellent solderability
- Low cost



Generic photo used for illustration purposes only

CASE STYLE: DB714

+RoHS Compliant

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

APPLICATIONS

- Cellular
- PCN
- GPS

ELECTRICAL SPECIFICATIONS AT 25°C

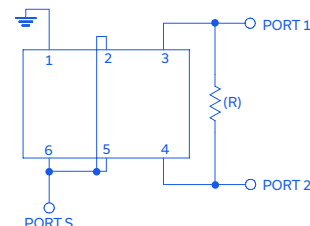
Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Frequency Range		1000		3000	MHz
Insertion Loss, above 3.0 dB	1000 - 3000	—	0.8	1.9	dB
Isolation	1000 - 3000	15	18	—	dB
Phase Unbalance	1000 - 3000	—	—	5.0	Degree
Amplitude Unbalance	1000 - 3000	—	—	0.9	dB

MAXIMUM RATINGS

Parameter	Ratings
Operating temperature	-40°C to 85°C
Storage temperature	-55°C to 100°C
RF Power Input (as splitter)	0.5 W max.

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

FUNCTIONAL SCHEMATIC



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REV. F
ECO-012587
TCP-2-33+
DY/TD/CP/AM
220328

PAGE 1 OF 3



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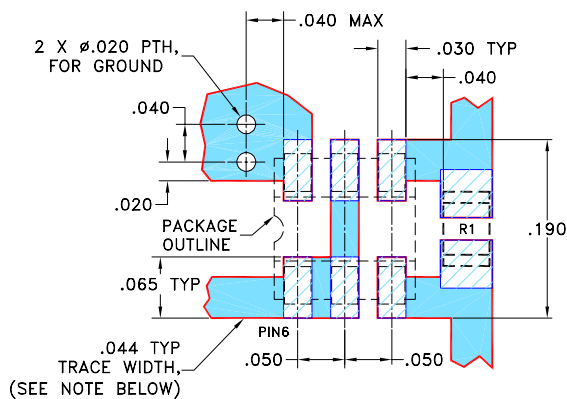
Power Splitter/Combiner **TCP-2-33+**

PIN CONNECTIONS

SUM PORT	2,5,6
PORT 1	3
PORT 2	4
GROUND	1
EXT. RESISTOR 200Ω	3,4

PRODUCT MARKING: N/A

DEMO BOARD MCL P/N: TB-464
SUGGESTED PCB LAYOUT (PL-357)



RESISTOR R1: 200 ± 1% Ohm, 0805 SIZE

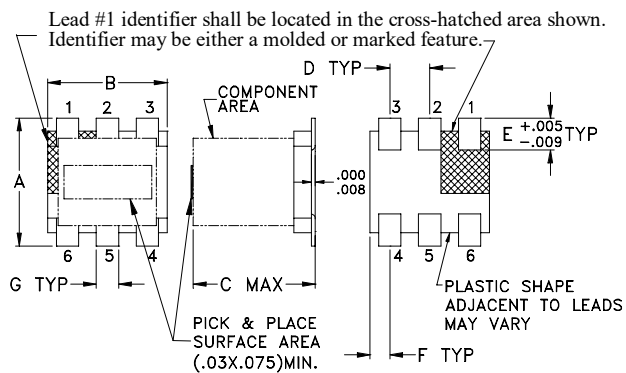
NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.020" ± 0.0015"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.

2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

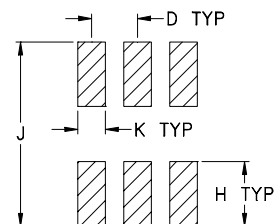
■ DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

▨ DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

OUTLINE DRAWING



PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

OUTLINE DIMENSIONS (Inches/mm)

A	B	C	D	E	F
.160	.150	.160	.050	.040	.025
4.06	3.81	4.06	1.27	1.02	0.64
G	H	J	K		wt
.028	.065	.190	.030		grams
0.71	1.65	4.83	0.76		0.15

