



6S8W4_1.6RP series

6W - Single/Dual Output - Wide Input - Isolated & Regulated DC-DC Converter

DC-DC Converter

6 Watt

- ⊕ Wide 4:1 input voltage range
- ⊕ High efficiency up to 83%
- ⊕ No-load power consumption as low as 0.12W
- ⊕ I/O isolation test voltage 1.5kVDC
- ⊕ Operating ambient temp. range: -40°C to +85°C
- ⊕ Input under-voltage protection, output short circuit, over-current protection
- ⊕ Industry standard pin-out
- ⊕ EN62368 approved

The 6S8W4_1.6RP series of isolated 6W DC-DC products with a 4:1 input voltage range. They feature efficiencies of up to 83%, 1500VDC input to output isolation, operating ambient temperature range of -40°C to +85°C, input under-voltage protection, output over-current, short circuit protection and they are widely used in applications such as medical care, industrial control, electric power, instruments and communication fields.



Common specifications

Short circuit protection:	Continuous, self-recovery
Operation temperature range:	-40°C~+105°C (Single output) -40°C~+85°C (Dual output)
Storage temperature range:	-55°C ~+125°C
Storage humidity range:	5-95% RH, without condensing
Pin welding resistance temperature:	300°C MAX, 1.5mm from case for 10 sec
Vibration:	10-150Hz, 5G, 0.75mm. along X, Y and Z
Switching Frequency*:	500kHz TYP, PWM mode
MTBF (MIL-HDBK 217F @25°C):	1000 K hours
Case material:	Black plastic; flame-retardant and heat-resistant (UL94-V0)
Cooling:	Free air convection
Weight:	4.6g, Typ.
Dimensions:	22.00 × 9.50 × 12.00 mm

* Reduced frequency technology, test value: full load. When the load is reduced to below 50%, the switching frequency decreases with decreasing load.

Input specifications

Item	Test condition	Min	Typ	Max	Units
Input current (full load/no load)	Single				
	• 3.3V output		238/5	245/12	mA
	• 5V output		305/5	313/12	mA
	• others		305/10	313/16	mA
Dual	• ±5V output		312/12	320/16	mA
	• ±9/±12/±15V output		301/12	309/16	mA
	• ±24V output		305/12	313/16	mA
	Reflected ripple current		50		mA
Surge voltage	1 sec. max	-0.7		50	VDC
Starting voltage				9	VDC
Input under voltage protection		5.5	6.5		VDC
Input filter	Capacitance filter				
Hot plug	Unavailable				
Ctrl*	Module switch on			Ctrl open circuit or connected to TTL high level (3.5-12VDC)	
	Module switch off			Ctrl pin connected to GND or low level (0-1.2VDC)	
	Input current when switched off		6	10	mA

* The voltage of Ctrl pin is relative to input pin GND.

Note:

- All specifications measured at Ta = 25°C, humidity <75%, nominal input voltage and rated output load unless otherwise specified.
- In this datasheet, all the test methods of indications are based on corporate standards.

Output specifications

Item	Test condition	Min	Typ	Max	Units
Voltage accuracy	5%-100% load		±1	±2	%
Voltage accuracy (Dual output)	5%-100% load • Vo1 • Vo2		±1.5	±2	%
			±2	±3	%
Line regulation (Single output)	Vin=min to max, full load		±0.5	±1	%
Line regulation (Dual output)	Vin=min to max, full load • Vo1 • Vo2		±0.5	±1	%
			±1.0	±1.5	%
Load regulation	5% to 100% full load		±0.5	±1.5	%
Load regulation	5% to 100% full load • Vo1 • Vo2		±0.8	±1.5	%
			±1.2	±2	%
Cross Regulation	25% load step change (Dual output)			±5	%
Transient recovery time	25% load step change • Single output • Dual output		300	500	µs
			450	500	µs
Transient response deviation (Single output)	25% load step change • 3.3V/5V output • others		±5	±8	%
			±8	±5	%
Transient response deviation (Dual output)	25% load step change • 5V output • others		±5	±8	%
			±3	±5	%
Temperature coefficient	full load			±0.03	%/°C
Ripple & Noise	20MHz Bandwidth		50	100	mVp-p
Ripple & Noise	20MHz bandwidth, 5% -100% load		120	150	mVp-p
Output over current protection	Input voltage range	110	160	230	%Io

