6DAW4_1.5 series

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



DC-DC Converter 6 Watt

- Efficiency up to 88%
- 4:1 wide input voltage range
- 1.5kVDC isolation test voltage
- No-load power consumption as low as 0.12W
- UL60950, EN60950, IEC60950 approved
- Meets EN62368 standard
- Operating temperature: -40°C ~ +85°C
- Input under-voltage
- Over-voltage protection
- Over-current protection
- Meet CISPR32/EN55032 CLASS A
- Industry standard pin-out
- Meets EN50155 railway standard

The 6DAW4_1.5 series of isolated 6W DC-DC converter products with an ultra-wide range of voltage input of 9-36VDC (24VDC input), 18-75VDC (48VDC input), input to output isolation is tested with 1500VDC, output over-voltage protection and output short-circuit protection.

They meet CLASS A of CISPR32/EN55032 EMI standards without external components and they are widely used in fields such as industrial control, electric power, instruments, communication. and railway applications.

Common specifications

Short circuit protection:	Continuous, automatic recovery
Cooling:	Free air convection
Operation temperature range: (power derating above 71°C)	-40°C~+85°C
Storage temperature range:	-55°C ~ +125°C
Lead temperature range:	300°C MAX, 1.5mm from case for 10 sec
Maximum case temperature:	105°C (Operating Temperature curve range)
Storage humidity range:	< 95% (non condensing)
Vibration:	-55Hz, 10G, 30 Min. along X, Y and Z
Switching frequency:	300KHz TYP (PWM mode)
Case material:	Aluminium alloy
MTBF (M1L-HDBK-217F):	>1,000,000 hours
Weight:	12g
Dimensions:	32.00 × 20.00 × 10.80mm

Input specifications

Item	Test condition	Min	Typ	Max	Units
Input current (full load/no load)	• 24VDC input • 48VDC input		316/5 156/4	325/12 160/8	mA mA
Reflected ripple current			20		mA
Input impulse voltage (1sec. max.)	• 24VDC input • 48VDC input	-0.7 -0.7		50 100	VDC VDC
Starting voltage	• 24VDC input • 48VDC input			9 18	VDC VDC
Under-voltage turn-off	• 24VDC input • 48VDC input	5.5 12	6.5 15.5		VDC VDC
Input filter	Pi				
Hot plug	Unavailable				

Isolation specifications

Item	Test condition	Min	Typ	Max	Units
Isolation voltage	Tested for 1 minute and 1mA max	1500			VDC
Isolation resistance	Test at 500VDC	1000			MΩ
Isolation capacitance	Input/Output 100KHz/0.1V		1000		pF

Output specifications

Item	Test condition	Min	Typ	Max	Units
Output voltage accuracy			±1	±3	%
Output voltage balance	Dual output, balance load		±0.5	±1.5	%
Line regulation	Full load, Input voltage from low to high • positive output • negative output		 ±0.2 ±0.5	 ±0.5 ±1	 % %
Load regulation	5% to 100% load • positive output • negative output		 ±0.5 ±0.5	 ±1 ±1.5	 % %
Cross regulation	Dual output, main circuit with 50% load, auxiliary circuit with 10%-100% load			±0.5	%
Temperature drift	100% full load			±0.03	%/°C
Ripple&Noise*	20MHz Bandwidth			85	mVp-p
Transient recovery time	25% load step change		300	500	µs
Transient response deviation	25% load step change • 3.3V, 5V, ±5V output • others		 ±5 ±3	 ±8 ±5	 % %
Over voltage protection	Input voltage range	110		160	%Vo
Over current protection	Input voltage range	110	140	190	%Io

* Ripple and noise tested by "parallel cable" method. See detailed operation instructions at Testing of Power Converter section, application notes.

Example:
6DAW4_2405D1.5
6 = 6Watt; D = DIP; A = series; W4 = wide input (4:1); 24 = 9-36Vin;
05 = 5Vout; D = Dual Output; 1.5 = 1500VDC isolation

Note:
1. The load shouldn't be less than 10%, otherwise ripple will increase dramatically.
2. Operation under 10% load will not damage the converter; However, they may not meet all specifications listed.
3. All specifications measured at Ta = 25°C, humidity <75%, nominal input voltage and rated output load unless otherwise specified.
4. In this datasheet, all the test methods of indications are based on corporate standards.
5. Only typical models listed, other models may be different, please contact our technical person for more details.

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Specifications subject to change without notice.

