

3S8W_3RP series

3W - Single/Dual Output DC-DC Converter - Wide Input - Isolated & Regulated



DC-DC Converter

3 Watt

- ⊕ 2:1 input voltage range
- ⊕ 3W output power
- ⊕ Operating temperature from -40°C to +85°C
- ⊕ up to 86% efficiency
- ⊕ On/Off control function

- ⊕ Short circuit protection (SCP)
- ⊕ 3000VDC isolation
- ⊕ Plastic case, flame class UL94-V0

Introducing our new 3S8W_3RP series – compact and reliable DC-DC converters designed for demanding applications. With a 2:1 input voltage range and 3W output power, these modules deliver up to 86% efficiency while maintaining stable performance across an operating temperature range of -40°C to +85°C. Built with a durable plastic case (UL94-V0 flame class) and 3000VDC isolation, they ensure safety and long-term reliability. The On/Off control function adds flexibility, while short-circuit protection (SCP) safeguards your systems. Versatile in use, the 3S8W_3RP series is well suited for instrumentation, communication systems, pure digital circuits, low-frequency analog designs, relay drive circuits, and data exchange circuits.



Common specifications	
Short circuit protection	Continuous, self-recovery
Switching frequency	330 kHz (nominal input voltage, full load)
Operation temperature	-40°C ~+85°C (with derating)
Storage temperature	-55°C ~+125°C
Case temperature rise	30°C (Ta = 25°C)
Pin welding can withstand the high temperatures	+300°C (1.5mm from the case, soldering time 10S)
Storage humidity	5~95% RH (non condensing)
MTBF: (MIL-HDBK-217F@25°C)	1,000,000 hours
Input filter	Capacitor filter
Hot plug	Unavailable
Vibration	10-150Hz, 5G, 30 Min. along X, Y and Z
Case material	Plastic in Black, flame class UL94-V0
Unit weight	4.5g (typ.)
Cooling method	Natural air
Dimensions	22.00× 9.50 × 12.00 mm

Input specifications					
Item	Test condition	Min	Typ	Max	Units
Input inrush voltage (1 sec max.)	4.5-9V input	-0.7		16	VDC
	9-18V input	-0.7		25	
	18-36V input	-0.7		50	
	36-75V input	-0.7		100	
Start-up voltage	4.5-9V input	3.5	4	4.5	VDC
	9-18V input	4.5	8	9	
	18-36V input	11	16	18	
	36-75V input	24	33	36	
Start-up current	4.5-9V input	1.5			A
	9-18V input	0.8			
	18-36V input	0.4			
	36-75V input	0.2			
No load power consumption				0.5	W
ON/OFF control (Ctrl)	Turn ON the converter	Ctrl no connection or connected to high resistance			
	Turn OFF the converter	Ctrl connected to high voltage level, current 5-10mA			

Note: The voltage of Ctrl is relative to the input GND.

Example:
3S8W_2405S3RP
 3 = 3Watt; S8 = SIP; W = Wide input; 24 = 24Vin; 05 = 5Vout; S = Single Output;
 3 = 3000VDC isolation; R = Regulated Output; P = Short circuit protection.

Output specifications					
Item	Test condition	Min	Typ	Max	Units
Output power		0.15		3	W
Positive output voltage accuracy (Full input voltage range)	10% - 100% load			±2	%
	0% - 10% load			±3	
Negative output voltage accuracy (full input voltage range)	10% - 100% load			±3	%
	0% - 10% load			±5	
Line voltage regulation (100% load)	Positive output			±0.2	%
	Negative output			±0.5	
Load regulation (10% - 100% load)	Positive output			±0.5	%
	Negative output			±3	
Cross regulation (dual output)	+Vo with 50% load, -Vo with 25%-100% load			±5	%
Transient response deviation	25% load change step		±3	±5	%
Transient recovery time	25% load change step		300	500	µS
Temperature drift coefficient	100% load			±0.03	%/°C
Ripple & noise (0%-100% load, 20MHz bandwidth)	±12, ±15, ±24 output		100	150	mVp-p
	Others		50	100	
Over current protection	Full input voltage range	150		300	%Io

Note 1: Dual output loads imbalance: ±5%

Note 2: The Ripple & noise is tested by the twisted pair method, please refer to the following test instruction.

