

# Ceramic Directional Coupler

## DCW-22-332+

50Ω 22 dB Coupling 1200 to 3300 MHz



Generic photo used for illustration purposes only

CASE STYLE: JC0603C

### Maximum Ratings

Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C
Permanent damage may occur if any of these limits are exceeded.	

### Pad Connections

INPUT	1
OUTPUT	6
COUPLED	3
TERMINATION	4
GROUND	2,5

### Features

- Wideband, 1200-3300 MHz
- Low insertion loss, 0.4 dB typ.
- Excellent return loss for input/output ports ideal for signal-tap
- Ultra small size, 0603 (1.6 x 0.8 mm)
- Temperature stable
- LTCC construction

### Applications

- ISM
- UMTS
- WiMAX
- PCS
- Wi-Fi
- LTE

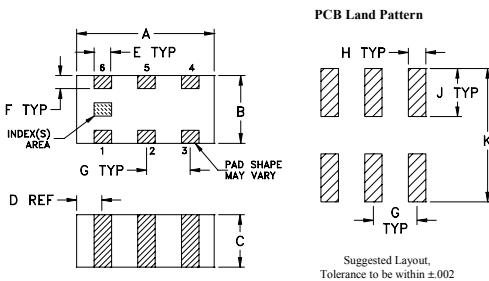
### +RoHS Compliant

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

Available Tape and Reel at no extra cost

Reel Size	Devices/Reel
7"	20, 50, 100, 200, 500, 1000, 4000

### Outline Drawing



### Outline Dimensions (inch/mm)

A	B	C	D	E	F
.063	.031	.024	.012	.008	.006
1.60	0.79	0.61	0.30	0.20	0.15
G	H	J	K	wt	
.020	.010	.022	.053	grams	
0.51	0.25	0.56	1.35	0.005	

### Electrical Specifications at 25°C

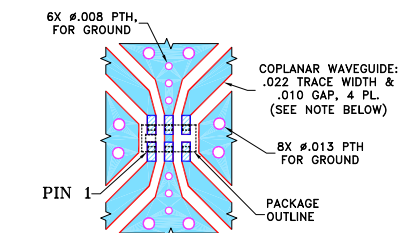
Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Frequency Range		1200		3300	MHz
Mainline Loss	1200-3300	—	0.4	0.7	dB
Coupling	1200-3300	—	22±2.0	—	dB
Coupling Flatness(±)	1200-3300	—	1.3	—	dB
Directivity	1200-3300	—	12	—	dB
Return Loss (Input)	1200-3300	15	20	—	dB
Return Loss (Output)	1200-3300	15	23	—	dB
Input Power <sup>1</sup>	1200-3300	—	2	—	W

1. Derate linearly 1W at 100°C.

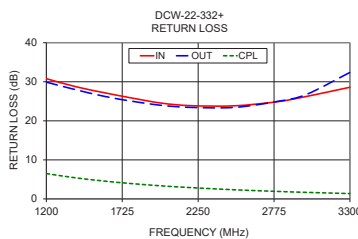
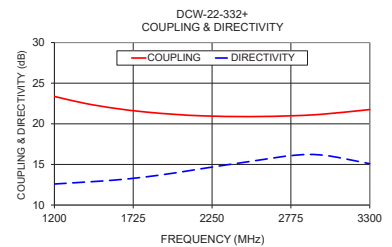
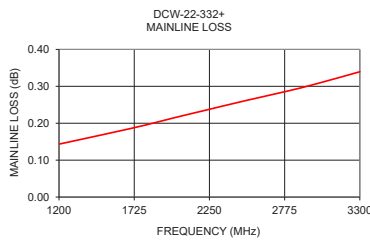
### Typical Performance Data

Frequency (MHz)	Mainline Loss (dB) In-Out	Coupling (dB) In-Cpl	Directivity (dB)	Return Loss (dB)		Cpl
				In	Out	
1200	0.14	23.37	12.59	30.79	29.90	6.49
1400	0.16	22.53	12.82	28.77	28.00	5.41
1600	0.18	21.91	13.07	27.20	26.28	4.57
1800	0.19	21.47	13.45	25.78	24.97	3.89
2000	0.21	21.17	13.95	24.51	23.95	3.34
2200	0.23	20.97	14.53	23.88	23.44	2.90
2500	0.26	20.89	15.36	23.84	23.43	2.34
2800	0.29	21.00	16.13	24.90	24.98	1.92
3000	0.31	21.20	16.12	26.25	26.77	1.68
3300	0.34	21.75	15.09	28.60	32.40	1.37

