



1S4AE_1.5UP series

1W, Fixed input voltage, isolated & unregulated single output DC-DC Converter

- ⊕ Continuous short-circuit protection
- ⊕ No-load input current as low as 8mA
- ⊕ Operating temperature range: -40°C to +105°C

- ⊕ High efficiency up to 81%
- ⊕ I/O isolation test voltage: 1.5kVDC
- ⊕ Industry standard pin-out
- ⊕ IEC62368, UL62368, EN62368 approved



Output specifications					
Item	Test condition	Min	Typ	Max	Units
Short Circuit Protection		Continuous, self-recovery			
Operating Temperature	Derating if the temperature $\geq 85^{\circ}\text{C}$, (see Fig. 2)	-40		105	$^{\circ}\text{C}$
Storage Temperature		-55		125	$^{\circ}\text{C}$
Casing Temperature Rise	Ta=25°C, nominal input, full load output		25		$^{\circ}\text{C}$
Pin Welding Resistance Temperature	Welding spot is 1.5mm away from the casing, 10s			300	$^{\circ}\text{C}$
Storage Humidity	Non-condensing	5		95	%RH
Vibration	10-150Hz, 5G, 0.75mm. along X, Y and Z				
Switching Frequency	Full load, nominal input voltage		260		KHz
MTBF	MIL-HDBK-217F@25	3500,000			h
Casing Material	Black plastic; flame-retardant and heat-resistant (UL94 V-0)				
Package Dimensions	11.60*6.00*10.16mm				
Weight	1.3g (Typ.)				
Cooling methods	Free air convection				

Input specifications					
Item	Test condition	Min	Typ	Max	Units
Input current (full load / no-load)	12V input				
	• 3.3VDC output	112/8		118	mA
	• 5/9/12VDC output	105/8		110	mA
	• 15/24VDC output	103/8		109	mA
	15V input				
	• 5/9/12VDC output	84/8		88	mA
	• 15/24VDC output	83/8		87	mA
	24V input				
	• 3.3VDC output	56/8		61	mA
	• 5VDC output	53/8		58	mA
• 9VDC output	53/8		57	mA	
• 12/15/24VDC output	52/8		56	mA	
Reflected ripple current		15			mA
Surge Voltage (1sec. max.)	• 12VDC input	-0.7		18	VDC
	• 15VDC input	-0.7		21	VDC
	• 24VDC input	-0.7		30	VDC
Input filter	Capacitor filter				
Hot plug	Unavailable				

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

DC-DC Converter 1 Watt

The 1S4AE_1.5UP series are specially designed for applications where an isolated voltage is required in a distributed power supply system. They are suitable for: pure digital circuits, low frequency analog circuits, relay-driven circuits and data switching circuits

Output specifications					
Item	Test condition	Min	Typ	Max	Units
voltage accuracy	See output regulation curves (Fig. 1)				
Line regulation	Input voltage change: $\pm 1\%$				
	• 3.3VDC output			1.5	%
	• 5/9/12/15/24VDC output			1.2	%
Load regulation	10% to 100% load				
	• 3.3VDC output		8	20	%
	• 5VDC output		5	15	%
	• 9VDC output		3	10	%
	• 12VDC output		3	10	%
	• 15VDC output		3	10	%
	• 24VDC output		2	10	%
Ripple & Noise*	20MHz Bandwidth				
	• 3.3/5/9/12C/15VDC output		30	75	mVp-p
	• 24VDC output		50	100	mVp-p
Temperature Drift Coefficient	Full load		± 0.02		%/ $^{\circ}\text{C}$

* The "parallel cable" method is used for ripple and noise test, please refer to DC-DC Converter Application Notes for specific information.

Example:

1S4AE_1203S1.5UP

1 = 1Watt; S4 = SIP4; A = Pinning; E = Cost effective; 12 = 12Vin; 03 = 3Vout; S = Single Output; 1.5 = 1.5kVDC; U = Unregulated

Isolation specifications					
Item	Test condition	Min	Typ	Max	Units
Isolation voltage	I/O, test for 1 minute, leak current of 1mA	1500			VDC
Isolation resistance	IO, test at 500VDC	1000			MΩ
Isolation capacitance	IO, 100KHz/0.1V		20		pF

EMC specifications					
EMI	CE	CISPR32/EN55032	CLASS B	(EMC recommended circuit)	
EMI	RE	CISPR32/EN55032	CLASS B	(EMC recommended circuit)	
EMS	ESD	IEC/EN61000-4-2	Air $\pm 8\text{kV}$,	Contact $\pm 4\text{kV}$	perf. Criteria B

Note:

- If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
- The maximum capacitive load offered were tested at input voltage range and full load;
- Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta = 25°C, humidity <75%RH with nominal input voltage and rated output load;
- All index testing methods in this datasheet are based on our Company's corporate standards;
- We can provide product customization service, please contact our technicians directly for specific information;
- Products are related to laws and regulations: see "Features" and "EMC";
- Classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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Product Selection Guide

