

Surface Mount

# Diplexer

## SDP-2R15+

50Ω DC to 2150 MHz  
(DC-800, 1500-2150 MHz)



Generic photo used for illustration purposes only

CASE STYLE: HU1186

### The Big Deal

- Low insertion loss
- High Rejection
- Miniature shielded package

### Product Overview

SDP-2R15+ is a low-pass + high-pass combination device. Low pass port is designed for DC to 800 MHz and high pass port is designed for 1500 to 2150 MHz. This diplexer can be used in SATCOM, navigation, point to point radio and vehicle tracking system and multiband radio systems.

### Key Features

Feature	Advantages
Low passband insertion loss	Suitable for high performance application
Excellent stopband rejection	Spurious rejection and avoids using additional filters
Shielded case	Reduced interference with the surrounding components.

#### Notes

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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](http://www.minicircuits.com/MCLStore/terms.jsp)



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50Ω DC to 2150 MHz (DC-800, 1500-2150 MHz)



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**+RoHS Compliant**

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

## Maximum Ratings

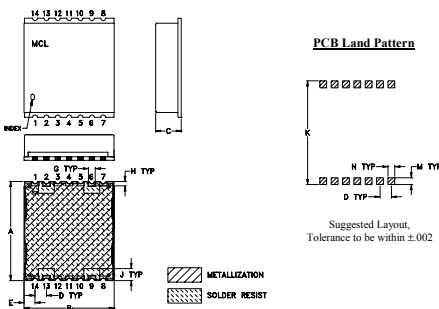
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	2W at 25°C

Permanent damage may occur if any of these limits are exceeded. These ratings are not intended for continuous normal operation

## Pin Connections

HIGH PASS PORT	6
LOW PASS PORT	13
COMMON PORT	2
GROUND	1,3-5,7-12,14

## Outline Drawing

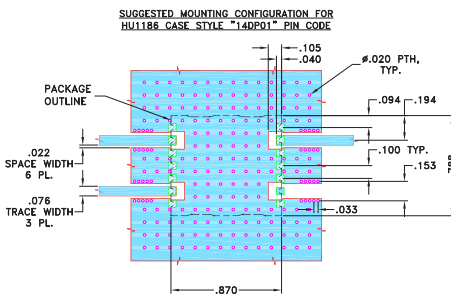


## Outline Dimensions (inch/mm)

A	B	C	D	E	F	G	H
.870	.800	.25	.100	.097	--	.060	.040
22.10	20.32	6.35	2.54	2.46	--	1.52	1.02
J	K	L	M	N	P	wt	
.105	.910	--	.060	.060	--	grams	
2.67	23.11	--	1.52	1.52	--	2.85	

Note: Please refer to case style drawing for details

## Demo Board MCL P/N: TB-647+ Suggested PCB Layout (PL-353)



- NOTES:
- TRACE WIDTH IS SHOWN FOR OAK (OAK-602) WITH DIELECTRIC THICKNESS .031" ±.002". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
  - BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
- DENOTES PCB COPPER LAYOUT WITH SMBCB (SOLDER MASK OVER BARE COPPER)
- DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

## Features

- Low insertion loss
- 50Ω Impedance
- Combination of Low pass and High pass filters
- Miniature shielded package
- Aqueous washable

## Applications

- Satcom
- Navigation
- Vehicle tracking system

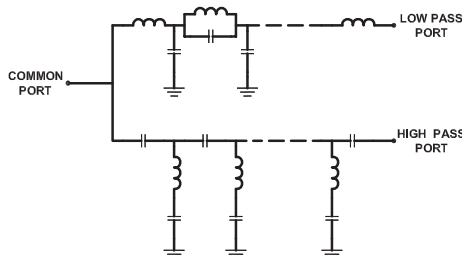
## Electrical Specifications at 25°C

Parameter	Port	Frequency (MHz)	Min.	Typ.	Max.	Unit	
Pass Band	Insertion Loss	Low Pass	DC-800	-	0.4	1.0	dB
		High Pass	1500-2150	-	0.5	1.0	
	Return Loss	Low Pass	DC-800	12	19	-	dB
		High Pass	1500-2150	12	20	-	
Common		DC-800	12	19	-		
Stop Band Isolation	Low Pass	1300-3000	20	30	-	dB	
	High Pass	DC-930	20	29	-		
		DC-800	33	46	-	dB	

