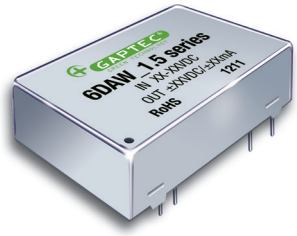
6DAW_1.5 series

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



DC-DC Converter 6 Watt

- Efficiency up to 88%
- 2:1 wide input voltage range
- 1.5kVDC input/output isolation
- Short circuit protection (SCP)
- Low ripple & noise
- International standard pin-out
- EN62368 approved
- Operating temperature: -40°C ~ +85°C
- Input under-voltage, over-current, over-voltage protection
- Meet CISPR32/EN55032 CLASS A, without extra components (except for 5VDC input)

The 6DAW_1.5 series are products of 6W output power, wide range of voltage input of 4.5-9VDC, 9-18VDC, 18-36VDC, 36-75VDC, isolation voltage of 1500VDC, input under-voltage protection, output over-voltage, over-current, short circuit protection and EMI meets CISPR32/EN55032 CLASS A without external components (except for 5VDC input); these products are widely used in fields such as industrial control, electric power, instruments and communication.

Common specifications

Short circuit protection:	Continuous, automatic recovery
Cooling:	Free air convection
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%
Vibration:	10-150Hz, 5G, 30 Min. along X, Y and Z
Switching frequency:	300KHz, PWM mode
Case material:	Aluminium alloy
MTBF (M1L-HDBK-217F @25°C):	>1,000,000 hours
Weight:	5VDC: 12g / Others: 14g
Dimensions:	32.00 × 20.00 × 10.80mm

Input specifications

Item	Test condition	Min	Typ	Max	Units
Input current (full load/no load)	5VDC input				
	• 5V/±5V output		1538/10	1578/30	mA
	• others		1428/10	1463/30	mA
	12VDC input				
	• 3.3V output		550/7	566/25	mA
	• others		607/7	641/25	mA
	24VDC input				
	• 3.3V output		265/7	272/25	mA
	• others		296/7	313/25	mA
	48VDC input				
	• 3.3V output		131/7	134/25	mA
	• others		147/7	155/25	mA
Reflected Ripple Current	• 5VDC output		50		mA
	• others		20		mA
Surge voltage (1sec. max.)	• 5VDC input	-0.7		16	VDC
	• 12VDC input	-0.7		25	VDC
	• 24VDC input	-0.7		50	VDC
	• 48VDC input	-0.7		100	VDC
Start-up Voltage	• 5VDC input			4.5	VDC
	• 12VDC input			9	VDC
	• 24VDC input			18	VDC
	• 48VDC input			36	VDC
Under-voltage protection	• 5VDC input	3	3.5		VDC
	• 12VDC input	5.5	6.5		VDC
	• 24VDC input	13	15		VDC
	• 48VDC input	26	30		VDC
Input filter	Pi filter				
Hot plug	Unavailable				

Output specifications

Item	Test condition	Min	Typ	Max	Units
Output voltage accuracy [1]	5VDC, 0%-100% load				
	• positive output		±1	±2	%
	• negative output		±1	±3	%
	others, 5%-100% load				
	• positive output		±1	±3	%
	• negative output		±1	±3	%
Line regulation (at full load)	Input voltage low to high				
	• positive output		±0.2	±0.5	%
	• negative output		±0.5	±1	%
Load regulation [2]	5VDC, 0%-100% load				
	• positive output			±1	%
	• negative output			±1.5	%
	others, 5%-100% load				
	• positive output		±0.5	±1	%
	• negative output		±0.5	±1.5	%
Cross regulation	Dual output, primary output 50% loading, auxiliary output 10%-100% loading			±5	%
Transient Recovery Time	25% load step change		300	500	µs
Transient Response Deviation	25% load step change				
	• 3.3V, 5V, ±5V output		±5	±8	%
	• others		±3	±5	%
Temperature coefficient	Full load			±0.03	%/°C
Ripple&Noise [3]	20MHz Bandwidth			100	mVp-p
Over-voltage protection	Input voltage range	110		160	%Vo
Over-current protection	Input voltage range	110	140	190	%Io

1) At 0%~5% load, the max. output voltage accuracy of ±5VDC output converter is ±5%.
2) When testing from 0% to100%load working conditions load regulation index of ±5%
3) Ripple & Noise at < 5% load is 5%Vo max. The "parallel cable" method is used for Ripple and Noise test.

