# AC/DC 200W Enclosed Switching Power Supply

## LM200-22BxxR2(-C, -Q, -CQ, -QQ, -CQQ) Series

MORNSUN®



UL62368-1 CB IEC62368-1 GB4943.1 Report EN62368-1 EN61558-1 EN60335-1 BS EN62368-1 BS EN61558-1 BS EN60335-1 RoHS

## FEATURES

- Universal 176 - 305VAC/240 - 430VDC input voltage
- Accepts AC or DC input (dual-use of same terminal)
- Operating ambient temperature range: - 40℃ to +85℃
- High I/O isolation test voltage up to 4000VAC
- Compact size, high power density
- High efficiency, high reliability
- Output short circuit, over-current, over-voltage, over-temperature protection
- OVC Ⅲ (designed to meet EN62477)
- 5000m altitude application

*LM200-22BxxR2 series is the ultra-small Mornsun second-generation new industrial standard enclosed power supply, which has innovated the industrial power supply standard from the aspect of dimension, performance, technology and structure. It features universal AC input and at the same time accepts DC input voltage, cost-effective, low no load power consumption, high efficiency, high reliability and double or reinforced insulation. These converters offer excellent EMC performance and meet IEC/EN61000-4, CISPR32/EN55032, UL/EN/IEC/BS EN62368, EN/IEC60335, EN651558, EN62477, GB4943 standards and they are widely used in areas of industrial, LED, street light control, electricity, security, telecommunications, smart home etc. For extremely harsh EMC environment, we recommend using the application circuit show in Design Reference of this datasheet.*

## Selection Guide

| Certification | Part No. | Output Power (W) | Nominal Output Voltage and Current (Vo/Io) | Output Voltage Adjustable Range ADJ (V) | Efficiency at 230VAC (%) Typ. | Max. Capacitive Load (uF) |
|---|---|---|---|---|---|---|
| UL/IEC/CQC/ EN/BIS | LM200-22B12R2 | 204 | 12V/17A | 11.4-13.8 | 89 | 4000 |
| | LM200-22B15R2 | 210 | 15V/14A | 14.25-17.25 | 89 | 3300 |
| | LM200-22B24R2 | 211.2 | 24V/8.8A | 22.8-27.6 | 91 | 1500 |
| | LM200-22B36R2 | 212.4 | 36V/5.9A | 34.2-41.4 | 91.5 | 1500 |
| | LM200-22B48R2 | 211.2 | 48V/4.4A | 43.2-52.8 | 92 | 470 |
| UL/IEC/ CQC/EN | LM200-22B54R2 | 210.6 | 54V/3.9A | 51.3-56.7 | 92 | 330 |

Note: *1. Use suffix "C" for terminal with protective cover, suffix "Q" for bottom conformal coating and "QQ" for both sides conformal coating;
2. The product picture is for reference only. For details, please refer to the actual product.

## Input Specifications

| Item | Operating Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Input Voltage Range (by switch) | AC input | | 176 | -- | 305 | VAC |
| | DC input | | 240 | -- | 430 | VDC |
| Input Voltage Frequency | | | 47 | -- | 63 | Hz |
| Input Current | 230VAC | | -- | -- | 3 | A |
| Inrush Current | 230VAC | Cold start | -- | 60 | 80 | |
| Leakage Current | 277VAC | | <0.75mA | | | |
| Hot Plug | | | Unavailable | | | |

## Output Specifications

| Item | Operating Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Output Voltage Accuracy | Full load range | 12V/15V | -- | ±1.5 | -- | % |
| | | 24V/36V/48V/54V | -- | ±1.0 | -- | |