EMC specifications					
EMI	CE	CISPR32/EN55032 CLASS A (without external circuit) CLASS B (External Circuit Refer to EMC recommended circuit ②)			
EMI	RE	CISPR32/EN55032 CLASS A (without external circuit) CLASS B (External Circuit Refer to recommended circuit ②)			
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	perf. Criteria B	(External Circuit Refer to recommended circuit ①)
EMS	Surge	IEC/EN61000-4-5	±2KV	perf. Criteria B	(External Circuit Refer to recommended circuit ①)
EMS	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A	
EMS	Voltage dips, short and interruptions immunity	IEC/EN61000-4-29	0%-70%	perf. Criteria B	

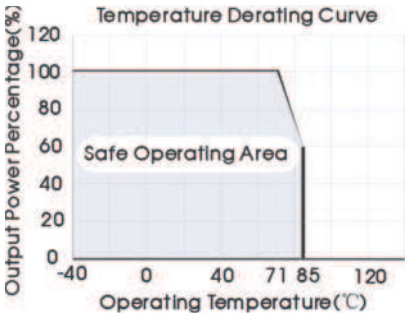
Product Selection Guide

Part Number	Input Voltage [VDC] Nominal	Range	Max*	Output Voltage [VDC]	Output current [mA] Max	Min	Capacitive load [µF, Max.]	Efficiency** [%, Typ.]
6DAW4_2403S1.5	24	9-36	40	3.3	1500	0	1800	79
6DAW4_2405S1.5	24	9-36	40	5	1200	0	1000	83
6DAW4_2409S1.5	24	9-36	40	9	667	0	1000	84
6DAW4_2412S1.5	24	9-36	40	12	500	0	470	87
6DAW4_2415S1.5	24	9-36	40	15	400	0	220	88
6DAW4_2424S1.5	24	9-36	40	24	250	0	100	87
6DAW4_4803S1.5	48	18-75	80	3.3	1500	0	1800	80
6DAW4_4805S1.5	48	18-75	80	5	1200	0	1000	84
6DAW4_4809S1.5	48	18-75	80	9	667	0	680	85
6DAW4_4812S1.5	48	18-75	80	12	500	0	470	87
6DAW4_4815S1.5	48	18-75	80	15	400	0	220	88
6DAW4_4824S1.5	48	18-75	80	24	250	0	100	87

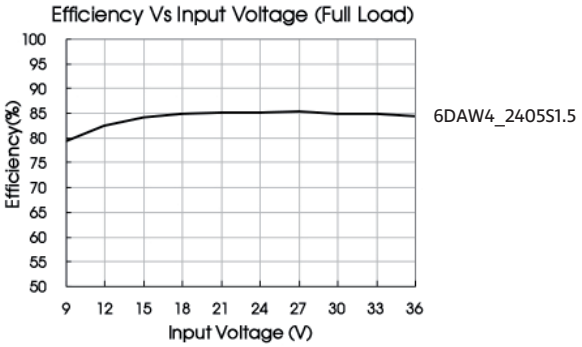
Part Number	Input Voltage [VDC] Nominal	Range	Max*	Output Voltage [VDC]	Output current [mA] Max	Min	Capacitive load [µF, Max.]	Efficiency** [%, Typ.]
6DAW4_2405D1.5	24	9-36	40	±5	±600	0	680	83
6DAW4_2409D1.5	24	9-36	40	±9	±333	0	220	86
6DAW4_2412D1.5	24	9-36	40	±12	±250	0	330	87
6DAW4_2415D1.5	24	9-36	40	±15	±200	0	220	88
6DAW4_2424D1.5	24	9-36	40	±24	±125	0	100	87
6DAW4_4805S1.5	48	18-75	80	±5	±600	0	680	83
6DAW4_4812D1.5	48	18-75	80	±12	±250	0	330	87
6DAW4_4815D1.5	48	18-75	80	±15	±200	0	220	88

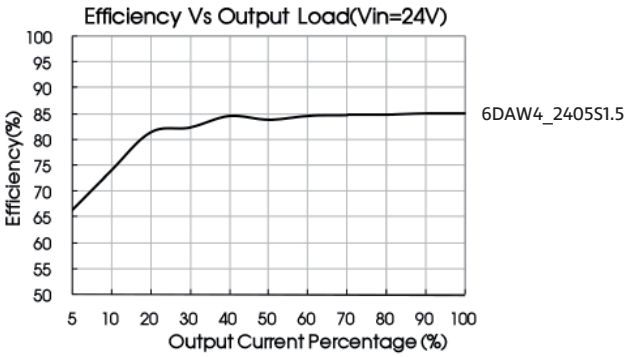
* Input voltage can't exceed this value, or it will cause permanent damage.
** Efficiency is measured In nominal input voltage and rated output load.

