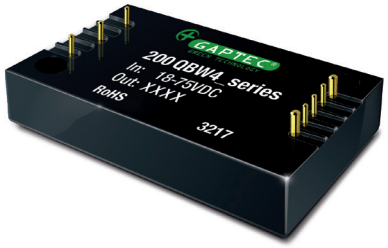
GAPTEC®
GREEN TECHNOLOGY




# 200QBW4_2.25 Series

200W Quarter-Brick - Single Output DC-DC Converter - Wide Input - Isolated & Regulated

## DC-DC Converter 200 Watt

- **Wide Input voltage range (4:1)**
- **High efficiency up to 94%**
- **Short circuit protection (SCP)**
- **Input under-voltage, over-current, over–voltage, over-temperature protection**
- **Isolation: 2.25KVDC**
- **Operating temperature range: -40°C to +85°C**
- **Five-sided metal shielding package**
- **International standard pin-out: 1/4 brick**

The 200QBW4_2.25 series offers 4:1 input voltage, efficiency up to 94%, 2250VDC isolation, Input under-voltage protection, output short circuit protection, over-current protection, over–voltage protection, over-temperature protection and EMI meets CISPR22/EN55022 CLASS B.

All models are widely applied in battery power supplies, industrial control, electricity, instruments, railway, communication fields.

SHORT CIRCUIT PROTECTED SCP

100% RoHS compliant 6/6

### Common specifications

| | |
|---|---|
| Short circuit protection: | Hiccup, continuous, automatic recovery |
| Cooling: | Natural (20FLM) or forced convection |
| Operation temperature range: | -40°C~+85°C |
| Storage temperature range: | -55°C ~+125°C |
| Over temperature protection: | +95°C MIN / +105°C TYP / +115°C MAX |
| Pin welding resistance temperature: | 300°C MAX, 1.5mm from case for 10sec. |
| Storage humidity range: | < 95% |
| Vibration: | IEC/EN61373 car body 1 B mold |
| Trim: | 90%Vo MIN, 110%Vo MAX |
| Sense: | 105%Vo MAX |
| Case material: | Plastic [UL94-V0] / aluminium |
| MTBF: | 500,000 hours |
| Weight: | 83g / 103g (with base-plate) / 114g (with heatsink) |

### Input specifications

| Item | Test condition | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Input current | full load/no load | | 4579/100 | 4682/200 | mA |
| Reflected ripple current | Nominal Vin and full load | | 100 | | mA |
| Surge voltage | 1sec. max. | -0.7 | | 90 | VDC |
| Start-up threshold voltage | 100% load | | | 18 | VDC |
| Input under voltage protection | | 14 | 16 | | VDC |
| Input filter | Pi Type | | | | |
| Hot plug | Unavailable | | | | |
| Ctrl (the voltage of Ctrl pin is relative to input pin GND) | • Module switch ON<br>• Module switch OFF | Ctrl suspended or connected to TTL high level (3.5-12VDC)<br>Ctrl pin connected to GND or low level (0-1.2VDC) | | | |
| | • Input current when switched OFF | | 2 | 10 | mA |

### Output specifications

| Item | Test condition | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Output voltage accuracy | | | ±1 | ±3 | % |
| Line regulation | | | ±0.2 | ±0.5 | % |
| Load regulation | | | ±0.5 | ±0.75 | % |
| Transient recovery time | 25% load step change | | 300 | 500 | µs |
| Transient response deviation | 25% load step change<br>• 5V output<br>• others | | ±3 | ±5 | % |
| Temperature coefficient | | | | ±0.03 | %/°C |
| Ripple & Noise* | 20MHz Bandwidth | | 150 | 250 | mVp-p |
| Output over-voltage protection | Input voltage range | 110 | 130 | 160 | %Vo |
| Output over-current protection | Input voltage range | 110 | 130 | 150 | %Io |
| Switching frequency | PWM mode | | 250 | | KHz |

*Test ripple and noise by "parallel cable" method.

