1S7WB_3RPR series

1W - Single Output DC-DC Converter - Isolated & Regulated

DC-DC Converter 1 Watt

- SIP7 package type
- 2:1 input voltage range
- Operating temperature range: -40°C to +100°C
- 3000VDC isolation voltage
- Up to 80% efficiency
- Input under-voltage protection
- Short-circuit protection (SCP)
- Over current protection

Introducing our new 1S7WB_3RPR series, a robust and high-isolation DC-DC converter platform designed for dependable performance in industrial and mission-critical applications. Housed in a compact SIP7 package, the series features a wide 2:1 input voltage range, offering enhanced flexibility for systems exposed to fluctuating supply conditions. With 3000 VDC isolation and efficiencies of up to 80%, the 1S7WB_3RPR series ensures reliable and stable power conversion. It operates across an extended temperature range from –40°C to +100°C, supporting demanding environmental requirements. Integrated input under-voltage protection, short-circuit protection (SCP), and overcurrent protection provide comprehensive safeguarding for both the converter and the end application. The 1S7WB_3RPR series combines electrical robustness, input flexibility, and system-level protection in a compact through-hole form factor.

Common specifications

Short circuit protection	Continuous, Self Recovery
Switching frequency	300 kHz (PWM)
Operation temperature	-40°C ~+100°C (with derating)
Storage temperature	-55°C ~+125°C
Soldering profile	Wave soldering, 260°C (±5°C); time: 5 - 10s Manual welding, 360°C (±10°C); time: 3 - 5s
Storage humidity	5~95% RH (non condensing)
MTBF: (MIL-HDBK-217F@25°C)	>1,000,000 hours
Input filter	Capacitance filter
Hot plug	Unavailable
Case material	Black plastic,flame-retardant and heat resistant (UL 94V-0 rated)
Package dimensions	19.60 x 7.05 x 10.10mm
Weight	2.7g (typ.)
Cooling method	Free air convection

Isolation specifications

Item	Test condition	Min	Typ	Max	Units
Isolation Voltage	Input-output,test time 1 minute,leakage current less than 1mA	3000			VDC
Insulation Resistance	Input-output,resistance at 500VDC	1000			MΩ
Isolation Capacitance	Input-output,100KHz/0.1V		1000		pF

Example:
1S7WB_2405S3RPR
1 = 1Watt; S7 = SIP; WB = Series; 24 = 24Vin; 05 = 5Vout; S = Single Output; 3 = 3000VDC isolation; R = Regulated Output; P = Short circuit protection; R = Revised

1. The input voltage should not exceed the specified range value, otherwise it may cause permanent and irreparable damage;
2. It is recommended to use at a load of over 5%. If the load is below 5%, the ripple index of the product may exceed the specifications, but it does not affect the reliability of the product;
3. The maximum capacitive load is tested within the input voltage range and under full load conditions;
4. Unless otherwise specified, all indicators in this datasheet are measured at Ta = 25°C, humidity <75% RH, nominal input voltage, and output rated load;
5. All indicator testing methods in this datasheet are based on our company's corporate standards;
6. For specific requirements please contact our technical team directly;
7. Product specifications are subject to change without prior notice.

Output specifications

Item	Test condition	Min	Typ	Max	Units
Output voltage accuracy	0% - 100% load		±3.0	±5.0	%
Linear regulation	Vin = min. to max. @full load		±1.0	±3.0	%
Load regulation	0% - 100% load		±3.0	±5.0	%
Transient recovery time	25% Load step change, nominal input voltage		0.5	2	ms
Transient response deviation	25% Load step change, nominal input voltage		±3.0	±5.0	%
Temperature coefficient	Full load	--	--	±0.03	%/°C
Ripple & noise*	20MHz bandwidth, 5%-100% load, parallel line test method	--	50	100	mVp-p
Over current protection	Input voltage range	110	160		%Io

Note: *Under 0% - 5% load conditions, ripple & noise does not exceed 5%Vo.

Input specifications

Item	Test condition	Min	Typ	Max	Units
Input current (full load/ no load)	**5VDC Nominal input** • 3.3V Output • 5V Output • 9/12/15V Output • 24V Output **12VDC Nominal input** • 3.3V Output • 5V Output • 9/12/15V Output • 24V Output **24VDC Nominal input** • 3.3V Output • 5V Output • Others Output		 323/15 308/15 286/15 267/20 124/10 119/10 111/15 104/15 58/5 56/5 52/10	 333/25 317/25 294/25 274/40 128/20 123/20 114/30 107/30 60/15 57/15 53/20	mA
Reflected ripple current	5VDC nominal input series 12VDC nominal input series 24VDC nominal input series		20 30 45		mA
Impulse voltage (1 sec. max)	5VDC nominal input series 12VDC nominal input series 24VDC nominal input series	-0.7 -0.7 -0.7		12 25 50	VDC
Starting voltage	5VDC nominal input series 12VDC nominal input series 24VDC nominal input series			4.5 9 18	VDC
Input under voltage protection	5VDC nominal input series 12VDC nominal input series 24VDC nominal input series	3.5 5.5 12	4 6.5 15.5		VDC

