MMIC BALUN

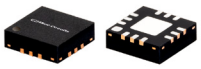
RF Transformer

MTX2-143+

50Ω 5500 to 13500 MHz

THE BIG DEAL

- Wideband, 5500 to 13500 MHz
- Low phase unbalance, 8 deg. and amplitude unbalance, 1.0 dB typ.
- Miniature size, (3 x 3 x 0.89 mm)
- Low cost
- Aqueous washable



Generic photo used for illustration purposes only

CASE STYLE: DQ1225

+RoHS Compliant

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

APPLICATIONS

- WiMAX/WIBRO
- ISM
- RADAR
- SATCOM

PRODUCT OVERVIEW

Mini-Circuits MTX2-143+ is a wideband MMIC balun transformer with an impedance ratio of 2:1 covering a wide range of applications from 5500 to 13500 MHz. Fabricated using IPD process technology, this model provides outstanding repeatability with low insertion loss, low amplitude unbalance, low phase unbalance, and RF input power handling up to +34 dBm (2.5W). The unit comes housed in a tiny 3 x 3 x 0.89mm QFN package with low inductance, excellent thermal efficiency, and high ESD rating.

Feature	Advantages
Wideband, 5500 to 13500 MHz	MTX2-143+ supports a broad variety of applications including WiMAX, WiBRO, ISM, radar, SAT-COM and more.
Low insertion loss • 0.8 dB, 5500 to 11200 MHz • 1.3 dB, 11200 to 13500 MHz	Enables excellent signal power transmission from input to output.
Low unbalance • 1.0 dB amplitude unbalance • 8° phase unbalance	Low unbalance can improve a system's electromagnetic compatibility by rejecting unwanted common-mode noise.
Tiny size, 3 x 3 x 0.89 mm	Accommodates tight space requirements for dense PCB layouts.

REV. B
ECO-009930
MTX2-143+
ED-1501211/9
JX/CP/AM
210920

ELECTRICAL SPECIFICATIONS AT 25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Units
Impedance Ratio (secondary/primary)			2		
Frequency Range		5500	—	13500	MHz
Insertion Loss[1]	5500 - 11200 11200 - 13500	— —	0.8 1.3	1.2 2.5	dB
Amplitude Unbalance	5500 - 13500	—	1.0	—	dB
Phase Unbalance[2]	5500 - 13500	—	8	—	Degree

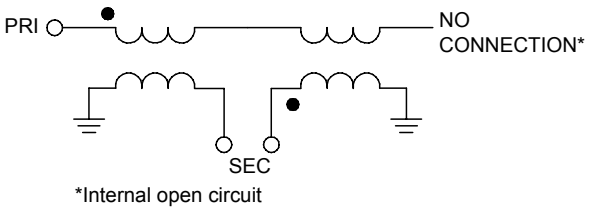
1. Insertion Loss is referenced to mid-band loss, 1.5 dB.
2. Relative to 180°

MAXIMUM RATINGS

Parameter	Ratings
Operating Temperature	-40°C to 85°C
Storage Temperature	-65°C to 150°C
Input RF Power	34 dBm at 25°C

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

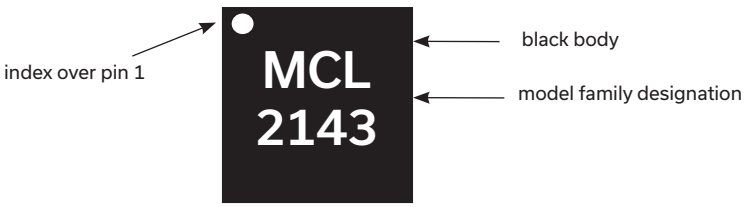
CONFIGURATION J



PAD CONNECTIONS

Function	Pad Number
PRIMARY DOT (Unbalanced Port)	2
SECONDARY DOT (Balanced)	7
SECONDARY (Balanced)	9
EXTERNAL GND	1,3,6,10 & paddle
NO CONNECTION	4,5,8,11,12