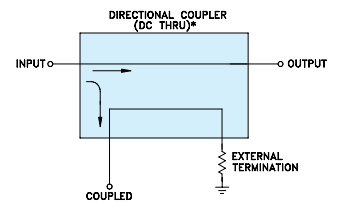
### Demo Board MCL P/N: TB-794+ Suggested PCB Layout (PL-440)



- Notes:
1. COPLANAR WAVEGUIDE IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .010" ± .001", COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP 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.



### Electrical Schematic



\* ELECTRICAL SCHEMATIC FOR DIRECTIONAL COUPLERS REQUIRING EXTERNAL TERMINATION THAT IS DESIGNED WITHOUT INTERNAL TRANSFORMERS.

### 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-Circuits' applicable established test performance criteria and measurement instructions.
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REV. A  
M151107  
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DCW-22-332+  
MY/CP/AM  
150702  
Page 1 of 1

# Directional Coupler

# DCW-22-332+

## Typical Performance Data

FREQUENCY (MHz)	INSERTION LOSS (dB)	COUPLING (dB)	DIRECTIVITY (dB)	RETURN LOSS (dB)		
				IN	OUT	CPL
600	0.10	28.32	12.39	38.74	36.79	12.04
700	0.11	27.12	12.41	37.06	35.90	10.74
800	0.12	26.10	12.38	35.66	34.11	9.63
900	0.12	25.25	12.40	34.54	33.08	8.67
1000	0.13	24.53	12.44	32.86	31.68	7.83
1100	0.14	23.91	12.49	32.19	30.72	7.13
1200	0.14	23.37	12.59	30.79	29.90	6.49
1250	0.15	23.14	12.60	30.48	29.32	6.19
1300	0.15	22.92	12.63	29.66	28.58	5.92
1350	0.16	22.72	12.74	29.00	28.20	5.66
1400	0.16	22.53	12.82	28.77	28.00	5.41
1450	0.16	22.35	12.85	28.45	27.44	5.19
1500	0.17	22.19	12.89	27.81	26.84	4.97
1550	0.17	22.05	13.02	27.37	26.58	4.76
1600	0.18	21.91	13.07	27.20	26.28	4.57
1650	0.18	21.78	13.14	26.74	25.84	4.38
1700	0.19	21.67	13.27	26.22	25.51	4.19
1750	0.19	21.57	13.37	26.00	25.25	4.03
1800	0.19	21.47	13.45	25.78	24.97	3.89
1850	0.20	21.38	13.56	25.37	24.63	3.75
1900	0.20	21.31	13.70	25.15	24.48	3.59
1950	0.21	21.24	13.79	24.93	24.25	3.45
2000	0.21	21.17	13.95	24.51	23.95	3.34
2050	0.22	21.11	14.14	24.37	23.85	3.22
2100	0.22	21.07	14.25	24.40	23.82	3.09
2150	0.23	21.02	14.35	24.21	23.59	2.98
2200	0.23	20.97	14.53	23.88	23.44	2.90
2250	0.24	20.95	14.70	23.87	23.44	2.79
2300	0.24	20.93	14.84	23.93	23.43	2.68
2350	0.25	20.90	14.93	23.67	23.24	2.60
2400	0.25	20.88	15.16	23.72	23.41	2.52
2450	0.26	20.88	15.33	23.95	23.57	2.43
2500	0.26	20.89	15.36	23.84	23.43	2.34
2550	0.27	20.89	15.55	23.68	23.55	2.27
2600	0.27	20.90	15.74	24.08	23.89	2.19
2650	0.27	20.92	15.83	24.34	24.09	2.11
2700	0.28	20.94	15.84	24.18	24.04	2.04
2750	0.28	20.96	16.00	24.36	24.49	1.99
2800	0.29	21.00	16.13	24.90	24.98	1.92
2850	0.29	21.05	16.04	25.07	25.09	1.85
2900	0.30	21.09	16.06	24.92	25.56	1.79
2950	0.30	21.14	16.15	25.58	26.34	1.74
3000	0.31	21.20	16.12	26.25	26.77	1.68
3050	0.31	21.20	16.12	26.25	26.77	1.68
3100	0.32	21.34	15.82	26.38	28.13	1.58
3150	0.32	21.34	15.82	26.38	28.13	1.58
3200	0.33	21.51	15.56	28.11	29.73	1.48
3250	0.33	21.51	15.56	28.11	29.73	1.48
3300	0.34	21.75	15.09	28.60	32.40	1.37
3400	0.35	22.01	14.48	30.36	32.76	1.28
3500	0.36	22.30	13.77	30.58	32.94	1.19
3600	0.38	22.67	12.92	30.84	30.65	1.11
3700	0.39	23.08	12.06	29.67	28.05	1.03
3800	0.41	23.57	11.00	28.19	26.18	0.95
3900	0.42	24.11	9.99	27.07	24.01	0.88
4000	0.44	24.73	8.75	25.19	22.56	0.82



