

Ceramic Directional Coupler

DCW-6-722+

50Ω 6 dB Coupling 4400 to 7200 MHz

The Big Deal

- Rugged, ceramic construction
- Industry leading combination of size/bandwidth



CASE STYLE: JC0603C

Product Overview

Mini-Circuits new directional coupler DCW-6-722+ offers an industry leading combination of operating bandwidth and size; The low insertion loss makes this component a versatile building block for use in a variety of systems and sub-system designs.

Key Features

Feature	Advantages
Small Size	Offered in the JC-0603C package size, the DCW-6-722+ offers an industry leading combination of size, bandwidth and frequency. The small footprint allows for reduced parasitics in systems with improved performance and simplified layout.
LTCC Construction	Provides repeatable performance in a rugged, ceramic package well suited for tough environments such as high humidity and temperature extremes.
Wrap-around terminations	Provides excellent solderability and easy visual inspection

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



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Generic photo used for illustration purposes only

CASE STYLE: JC0603C

+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

Maximum Ratings

Operating Temperature -55°C to 125°C

Storage Temperature -55°C to 125°C

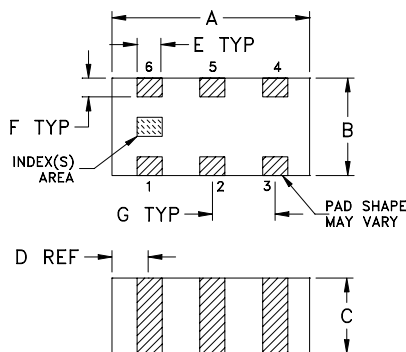
Input Power¹ 1W

Permanent damage may occur if any of these limits are exceeded.
1. Derate linearly 0.5W at 125°C

Pad Connections

INPUT	1
OUTPUT	4
COUPLED	6
TERMINATION	3
GROUND	2.5

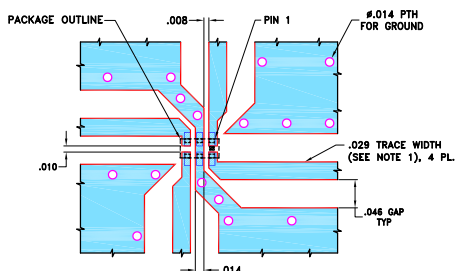
Outline Drawing



Outline Dimensions (inch/mm)

A	B	C	D	E	F	G	wt
.063	.031	.024	.012	.008	.006	.020	grams
1.60	0.79	0.61	0.30	0.20	0.15	0.51	0.005

Demo Board MCL P/N: TB-DCW-6-722+ Suggested PCB Layout (PL-572)



- NOTES:
- TRACE WIDTH & GAP ARE SHOWN FOR FR4, GRADE IT-180TC (ITEQ CORP.) WITH DIELECTRIC THICKNESS .016±.0015. COPPER: 1/2 OZ EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
 - BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
 - REFER TO MODEL DATASHEET FOR PIN OUTS.
- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).
- DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

Features

- Wideband, 4400-7200 MHz
- 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

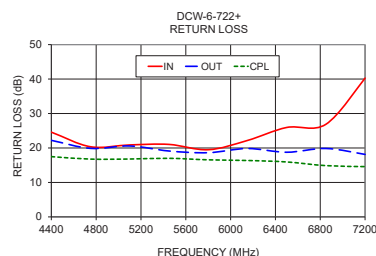
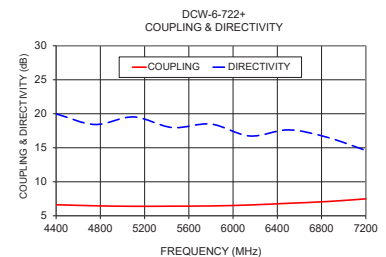
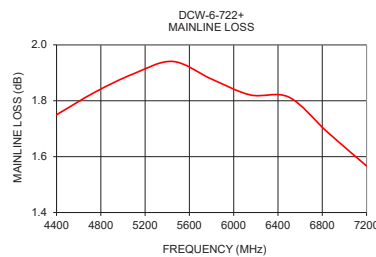
- 5G sub 6GHz
- Wi-Fi