## Typical Performance Data at 25°C

FREQUENCY (MHz)	INSERTION LOSS (dB)			RETURN LOSS (dB)	
	Low Pass Port	High Pass Port	Common Port	Low Pass Port	High Pass Port
1	0.01	92.57	51.39	50.76	0.00
10	0.02	74.49	44.64	45.01	0.00
30	0.04	64.97	35.95	36.12	0.00
110	0.09	53.78	26.02	26.11	0.02
270	0.17	47.24	20.14	20.16	0.08
395	0.20	46.86	19.63	19.63	0.14
800	0.36	48.55	24.17	22.93	0.39
870	0.58	36.79	14.84	14.27	0.43
930	1.31	29.33	8.26	7.98	0.52
980	2.87	19.89	4.52	4.24	0.69
1000	3.85	15.94	3.57	3.17	0.84
1070	9.19	6.43	2.83	1.05	2.32
1110	13.23	3.90	3.82	0.61	3.81
1150	17.41	2.56	5.20	0.45	5.40
1250	27.13	1.15	9.17	0.34	9.38
1300	31.77	0.84	11.56	0.33	11.67
1500	48.49	0.42	29.33	0.33	27.58
1595	59.49	0.40	33.71	0.33	37.20
1905	49.68	0.41	25.88	0.34	27.14
2150	47.56	0.46	20.40	0.34	21.11
2800	45.37	1.15	8.79	0.36	8.68
3000	47.80	1.34	8.10	0.38	7.90

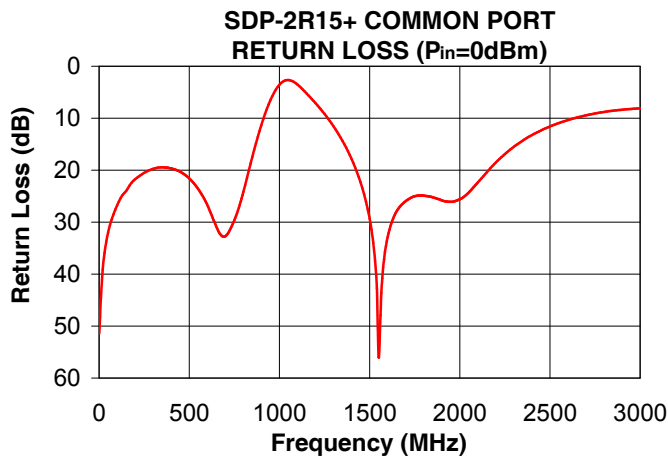
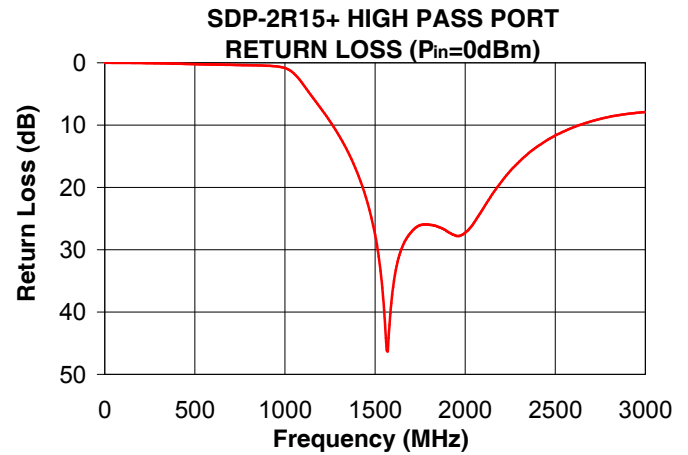
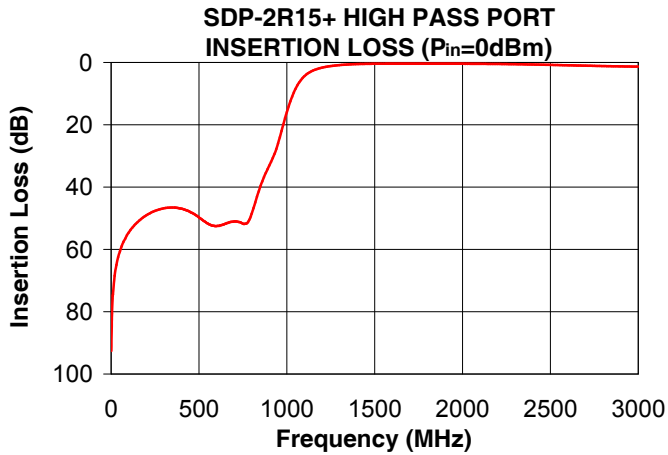
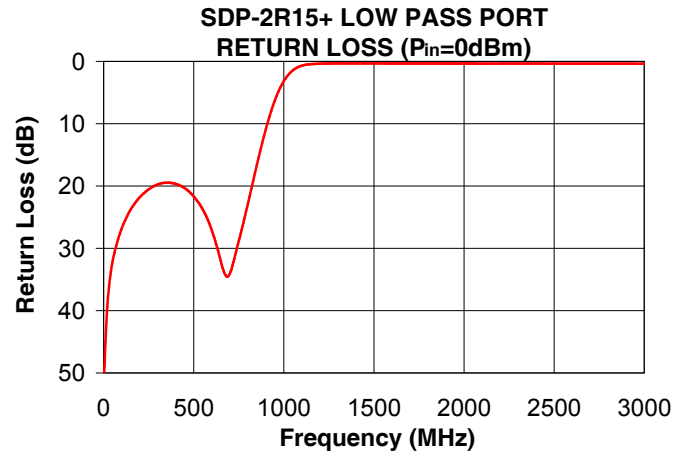
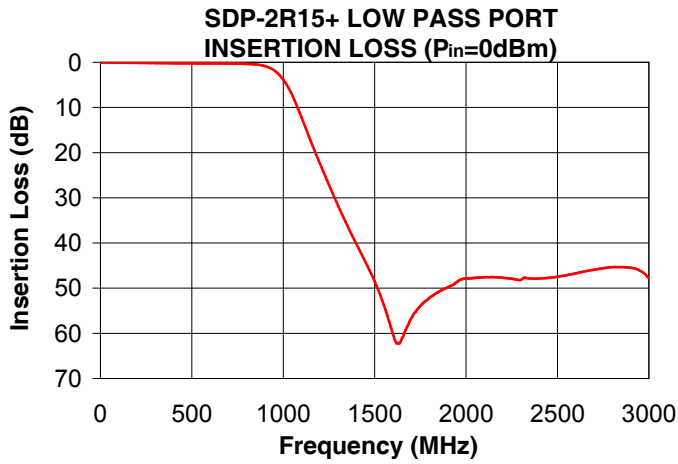
## Functional Schematic