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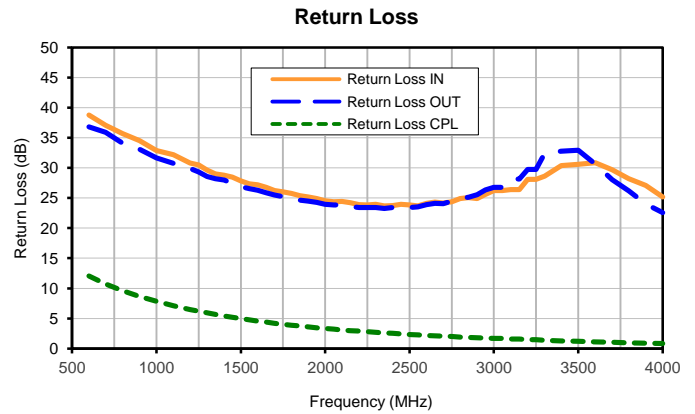
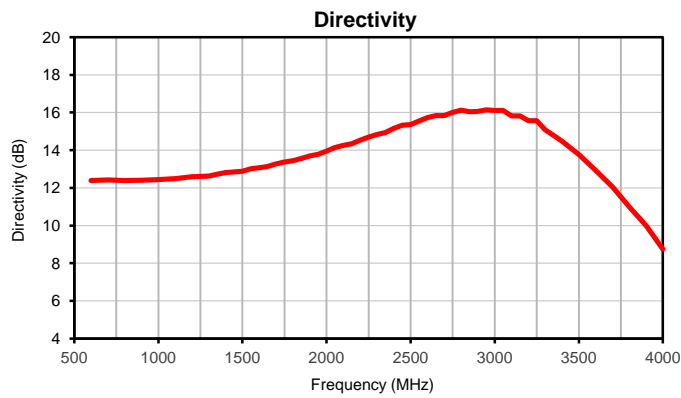
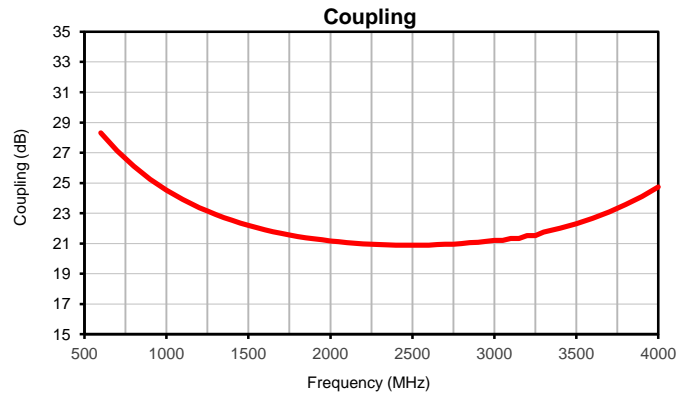
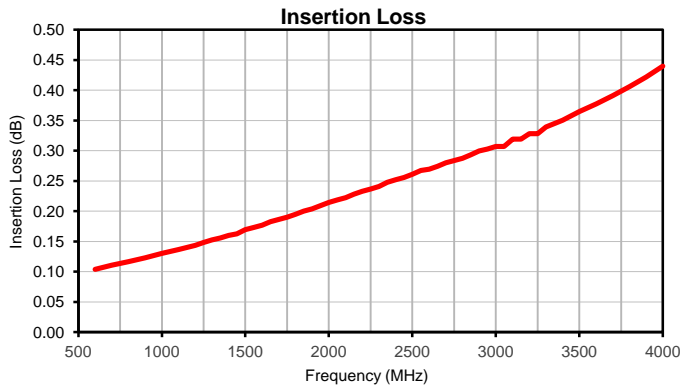
IF/RF MICROWAVE COMPONENTS

