



## 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.



UL-60950-1 (E347551)

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 (MIL-HDBK-217F):	>1,000,000 hours
Weight:	12g
Dimensions:	32.00 × 20.00 × 10.80mm

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	±1	%	
			±0.5	±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	±8	%	
			±3	±5	%	
Over voltage protection	Input voltage range	110		160	%Vo	
Over current protection	Input voltage range	110	140	190	%Io	

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

\* 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:

- The load shouldn't be less than 10%, otherwise ripple will increase dramatically.
- Operation under 10% load will not damage the converter; However, they may not meet all specifications listed.
- 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.
- Only typical models listed, other models may be different, please contact our technical person for more details.

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	

## 6DAW4\_1.5 series

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

EMC specifications				
EMI	CE	CISPR32/EN55032 CLASS A (without external circuit) CLASS B (External Circuit Refer to EMC recommended circuit <sup>(2)</sup> )		
EMI	RE	CISPR32/EN55032 CLASS A (without external circuit) CLASS B (External Circuit Refer to recommended circuit <sup>(2)</sup> )		
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 <sup>(1)</sup> )
EMS	Surge	IEC/EN61000-4-5	±2KV	perf. Criteria B (External Circuit Refer to recommended circuit <sup>(1)</sup> )
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

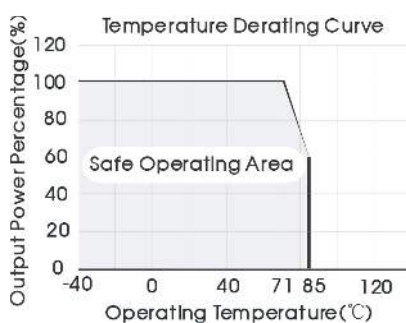
Part Number	Input Voltage [VDC]			Output Voltage [VDC]	Output current [mA]		Capacitive load [µF, Max.]	Efficiency** [%, Typ.]
	Nominal	Range	Max*		Max	Min		
6DAW4_2403S1.5	24	9-36	40	3.3	1500	0	1800	79
6DAW4_2405S1.5	24	9-36	40	5	1200	0	1000	83
6DAW4_2409S1.5	24	9-36	40	9	667	0	1000	84
6DAW4_2412S1.5	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]			Output Voltage [VDC]	Output current [mA]		Capacitive load [µF, Max.]	Efficiency** [%, Typ.]
	Nominal	Range	Max*		Max	Min		
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.

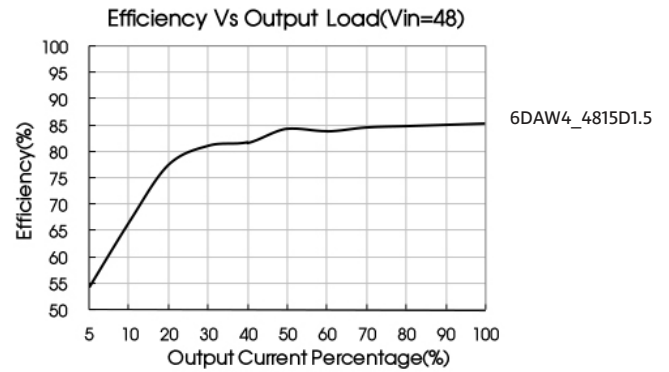
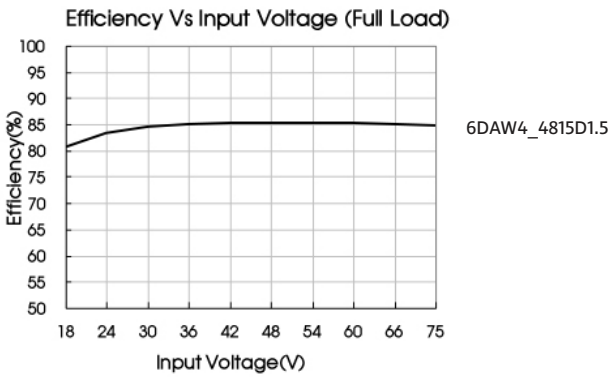
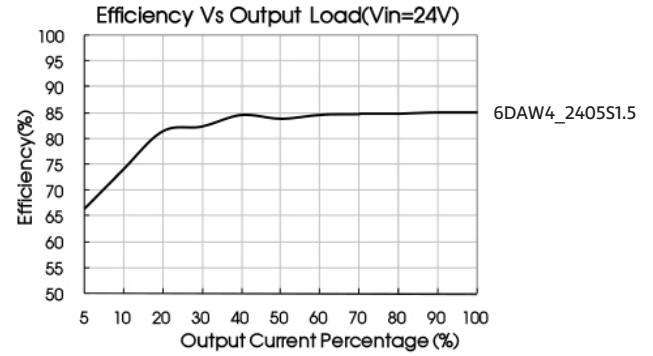
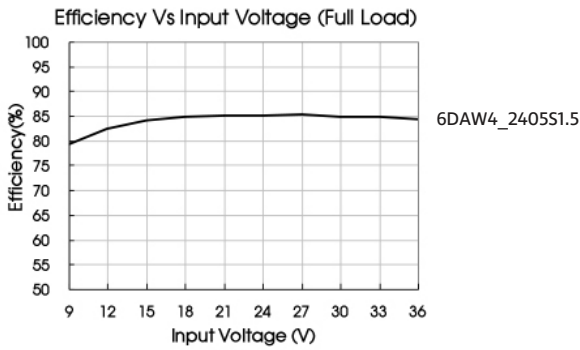
## Typical characteristics



