1S8W_1.5RP series

1W - Single and Dual Output - Wide Input - Isolated & Regulated SIP - DC-DC Converter

DC-DC Converter 1 Watt

- Ultra compact SIP package
- Wide input voltage range (2:1)
- Operating temperature range: -40°C to +85°C
- I/O Isolation test voltage: 1.5kVDC
- Low ripple & noise
- Short-circuit protection (self-recovery)
- Remote On/Off

The 1S8W_1.5RP series are isolated 1W DC-DC converter productions with a wide 2:1 input voltage range and input isolation is tested with 1500VDC. The product has a relatively compact SIP-8 plastic package, and features high efficiency, operating temperature of -40°C to +85°C, remote control, and continuous short-circuit protection. The smaller size and cost-effective design make the converter an ideal solution in communication, instruments, and industrial electronics applications.

Common specifications

Short circuit protection:	Continuous, self-recovery
Temperature rise at full load:	25°C TYP
Operation temperature range:	-40°C~+85°C
Storage temperature range:	-55°C ~+125°C
Lead temperature range:	300°C MAX, 1.5mm from case for 10 sec
Storage humidity range:	< 95%
MTBF (MIL-HDBK-217F@25°C):	>1,000,000 hours
Case material:	Black flame-retardant and heat-resistant plastic
Cooling:	Free air convection
Dimension:	22.00x9.50x12.00mm
Weight:	4.5g Typ.

Input specifications

Item	Test condition	Min	Typ	Max	Units
Input Current (full load/no-load)	• 5VDC input • 12VDC input • 24VDC input • 48VDC input		281/40 111/15 55/6 27/4	290/60 114/30 57/10 28/6	mA mA mA mA
Reflected Ripple Current	• 5VDC input • 12VDC input • 24VDC input • 48VDC input		30 40 55 45		mA mA mA mA
Surge Voltage (1sec. max.)	• 5VDC input • 12VDC input • 24VDC input • 48VDC input	-0.7 -0.7 -0.7 -0.7		12 25 50 100	VDC VDC VDC VDC
Starting Voltage	• 5VDC input • 12VDC input • 24VDC input • 48VDC input			4.5 9 18 36	VDC VDC VDC VDC
Input filter	Filter capacitor				
Hot Plug	Unavailable				
Ctrl [1]	• Models ON • Models OFF	Ctrl pin open (high resistance) Ctrl pin pulled high (current 5-10mA typ. into Ctrl.)			

[1] * For use of Ctrl, please refer to the "design reference" in this manual.

Example:
1S8W_0505S1.5RP
1 = 1Watt; S8 = SIP8; W = wide input (4,5 - 9Vin); 05 = 5Vin; 05 = 5Vout; S = Single Output; 1.5 = 1500VDC isolation ; R = Regulated Output P = Short Circuit Protection

Output specifications

Item	Test condition	Min	Typ	Max	Units
Output voltage accuracy (Input voltage range)	5% to 100% load • 3.3V/5V output • others		 ±2 ±1	 ±5 ±3	 % %
Line regulation	Input voltage from low to high, full load		±0.2	±0.5	%
Load regulation	5% to 100% load		±0.4	±0.75	%
Temperature coefficient	100% load		±0.02	±0.03	%/°C
Transient recovery time	25% load step change		0.5	2	ms
Transient response deviation	25% load step change		±2.5	±5	%
Switching frequency (PFM mode)	Full load, nominal input voltage		200		KHz

Test ripple and noise by "parallel cable" method. See detailed operation instructions at application notes.