- At 0%~5% load, the Vo1 Max. output voltage accuracy is ±3%, the Vo2 Max. output voltage accuracy is ±5%.
- At 0%~100% load, the Vo1 regulation for 0%~100% load is ±4%, the Vo2 regulation for 0%~100% load is ±4.5%.
- Ripple & Noise at ≤ 5% load is no more than 180mV. The "parallel cable" method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information.

Example:

6S8W4_2405S1.6RP

6 = 6Watt; 8 = SIP8; W4 = wide input 4:1; 24 = 9-36Vin; 05 = 5Vout; S = Single Output; 1.6 = 1600VDC; R = Regulated Output; P = Short Circuit Protection

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EMC specifications				
EMI	CE	CISPR22/EN55032 CLASS B (see EMC recommended circuit)		
EMI	RE	CISPR22/EN55032 CLASS B (see EMC recommended circuit)		
EMS	ESD	IEC/EN61000-4-2	Contact $\pm 4\text{KV}$	perf. Criteria B
EMS	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
EMS	EFT	IEC/EN61000-4-4	$\pm 2\text{KV}$	perf. Criteria B (see EMC recommended circuit)
EMS	Surge	IEC/EN61000-4-5	line to line $\pm 2\text{KV}$	perf. Criteria B (see EMC recommended circuit)
EMS	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A

Isolation specifications					
Item	Test condition	Min	Typ	Max	Units
Isolation voltage	Tested for 1 second • Single output • Dual output	1600			VDC
		1500			VDC
Isolation resistance	500VDC, input to output	1000			M Ω
Isolation capacitance	Input/Output, 100KHz/0.1V		1000		pF

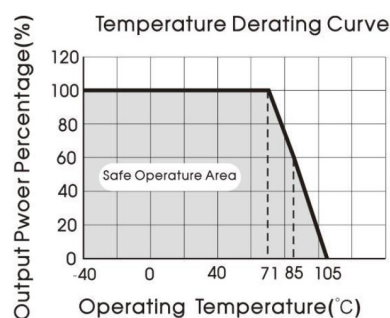
Product Selection Guide

Part Number	Input Voltage [VDC]			Output Voltage [VDC]	Output Current [mA, max.]	Efficiency [%, typ.]	Capacitive Load [max.]
	Nominal	Range	Max				
6S8W4_2403S1.6RP	24	9-36	40	3.3	1350	78	1800
6S8W4_2405S1.6RP	24	9-36	40	5	1200	82	1000
6S8W4_2409S1.6RP	24	9-36	40	9	667	84	470
6S8W4_2412S1.6RP	24	9-36	40	12	500	86	470
6S8W4_2415S1.6RP	24	9-36	40	15	400	87	220
6S8W4_2424S1.6RP	24	9-36	40	24	250	85	100

Part Number	Input Voltage [VDC]			Output Voltage [VDC]	Output Current [mA, max./min.]	Full Load Efficiency [%, min./typ.]	Capacitive Load [max.]
	Nominal	Range	Max				
6S8W4_2405D1.6RP	24	9-36	40	± 5	± 600	82	1000
6S8W4_2409D1.6RP	24	9-36	40	± 9	± 333	84	470
6S8W4_2412D1.6RP	24	9-36	40	± 12	± 250	86	470
6S8W4_2415D1.6RP	24	9-36	40	± 15	± 200	87	220
6S8W4_2424D1.6RP	24	9-36	40	± 24	± 125	85	100

