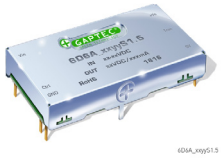
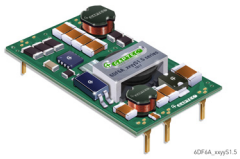
# 6D6AW_1.5RP series

6W Single Output - Wide Input - Isolated & Regulated
DIP PACKAGE





## DC-DC Converter 6 Watt

- Wide input voltage range
- 1.5kVDC/500VAC isolation
- High efficiency up to 86%
- Operation temperature range: -40°C ~ +85°C
- No-load power consumption as low as 0.12W
- Input under-voltage, over-current, over-voltage protection
- DIP package
- Industry standard pinout
- RoHS compliance

The 6D6AW_1.5RP series are isolated 6W DC-DC products with 2:1 input voltage, featuring 500VAC/500VDC isolation, input under-voltage protection, output over-voltage, over-current, and the series is short circuit protected.

This makes them widely applied in industrial control, electricity, instruments and communication fields.

### Common specifications

| | |
|---|---|
| Short circuit protection: | Continuous, automatic recovery |
| Cooling: | Free air convection |
| Operation temperature range: | -40°C to +85°C |
| Storage temperature range: | -55°C to +125°C |
| Lead temperature: | 300°C (1.5mm from case for 10 sec.) |
| Vibration: | 10-150Hz, 5G, 90 Min. along X, Y and Z |
| Storage humidity range: | < 95% |
| Case material: | Aluminium alloy |
| MTBF: | >1,000,000 hours |
| Dimensions: | 31.60*18.10*6.10mm (without housing)<br>32.60*19.10*6.80mm (with housing) |
| Weight: | 4.7g / 5.7g with housing |

### Input specifications

| Item | Test condition | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Input current (full load/no load) | • 12VDC input | | | | |
| | - 5V output | | 617/7 | 633/25 | mA |
| | - 12V output | | 595/10 | 610/30 | mA |
| | - 15V output | | 588/9 | 603/30 | mA |
| | • 24VDC input | | | | |
| | - 3.3V output | | 261/3 | 268/15 | mA |
| | - 5V output | | 301/4 | 308/18 | mA |
| | - 12V output | | 294/5 | 302/20 | mA |
| | - 15V output | | 291/5 | 398/20 | mA |
| Reflected ripple current | | | 20 | | mA |
| Surge voltage (1 sec. max) | • 12VDC input | -0.7 | | 25 | VDC |
| | • 24VDC input | -0.7 | | 50 | VDC |
| Starting voltage | • 12VDC input | | | 9 | VDC |
| | • 24VDC input | | | 18 | VDC |
| Input under voltage protection | • 12VDC input | 5.5 | 6.5 | | VDC |
| | • 24VDC input | 13 | 15 | | VDC |
| Input filter | Capacitance filter | | | | |
| Hot plug | Unavailable | | | | |
| Ctrl* | • Module switch on | Ctrl suspended or connected to TTL low level (0-0.3VDC) | | | |
| | • Module switch off | Ctrl pin connected to high level (2-12VDC) | | | |
| | • Input current when switched off | | 5 | 10 | mA |

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

### Output specifications

| Item | Test condition | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Voltage accuracy | 0%-100% load | | ±1 | ±3 | % |
| Line regulation | full load, input voltage from low to high | | ±0.2 | ±0.5 | % |
| Load regulation* | 5%-100% load | | ±0.5 | ±1 | % |
| Temperature drift | 100% full load | | | ±0.03 | %/°C |
| Transient response deviation | 25% load step change | | | | |
| | • 3.3V/5V output | | ±5 | ±8 | % |
| | • others | | ±3 | ±5 | % |
| Transient recovery time | 25% load step change | | 300 | 500 | µs |
| Temperature coefficient | full load | | | ±0.03 | %/°C |
| Ripple&Noise** | 20MHz Bandwidth | | | 100 | mVp-p |
| Trim | | | ±5 | | %Vo |
| Output over voltage protection | Input voltage range | 110 | | 160 | %Vo |
| Output over current protection | Input voltage range | 110 | 140 | 200 | %Io |
| Switching frequency | PWM mode | | 330 | | KHz |

* When testing from 0% -100% load working conditions, load regulation index of ±5%;
** 0% - 5% load ripple&Noise is no more than 5%Vo Ripple and noise are measured by "parallel cable" method.