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| | | | | | | |
|---|---|---|---|---|---|---|
| Line Regulation | Rated load | | -- | ±0.5 | -- | % |
| Load Regulation | 0% - 100% load | 12V/15V | -- | ±1.0 | -- | |
| | | 24V/36V/48V/54V | -- | ±0.5 | -- | |
| Output Ripple & Noise* | 20MHz bandwidth (peak-to-peak value) | 12V/15V/24V | -- | 150 | -- | mV |
| | | 36V/48V/54V | -- | 200 | -- | |
| Temperature Coefficient | | | -- | ±0.03 | -- | %/℃ |
| Minimum Load | | | 0 | -- | -- | % |
| Stand-by Power Consumption | 230VAC, 25℃ | | -- | -- | 0.75 | W |
| Hold-up Time | 230VAC | | 16 | -- | -- | ms |
| Short Circuit Protection | Recovery time <5s after the short circuit disappear. | | Hiccup, continuous, self-recover | | | |
| Over-current Protection | | | 120% - 250% Io, hiccup, self-recover after fault elimination | | | |
| Over-voltage Protection | 12V | | ≤16.2VDC (hiccup or clamp, self-recover after fault elimination) | | | |
| | 15V | | ≤21VDC (hiccup or clamp, self-recover after fault elimination) | | | |
| | 24V | | ≤33.6VDC (hiccup or clamp, self-recover after fault elimination) | | | |
| | 36V | | ≤46.8VDC (hiccup or clamp, self-recover after fault elimination) | | | |
| | 48V | | ≤60VDC (hiccup or clamp, self-recover after fault elimination) | | | |
| | 54V | | ≤63VDC (hiccup or clamp, self-recover after fault elimination) | | | |
| Over-temperature Protection | | | Output voltage turn off, self-recover after fault elimination | | | |

Note: *The "Tip and barrel method" is used for ripple and noise test, output parallel 47uF electrolytic capacitor and 0.1uF ceramic capacitor, please refer to Enclosed Switching Power Supply Application Notes for specific information.

## General Specifications

| Item | | Operating Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Isolation | Input - ⏚ | Electric strength test for 1min., leakage current <5mA | 2000 | -- | -- | VAC |
| | Input - output | | 4000 | -- | -- | |
| | Output - ⏚ | | 500 | -- | -- | |
| Insulation Resistance | Input - ⏚ | Testing voltage at 500VDC | 100 | -- | -- | MΩ |
| | Input - output | | 100 | -- | -- | |
| | Output - ⏚ | | 100 | -- | -- | |
| Operating Temperature | | | -40 | -- | +85 | ℃ |
| Storage Temperature | | | -40 | -- | +85 | |
| Storage Humidity | | Non-condensing | 10 | -- | 95 | %RH |
| Operating Humidity | | | 20 | -- | 90 | |
| Power Derating | | +50℃ to +70℃ | 2.5 | -- | -- | %/℃ |
| | | +70℃ to +85℃ | 1.33 | -- | -- | |
| Safety Standard | | 12V/15V/24V/36V/48V | UL/IEC62368-1, GB4943.1, IS13252 (Part1) safety approved & BS EN/EN60335-1, BS EN/EN61558-1, BS EN/EN62368-1 (report) | | | |
| | | 54V | UL/IEC62368-1, GB4943.1 safety approved & BS EN/EN60335-1, BS EN/EN61558-1, BS EN/EN62368-1 (report) | | | |
| Safety Class | | | CLASS I | | | |
| MTBF | MIL-HDBK-217F@25℃ | | >300,000 h | | | |

## Mechanical Specifications

| | | |
|---|---|---|
| Case Material | | Metal (AL5052, SGCC) |
| Dimensions | 12/15V | 159.00 x 97.00 x 30.00mm |
| | 24/36/48/54V | 129.00 x 97.00 x 30.00mm |


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| | | |
|---|---|---|
| Weight | 12/15V | 410g (Typ.) |
| | 24/36/48/54V | 350g (Typ.) |
| Cooling Method | | Free air convection |

## Electromagnetic Compatibility (EMC)

| | | | | |
|---|---|---|---|---|
| Emissions | CE | CISPR32/EN55032 | CLASS A | |
| | RE | CISPR32/EN55032 | CLASS A | |
| Immunity | ESD | IEC/EN61000-4-2 | Contact ±6KV/Air ±8KV | perf. Criteria A |
| | RS | IEC/EN61000-4-3 | 10V/m | perf. Criteria A |
| | EFT | IEC/EN61000-4-4 | ±4KV | perf. Criteria A |
| | Surge | IEC/EN61000-4-5 | line to line ±2KV/line to PE ±4KV | perf. Criteria A |
| | CS | IEC/EN61000-4-6 | 10Vr.m.s | perf. Criteria A |
| | PFMF | IEC/EN61000-4-8 | 30A/m | perf. Criteria A |
| | Voltage dip, short interruption and voltage variation | IEC/EN61000-4-11 | 0%, 70% | perf. Criteria B |

Remark:

1. This power supply does not meet the harmonic current requirements specified in EN61000-3-2.

Please do not use this power supply under the following conditions:

1) The terminal equipment is used in the European Union.

