

2 Way-0°    50Ω    0.5 to 9.5 GHz

## The Big Deal

- Ultra-wide bandwidth, 0.5 to 9.5 GHz
- Tiny size, 5 x 5 x 1mm
- High power handling, 2.5W as a splitter



CASE STYLE: DG1677-2

## Product Overview

Mini-Circuits' EP2W1+ is a MMIC 2-way 0° splitter/combiner designed for wideband operation from 0.5 to 9.5 GHz supporting many applications requiring high performance across a wide frequency range including all the LTE bands through WiMax and WiFi, as well as instrumentation and more. This model provides excellent power handling up to 2.5W (as a splitter) with low insertion loss, good isolation, and low phase and amplitude unbalance in a tiny 5x5mm QFN package. Manufactured using GaAs IPD technology, the EP2W1+ provides a high level of ESD protection and excellent repeatability.

## Key Features

Feature	Advantages
Wideband, 0.5 to 9.5 GHz	One power splitter can be used in all the LTE bands through WiMAX and WiFi, saving component count. Also ideal for wideband applications such as military and instrumentation.
Tiny size, 5 x 5mm QFN package	Tiny footprint saves space in dense layouts while providing low inductance, repeatable transitions, and excellent thermal contact to the PCB.
Excellent power handling <ul style="list-style-type: none"> <li>• 2.5W as a splitter</li> <li>• 1.7W internal dissipation as a combiner</li> </ul>	In power combiner applications, half the power is dissipated internally. EP2W1+ is designed to handle 1.7W internal dissipation as a combiner allowing reliable operation without excessive temperature rise. Similar splitters implemented as Wilkinson splitters on PCB require big resistors and additional heat sinking. As a splitter, EP2W1+ can handle up to 2.5W in a very small package.
DC Passing	DC current passing is helpful in applications where both RF & DC need to pass through the DUT, such as antenna mounted hardware.

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**Features**

- Wide bandwidth, 0.5 to 9.5 GHz
- Excellent amplitude unbalance, 0.1 dB typ. to 6 GHz
- Good phase unbalance, 1 to 3 deg. typ.
- Small size, 5x5 mm
- High ESD level\*
- Aqueous washable
- DC passing

**Applications**

- WIMAX
- ISM
- Instrumentation
- Radar
- WLAN
- Satellite communications
- LTE



Generic photo used for illustration purposes only

CASE STYLE: DG1677-2

**+RoHS Compliant**

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

**Electrical Specifications<sup>1</sup> at 25°C**

Parameter	Frequency (GHz)	Min.	Typ.	Max.	Unit
Frequency Range		0.5		9.5	GHz
Insertion Loss <sup>2</sup> , above 3.0 dB	0.5 - 1.5	—	1.0	1.5	dB
	1.5 - 3.0	—	1.3	1.9	
	3.0 - 6.0	—	1.8	2.5	
	6.0 - 9.5	—	3.4	4.5	
Isolation	0.5 - 1.5	6.3	9.3	—	dB
	1.5 - 3.0	16.8	19.8	—	
	3.0 - 6.0	16.4	19.4	—	
Phase Unbalance	0.5 - 1.5	—	0.5	2.5	Degree
	1.5 - 3.0	—	0.9	2.9	
	3.0 - 6.0	—	1.7	6.0	
	6.0 - 9.5	—	2.5	—	
Amplitude Unbalance	0.5 - 1.5	—	0.1	0.3	dB
	1.5 - 3.0	—	0.1	0.3	
	3.0 - 6.0	—	0.1	0.4	
	6.0 - 9.5	—	0.5	—	
VSWR (Port S)	0.5 - 1.5	—	1.6	—	:1
	1.5 - 3.0	—	1.5	—	
	3.0 - 6.0	—	1.6	—	
	6.0 - 9.5	—	1.7	—	
VSWR (Port 1-2)	0.5 - 1.5	—	1.3	—	:1
	1.5 - 3.0	—	1.3	—	
	3.0 - 6.0	—	1.4	—	
	6.0 - 9.5	—	1.5	—	

1. Tested on Mini-Circuits Test Board TB-880+

2. Insertion Loss Values are de-embedded from Test Board Loss.

**Maximum Ratings**

Parameter	Ratings
Operating Temperature	-40°C to 85°C
Storage Temperature	-65°C to 150°C
Power Input (as a splitter)	2.5W <sup>3</sup> Max. at 25°C
Internal Dissipation	1.7W <sup>4</sup> Max. at 25°C
DC Current	0.4A Max.