### Isolation specifications

| Item | Test condition | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Isolation voltage | Tested for 1 minute and leak current less than 5mA | 2250 | | | VDC |
| Isolation resistance | Insulation voltage 500VDC | 100 | | | MΩ |
| Isolation capacitance | Input-output, 100KHz/0.1V | | 2200 | | pF |

**Example:**
**200QBW4_4805S2.25**
**200= 200 Watt; QB= Quarter-Brick; W4= Wide input (4:1);**
**48= 18-75 Vin; 05= 5Vout; S= Single Output; 2.25= 2.25kVDC isolation**

**Note:**
1. Operation under minimum load will not damage the converter; However, they may not meet all specification listed, and that will reduce the life of product.
2. All specifications measured at Ta=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
3. In this datasheet, all the test methods of indications are based on corporate standards.


GAPTEC-Electronic GmbH & Co. KG
sales@gaptec-electronic.com – www.gaptec-electronic.com

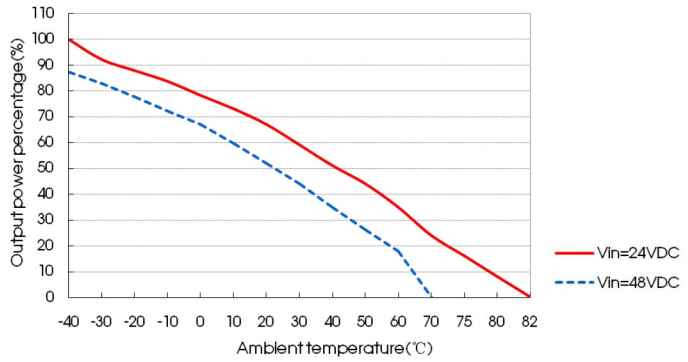
| EMC specifications | | | | |
|---|---|---|---|---|
| EMI | CE | CISPR22/EN55022, EN50121-3-2 | CLASS A (see EMC recommended circuit) | |
| EMI | RE | CISPR22/EN55022, EN50121-3-2 | CLASS A (see EMC recommended circuit) | |
| EMS | ESD | IEC/EN61000-4-2, EN50121-3-2 | Contact ±6KV/Air ±8KV | perf. Criteria B |
| EMI | RS | IEC/EN61000-4-3, EN50121-3-2 | 10V/m | perf. Criteria A |
| EMI* | EFT | IEC/EN61000-4-4, EN50121-3-2 | ±2KV (see EMC recommended circuit) | perf. Criteria A |
| EMS | Surge | EN50121-3-2 | differential mode ±1KV, 1.2/50us, source impedance 42Ω (see EMC recommended circuit) | perf. Criteria B |
| EMI | CS | IEC/EN61000-4-6, EN50121-3-2 | 10 Vr.m.s | perf. Criteria A |

| Part Number | Input Voltage [V] Nominal | Range | Output Voltage [VDC] | Output Current [A, max] | Efficiency [%, Typ] | Capacitive load [A, max] |
|---|---|---|---|---|---|---|
| 200QBW4_4812S2.25 | 48 | 18-75 | 12 | 16.7 | 91 | 2000 |
| 200QBW4_4824S2.25 | 48 | 18-75 | 24 | 8.4 | 91 | 1000 |
| 200QBW4_4848S2.25 | 48 | 18-75 | 48 | 4.2 | 91 | 450 |