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

Example:
6DAW_2405D1.5
6 = 6Watt; D = DIP; A = series; W = wide input (2:1); 24 = 18-36Vin; 05 = 5Vout; D = Dual Output; 1.5 = 1500VDC isolation

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EMC specifications					
EMI	CE	5VDC input: CISPR32/EN55032 CLASS B (see EMC recommended circuit, ②) Others: CISPR32/EN55032 CLASS A (without external components) / CLASS B (see EMC recommended circuit, ②)			
EMI	RE	5VDC input: CISPR32/EN55032 CLASS B (see EMC recommended circuit, ②) Others: CISPR32/EN55032 CLASS A (without external components) / CLASS B (see EMC 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	(see EMC recommended circuit, ①)
EMS	Surge	IEC/EN61000-4-5	line to line ±2KV	perf. Criteria B	(see EMC recommended circuit, ①)
EMS	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A	

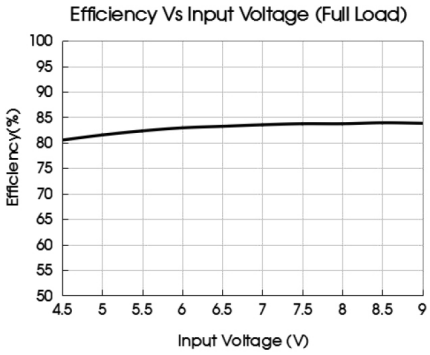
Product Selection Guide

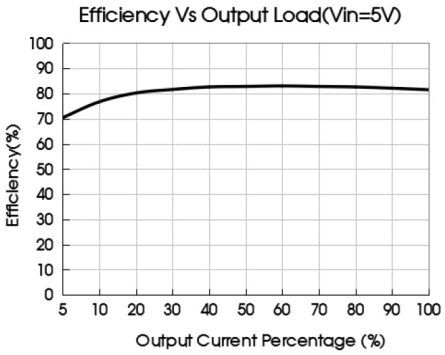
Part Number	Input Voltage [VDC]			Output Voltage [VDC]	Current [mA, max.]	Efficiency [2] [%, Typ.]	Capacitive load [3] [µF, max.]
	Nominal	Range	Max [1]				
6DAW_0505S1.5	5	4.5-9	12	5	1200	78	1000
6DAW_0512S1.5	5	4.5-9	12	12	500	84	470
6DAW_0515S1.5	5	4.5-9	12	15	400	84	220
6DAW_0524S1.5	5	4.5-9	12	24	250	84	100
6DAW_1203S1.5	12	9-18	20	3.3	1500	75	1800
6DAW_1205S1.5	12	9-18	20	5	1200	80	1000
6DAW_1212S1.5	12	9-18	20	12	500	84	470
6DAW_1215S1.5	12	9-18	20	15	400	85	220
6DAW_1224S1.5	12	9-18	20	24	250	85	100
6DAW_2403S1.5	24	18-36	40	3.3	1500	78	1800
6DAW_2405S1.5	24	18-36	40	5	1200	82	1000
6DAW_2412S1.5	24	18-36	40	12	500	85	470
6DAW_2415S1.5	24	18-36	40	15	400	86	220
6DAW_2424S1.5	24	18-36	40	24	250	86	100
6DAW_4803S1.5	48	36-72	80	3.3	1500	79	1800
6DAW_4805S1.5	48	36-72	80	5	1200	83	1000
6DAW_4812S1.5	48	36-72	80	12	500	87	470
6DAW_4815S1.5	48	36-72	80	15	400	88	220
6DAW_4824S1.5	48	36-72	80	24	250	87	100