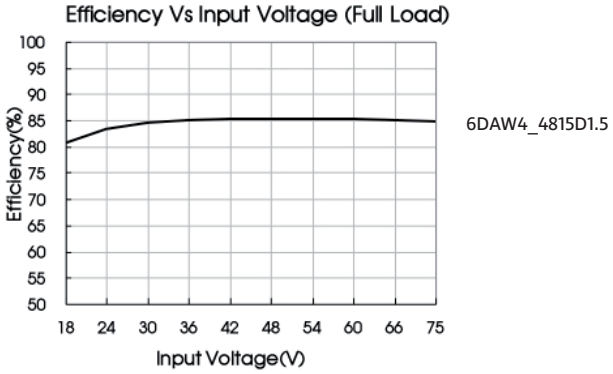
Typical characteristics

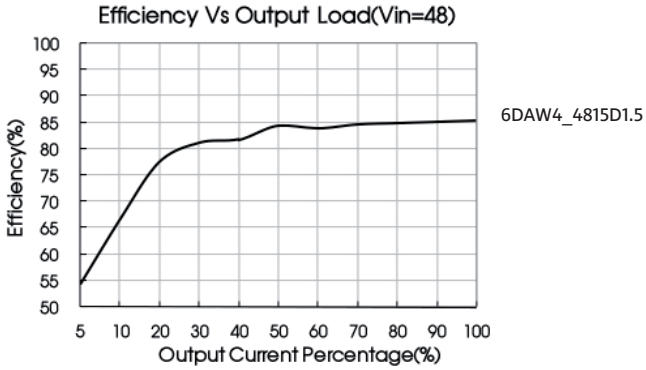


Efficiency









Recommended circuit

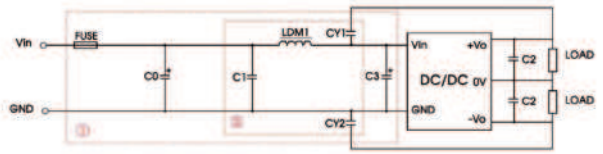


Fig. 2

Vin(VDC)	Cin	Vo(VDC)	Cout
24	100μF/50V	3.3/5/9/±5/±9	10μF/16V
		12/15/±12/±15	10μF/25V
		24/±24	10μF/50V
48	10μF/100V~47μF/100V	3.3/5/9/±5	10μF/16V
		12/15/±12/±15	10μF/25V
		24	10μF/50V

2. EMC compliance circuit

Dual output:



Single output:

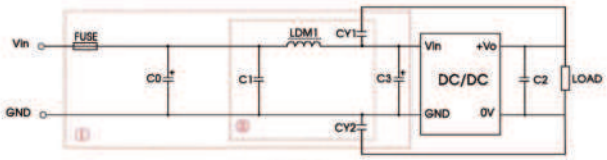


Fig. 3

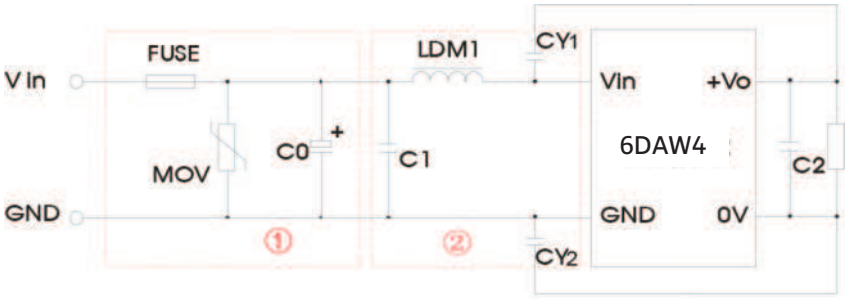
Notes: For EMC tests we use Part ① in Fig. 3 for immunity and part ② for emissions test. Selecting based on needs.

Parameter description:

Model	Vin:24VDC	Vin:48VDC
FUSE	Choose according to actual input current	
C0/C3	330μF/50V	330μF/100V
C1	1μF/50V	1μF/100V
C2	Refer to the Cout in Fig.2	
LDM1	4.7μH	
CY1/CY2	1nF/2KV	

All the DC/DC converters of this series are tested according to the recommended circuit before delivery.
If it is required to further reduce input and output ripple, properly increase the input & output of additional capacitors Cin and Cout or select capacitors of low equivalent impedance provided that the capacitance is no larger than the max. capacitive load of the product.

