MMIC Surface Mount

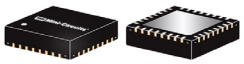
Power Splitter/Combiner

EP4KA+

4 Way-0° 50Ω 10.7 to 31 GHz

The Big Deal

- Ultra-wide bandwidth, 10.7 to 31 GHz
- High Isolation, 20 dB typ. at 21 GHz
- Small size, 5 x 5 x 1 mm



CASE STYLE: DG1677-2

Product Overview

Mini-Circuits' EP4KA+ is a MMIC 4-way 0° splitter/combiner designed for wideband operation from 10.7 to 31 GHz supporting many applications requiring high performance across a wide frequency range including LTE bands through phased array radars, 5G, as well as instrumentation and more. This model provides good isolation, and low phase and amplitude unbalance in a small 5 x 5mm QFN package. Manufactured using GaAs IPD technology, the EP4KA+ not only provides a repeatable performance, but also a high level of ESD protection.

Key Features

Feature	Advantages
Wideband, 10.7 to 31 GHz	One power splitter can be used for wideband applications such as 5G, phased array radars, military and instrumentation.
Excellent Amplitude and phase unbalance: amplitude unbalance, 0.2 dB typ. at 21 GHz phase unbalance, 7° typ. at 21 GHz	Ideal for Applications such as MIMO & phased array radars
DC Passing	DC current passing is helpful in applications where both RF & DC need to pass through the DUT, such as antenna mounted hardware.
Small 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.

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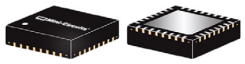
Features

- Wide bandwidth, 10.7 to 31 GHz
- Excellent isolation, 20 dB typ. at 21 GHz
- Excellent amplitude unbalance, 0.2 dB typ. at 21 GHz
- Small size, 5x5 mm
- Aqueous washable



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

Applications

- Instrumentation
- Radar
- Satellite communications
- 5G

Electrical Specifications[1] at 25°C

Parameter		Frequency (GHz)	Min.	Typ.	Max.	Unit
Frequency Range			10.7		31	GHz
Insertion Loss[2] above 6.0 dB		10.7 - 13		0.4	2.1	dB
		13 - 22		0.6	2.4	
		22 - 31		1.1	2.6	
Isolation		10.7 - 13	9	13.1		dB
		13 - 22	11	19.3		
		22 - 31	14	21.5		
Phase Unbalance		10.7 - 13		2.7	—	Degree
		13 - 22		4.7	—	
		22 - 31		7.8	—	
Amplitude Unbalance		10.7 - 13		0.3	0.8	dB
		13 - 22		0.2	0.8	
		22 - 31		0.2	0.9	
VSWR (Port S)		10.7 - 13		1.2		:1
		13 - 22		1.3		
		22 - 31		1.2		
VSWR (Port 1-4)		10.7 - 13		1.4		:1
		13 - 22		1.3		
		22 - 31		1.2		
Power Handling	As a splitter	DC - 18	—	—	0.6	W
	Per port as a combiner	DC - 18	—	—	0.6	

1. Tested on Mini-Circuits Test Board TB-EP4KAC+

Maximum Ratings

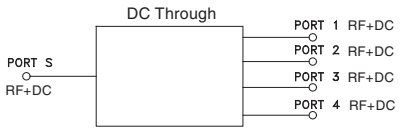
Parameter	Ratings
Operating Temperature	-55°C to 105°C
Storage Temperature	-65°C to 150°C
DC Current	100mA

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

Pad Connections

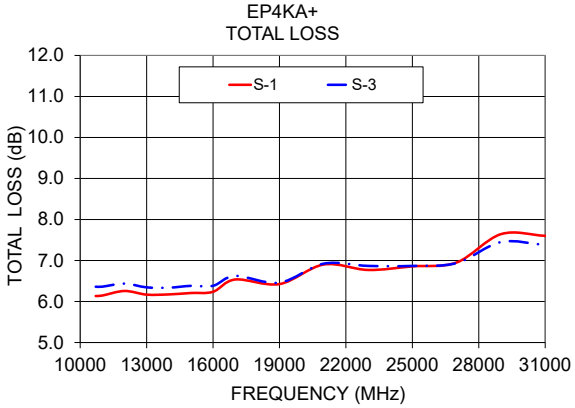
Function	Pad Number
SUM PORT	21
PORT 1	14
PORT 2	10
PORT 3	31
PORT 4	27
GROUND	9,11,13,15,20,22,26,28,30,32 and Paddle
NOT USED, GROUND EXTERNALLY	1-8, 12, 16-19, 23-25, 29