## Notes

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Notes

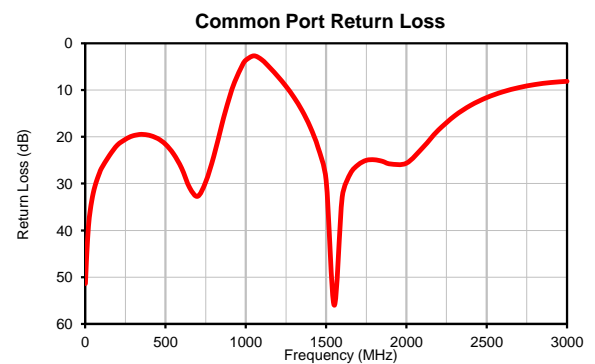
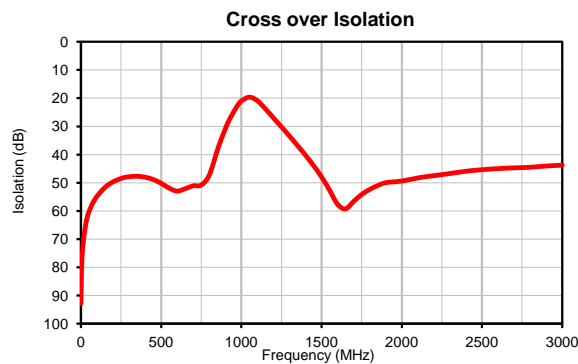
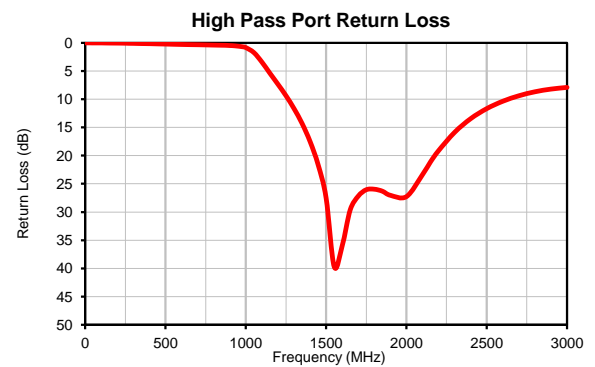
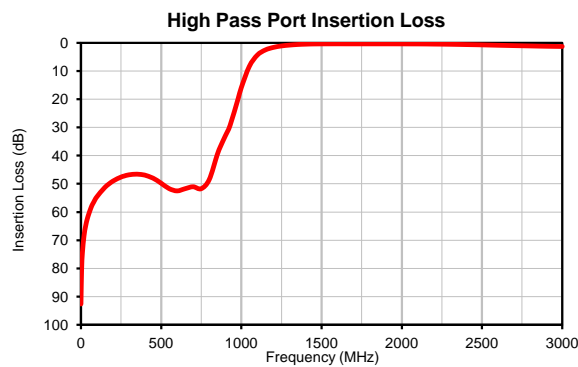
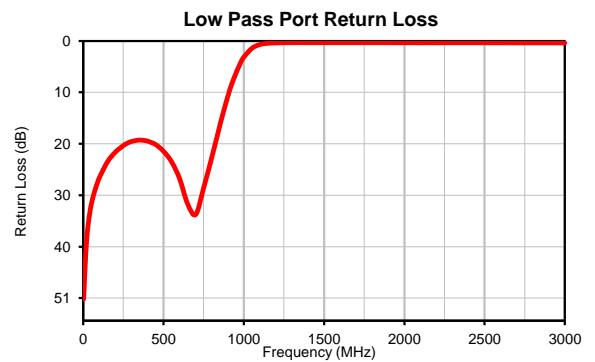
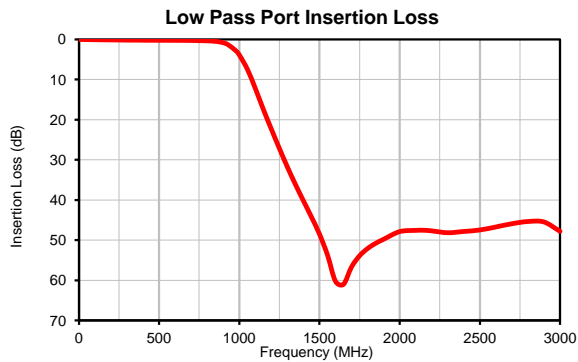
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Typical Performance Data