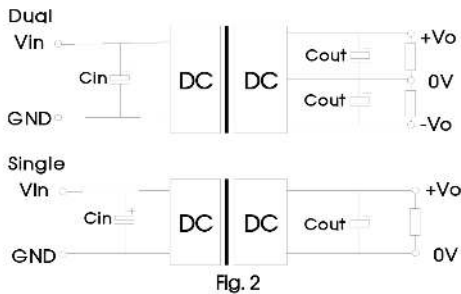
# 6DAW4\_1.5 series

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

## Efficiency



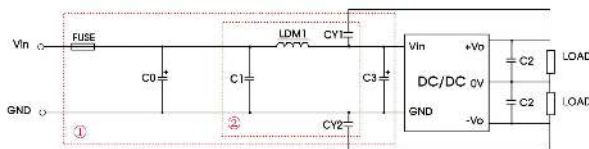
## Recommended circuit



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:

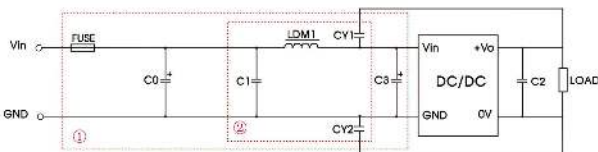


Fig. 3

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	

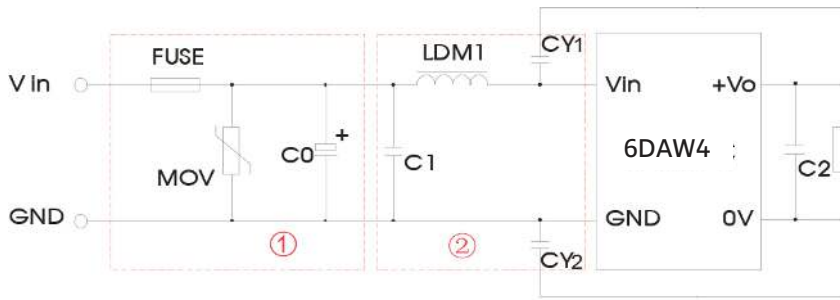
All the DC/DC converters of this series are tested according to the recommended circuit before delivery.

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.

