



## 1S7B\_6UP series

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

### DC-DC Converter

1 Watt

- ⊕ High efficiency up to 80%
- ⊕ 4200VAC/6000VDC isolation
- ⊕ SIP package
- ⊕ Reinforced insulation
- ⊕ The patient leakage current: Max 2μA
- ⊕ International standard pinout
- ⊕ Operating temperature: -40°C up to +85°C
- ⊕ RoHS compliance
- ⊕ Short circuit protection
- ⊕ EN60601-1, ANSI/AAMI ES60601-1 approved (1 x MOPP/2 x MOOP)
- ⊕ Meets EN62368



The 1S7B\_6UP 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.

These products apply to:

- 1) Where the voltage of the input power supply is fixed (voltage variation  $\leq \pm 10\%$ )
- 2) Where isolation is necessary between input and output (isolation voltage  $\leq 4200\text{VAC}$  or  $6000\text{VDC}$ )
- 3) Where do not has high requirement of line regulation and the ripple & noise of the output voltage; such as: Medical collection and isolation, High voltage collection circuit, IGBT-driven circuits, etc.

#### Common specifications

Short circuit protection:	Continuous, self-recovery
Operation temperature range:	-40°C – +105°C
Storage temperature range:	-55°C – +125°C
Pin Soldering Resistance Temp	300°C MAX, 1.5mm from case for 10 sec
Storage humidity range:	< 95% (Non-condensing)
MTBF (MIL-HDBK-217F@25°C):	>3,500,000 hours
Case Temperature Rise (Ta=25°C)	25°C
Transformer Creepage:	5mm
Transformer Clearance:	5mm
PCB Creepage & Clearance:	5.5mm
Case material:	Black plastic; flame-retardant and heat-resistant (UL94-V0)
Weight:	4.2g
Dimensions	19.50 x 9.80 x 12.50 mm
Cooling:	Free air convection

#### Output specifications

Item	Test condition	Min	Typ	Max	Units
Voltage accuracy	See output regulation curve (Fig. 1)				
Line regulation	For Vin change of $\pm 1\%$			$\pm 1.2$	%
Load regulation	10% to 100% load				
	• 3.3VDC output		15		%
	• 5VDC output		12		%
	• 7.2/9VDC output		8		%
	• 12VDC output		7		%
	• 15VDC output		6		%
	• 24VDC output		5		%
Temperature coefficient	full load		$\pm 0.03$		%/°C
Ripple & Noise*	20MHz Bandwidth				
	• 3.3/5/7.2/9/12VDC output	100		150	mVp-p
	• 15/24VDC output	150		120	mVp-p
Switching frequency	Full load, nominal input		50		KHz

\* Note:\* The "parallel cable" method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information.

#### Input specifications

Item	Test condition	Min	Typ	Max	Units
Input current (no-load/full load)	• <b>5VDC input</b>	3.3VDC output	278/30	295/-	mA
		5/7.2VDC output	256/30	271/-	mA
		9/12/15VDC output	253/30	267/-	mA
		24VDC output	250/30	264/-	mA
	• <b>12VDC input</b>	5/7.2VDC output	104/20	110/-	mA
		9/15VDC output	102/20	107/-	mA
		12VDC output	103/20	109/-	mA
	• <b>15VDC input</b>	5VDC output	82/15	88/-	mA
		15VDC output	81/15	87/-	mA
	• <b>24VDC input</b>	3.3VDC output	58/10	62/-	mA
		5/12/15VDC output	52/10	55/-	mA
	Reflected Ripple Current*	• 5VDC input		15	
• 12/15/24VDC input			5		mA
Input surge voltage (1sec. max.)	• 5VDC input	-0.7		9	VDC
	• 12VDC input	-0.7		18	VDC
	• 15VDC input	-0.7		21	VDC
	• 24VDC input	-0.7		30	VDC
Input filter	Capacitor				
Hot plug	Unavailable				

Note: \* Refer to DC-DC Converter Application Notes for detailed description of reflected ripple current test method.

