



## 1S7E\_1.5UP Series

1W - Dual/Single Output DC-DC Converter - Fixed Input - Isolated & Unregulated

# DC-DC Converter 1 Watt

- ⊕ Ultra compact SIP Package
- ⊕ Efficiency up to 80%
- ⊕ Low Isolation Capacitance
- ⊕ 1500VDC Isolation Voltage
- ⊕ Internal SMD Construction
- ⊕ Operating Temperature: -40°C to +105°C
- ⊕ Industry Standard Pinout
- ⊕ RoHS compliance
- ⊕ Short circuit protection (SCP)

The 1S7E\_1.5UP series is specially 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  $\leq \pm 10\%V_{in}$ )
- 2) Where isolation is necessary between input and output (isolation voltage  $\leq 1500VDC$ )
- 3) Where the regulation of the output voltage and the output ripple noise are not demanding

Such as: purely digital circuits, ordinary low frequency analog circuits, and data switching circuits.



### Common specifications

Short circuit protection*:	1S7E_24xxS1.5U/1S7E_24xxD1.5U/ 1S7A_0524S1.5U/1S7A_0524D1.5U: 1s Others: Continuous, automatic recovery
Temperature rise at full load:	25°C TYP
Cooling:	Free air convection
Operation temperature range:	-40°C~+105°C
Storage temperature range:	-55°C~+125°C
Lead temperature:	300°C max, 1.5mm from case for 10 sec
Storage humidity range:	< 95%
Package material:	Plastic [UL94-V0]
Switching frequency	Full load, nominal input 100KHz typ.
MTBF (MIL-HDFK-217F@25°C):	>3500 Khours
Weight:	2.4g

\* Supply voltage must be discontinued at the end of short circuit duration for models 1S7E\_24xxS1.5U, 1S7E\_24xxD1.5U, 1S7A\_0524S1.5U and 1S7A\_0524D1.5U.

### Input specifications

Item	Test condition	Min	Typ	Max	Units
Input current (No load/full load)	• 3.3V input		30/426	70/-	mA
	• 5V input		25/281	60/-	mA
	• 9V input		20/142	60/-	mA
	• 12V input		15/106	50/-	mA
	• 15V input		10/84	35/-	mA
	• 24V input		7/54	30/-	mA
Surge voltage (1sec. max.)	• 3.3V input	-0.7		5	VDC
	• 5V input	-0.7		9	VDC
	• 9V input	-0.7		12	VDC
	• 12V input	-0.7		18	VDC
	• 15V input	-0.7		21	VDC
	• 24V input	-0.7		30	VDC
Reflected ripple current			15		mA
Filter	Capacitor				
Hot plug	Unavailable				

### Isolation specifications

Item	Test condition	Min	Typ	Max	Units
Isolation voltage	Tested for 1 minute and 1mA max	1500			VDC
Isolation resistance	Test at 500VDC	1000			MΩ
Isolation Capacitance	Input/output, 100KHz/0.1V		20		pF

### Output specifications

Item	Test condition	Min	Typ	Max	Units
Output voltage accuracy	Follow the tolerance envelope graph				
Line regulation	For $V_{in}$ change of $\pm 1\%$				
	• 3.3VDC output • Other output			$\pm 1.5$ $\pm 1.2$	% %
Load regulation	10% to 100% load				
	• 3.3V input		18		%
	• 5V input		12		%
	• 9V input		9		%
	• 12V input		8		%
	• 15V input • 24V input		7 6		% %
Temperature drift	100% full load			$\pm 0.03$	%/°C
Ripple & Noise*	20MHz Bandwidth		60	150	mVp-p

\* Test ripple and noise by "parallel cable" method. See detailed operation instructions at Testing of Power Converter section, application notes.

### Example:

#### 1S7E\_0505D1.5UP

1 = 1Watt; S7 = SIP7; E = series; 5Vin; 5Vout; D = Dual Output;  
1.5 = 1.5kVDC; U = Unregulated Output; P = Short Circuit Protection

### Note:

1. If the product is operated under the min. required load, the product performance cannot be guaranteed to comply with all performance indexes in this datasheet;
2. The max. capacitive load should be tested within the input voltage range and under full load conditions;
3. Unless otherwise specified, data in this data sheet should be tested under the conditions of  $T_a = 25^\circ C$ , humidity <75% when inputting nominal voltage and outputting rated load;
4. All index testing methods in this datasheet are based on our Company's corporate standards;
5. The performance indexes of the product models listed in this manual are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements, and please directly contact our technicians for specific information;
6. We can provide product customization service;
7. Specifications of this product are subject to changes without prior notice.

