1S7B2_6UP series

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

DC-DC Converter 1 Watt

- SIP7 Package
- Ultra-High I/O Isolation 5000VAC with reinforced Insulation, rated for 300 Vrms working voltage
- CMTI 65 KV/µs at 1KV Common mode Voltage
- Continuous Short Circuit Protection
- Low coupling capacitance
- Efficiency up to 82%
- -40 ~ 95°C Operation Temperature Range
- Suitable for IGBT applications

The 1S7B2_6UP series are miniature, 5kVAC isolated 1 W DC-DC-converters in a SIP package with single and dual output voltage. They offer the ideal solution in many space critical applications for board level power distribution. The internal SMD construction makes it possible to offer a product with high performance at low cost. The series offers smaller size, improved efficiency, lower output ripple noise.

UL62368 - E347551

Common specifications

Short circuit protection:	Continuous and automatic recovery
Operating ambient temperature	-40°C – +95°C
Maximum case temperature	+115°C
Thermal impedance	30 °C/W
Operating altitude	5000 m
Pollution degree	PD2
Storage humidity	95% rel. H
Storage temperature	-55°C – +125°C
Soldering Temperature	1.5mm from case 10sec max. - 260°C
Cooling	Natural Convection 30-65 LFM
Common mode transient immunity	1KV Common mode Voltage 65KV/µs
Leakage current	250VAC, 60Hz - 2.0 µA
Clearance / creepage	6 mm
Working voltage	300 Vrms
Overvoltage category	OV2
Switching frequency	20 kHz
MTBF (MIL-HDBK-217F @25°C):	2.4 M hours
Safety approval	IEC / EN / UL 62368-1 DK-131558-UL, E347551
Insulation system	Reinforced Insulation
Case material	Nonconductive black plastic (UL94V-0 rated)
Pin material	Tinned copper
Potting material	Silicone (UL94V-0 rated)
Weight	4.3 g, typ.
Dimensions	0.77" x 0.39" x 0.49"

Isolation specifications

Item	Test condition	Min	Typ	Max	Units
Isolation voltage	Input-output, and rated for 60sec	5000			VAC
Isolation resistance	Input-output	1000			MΩ
Isolation capacitance	Input-output		10		pF

Output specifications

Item	Test condition	Min	Typ	Max	Units
Output Voltage Accuracy		-3		+3	%
Line Regulation	For 1% Vin Change	-1.2		+1.2	%
Load Regulation	From 10% to 100% Load From 0% to 100% Load			10 35	% %
Cross Regulation	Asymmetrical Load 25% / 100% for Dual Output	-5		+5	%
Ripple & Noise (1)	20MHz bandwidth			100	mVpk-pk
Temperature Coefficient		-0.03		+0.03	%/°C
Maximum Capacitive Load	Minimum Vin and constant resistive load	See Table			

Note: Measured with a 0.1µF MLCC.

Input specifications

Item	Test condition	Min	Typ	Max	Units
Voltage range	• 5V Input • 12V Input • 15V Input • 24V Input	4.5 10.8 13.5 21.6	5 12 15 24	5.5 13.2 16.5 26.4	VDC VDC VDC VDC
Input Filter	Capacitor				
Input Reflected Ripple Current (1)			20		mApk-pk
Start up Time			30		ms
Recommended input fuse (slow blow)	• 5V Input • 12V Input • 15V Input • 24V Input		0.4 0.2 0.2 0.1		A A A A
Input Surge Voltage (100 ms)	• 5V Input • 12V Input • 15V Input • 24V Input		7 15 18 28		VDC VDC VDC VDC

Note: Measured with a simulated source inductance of 12µH and a source capacitor Cin (47µF, ESR<1.0Ω at 100kHz).

These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.

Example:
1S7B2_1205D6UP
1 = 1Watt; S7 = SIP7; B2 = Pinning; 12 = 12Vin; 05 = 5Vout; D = Dual Output; 6 = 6kVDC isolation; U = Unregulated Output; P = Short circuit protection