### Isolation specifications

| Item | Test condition | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Isolation voltage | Input-output; 1 min./ leak current <5mA | 500<br>1500 | | | VAC<br>VDC |
| Isolation resistance | Input-output, isolation voltage 500VDC | 100 | | | MΩ |
| Isolation capacitance | Input-output, 100KHz/0.1V | | 1000 | | pF |

**Example:**
**6D6AW_0505S1.5RP**
**6 = 6 Watt; D6 = DIP6; A = Pinning; W = Wide input; o5 = 5Vin;**
**05 = 5Vout; S = Single Output; 1.5 = 1.5kVDC; R= Regulated Output;**
**P= Short Circuit Protection**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## 6D6AW_1.5RP series

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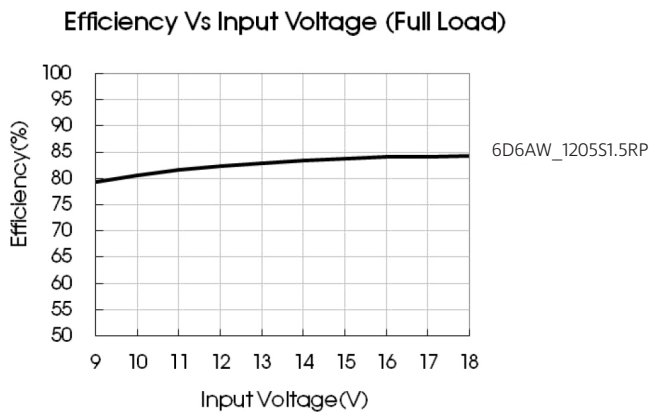
| EMC specifications | | | | |
|---|---|---|---|---|
| EMI | CE | CISPR22/EN55032 | CLASS B | (see EMC recommended circuit, ②) |
| EMI | RE | CISPR22/EN55032 | CLASS B | (see EMC recommended circuit, ②) |
| EMS | ESD | IEC/EN61000-4-2 | Contact ±6KV | perf. Criteria B |
| EMS | RS | IEC/EN61000-4-3 | 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 |