#### Isolation specifications

Item	Test condition	Min	Typ	Max	Units
Isolation voltage	Tested for 1 minute and 1mA max	6000			VDC
Isolation resistance	Test at 500VDC	1000			MΩ
Isolation capacitance	Input/Output, 100KHz/0.1V		10	8	pF
Patient leakage current*:	250VAC, 50/60Hz			2	μA

#### Example:

##### 1S7B\_0505D6UP

1 = 1Watt; S7 = SIP7; B = Pinning; 05 = 5Vin; 05 = 5Vout; D = Dual Output; 6 = 6kVDC isolation; U = Unregulated Output; P = Short circuit protection

#### EMC specifications

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

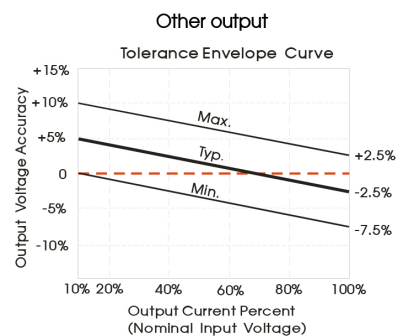
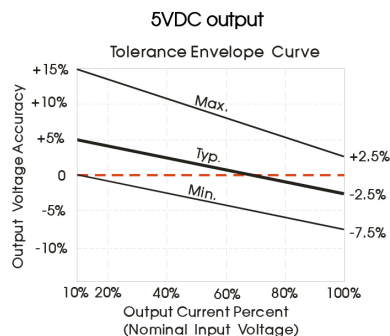
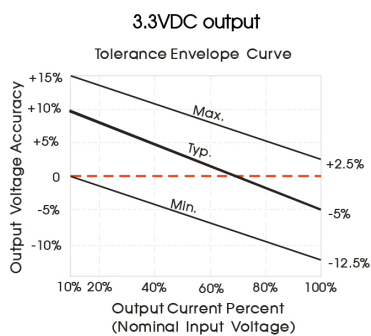
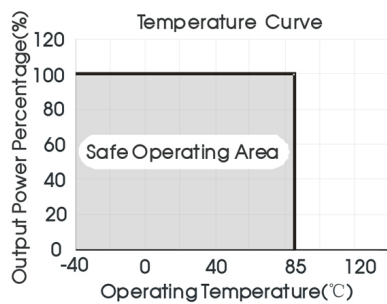
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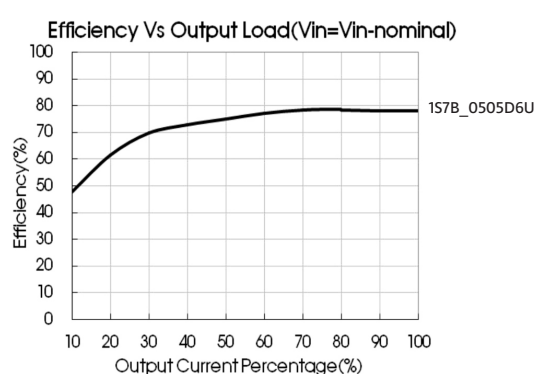
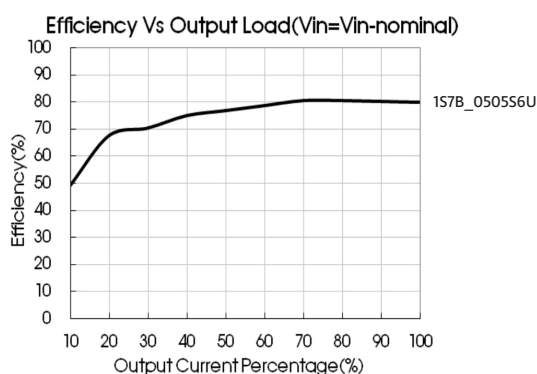
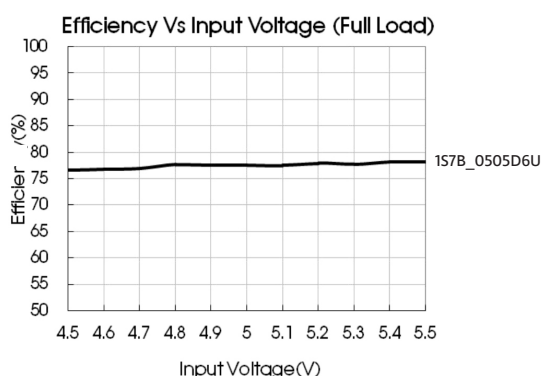
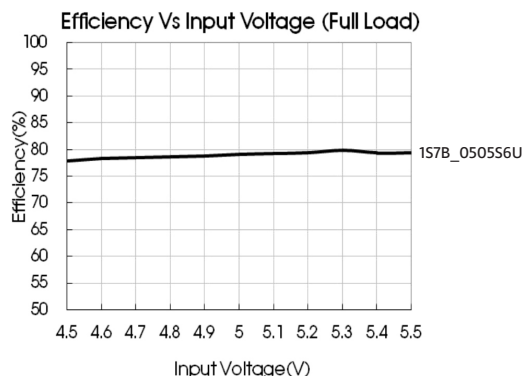
Part Number	Input Voltage [Nominal (Range), V]	Output Voltage [VDC]	Output current [mA]	Max. capacitive load [ $\mu$ F]	Efficiency [%, typ]
1S7B_0503S6UP	5 (4.5-5.5)	3.3	303	220	72
1S7B_0505S6UP	5 (4.5-5.5)	5	200	220	78
1S7B_0509S6UP	5 (4.5-5.5)	9	111	220	79
1S7B_0512S6UP	5 (4.5-5.5)	12	84	220	79
1S7B_0515S6UP	5 (4.5-5.5)	15	67	220	79
1S7B_0524S6UP	5 (4.5-5.5)	24	42	220	80
1S7B_1205S6UP	12 (10.8-13.2)	5	200	220	80
1S7B_1207S6UP	12 (10.8-13.2)	7.2	139	220	80
1S7B_1209S6UP	12 (10.8-13.2)	9	111	220	82
1S7B_1212S6UP	12 (10.8-13.2)	12	84	220	81
1S7B_1215S6UP	12 (10.8-13.2)	15	67	220	82
1S7B_1505S6UP	15 (13.5-16.5)	5	200	220	80
1S7B_2403S6UP	24 (21.6- 26.4)	3.3	303	220	72
1S7B_2405S6UP	24 (21.6- 26.4)	5	200	220	80
1S7B_2412S6UP	24 (21.6- 26.4)	12	84	220	80
1S7B_2415S6UP	24 (21.6- 26.4)	15	67	220	80