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

Product Selection Guide

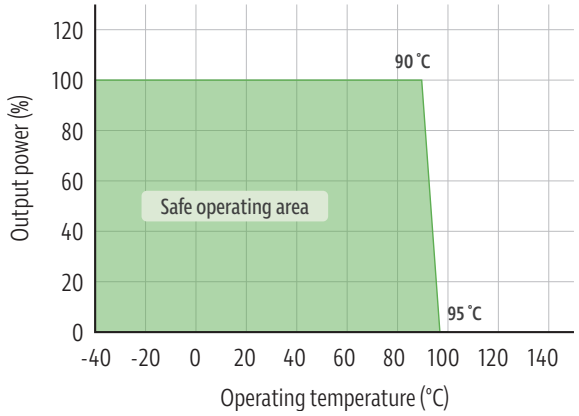
Approval	Part Number	Input voltage [V]	INPUT Current No-Load [mA, max.]	INPUT Current Full Load [mA, typ.]	Output voltage [VDC]	Output current [Min. load, mA]	Output current [Full load, mA]	Efficiency [%, Typ.]	Capacitive Load (µF, max.)
	1S7B2_0503S6UP	4.5-5.5	50	253.17	3.3	0	303	79	2200
UL	1S7B2_0505S6UP	4.5-5.5	50	250	5	0	200	80	1000
	1S7B2_0509S6UP	4.5-5.5	50	243.91	9	0	111	82	1000
UL	1S7B2_0512S6UP	4.5-5.5	50	243.91	12	0	83.3	82	470
UL	1S7B2_0515S6UP	4.5-5.5	60	253.17	15	0	66.7	79	470
	1S7B2_1203S6UP	10.8-13.2	30	106.84	3.3	0	303	78	2200
UL	1S7B2_1205S6UP	10.8-13.2	30	104.17	5	0	200	80	1000
	1S7B2_1209S6UP	10.8-13.2	30	102.89	9	0	111	81	1000
UL	1S7B2_1212S6UP	10.8-13.2	30	100.41	12	0	83.3	83	470
UL	1S7B2_1215S6UP	10.8-13.2	30	102.89	15	0	66.7	81	470
	1S7B2_1503S6UP	13.5-16.5	20	83.34	3.3	0	303	80	2200
	1S7B2_1505S6UP	13.5-16.5	25	82.31	5	0	200	81	1000
	1S7B2_1509S6UP	13.5-16.5	25	81.31	9	0	111	82	1000
	1S7B2_1512S6UP	13.5-16.5	25	82.31	12	0	83.3	81	470
	1S7B2_1515S6UP	13.5-16.5	25	82.31	15	0	66.7	81	470
	1S7B2_2403S6UP	21.6-26.4	20	55.56	3.3	0	303	75	2200
UL	1S7B2_2405S6UP	21.6-26.4	20	54.83	5	0	200	76	1000
	1S7B2_2409S6UP	21.6-26.4	20	52.75	9	0	111	79	1000
UL	1S7B2_2412S6UP	21.6-26.4	20	53.42	12	0	83.3	78	470
UL	1S7B2_2415S6UP	21.6-26.4	20	54.12	15	0	66.7	77	470

Approval	Part Number	Input voltage [V]	INPUT Current No-Load [mA, max.]	INPUT Current Full Load [mA, typ.]	Output voltage [VDC]	Output current [Min. load, mA]	Output current [Full load, mA]	Efficiency [%, Typ.]	Capacitive Load (µF, max.)
	1S7B2_0503D6UP	4.5-5.5	50	250	±3.3	0	±151	80	±1000
UL	1S7B2_0505D6UP	4.5-5.5	50	243.91	±5	0	±100	82	±470
	1S7B2_0509D6UP	4.5-5.5	50	238.1	±9	0	±55.5	84	±470
UL	1S7B2_0512D6UP	4.5-5.5	50	243.91	±12	0	±41.7	82	±220
UL	1S7B2_0515D6UP	4.5-5.5	60	253.17	±15	0	±33.3	79	±220
UL	1S7B2_051509D6UP	4.5-5.5	50	240.97	+15 / -9	0	+33.3 / -55.6	83	+68 / -220
	1S7B2_1203D6UP	10.8-13.2	30	104.17	±3.3	0	±151	80	±1000
UL	1S7B2_1205D6UP	10.8-13.2	30	102.89	±5	0	±100	81	±470
	1S7B2_1209D6UP	10.8-13.2	30	99.21	±9	0	±55.5	84	±470
UL	1S7B2_1212D6UP	10.8-13.2	30	99.21	±12	0	±41.7	84	±220
UL	1S7B2_1215D6UP	10.8-13.2	30	101.63	±15	0	±33.3	82	±220
UL	1S7B2_121509D6UP	10.8-13.2	30	101.63	+15 / -9	0	+33.3 / -55.6	82	+68 / -220
	1S7B2_1503D6UP	13.5-16.5	25	83.34	±3.3	0	±151	80	±1000
	1S7B2_1505D6UP	13.5-16.5	25	81.31	±5	0	±100	82	±470
	1S7B2_1509D6UP	13.5-16.5	25	79.37	±9	0	±55.5	84	±470
	1S7B2_1512D6UP	13.5-16.5	25	81.31	±12	0	±41.7	82	±220
	1S7B2_1515D6UP	13.5-16.5	25	82.31	±15	0	±33.3	81	±220
	1S7B2_151509D6UP	13.5-16.5	30	87.72	+15 / -9	0	+33.3 / -55.6	76	+68 / -220
	1S7B2_2403D6UP	21.6-26.4	20	54.12	±3.3	0	±151	77	±1000
UL	1S7B2_2405D6UP	21.6-26.4	20	54.12	±5	0	±100	77	±470
	1S7B2_2409D6UP	21.6-26.4	20	51.45	±9	0	±55.5	81	±470
UL	1S7B2_2412D6UP	21.6-26.4	20	52.75	±12	0	±41.7	79	±220
UL	1S7B2_2415D6UP	21.6-26.4	20	52.75	±15	0	±33.3	79	±220
UL	1S7B2_241509D6UP	21.6-26.4	25	55.56	+15 / -9	0	+33.3 / -55.6	75	+68 / -220