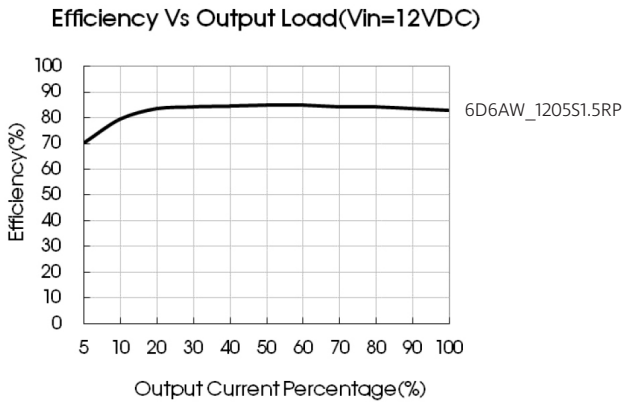
# Product Selection Guide

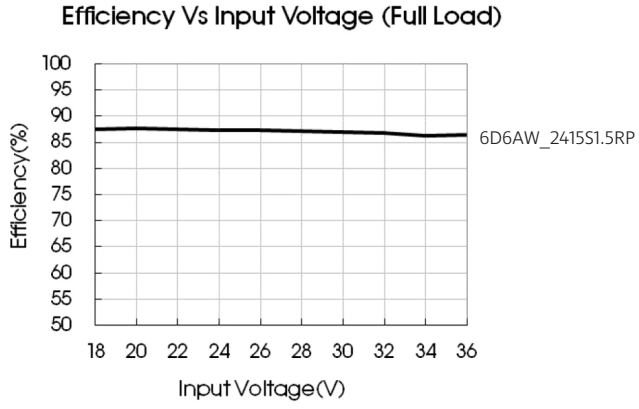
| Part Number | Input Voltage [V] Nominal | Range | Max | Output Voltage [VDC] | Current [mA, max] | Efficiency [%, typ] | Capacitive load [µF, max] |
|---|---|---|---|---|---|---|---|
| 6D6AW_1205S1.5RP | 12 | 9-18 | 20 | 5 | 1200 | 81 | 1000 |
| 6D6AW_1212S1.5RP | 12 | 9-18 | 20 | 12 | 500 | 84 | 680 |
| 6D6AW_1215S1.5RP | 12 | 9-18 | 20 | 15 | 400 | 85 | 470 |
| 6D6AW_2403S1.5RP | 24 | 18-36 | 40 | 3.3 | 1500 | 79 | 1800 |
| 6D6AW_2405S1.5RP | 24 | 18-36 | 40 | 5 | 1200 | 83 | 1000 |
| 6D6AW_2412S1.5RP | 24 | 18-36 | 40 | 12 | 500 | 85 | 680 |
| 6D6AW_2415S1.5RP | 24 | 18-36 | 40 | 15 | 400 | 86 | 470 |

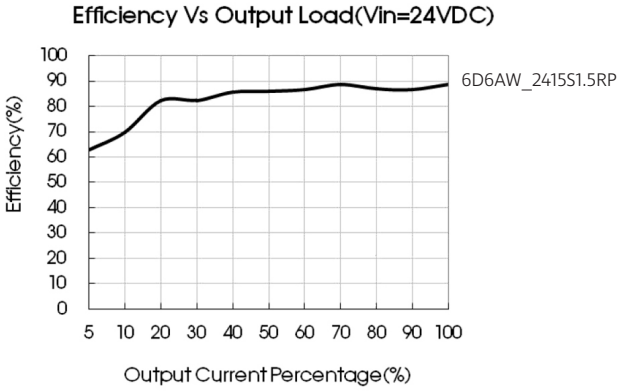
Notes: DIP package without housing: 6D**F**6AW_xxyyS1.5RP

# Efficiency





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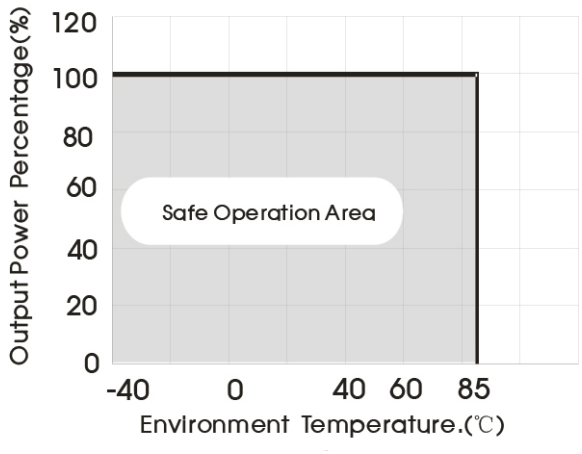
## Typical characteristics