Part Number	Certification	Input Voltage [VDC]		Output Voltage [VDC]	Output Current [mA, Max./Min]	Full Load Efficiency [%, Min./Typ.]	Capacitive load [μ F, Max]
		Nominal	Range				
1S4AE_1203S1.5UP	UL	12	(10.8-13.2)	3.3	303/30	71/75	2400
1S4AE_1205S1.5UP	UL	12	(10.8-13.2)	5	200/20	76/80	2400
1S4AE_1209S1.5UP	UL	12	(10.8-13.2)	9	111/12	76/80	1000
1S4AE_1212S1.5UP	UL	12	(10.8-13.2)	12	83/9	76/80	560
1S4AE_1215S1.5UP	UL	12	(10.8-13.2)	15	67/7	77/81	560
1S4AE_1224S1.5UP	UL	12	(10.8-13.2)	24	42/5	77/81	220
1S4AE_1505S1.5UP	UL	15	(13.5-16.5)	5	200/20	76/80	2400
1S4AE_1509S1.5UP	UL	15	(13.5-16.5)	9	111/12	76/80	1000
1S4AE_1512S1.5UP	UL	15	(13.5-16.5)	12	83/9	76/80	560
1S4AE_1515S1.5UP	UL	15	(13.5-16.5)	15	67/7	77/81	560
1S4AE_1524S1.5UP	-	15	(13.5-16.5)	24	42/5	77/81	220
1S4AE_2403S1.5UP	UL	24	(21.6-26.4)	3.3	303/30	71/75	2400
1S4AE_2405S1.5UP	UL	24	(21.6-26.4)	5	200/20	76/80	2400
1S4AE_2409S1.5UP	UL	24	(21.6-26.4)	9	111/12	76/80	1000
1S4AE_2412S1.5UP	UL	24	(21.6-26.4)	12	83/9	76/80	560
1S4AE_2415S1.5UP	UL	24	(21.6-26.4)	15	67/7	77/81	560
1S4AE_2424S1.5UP	UL	24	(21.6-26.4)	24	42/5	77/81	220