Electrical Specifications at 25°C

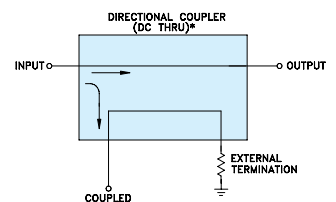
Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Frequency Range		4400		7200	MHz
Mainline Loss (Theoretical loss included)	4400-7200	—	1.7	2.6	dB
Coupling	4400-7200	—	6.75	—	dB
Coupling Flatness(±)	4400-7200	—	1.3	—	dB
Directivity	4400-7200	—	17	—	dB
Return Loss (Input)	4400-7200	9.5	17	—	dB
Return Loss (Output)	4400-7200	9.5	17	—	dB

Typical Performance Data

Frequency (MHz)	Mainline Loss (dB) In-Out	Coupling (dB) In-Cpl	Directivity (dB)	Return Loss (dB)		Cpl
				In	Out	
4400.00	1.75	6.63	19.99	24.59	22.22	17.49
4750.00	1.83	6.47	18.42	20.36	19.89	16.77
5100.00	1.90	6.40	19.53	20.89	20.59	16.80
5450.00	1.94	6.41	17.97	21.04	19.12	17.00
5800.00	1.88	6.45	18.49	19.50	18.63	16.56
6150.00	1.82	6.59	16.73	22.18	19.84	16.37
6500.00	1.81	6.84	17.63	25.95	18.76	15.95
6850.00	1.69	7.09	16.55	26.87	19.86	14.88
7200.00	1.57	7.49	14.60	40.27	18.13	14.59



Electrical Schematic



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

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REV. OR
ECO-005228
DCW-6-722+
AVB/CP/AM
201216

Directional Coupler

DCW-6-722+

Typical Performance Data

FREQUENCY (MHz)	INSERTION LOSS (dB)	COUPLING (dB)	DIRECTIVITY (dB)	RETURN LOSS (dB)		
				IN	OUT	CPL
4200	1.70	6.73	21.18	26.11	22.83	18.20
4225	1.70	6.71	21.04	25.53	22.82	18.05
4250	1.70	6.70	20.94	25.19	22.90	18.06
4275	1.71	6.69	20.85	25.35	22.91	18.01
4300	1.72	6.67	20.69	25.38	22.77	17.76
4325	1.73	6.65	20.52	24.87	22.62	17.56
4350	1.73	6.64	20.37	24.57	22.59	17.62
4375	1.74	6.63	20.17	24.73	22.46	17.71
4400	1.75	6.63	19.99	24.59	22.22	17.49
4750	1.83	6.47	18.42	20.36	19.89	16.77
5100	1.90	6.40	19.53	20.89	20.59	16.80
5450	1.94	6.41	17.97	21.04	19.12	17.00
5800	1.88	6.45	18.49	19.50	18.63	16.56
6150	1.82	6.59	16.73	22.18	19.84	16.37
6500	1.81	6.84	17.63	25.95	18.76	15.95
6850	1.69	7.09	16.55	26.87	19.86	14.88
7200	1.57	7.49	14.60	40.27	18.13	14.59
7233	1.56	7.53	14.48	36.11	18.05	14.35
7267	1.56	7.57	14.20	37.54	18.06	14.20
7300	1.54	7.60	14.12	38.91	17.99	14.35
7333	1.54	7.63	13.96	35.31	17.91	14.14
7367	1.54	7.67	13.59	36.13	17.92	13.94
7400	1.53	7.71	13.30	36.32	17.98	14.03
7433	1.53	7.75	12.94	33.99	18.10	13.84
7467	1.52	7.80	12.49	34.74	18.16	13.62
7500	1.51	7.86	12.15	34.53	18.14	13.68