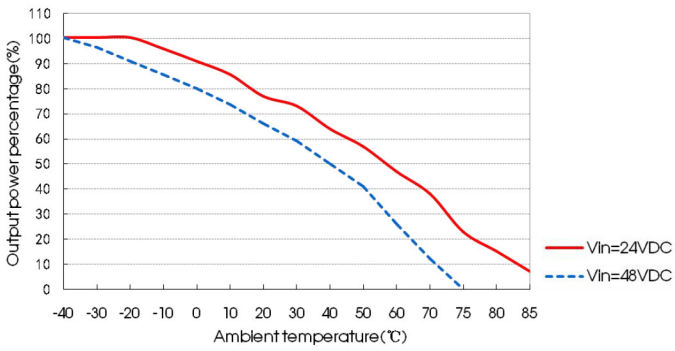
For aluminium base-plate add suffix -BP, f.ex. 200QBW4_xxyyS2.25-BP. For heatsink add suffix -HS, f.ex. 200QBW4_xxyyS2.25-HS.

# Temperature derating curves

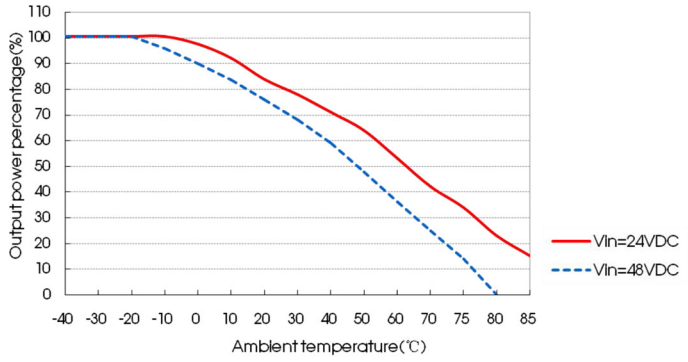
200QBW4_48yyS2.25
(yy = 12, 24 & 48Vdc)




200QBW4_48yyS2.25-BP
(yy = 12, 24 & 48Vdc)



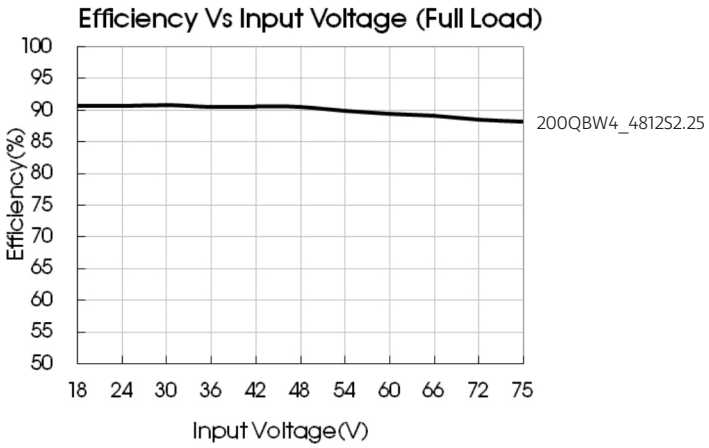

200QBW4_48yyS2.25-HS
(yy = 12, 24 & 48Vdc)

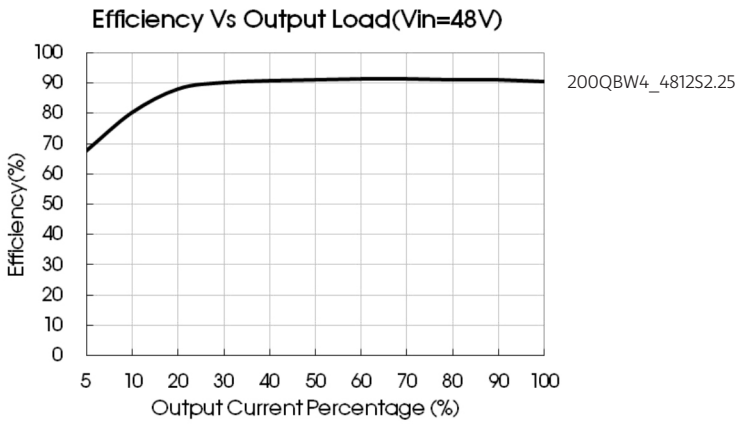





GAPTEC-Electronic GmbH & Co. KG
sales@gaptec-electronic.com – www.gaptec-electronic.com