Isolation specifications					
Item	Test condition	Min	Typ	Max	Units
Isolation voltage	I/P-O/P, test 1 minute, leakage current <1mA	3000			VDC
Isolation resistance	I/P-O/P, @ 500VDC	1000			MΩ
Isolation capacitance	I/P-O/P, 100kHz/0.1V		120		pF

- This series of products cannot be connected in parallel to increase the output power, and do not support hot-plug.
- The product should be used according to the specifications, otherwise it could be permanently damaged.
- The product performance cannot be guaranteed if it works at a lower load than the minimum load defined.
- The product performance cannot be guaranteed if it works under the over-load condition.
- Unless otherwise specified, all values or indicators on this datasheet are tested at Ta = 25°C, humidity <75%RH, nominal input voltage and rated load (pure resistance load).
- All values or indicators in this datasheet have been tested based on our tests.
- The specifications are specially for the parts listed on this datasheet, any other non-standard model performances could be out of the specifications. Please contact our technician for specific requirements.

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Product Selection Guide

Approval	Part number	Input Voltage Nominal (VDC)	Input Voltage Range (VDC)	Output Voltage Vo (VDC)	Output Current Io (mA)	Input Current (mA) Typ. @nominal volt. (Full Load)	Input Current (mA) Typ. @nominal volt. (No Load)	Capacitive Load Max. (µF)	Efficiency (%) @full load nominal volt. (typ.)
	3S8W_0503S3RP	5	4.5 - 9	3.3	758	735	53	2200	68
	3S8W_0505S3RP	5	4.5 - 9	5	600	801	38	2200	75
	3S8W_0509S3RP	5	4.5 - 9	9	333	769	54	1000	74
	3S8W_0512S3RP	5	4.5 - 9	12	250	763	39	1000	79
	3S8W_0515S3RP	5	4.5 - 9	15	200	829	50	680	76
	3S8W_0524S3RP	5	4.5 - 9	24	125	769	67	330	76
	3S8W_1203S3RP	12	9 - 18	3.3	758	275	15	2200	72
	3S8W_1205S3RP	12	9 - 18	5	600	316	15	2200	79
	3S8W_1212S3RP	12	9 - 18	12	250	306	18	1000	82
	3S8W_1215S3RP	12	9 - 18	15	200	314	25	680	82
	3S8W_1224S3RP	12	9 - 18	24	125	313	29	330	81
	3S8W_2403S3RP	24	18 - 36	3.3	758	140	12	2200	74
	3S8W_2405S3RP	24	18 - 36	5	600	157	10	2200	78
	3S8W_2412S3RP	24	18 - 36	12	250	152	10	1000	83
	3S8W_2415S3RP	24	18 - 36	15	200	148	10	680	86
	3S8W_2424S3RP	24	18 - 36	24	125	146	11	330	86
	3S8W_4803S3RP	48	36 - 75	3.3	758	73	7	2200	72
	3S8W_4803S3RP	48	36 - 75	5	600	77	7	2200	82
	3S8W_4803S3RP	48	36 - 75	12	250	74	8	1000	86
	3S8W_4803S3RP	48	36 - 75	15	200	78	8	680	84
	3S8W_4803S3RP	48	36 - 75	24	125	74	8	330	86

Approval	Part number	Input Voltage Nominal (VDC)	Input Voltage Range (VDC)	Output Voltage Vo (VDC)	Output Current Io (mA)	Input Current (mA) Typ. @nominal volt. (Full Load)	Input Current (mA) Typ. @nominal volt. (No Load)	Capacitive Load Max. (µF)	Efficiency (%) @ full load nominal volt. (typ.)
	3S8W_0503D3RP	5	4.5 - 9	±3.3	±379	735	47	±470	68
	3S8W_0505D3RP	5	4.5 - 9	±5	±300	811	47	±470	74
	3S8W_0512D3RP	5	4.5 - 9	±12	±125	807	41	±220	74
	3S8W_0515D3RP	5	4.5 - 9	±15	±100	876	51	±150	76
	3S8W_0524D3RP	5	4.5 - 9	±24	±62.5	876	67	±100	76
	3S8W_1203D3RP	12	9 - 18	±3.3	±379	282	12	±470	74
	3S8W_1205D3RP	12	9 - 18	±5	±300	316	12	±470	79
	3S8W_1212D3RP	12	9 - 18	±12	±125	302	17	±220	83
	3S8W_1215D3RP	12	9 - 18	±15	±100	313	22	±150	80
	3S8W_1224D3RP	12	9 - 18	±24	±62.5	313	22	±100	80
	3S8W_2403D3RP	24	18 - 36	±3.3	±379	141	10	±470	74
	3S8W_2405D3RP	24	18 - 36	±5	±300	156	10	±470	80
	3S8W_2412D3RP	24	18 - 36	±12	±125	141	11	±220	85
	3S8W_2415D3RP	24	18 - 36	±15	±100	144	12	±150	86
	3S8W_2424D3RP	24	18 - 36	±24	±62.5	144	12	±100	86
	3S8W_4803D3RP	48	36 - 75	±3.3	±379	70	7	±470	74
	3S8W_4803D3RP	48	36 - 75	±5	±300	82	7	±470	79
	3S8W_4803D3RP	48	36 - 75	±12	±125	78	8	±220	82
	3S8W_4803D3RP	48	36 - 75	±15	±100	78	8	±150	82
	3S8W_4803D3RP	48	36 - 75	±24	±62.5	78	8	±100	82