REV. A  
DCW-22-332+  
2/5/2015  
Page 1 of 1

# Directional Coupler

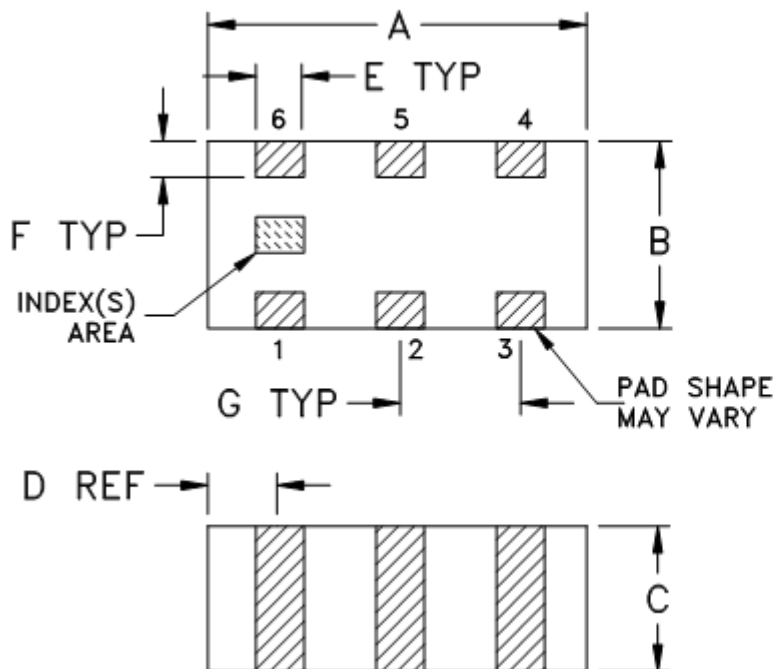
# DCW-22-332+

## Typical Performance Curves

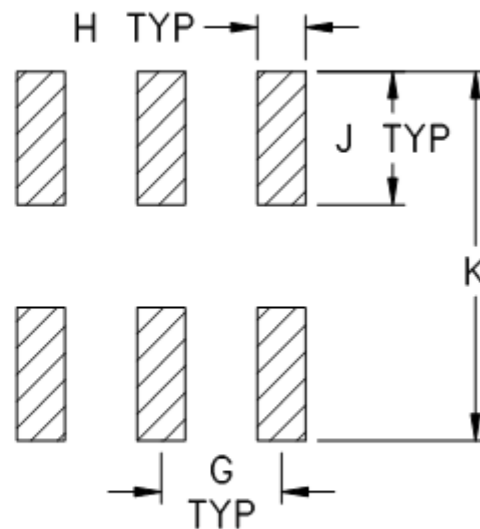


## Outline Dimensions

JC0603C



## PCB Land Pattern



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

CASE #	A	B	C	D	E	F	G	H	J	K	WT. GRAM
JC0603C	.063 (1.60)	.031 (0.80)	.024 (0.60)	.012 (0.30)	.008 (0.20)	.006 (0.15)	.020 (0.50)	.010 (0.25)	.022 (0.55)	0.053 (1.35)	.005

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

### Notes:

- Open style, ceramic base.
- Termination finish:  
For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.