# Efficiency

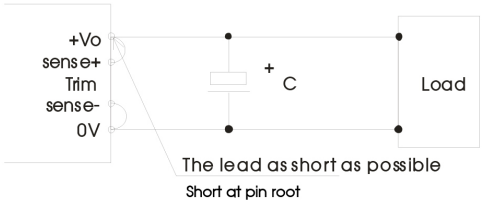



# Sense of application and precautions

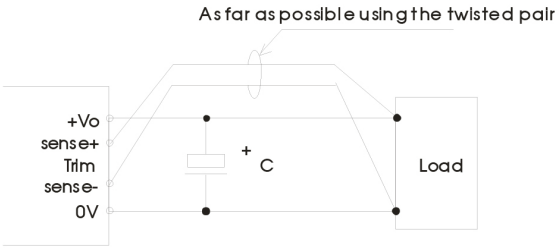
**When not using remote sense**

Notes:
1. When not using remote sense, make sure + Vo and Sense + are shorted, and that 0V and Sense- are shorted as well;
2. Keep the tracks between + Vo and Sense +, 0V and Sense- as short as possible. and close to the terminal. Avoid a looping track. If noise interferes the loop, the operation of the power module will become unstable.




**When remote sense is used**

Notes:
1. Using remote sense with long wires may cause output voltage to become unstable. Consult us if long sensing wiring is necessary.
2. Sense tracks or wires should be as short as possible. If using wires, it should not use twisted-pair or shielded wires.
3. Please use wide PCB tracks or a thick wires between the power supply module and the load, the line voltage drop should be kept less than 0.3V. Make sure the power supply module's output voltage remains within the specified range.
4. The impedance of wires may cause the output voltage oscillation or a greater ripple, please take adequate assessments before using.




# Typical application

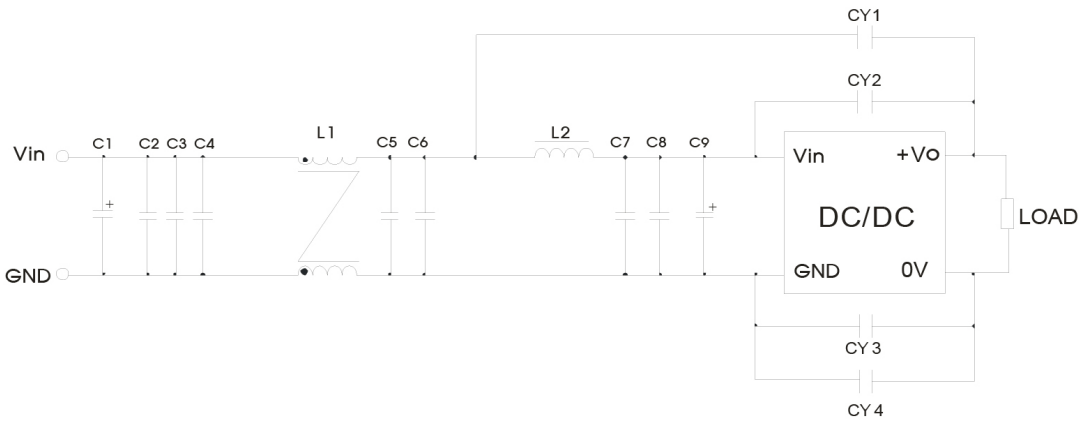
If not using Gaptec's recommended cicuit, please ensure an 220μF electrolytic capacitors in parallel with the input, which used to suppress the surge voltage come from the iuput terminal.
All the DC/DC converters of this series are tested according to the recommended circuit (see Fig. 1) before delivery.

If it is required to further reduce input&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.