3. Derate linearly to 1.25W at 85°C

4. Derate linearly to 1.1W at 85°C

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

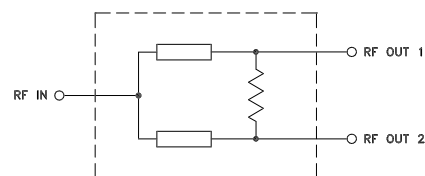
\* ESD rating

Human body model (HBM): Class 2 (2000 to &lt;4000V) in accordance with ANSI/ESD 5.1-2007

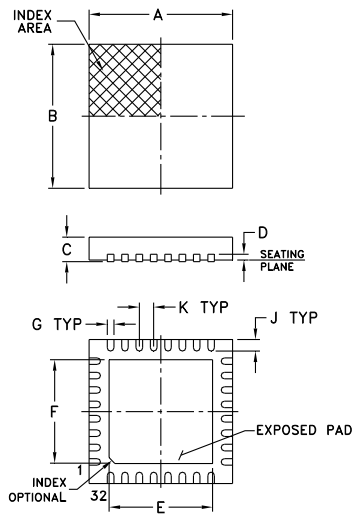
Machine model: Class M3 (200 to &lt;4000V) in accordance with ANSI/ESD 5.2-2009

**Pad Connections**

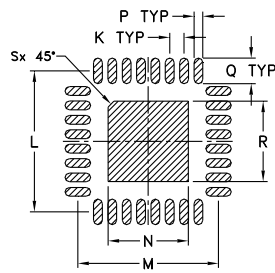
Function	Pad Number
SUM PORT	4
PORT 1	15
PORT 2	26
NOT USED, GROUND, EXTERNALLY	1-3, 5-14, 16-25, 27-32 & Paddle

**Simplified Electrical Schematic**

Outline Drawing



PCB Land Pattern



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

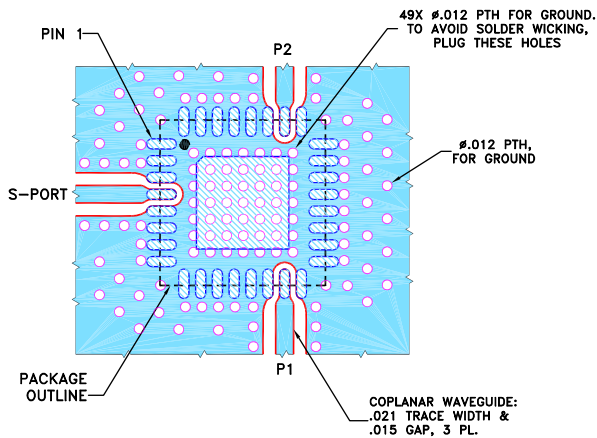
Product Marking



Outline Dimensions (inch/mm)

A	B	C MAX	C MIN	D	E	F	G	H	J
.197	.197	.039	.031	.008	.142	.142	.009	-	.016
5.00	5.00	0.99	0.79	0.20	3.61	3.61	0.23	-	0.41
K	L	M	N	P	Q	R	S	wt	
.020	.193	.193	.110	.012	.035	.110	0.008	grams	
0.51	4.90	4.90	2.79	0.30	0.89	2.79	0.20	0.05	

Demo Board MCL P/N: TB-880W+  
Suggested PCB Layout (PL-488)

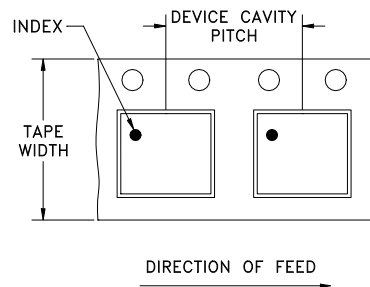


NOTES:

- 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.
  - 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.