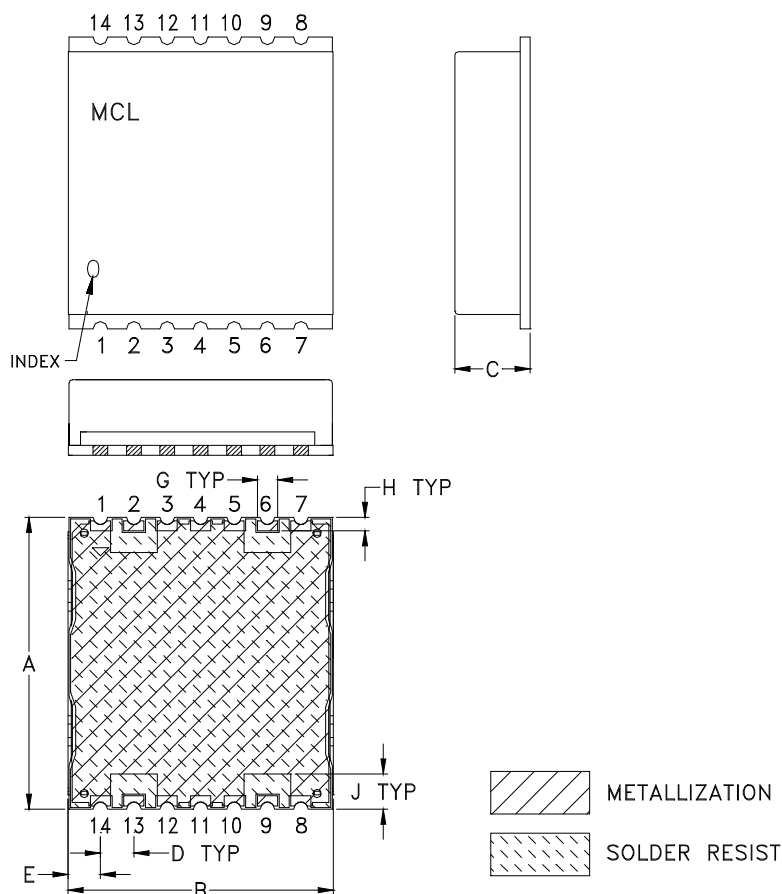
FREQUENCY (MHz)	INSERTION LOSS (dB)		CROSS OVER ISOLATION (dB) (between LPF and HPF)	RETURN LOSS (dB)		
	Low Pass port	High Pass port		Common port	Low Pass port	High Pass port
1.0	0.01	92.57	92.84	51.39	50.76	0.00
5.0	0.01	80.62	80.60	48.24	48.73	0.00
10.0	0.02	74.49	74.53	44.64	45.01	0.00
20.0	0.03	68.47	68.92	39.10	39.43	0.00
30.0	0.04	64.97	65.10	35.95	36.12	0.00
40.0	0.05	62.49	62.30	33.73	33.79	0.01
50.0	0.05	60.65	60.41	31.96	32.03	0.01
60.0	0.06	59.01	59.07	30.60	30.71	0.01
70.0	0.07	57.58	57.73	29.46	29.57	0.01
80.0	0.07	56.55	56.69	28.48	28.57	0.01
90.0	0.08	55.45	55.71	27.58	27.67	0.01
100.0	0.08	54.60	54.85	26.77	26.84	0.01
150.0	0.11	51.26	51.69	23.99	23.76	0.03
200.0	0.13	49.04	49.71	21.74	21.82	0.04
250.0	0.15	47.62	48.50	20.52	20.54	0.06
270.0	0.17	47.24	48.16	20.14	20.16	0.08
300.0	0.18	46.81	47.88	19.73	19.75	0.09
350.0	0.19	46.57	47.69	19.45	19.47	0.12
395.0	0.20	46.86	47.98	19.63	19.63	0.14
400.0	0.21	46.93	48.00	19.67	19.67	0.14
450.0	0.22	47.98	48.83	20.32	20.34	0.18
500.0	0.22	49.75	50.18	21.59	21.69	0.21
550.0	0.23	51.68	51.90	23.66	23.75	0.25
600.0	0.24	52.50	52.96	26.69	27.08	0.28
650.0	0.25	51.72	52.14	30.88	32.04	0.31
700.0	0.27	51.03	51.09	32.71	34.10	0.33
750.0	0.31	51.74	50.84	29.63	28.82	0.36
800.0	0.36	48.55	47.38	24.17	22.93	0.39
850.0	0.48	39.71	38.65	17.42	16.67	0.42
870.0	0.58	36.79	35.37	14.84	14.27	0.43