Note:

- The max capacitive load is the capacitance allowed when the power supply starts up at full load. The converter may not start if the output capacitor exceeds this value.
- The efficiency is tested at the nominal input voltage and the rated load.
- Please contact our sales team for other output voltages requirements of this series but not listed in this table.
- The * marked parts have been developed in process.

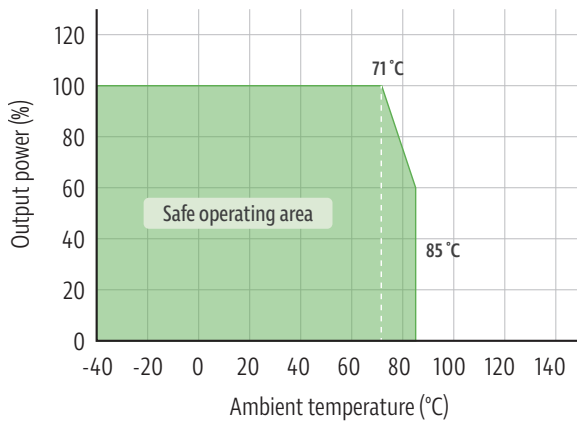
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EMC specifications					
EMC	EMI	CE	CISPR32/EN55032	Class B (with the recommended EMC circuit)	
EMC	EMI	RE	CISPR32/EN55032	Class B (with the recommended EMC circuit)	
EMC	EMS	ESD	IEC/EN61000-4-2	Contact ±4kV	perf. criteria B

Typical characteristics

Temperature derating graph



Typical circuit design and application

1. CS Terminal

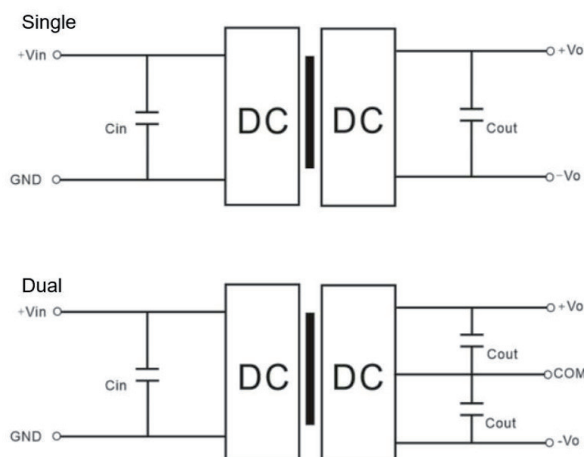
This terminal has connected with the converter internal main filter capacitor (positive). It is recommended to use a low ESR capacitor ($\leq 47\mu\text{F}$) between CS and Pin 7 (negative) to improve the output ripple and noise performance.

2. Requirement for the output load

- To ensure the converter operating efficiently and reliably, its minimum load should not be less than 5% of the rated load. Dual output loads should be balanced in $\pm 5\%$ or else the output voltage accuracy could be out of the range.
- The maximum capacitive load is tested at the full load. The converter may not start or be damaged at the capacitive over-load. It is recommended to use a resistor (equal to 5% load) at the output or decrease the output capacitive load when the converter will work with no load, or else the output voltage will be unstable or out of the voltage accuracy range.