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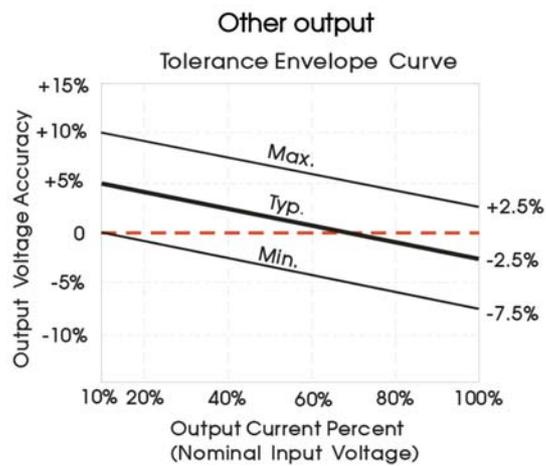
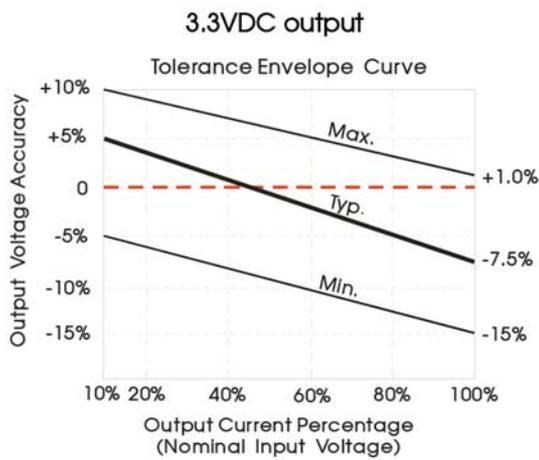
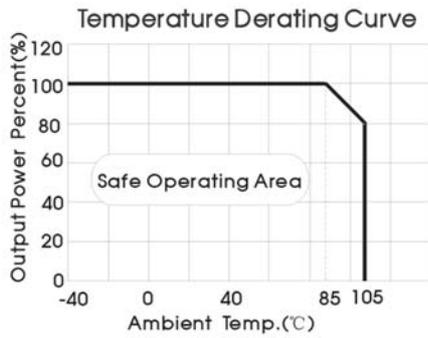
EMC specifications				
EMI	CE	CISPR22/EN55022	CLASS B	(External Circuit Refer to EMC recommended circuit)
EMI	RE	CISPR22/EN55022	CLASS B	(External Circuit Refer to EMC recommended circuit)
EMS	ESD	IEC/EN61000-4-2 IEC/EN61000-4-2	Contact ±6KV Contact ±8KV	perf. Criteria B (1S7E_D1.5UP) perf. Criteria B (1S7E_S1.5UP)

Part Number	Input Voltage [V]	Output Voltage [VDC]	Current [mA, max]	Efficiency [%, typ]	Capacitive load [μF, max]	Certification
1S7E_0303S1.5UP	3.3	3.3	303	72	220	-
1S7E_0305S1.5UP	3.3	5	200	78	220	-
1S7E_0503S1.5UP	5	3.3	303	74	220	-
1S7E_0505S1.5UP	5	5	200	80	220	UL/CE
1S7E_0509S1.5UP	5	9	111	80	220	UL/CE
1S7E_0512S1.5UP	5	12	84	80	220	UL/CE
1S7E_0515S1.5UP	5	15	67	80	220	UL/CE
1S7E_0524S1.5U	5	24	42	80	220	UL/CE
1S7E_1203S1.5UP	12	3.3	303	76	220	-
1S7E_1205S1.5UP	12	5	200	80	220	UL/CE
1S7E_1209S1.5UP	12	9	111	80	220	UL/CE
1S7E_1212S1.5UP	12	12	84	80	220	UL/CE
1S7E_1215S1.5UP	12	15	67	80	220	UL/CE
1S7E_1224S1.5UP	12	24	42	80	220	UL/CE
1S7E_1505S1.5UP	15	5	200	80	220	CE
1S7E_1512S1.5UP	15	12	84	80	220	-
1S7E_1515S1.5UP	15	15	67	80	220	CE
1S7E_2403S1.5U	24	3.3	303	74	220	-
1S7E_2405S1.5U	24	5	200	80	220	UL/CE
1S7E_2409S1.5U	24	9	111	80	220	UL/CE
1S7E_2412S1.5U	24	12	84	80	220	UL/CE
1S7E_2415S1.5U	24	15	67	80	220	UL/CE
1S7E_2424S1.5U	24	24	42	80	220	UL/CE
1S7E_0503D1.5UP	5	±3.3	±152	71	100	-
1S7E_0505D1.5UP	5	±5	±100	80	100	UL/CE
1S7E_0509D1.5UP	5	±9	±56	80	100	UL/CE
1S7E_0512D1.5UP	5	±12	±42	80	100	UL/CE
1S7E_0515D1.5UP	5	±15	±34	80	100	UL/CE
1S7E_0524D1.5U	5	±24	±21	80	100	UL/CE
1S7E_0909D1.5UP	9	±9	±56	80	100	-
1S7E_0915D1.5UP	9	±15	±34	80	100	-
1S7E_1203D1.5UP	12	±3.3	±152	76	100	-
1S7E_1205D1.5UP	12	±5	±100	80	100	UL/CE
1S7E_1209D1.5UP	12	±9	±56	80	100	UL/CE
1S7E_1212D1.5UP	12	±12	±42	80	100	UL/CE
1S7E_1215D1.5UP	12	±15	±34	80	100	UL/CE
1S7E_1224D1.5UP	12	±24	±21	80	100	UL/CE
1S7E_1505D1.5UP	15	±5	±100	80	100	-
1S7E_1512D1.5UP	15	±12	±42	80	100	-
1S7E_1515D1.5UP	15	±15	±34	80	100	UL
1S7E_2405D1.5U	24	±5	±100	80	100	UL/CE
1S7E_2409D1.5U	24	±9	±56	80	100	UL/CE
1S7E_2412D1.5U	24	±12	±42	80	100	UL/CE
1S7E_2415D1.5U	24	±15	±34	80	100	UL/CE
1S7E_2424D1.5U	24	±24	±21	80	100	UL/CE