Typical characteristics

Single



Dual

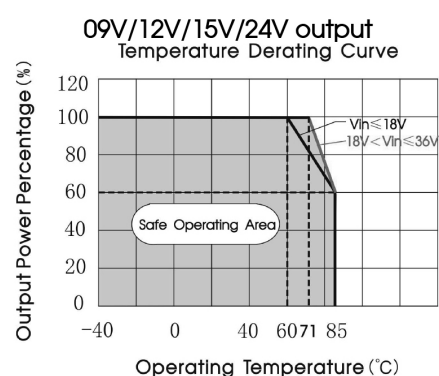
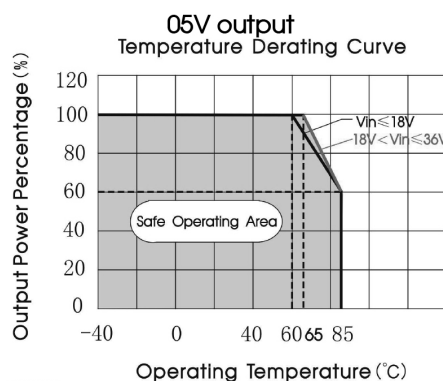
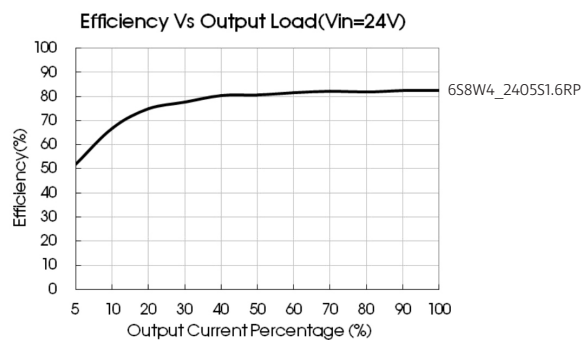
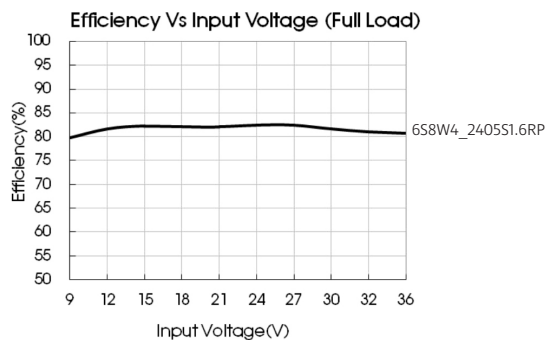


Fig. 1

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Efficiency



Typical application

All the DC/DC converters of this series are tested according to the recommended circuit (below) before delivery.

If it is required to further reduce input and output ripple, properly increase the input & output of additional capacitors C_{in} and C_{out} or select capacitors of low equivalent impedance provided that the capacitance is no larger than the max. capacitive load of the product.

Single output



$C_{in}(\mu F)$	$C_{out}(\mu F)$
100	22

Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values C_{in} and C_{out} 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.

Dual output

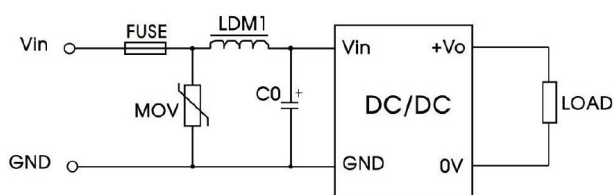


$C_{in}(\mu F)$	$C_{out}(\mu F)$
100	22

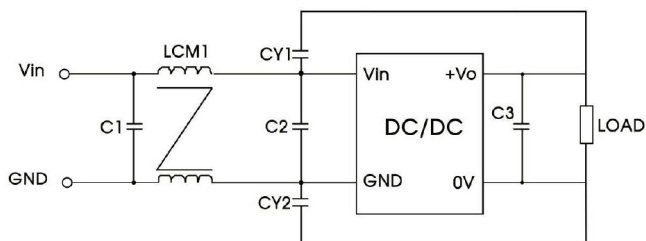
Fig. 2

EMC solution recommended circuit

Single output



Parameter description	
Model	$V_{in}: 24V$
FUSE	Choose according to actual input current
MOV	S20K30
C0	680 μF /50V
LDM1	82 μH