3. Typical application circuits

To ensure effectively decrease the input and output ripple and noise, a capacitor filter can be connected at the input and output, the application circuits are shown below. The suitable filtering capacitors should be chosen as the recommended capacitive load values in table 1. The converter could not start if the capacitance is too big.



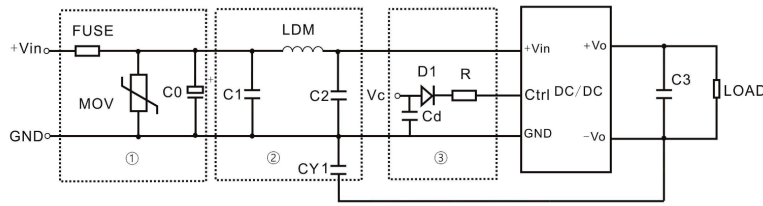
Recommended Capacitive Load Values (Table 1)

Vin (VDC)	Cin	Single Vout (VDC)	Cout	Dual Vout (VDC)	Cout
5	10uF/16V	3.3	10uF/16V	±3.3	4.7uF/16V
12	2.2uF/50V	5	10uF/16V	±5	4.7uF/16V
24	2.2uF/50V	9	2.2uF/25V	±9	2.2uF/25V
48	1uF/100V	12	2.2uF/25V	±12	1uF/50V
-	-	15	1uF/50V	±15	1uF/50V
-	-	24	1uF/50V	±24	0.47uF/50V

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Recommended EMC circuit diagram



Note: The part ① circuit is for EMS test, part ② for EMI filtering, part ③ for ON/OFF control, all can be adjusted according to the actual situation.

EMI recommended component parameters

Vin	5V/12V	24V	48V
FUSE	TBD by the input current		
MOV	14D330K	14D470K	14D101K
C0	680uF/25V	330uF/50V	220uF/100V
C1,C2	4.7uF/50V	4.7uF/50V	4.7uF/100V
LDM	12uH		
C3	Refer to the Recommended Capacitive Load Values (Table 1)		
CY1	1nF/3kV		
D1	Anti-reverse diode, RB160M,1A/60V		
Cd	100nF/100V		
R	Current-limiting resistor for Ctrl, see below calculating formula		

ON/OFF Control

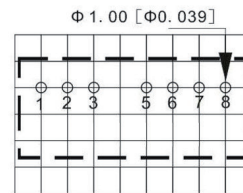
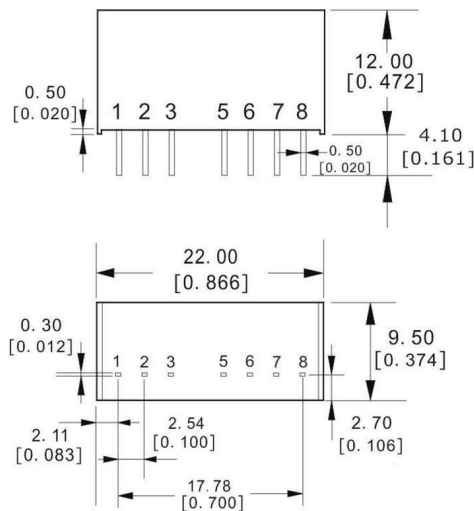
The converter starts with normal output when the Ctrl terminal is no connection or connected with a high resistance, it will be turn OFF when the Ctrl terminal is connected to high voltage level (vs GND).

Note: The current vale 5-10mA through the Ctrl can be available, the converter could be broken if the current is over 10mA (for example 20mA). Below is the calculating formula for R:

$$R = \frac{V_c - V_d - 0.7}{I_c} - 330$$

Vc is the input voltage of Ctrl, Vd is the forward voltage drop of D1, 0.7V is the Triode voltage drop, 330Ω is the internal resistance of the Ctrl, Ic is the working current of Ctrl.

Mechanical dimensions



PCB layout vertical view
Grid 2.54x2.54[0.10x0.10]

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

Pin Definition Table								
Pin No.	1	2	3	4	5	6	7	8
Single (S)	GND	+Vin	Ctrl	NP	NC	+Vo	-Vo	CS
Dual (D)	GND	+Vin	Ctrl	NP	NC	+Vo	0V	-Vo

Note 1: NC means No Connection, NP means No Pin, CS refers to the following application instruction.

Note 2: Please take the pin definition on the product label as the right one if it is different than the data sheet description.