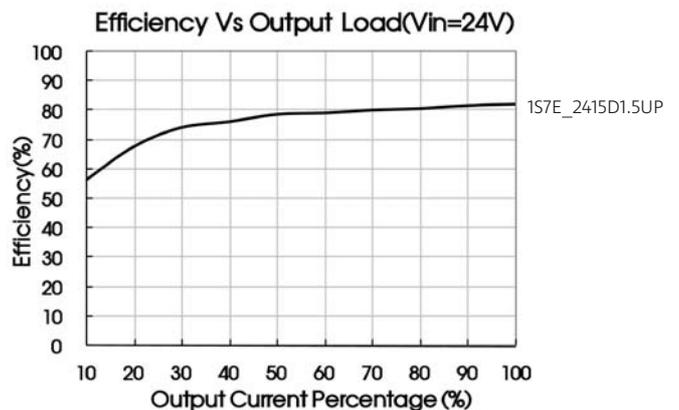
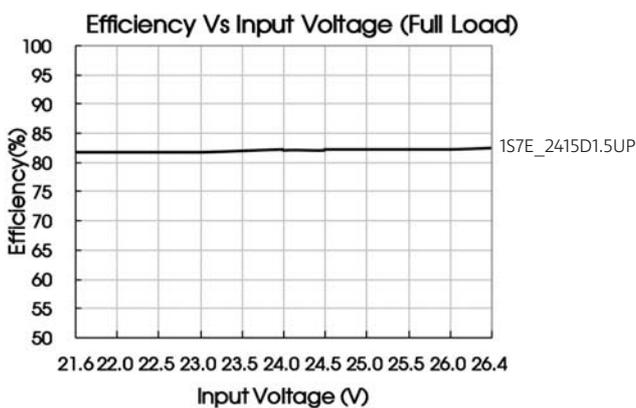
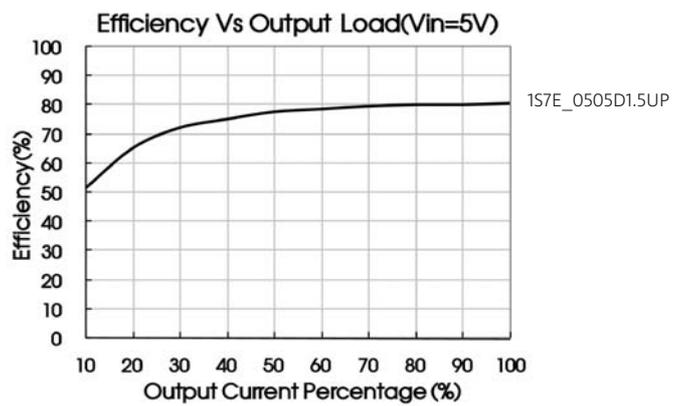
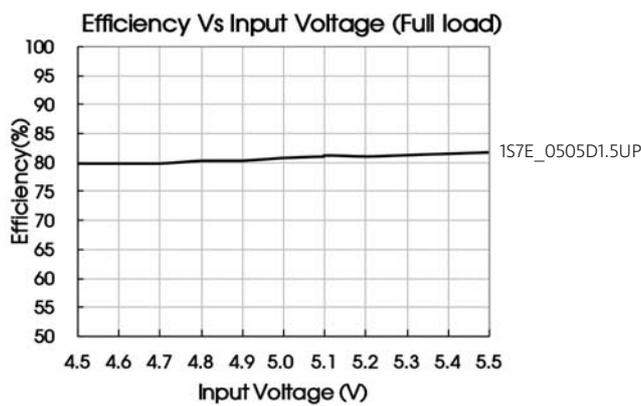
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## Typical characteristics



