1S4E_1U series

1W - Single Output DC-DC converter - Isolated & Unregulated

DC-DC Converter 1 Watt

- SIP4 package
- Operating temperature range: -40°C to 105°C
- 1000VDC isolation voltage
- Up to 89% efficiency
- Single and unregulated output
- MTBF 3,500,000 hours

Introducing our new 1S4E_1U series. Compact and efficient, our latest SIP4 series offers reliable DC/DC conversion in a space-saving SIP4 package. Designed to operate across a wide temperature range from -40°C to +105°C, these modules deliver up to 89% efficiency and feature a 1000VDC isolation voltage for enhanced safety. With a single, unregulated output and an impressive MTBF of 3,500,000 hours, the SIP4 series is engineered for durability and long-term performance. These converters are perfectly suited for a wide range of applications including power systems, industrial control, communications, Internet of Things (IoT), and automotive electronics - anywhere compact size and dependable operation are essential.

Common specifications

Switching frequency	220kHz (full load, nominal input voltage)
Operating temperature	-40°C - +105°C, (with derating)
Storage temperature	-55°C - +125°C
Case temperature rise	+15°C (typ.) Ta = 25°C, nominal input, output load
Pin welding can withstand the highest temperature	300°C (max.) soldering spot is 1.5mm away from case for 10 seconds
Relative humidity	95% RH (non-condensing)
Input Filter	Capacitance filter
Hot Plug	Unavailable
MTBF (MIL-HDBK-217F@25°C)	3,500,000 Hours
Case Material	Black plastic; flame-retardant and heat-resistant (UL94V-0)
Package Dimensions	11.6 x 6.00 x 10.20mm
Weight	1.6g (typ.)
Cooling Method	Free air convection

Input specifications

Item	Operating condition	Min	Typ	Max	Units
Input current (full load/no-load)	3.3VDC input 5VDC input 12VDC input 15VDC input 24VDC input		370/3 230/3 99/3 78/3 50/3	390/15 260/15 105/15 85/15 55/15	mA
Reflected ripple current			15		mA
Impulse voltage	3.3VDC input 5VDC input 12VDC input 24VDC input	-0.7 -0.7 -0.7 -0.7		5 9 18 30	VDC

Output specifications

Item	Operating condition	Min	Typ	Max	Units
Output voltage accuracy	See envelope curve figure (1)				
Linear regulation rate (input voltage variation ±1%)	3.3VDC output Others output		±1.5 ±1.2		%
Load regulation rate (10% - 100% load)	3.3VDC output 5VDC output 9VDC output 12VDC output 15VDC output 24VDC output		10 8 8 7 6 6		%
Ripple noise	20MHz Bandwidth (peak to peak)	--	45	70	mV
Temperature drift coefficient	Full load	--	±0.03	--	%/°C

Isolation specifications

Item	Operating Conditions	Min	Typ	Max	Units
Isolation voltage	Input-output, test time 1 minute, leakage current less than 1mA	1000			VDC
Isolation resistance	Input-output, isolated voltage 500VDC	1000			MΩ
Isolation capacitance	Input-output, 100kHz/0.1V		20		pF

EMC specifications

EMI	CE	CISPR32/EN55032 CLASS B (the recommended circuit is shown in Figure 4)
EMI	RE	CISPR32/EN55032 CLASS B (the recommended circuit is shown in Figure 4)
EMS	ESD	IEC/EN61000-4-2 Contact ±6kV perf. Criteria B

Example:
1S4E_0509S1U
1 = 1Watt; S4 = SIP4; E = Series; 05 = 5Vin; 09 = 9Vout; S = Single Output;
1 = 1kVDC isolation; U = Unregulated Output.

1. The input voltage cannot exceed the specified range value, otherwise permanent and irreparable damage may be caused ;
2. Unless otherwise specified,the parameters in this datasheet were measured at 25°C, humidity 40%~75%, input nominal voltage and output pure resistance mode under full load;
3. All index test methods are based on our company's standards;