2) Supporting terminals are connected to a public power grid with 220VAC or a higher voltage that comply with the requirements of EN61000-3-2.

3) The power supply is installed in terminal equipment with average or continuous input power greater than 75W.

4) The power supply belong to a part of lighting system.

Exception: The power supply used in the following terminal equipment does not need to meet EN61000-3-2.

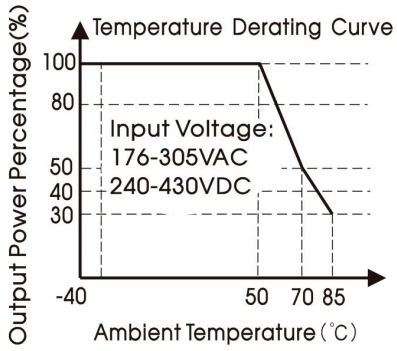
1) Professional equipment with a total rated input power greater than 1000W.

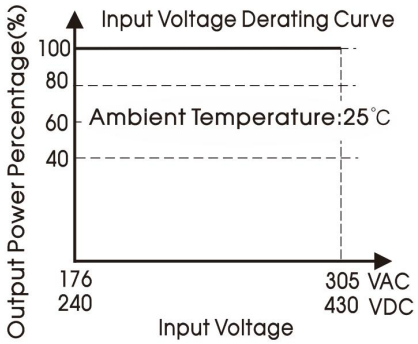
2) Symmetrically controlled heating element with a rated power less than or equal to 200W.

2. If no harmonic current is required or customers can solve harmonic current problems by themselves, this product can be used.

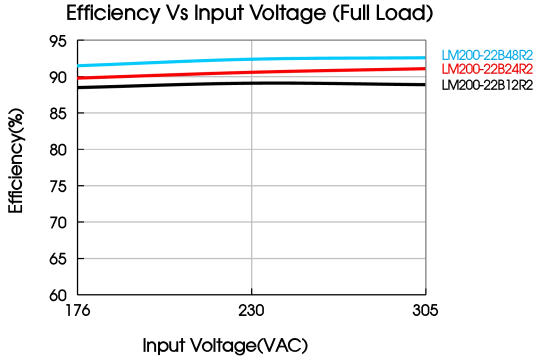
3. If the EMC performance needed to be improved, please add EMC filter FC-L06Wx series (see wiring diagram 1). Details of specific indicators please refer to filter datasheet.

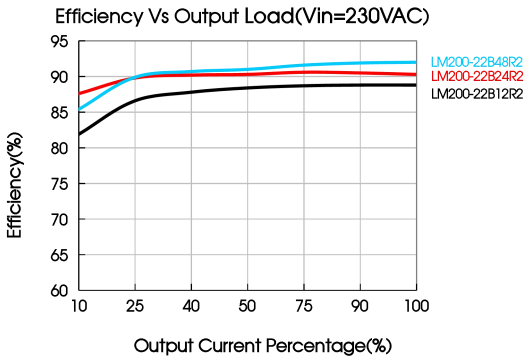
## Product Characteristic Curve




Note: ① This product is suitable for applications using natural air cooling; for applications in closed environment please consult factory or one of our FAE.





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## FC-L06Wx & LM200-22BxxR2 Wiring Diagram

