

2S4E_1U series

2W - Single Output DC-DC Converter - Isolated & Unregulated



DC-DC Converter

2 Watt

- ⊕ SIP4 package
- ⊕ Operating temperature: -40°C up to +105°C
- ⊕ 1000VDC isolation voltage
- ⊕ Up to 86% efficiency
- ⊕ Standard pin-out
- ⊕ MTBF: 3,500,000 hours

Introducing our new 2S4E_1U series, a compact and efficient DC-DC converter solution designed for reliable performance in demanding applications. Housed in a space-saving SIP4 package, the series is ideal for designs where board space and long-term stability matter. The converters operate over a wide temperature range from -40 °C up to +105 °C, ensuring dependable operation even under harsh environmental conditions. With an isolation voltage of 1000 VDC and efficiencies of up to 86 %, the 2S4E_1U series delivers a balanced combination of safety, efficiency, and thermal performance.

A standard pin-out allows for easy integration and drop-in replacement, while a high MTBF of 3,500,000 hours underlines the series' suitability for industrial and long-life applications.



Common specifications

Short circuit protection	Sustainable short-circuit, self-recovery
Switching frequency	220 kHz (full load, nominal input voltage)
Operation temperature	-40°C ~+105°C (with derating)
Storage temperature	-55°C ~+125°C
Pin welding can withstand the highest temperature	+300°C (soldering spot is 1.5mm away from case for 10 seconds)
Case temperature rise	15°C (Ta = 25°C nominal input, output load)
Storage humidity	95% RH (no condensation)
MTBF: (MIL-HDBK-217F@25°C)	>3,500,000 hours
Input filter	Capacitor Filtering
Hot plug	Non support
Case material	Black plastic; flame-retardant and heat-resistant (UL94V-0)
Package dimensions	11.6 x 6.00 x 10.20 mm
Weight	1.6g (typ.)
Cooling method	Free air convection

Input specifications

Item	Test condition	Min	Typ	Max	Units
Input current (full load / empty load)	5VDC input				
	• 15/24VDC output		482/18	488/-	
	• Other output		500/12	513/15	
	12VDC input		194/8	209/15	
	15VDC input, 5VDC output		155/7	160/15	
Reflective ripple current	24VDC input		101/3	106/15	
			15		mA
Impulse voltage	5VDC input	-0.7		9	
	12VDC input	-0.7		18	
	15VDC input	-0.7		24	
	24VDC input	-0.7		30	VDC

Example:

2S4E_2405S1.5UP

2 = 2Watt; S4 = SIP; E = Series; 24 = 24Vin; 05 = 5Vout; S = Single Output; 1 = 1000VDC isolation; U = Unregulated Output;

Output specifications

Item	Test condition	Min	Typ	Max	Units
Output voltage accuracy	See envelope curve figure 1				
Linear regulation (input voltage change of ± 1%)	5VDC output		±1.5		
	Other output		±1.2		%
Load regulation (10% - 100% load)	3.3VDC output		15		
	5/7VDC output		12		
	9VDC output		10		
	12VDC output		9		%
	15VDC output		8		
	24VDC output		8		
Ripple & noise	20 MHz bandwidth (peak-peak)		75	200	mV
Temperature drift coefficient	Loaded to capacity		±0.03		%/°C

Isolation specifications

Item	Test condition	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

- The input voltage shall not exceed the specified range value, otherwise it may cause permanent and unrecoverable damage;
- It is recommended to use the load above 5%. If the load is less than 5%, the ripple index of the product may exceed the specification, but it does not affect the reliability of the product;
- The maximum capacitive load is tested in the input voltage range and under full load conditions;
- Except for special instructions, all indicators in this datasheet are measured at Ta = 25°C, humidity <75% RH, nominal input voltage and output rated load;
- All the index test methods in this datasheet are based on the enterprise standards of the company;
- For any specific needs please contact technical team directly;
- Product specifications are subject to change without notice.

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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 $\pm 6\text{kV}$ perf. criteria B

Product Selection Guide

Approval	Part number	Input Voltage Nominal (Range) (VDC)	Output Voltage (VDC)	Output Current max./min.(mA)	Full Load Efficiency (%) typ.	Capacitive Load max. (μF)
	2S4E_0503S1U	5	3.3	400/40	78	2400
	2S4E_0505S1U	5	5	400/40	80	2400
	2S4E_0507S1U	5	7	285/29	80	1000
	2S4E_0509S1U	5	9	222/22	81	1000
	2S4E_0512S1U	5	12	167/17	81	560
	2S4E_0515S1U	5	15	133/13	82	560
	2S4E_0524S1U	5	24	83/8	83	220
	2S4E_1203S1U	12	3.3	400/40	80	2400
	2S4E_1205S1U	12	5	400/40	81	2400
	2S4E_1209S1U	12	9	222/22	84	1000
	2S4E_1212S1U	12	12	167/17	86	560
	2S4E_1215S1U	12	15	133/13	86	560
	2S4E_1505S1U	15	5	400/40	83	2400
	2S4E_2403S1U	24	3.3	400/40	79	2400
	2S4E_2405S1U	24	5	400/40	82	2400
	2S4E_2409S1U	24	9	222/22	83	1000
	2S4E_2424S1U	24	24	83/8	80	220