900.0	0.84	33.08	30.96	11.30	10.92	0.47
930.0	1.31	29.33	27.15	8.26	7.98	0.52
980.0	2.87	19.89	22.32	4.52	4.24	0.69
1000.0	3.85	15.94	21.01	3.57	3.17	0.84
1050.0	7.38	8.40	19.63	2.65	1.44	1.72
1100.0	12.19	4.39	20.89	3.51	0.69	3.41
1150.0	17.41	2.56	23.75	5.20	0.45	5.40
1200.0	22.34	1.67	26.99	7.09	0.38	7.35
1250.0	27.13	1.15	30.14	9.17	0.34	9.38
1300.0	31.77	0.84	33.41	11.56	0.33	11.67
1350.0	36.11	0.64	36.76	14.36	0.32	14.30
1400.0	40.21	0.52	40.23	17.82	0.33	17.52
1450.0	44.23	0.45	43.89	22.33	0.33	21.63
1500.0	48.49	0.42	47.91	29.33	0.33	27.58
1550.0	53.69	0.41	52.61	56.02	0.33	39.71
1600.0	60.25	0.40	57.64	32.85	0.33	36.01
1650.0	61.02	0.41	59.28	27.90	0.33	29.62
1700.0	56.70	0.41	56.65	25.95	0.33	27.19
1750.0	53.92	0.41	54.19	25.01	0.33	26.06
1800.0	52.11	0.41	52.38	24.89	0.33	25.97
1850.0	50.82	0.41	51.02	25.22	0.33	26.32
1900.0	49.80	0.41	49.99	25.79	0.34	27.05
2000.0	47.89	0.42	49.39	25.62	0.34	27.28
2100.0	47.58	0.44	48.31	22.35	0.35	23.38
2150.0	47.56	0.46	47.85	20.40	0.34	21.11
2200.0	47.70	0.49	47.50	18.50	0.35	19.13
2300.0	48.17	0.56	46.74	15.49	0.34	15.87
2400.0	47.85	0.66	45.92	13.24	0.34	13.45
2500.0	47.48	0.77	45.38	11.58	0.35	11.67
2600.0	46.73	0.91	44.99	10.35	0.35	10.36
2700.0	45.92	1.03	44.72	9.45	0.36	9.39
2800.0	45.37	1.15	44.51	8.79	0.36	8.68
2900.0	45.49	1.26	44.07	8.36	0.36	8.20
3000.0	47.80	1.34	43.78	8.10	0.38	7.90