Isolation specifications

Item	Test condition	Min	Typ	Max	Units
Isolation voltage	Tested for 1 minute, leakage current less than 1 mA	1500			VDC
Isolation resistance	Test at 500VDC	1000			MΩ
Isolation capacitance	Input/Output, 100KHz/0.1V		120		pF

Note:
1. Min. load shouldn't be less than 5%, otherwise ripple maybe increased dramatically. If the product operates under min. load, it may not be guaranteed to meet all specifications listed. Operation under minimum load will not damage the converter.
2. Recommended Dual output models unbalanced load is ≤±5%, if the product operates >±5%, it may not be guaranteed to meet all specifications listed. Please contact our technical support for more details.
3. Max. Capacitive Load is tested at input voltage range and full load.
4. All specifications measured at Ta = 25°C, humidity <75%, nominal input voltage and rated output load unless otherwise specified.
5. In this datasheet, all test methods are based on our corporate standards.
6. All characteristics are for listed models,and non-standard models may perform differently.Please contact our technical support for more details.
7. Please contact our technical support for any specific requirement.
8. Specifications of this product are subject to changes without prior notice.

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 3 Vr.m.s perf. Criteria A
EMS	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-29 0%, 70% perf. Criteria B

Product Selection Guide

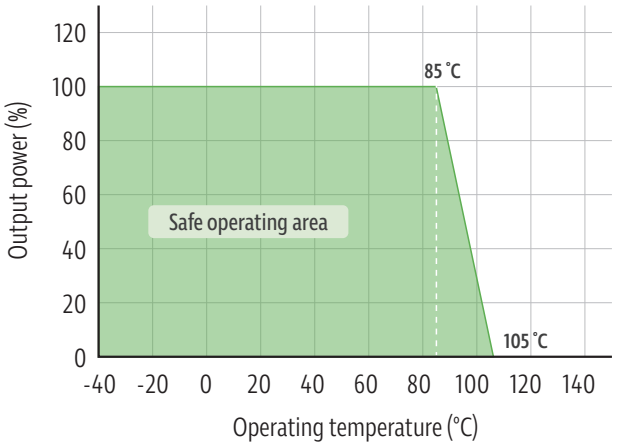
Part Number	Input Voltage [VDC] Nominal	Range	Max	Output Voltage [VDC]	Output Current [mA] Max	Min	Reflected ripple current [mA, Typ.]	Capacitive load [µF, Max.]	Efficiency [%, Typ.]
1S8W_0503S1.5RP	5	4.5-9	11	3.3	±42	±2	70/100	1800	69/71
1S8W_0505S1.5RP	5	4.5-9	11	5	±33	±2	70/100	2200	70/72
1S8W_0512S1.5RP	5	4.5-9	11	12	303	15	70/100	1000	74/76
1S8W_0515S1.5RP	5	4.5-9	11	15	200	10	70/100	680	73/75
1S8W_0524S1.5RP	5	4.5-9	11	24	111	6	70/100	470	71/73
1S8W_1203S1.5RP	12	9-18	20	3.3	±100	±5	100/150	2700	73/75
1S8W_1205S1.5RP	12	9-18	20	5	±56	±3	100/150	2200	75/77
1S8W_1209S1.5RP	12	9-18	20	9	±42	±2	100/150	1800	77/79
1S8W_1212S1.5RP	12	9-18	20	12	±33	±2	100/150	1000	76/78
1S8W_1215S1.5RP	12	9-18	20	15	303	15	100/150	680	78/80
1S8W_1224S1.5RP	12	9-18	20	24	200	10	100/150	470	74/76
1S8W_2403S1.5RP	24	18-36	40	3.3	±42	±2	70/100	2700	73/75
1S8W_2405S1.5RP	24	18-36	40	5	±33	±2	70/100	2200	75/77
1S8W_2412S1.5RP	24	18-36	40	12	303	15	70/100	1000	76/78
1S8W_2415S1.5RP	24	18-36	40	15	200	10	70/100	680	76/78
1S8W_2424S1.5RP	24	18-36	40	24	83	4	70/100	470	75/77
1S8W_4803S1.5RP	48	36-75	80	3.3	200	10	100/150	2700	73/75
1S8W_4805S1.5RP	48	36-75	80	5	200	10	100/150	2200	74/76
1S8W_4812S1.5RP	48	36-75	80	12	83	4	100/150	1000	78/80
1S8W_4815S1.5RP	48	36-75	80	15	67	3	100/150	680	77/79