PRODUCT MARKING



Marking may contain other features or characters for internal lot control

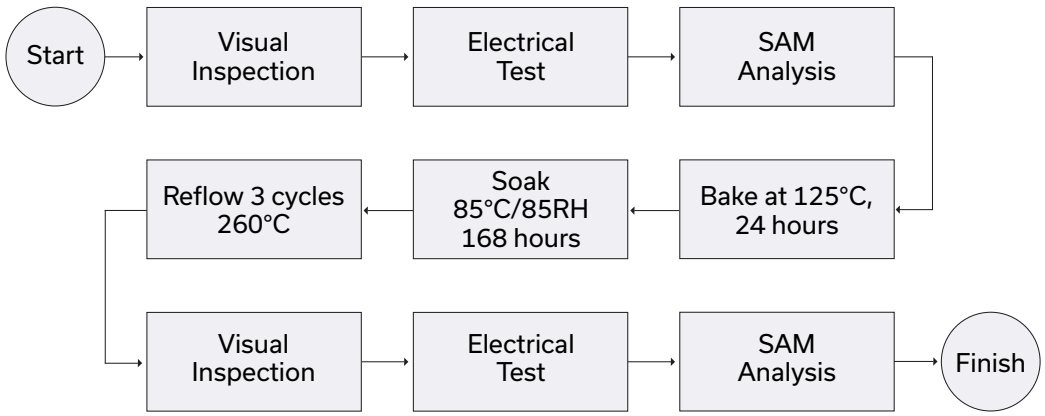
ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASH BOARD. TO ACCESS CLICK HERE

Performance Data	Data Table Swept Graphs S-Parameter (S2P Files) Data Set (.zip file)
Case Style	DQ1225 Plastic package, exposed paddle lead finish: Matte-Tin
Tape & Reel **Standard quantities available on reel**	F66 7" reels with 20, 50, 100, 200, 500 or 1K devices
Suggested Layout for PCB Design	PL-497
Evaluation Board	TB-MTX2-143+
Environmental Ratings	ENV12

ESD RATING

Human body model (HBM): Class 1B (500 to<1000V) in accordance with ANSI/ESD 5.1-2007

MSL TEST FLOW CHART



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

RF Transformer MTX2-143+

Typical Performance Data

FREQUENCY (MHz)	INSERTION LOSS[1] (dB)	INPUT RETURN LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE[2] (deg.)
4000	1.52	6.68	1.04	1.85
4200	1.29	7.33	0.99	2.67
4400	1.10	8.00	0.96	3.45
4600	0.93	8.69	0.93	4.14
4800	0.78	9.36	0.92	4.70
5000	0.65	10.06	0.89	5.21
5200	0.53	10.72	0.87	5.56
5500	0.38	11.66	0.85	6.07
5600	0.33	12.00	0.82	6.19
5800	0.25	12.59	0.79	6.53
6000	0.18	13.12	0.78	6.68
6200	0.12	13.61	0.76	6.81
6500	0.04	14.27	0.72	6.99
6600	0.01	14.49	0.70	7.05
6800	0.03	14.94	0.68	7.09
7000	0.06	15.36	0.65	7.10
7200	0.08	15.79	0.63	7.07
7500	0.11	16.60	0.59	6.89
7600	0.12	16.90	0.58	6.80
7800	0.13	17.53	0.55	6.55
8000	0.14	18.28	0.51	6.19
8200	0.14	19.11	0.46	5.80
8500	0.14	20.78	0.36	5.22
8600	0.13	21.51	0.32	5.04
8800	0.12	23.04	0.24	4.73
9000	0.13	24.65	0.18	4.34
9200	0.12	25.66	0.09	3.86
9500	0.09	23.79	0.08	3.34
9600	0.07	22.46	0.14	3.13
9800	0.03	19.79	0.25	2.87
10000	0.04	17.33	0.39	2.71
10200	0.13	15.17	0.51	2.63
10500	0.29	12.61	0.70	2.86
10600	0.35	11.98	0.73	2.98
10800	0.49	10.88	0.81	3.07
11000	0.63	9.96	0.89	3.25
11200	0.77	9.19	0.96	3.54
11500	0.95	8.42	1.03	4.17
11600	1.00	8.27	1.03	4.42
11800	1.09	8.02	1.01	4.73
12000	1.15	7.87	0.95	4.96
12200	1.20	7.79	0.89	4.99
12500	1.25	7.83	0.79	4.81
12600	1.26	7.88	0.75	4.82
12800	1.30	8.02	0.65	4.56
13000	1.34	8.16	0.54	4.23
13200	1.39	8.34	0.40	3.79
13500	1.51	8.57	0.18	2.61
13600	1.55	8.61	0.12	2.04
13800	1.66	8.65	0.03	1.39
14000	1.79	8.63	0.17	1.03