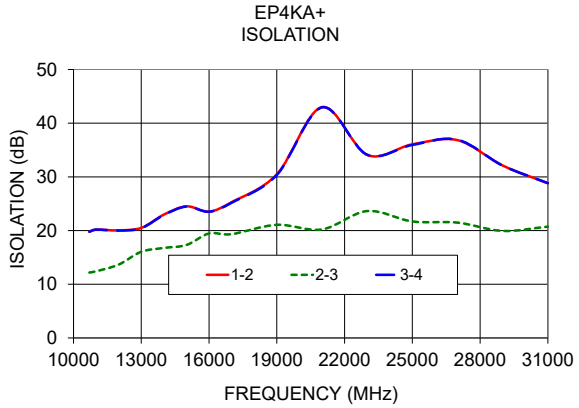
Simplified Electrical Schematic

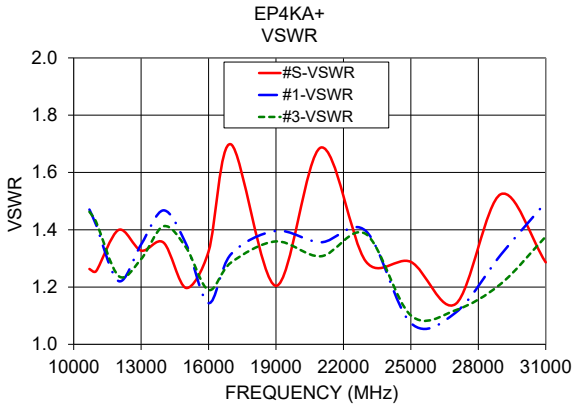


Typical Performance Data

Freq. (MHz)	Total Loss[1] (dB)				Amp. Unbal. (dB)	Isolation (dB)			Phase Unbal. (deg.)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
	S-1	S-2	S-3	S-4		1-2	2-3	3-4						
10700	6.13	6.26	6.36	6.05	0.31	19.79	12.18	19.78	3.06	1.26	1.47	1.39	1.46	1.41
11000	6.15	6.25	6.36	6.04	0.32	20.18	12.42	20.18	3.47	1.26	1.42	1.33	1.43	1.33
12000	6.26	6.19	6.44	6.17	0.27	20.04	13.67	20.00	4.01	1.40	1.22	1.16	1.24	1.18
13000	6.17	6.34	6.35	6.20	0.18	20.50	16.05	20.44	3.31	1.33	1.35	1.38	1.30	1.43
14000	6.17	6.36	6.34	6.16	0.19	22.98	16.76	22.90	4.99	1.36	1.47	1.45	1.41	1.47
15000	6.21	6.22	6.38	6.14	0.24	24.52	17.32	24.47	4.90	1.20	1.35	1.28	1.34	1.32
16000	6.24	6.37	6.38	6.22	0.16	23.53	19.46	23.51	5.14	1.32	1.14	1.18	1.19	1.19
17000	6.54	6.61	6.62	6.51	0.11	25.28	19.34	25.18	6.32	1.70	1.31	1.33	1.29	1.30
19000	6.43	6.43	6.46	6.26	0.20	30.47	21.07	30.36	6.87	1.20	1.40	1.31	1.36	1.31
21000	6.90	6.89	6.92	6.82	0.11	43.00	20.21	42.94	7.34	1.69	1.36	1.24	1.31	1.33
23000	6.77	6.78	6.87	6.73	0.14	34.09	23.64	34.13	7.96	1.29	1.40	1.32	1.38	1.42
25000	6.86	6.85	6.87	6.77	0.09	36.06	21.70	35.95	9.32	1.29	1.07	1.10	1.10	1.13
27000	6.95	6.97	6.94	6.86	0.11	36.84	21.48	36.92	10.57	1.14	1.11	1.17	1.12	1.11
29000	7.64	7.47	7.45	7.59	0.19	32.12	19.94	32.10	11.29	1.52	1.31	1.20	1.21	1.36
31000	7.60	7.42	7.38	7.57	0.22	28.82	20.73	28.83	11.82	1.29	1.50	1.36	1.38	1.48





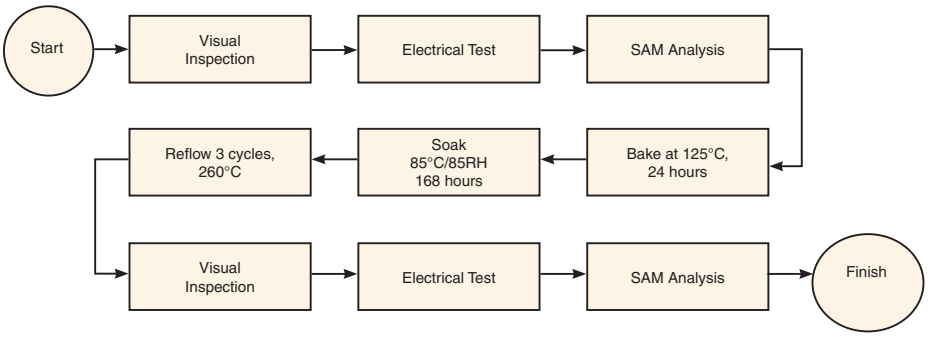


Additional Detailed Technical Information *additional information is available on our dash board. To access this information click here*	
Performance Data	Data Table
	Swept Graphs
	S-Parameter (S5P Files) Data Set (.zip file)
Case Style	DG1677-2 *Plastic package, exposed paddle* *lead finish: Matte Tin*
Tape & Reel **Standard quantities available on reel**	F68 *7" reels with 20, 50, 100, 200, 500 and 1000 devices*
Suggested Layout for PCB Design	PL-649
Evaluation Board	TB-EP4KA+ (Without connectors) TB-EP4KAC+ (With connectors)
Environmental Ratings	ENV08T1

ESD Rating

Human Body Model (HBM): Class 2 (Pass 2000V) in accordance with ANSI/ESD STM 5.1 - 2001

MSL Test Flow Chart



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-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