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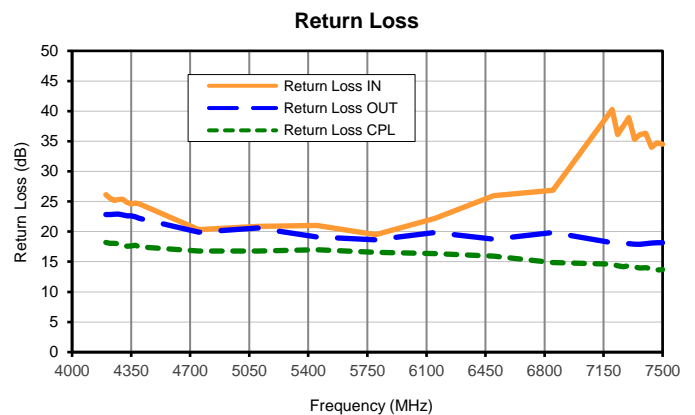
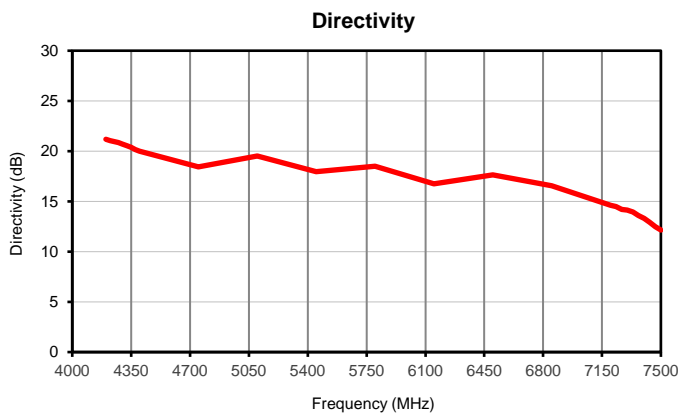
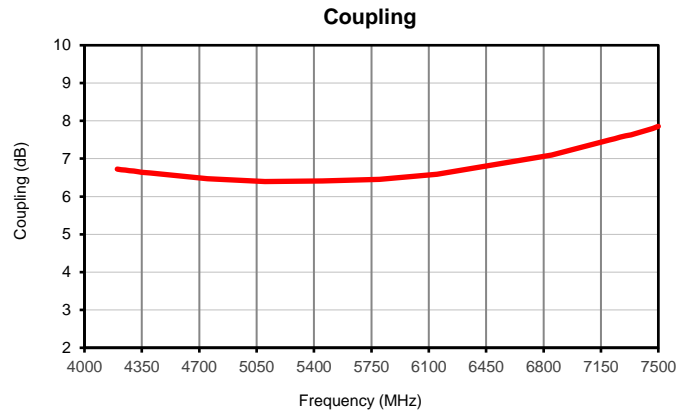
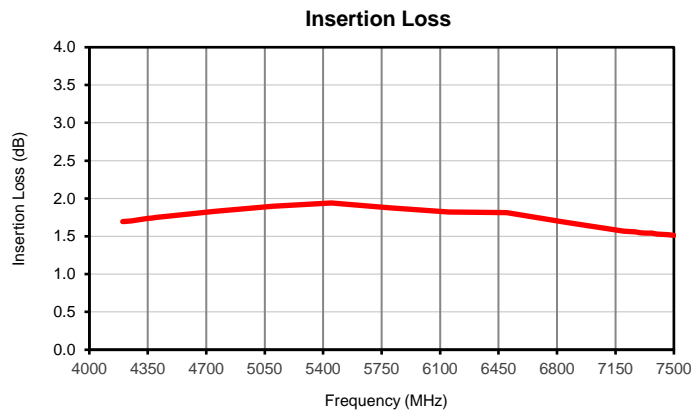


The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

IF/RF MICROWAVE COMPONENTS

REV. OR
DCW-6-722+
12/14/2020
Page 1 of 1

Typical Performance Curves



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	

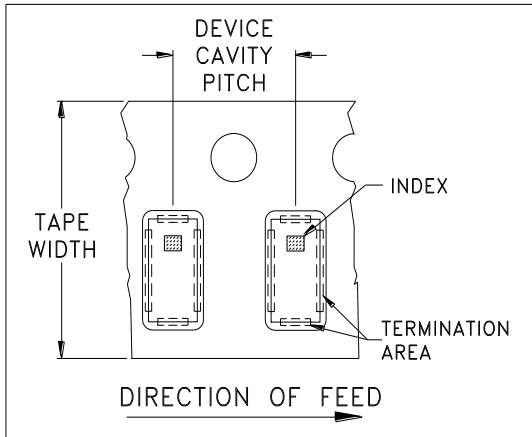


ILLUSTRATION 2

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	
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
			Standard	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