[1] Insertion Loss is referenced to mid-band loss, 1.5 dB

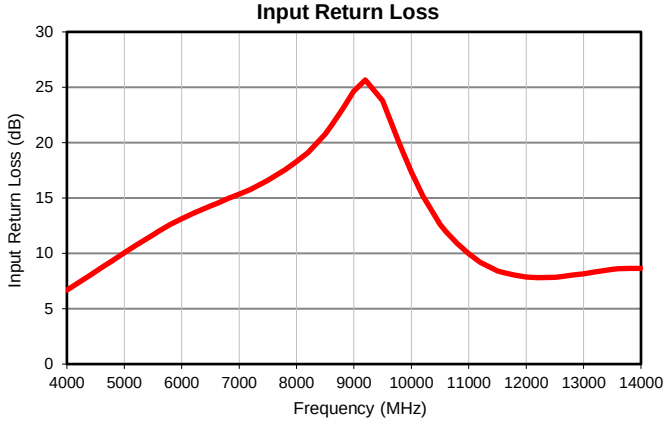
[2] Relative to 180°

RF Transformer MTX2-143+

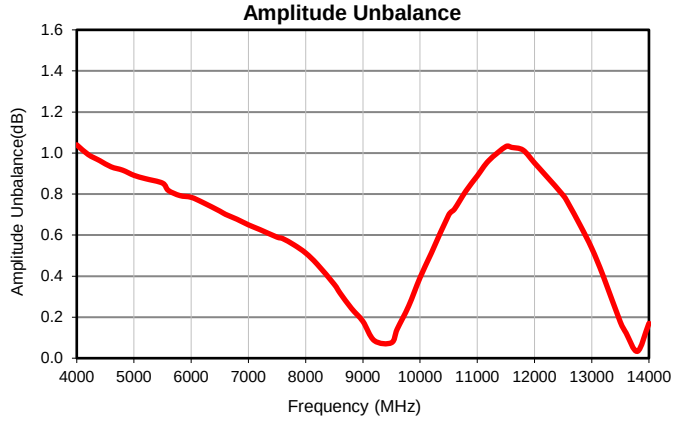
Typical Performance Data

Insertion Loss

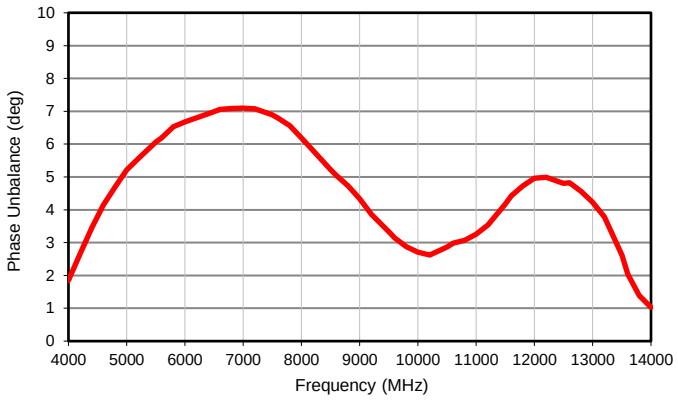
Input Return Loss



Amplitude Unbalance



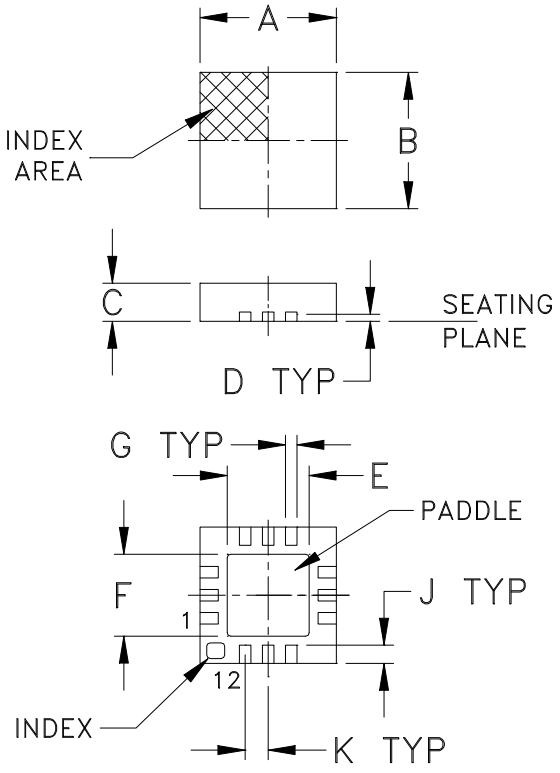
Phase Unbalance



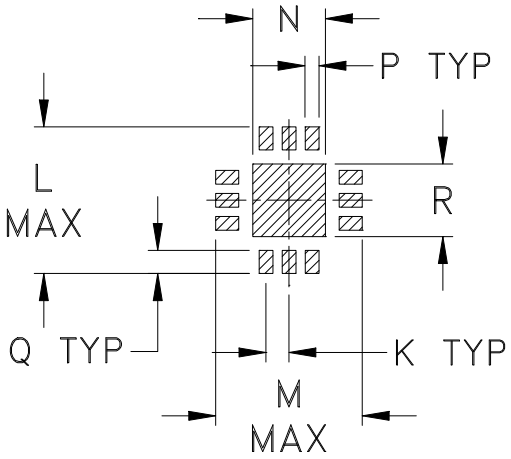
Case Style DQ

DQ1225

Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

CASE #	A	B	C	D	E	F	G	H	J	K	L	M	N