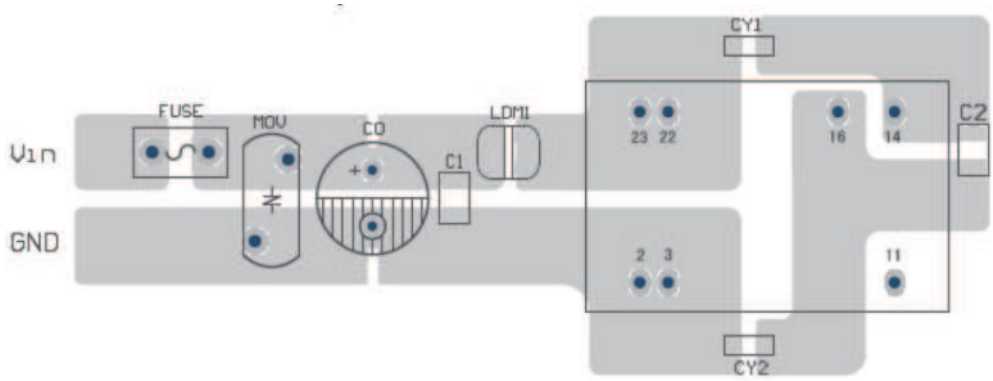
EMC recommended circuit



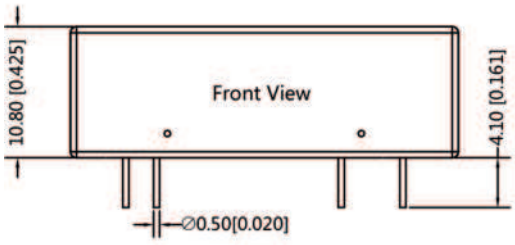
Part ① is for EMS test, part ② is for EMI filtering; parts ①
can be added based on actual requirement.

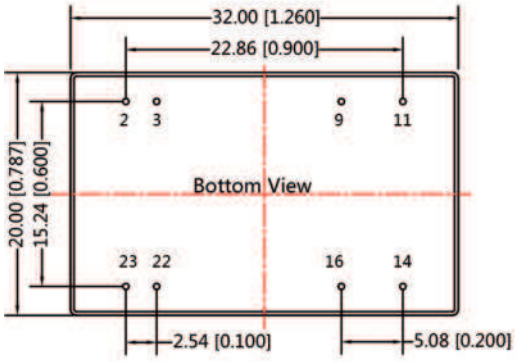
Parameters	Vin: 24V	Vin: 48V
FUSE	Choose according to practical input current	
MOV	S14K35	S14K60
LDM1	56µH	
C0	330µF/50V	330µF/100V
C1	1µF/50V	1µF/100V
C2	Refer to the Cout in recommended circuit	
LDM1	4.7µH	
CY1	1nF/2kV	
CY2	1nF/2kV	

EMC recommended circuit PCB layout

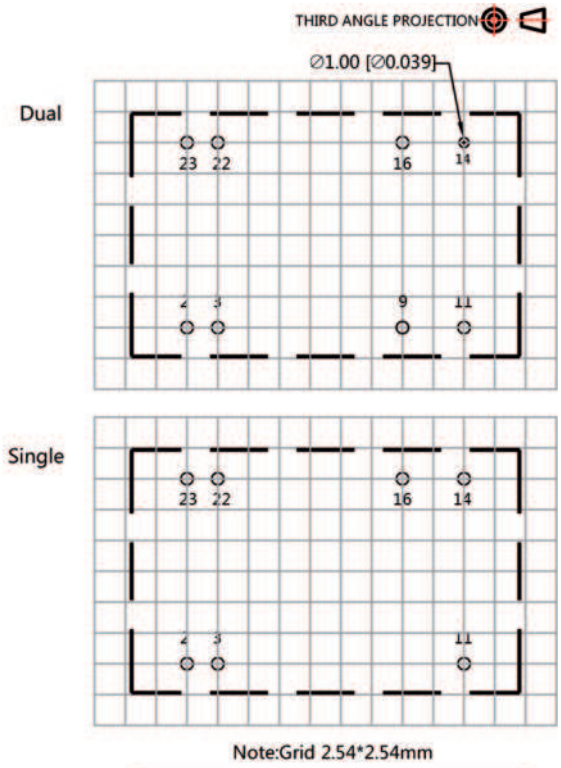


Mechanical dimensions and footprint





Note:
Unit: mm[inch]
Grid: 2.54*2.54mm.
Pin section tolerances: ±0.10mm [±0.004inch]
General tolerances: ±0.25mm [±0.010inch]



Note:Grid 2.54*2.54mm

Pin	Single	Dual
2,3	GND	GND
9	No Pin	0V
11	NC	-Vo
14	+Vo	+Vo
16	0V	0V
22,23	Vin	Vin

NC: No Connection