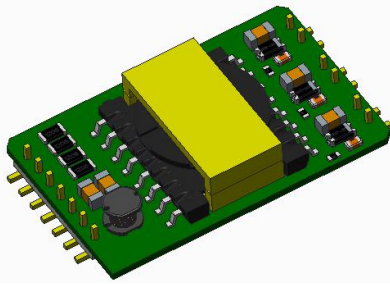


6W isolated DC-DC converter in SMD package
Wide input and regulated triple output



Patent Protection RoHS

FEATURES

- Wide input voltage range (9-16VDC)
- High efficiency up to 82%
- No-load power consumption as low as 0.12W
- I/O isolation test voltage 2.7k VDC
- Operating ambient temperature range: -40°C to +105°C
- Input under-voltage protection, output short-circuit, over-current, over-voltage protection
- Emissions meets EN55025/CISPR25 CLASS 4 standard
- SMD package

VRC1215JD-6WR3 of 6W DC-DC converter products with a wide range of voltage input of 9-16VDC, input to output isolation is tested with 2700 VDC, emissions meets EN55025/CISPR25 CLASS 4 standard, input under-voltage, output short-circuit, output over-current and over-voltage protection, products use SMD package process, it is easy for customers to automate machining and they are widely used in fields such as vehicle electronics, medical care, industrial control, electric power, instrumentation and communications.

Selection Guide

| Certification | Part No. | Input Voltage (VDC) | | Output | | | | | | Full Load Efficiency ^② (%) Min./Typ. | Capacitive Load ^③ (μF)Max. |
|---------------|----------------|---------------------|-------------------|------------------|-----|-----|---------------------------|-------|-------|--|--|
| | | Nominal (Range) | Max. ^① | Voltage (VDC) | | | Current (mA) Max./Min. | | | | |
| | | | | Vo1 | Vo2 | Vo3 | Io1 | Io2 | Io3 | | |
| -- | VRC1215JD-6WR3 | 12 (9-16) | 36 | 15 | 15 | 15 | 200/0 | 100/0 | 100/0 | 80/82 | 100 |

Notes: ① Exceeding the maximum input voltage may cause permanent damage;
② Efficiency is measured at nominal input voltage and rated output load;
③ The specified maximum capacitive load for triple output is identical.

Input Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------|----------------------|-------------|--------|--------|------|
| Input Current (full load / no-load) | | -- | 813/10 | 833/20 | mA |
| Surge Voltage (1sec. max.) | | -0.7 | -- | 40 | VDC |
| Start-up Voltage | | -- | -- | 9 | |
| Input Under-voltage Protection | | 5.5 | 6.5 | -- | |
| Input Filter | | Pi filter | | | |
| Hot Plug | | Unavailable | | | |

Output Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit | |
|------------------------------|---|----------|------|-------|-------|---|
| Voltage Accuracy | | Vo1 | -- | ±1 | ±3 | % |
| | | Vo2, Vo3 | -- | ±5 | ±8 | |
| Linear Regulation | Input voltage variation from low to high at full load | Vo1 | -- | ±0.2 | ±0.5 | |
| | | Vo2, Vo3 | -- | ±0.5 | ±1 | |
| Load Regulation ^① | 5%-100% load | Vo1 | -- | ±0.5 | ±1 | |
| | | Vo2, Vo3 | -- | ±1 | ±2 | |
| Cross Regulation | Three output with main output at 50% load and supplement output from 25%-100% | -- | -- | ±8 | | |
| Transient Recovery Time | 25% load step change | -- | 300 | 1000 | μs | |
| Transient Response Deviation | | -- | ±3 | ±5 | % | |
| Temperature Coefficient | Full load | -- | -- | ±0.03 | %/°C | |
| Ripple & Noise ^② | 20MHz bandwidth | -- | 100 | 200 | mVp-p | |

| | | | | | |
|--------------------------|---------------------|---------------------------|-----|-----|-----|
| Over-voltage Protection | Input voltage range | 110 | -- | 160 | %Vo |
| Over-current Protection | | 110 | 150 | 200 | %Io |
| Short-circuit Protection | | Continuous, self-recovery | | | |

Notes: ①Load regulation for 0% -100% is $\pm 5\%$;
 ②The "parallel cable" method is used for ripple and noise test, please refer to DC-DC Converter Application Notes for specific information.

General Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|--------------------------------------|--|--|------|------|------------|
| Isolation | Input-output Electric Strength Test for 1 minute with a leakage current of 1mA max. | 2700 | -- | -- | VDC |
| | Output-output Electric Strength Test for 1 minute with a leakage current of 1mA max. | 500 | -- | -- | |
| Insulation Resistance | Input-output resistance at 500VDC | 1000 | -- | -- | M Ω |
| Isolation Capacitance | Input-output capacitance at 100kHz/0.1V | -- | 2500 | -- | pF |
| Operating Temperature | see Fig. 1 | -40 | -- | 105 | °C |
| Storage Temperature | | -55 | -- | 125 | |
| Storage Humidity | Non-condensing | 5 | -- | 95 | %RH |
| Pin Soldering Resistance Temperature | Soldering spot is 1.5mm away from case for 10 seconds | -- | -- | 300 | °C |
| Reflow Soldering Temperature | | Peak temp. $\leq 245^{\circ}\text{C}$, maximum duration time $\leq 60\text{s}$ over 217°C . For actual application, please refer to IPC/JEDEC J-STD-020D.1. | | | |
| Vibration | | JEDEC JESD22-B103(10-1000Hz, 70Hz, 1.0mm, 10G, along X, Y and Z) | | | |
| Switching Frequency * | PWM mode | -- | 210 | -- | kHz |
| MTBF | MIL-HDBK-217F@25°C | 1000 | -- | -- | k hours |

Note: * Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.

Mechanical Specifications

| | |
|----------------|--------------------------|
| Dimensions | 42.10 x 25.00 x 11.20 mm |
| Weight | 9.0g(Typ.) |
| Cooling Method | Free air convection |

Electromagnetic Compatibility (EMC)

| | | | |
|-----------|----|-----------------|--|
| Emissions | CE | EN55025/CISPR25 | CLASS 4 (see Fig. 3 or Fig. 4 for recommended circuit) |
| | RE | EN55025/CISPR25 | CLASS 4 (see Fig. 3 or Fig. 4 for recommended circuit) |

Typical Characteristic Curve

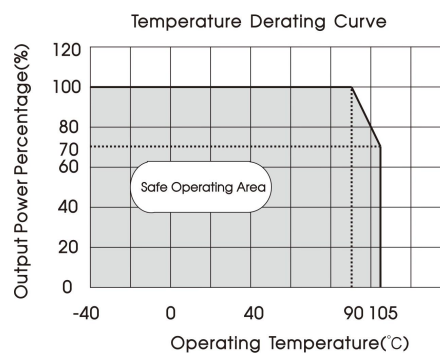


Fig. 1

Design Reference

1. Typical application

All the DC-DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 2.

Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values C_{in} and C_{out} and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the max. capacitive load value of the product.

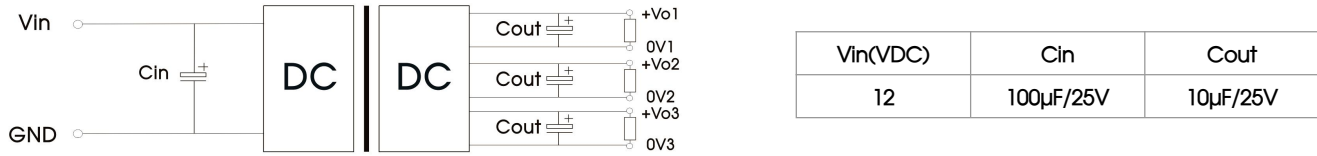


Fig. 2

2. EMC compliance circuit

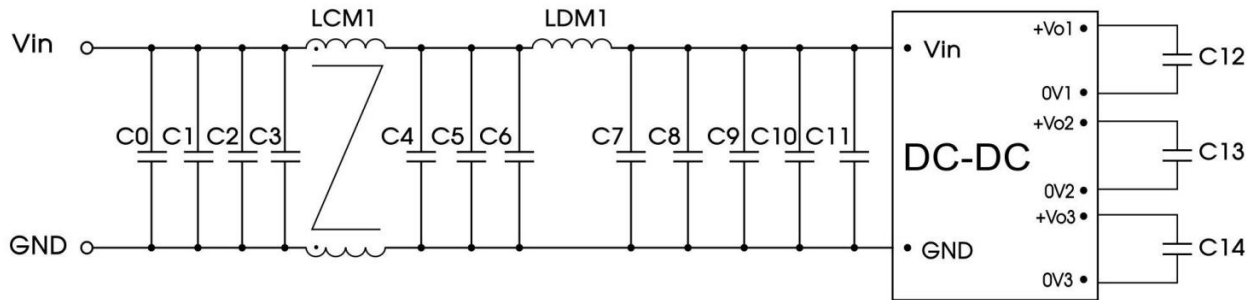


Fig. 3

Parameter description:

| | |
|------------------------------|-----------------|
| C0 | 1nF/50V |
| C1/C4 | 100nF/50V |
| C5 | 1 μ F/50V |
| C2/C6/C7 | 4.7 μ F/50V |
| C3/C8/C9/C10/C11/C12/C13/C14 | 10 μ F/50V |
| LCM1 | 470 μ H |
| LDM1 | 220 μ H |