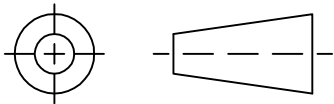
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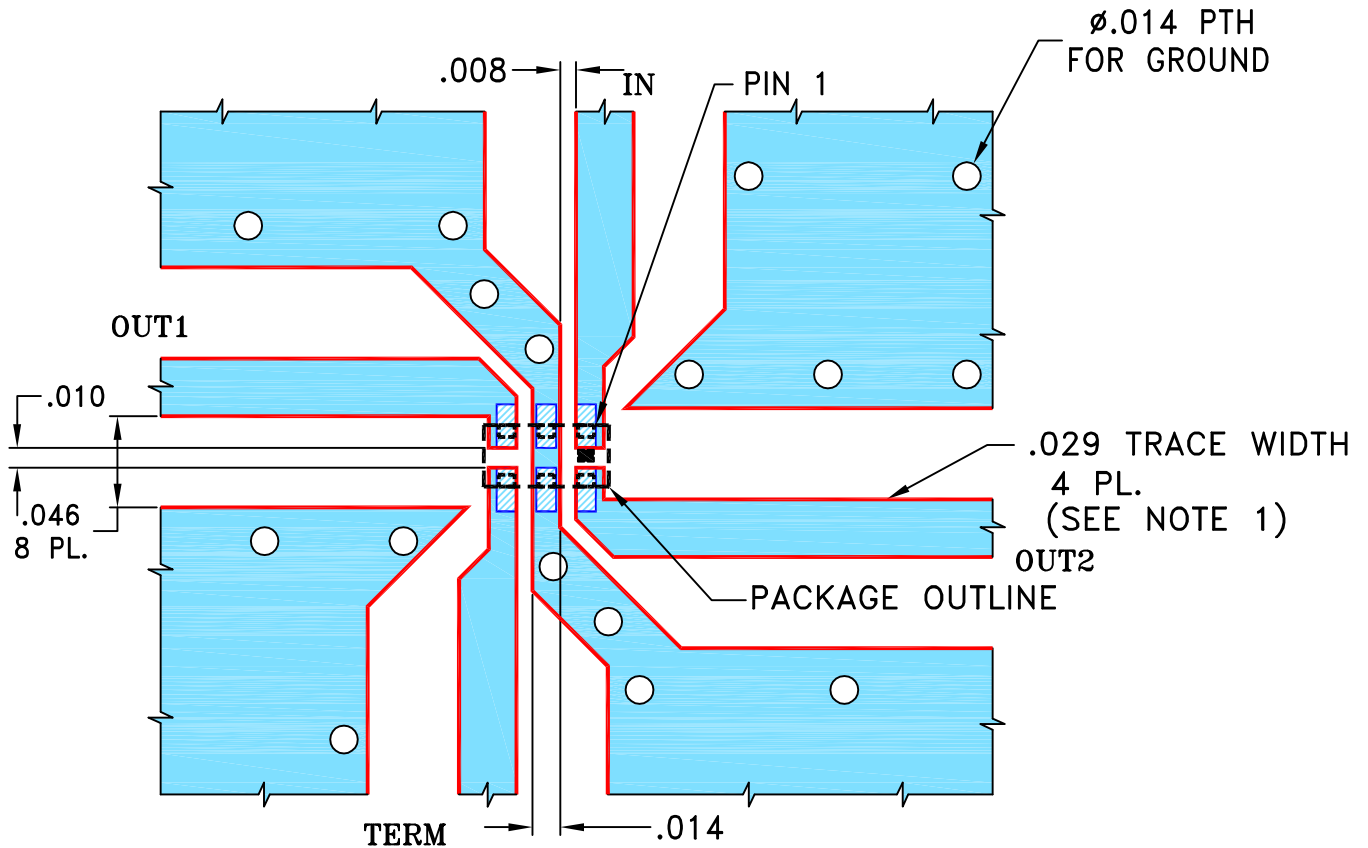
THIRD ANGLE PROJECTION



REVISIONS



REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M168200	NEW RELEASE	05/31/18	NP	SL

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




NOTES:

1. TRACE WIDTH IS SHOWN FOR FR4, GRADE IT-180TC (ITEQ CORP.) WITH DIELECTRIC THICKNESS $.016 \pm .0015$. COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

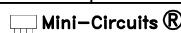
-  DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).
-  DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