## Typical Performance Curves

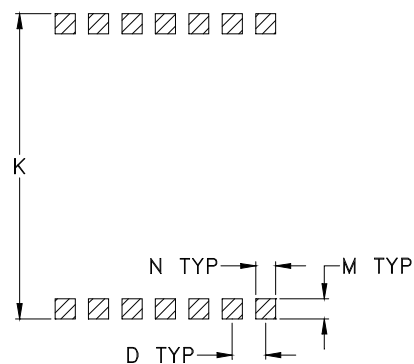


## Outline Dimensions

HU1186



## PCB Land Pattern



Suggested Layout,  
Tolerance to be within  $\pm 0.002$

CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N	P	WT, GRAM
HU1186	.870 (22.10)	.800 (20.32)	.25 (6.35)	.100 (2.54)	.097 (2.46)	-	.060 (1.52)	.040 (1.02)	.105 (2.67)	.910 (23.11)	-	.060 (1.52)	.060 (1.52)	-	2.85

Dimensions are in inches (mm). Tolerances: 2PL. +/- .03; 3PL. +/- .015

### Notes:

1. Case material: Nickel-Silver alloy.
2. Base: Printed wiring laminate.
3. Termination finish:  
For RoHS Case Styles: 2-5  $\mu$  inch (.05-.13 microns) Gold over 120-240  $\mu$  inch (3.05-6.10 microns) Nickel plate.  
For RoHS-5 Case Styles: Tin-Lead plate.

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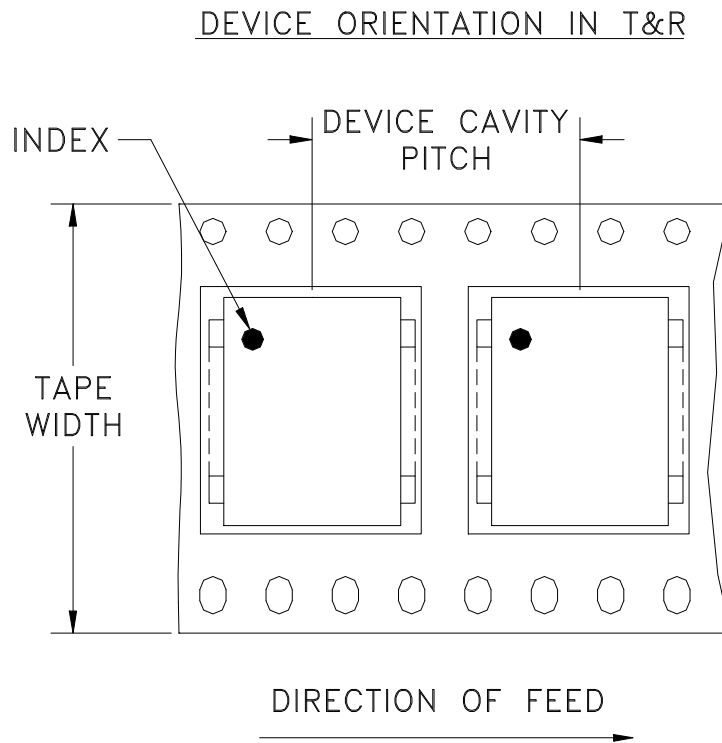
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# Tape & Reel Packaging TR-F21



<b>Tape Width, mm</b>	<b>Device Cavity Pitch, mm</b>	<b>Reel Size, inches</b>	<b>Devices per Reel</b>
32	32	13	200

