

## 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_24xD1.5U/ 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		$\pm 1.5$	%
		• Other output		$\pm 1.2$	%
Load regulation	10% to 100% load	• 3.3V input	18		%
		• 5V input	12		%
		• 9V input	9		%
		• 12V input	8		%
		• 15V input	7		%
		• 24V input	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.

#### Model selection:

WCTP\*\*\_xyyN##O

W=Watt; C= Case; T=Type; P=Pinning; \*\*= Voltage Variation (omitted  $\pm 10\%$ ); xx=  $V_{in}$ ; yy=  $V_{out}$ ; N= Numbers of Output; ##= Isolation (kVDC); O= output regulation

#### 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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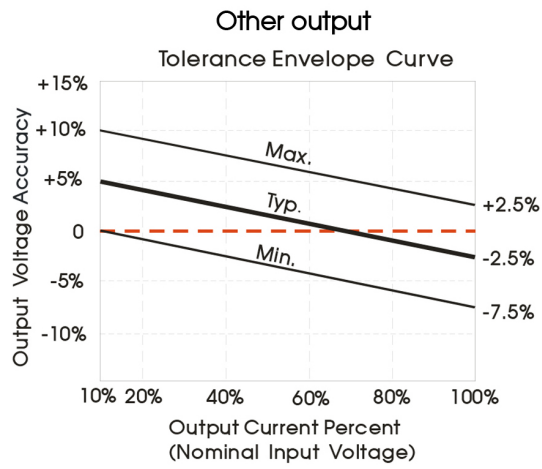
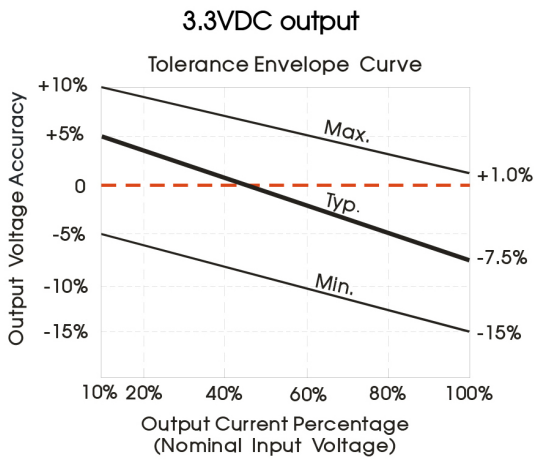
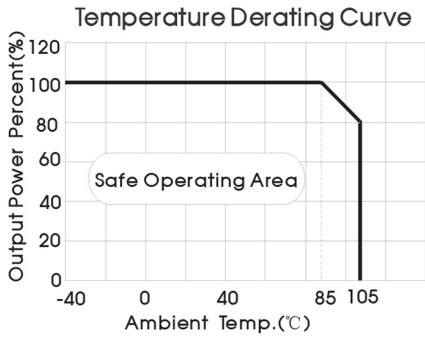
EMC specifications				
EMI	CE	CISPR22/EN55022	CLASS B	(External Circuit Refer to EMC recommended circuit)
EMI	RE	CISPR22/EN55022	CLASS B	(External Circuit Refer to EMC recommended circuit)
EMS	ESD	IEC/EN61000-4-2 IEC/EN61000-4-2	Contact ±6KV Contact ±8KV	perf. Criteria B (1S7E_D1.5UP) perf. Criteria 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	42	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