TAPE & REEL INFORMATION: F47



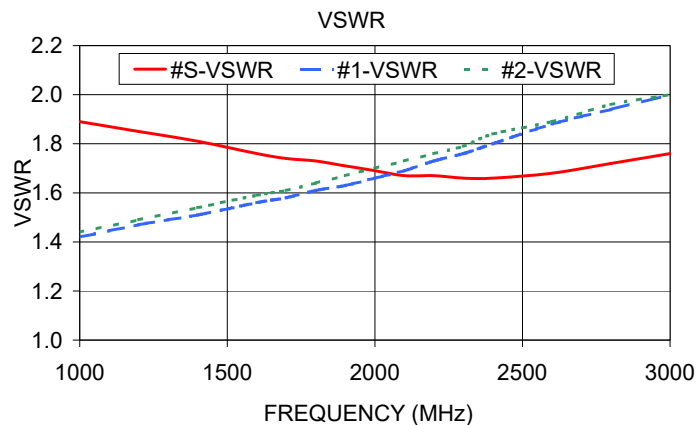
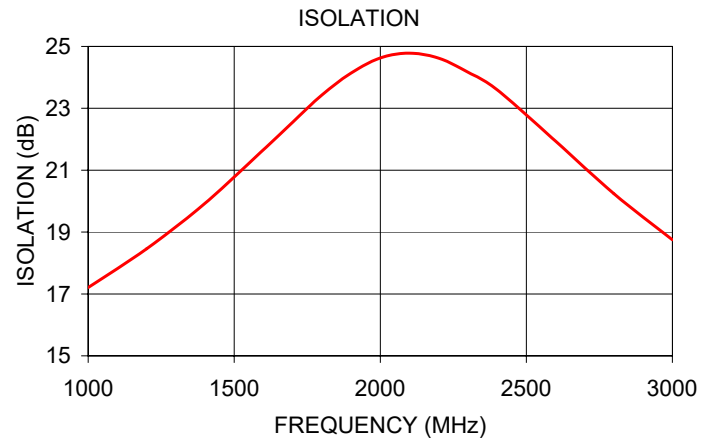
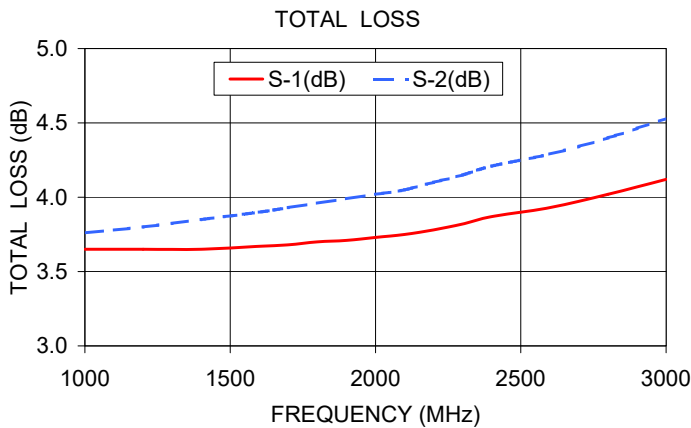
SURFACE MOUNT

Power Splitter/Combiner TCP-2-33+

TYPICAL PERFORMANCE DATA AT 25°C

Frequency (MHz)	Total Loss ¹ (dB)		Amplitude Unbalance (dB)	Isolation (dB)	Phase Unbalance (deg.)	VSWR (:1)		
	S-1	S-2				S	1	2
1000.00	3.65	3.76	0.11	17.21	0.35	1.89	1.42	1.44
1200.00	3.65	3.80	0.15	18.46	0.37	1.85	1.47	1.49
1400.00	3.65	3.85	0.20	19.93	0.41	1.81	1.51	1.54
1600.00	3.67	3.90	0.23	21.66	0.50	1.76	1.56	1.59
1700.00	3.68	3.93	0.25	22.55	0.53	1.74	1.58	1.61
1800.00	3.70	3.96	0.26	23.43	0.59	1.73	1.61	1.64
1900.00	3.71	3.99	0.28	24.14	0.65	1.71	1.63	1.67
2000.00	3.73	4.02	0.29	24.63	0.74	1.69	1.66	1.70
2100.00	3.75	4.05	0.30	24.78	0.82	1.67	1.69	1.73
2200.00	3.78	4.10	0.31	24.62	0.91	1.67	1.73	1.76
2300.00	3.82	4.15	0.32	24.17	0.97	1.66	1.76	1.79
2400.00	3.87	4.21	0.34	23.60	1.16	1.66	1.80	1.84
2600.00	3.93	4.29	0.35	21.94	1.27	1.68	1.88	1.89
2800.00	4.02	4.40	0.38	20.24	1.45	1.72	1.94	1.96
3000.00	4.12	4.53	0.41	18.75	1.73	1.76	2.00	2.00