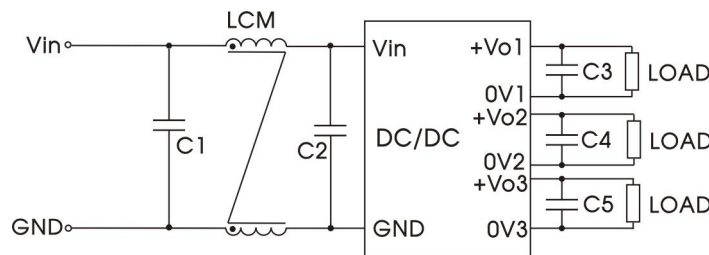


Fig. 4

Parameter description:

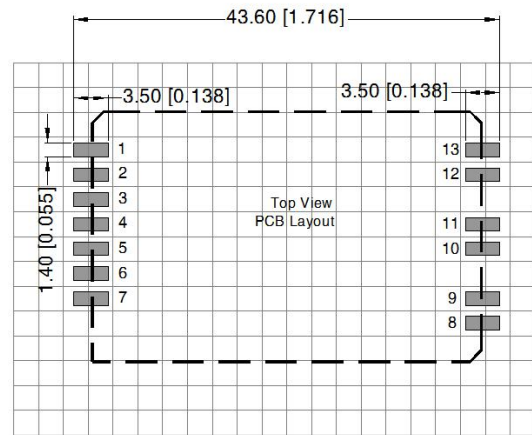
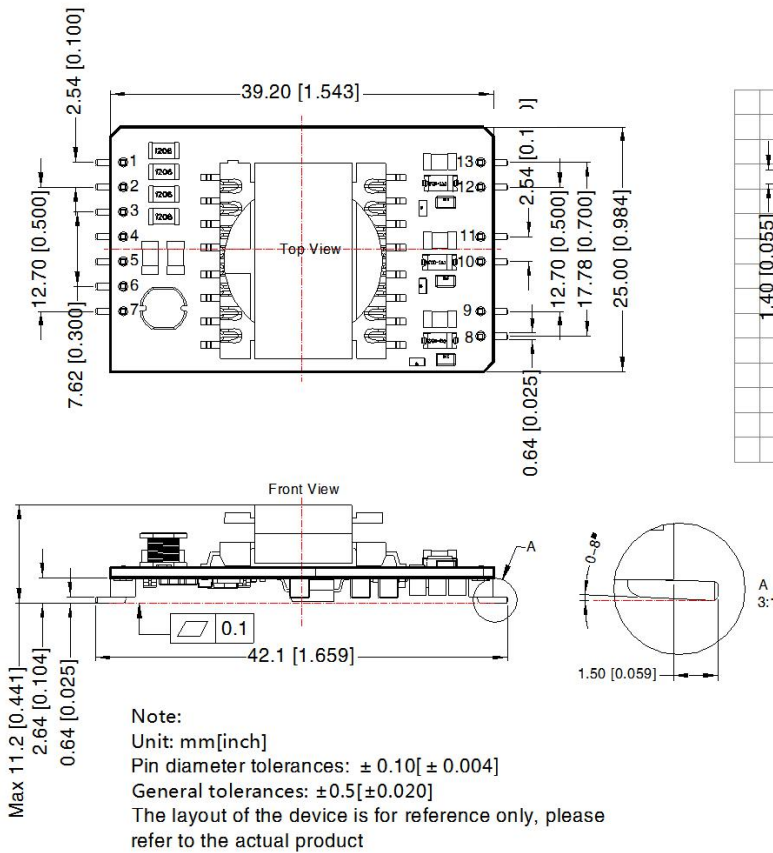
| | |
|----------------|----------------|
| C1/C2/C3/C4/C5 | 10 μ F/50V |
| LCM | 1mH |

3. The products do not support parallel connection of their output

4. For additional information please refer to DC-DC converter application notes on www.mornsun-power.com

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



Note: Grid 2.54*2.54mm

| Pin-Out | | | |
|---------|------|-----|------|
| Pin | Mark | Pin | Mark |
| 1 | NC | 8 | +Vo3 |
| 2 | GND | 9 | 0V3 |
| 3 | GND | 10 | +Vo2 |
| 4 | GND | 11 | 0V2 |
| 5 | Vin | 12 | +Vo1 |
| 6 | Vin | 13 | 0V1 |
| 7 | Vin | | |

NC: Pin to be isolated from circuitry

Notes:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58210059;
2. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
3. The maximum capacitive load offered were tested at input voltage range and full load;
4. Unless otherwise specified, parameters in this datasheet were measured under the conditions of $T_a=25^\circ\text{C}$, humidity<75%RH with nominal input voltage and rated output load; All index testing methods in this datasheet are based on our company corporate standards;
5. All index testing methods in this datasheet are based on our company corporate standards;
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. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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