## 6DAW4\_1.5 series

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

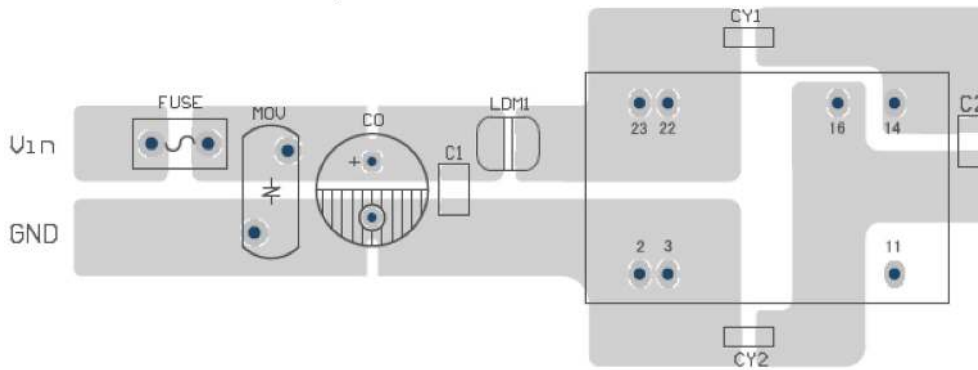
### EMC recommended circuit



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	56 $\mu$ H	
C0	330 $\mu$ F/50V	330 $\mu$ F/100V
C1	1 $\mu$ F/50V	1 $\mu$ F/100V
C2	Refer to the Cout in recommended circuit	
LDM1	4.7 $\mu$ H	
CY1	1nF/2kV	
CY2	1nF/2kV	

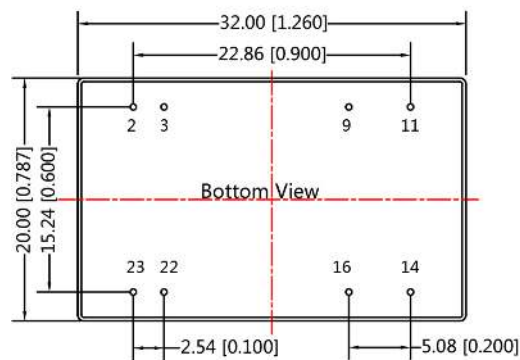
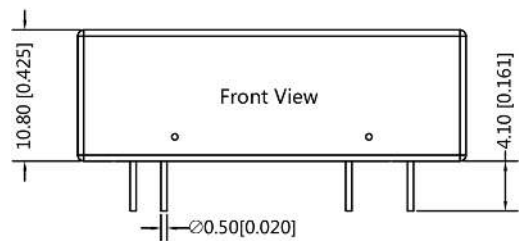
### EMC recommended circuit PCB layout



## 6DAW4\_1.5 series

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

### Mechanical dimensions and footprint



**Note:**

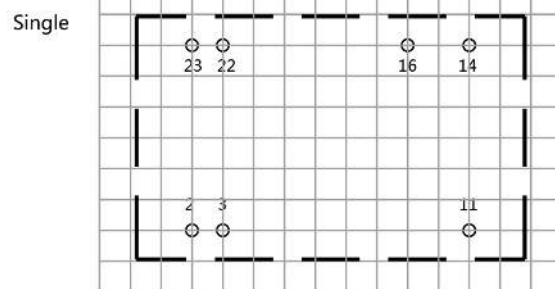
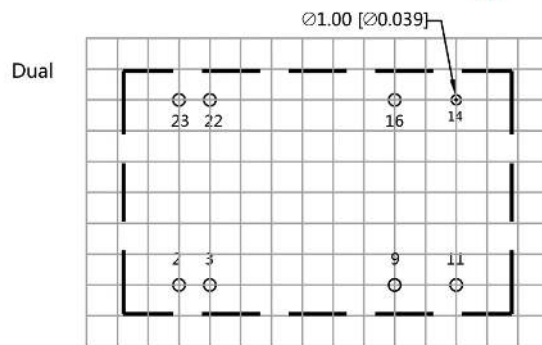
Unit: mm[inch]

Grid: 2.54\*2.54mm.

Pin section tolerances:  $\pm 0.10\text{mm}$  [ $\pm 0.004\text{inch}$ ]

General tolerances:  $\pm 0.25\text{mm}$  [ $\pm 0.010\text{inch}$ ]

THIRD ANGLE PROJECTION



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