



2S4AE_1.5UP series

2W - Single Output - Fixed Input - Isolated & Unregulated
Miniature SIP Package

DC-DC Converter 2 Watt

- ⊕ Operating temperature range: -40°C to +85°C
- ⊕ Ultra compact SIP package
- ⊕ Isolation voltage: 1.5kVDC
- ⊕ High power density
- ⊕ No external component required
- ⊕ International standard pin-out



Common specifications	
Short circuit protection:*	• 2S4AE_0505S1.5UP Continuous, self-recovery • Others 1s
Operation temperature:	-40°C~+85°C (Derating if the temperature $\geq 71^\circ\text{C}$, see Fig. 2)
Storage temperature:	-40°C ~+125°C
Storage humidity range:	< 95% RH Max.
Casing Temperature Rise:	25°C Typ. (Ta=25°C)
Pin Welding Resistance Temperature:	300°C Max. (Welding spot is 1.5mm away from the casing, 10 seconds)
MTBF(MIL-HDBK-217F@25°C):	>3500 Khours
Case material:	Black flame-retardant and heat-resistant plastic(UL94 V-0)
Cooling:	Free air convection
Dimensions:	11.60x7.55x10.16 mm
Weight:	1.6g Typ.

* Supply voltage must be discontinued at the end of short circuit duration for others series.

Input specifications					
Item	Test condition	Min	Typ	Max	Units
Input Current (full load / no-load)	• 5V input		506/23	-/60	mA
	• 12V input		200/15	-/50	mA
	• 24V input		105/6	-/30	mA
Input reflected ripple current*			15		mA
Input surge voltage (1sec. max.)	• 5V input	-0.7		9	VDC
	• 12V input	-0.7		18	VDC
	• 24V input	-0.7		30	VDC
Input filter	Filter capacitor				
Hot Plug	Unavailable				

*Reflected ripple current testing method please see DC-DC Converter Application Notes for specific operation.

Isolation specifications					
Item	Test condition	Min	Typ	Max	Units
Isolation voltage	Input-output, with the test time of 1 minute and the leak current lower than 1mA	1500			VDC
Isolation resistance	Input-output, isolation voltage 500VDC	1000			MΩ
Isolation capacitance			20		pF

The 2S4AE_1.5UP series is especially designed for applications where an isolated voltage is required in a distributed power supply system.

These products apply to:

- 1) Where the voltage of the input power supply is stable (voltage variation: $\pm 10\%V_{in}$);
- 2) Where isolation between input and output is necessary (isolation voltage $\leq 1500\text{VDC}$);
- 3) Where the output voltage regulation and the ripple & noise of the output voltage is not strictly required;
- 4) Typical application: digit circuit condition; normal low-frequency artificial circuit condition; relay drive circuit condition, etc.

Output specifications					
Item	Test condition	Min	Typ	Max	Units
Output voltage accuracy	See tolerance envelope graph (Fig. 1)				
Line regulation	For V_{in} change of 1% • 3.3V output • Other output			± 1.5	%
				± 1.2	%
Load regulation	10%-100% load • 3.3V output • Other output		15		%
			10		%
Ripple & Noise	20MHz Bandwidth		75	150	mVp-p
Temperature drift	100% full load			± 0.03	%/°C
Switching frequency	variable		100		KHz

* Ripple and noise are measured by "parallel cable" method, please see DC-DC Converter Application Notes for specific operation;

EMC specifications		
Emissions	CE	CISPR32/EN55032 CLASS B (see Fig. 4 for recommended circuit)
Emissions	RE	CISPR32/EN55032 CLASS B (see Fig. 4 for recommended circuit)
Immunity	ESD	IEC/EN61000-4-2 Contact $\pm 8\text{kV}$ perf. Criteria B

Example:

2S4AE_0505S1.5UP

**2 = 2Watt; S4 = SIP4; AE = Pinning; 05 = 5Vin; 05 = 5Vout;
S = Single Output; 1 = 1.5kVDC; U = Unregulated Output
P = Short Circuit Protection (SCP)**

Note:

1. All specifications measured at TA = 25°C, humidity < 75%, nominal input voltage and rated output load unless otherwise specified.
2. See below recommended circuits for more details.
3. If the power module such as the definition of the pin does not match with the hand book, please refer to the actual item.