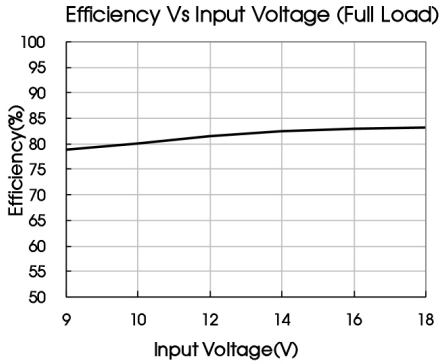
Part Number	Input Voltage [VDC]			Output Voltage [VDC]	Current [mA, max.]	Efficiency [2] [%, Typ.]	Capacitive load [3] [µF, max.]
	Nominal	Range	Max [1]				
6DAW_0505D1.5	5	4.5-9	12	±5	±600	78	1000
6DAW_0512D1.5	5	4.5-9	12	±12	±250	84	470
6DAW_0515D1.5	5	4.5-9	12	±15	±200	84	220
6DAW_0524D1.5	5	4.5-9	12	±24	±125	84	100
6DAW_1205D1.5	12	9-18	20	±5	±600	80	680
6DAW_1212D1.5	12	9-18	20	±12	±250	84	330
6DAW_1215D1.5	12	9-18	20	±15	±200	85	220
6DAW_1224D1.5	12	9-18	20	±24	±125	84	100
6DAW_2405D1.5	24	18-36	40	±5	±600	83	680
6DAW_2412D1.5	24	18-36	40	±12	±250	86	330
6DAW_2415D1.5	24	18-36	40	±15	±200	87	220
6DAW_2424D1.5	24	18-36	40	±24	±125	85	100
6DAW_4805D1.5	48	36-72	80	±5	±600	83	680
6DAW_4812D1.5	48	36-72	80	±12	±250	87	330
6DAW_4815D1.5	48	36-72	80	±15	±200	85	220
6DAW_4824D1.5	48	36-72	80	±24	±125	85	100

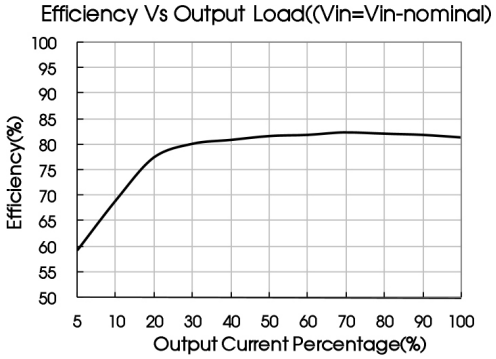
1) Exceeding the maximum input voltage may cause permanent damage;
2) Efficiency is measured In nominal input voltage and rated output load;
3) The specified maximum capacitive load for positive and negative output is identical.

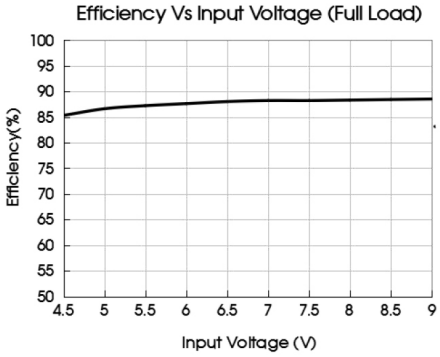
Efficiency

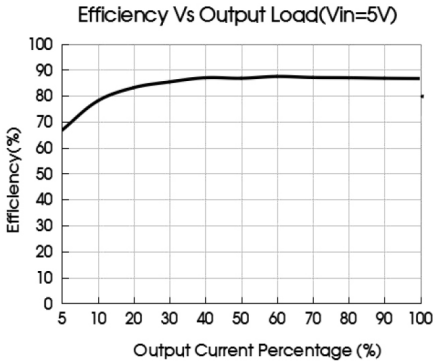

Efficiency Vs Input Voltage (Full Load)
Efficiency(%)
Input Voltage (V)

