GAPTEC

THIS SERIES IS NOT recommended for new design-ins and this series is discontinued

Recommended alternative: 1S7B1_6UP series

Please click here for the datasheet.

1S7B_6UP series

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

DC-DC Converter 1 Watt

- High efficiency up to 81%
- 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

UL-60601-1 (E486991)

The 1S7B_6UP series meets reinforced insulation requirements. They are specially designed for applications where require compact size, high isolation, low isolation capacitor and low leakage current power. They are widely used in medical, electricity, IGBT driver and so on.

They are suitable for:
1. Where the voltage of the input power supply is stable (voltage variation: ±10%Vin);
2. Where isolation is necessary between input and output (isolation voltage ≤4200VAC or 6000VDC);
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 – +85°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

Input specifications

Item	Test condition	Min	Typ	Max	Units
Input current (no-load/full load)	• 3.3VDC input		45/426	70/-	mA
	• 5VDC input		35/274	60/-	mA
	• 12VDC input		15/114	40/-	mA
	• 15VDC input		18/93	40/-	mA
	• 24VDC input		10/56	25/-	mA
Reflected Ripple Current*	• 5VDC input		15		mA
	• 12/15/24VDC input		5		mA
Input surge voltage (1sec. max.)	• 3.3VDC input	-0.7		7	VDC
	• 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.

Output specifications

Item	Test condition	Min	Typ	Max	Units
Voltage accuracy	See output regulation curve (Fig. 1)				
Line regulation	For Vin change of ±1%				
	3.3V output			±1.5	%
	others			±1.2	
Load regulation	10% to 100% load				
	• 3.3VDC output		20		%
	• 5VDC output		20		%
	• 7.2/9VDC output		15		%
	• 12VDC output		15		%
	• 15VDC output		15		%
	• 24VDC output		15		%
Temperature coefficient	full load		±0.02		%/°C
Ripple & Noise*	20MHz Bandwidth				
	• 3.3VDC output		80	150	mVp-p
	• others		70	120	mVp-p
Switching frequency	Full load, nominal input		100		KHz

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

Isolation specifications

Item	Test condition	Min	Typ	Max	Units
Isolation voltage	Input-output, with the test time of 1 minute	6000 4200			VDC VAC
Isolation resistance	Test at 500VDC	1000			MΩ
Isolation capacitance	Input/Output, 100KHz/0.1V		5		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 ±8kV perf. Criteria B

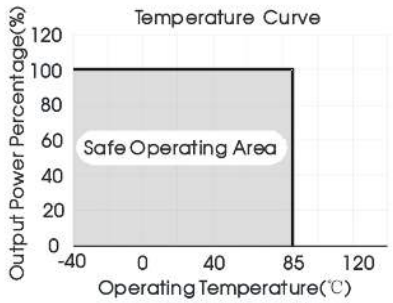
GAPTEC-Electronic GmbH & Co. KG
sales@gaptec-electronic.com – www.gaptec-electronic.com

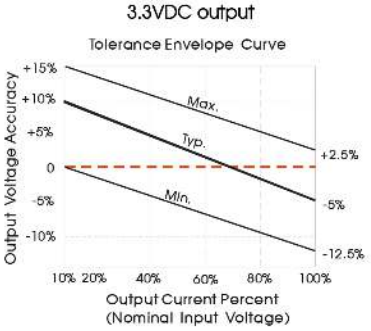
Product Selection Guide

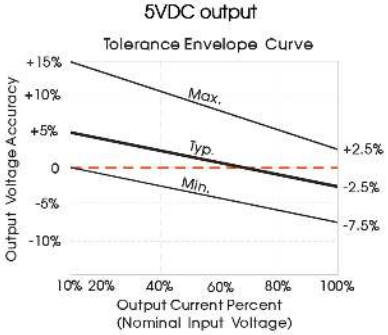
Part Number	Input Voltage [Nominal (Range), V]	Output Voltage [VDC]	Output current [mA]	Max. capacitive load [µF]	Efficiency [%, typ]
1S7B_0305S6UP	3.3 (2.97-3.63)	5	200	1000	71
1S7B_0503S6UP	5 (4.5-5.5)	3.3	303	1000	73
1S7B_0505S6UP	5 (4.5-5.5)	5	200	1000	78
1S7B_0512S6UP	5 (4.5-5.5)	12	84	470	76
1S7B_0515S6UP	5 (4.5-5.5)	15	67	470	76
1S7B_1205S6UP	12 (10.8-13.2)	5	200	1000	77
1S7B_1212S6UP	12 (10.8-13.2)	12	84	470	81
1S7B_1215S6UP	12 (10.8-13.2)	15	67	470	81
1S7B_2405S6UP	24 (21.6- 26.4)	5	200	1000	76
1S7B_2412S6UP	24 (21.6- 26.4)	12	84	470	78
1S7B_2415S6UP	24 (21.6- 26.4)	15	67	470	78