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Part Number	Input Voltage [V, Range]	Output Voltage [VDC]	Output current [mA, max/min]	Efficiency @ Full Load [%, min./typ.]	Max. Capacitor load [μ F]
2S4AE_0505S1.5UP	5 (4.5-5.5)	5	400/40	75/79	220
2S4AE_0509S1.5UP	5 (4.5-5.5)	9	223/23	80/84	220
2S4AE_0512S1.5UP	5 (4.5-5.5)	12	167/17	75/79	220
2S4AE_0515S1.5UP	5 (4.5-5.5)	15	133/13	75/79	220
2S4AE_0524S1.5UP	5 (4.5-5.5)	24	84/9	80/84	220
2S4AE_1203S1.5UP	12 (10.8-13.2)	3.3	400/40	69/73	220
2S4AE_1212S1.5UP	12 (10.8-13.2)	12	167/17	78/83	220
2S4AE_2405S1.5UP	24 (21.6-26.4)	5	400/40	75/79	220
2S4AE_2415S1.5UP	24 (21.6-26.4)	15	133/13	78/82	220

Typical characteristics

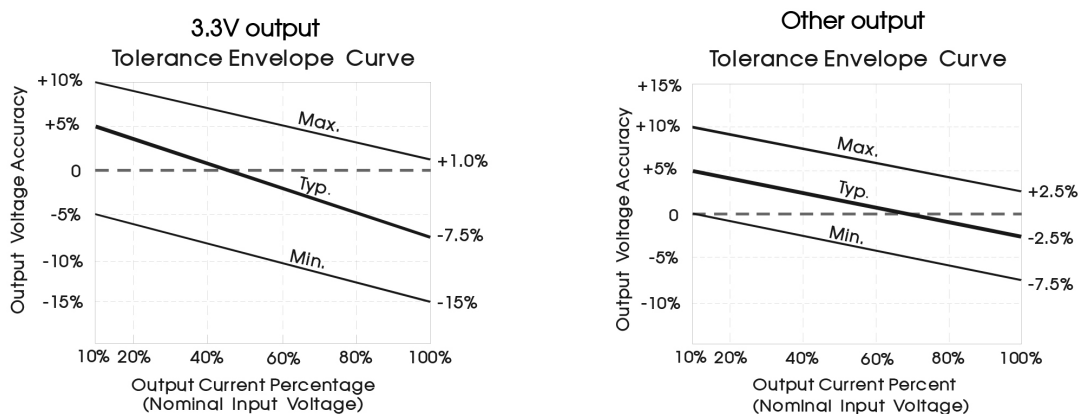


Fig. 1

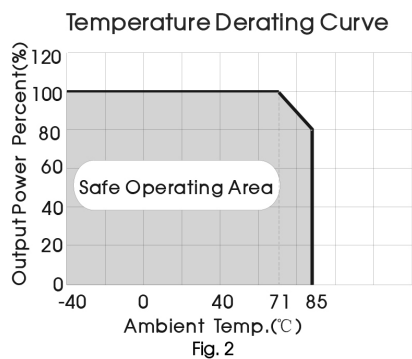
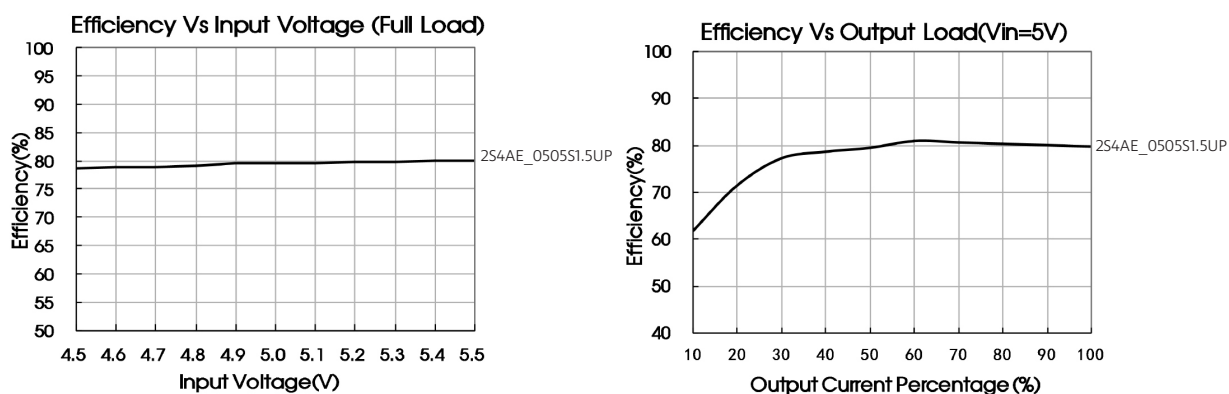