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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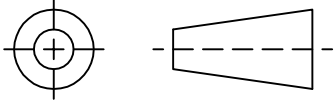
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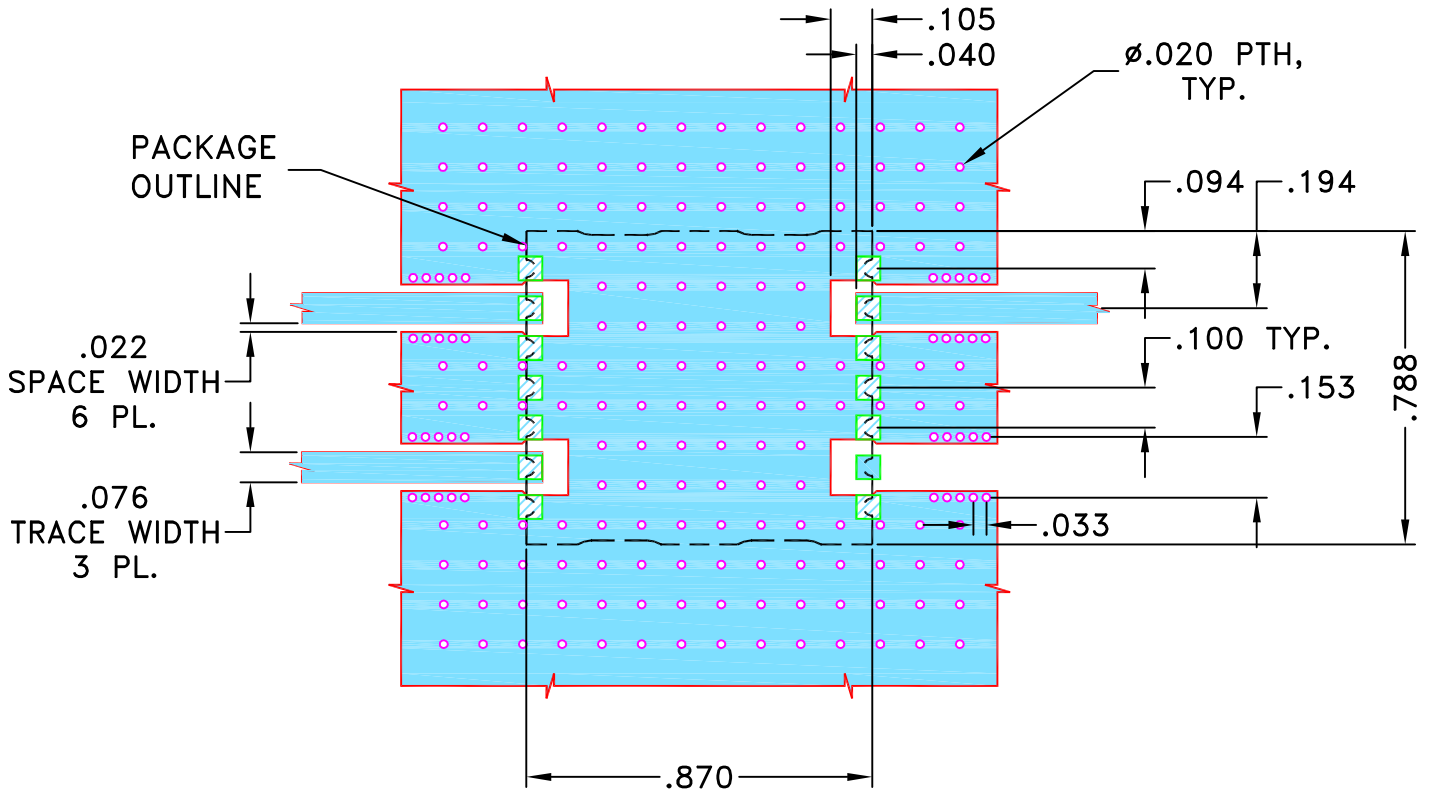
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M133584	NEW RELEASE	NOV 11	DDR	KG

SUGGESTED MOUNTING CONFIGURATION FOR  
HU1186 CASE STYLE "14DP01" PIN CODE



NOTES:

- TRACE WIDTH IS SHOWN FOR OAK (OAK-602) WITH DIELECTRIC THICKNESS  $.031 \pm .002$ ". COPPER: 1/2 OZ. EACH SIDE.  
FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
- 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 SOLDERMASK

UNLESS OTHERWISE SPECIFIED	INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN DDR	01 NOV 11
TOLERANCES ON: 2 PL DECIMALS $\pm$ 3 PL DECIMALS $\pm$ .005"	CHECKED MD	01 NOV 11
ANGLES $\pm$ FRACTIONS $\pm$	APPROVED GM	01 NOV 11