Part Number	Input Voltage [VDC] Nominal	Range	Max	Output Voltage [VDC]	Output Current [mA] Max	Min	Reflected ripple current [mA, Typ.]	Capacitive load [µF, Max.]	Efficiency [%, Typ.]
1S8W_0505D1.5RP	5	4.5-9	11	±5	±100	±5	70/100	1000	71/73
1S8W_0512D1.5RP	5	4.5-9	11	±12	±42	±2	70/100	470	74/76
1S8W_0515D1.5RP	5	4.5-9	11	±15	±33	±2	70/100	330	73/75
1S8W_1205D1.5RP	12	9-18	20	±5	±100	±5	100/150	1000	75/77
1S8W_1212D1.5RP	12	9-18	20	±12	±42	±2	100/150	470	79/81
1S8W_1215D1.5RP	12	9-18	20	±15	±33	±2	100/150	330	76/78
1S8W_2405D1.5RP	24	18-36	40	±5	±100	±5	70/100	1000	77/79
1S8W_2409D1.5RP	24	18-36	40	±9	±56	±3	70/100	680	77/79
1S8W_2412D1.5RP	24	18-36	40	±12	±42	±2	70/100	470	76/78
1S8W_2415D1.5RP	24	18-36	40	±15	±33	±2	70/100	330	76/78
1S8W_4805D1.5RP	48	36-75	80	±5	±100	±5	100/150	1000	74/76
1S8W_4812D1.5RP	48	36-75	80	±12	±42	±2	100/150	470	76/78
1S8W_4815D1.5RP	48	36-75	80	±15	±33	±2	100/150	330	78/80

①Exceeding the maximum input voltage may cause permanent damage;
②For the dual output modules, the capacitive loads of positive and negative outputs are the same.

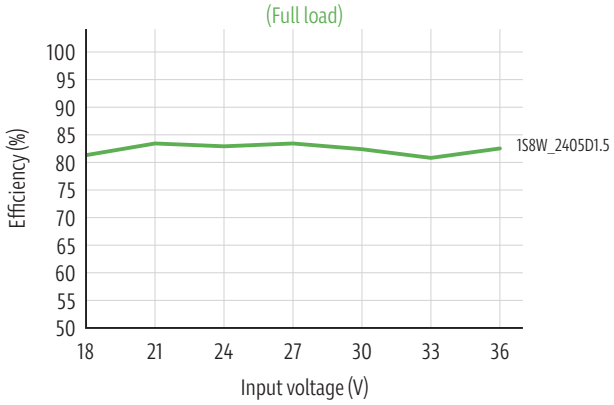
Typical characteristics

Temperature derating graph

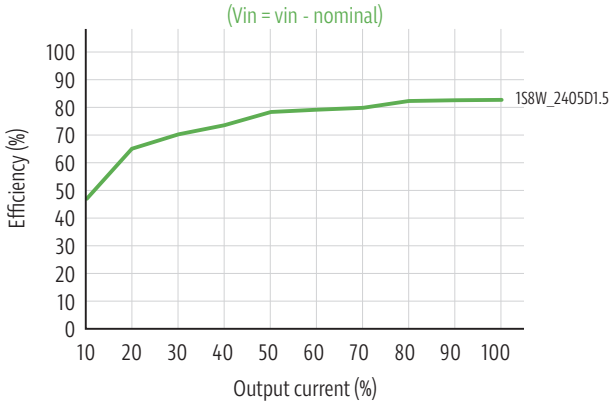


Efficiency

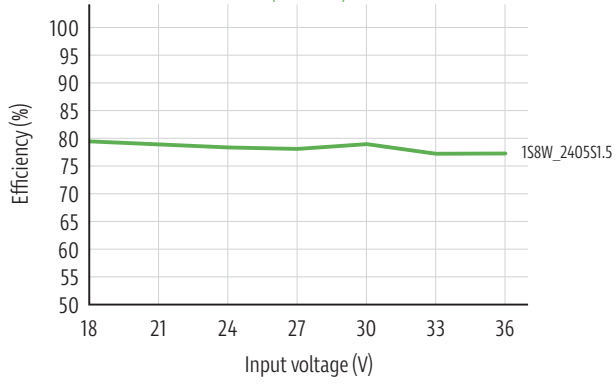
Efficiency vs input voltage
(Full load)