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RF/IF MICROWAVE COMPONENTS

# Tape & Reel Packaging TR-F114

## DEVICE ORIENTATION IN T&R

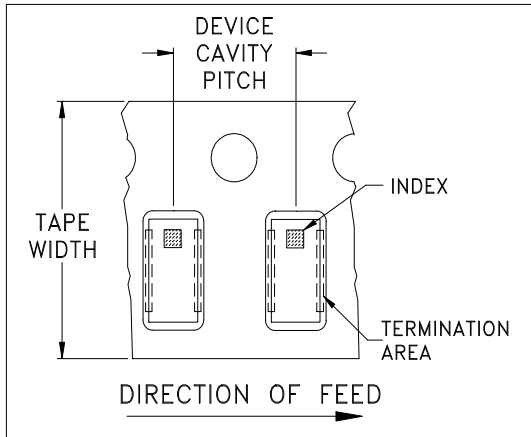


ILLUSTRATION 1

Applicable Case Styles	
GE0805C	JC0603C
GE0805C-1	JC0603C-4
GE0805C-1AP	JC0603C-6
GE0805C-7	
GE0805C-9	
GE0805C-10	
GE0805C-11	
GE0805C-12	

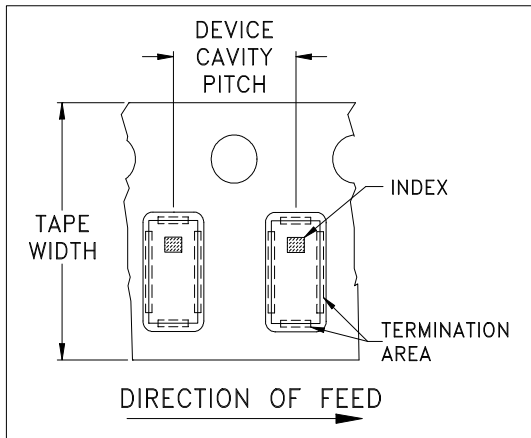


ILLUSTRATION 2

Applicable Case Styles	
GE0805C-2	JC0603C-1
GE0805C-3	JC0603C-2
GE0805C-4	JC0603C-3
GE0805C-5	JC0603C-5
GE0805C-6	JC0603C-7
GE0805C-8	JV1210C-1
GE0805C-15	

Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
8	4	7	Small quantity standards (see note)	20
				50
				100
				200
				500
				1000
			Standard	4000

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



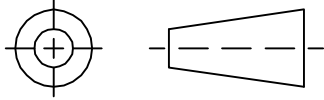
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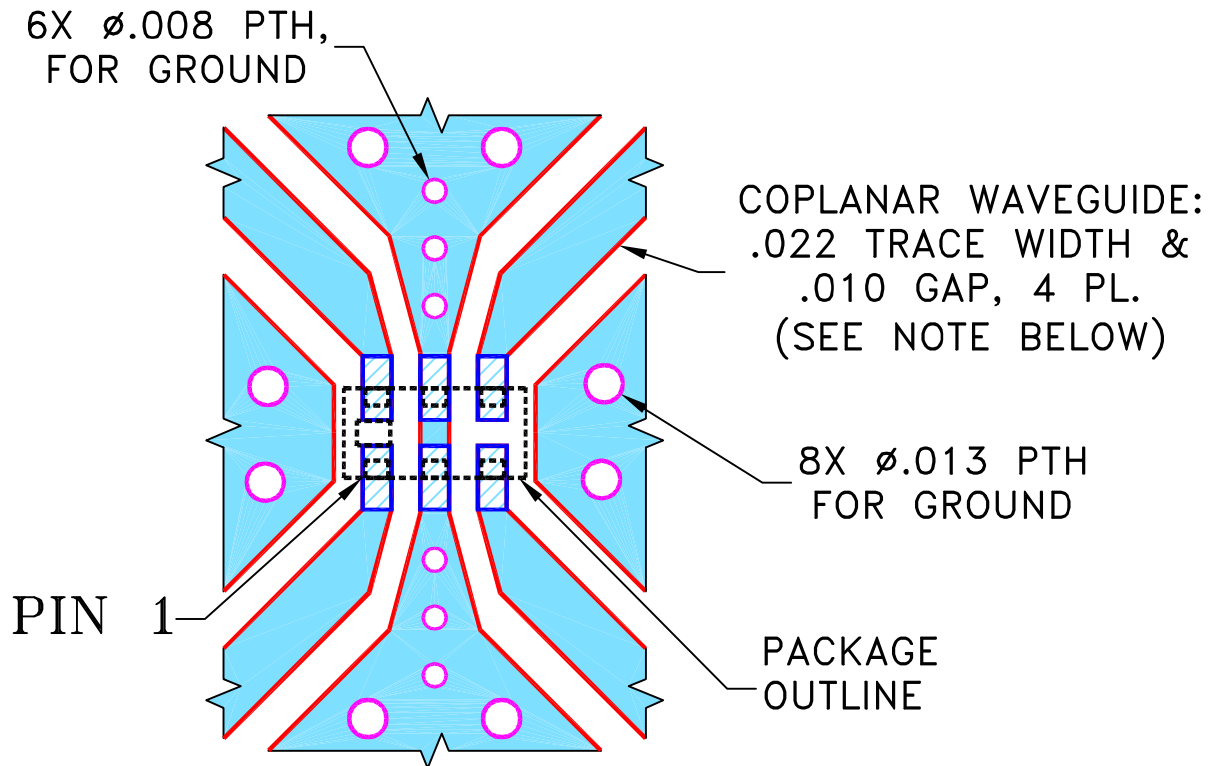
THIRD ANGLE PROJECTION