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

EMC specifications			
EMI	CE	CISPR32/EN55032 CLASS B (see fig. 3-② for recommended circuit)	
EMI	RE	CISPR32/EN55032 CLASS B (see fig. 3-② for recommended circuit)	
EMS	ESD	IEC/EN61000-4-2 Contact ±4kV	Perf. criteria B
EMS	RS	IEC/EN61000-4-3 10V/m	Perf. criteria A
EMS	EFT	IEC/EN61000-4-4 ±2kV (see fig. 3-① for recommended circuit)	Perf. criteria B
EMS	Surge	IEC/EN61000-4-5 line to line ±2kV (see fig. 3-① for recommended circuit)	Perf. criteria B
EMS	CS	IEC/EN61000-4-6 3Vr.m.s	Perf. criteria A

Product Selection Guide

Approval	Part number	Input Voltage Nominal (Range) (VDC)	Input Voltage max. (VDC)*	Output Voltage (VDC)	Output Current max. (mA)	Full Load Efficiency (%) typ.**	Capacitive Load max. (µF)
	1S7WB_0503S3RPR	5 (4.5-9)	11	3.3	303	62	1200
	1S7WB_0505S3RPR	5 (4.5-9)	11	5	200	65	1000
	1S7WB_0509S3RPR	5 (4.5-9)	11	9	112	70	680
	1S7WB_0512S3RPR	5 (4.5-9)	11	12	84	70	560
	1S7WB_0515S3RPR	5 (4.5-9)	11	15	67	70	470
	1S7WB_0524S3RPR	5 (4.5-9)	11	24	42	75	220
	1S7WB_1203S3RPR	12 (9-18)	20	3.3	303	67	1200
	1S7WB_1205S3RPR	12 (9-18)	20	5	200	70	1000
	1S7WB_1209S3RPR	12 (9-18)	20	9	112	75	680
	1S7WB_1212S3RPR	12 (9-18)	20	12	84	75	560
	1S7WB_1215S3RPR	12 (9-18)	20	15	67	75	470
	1S7WB_1224S3RPR	12 (9-18)	20	24	42	80	220
	1S7WB_2403S3RPR	24 (18-36)	40	3.3	303	72	1200
	1S7WB_2405S3RPR	24 (18-36)	40	5	200	75	1000
	1S7WB_2409S3RPR	24 (18-36)	40	9	112	80	680
	1S7WB_2412S3RPR	24 (18-36)	40	12	84	80	560
	1S7WB_2415S3RPR	24 (18-36)	40	15	67	80	470
	1S7WB_2424S3RPR	24 (18-36)	40	24	42	80	220

Note: * Exceeding the maximum input voltage may cause permanent damage;
** Efficiency is measured at nominal input voltage and rated output load.

