

# DC/DC Converter

## SK78\_JT-500R3 Series



Wide input voltage, non-isolated & regulated single output



### FEATURES

- Ultra-thin SMD Package, thickness  $\leq 3.5\text{mm}$
- High efficiency up to 95%
- No-load input current as low as 0.2mA
- Operating ambient temperature range:  $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
- Output short-circuit protection
- EN62368 approved

SK78\_JT-500R3 series are high efficiency switching regulators. The converters feature high efficiency, low loss and short-circuit protection in a compact SMD package. These products are widely used in applications such as industrial control, instrumentation and electric power.

### Selection Guide

| Certification | Part No.       | Input Voltage (VDC)* | Output        |                      | Full Load Efficiency (%) Typ.<br>Vin Min. / Vin Max. | Capacitive Load( $\mu\text{F}$ )<br>Max. |
|---------------|----------------|----------------------|---------------|----------------------|------------------------------------------------------|------------------------------------------|
|               |                | Nominal (Range)      | Voltage (VDC) | Current (mA)<br>Max. |                                                      |                                          |
| CE            | SK7803JT-500R3 | 24<br>(4.75-36)      | 3.3           | 500                  | 86/80                                                | 680                                      |
|               | SK7805JT-500R3 | 24<br>(6.5-36)       | 5             | 500                  | 90/84                                                | 680                                      |
|               | SK7809JT-500R3 | 24<br>(12-36)        | 9             | 500                  | 93/90                                                | 680                                      |
|               | SK7812JT-500R3 | 24<br>(15-36)        | 12            | 500                  | 94/91                                                | 680                                      |
|               | SK7815JT-500R3 | 24<br>(19-36)        | 15            | 500                  | 95/93                                                | 680                                      |

Note: \* For input voltage exceeding 30 VDC, an input capacitor of 22 $\mu\text{F}$ /50V is required.

### Input Specifications

| Item                      | Operating Conditions   | Min.                                        | Typ. | Max. | Unit          |
|---------------------------|------------------------|---------------------------------------------|------|------|---------------|
| No-load Input Current     |                        | --                                          | 0.2  | 1.5  | mA            |
| Reverse Polarity at Input |                        | Avoid / Not protected                       |      |      |               |
| Input Filter              |                        | Capacitance filter                          |      |      |               |
| Ctrl*                     | Module on              | Ctrl pin open or pulled high (TTL 3.2-8VDC) |      |      |               |
|                           | Module off             | Ctrl pin pulled low to GND (0-0.8VDC)       |      |      |               |
|                           | Input current when off | --                                          | 30   | 100  | $\mu\text{A}$ |

Note: \* The Ctrl pin voltage is referenced to input GND.

### Output Specifications

| Item              | Operating Conditions                   | Min.                           | Typ.      | Max.      | Unit  |
|-------------------|----------------------------------------|--------------------------------|-----------|-----------|-------|
| Voltage Accuracy  | Full load, input voltage range         | 3.3 VDC output                 | --        | $\pm 2$   | %     |
|                   |                                        | Others                         | --        | $\pm 2$   |       |
| Linear Regulation | Full load, input voltage range         | --                             | $\pm 0.2$ | $\pm 0.4$ |       |
| Load Regulation   | Nominal input voltage, 10% -100% load  | 3.3/5VDC output                | --        | $\pm 0.6$ | %     |
|                   |                                        | Others                         | --        | $\pm 0.3$ |       |
| Ripple & Noise*   | 20MHz bandwidth, nominal input voltage | 3.3 VDC output, 20% -100% load | --        | 20        | mVp-p |
|                   |                                        | Others, 10% -100% load         | --        | 20        |       |

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|                                                                                                                                                                                                                                                                                                                                                    |                                             |                           |     |       |      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|---------------------------|-----|-------|------|
| Temperature Coefficient                                                                                                                                                                                                                                                                                                                            | Full load                                   | --                        | --  | ±0.03 | %/°C |
| Transient Response Deviation                                                                                                                                                                                                                                                                                                                       | Nominal input voltage, 25% load step change | --                        | ±50 | ±200  | mV   |
| Transient Recovery Time                                                                                                                                                                                                                                                                                                                            |                                             | --                        | 0.2 | 1     | ms   |
| Short-circuit Protection                                                                                                                                                                                                                                                                                                                           | Input voltage range                         | Continuous, self-recovery |     |       |      |
| Notes: * 1. The “parallel cable” method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information;<br>2. With light loads at or below 20%, Ripple & Noise for 3.3V output parts increase to 100mVp-p max, and a load below 10% for 5V/9V/12V/15V output parts levels increase to 150mVp-p max. |                                             |                           |     |       |      |