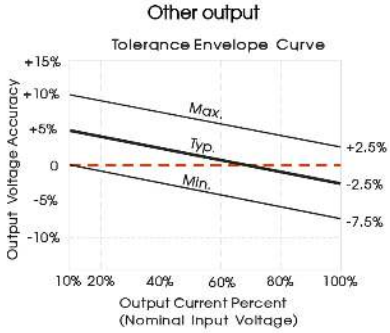
Part Number	Input Voltage [Nominal (Range), V]	Output Voltage [VDC]	Output current [mA]	Max. capacitive load [µF]	Efficiency [%, typ]
1S7B_0505D6UP	5 (4.5-5.5)	±5	±100	470	78
1S7B_0509D6UP	5 (4.5-5.5)	±9	±56	470	80
1S7B_0512D6UP	5 (4.5-5.5)	±12	±42	220	74
1S7B_0515D6UP	5 (4.5-5.5)	±15	±33	220	76
1S7B_1205D6UP	12 (10.8-13.2)	±5	±100	470	77
1S7B_1209D6UP	12 (10.8-13.2)	±9	±56	470	80
1S7B_1212D6UP	12 (10.8-13.2)	±12	±42	220	73
1S7B_1215D6UP	12 (10.8-13.2)	±15	±34	220	75
1S7B_1515D6UP	15 (13.5-16.5)	±15	±34	220	72
1S7B_2405D6UP	24 (21.6- 26.4)	±5	±100	470	75
1S7B_2409D6UP	24 (21.6- 26.4)	±9	±56	470	79
1S7B_2412D6UP	24 (21.6- 26.4)	±12	±42	220	76
1S7B_2415D6UP	24 (21.6- 26.4)	±15	±42	220	76

Typical characteristics

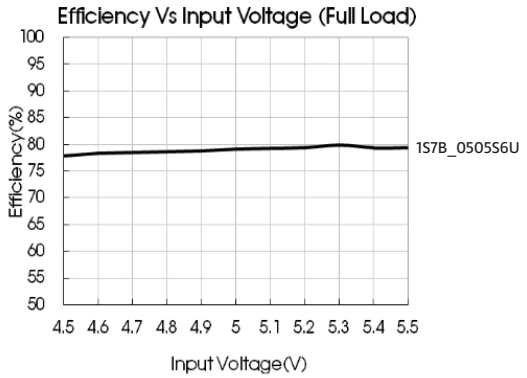


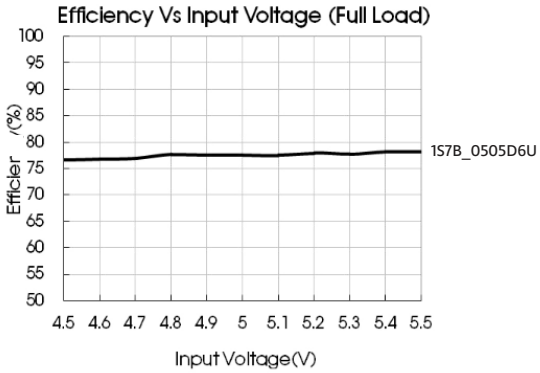


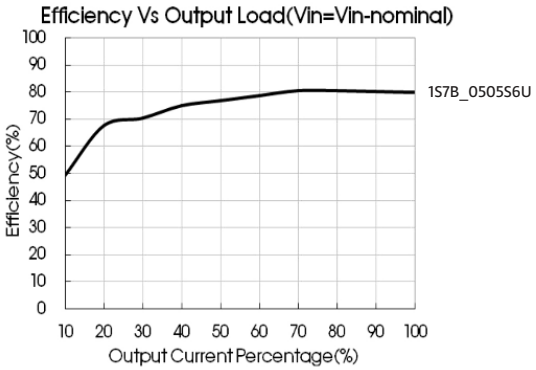


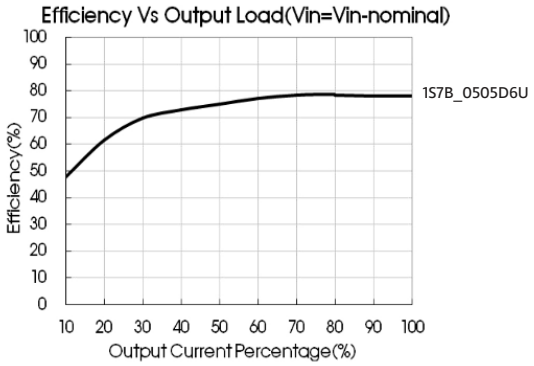


Efficiency curves









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 ensured 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