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



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/terms/viewterm.html



2 Way-0° Power Splitter/Combiner

TCP-2-33+

Typical Performance Data

FREQUENCY (MHz)	TOTAL LOSS ¹		AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	PHASE UNBALANCE (Deg)	FREQUENCY (MHz)	VSWR		
	(dB)						(:1)		
	S-1	S-2					S	1	2
1000.00	3.65	3.76	0.11	17.21	0.35	1000.00	1.89	1.42	1.44
1200.00	3.65	3.80	0.15	18.46	0.37	1200.00	1.85	1.47	1.49
1400.00	3.65	3.85	0.20	19.93	0.41	1400.00	1.81	1.51	1.54
1600.00	3.67	3.90	0.23	21.66	0.50	1600.00	1.76	1.56	1.59
1700.00	3.68	3.93	0.25	22.55	0.53	1700.00	1.74	1.58	1.61
1800.00	3.70	3.96	0.26	23.43	0.59	1800.00	1.73	1.61	1.64
1900.00	3.71	3.99	0.28	24.14	0.65	1900.00	1.71	1.63	1.67
2000.00	3.73	4.02	0.29	24.63	0.74	2000.00	1.69	1.66	1.70
2100.00	3.75	4.05	0.30	24.78	0.82	2100.00	1.67	1.69	1.73
2200.00	3.78	4.10	0.31	24.62	0.91	2200.00	1.67	1.73	1.76
2300.00	3.82	4.15	0.32	24.17	0.97	2300.00	1.66	1.76	1.79
2400.00	3.87	4.21	0.34	23.60	1.16	2400.00	1.66	1.80	1.84
2600.00	3.93	4.29	0.35	21.94	1.27	2600.00	1.68	1.88	1.89
2800.00	4.02	4.40	0.38	20.24	1.45	2800.00	1.72	1.94	1.96
3000.00	4.12	4.53	0.41	18.75	1.73	3000.00	1.76	2.00	2.00