Parameter description	
Model	$V_{in}: 24V$
C1/C2	10 μF /50V
C3	22 μF /50V
LCM1	1.4-1.7mH (TN150P-RH 12.7*12.7*7.9)
CY1/CY2	1nF/400VAC

Fig. 2

It is not allowed to connect modules output in parallel to enlarge the power.

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EMC solution recommended circuit

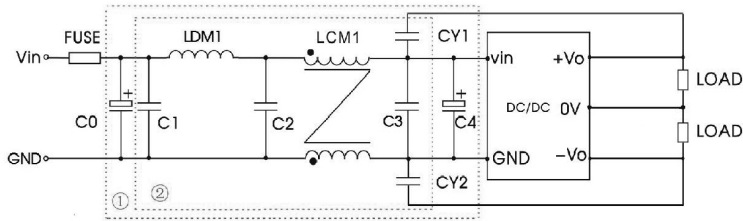
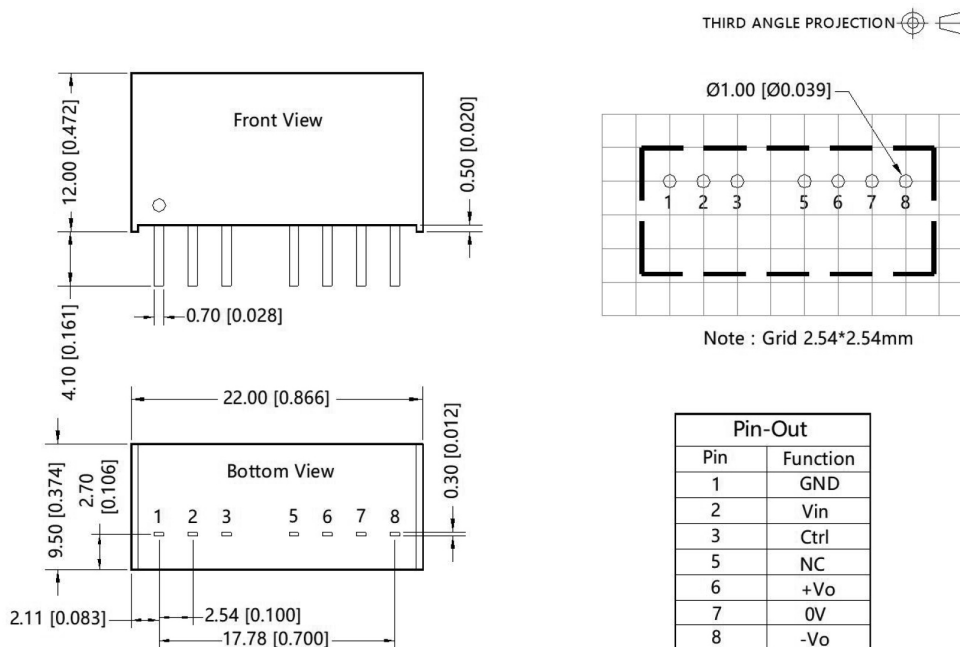


Fig. 3

Notes: For EMC tests we use Part 1 in Fig. 3 for immunity and part 2 for emissions test. Selecting based on needs

Parameter description	
FUSE	Choose according to actual input current
C0, C4	330μF/100V
C1, C2, C3	10μF/50V
LDM1	10μH
LCM1	1.4-1.7mH (TN150P-RH12.7*12.7*7.9)
CY1, CY2	1nF/2KV

Mechanical dimensions



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