



6DAW4_3 series

6W - Dual Output - 4:1 Ultra Wide Input - Isolated & Regulated
DIP DC-DC Converter

DC-DC Converter

6 Watt

- ⊕ High Efficiency up to 88%
- ⊕ Operating Temperature: -40°C to +85°C
- ⊕ Wide input range (4:1)
- ⊕ 3kVDC Input/Output Isolation
- ⊕ Short Circuit Protection (SCP)
- ⊕ IEC60950, UL60950, EN60950 approval
- ⊕ No-load power consumption as low as 0.12W
- ⊕ Over-voltage protection
- ⊕ Over-current protection
- ⊕ Input under-voltage protection
- ⊕ Meet CISPR32/EN55032 CLASS A
- ⊕ Industry standard pin-out
- ⊕ RoHS Compliance

The 6DAW4_3 series of isolated 6W DC-DC converter products with 4:1 input voltage. They feature efficiencies of up to 88%, 3000VDC input to output isolation, operating ambient temperature of -40°C to +85°C, input under-voltage protection, output short-circuit protection.

The products meet CLASS A of CISPR32/EN55032 EMI standards, they are widely used in applications such as industrial control, electrical power, instrumentation and telecommunication fields.



UL-60950-1 (E347551)

Common specifications

| | |
|--------------------------------|--|
| Short circuit protection: | Continuous, automatic recovery |
| Cooling: | Free air convection |
| Operation temperature range: | -40°C~+85°C / Derating if the temperature is $\geq 71^\circ\text{C}$ (see Typical characteristics) |
| Storage temperature range: | -55°C ~+125°C |
| Temperature rise at full load: | 40°C TYP |
| Lead temperature range: | 300°C MAX, 1.5mm from case for 10 sec |
| Vibration: | 10-55Hz, 10G, 30 Min. along X, Y and Z |
| Storage humidity range: | < 95% |
| Case material: | Plastic(UL94-V0) |
| MTBF (MIL-HDBK-217F@25°C): | >1,000,000 hours |
| Dimensions/Weight: | 31.60 × 20.30 × 10.20 mm - 13g (typ.) |

Input specifications

| Item | Test condition | Min | Typ | Max | Units |
|-------------------------------------|---|------|--------|--------|-------|
| Input current (full load / no load) | 24VDC input: • 3.3V output • other output | | 320/10 | 329/16 | mA |
| | | | 298/10 | 320/16 | mA |
| Reflected ripple current | 48VDC input: • 3.3V output • other output | | 158/4 | 162/7 | mA |
| | | | 147/4 | 154/7 | mA |
| Input impulse voltage (1sec. max.) | • 24VDC input • 48VDC input | -0.7 | | 50 | VDC |
| | | -0.7 | | 100 | VDC |
| Start-up voltage | • 24VDC input • 48VDC input | | | 9 | VDC |
| | | | | 18 | VDC |
| Under-voltage turn-off | • 24VDC input • 48VDC input | 5.5 | 6.5 | | VDC |
| | | 12 | 15.5 | | VDC |
| Starting time | Nominal input & constant resistance load | | 10 | | ms |
| Input filter | Pi | | | | |
| Hot plug | Unavailable | | | | |

Isolation specifications

| Item | Test condition | Min | Typ | Max | Units |
|-----------------------|---------------------------------|------|------|-----|-------|
| Isolation voltage | Tested for 1 minute and 1mA max | 3000 | | | 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 | • 5%-100% load • 0%-5% load Single output Dual output | | ±1 | ±3 | % | |
| | | | ±1 | ±3 | % | |
| | | | ±2 | ±5 | % | |
| Balance of output voltage | Dual output, balanced loa | | ±0.5 | ±1.5 | % | |
| Line regulation (at full load) | Input voltage from low to high • positive output • negative output | | ±0.2 | ±0.5 | % | |
| | | | ±0.5 | ±1 | % | |
| | | | | | | |
| Load regulation* | from 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 | | | ±5 | % | |
| Transient Recovery Time | 25% load step change | | 300 | 500 | μs | |
| Transient Response Deviation | 25% load step change | | ±3 | ±5 | % | |
| Temperature coefficient | full load | | | ±0.03 | %/°C | |
| Ripple & Noise** | 20MHz Bandwidth | | 85 | 120 | mVp-p | |
| Over-voltage protection | Input voltage range | 110 | | 160 | %Vo | |
| Over-current protection | Input voltage range • 24V output • others | | 110 | 220 | 290 | %Io |
| | | | 110 | 140 | 190 | %Io |
| | | | | | | |
| Switching frequency | PWM mode | | 300 | | KHz | |

* When testing from 0%-100% load, working conditions load regulation index of $\pm 5\%$

** 0%-5% load ripple&Noise is no more than 5%Vo. Test ripple and noise by "parallel cable" method. See detailed operation instructions at Testing of Power Converter section, application notes.