¹Total Loss = Insertion Loss + 3dB Splitter Loss



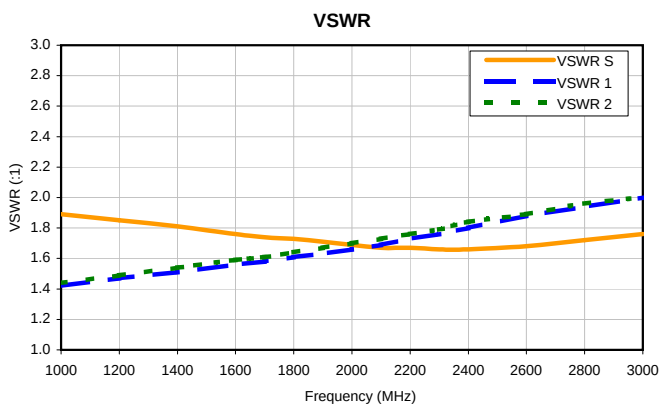
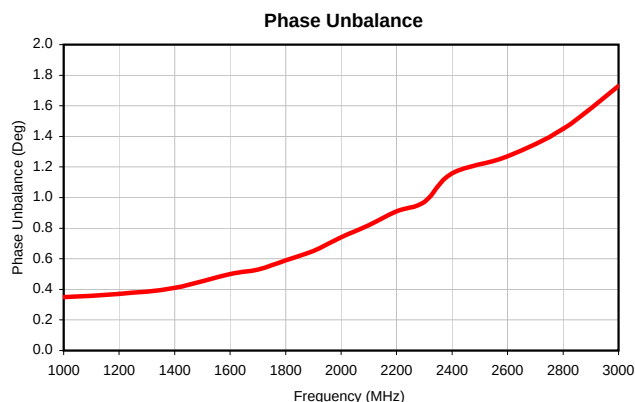
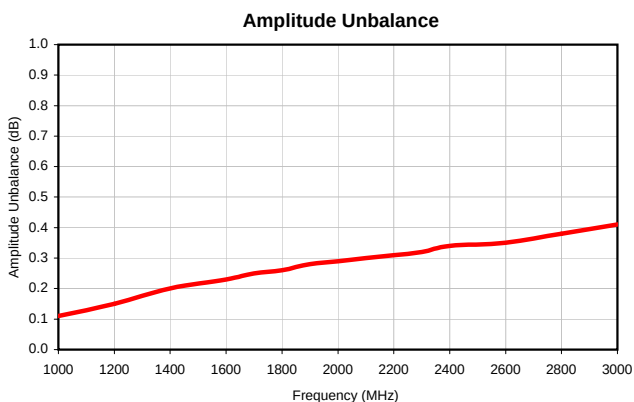
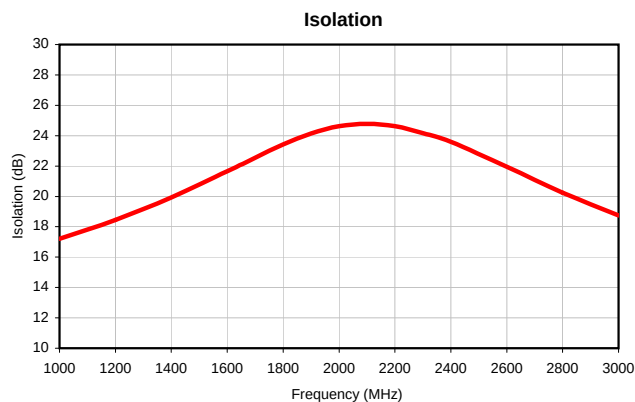
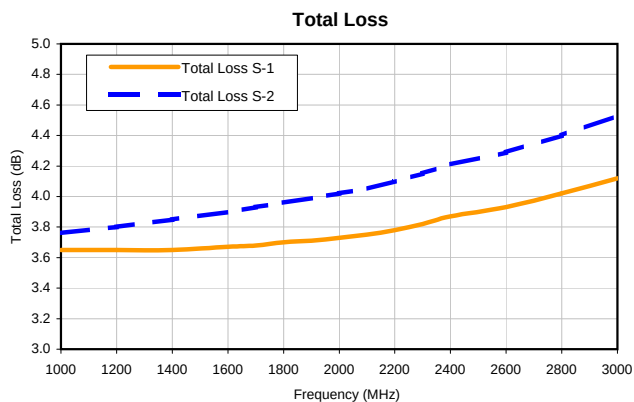
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 The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

