



1S4AE_1.5UP series

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

DC-DC Converter 1 Watt

- + 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

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
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				

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

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.

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

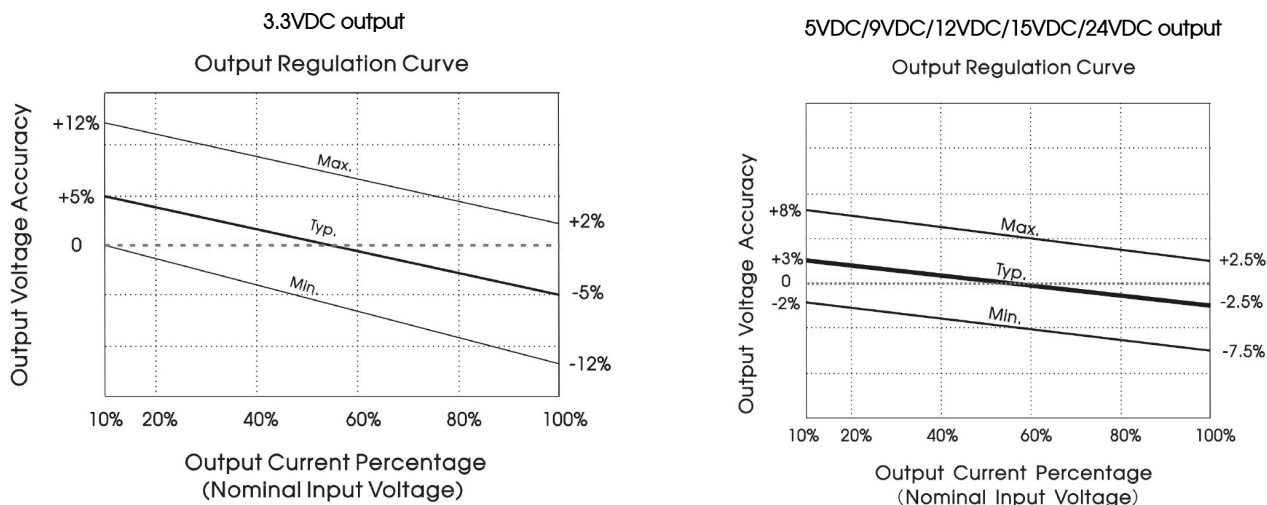


Fig. 1

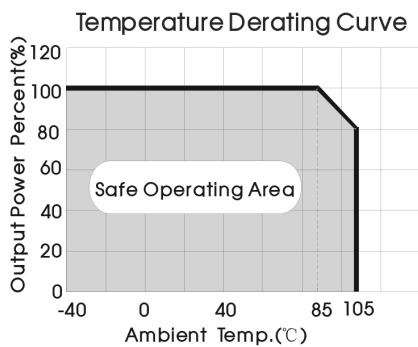
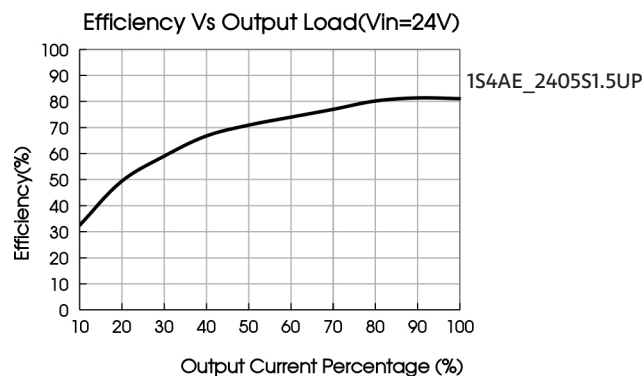
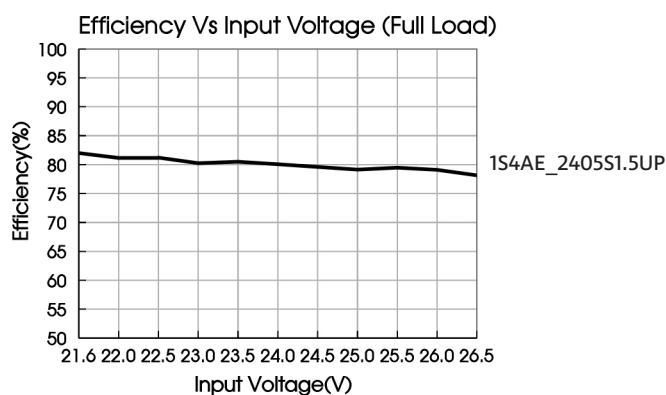
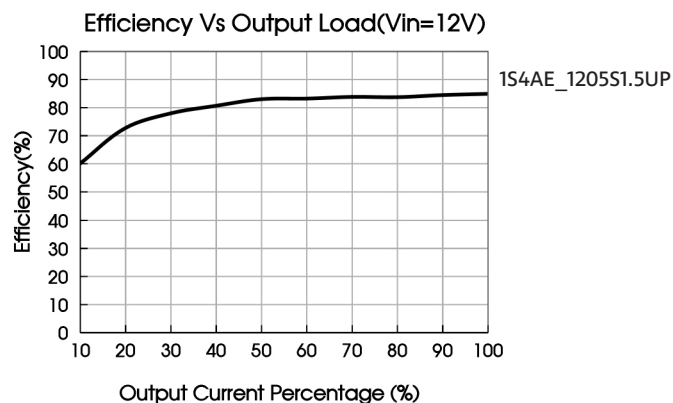
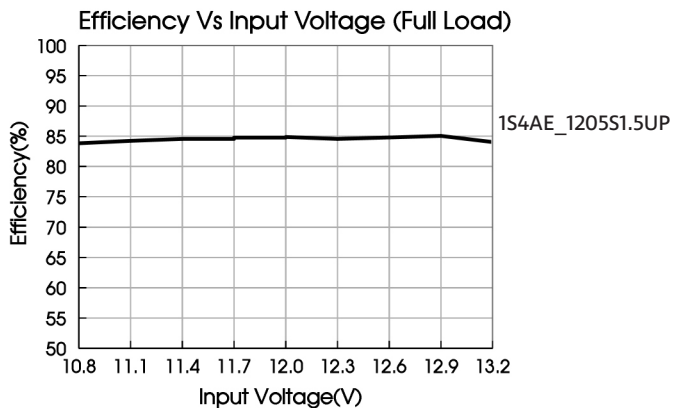