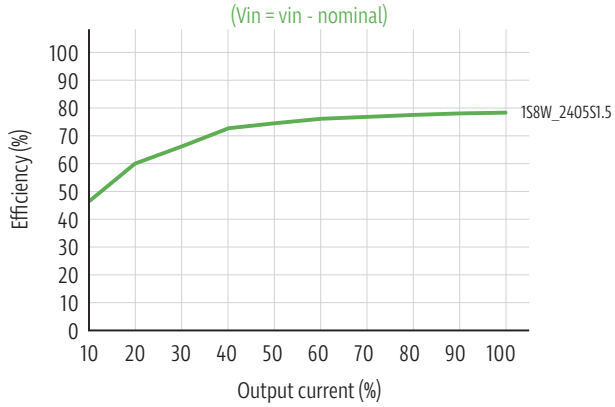
Efficiency vs output load
(Vin = vin - nominal)



Efficiency vs input voltage
(Full load)



Efficiency vs output load
(Vin = vin - nominal)



Typical application

All 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 Cin and Cout 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.

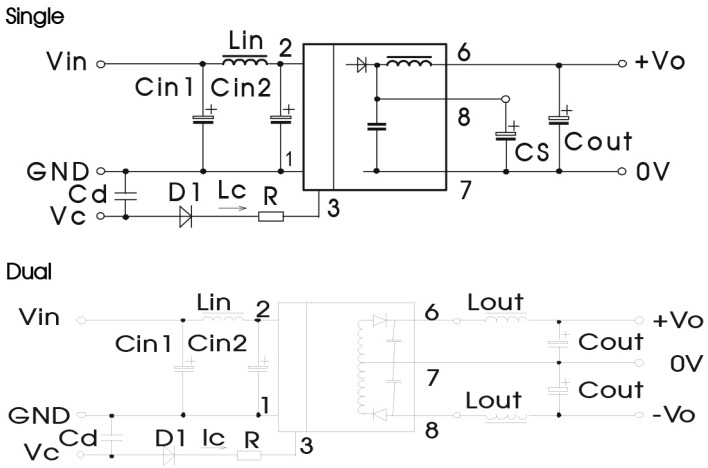


Fig. 2

Vin	5VDC&12VDC	24VDC&48VDC
Cin1	100μF/25V	10μF/100V
Cin2	47μF/25V	1μF/100V
Lin	4.7μH-12μH	
Cs	10μF-22μF/50V	
Cout	Vo(3/±3/5/±5/9/±9V):100μF/16V Vo(12/±12/15/±15V):100μF/25V Vo(24/±24V):100μF/50V	
Lout	2.2μH-10μH	
Cd	47nF/100V	

EMC recommended circuit

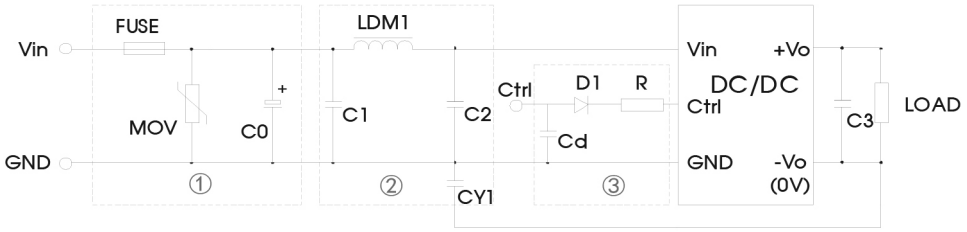


Fig. 3

Model	Vin: 5VDC	Vin: 12VDC	Vin: 24VDC	Vin: 48VDC
FUSE	Slow-blow, selecting based on needs			
MOV		S14K25	S14K35	S14K60
C0	1000μF/16V	1000μF/25V	330μF/50V	330μF/100V
C1	4.7μF/50V			4.7μF/100V
LDM1	12μH			
C2	4.7μF/50V			4.7μF/100V
C3	Refer to the Cout in Fig.2			
CY1	1nF/2kV			
D1	60V/1A			
R	In accordance with the formula: $R = \frac{V_C - V_D - 1.0}{I_C} - 300$			
Cd	47nF/100V			