Tape and Reel (F68)

DEVICE ORIENTATION IN T&R

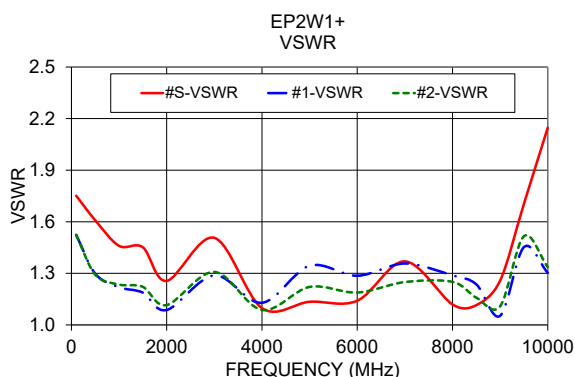
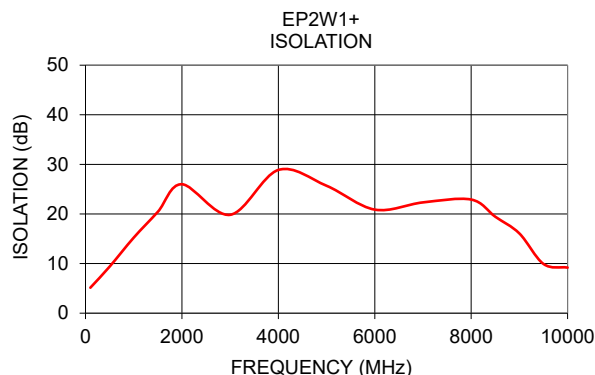
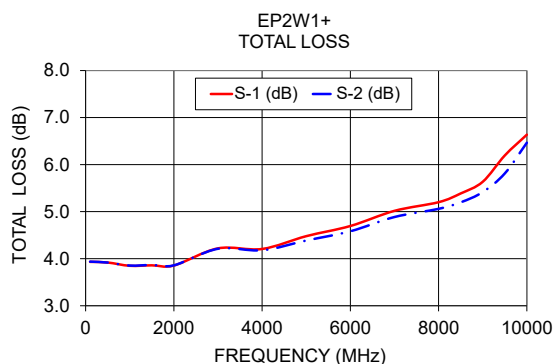


Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel see note	
12	8	7	Small quantity standard	20
				50
			100	
			200	
		500		
		1000		
7	Standard	2000		
		3000		
13	Standard	4000		

Typical Performance Data

Frequency (GHz)	Total Loss <sup>1</sup> (dB)		Amplitude Unbalance (dB)	Isolation (dB)	Phase Unbalance (deg.)	VSWR S	VSWR 1	VSWR 2
	S-1	S-2						
100	3.93	3.94	0.00	5.13	0.00	1.75	1.52	1.52
500	3.92	3.92	0.00	9.39	0.01	1.61	1.30	1.29
1000	3.85	3.85	0.00	15.23	0.04	1.46	1.22	1.23
1500	3.86	3.87	0.01	20.43	0.02	1.45	1.19	1.22
2000	3.85	3.86	0.00	25.99	0.10	1.26	1.09	1.12
3000	4.22	4.21	0.01	19.83	0.10	1.51	1.29	1.31
4000	4.21	4.18	0.03	28.88	0.25	1.10	1.13	1.09
5000	4.48	4.39	0.09	25.69	0.23	1.13	1.34	1.22
6000	4.70	4.58	0.11	20.88	0.04	1.14	1.29	1.19
7000	5.02	4.89	0.13	22.33	0.32	1.37	1.36	1.25
8000	5.20	5.06	0.14	22.91	0.30	1.12	1.29	1.25
8500	5.39	5.20	0.19	19.44	0.28	1.12	1.24	1.16
9000	5.63	5.42	0.22	16.07	0.26	1.26	1.05	1.11
9500	6.19	5.81	0.38	9.92	0.47	1.70	1.45	1.52
10000	6.64	6.47	0.17	9.18	3.26	2.15	1.30	1.34

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



Additional 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-Circuits' 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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