DQ1225	.118 (3.00)	.118 (3.00)	.035 (0.89)	.008 (0.20)	.057 (1.45)	.057 (1.45)	.009 (0.23)	-- --	.016 (0.41)	.020 (0.51)	.127 (3.22)	.127 (3.22)	.049 (1.25)

CASE #	P	Q	R	S	T	WT. GRAM
DQ1225	.010 (0.25)	.020 (0.51)	.049 (1.25)	-- --	-- --	.02

Dimensions are in inches (mm). Tolerances: 2Pl. ± .01; 3 Pl. ± .004

Notes:

1. Case material: Plastic.
2. Termination finish:
   For RoHS Case Styles: Tin-Silver alloy plate over Nickel barrier or Matte-Tin. All models, (+) suffix. See Data sheet.
   For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

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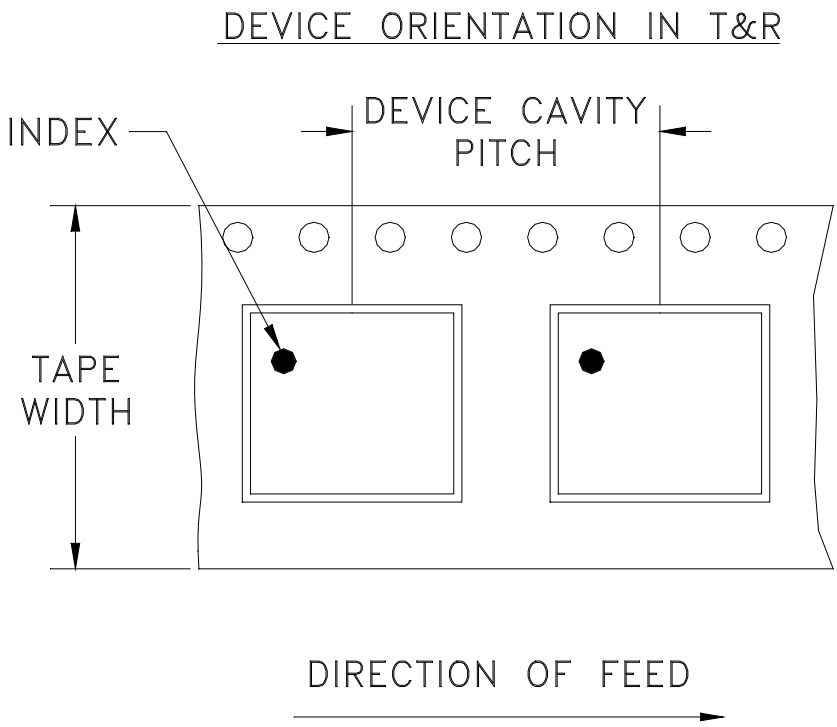
Tape & Reel Packaging TR-F66