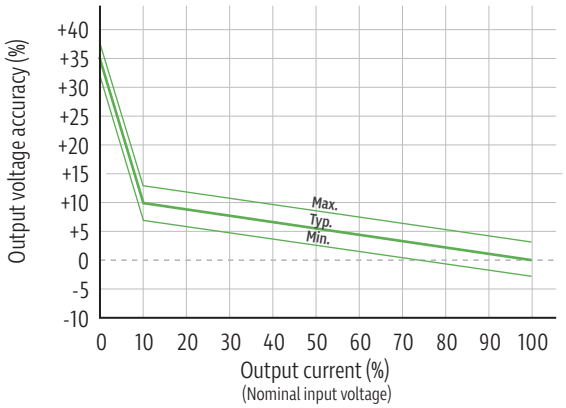
EMC specifications (EN50155)			
Conducted Emissions	EN55032	with external components	Perf. Criteria B
Radiated Emissions	EN55032		Perf. Criteria B
ESD	IEC 61000-4-2	Air: ±15kV / Indirect: ±6kV	Perf. Criteria A
RS	IEC 61000-4-3	10V/m	Perf. Criteria A
EFT	IEC 61000-4-4	±2kV with external components	Perf. Criteria A
Surge	IEC 61000-4-5	±2kV with external components	Perf. Criteria A
CS	IEC 61000-4-6	10Vrms	Perf. Criteria A
PFMF	IEC 61000-4-8	100A/m	Perf. Criteria A