Part Number	Input Voltage [Nominal (Range), V]	Output Voltage [VDC]	Output current [mA]	Max. capacitive load [ $\mu$ F]	Efficiency [%, typ]
1S7B_0505D6UP	5 (4.5-5.5)	$\pm$ 5	$\pm$ 100	100	78
1S7B_0507D6UP	5 (4.5-5.5)	$\pm$ 7.2	$\pm$ 70	100	78
1S7B_0509D6UP	5 (4.5-5.5)	$\pm$ 9	$\pm$ 56	100	79
1S7B_0512D6UP	5 (4.5-5.5)	$\pm$ 12	$\pm$ 42	100	79
1S7B_0515D6UP	5 (4.5-5.5)	$\pm$ 15	$\pm$ 33	100	79
1S7B_1205D6UP	12 (10.8-13.2)	$\pm$ 5	$\pm$ 100	100	77
1S7B_1207D6UP	12 (10.8-13.2)	$\pm$ 7.2	$\pm$ 70	100	77
1S7B_1209D6UP	12 (10.8-13.2)	$\pm$ 9	$\pm$ 56	100	80
1S7B_1212D6UP	12 (10.8-13.2)	$\pm$ 12	$\pm$ 42	100	73
1S7B_1215D6UP	12 (10.8-13.2)	$\pm$ 15	$\pm$ 34	100	75
1S7B_1515D6UP	15 (13.5-16.5)	$\pm$ 15	$\pm$ 33	100	81
1S7B_1505D6UP	15 (13.5-16.5)	$\pm$ 5	$\pm$ 100	100	80

## Typical characteristics



## Efficiency curves



## 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 suitable filter capacitor is very important, start-up problems may be caused by too large capacitance. To ensure the modules running well, the recommended capacitive load values as shown in Table 1.

The simplest device for output voltage regulation, over-voltage and over-current protection is a linear voltage regulator with overheat protection that is connected to the input or output end in series (see Fig. 2).

Recommended capacitive load value table:

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

It's not recommended to connect any external capacitor in the application field with less than 0.5 watt output.