Typical Characteristic Curves

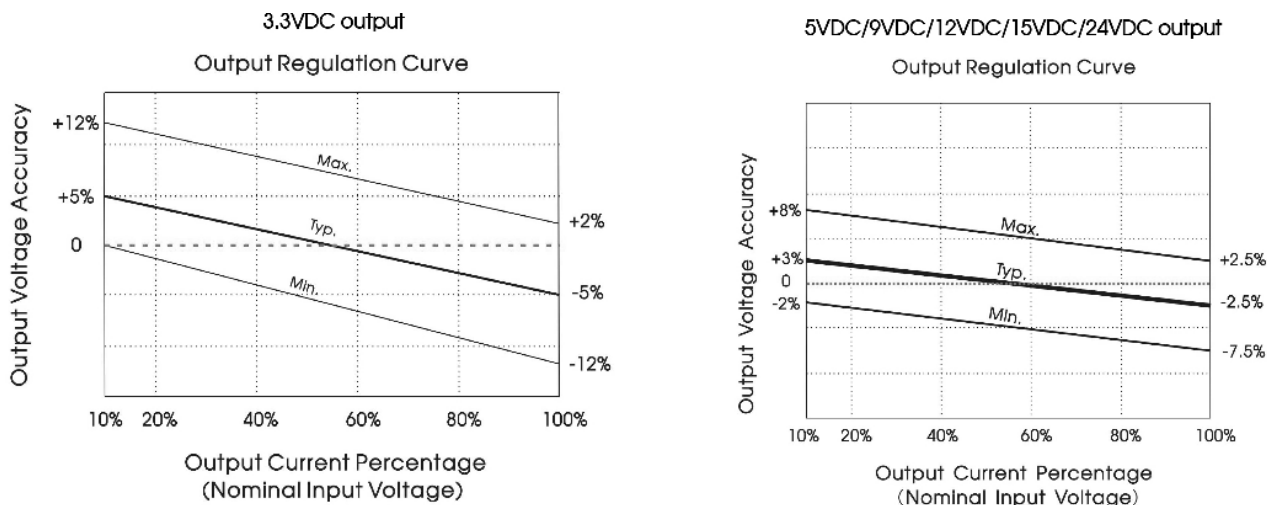


Fig. 1

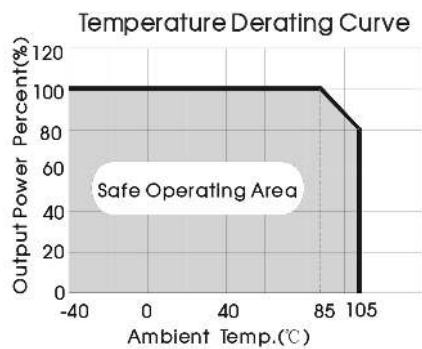
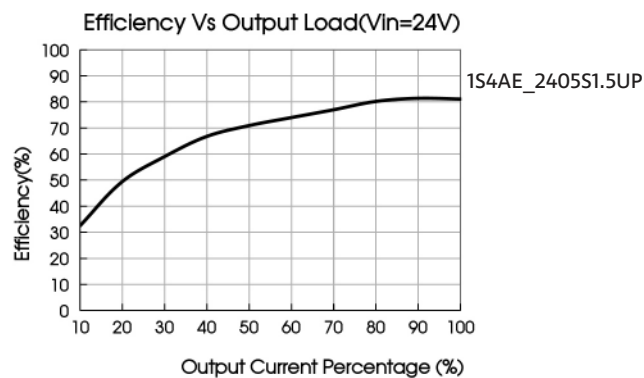
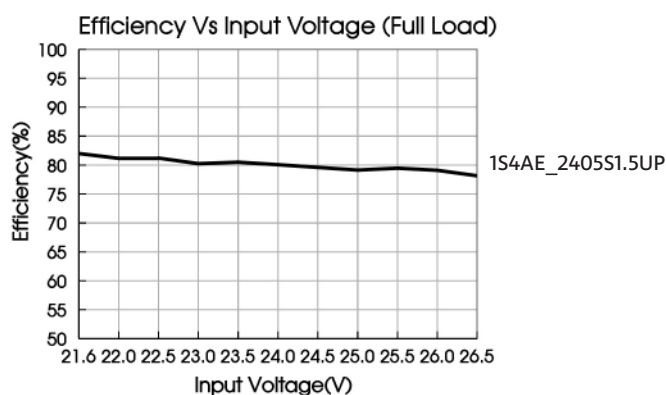
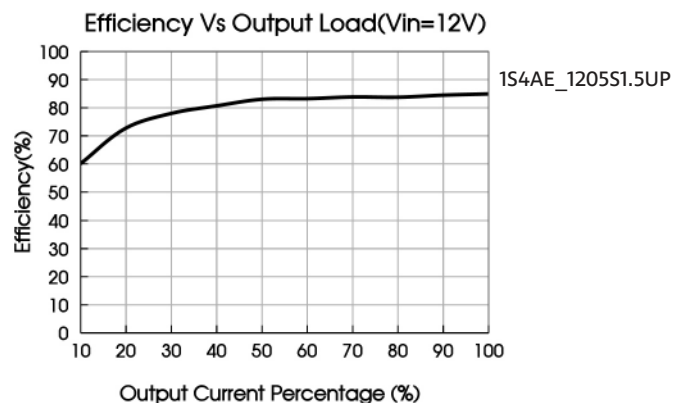
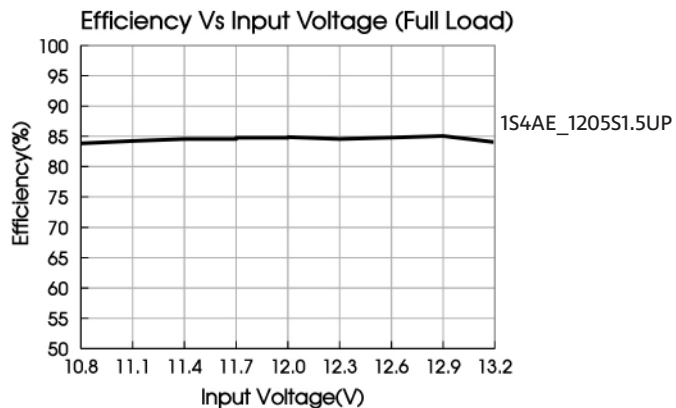


Fig. 2

1S4AE_1.5UP series

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Efficiency curves



Typical application

Input and/or output ripple can be further reduced, by connecting a filter capacitor from the input and/or output terminals to ground as shown in Fig.3. Choosing suitable filter capacitor values is very important for a smooth operation of the modules, particularly to avoid start-up problems caused by capacitor values that are too high. For recommended input and output capacitor values refer to Table 1.

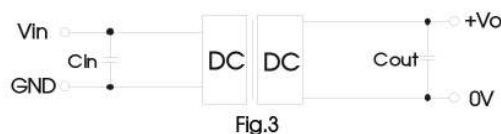


Table 1: Recommended input and output capacitor values

V _{in} (VDC)	C _{in} (μF)	V _{out} (VDC)	C _{out} (μF)
12VDC	2.2μF/25V	3.3VDC	10μF/16V
15VDC	2.2μF/25V	5VDC	10μF/16V
24VDC	1μF/50V	9VDC	2.2μF/16V
		12VDC	2.2μF/25V
		15VDC	1μF/25V
		24VDC	1μF/50V

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DC-DC Converter

EMC solution-recommended circuit

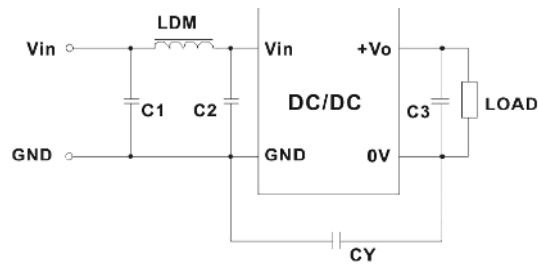


Fig. 4

Emissions	C1	4.7 μ F /50V
	C2	4.7 μ F /50V
	C3	Refer to the Cout in Fig.3
	LDM	6.8 μ H
	CY	270pF/2kV

Mechanical dimensions and recommended layout