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel see note	
8	4	7	Small quantity standard	20
				50
				100
				200
				500
		7	Standard	1000, 2000, 3000

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.

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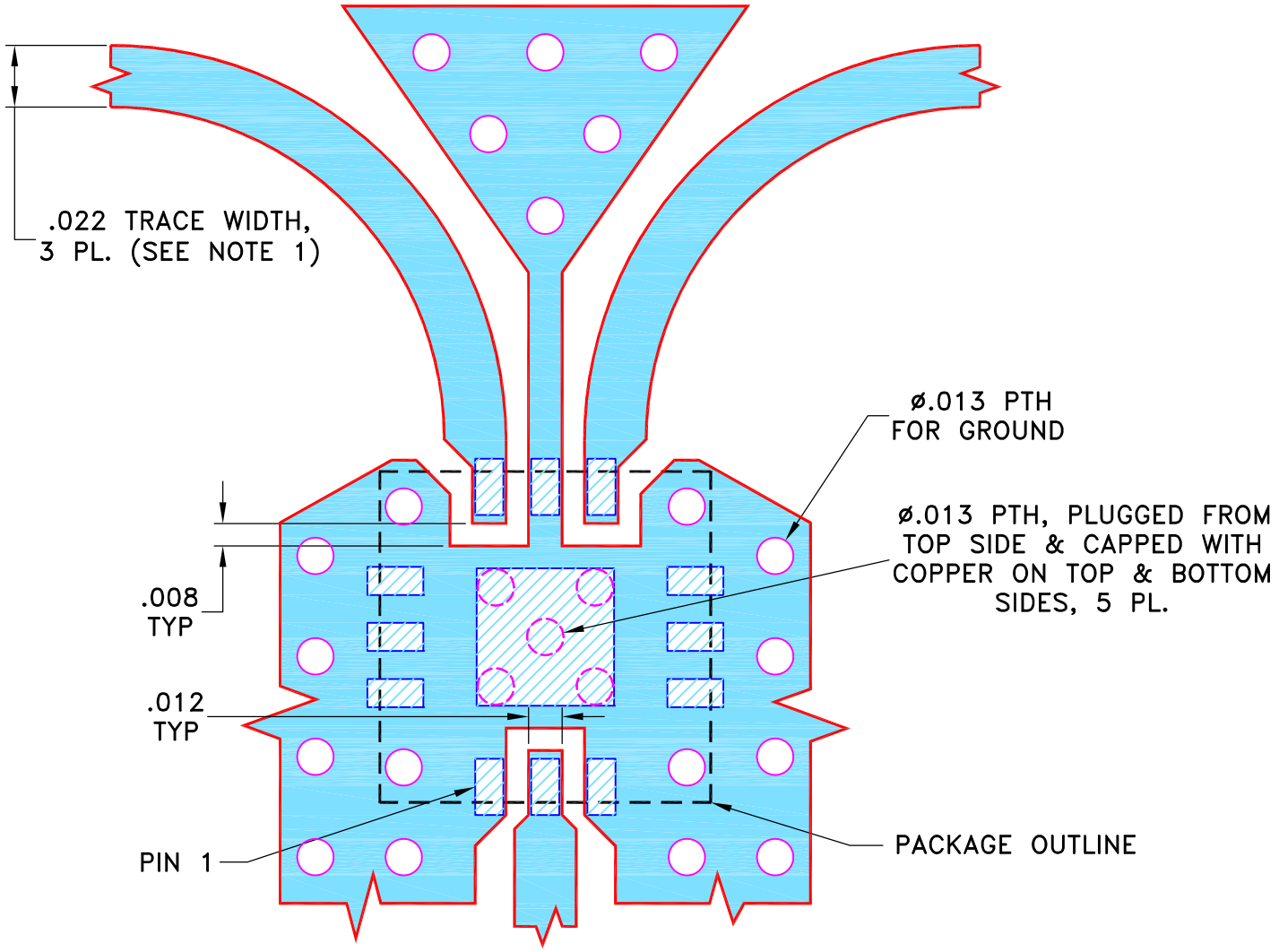
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M159779	NEW RELEASE	01/18/17	ITG	JX