## General Specifications

| Item                         | Operating Conditions     | Min.                                                                                                                      | Typ. | Max. | Unit    |
|------------------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------|------|------|---------|
| Operating Temperature        | See Fig. 1               | -40                                                                                                                       | --   | +85  | °C      |
| Storage Temperature          |                          | -55                                                                                                                       | --   | +125 |         |
| Storage Humidity             | Non-condensing           | 5                                                                                                                         | --   | 95   | %RH     |
| Reflow Soldering Temperature |                          | Peak temp. ≤245°C, maximum duration time ≤60s over 217°C. For actual application, please refer to IPC/JEDEC J-STD-020D.1. |      |      |         |
| Switching Frequency          | Full load, nominal input | --                                                                                                                        | 700  | --   | KHz     |
| MTBF                         | MIL-HDBK-217F@25°C       | 2000                                                                                                                      | --   | --   | K hours |

## Mechanical Specifications

|                |                        |
|----------------|------------------------|
| Dimensions     | 12.50 x 13.50 x 3.50mm |
| Weight         | 0.9g (Typ.)            |
| Cooling Method | Free air convection    |

## Electromagnetic Compatibility (EMC)

|           |       |                  |                                                                           |
|-----------|-------|------------------|---------------------------------------------------------------------------|
| Emissions | CE    | CISPR32/EN55032  | CLASS B (see Fig. 4-② for recommended circuit)                            |
|           | RE    | CISPR32/EN55032  | CLASS B (see Fig. 4-② for recommended circuit)                            |
| Immunity  | ESD   | IEC/EN 61000-4-2 | Contact ±4KV perf. Criteria B                                             |
|           | RS    | IEC/EN 61000-4-3 | 10V/m perf. Criteria A                                                    |
|           | EFT   | IEC/EN 61000-4-4 | ±1KV (see Fig. 4-① for recommended circuit) perf. Criteria B              |
|           | Surge | IEC/EN 61000-4-5 | line to line ±1KV (see Fig. 4-① for recommended circuit) perf. Criteria B |
|           | CS    | IEC/EN 61000-4-6 | 3Vr.m.s perf. Criteria A                                                  |

## Typical Characteristic Curves

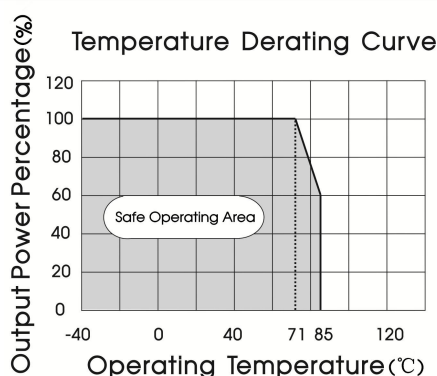
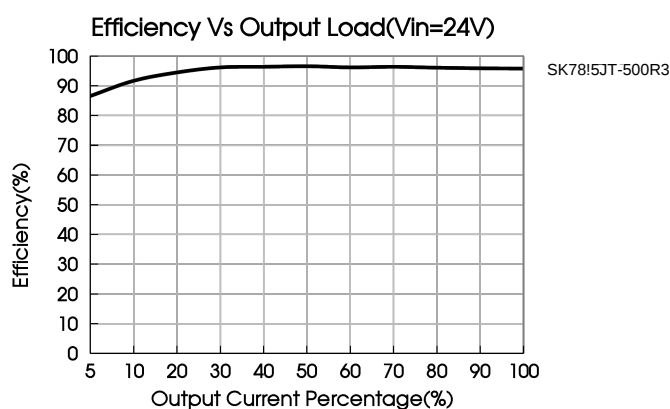
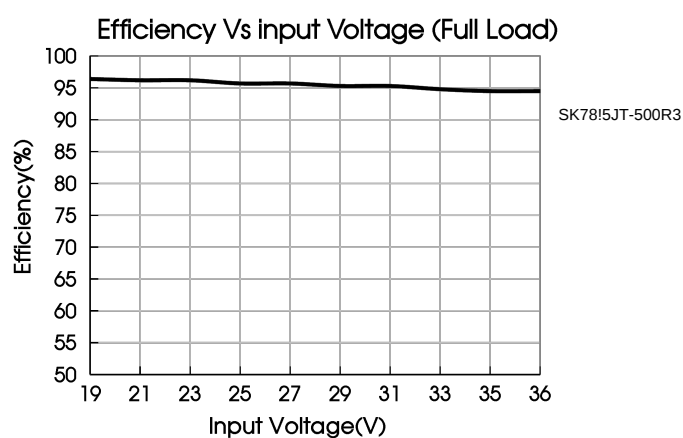
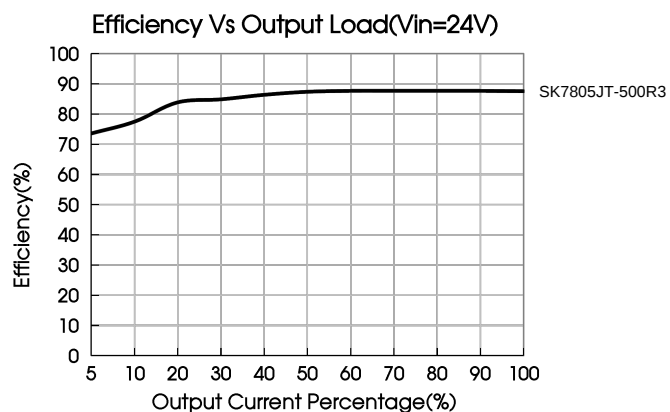
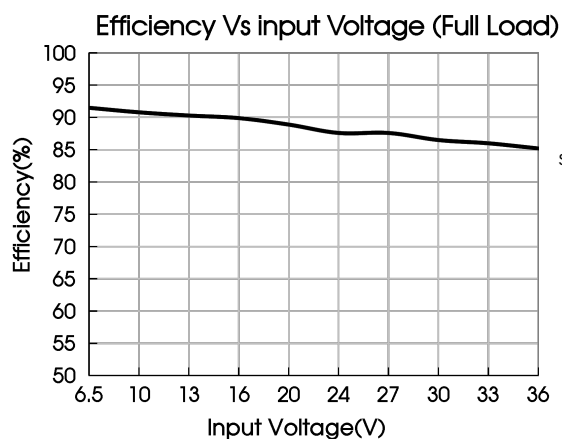