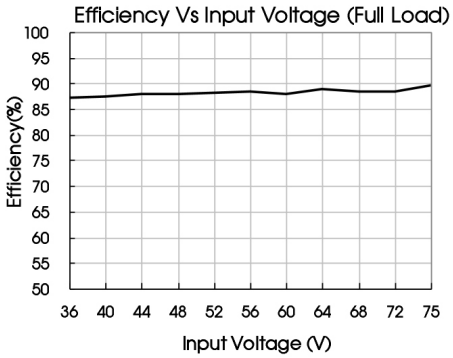

Efficiency Vs Output Load(Vin=5V)
Efficiency(%)
Output Current Percentage (%)

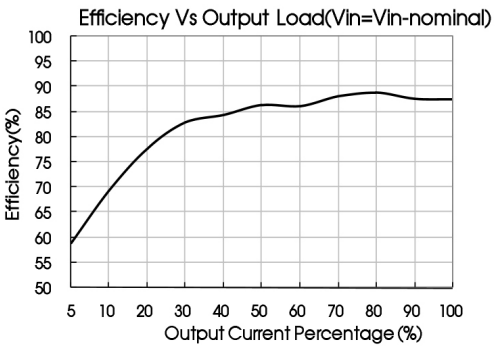

Efficiency Vs Input Voltage (Full Load)
Efficiency(%)
Input Voltage(V)


Efficiency Vs Output Load((Vin=Vin-nominal)
Efficiency(%)
Output Current Percentage(%)

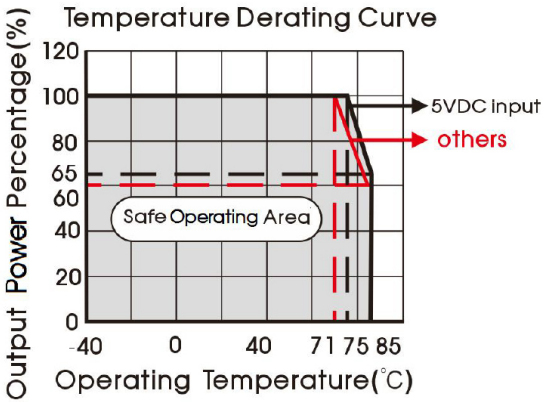

Efficiency Vs Input Voltage (Full Load)
Efficiency(%)
Input Voltage (V)


Efficiency Vs Output Load(Vin=5V)
Efficiency(%)
Output Current Percentage (%)


Efficiency Vs Input Voltage (Full Load)
Efficiency(%)
Input Voltage (V)

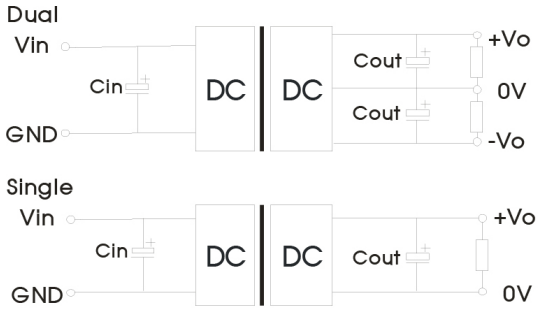

Efficiency Vs Output Load(Vin=Vin-nominal)
Efficiency(%)
Output Current Percentage (%)