Example:

6DAW4_2405D3

6 = 6Watt; D = DIP; A = series; W4 = wide input (4:1) 9-36Vin;
24 = 24Vin; 05 = 5Vout; D = Dual Output; 3 = 3000VDC isolation

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EMC specifications

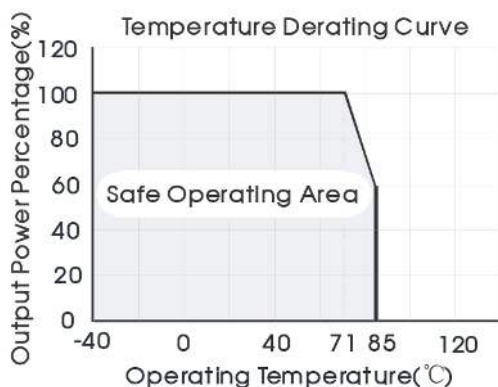
| | | | | | |
|-----|--------------|--|--------------|--|--|
| EMI | CE | CISPR32/EN55032 CLASS A (without external components) CLASS B (External Circuit Refer to EMC recommended circuit, 2) | | | |
| EMI | RE | CISPR32/EN55032 CLASS A (without external components) CLASS B (External Circuit Refer to 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 | IEC/EN61000-4-29 | 0%-70% | perf. Criteria B (short interruptions and voltage variations immunity) | |

Product Selection Guide

| Part Number | Input Voltage [VDC] | | Max* | Output Voltage [VDC] | Current [mA] | | Efficiency [% , Typ.] | Max. Capacitive Load [µF] |
|--------------|---------------------|-------|------|----------------------|--------------|-----|-----------------------|---------------------------|
| | Nominal | Range | | | Max | Min | | |
| 6DAW4_2405S3 | 24 | 9-36 | 40 | 5 | 1200 | 0 | 79 | 2200 |
| 6DAW4_2409S3 | 24 | 9-36 | 40 | 9 | 667 | 0 | 82 | 1000 |
| 6DAW4_2412S3 | 24 | 9-36 | 40 | 12 | 500 | 0 | 82 | 680 |
| 6DAW4_2415S3 | 24 | 9-36 | 40 | 15 | 400 | 0 | 84 | 680 |
| 6DAW4_2424S3 | 24 | 9-36 | 40 | 24 | 250 | 0 | 84 | 680 |
| 6DAW4_4803S3 | 48 | 18-72 | 80 | 3.3 | 1500 | 0 | 77 | 2200 |
| 6DAW4_4805S3 | 48 | 18-72 | 80 | 5 | 1200 | 0 | 81 | 2200 |
| 6DAW4_4812S3 | 48 | 18-72 | 80 | 12 | 500 | 0 | 85 | 680 |
| 6DAW4_4815S3 | 48 | 18-72 | 80 | 15 | 400 | 0 | 86 | 680 |
| 6DAW4_4824S3 | 48 | 18-72 | 80 | 24 | 250 | 0 | 85 | 680 |
| 6DAW4_2405D3 | 24 | 9-36 | 40 | ±5 | ±600 | 0 | 78 | 680 |
| 6DAW4_2412D3 | 24 | 9-36 | 40 | ±12 | ±250 | 0 | 81 | 330 |
| 6DAW4_2415D3 | 24 | 9-36 | 40 | ±15 | ±200 | 0 | 82 | 220 |

* Input voltage can't exceed this value, or it will cause permanent damage.

Typical characteristics



Typical application

All the DC-DC converters of this series are tested according to the recommended circuit (see Fig. 1) 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.