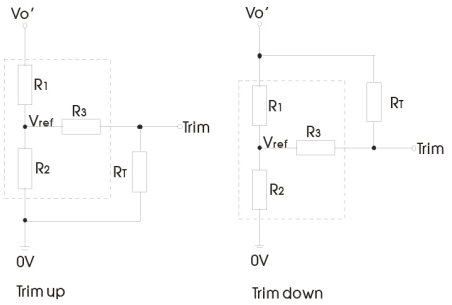

| Vout (VDC) | Fuse | Cin | Cout |
|---|---|---|---|
| 12 | 20A, slow blow | 220μF | 220μF |
| 24 | 20A, slow blow | 220μF | 100μF |
| 48 | 20A, slow blow | 220μF | 100μF |

# EMC solution recommended circuit




| Device number | Device parameter | Device function |
|---|---|---|
| C1 | 150μF electrolytic capacitor | Meet puise group and surge |
| C9 | 47μF electrolytic capacitor | |
| C1 | 150μF electrolytic capacitor | Meet conducted emission and radiated emission |
| C9 | 47μF electrolytic capacitor | |
| C2, C3, C4, C5, C6, C7, C8 | 2.2μF ceramic capacitor | |
| L1 | 1.0mH common mode inductor | |
| L2 | 1.5μH inductance | |
| CY1, CY2, CY3, CY4 | 1nF Y1 safety capacitor | |

# Trim application & trim resistance




Application circuit for TRIM (Part in broken line is the interior of models)
Note: RT 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.

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

Calculation formula of Trim resistance:

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

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

| Vout(V) | R1(KΩ) | R2(KΩ) | R3(KΩ) | Vref(V) |
|---|---|---|---|---|
| 12 | 11.000 | 2.87 | 15 | 2.5 |
| 24 | 24.872 | 2.87 | 15 | 2.5 |
| 48 | 53.017 | 2.913 | 15 | 2.5 |

# Reflected ripple current

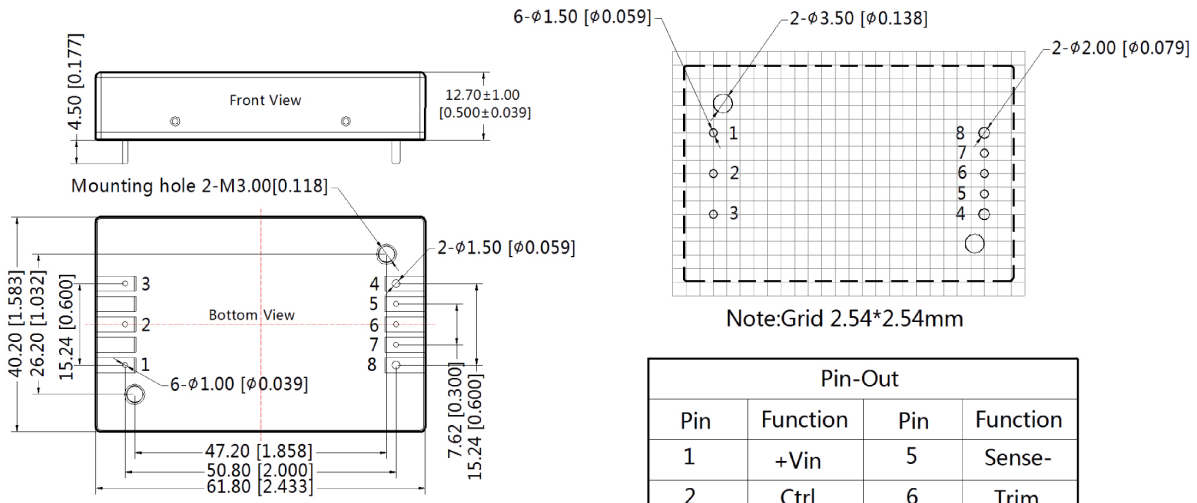



Note:Lin(4.7μH) ， Cin(220μF, ESR < 1.0Ω at 100 KHz)