IF/RF MICROWAVE COMPONENTS



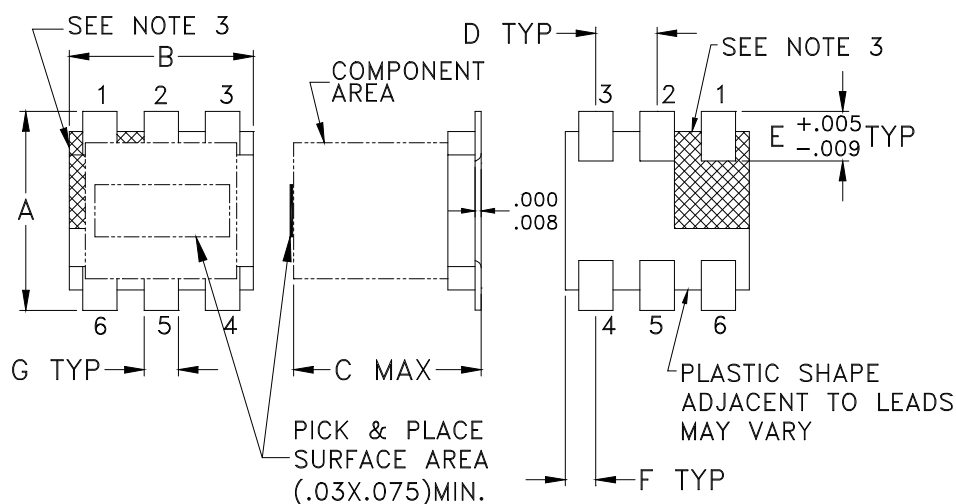
REV. X2
 TCP-2-33+
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 Page 1 of 1

Typical Performance Curves

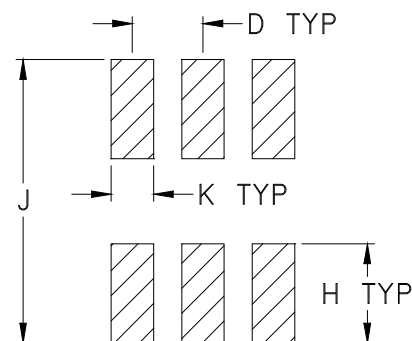


Outline Dimensions

DB714



PCB Land Pattern



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

CASE #	A	B	C	D	E	F	G	H	J	K	WT. GRAM
DB714	.160 (4.06)	.150 (3.81)	.160 (4.06)	.050 (1.27)	.040 (1.02)	.025 (0.64)	.028 (0.71)	.065 (1.65)	.190 (4.83)	.030 (0.76)	.15

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

Notes:

- Case material: Plastic.
- Termination finish:
For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.
For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.
- Lead #1 identifier shall be located in the cross-hatched area shown.
Identifier may be either a molded or marked feature.



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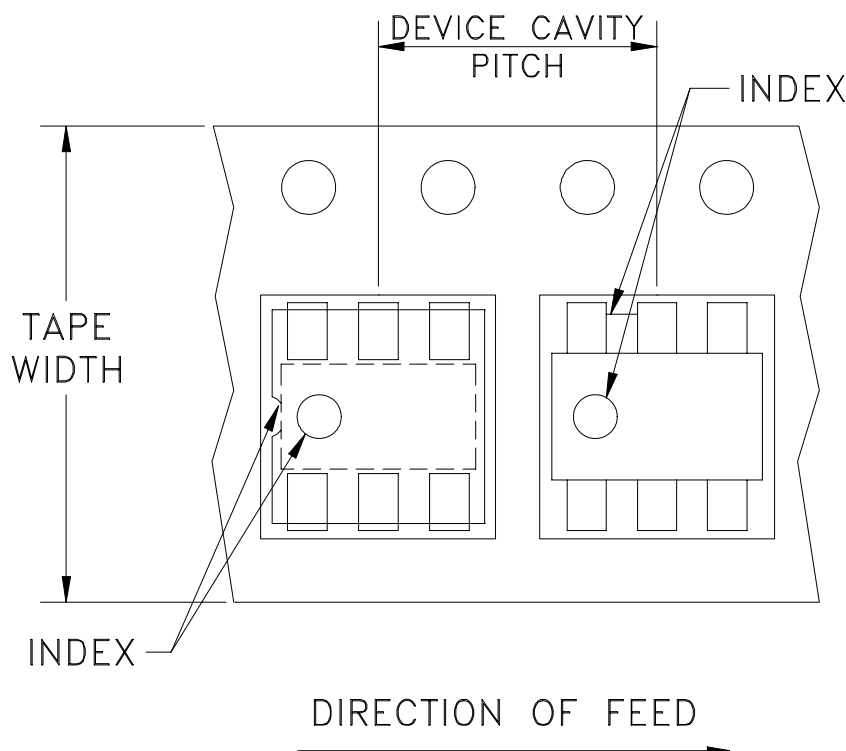