Typical characteristics

Temperature derating graph

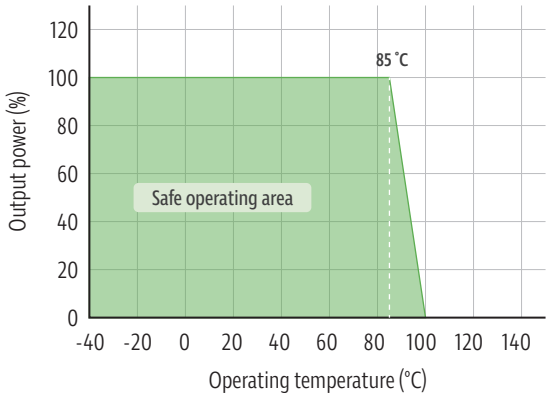
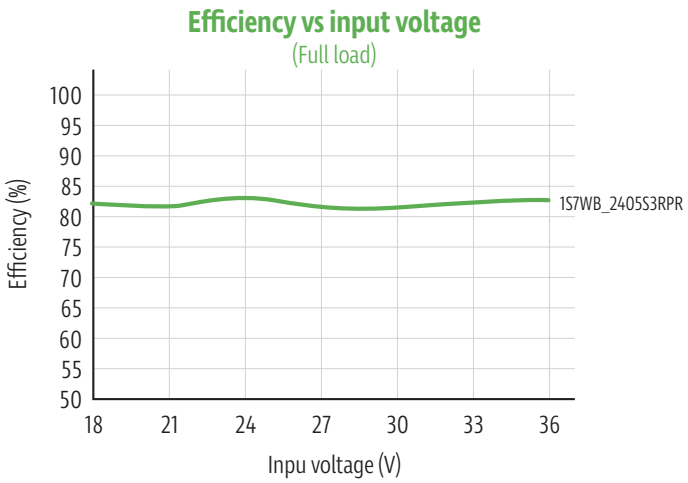
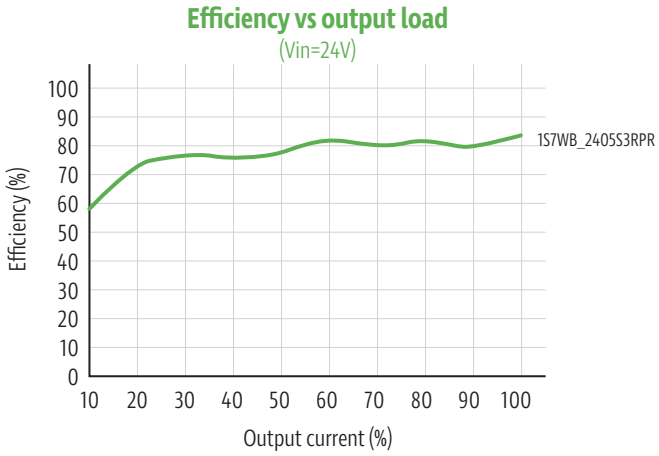


Figure 1

Typical characteristics





Typical circuit design and application

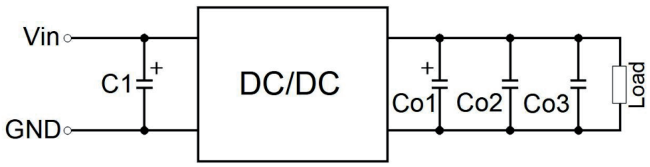


Figure 2

Recommended capacitive load value table

Vout	C1	Co1	Co2	Co3
3.3/5VDC	100µF/100V	47µF/16V	10µF/50V	0.1µF/16V
9/12/15VDC	100µF/100V	47µF/25V	10µF/50V	0.1µF/25V
24VDC	100µF/100V	47µF/50V	10µF/50V	0.1µF/50V

All the DC-DC converters of this series are tested before delivery using the recommended circuit shown in fig. 2. Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values C1 and Co1/Co2/Co3 and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the specified max. capacitive load value of the product.

Recommended EMC circuit diagram

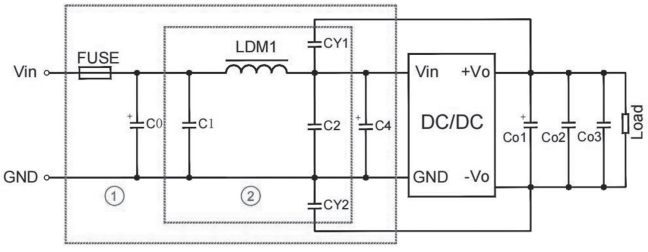


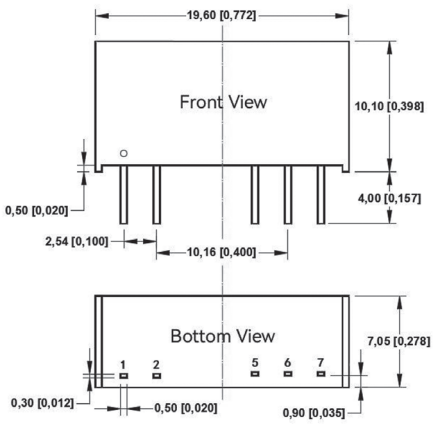
Figure 3

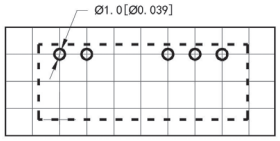
EMI recommended parameter table

Model	Vin: 5VDC	Vin: 12VDC	Vin: 24VDC
FUSE	Select according to the actual input current of the customer		
C0/C4	680µF/25V	680µF/25V	330µF/50V
C1/C2	4.7µF/50V		
LDM1	12µH		
Co1/Co2/Co3	Refer fig. 2 capacitive load value table		
CY1/CY2	1nF/3kV		

Note: We use part ① in fig. 3 for immunity tests and part ② for emissions test. Selecting based on

Mechanical dimensions





Note:
Unit: mm [inch]
Pin section tolerances: ±0.10 [±0.004]
General tolerances: ±0.50 [±0.020]

Pin Definition Table	
Pin	Function
1	Vin
2	GND
5	-Vo
6	No Pin
7	+Vo

No Pin: No such Pin