# Mechanical dimensions

**200QBW4_xxyyS2.25**

THIRD ANGLE PROJECTION



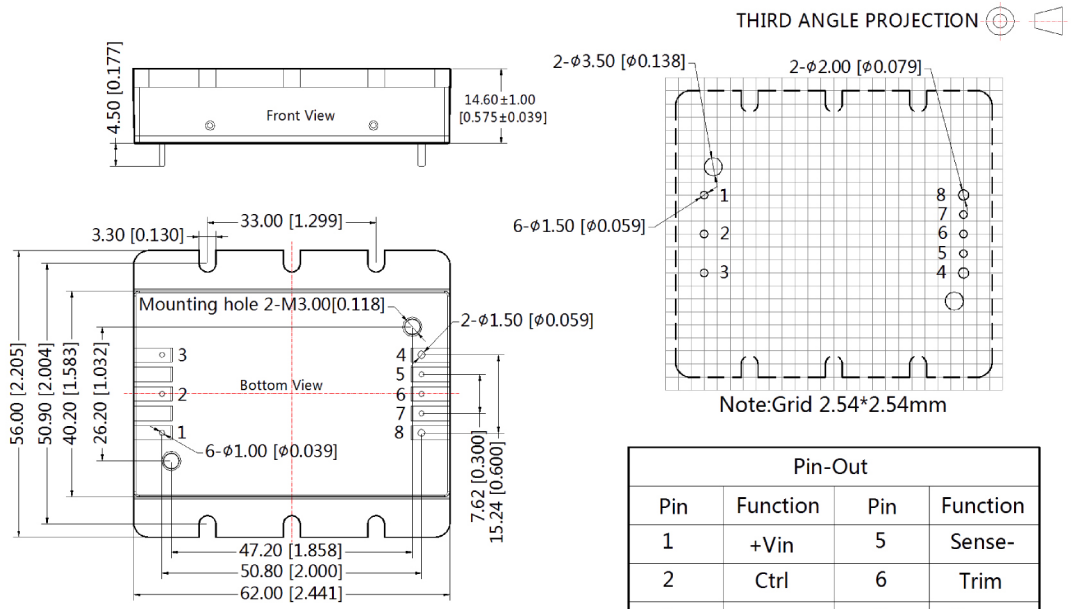

| Pin-Out | | | |
|---|---|---|---|
| Pin | Function | Pin | Function |
| 1 | +Vin | 5 | Sense- |
| 2 | Ctrl | 6 | Trim |
| 3 | -Vin | 7 | Sense+ |
| 4 | 0V | 8 | +Vo |

Note:
Unit: mm[inch]
Pin1, 2, 3, 5, 6, 7's diameter: 1.00[0.039]
Pin4, 8's diameter: 1.50[0.059]
Pin diameter tolerances: ±0.10[±0.004]
General tolerances: ±0.50[±0.020]
Mounting hole screwing torque: Max 0.4 N·m