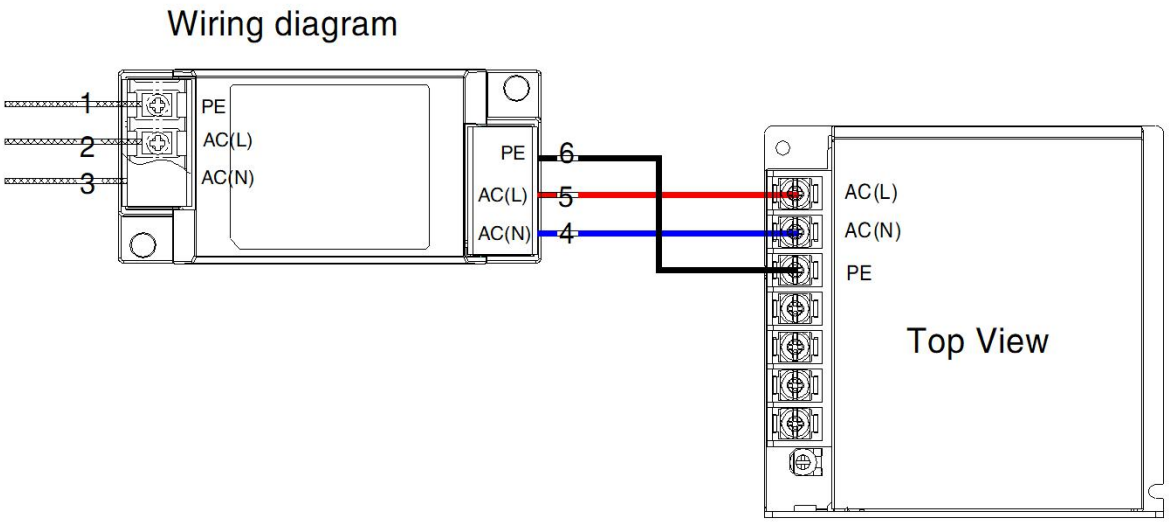
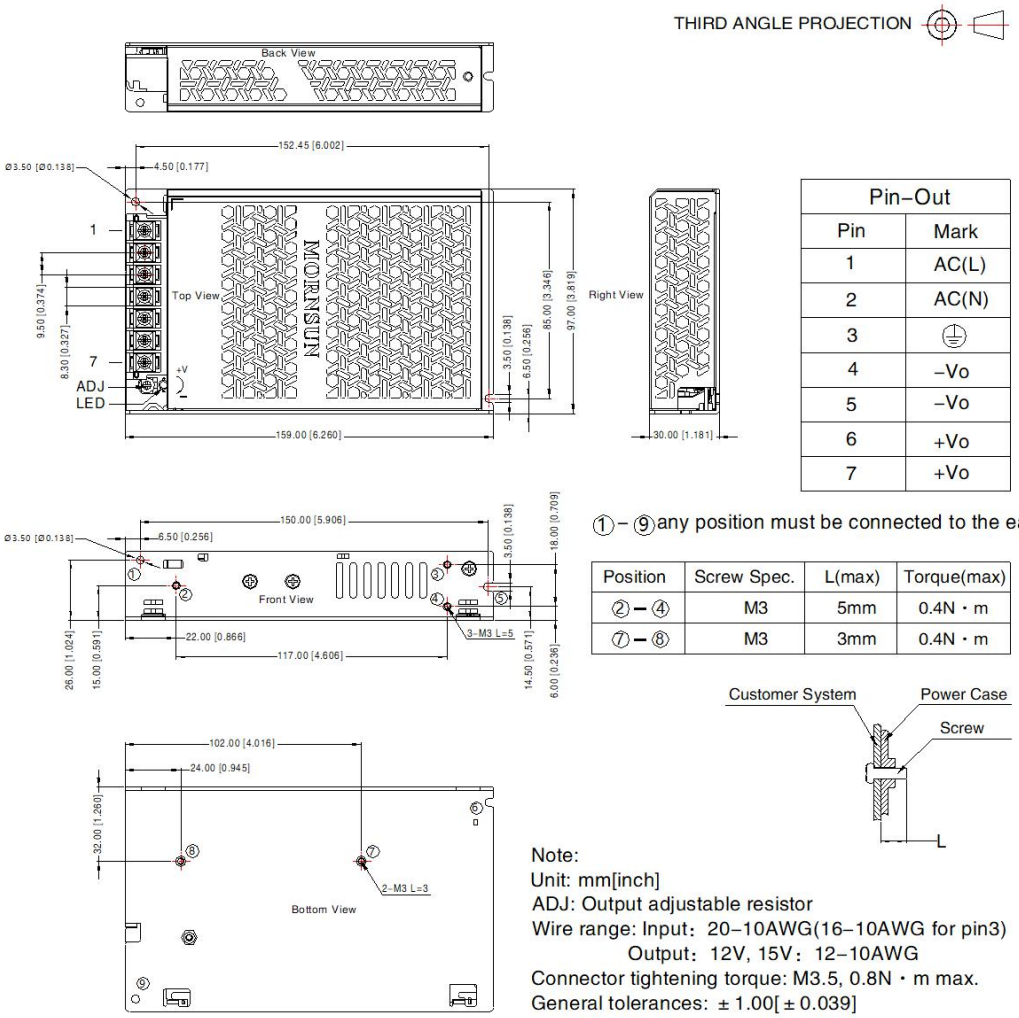