图 1

# DC/DC Converter

## SK78\_JT-500R3 Series



## Design Reference

### 1. Typical application

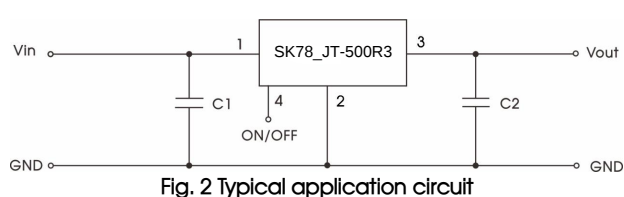


Fig. 2 Typical application circuit

| Part No.       | C1<br>(ceramic<br>capacitor) | C2<br>(ceramic<br>capacitor) |
|----------------|------------------------------|------------------------------|
| SK7803JT-500R3 | 10μF/50V                     | 22μF/10V                     |
| SK7805JT-500R3 |                              | 22μF/16V                     |
| SK7809JT-500R3 |                              | 22μF/25V                     |
| SK7812JT-500R3 |                              | 22μF/25V                     |
| SK7815JT-500R3 |                              | 22μF/25V                     |

Table 1

#### Notes:

1. The required C1 and C2 capacitors must be connected as close as possible to the terminals of the module;
2. Refer to Table 1 for C1 and C2 capacitor values. For certain applications, increased values and/or tantalum or low ESR electrolytic capacitors may also be used instead;
3. Converter cannot be used for hot swap and with output in parallel;
4. To further reduce the output ripple and noise, we suggested the use of a "LC" filter at the output terminals, with an inductor value (L) of 10μH-47μH.

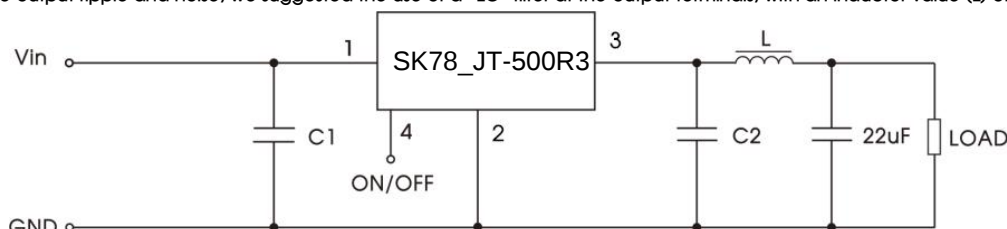


Fig. 3 External "LC" output filter circuit diagram

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### 2. EMC Compliance circuit