REVISIONS


REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M148537	NEW RELEASE	10/14/14	GF	MY

SUGGESTED MOUNTING CONFIGURATION  
FOR JC0603C CASE STYLE, "06DC12" PIN CODE



NOTES:

1. COPLANAR WAVEGUIDE IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .010" ± .001". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

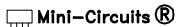
 DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).

 DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

UNLESS OTHERWISE SPECIFIED	INITIALS	DATE
DRAWN	GF	10/07/14
CHECKED	AV	10/14/14
APPROVED	MY	10/14/14

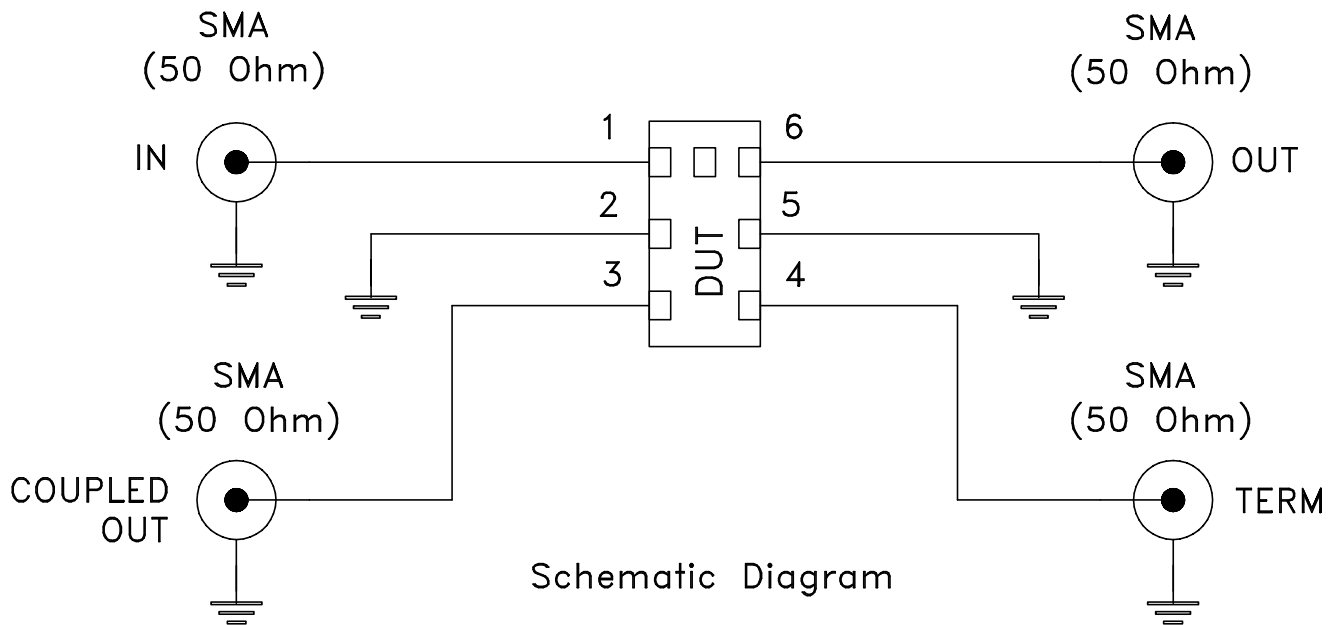