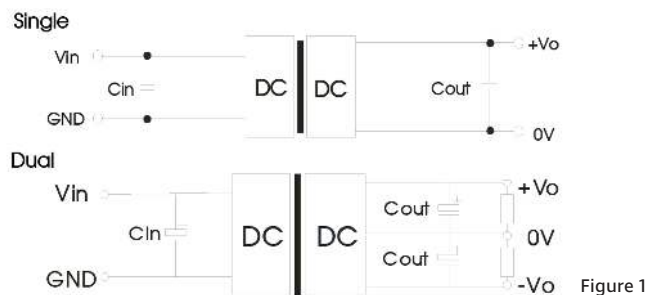


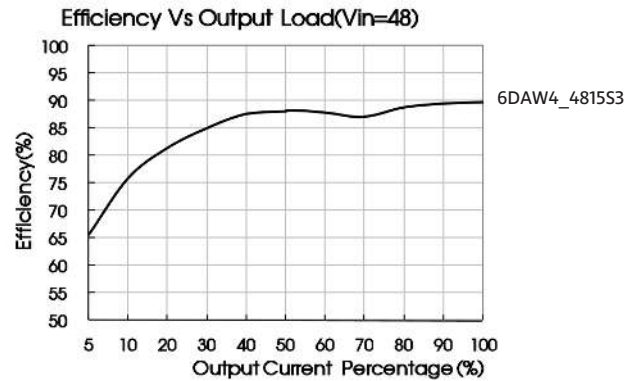
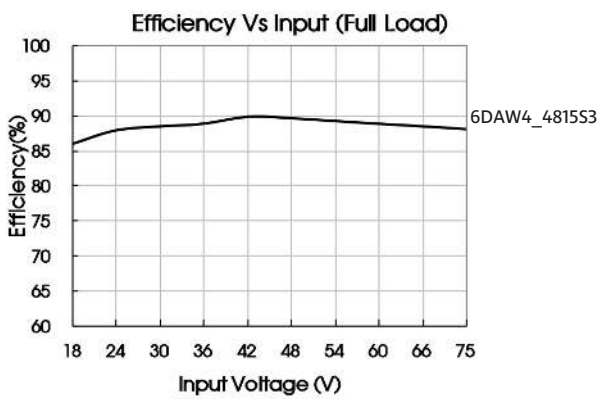
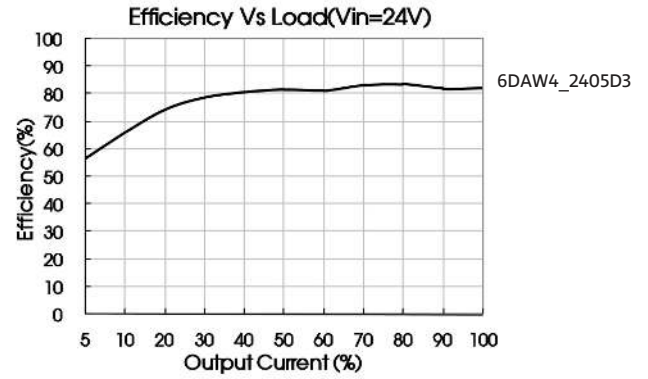
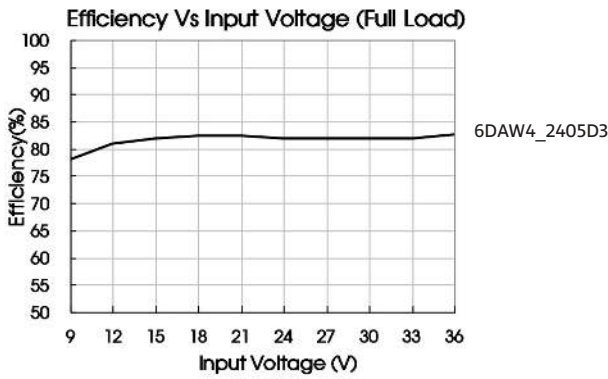
Figure 1

| Vin (VDC) | Cin (µF) | Cout (µF) |
|-----------|----------|-----------|
| 24 | 100 | 10 |
| 48 | 10~47 | 10 |

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Efficiency



EMC solution-recommended circuit

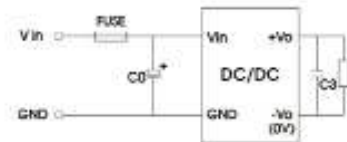
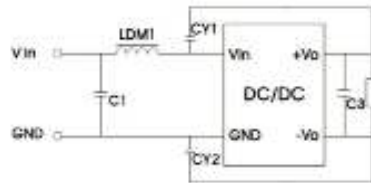
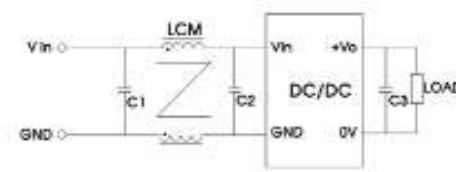


Fig. 3-1

Dual



Single



Notes: Part 1ⓐ is used for EMS test and part 2ⓑ for EMIfiltering; selected based on needs.