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Product Selection Guide

Approval	Part number	Input Voltage Nominal (Range) (VDC)	Output Voltage (VDC)	Output Current Min (mA)	Output Current Max (mA)	Full Load Efficiency% (typ.)	Max. Capacitive Load (uF)
	1S4E_0303S1U	3.3	3.3	0	303	82	2400
	1S4E_0305S1U	3.3	5	0	200	83	2400
	1S4E_0309S1U	3.3	9	0	111	84	1000
	1S4E_0312S1U	3.3	12	0	84	85	560
	1S4E_0503S1U	5	3.3	0	303	82	2400
	1S4E_0505S1U	5	5	0	200	84	2400
	1S4E_0509S1U	5	9	0	111	86	1000
	1S4E_0512S1U	5	12	0	84	88	560
	1S4E_0515S1U	5	15	0	67	88	560
	1S4E_0524S1U	5	24	0	42	89	220
	1S4E_0909S1U	9	9	0	111	87	1000
	1S4E_1203S1U	12	3.3	0	303	84	2400
	1S4E_1205S1U	12	5	0	200	88	2400
	1S4E_1209S1U	12	9	0	111	87	1000
	1S4E_1212S1U	12	12	0	84	89	560
	1S4E_1215S1U	12	15	0	67	88	560
	1S4E_1224S1U	12	24	0	42	89	220
	1S4E_1503S1U	15	3.3	0	303	85	2400
	1S4E_1505S1U	15	5	0	200	85	2400
	1S4E_1509S1U	15	9	0	111	88	1000
	1S4E_1512S1U	15	12	0	84	89	560
	1S4E_1515S1U	15	15	0	67	89	560
	1S4E_2403S1U	24	3.3	0	303	84	2400
	1S4E_2405S1U	24	5	0	200	87	2400
	1S4E_2409S1U	24	9	0	111	89	1000
	1S4E_2412S1U	24	12	0	84	88	560
	1S4E_2415S1U	24	15	0	67	88	560
	1S4E_2424S1U	24	24	0	42	89	220

Product characteristic curves

Temperature derating graph

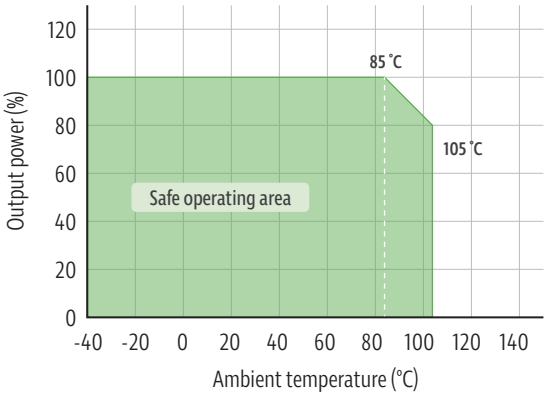


Figure 1

Output regulation curve

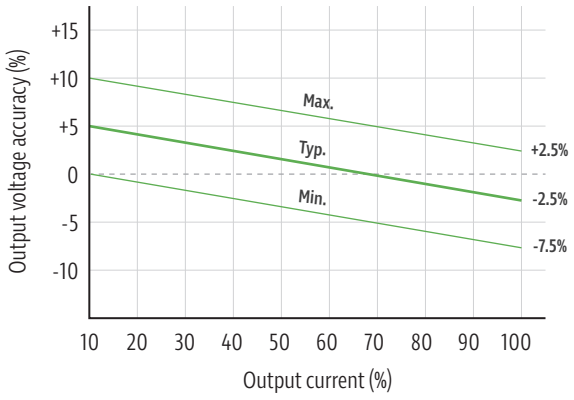
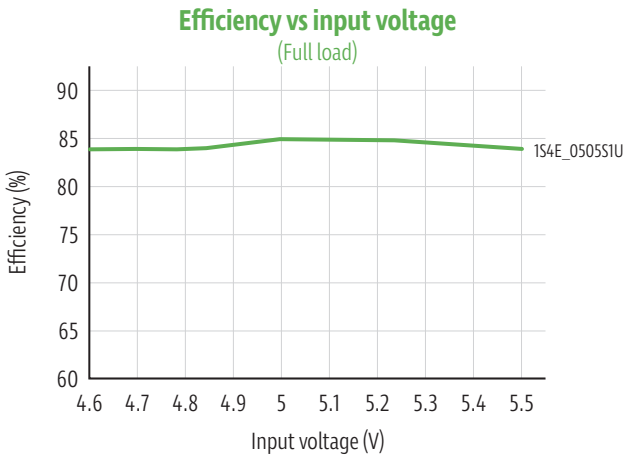
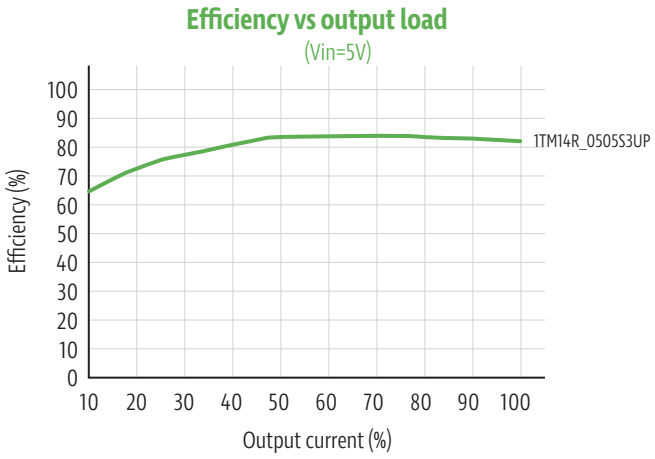