## Efficiency



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### Typical application

If it is required to further reduce input and output ripple, a filter capacitor can be connected to the input and output terminals, see Fig. 1. Moreover, choosing a suitable filter capacitor is very important, start-up problems may be caused by too large capacitance. To ensure the modules are running well, see the recommended capacitive load values as shown in Table 1.

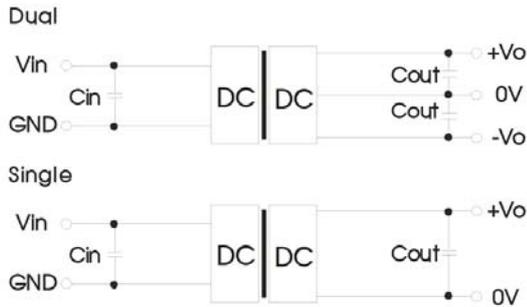
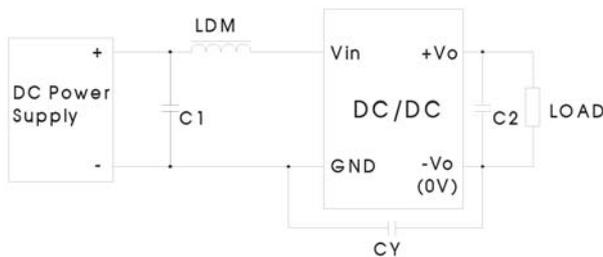


Figure 1

Vin (VDC)	Cin (μF)	Single output (VDC)	Cout (μF)	Dual output (VDC)	Cout (μF)
3.3/5	4.7	3.3/5	10	±3.3/±5	4.7
9/12	2.2	9/12	2.2	±9/ ±12	1
15	2.2	15/24	1	±15/±24	0.47
24	1	-	-	-	-

It is not recommended to connect any external capacitor when output power is less than 0.5W.

### EMC typical recommended circuit (Class B)



Input voltage (VDC)		3.3/5/9/12	15/24
EMI	C1	4.7μF /50V	
	C2	Refer to the Cout in Fig.1	
	CY	--	1nF/2KV
	LDM	6.8μH	

Note: 1. 15V/ 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 "--".

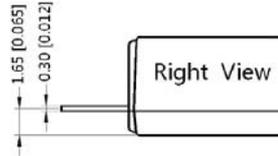
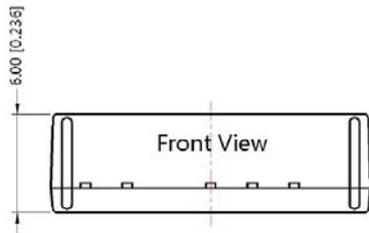
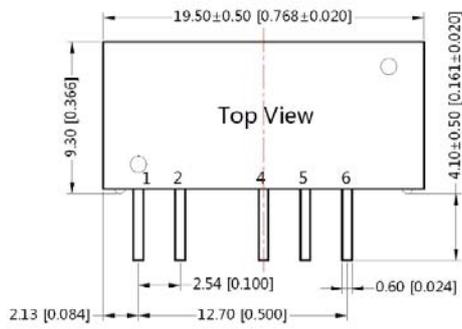
#### Output load requirements

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%).

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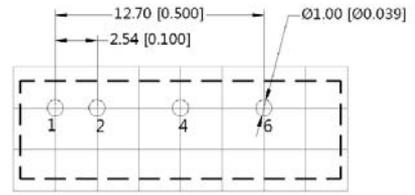
## Mechanical dimensions



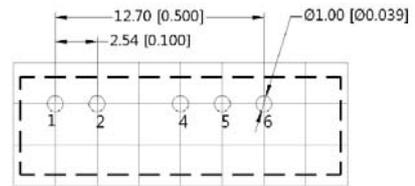
**Note:**  
 Unit: mm[inch]  
 Pin section tolerances: ± 0.10mm[± 0.004inch]  
 General tolerances: ± 0.25mm[± 0.010inch]

THIRD ANGLE PROJECTION

1S7E\_S1.5UP



1S7E\_D1.5UP



Note: Grid 2.54\*2.54mm

Pin-Out		
Pin	1S7E_S1.5UP	1S7E_D1.5UP
1	Vin	Vin
2	GND	GND
4	0V	-Vo
5	No Pin	0V
6	+Vo	+Vo