Typical characteristics

Temperature derating graph

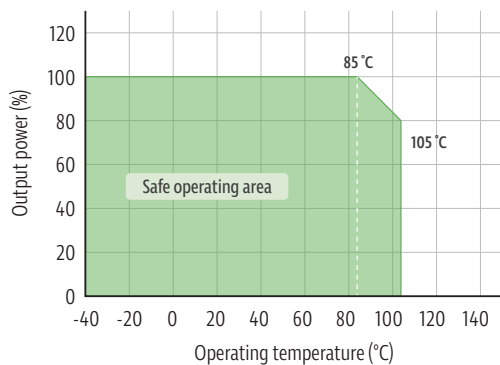


Figure 2

Output regulation curve

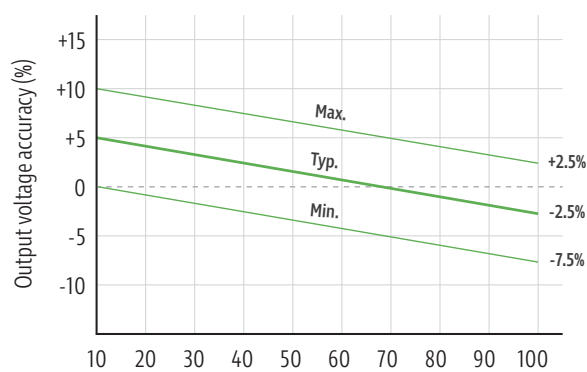


Figure 1.1

Output regulation curve

3.3VDC output

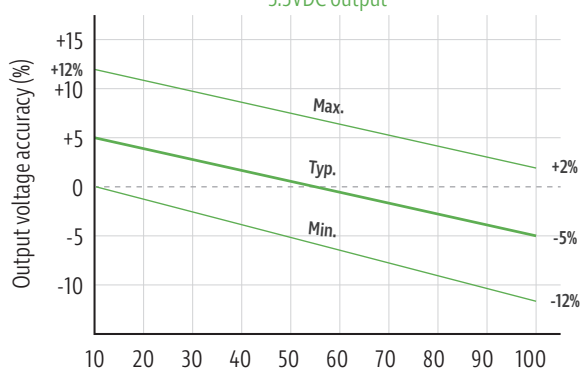


Figure 1.2

Typical circuit design and application

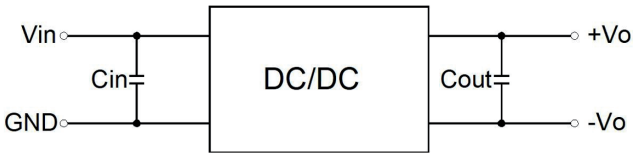


Figure 3

Recommended component parameters

Vin	Cin	Vo	Cout
5VDC	4.7uF/16V	3.3/5VDC	10uF/10V
12/15VDC	2.2uF/25V	7/9VDC	4.7uF/16V
24VDC	1.0uF/50V	12/15VDC	2.2uF/25V
--	--	24VDC	0.47uF/50V

Recommended EMC circuit diagram

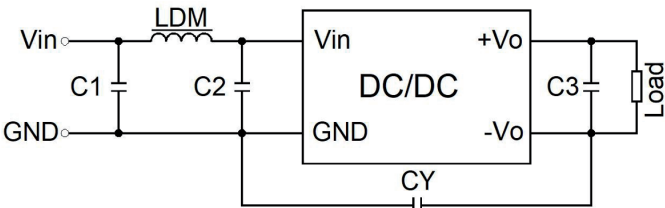


Figure 4

EMC Recommended component parameters

EMI	Input Voltage (VDC)	5/12/24
	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 application

If further reduction of input and output ripple is required, a capacitance filter network can be connected at the input and output end, and the application circuit is shown in figure 3.

However, attention should be paid to choosing the appropriate filter capacitor. If the capacitor is too large, it is likely to cause startup problems.

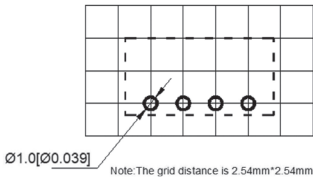
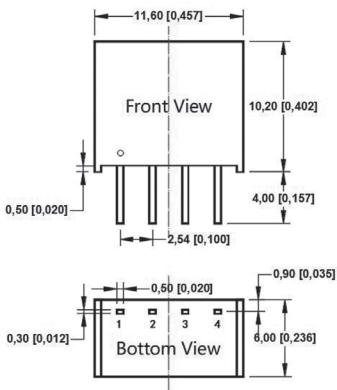
For each output, the recommended tolerance load values are shown in the table.

2. EMC recommended circuit: see figure 4

3. Output load requirements

To ensure that the module can work efficiently and reliably, its output minimum load cannot be less than 10% of the rated load. If your power is really small, parallel a resistance at the output (the sum of the resistance consumption and the actual power is greater than 10% of the rated power).

Mechanical dimensions



Pin Definition Table

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

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