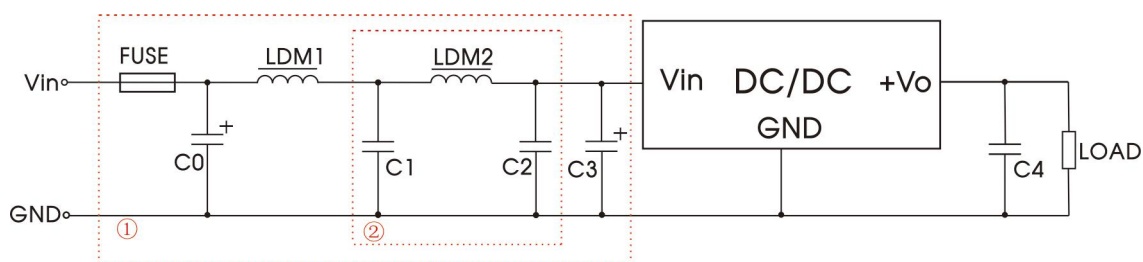


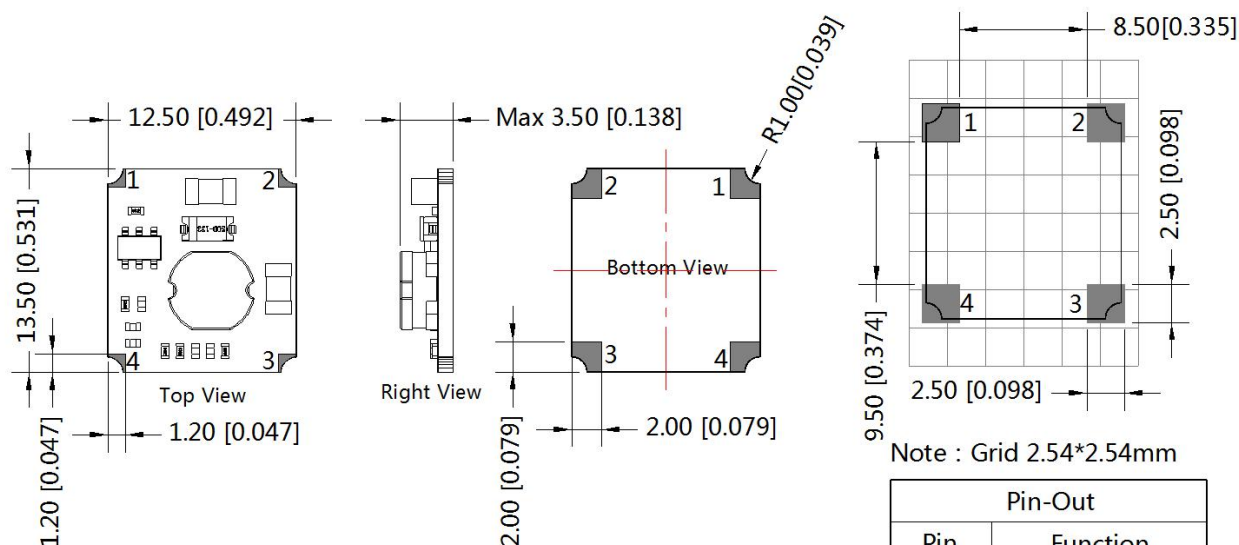
Fig.4 Recommended compliance circuit

| FUSE                                                       | LDM1 | C0/C3      | C4               | C1/C2     | LDM2 |
|------------------------------------------------------------|------|------------|------------------|-----------|------|
| Selecting based on the actual input current in application | 82μH | 330μF /50V | Refer to table 1 | 10μF /50V | 22μH |

Note: For EMC tests we use Part ① in Fig. 4 for immunity and part ② for emissions test. Selecting based on needs.

### Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



Note:  
Unit :mm[inch]  
General tolerances:  $\pm 0.25[\pm 0.010]$   
The layout of the device is for reference only, please refer to the actual product

Note : Grid 2.54\*2.54mm

| Pin-Out |               |
|---------|---------------|
| Pin     | Function      |
| 1       | +Vin          |
| 2       | GND           |
| 3       | +Vo           |
| 4       | Remote On/Off |

### Notes:

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  $T_a=25^{\circ}\text{C}$ , humidity<75% with nominal input voltage and rated output load;
3. All index testing methods in this datatable are based on our company corporate standards;
4. We can provide product customization service, please contact our technicians directly for specific information;
5. Products are related to laws and regulations: see "Features" and "EMC";
6. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.