# Base-plate dimensions and recommended layout

**200QBW4_xxyyS2.25-BP**

THIRD ANGLE PROJECTION

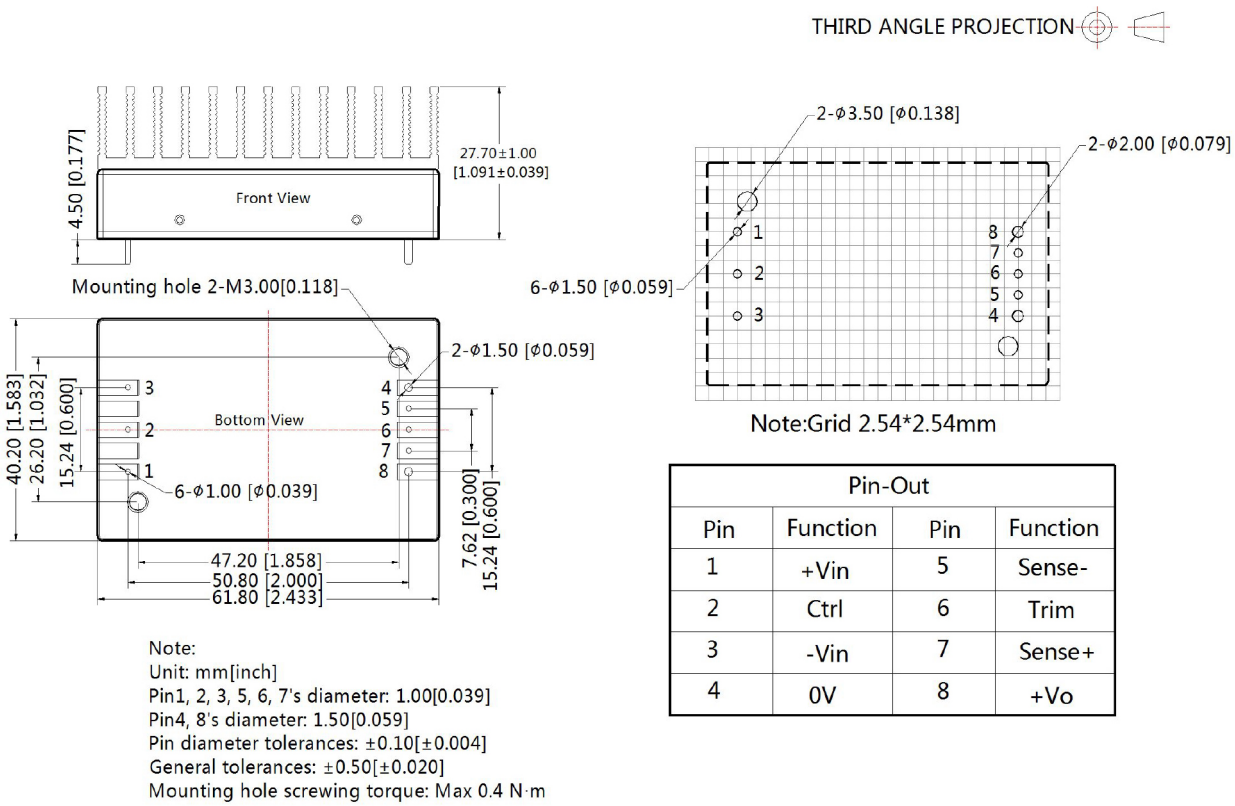



| Pin-Out | | | |
|---|---|---|---|
| Pin | Function | Pin | Function |
| 1 | +Vin | 5 | Sense- |
| 2 | Ctrl | 6 | Trim |
| 3 | -Vin | 7 | Sense+ |
| 4 | 0V | 8 | +Vo |

Note:
Unit: mm[inch]
Pin1, 2, 3, 5, 6, 7's diameter: 1.00[0.039]
Pin4, 8's diameter: 1.50[0.059]
Pin diameter tolerances: ±0.10[±0.004]
General tolerances: ±0.50[±0.020]
Mounting hole screwing torque: Max 0.4 N·m

# Heatsink dimensions and recommended layout

**200QBW4_xxyyS2.25-HS**




Note:
Unit: mm[inch]
Pin1, 2, 3, 5, 6, 7's diameter: 1.00[0.039]
Pin4, 8's diameter: 1.50[0.059]
Pin diameter tolerances: ±0.10[±0.004]
General tolerances: ±0.50[±0.020]
Mounting hole screwing torque: Max 0.4 N·m

| Pin-Out | | | |
|---|---|---|---|
| Pin | Function | Pin | Function |
| 1 | +Vin | 5 | Sense- |
| 2 | Ctrl | 6 | Trim |
| 3 | -Vin | 7 | Sense+ |
| 4 | 0V | 8 | +Vo |