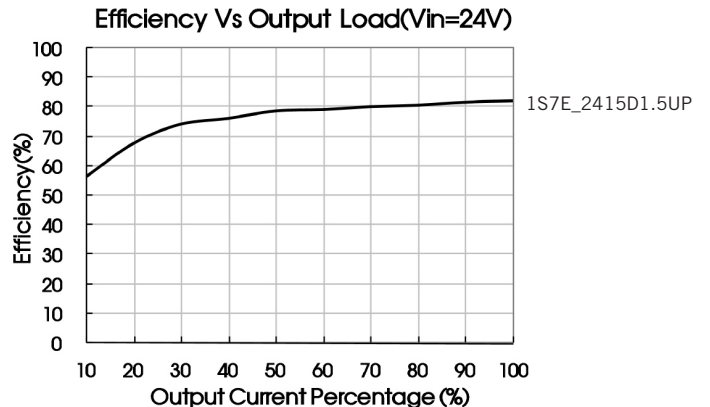
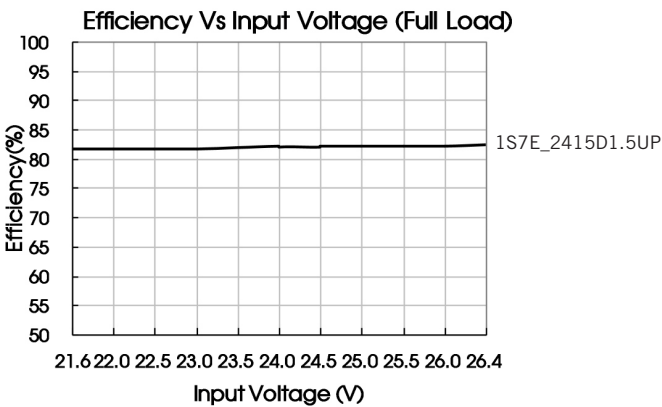
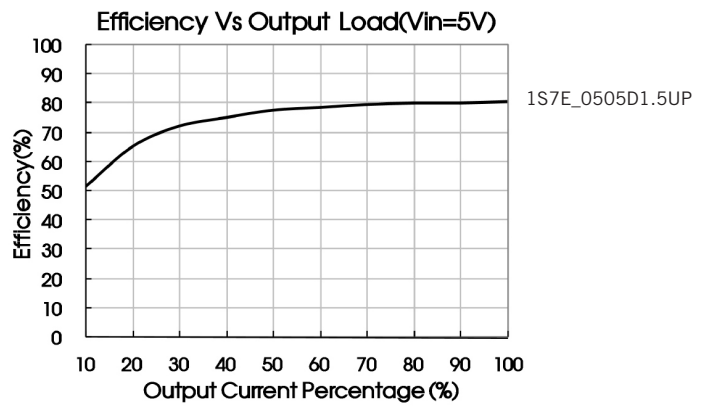
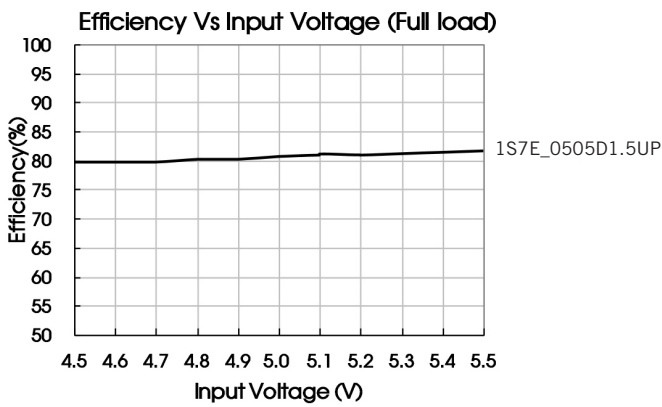
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## Typical characteristics



## 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.

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.

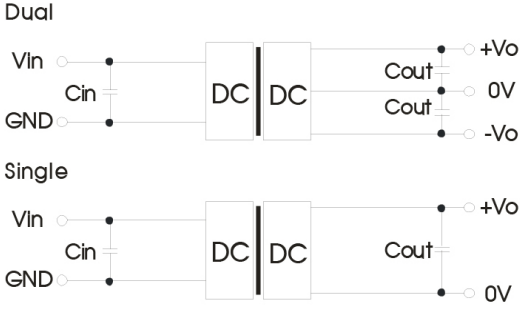
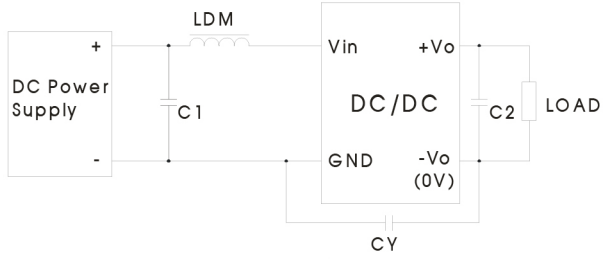


Figure 1

## 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. 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 "--".

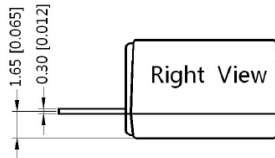
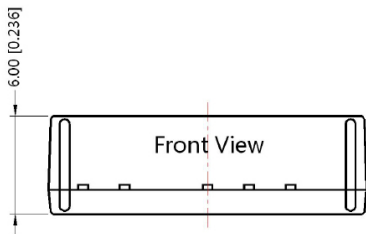
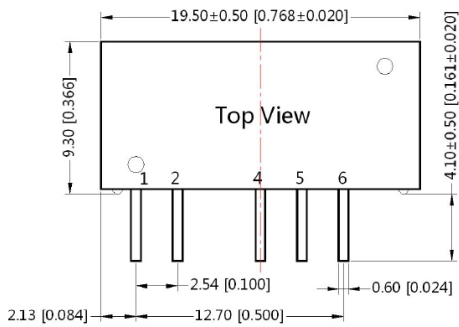
### Output load requirements

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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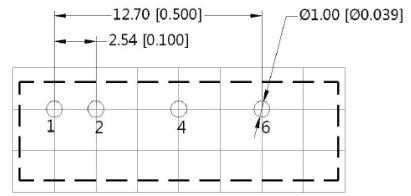
## Mechanical dimensions



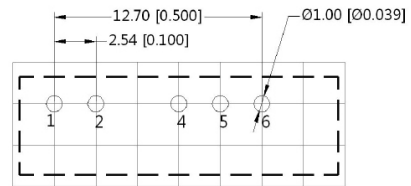
**Note:**  
 Unit: mm[inch]  
 Pin section tolerances: ± 0.10mm[± 0.004inch]  
 General tolerances: ± 0.25mm[± 0.010inch]

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