Temperature derating graph



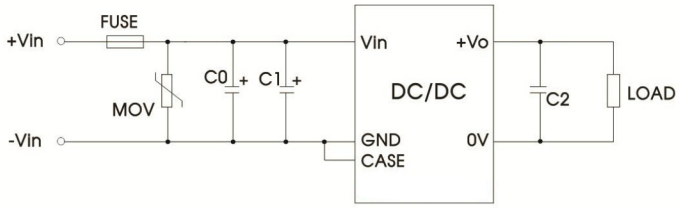

## Typical application

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

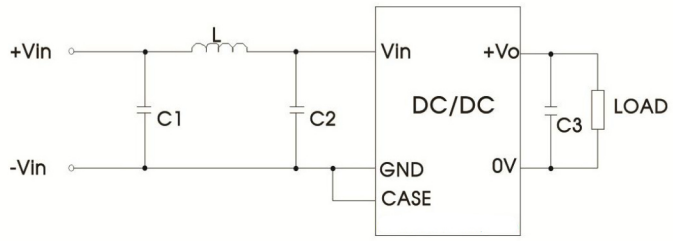

| Vout(VDC) | Cin(uF) | Cout(uF) |
|---|---|---|
| 3.3/5/12/15 | 10 | 10 |

## EMC solution-recommended circuit



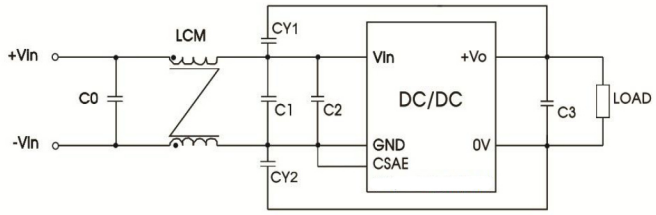

Parameter description:

| Model | Vin: 12VDC/24VDC |
|---|---|
| FUSE | Choose according to actual input current |
| MOV | S20K30 |
| C0 | 680μF/100V |
| C1 | 330μF/100V |
| C2 | 10μF/25V |




Parameter description:

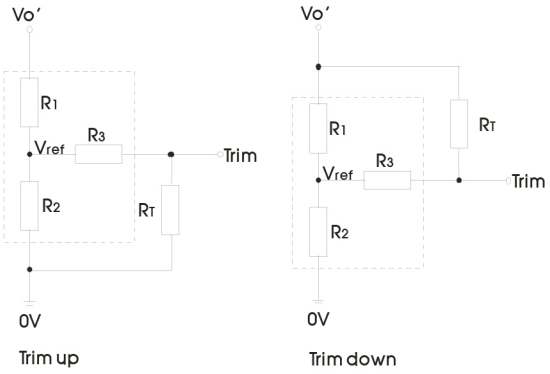
| Vin(VDC) | C1/C2 | L | C3 |
|---|---|---|---|
| 12/24 | 4.7μF/50V | 4.7μH | 10μF/25V |




Parameter description:

| Model | Vin: 12VDC/24VDC |
|---|---|
| C0 | 4.7μF/50V |
| C1 | 4.7μF/50V |
| C2 | 4.7μF/50V |
| C3 | 10μF/25V |
| LCM | 3.3mH |
| CY1/CY2 | 1000pF/⩾2000VDC |

# Application of Trim and calculation of Trim resistance




Calculation formula of Trim resistance:

$$up:\ R_T=\frac{aR_2}{R_2-a}-R_3 \qquad a=\frac{Vref}{Vo'-Vref}R_1$$

$$down:\ R_T=\frac{aR_1}{R_1-a}-R_3 \qquad a=\frac{Vo'-Vref}{Vref}R_2$$

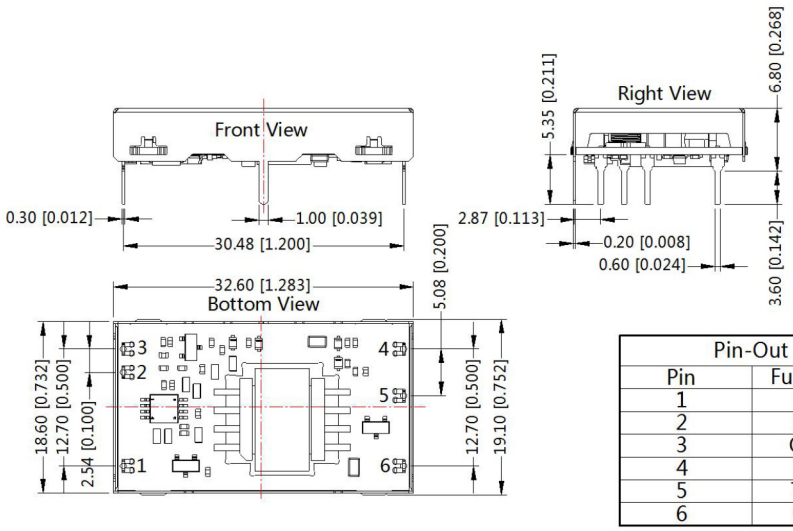
$R_T$ is Trim resistance ,a is a self-defined parameter, with no real meaning.
Vo' for the actual needs of the up or down regulated voltage