Figure 2

Product characteristic curves





Typical circuit design and application

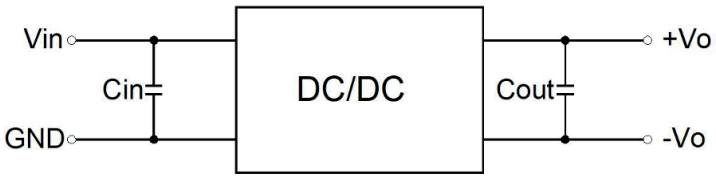


Figure 3

Recommended capacitive load value table

Vin	Cin	Vo	Cout
3.3/5VDC	4.7uF/16V	3.3/5VDC	10μF/16V
12VDC	2.2uF/25V	9VDC	4.7μF/16V
15VDC	2.2uF/25V	12VDC	2.2μF/25V
24VDC	1.0uF/50V	15VDC	1.0μF/25V
--	--	24VDC	0.47μF/50V

EMI compliance circuit

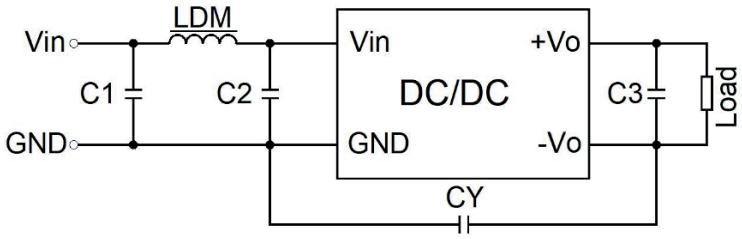


Figure 4

EMI recommended parameter table

EMI	C1	4.7μF /50V
	C2	4.7μF /50V
	C3	Refer to the Cout parameter in figure 3
	CY	1000pF/2kV
	LDM	6.8μH

1. Typical applications

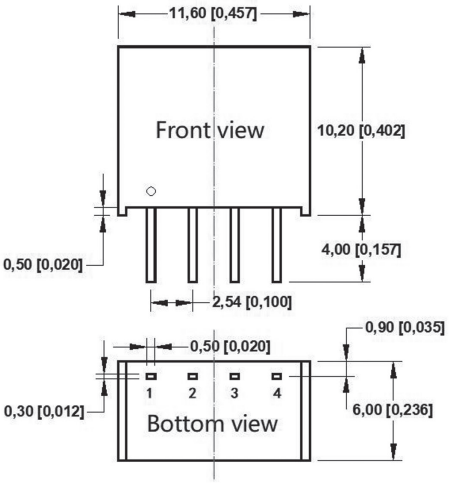
To further reduce input and output ripple, a capacitor filtering network can be connected at the input and output terminals. The application circuit is shown in Figure 3. However, care should be taken to select a suitable filter capacitor. If the capacitance is too large, it is likely to cause start-up problems. For each output, the recommended capacitive load values are shown in Table 1 for safe and reliable operation.

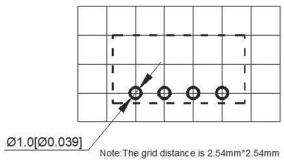
2. EMC typical recommended circuit (see figure 4)

3. Output load requirements

In order to ensure that the module can work efficiently and reliably, the minimum output load should not be less than 10% of the rated load when used. If the power required is really small, connect a resistor in parallel to the output end (the sum of the power consumed by the resistance and the power actually used is greater than or equal to 10% of the rated power).

Mechanical dimensions





Note:
Unit: mm [inch]
Pin section tolerances: ±0.10 [±0.004]
General tolerances: ¿±0.50 [±0.020]

Pin	Function
1	GND
2	Vin
3	-Vo
4	+Vo