Table 1

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

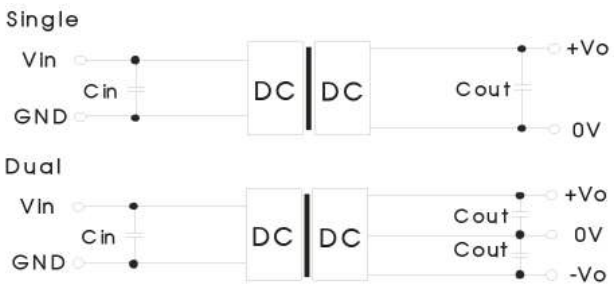


Fig. 1

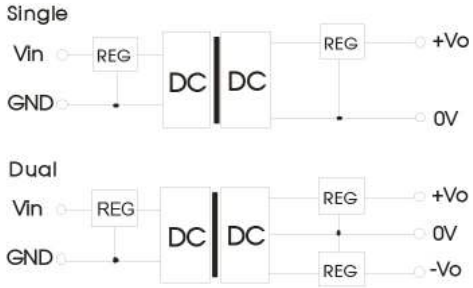
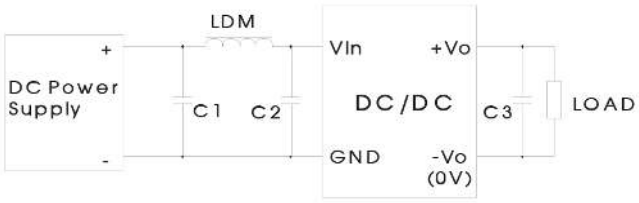


Fig. 2

EMC typical recommended circuit (CLASS B)

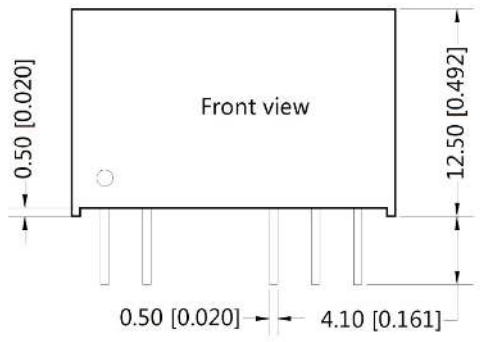


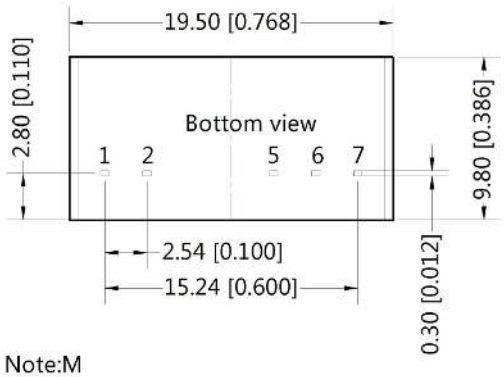
Recommended typical circuit parameters:

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%).

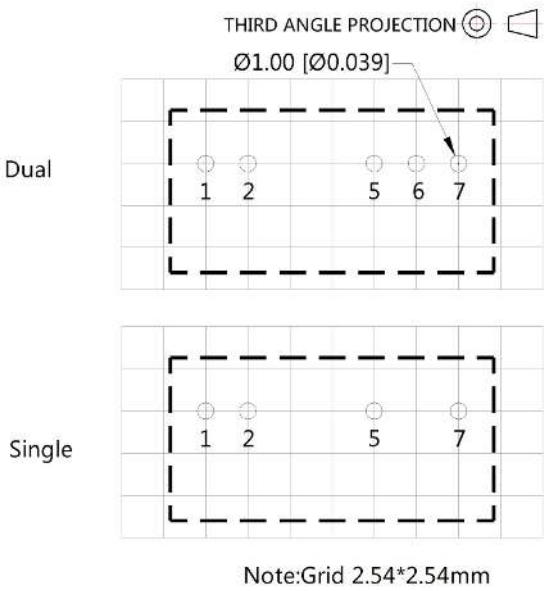
Mechanical dimensions





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

Recommended footprint



Note:Grid 2.54*2.54mm

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 per form 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.