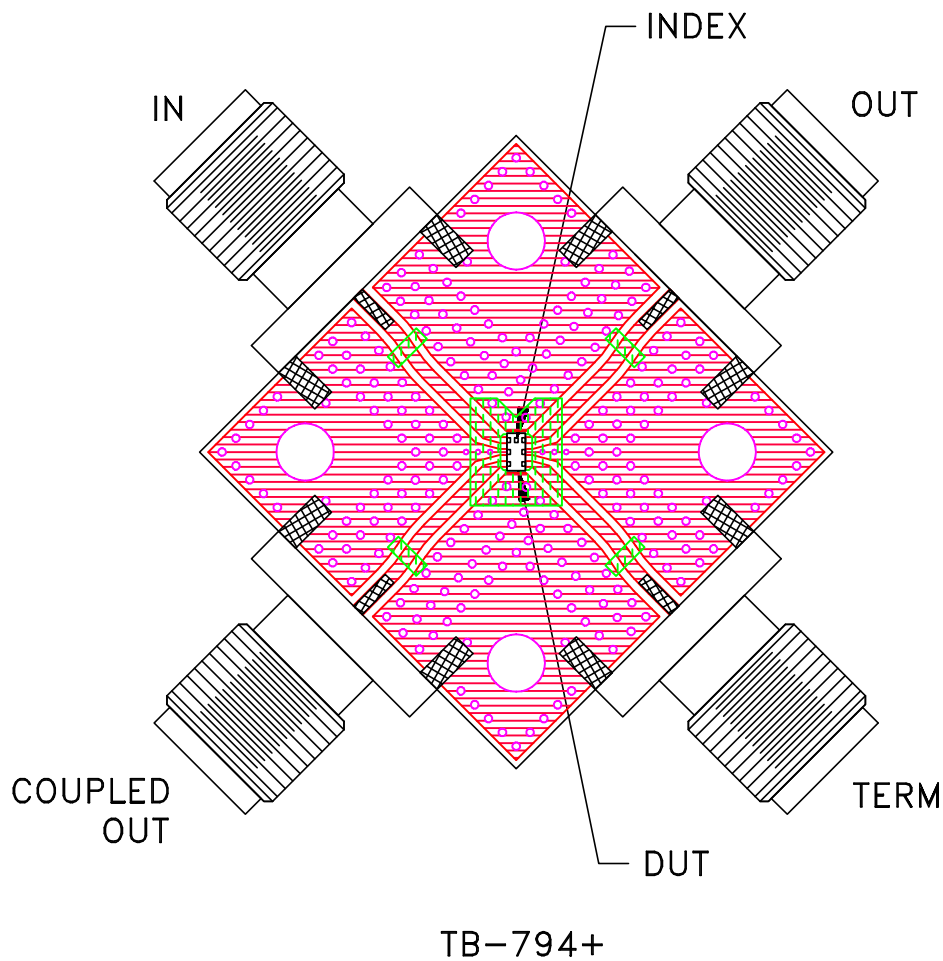
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PL, 06DC12, JC0603C, TB-794+

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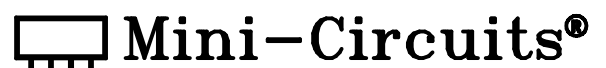
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-440	OR
FILE:	98PL440	SCALE: 15:1	SHEET: 1 OF 1

# Evaluation Board and Circuit



**Notes:**

1. 50 Ohm SMA Female connectors.
2. PCB Material: R04350 or equivalent,  
Dielectric Constant=3.5, Thickness=.010 inch.



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 100°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
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