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Brooklyn NY 11235

PL, 14DP01, HU1186, DPL,  
TB-647+, 50 Ohm

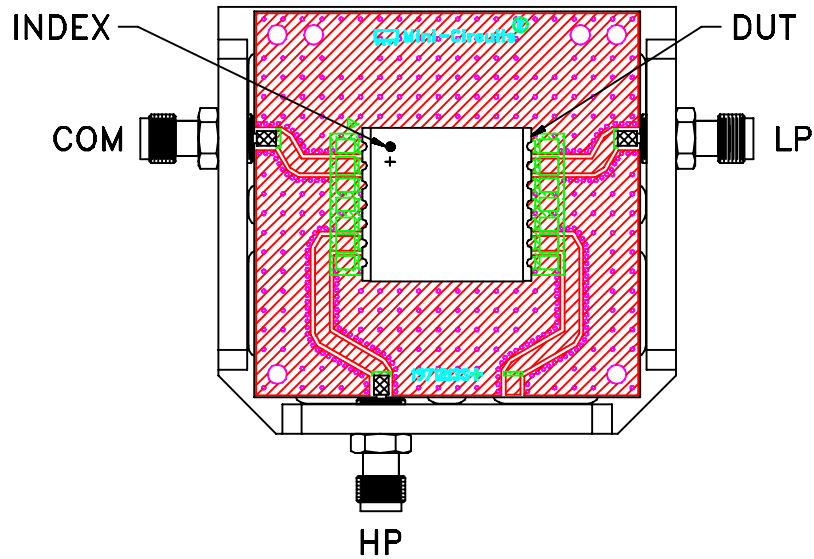
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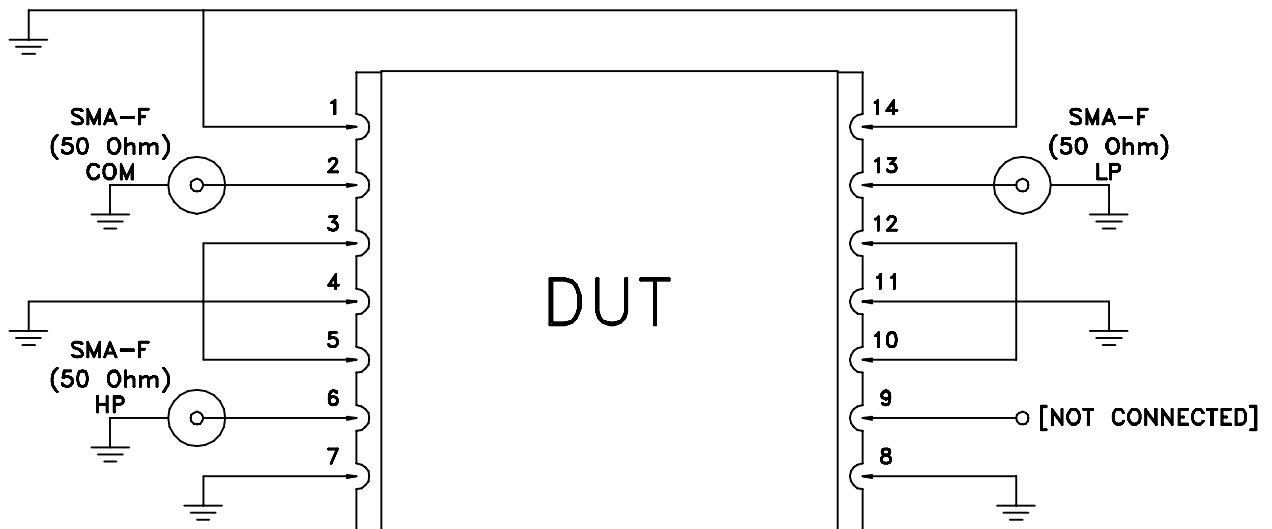
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FILE:	98PL353	SCALE:	SHEET:
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# Evaluation Board and Circuit



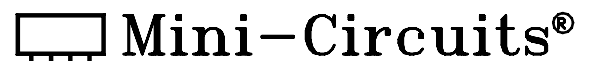
TB-647+



Schematic Diagram

**Notes:**

1. 50 Ohm SMA Female connectors.
2. PCB Material: OAK-602 OR Equivalent  
Dielectric Constant=2.50±.04, Thickness=.031 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 85°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
HAST	130°C, 85% RH, 96 hours	JESD22-A110
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