Fig. 2

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DC-DC Converter

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.



Fig.3

Table 1: Recommended input and output capacitor values

Vin (VDC)	Cin(μF)	Vout (VDC)	Cout (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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EMC solution-recommended circuit

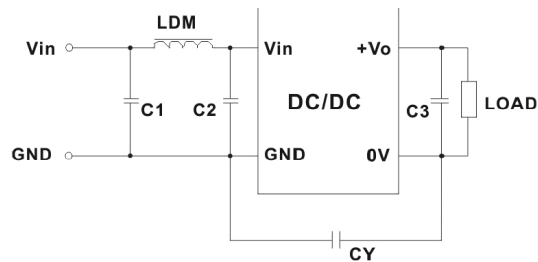
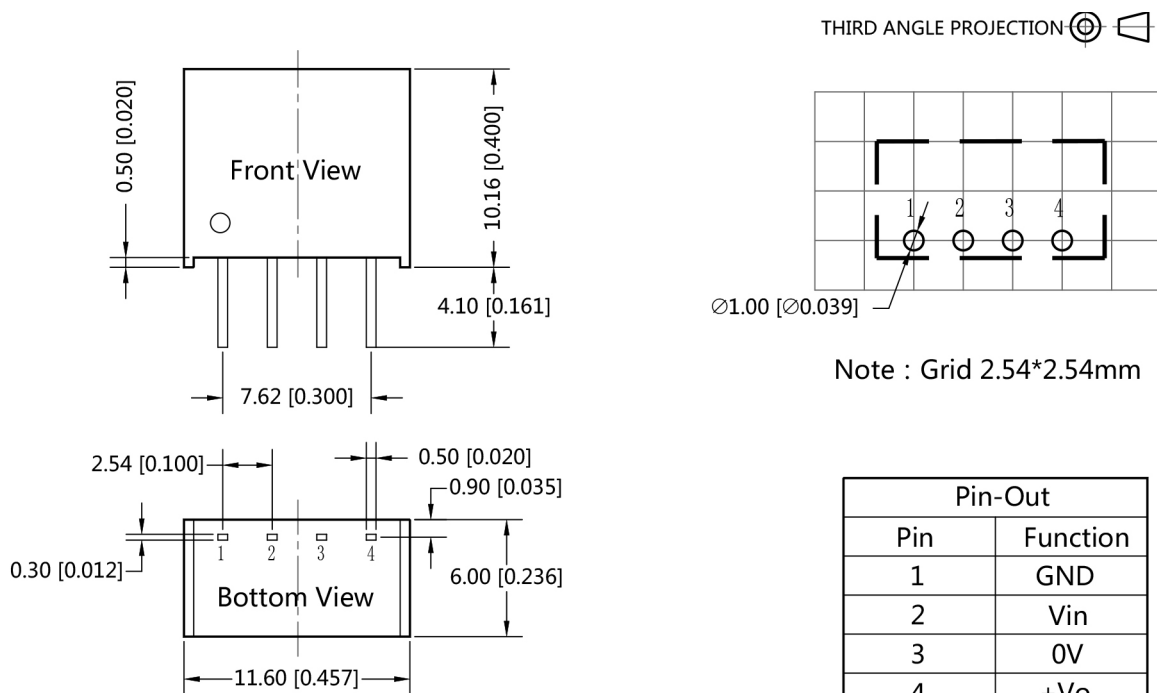


Fig. 4

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



Note:

Unit :mm[inch]

Pin section tolerances : $\pm 0.10[\pm 0.004]$

General tolerances: $\pm 0.25[\pm 0.010]$