SUGGESTED MOUNTING CONFIGURATION
FOR DQ1225 CASE STYLE, "12TJ01" PIN CODE



NOTES:

1. TRACE WIDTH PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .010"±.001". 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	ITG	01/09/17
TOLERANCES ON:	CHECKED	GF	01/18/17
2 PL DECIMALS ±	APPROVED	JX	01/18/17
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

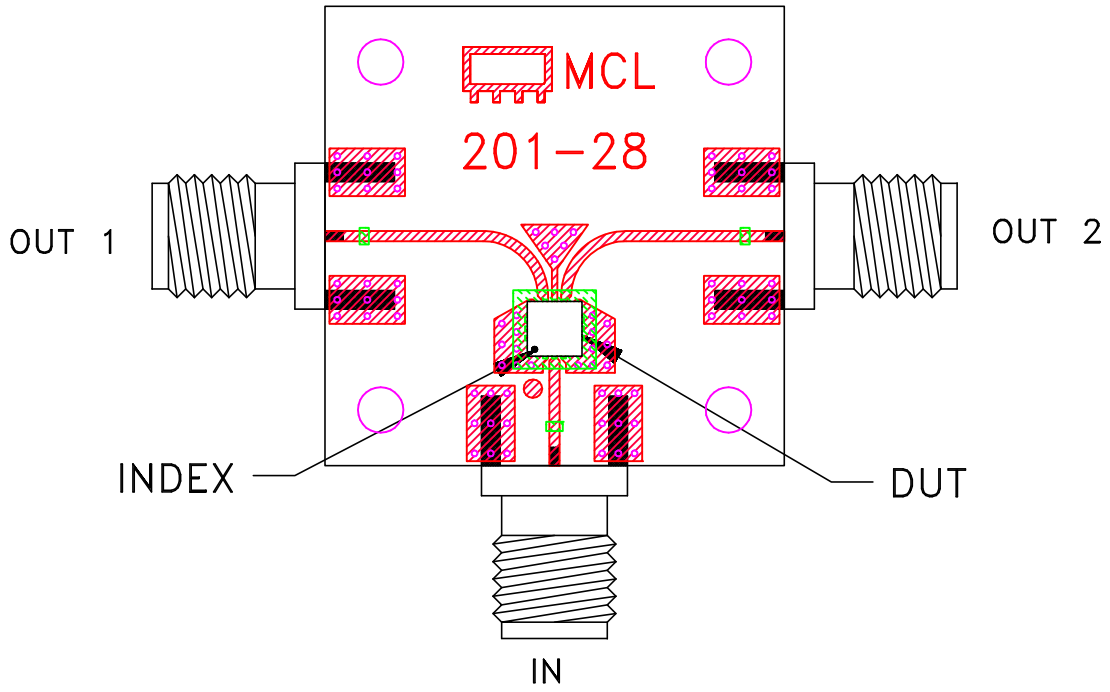
ASHEETA1.DWG REV:A DATE:01/12/95

Mini-Circuits®
13 Neptune Avenue
Brooklyn NY 11235

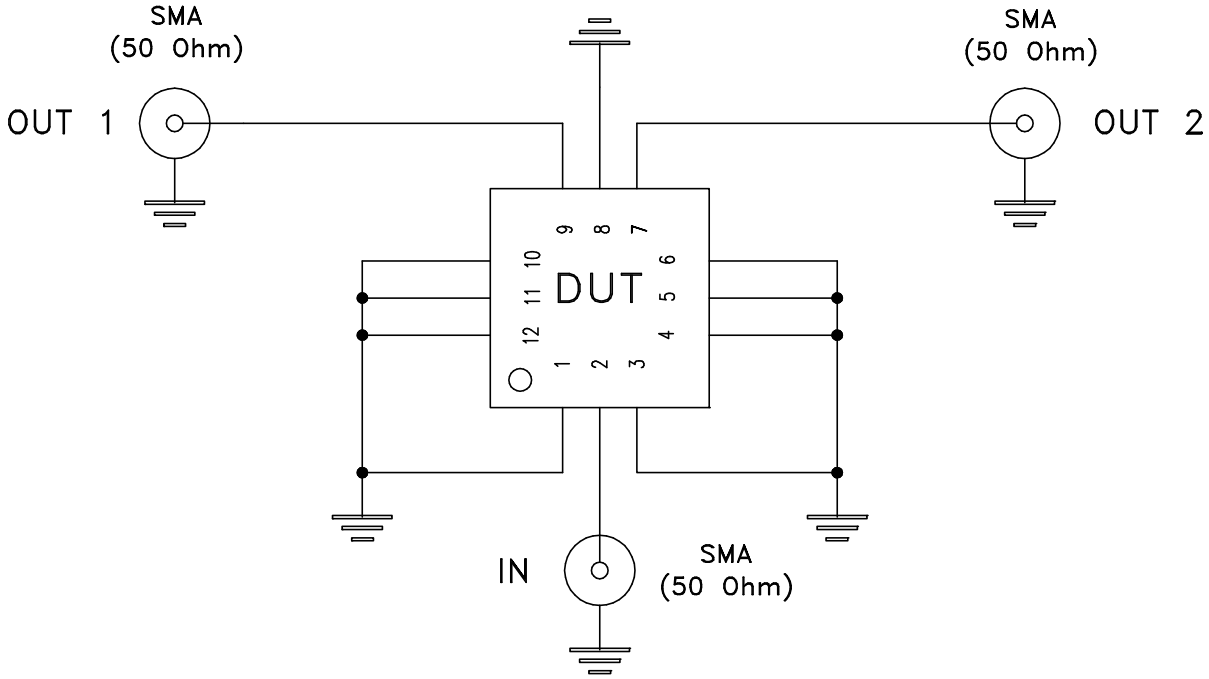
PL, 12TJ01, DQ1225, TB-900+

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-497	OR
FILE: 98PL497	SCALE: 16:1	SHEET: 1 OF 1	

Evaluation Board and Circuit



TB-900+



Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: RO4350 or equivalent,
   Dielectric Constant=3.5,
   Thickness=.010 inch.

Mini-Circuits®

Mini-Circuits

Environmental Specifications ENV12

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	-65° to 150° C Ambient Environment	Individual Model Data Sheet
Autoclave	15 psig, 100% RH, 121°C, 96 hours	JESD22-A102-C, Condition C
Temperature Cycling	-65° to 150°C, 100 cycles	JESD22-A104
Temperature Humidity	85°C/ 85% RH, 168 hours	JESD22-113
Solder Reflow Heat	Sn-Pb Eutetic Process: 240°C peak Pb-Free Process: 260°C peak	J-STD-020, Table 4-1, 4-2 and 5-2; Figure 5-1
Moisture Sensitivity: Level 1	Bake at 125°C for 24 hours Soak at 85°C/85% RH for 168 hours, Reflow 3 cycles at 240°C peak (Non-RoHS) or 260°C (RoHS)	J-STD-020
Solderability	10X magnification, 95% coverage	JESD22-B102, Method 1: Dip and Look Test
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
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