Fig. 2

Efficiency



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Typical application circuit

If it is required to further reduce input and output ripple, a filter capacitor may be connected to the input and output terminals, see Fig.3. Moreover, choosing a suitable filter capacitor is very important, start-up problems may be caused if the capacitance is too large. Under the condition of safe and reliable operation, the recommended capacitive load values are shown in Table 1.



Fig.3

Recommended capacitive load value table (Table 1)

Vin (VDC)	Cin (μF)	Vo (VDC)	Cout (μF)
5	4.7	3.3/5/9/12	10
12	2.2	15/24	1
24	1		

EMC solution-recommended

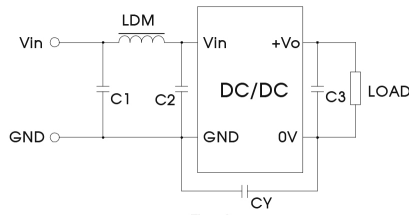


Fig. 4

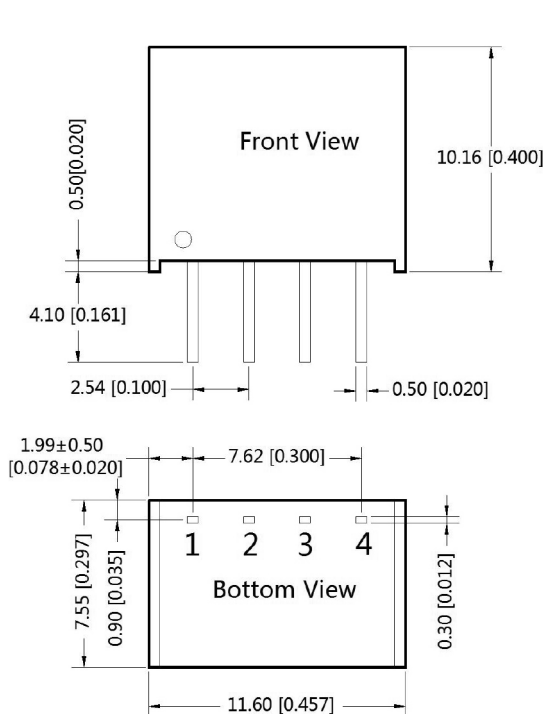
Output voltage		5/12	24
Emissions	C1/C2	4.7μF /50V	
	CY	--	1nF/2KVDC
	C3	Refer to the Cout in Fig.3	
	LDM	6.8μH	

Note: 1. 24V input series is subject to CY (CY : 1nF/2KV).
2. It is not needed to add the component in the peripheral circuit when parameter with the symbol of „-“.

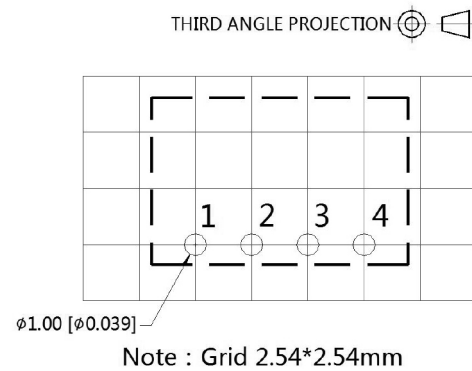
Output load requirements

In order to ensure the converter can work reliably with high efficiency, the minimum load should not less than 10% rated load when it is used. If the needed power is indeed small, please parallel a resistor on the output side (The sum of the efficient power and resistor consumption power is not less than 10%).

Mechanical dimensions



Note:
Unit :mm[inch]
Pin section tolerances:±0.10[±0.004]
General tolerances:±0.25[±0.010]



Note : Grid 2.54*2.54mm

Pin-Out	
Pin	Function
1	GND
2	Vin
3	0V
4	+Vo