Typical characteristics

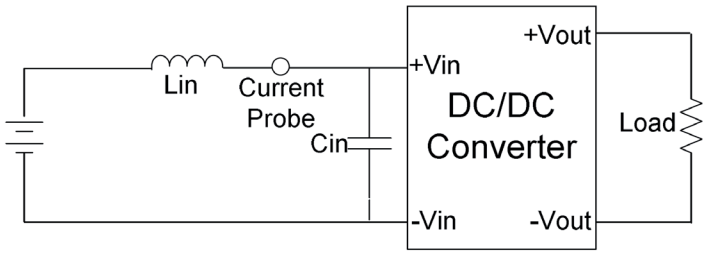
Temperature derating graph



Output regulation curve

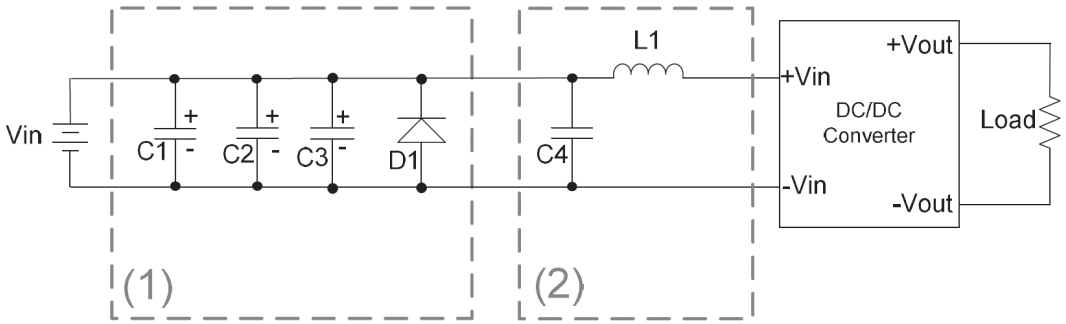


Input reflected ripple current test step



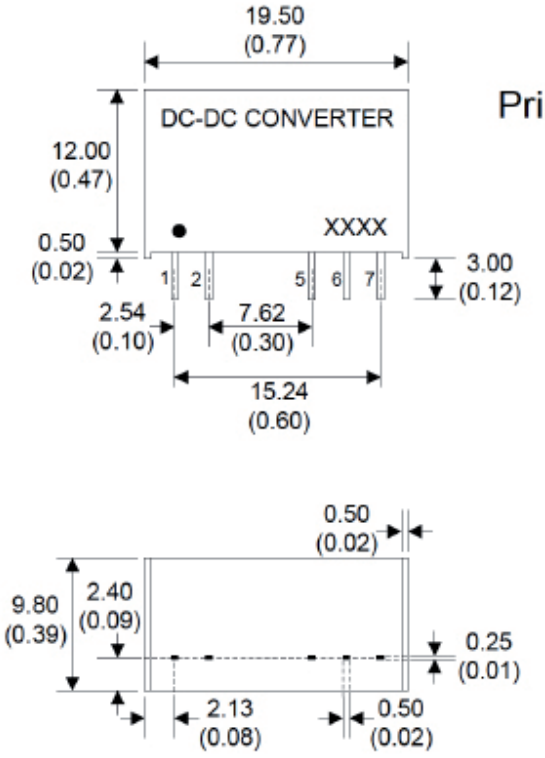
Input reflected ripple current is measured with a source inductor Lin (12µH) and a source capacitor Cin (47µF, ESR<1.0Ω at 100kHz) at nominal input and full load.

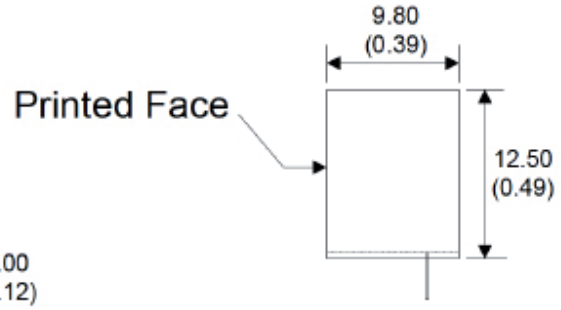
EMC filter



Vin	C1, C2	C3	D1	C4	L1
5V	NIPPON Chemi-con KY Series 680µF, 100V	NIPPON Chemi-con KY Series 680µF, 100V	SMDJ8.0A	MLCC 4.7µF, 50V	6.8µH
12V		DNP	SMDJ16.0A	MLCC 10µF, 50V	6.8µH
15V		DNP	SMDJ18.0A	MLCC 10µF, 50V	6.8µH
24V		DNP	SMDJ28.0A	MLCC 10µF, 50V	6.8µH

Mechanical dimensions





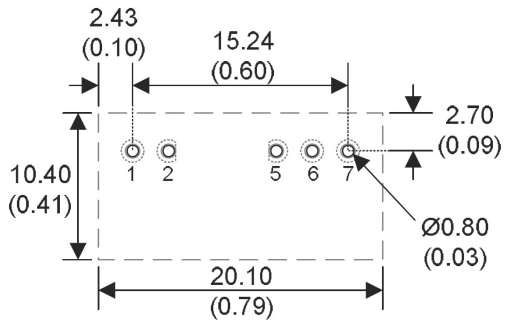
7 PIN SIP Dual Output		
Pin	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
5	-Vout	-Vout
6	N.P.	COM
7	+Vout	+Vout

*N.P.: No PIN

Notes: All dimensions are typical in millimeters (inches).
1. Pin dimension tolerance: ±0.05 (±0.002)
2. Pin pitch and length tolerance: ±0.35 (±0.014)
3. Case tolerance: ±0.5 (±0.02)
4. Pin to Case tolerance: ±0.5 (±0.02)

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

Recommended footprint details



Notes: 1. All dimensions are typical in mm (inches).
Through hole 1 ~ 7: Ø0.80 (0.031)
Top view pad 1 ~ 7: Ø1.00 (0.039)
Bottom view pad 1 ~ 7: Ø1.60 (0.063)
pad 2 to pad 5 spacing: 6.00 (0.236)
2. There should be at least 6mm distance between primary and secondary circuit.