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

Dual

| Parameters | Vin: 24V |
|------------|--|
| FUSE | Choose according to actual input current |
| MOV | S20K30 |
| C0 | 1000μF/50V |
| C1 | 1μF/50V |
| C3 | Refer to the Cout in Typical application |
| LDM1 | 4.7μH |
| CY1, CY2 | 1nF/3KV |

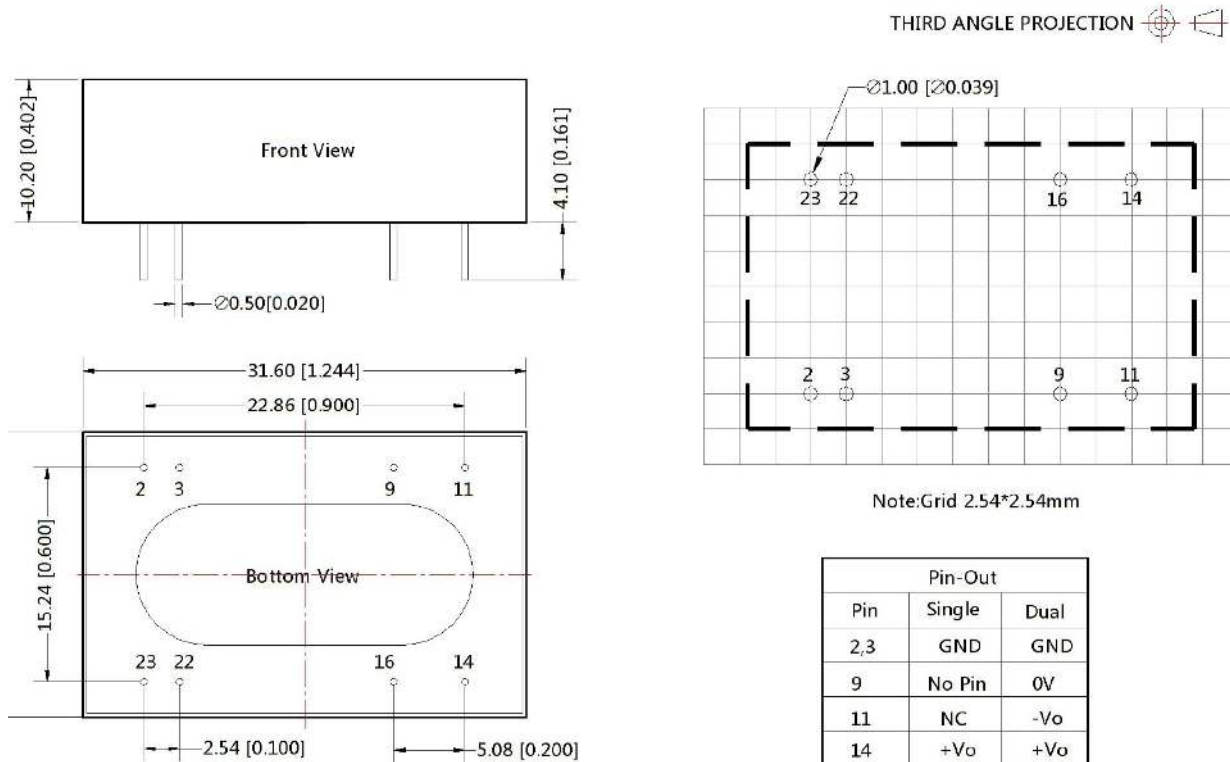
Single

| Parameters | Vin: 24V | Vin: 48V |
|------------|--|------------|
| FUSE | Choose according to actual input current | |
| MOV | S20K30 | S14K60 |
| C0 | 330μF/50V | 330μF/100V |
| C1, C2 | 2.2μF/50V | 2.2μF/100V |
| LCM | 2.2μH | |
| C3 | Refer to the Cout in Typical application | |

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Mechanical dimensions



Note:
Unit: mm[inch]
Pin diameter tolerances: $\pm 0.10\text{mm}$ [$\pm 0.004\text{inch}$]
General tolerances: $\pm 0.25\text{mm}$ [$\pm 0.010\text{inch}$]

Note:

1. The max. capacitive load should be tested within the input voltage range and under full load conditions;
2. Unless otherwise specified, data in this datasheet should be tested under the conditions of $T_a = 25\%$, humidity $< 75\%RH$ when inputting nominal voltage and outputting rated load;
3. The recommended unbalance degree of the dual output module load is $\leq \pm 5\%$; if the degree exceeds $\pm 5\%$, the product performance cannot be guaranteed to comply with all parameters in the datasheet. Please contact our technicians directly for specific information;
4. All index testing methods in this datasheet are based on our Company's corporate standards;
5. The performance indexes of the product models listed in this datasheet are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements, and please directly contact our technicians for specific information;
6. We can provide product customization service;
7. Specifications of this product are subject to changes without prior notice.