Fig. 1：EMC application circuit with higher requirement

## 12/15V Dimensions and Recommended Layout

LM200-22B12/15R2 (-Q, -QQ) Series




| Pin-Out | |
|---|---|
| Pin | Mark |
| 1 | AC(L) |
| 2 | AC(N) |
| 3 | ⏚ |
| 4 | -Vo |
| 5 | -Vo |
| 6 | +Vo |
| 7 | +Vo |

①-⑨any position must be connected to the earth( ⏚ )

| Position | Screw Spec. | L(max) | Torque(max) |
|---|---|---|---|
| ②-④ | M3 | 5mm | 0.4N・m |
| ⑦-⑧ | M3 | 3mm | 0.4N・m |

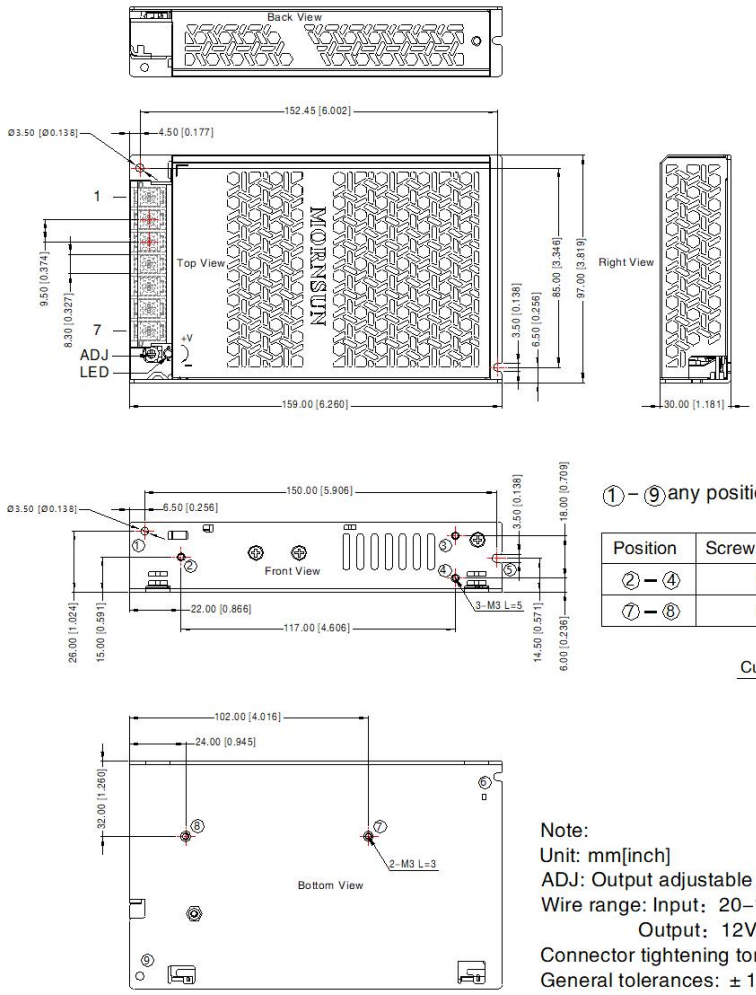



Note:
Unit: mm[inch]
ADJ: Output adjustable resistor
Wire range: Input：20-10AWG(16-10AWG for pin3)
Output：12V, 15V：12-10AWG
Connector tightening torque: M3.5, 0.8N・m max.
General tolerances: ± 1.00[± 0.039]


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## LM200-22B12/15R2-C (-CQ, -CQQ) Series

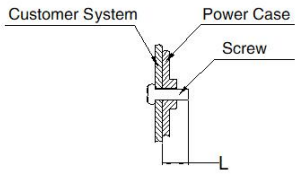
THIRD ANGLE PROJECTION




| Pin-Out | |
|---|---|
| Pin | Mark |
| 1 | AC(L) |
| 2 | AC(N) |
| 3 | ⏚ |
| 4 | -Vo |
| 5 | -Vo |
| 6 | +Vo |
| 7 | +Vo |