Applied circuits of Trim (Part in broken line is the interior of models)

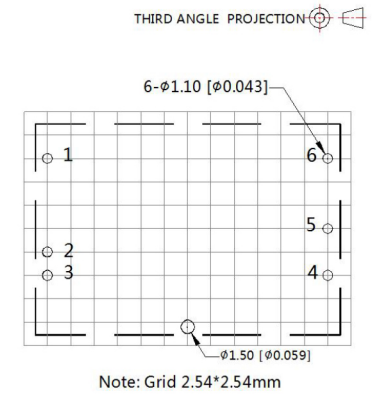
| Model | R1 (KΩ) | R1 (KΩ) | R1 (KΩ) | Vref (V) |
|---|---|---|---|---|
| 6D6AW_1205S1.5RP | 2.94 | 2.87 | 10 | 2.5 |
| 6D6AW_1212S1.5RP | 11 | 2.87 | 15 | 2.5 |
| 6D6AW_1215S1.5RP | 14.5 | 2.87 | 15 | 2.5 |
| 6D6AW_2403S1.5RP | 4.8 | 2.87 | 12 | 1.24 |
| 6D6AW_2405S1.5RP | 2.94 | 2.87 | 15 | 2.5 |
| 6D6AW_2412S1.5RP | 11 | 2.87 | 33 | 2.5 |
| 6D6AW_2415S1.5RP | 14.5 | 2.87 | 15 | 2.5 |

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

# Mechanical dimensions with housing



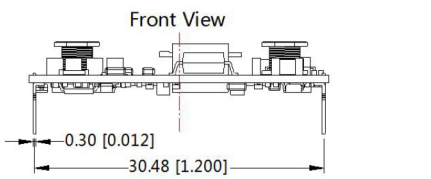

| Pin-Out | |
|---|---|
| Pin | Function |
| 1 | Vin |
| 2 | Ctrl |
| 3 | GND |
| 4 | 0V |
| 5 | Trim |
| 6 | +Vo |

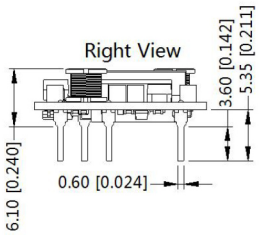


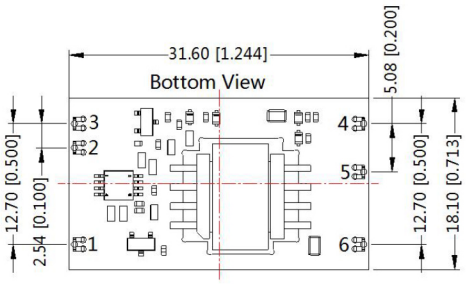

Note: Grid 2.54*2.54mm

Note:
Unit: mm[inch]
Pin section tolerances: ±0.10[±0.004]
General tolerances: ±0.50[±0.020]
The layout of the device is for reference only , please refer to the actual product

# Mechanical dimensions without housing




| Pin-Out | |
|---|---|
| Pin | Function |
| 1 | Vin |
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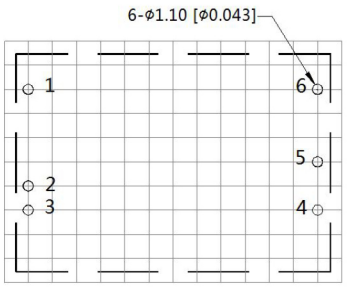


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Note:
Unit: mm[inch]
Pin section tolerances: ±0.10[±0.004]
General tolerances: ±0.50[±0.020]
The layout of the device is for reference only , please refer to the actual product

**Note:**
1. The maximum capacitive load offered were tested at nominal input voltage and full load;
2. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta = 25°C, humidity <75% with nominal input voltage and rated output load;
3. All index testing methods in this datasheet are based on our Company's corporate standards;
4. The performance parameters of the product models listed in this manual are as above, but some parameters of non-standard model products may exceed the requirements mentioned above. Please contact our technicians directly for specific information;
5. We can provide product customization service;
6. Specifications are subject to change without prior notice.