Typical characteristics



Typical application

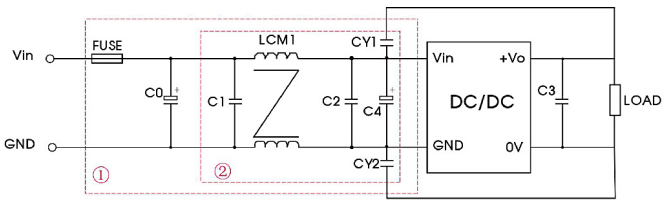
All the DC/DC converters of this series are tested according to the recommended circuit before delivery.
If it is required to further reduce input and output ripple, properly increase the input & output of additional capacitors Cin and Cout or select capacitors of low equivalent impedance provided that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



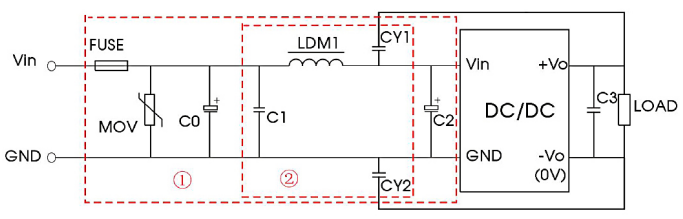
Vin(VDC)	Cin	Cout
5/12/24	100μF	10μF
48	10μF - 47μF	

EMC recommended circuit

5VDC input



12VDC/24VDC/48VDC input

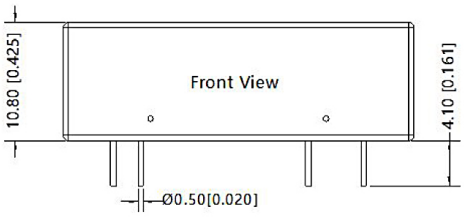


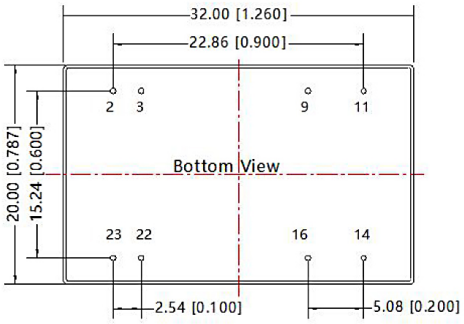
For EMC tests we use Part ① for immunity and part ② for emissions test.
Selecting based on needs.

Model	Vin: 5V
FUSE	Choose according to actual input current
C0	2200μF/35V
C1/C2	4.7μF/50V
C3	Refer to the Cout in Typical application
C4	100μF/35V
LCM1	2.2μH
CY1, CY2	2.2nF/2kV

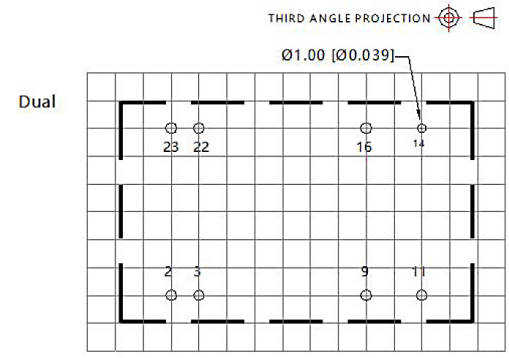
Model	Vin: 12V	Vin: 24V	Vin: 48V
FUSE	Choose according to actual input current		
MOV	S14K20	S20K30	S14K60
C0	1000μF/35V	1000μF/50V	680μF/100V
C1	1μF/50V		1μF/100V
C2	100μF/35V	100μF/50V	100μF/100V
C3	Refer to the Cout in recommended circuit		
LDM1	4.7μH		
CY1, CY2	1nF/2kV		

Mechanical dimensions





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



Note:Grid 2.54*2.54mm

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

* Note: 5V input product without 9th pin
NC: Pin to be isolated from circuit

Note:
1. The maximum capacitive load offered were tested at input voltage range and full load;
2. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta = 25°C, humidity <75%RH with nominal input voltage and rated output load;
3. All index testing methods in this datasheet are based on company corporate standards;
4. We can provide product customization service, please contact our technicians directly for specific information;
5. Products are related to laws and regulations: see „Features" and „EMC";
6. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.