Notes:
① For EMC tests we use Part ① in Fig. 3 for immunity and part ② for emissions test. Selecting based on needs.
② VC is the voltage of the Ctrl end relative to the GND of the input grounding; VD is the positive-going conduction pressure drop of D1; IC is the current flows into the Ctrl end and its value is generally 5-10mA, see Fig. 3-③ for the peripheral circuit of Ctrl end;
③ If there is no recommended parameters, no external component is required.

Ctrl end

The modules are of normal output when the Ctrl end is suspended or of high resistance; the modules turn off when connecting with high level (relative to the input grounding); notice that the current flows into the pin shall be 5 - 10mA, the modules will be permanently damaged if the current exceeds its max. value (20mA in general). The value of R can be derived as follows:

$$R = \frac{V_C - V_D - 1.0}{I_C} - 300$$

For Detailed parameter, please refer to EMC solution-recommended circuit in this manual.

Input current

When the electricity is provided by the unstable power supply, please make sure that the range of the output voltage fluctuation and the ripple voltage of the power supply do not exceed the indicators of the modules. Input current of power supply should afford the flash startup current of this kind of DC/DC module(see Fig. 5).
Generally: Vin= 5V series lave =445mA
Vin=12V series lave =205mA
Vin=24V series lave =104mA
Vin=48V series lave =53mA

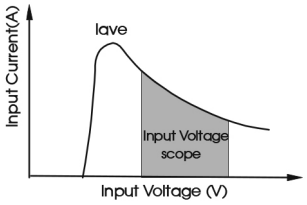
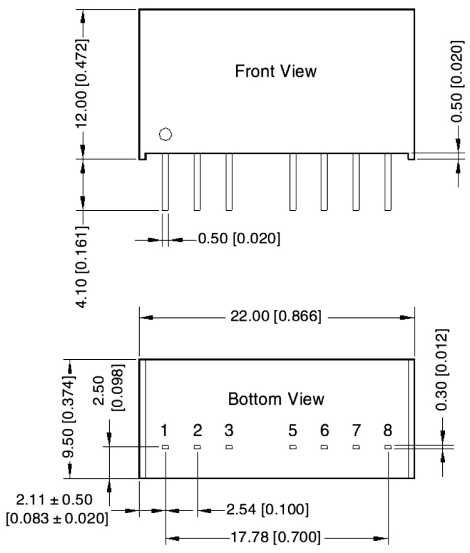


Fig. 5

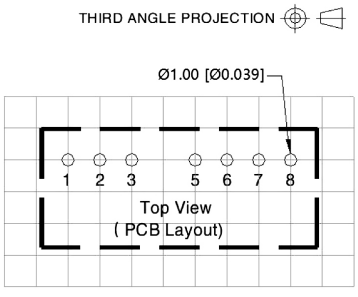
Output load requirements

When using, the minimum load of the module output should not be less than 5% of the nominal load. In order to meet the performance parameters of this datasheet, please connect a 5% dummy load in parallel at the output end, the dummy load is generally a resistor, please note that the resistor needs to be used in derating.

Mechanical dimensions



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



Note: Grid 2.54*2.54mm

Pin–Out		
Pin	Single	Dual
1	GND	GND
2	Vin	Vin
3	Ctrl	Ctrl
5	NC	NC
6	+Vo	+Vo
7	0V	0V
8	CS	–Vo

NC: Not available for electrical connection