The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

RF/IF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F47

DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel see note
12	8	13	1000, 2000
		7	20, 50, 100, 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



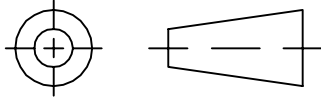
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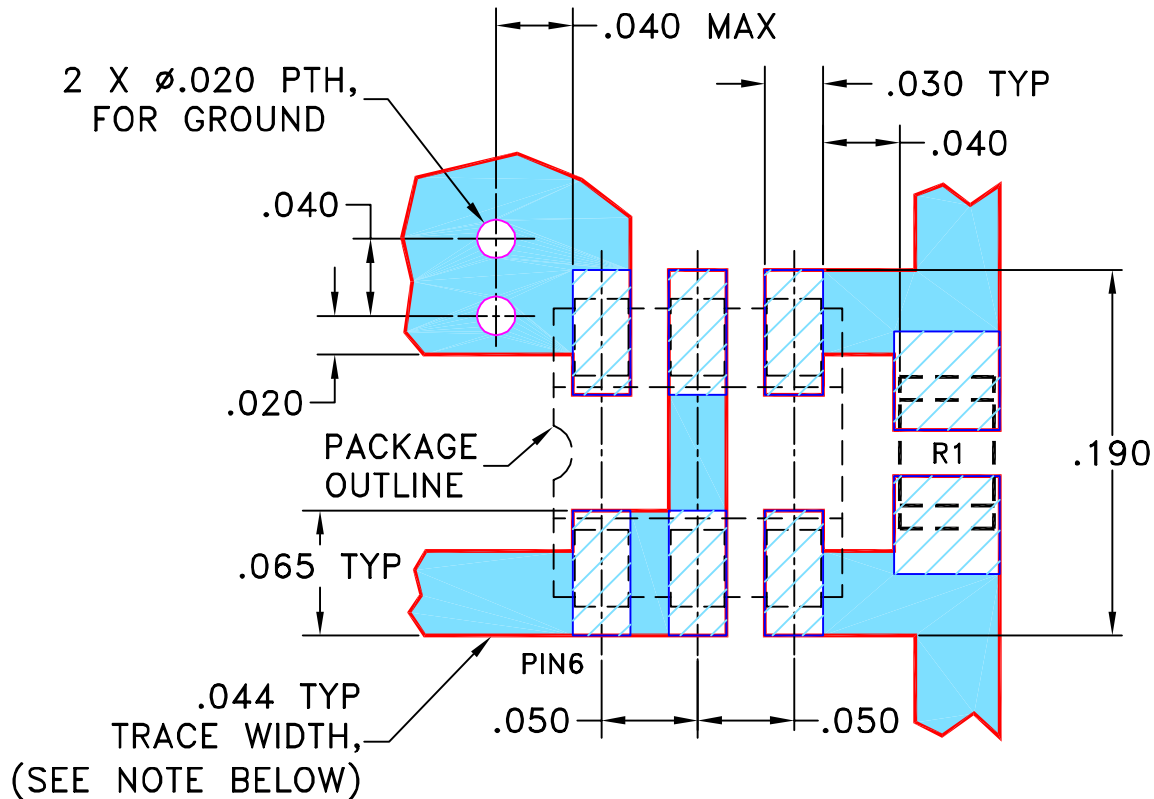
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M73079	NEW RELEASE	07/00	IL	DB
A	M82377	UPDATED DRAWING	08/06/02	GF	HY
B	M102713	UPDATED NOTES	01/12/06	GF	IL

SUGGESTED MOUNTING CONFIGURATION FOR
DB714 CASE STYLE, "nb" PIN CONNECTION

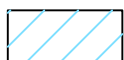


RESISTOR R1: 475 $\pm$ 1% Ohm, 0805 SIZE

NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.020" $\pm$ 0.0015"; 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

DRAWN

IL

07/28/00

TOLERANCES ON:

CHECKED

DY

08/03/00

2 PL DECIMALS $\pm$

APPROVED

DB

08/03/00

3 PL DECIMALS $\pm$.005ANGLES $\pm$ FRACTIONS $\pm$
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ASHEETA1.DWG REV:A DATE:01/12/95



Mini-Circuits® 13 Neptune Avenue
Brooklyn NY 11235

PL, nb, DB714, TCP-2-25, TB-86

SIZE

CODE IDENT

DRAWING NO:

REV:

A

15542

98-PL-008

B

FILE: 98PL008

SCALE:

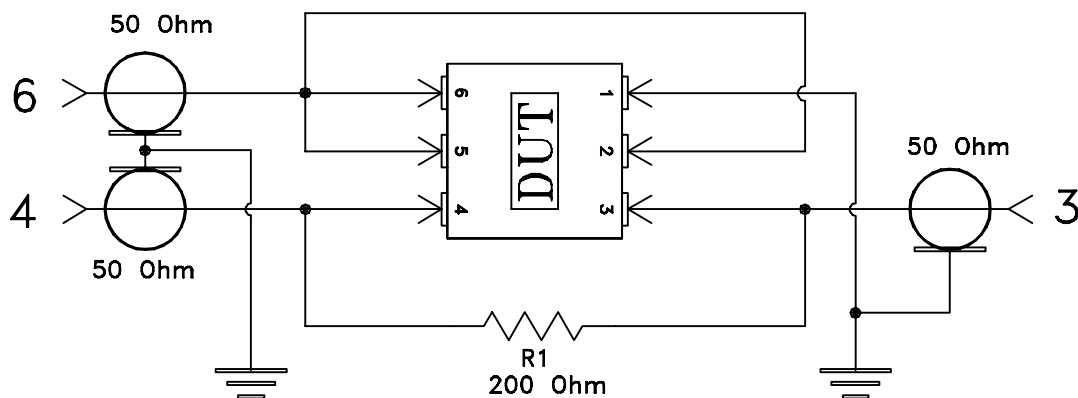
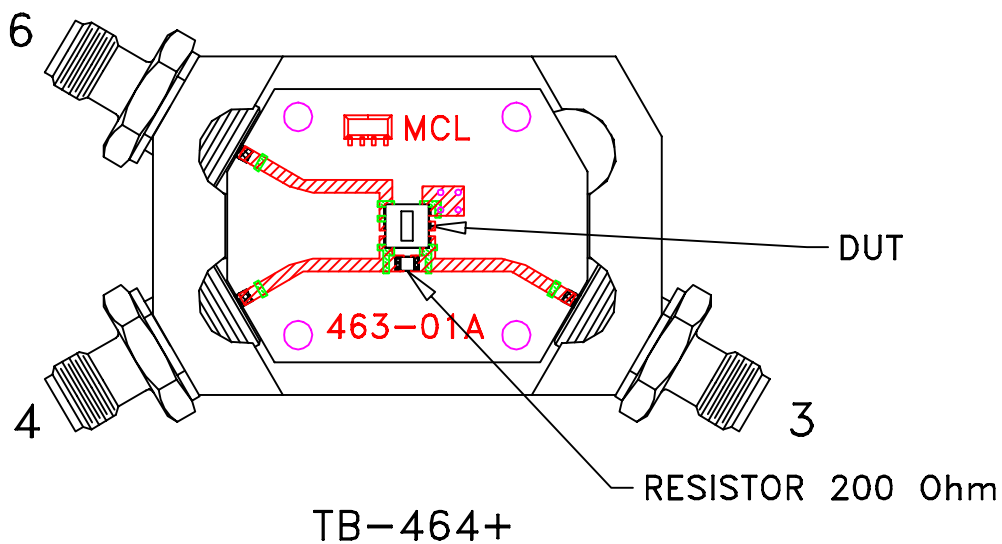
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SHEET:

1 OF 1

Evaluation Board and Circuit

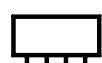
For Pins Connections Refer to Data Sheet of the DUT



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent,
Dielectric Constant=3.5, Thickness=.020 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