①- ⑨any position must be connected to the earth( ⏚ )

| Position | Screw Spec. | L(max) | Torque(max) |
|---|---|---|---|
| ②－④ | M3 | 5mm | 0.4N・m |
| ⑦－⑧ | M3 | 3mm | 0.4N・m |

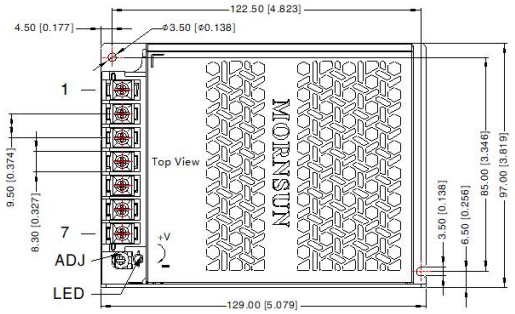


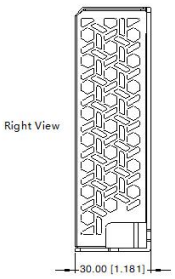

Note:
Unit: mm[inch]
ADJ: Output adjustable resistor
Wire range: Input：20-10AWG(16-10AWG for pin3)
Output：12V, 15V：12-10AWG
Connector tightening torque: M3.5, 0.8N・m max.
General tolerances: ± 1.00[ ± 0.039]


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## 24/36/48/54V Dimensions and Recommended Layout

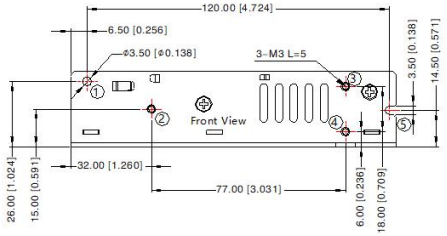
### LM200-22B24/36/48/54R2 (-Q, -QQ) Series

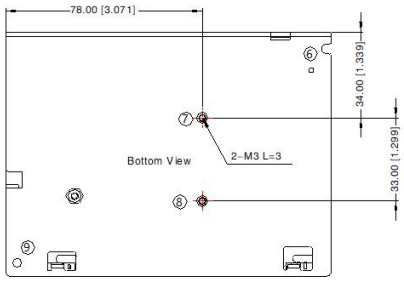



THIRD ANGLE PROJECTION

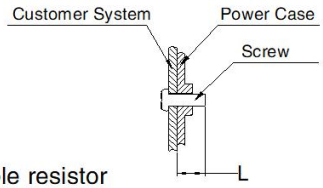
| Pin–Out | |
|---|---|
| Pin | Mark |
| 1 | AC(L) |
| 2 | AC(N) |
| 3 | ⏚ |
| 4 | –Vo |
| 5 | –Vo |
| 6 | +Vo |
| 7 | +Vo |




①– ⑨any position must be connected to the earth( ⏚ )