UNLESS OTHERWISE SPECIFIED	INITIALS	DATE
DRAWN	NP	05/30/18
CHECKED	GF	05/30/18
APPROVED	SL	05/31/18

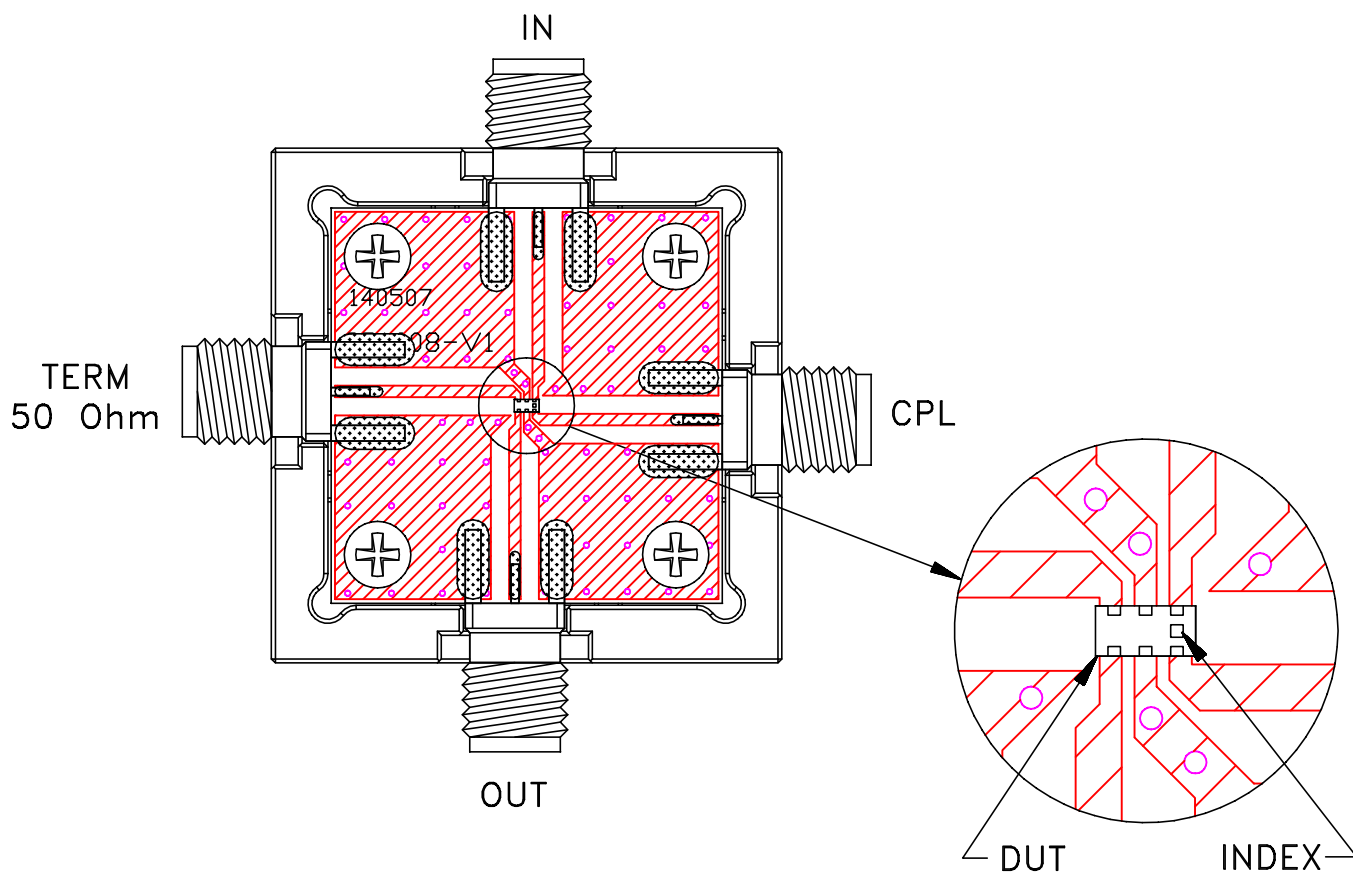
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PL, 06DC12, JC0603C, TB-1031+

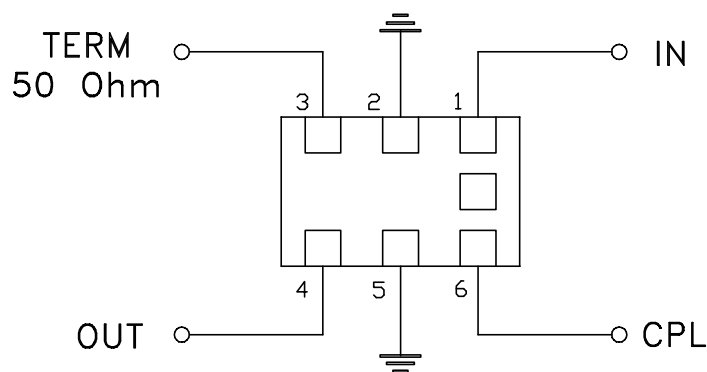
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Evaluation Board and Circuit




TB-DCW-6-722+



Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: FR4 or equivalent,
Dielectric Constant=4.5, Thickness=.016 inch.

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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