Table 1

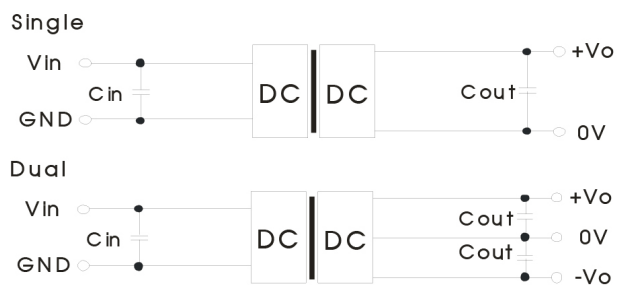


Fig. 1

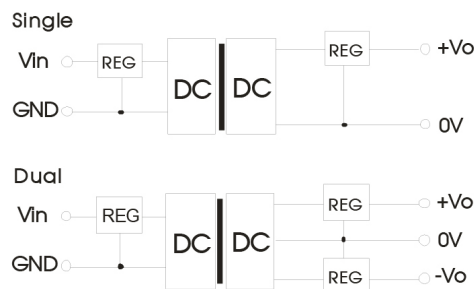
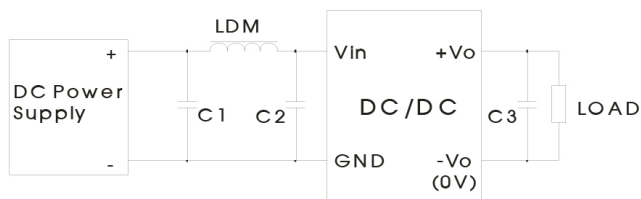


Fig. 2

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## EMC typical recommended circuit (CLASS B)



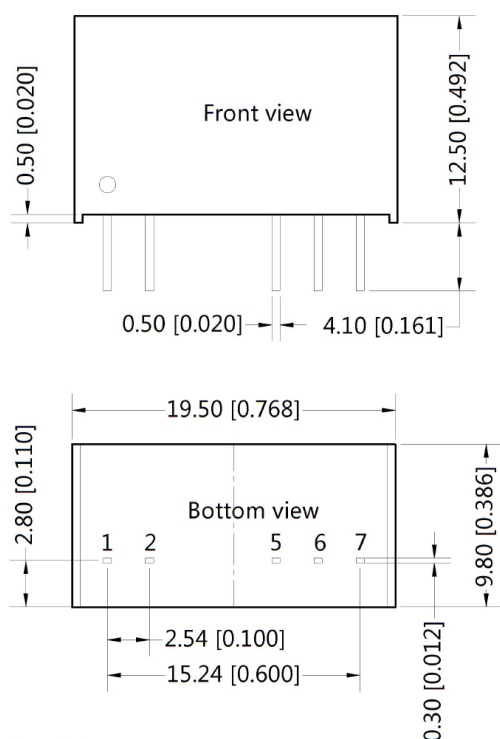
Recommended typical circuit parameters:

Input voltage	3.3/5/12/15/24	
EMI	C1, C2	4.7μF/50V
EMI	C3	Refer to the Cout in Typical application, fig. 1
EMI	LDM	6.8μH

### 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



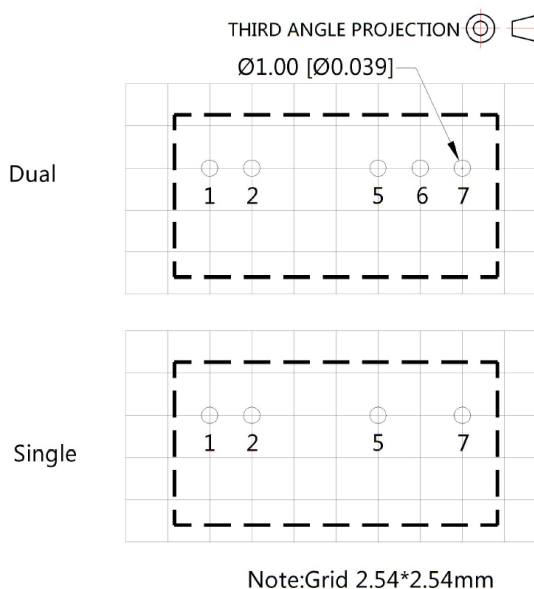
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Unit :mm[inch]

Pin section tolerances:±0.10[±0.004]

General tolerances:±0.25[±0.010]

## Recommended footprint



Pin-Out		
Pin	Single	Dual
1	Vin	Vin
2	GND	GND
5	0V	-Vo
6	No Pin	0V
7	+Vo	+Vo

### Note:

1. Operation under minimum load will not damage the converter; however, they may not meet all specifications.
2. Max. Capacitive Load is tested at nominal input voltage and full load.
3. Unless otherwise noted, All specifications are measured at Ta = 25°C, humidity <75%, nominal input voltage and rated output load.
4. In this datasheet, all test methods are based on our corporate standards.
5. All characteristics are for listed models, and non-standard models may perform differently. Please contact our technical support for more detail.
6. Please contact our technical support for any specific requirement.
7. Specifications of this product are subject to changes without prior notice.