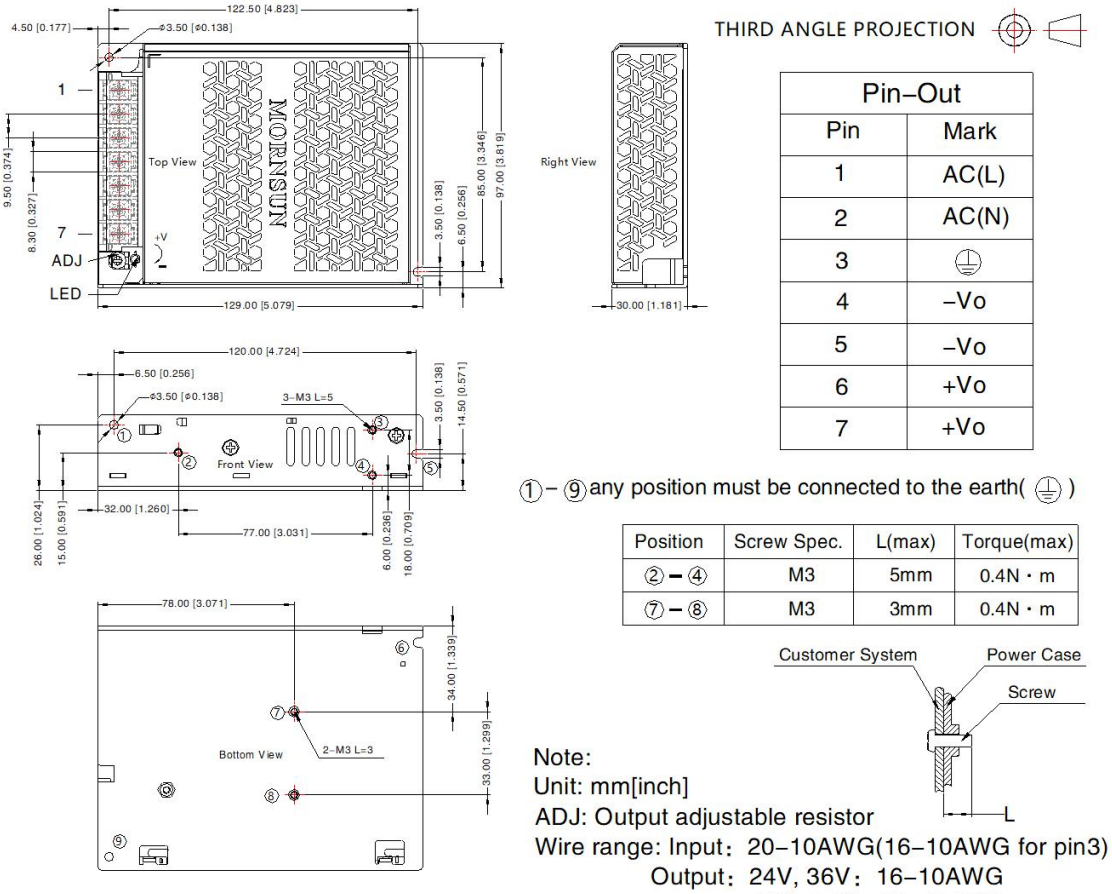
| Position | Screw Spec. | L(max) | Torque(max) |
|---|---|---|---|
| ②– ④ | M3 | 5mm | 0.4N · m |
| ⑦– ⑧ | M3 | 3mm | 0.4N · m |




Note:
Unit: mm[inch]
ADJ: Output adjustable resistor
Wire range: Input: 20–10AWG(16–10AWG for pin3)
Output: 24V, 36V: 16–10AWG
48V, 54V: 20–10AWG
Connector tightening torque: M3.5, 0.8N · m max.
General tolerances: ± 1.00[ ± 0.039]


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## LM200-22B24/36/48/54R2-C (-CQ, -CQQ) Series




| Pin–Out | |
|---|---|
| Pin | Mark |
| 1 | AC(L) |
| 2 | AC(N) |
| 3 | ⏚ |
| 4 | –Vo |
| 5 | –Vo |
| 6 | +Vo |
| 7 | +Vo |

①– ⑨any position must be connected to the earth( ⏚ )

| Position | Screw Spec. | L(max) | Torque(max) |
|---|---|---|---|
| ②– ④ | M3 | 5mm | 0.4N · m |
| ⑦– ⑧ | M3 | 3mm | 0.4N · m |




Note:
Unit: mm[inch]
ADJ: Output adjustable resistor
Wire range: Input：20–10AWG(16–10AWG for pin3)
Output：24V, 36V：16–10AWG
48V, 54V：20–10AWG
Connector tightening torque: M3.5, 0.8N · m max.
General tolerances: ± 1.00[ ± 0.039]

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. 12/15VPackaging bag number: 58220329; 24/36/48/54V Packaging bag number: 58220270;
2. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%RH with nominal input voltage and rated output load;
3. The ambient temperature derating of 5℃/1000m is needed for operating altitude greater than 2000m;
4. All index testing methods in this datasheet are based on our company corporate standards;
5. In order to improve the efficiency at high input voltage, there will be audible noise generated, but it does not affect product performance and reliability;
6. We can provide product customization service, please contact our technicians directly for specific information;
7. Products are related to laws and regulations: see "Features" and "EMC";
8. The out case needs to be connected to PE(⏚) of system when the terminal equipment in operating;
9. The output voltage can be adjusted by the ADJ, clockwise to increase;
10. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units;
11. The power supply is considered a component which will be installed into a final equipment. All EMC tests should be confirmed with the final equipment. Please consult our FAE for EMC test operation instructions.

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