

# Datasheet

## RS Pro K78xxJT-500R3 DC-DC Converter

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
- 3 Year warranty



*K78\_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 | RS Stock no.<br>(Standard Pack) | RS Stock no.<br>(Tube Pack) | 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            | 1933954                         | 1933953                     | K7803JT-500R3 | 24<br>(4.75-36)      | 3.3           | 500                  | 86/80  | 680                                       |
|               | 1933956                         | 1933955                     | K7805JT-500R3 | 24<br>(6.5-36)       | 5             | 500                  | 90/84  | 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.

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### Output Specifications

| Item                         | Operating Conditions                        | Min.                           | Typ. | Max.  | Unit |       |
|------------------------------|---|--------------------------------|------|-------|------|-------|
| Voltage Accuracy             | Full load, input voltage range              | 3.3 VDC output                 | --   | ±2    | ±4   | %     |
|                              |   | 5 VDC output                   | --   | ±2    | ±3   |       |
| Linear Regulation            | Full load, input voltage range              | --                             | ±0.2 | ±0.4  |      |       |
| Load Regulation              | Nominal input voltage, 10% -100% load       | 3.3/5VDC output                | --   | ±0.6  | --   | %     |
| Ripple & Noise*              | 20MHz bandwidth, nominal input voltage      | 3.3 VDC output, 20% -100% load | --   | 20    | 50   | mVp-p |
|                              |   | 5 VDC, 10% -100% load          | --   | 20    | 50   |       |
| 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;  
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 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 |  |

# DC/DC Converter

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## Typical Characteristic Curves

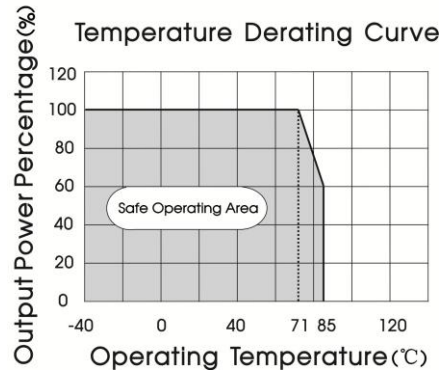
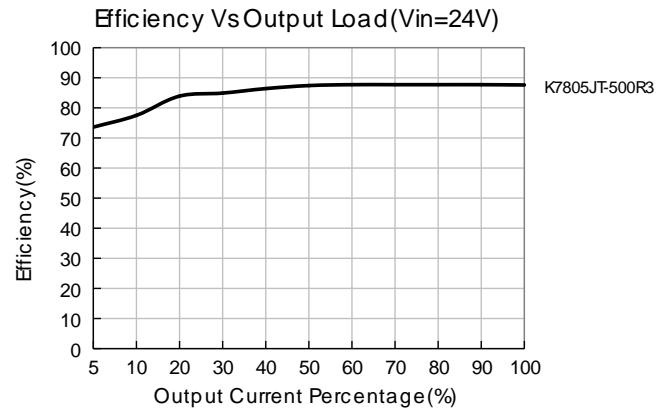
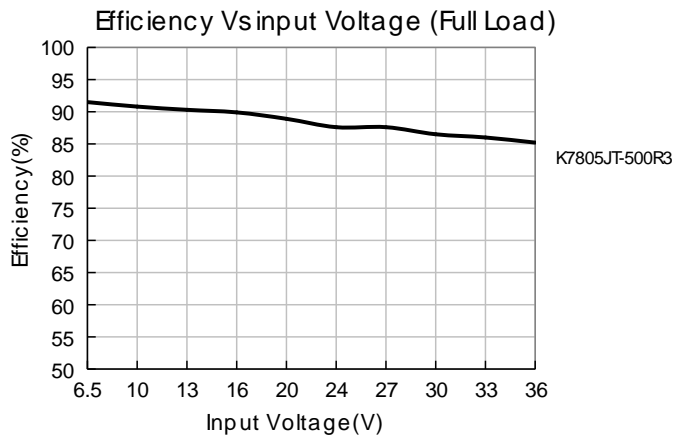


图 1



# DC/DC Converter

## K78xxJT-500R3 Series

### Design Reference

#### 1. Typical application

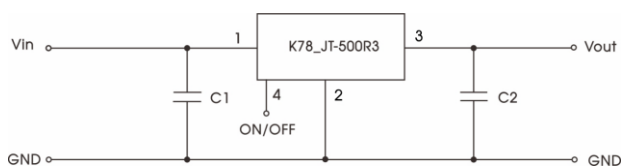


Fig. 2 Typical application circuit

| Part No.      | C1<br>(ceramic capacitor) | C2<br>(ceramic capacitor) |
|---------------|---------------------------|---------------------------|
| K7803JT-500R3 | 10 $\mu$ F/50V            | 22 $\mu$ F/10V            |
| K7805JT-500R3 |                           | 22 $\mu$ F/16V            |

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 10 $\mu$ H-47 $\mu$ H.

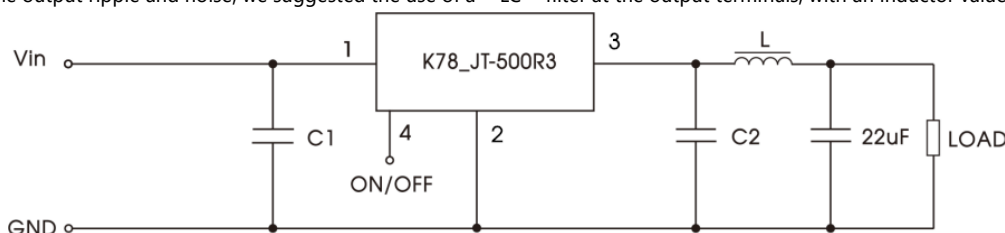


Fig. 3 External "LC" output filter circuit diagram

#### 2. EMC Compliance circuit

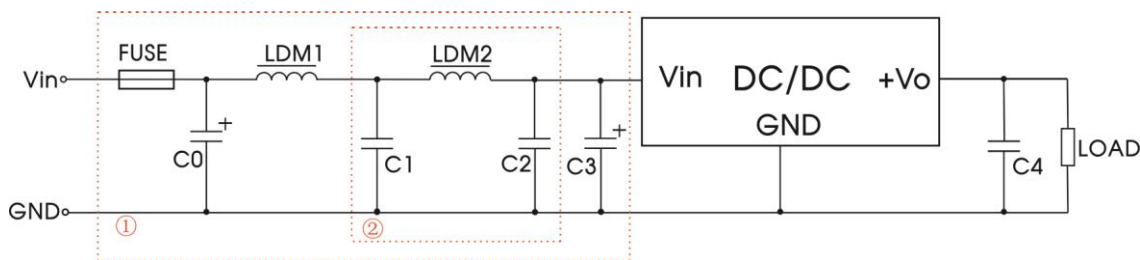


Fig.4 Recommended compliance circuit

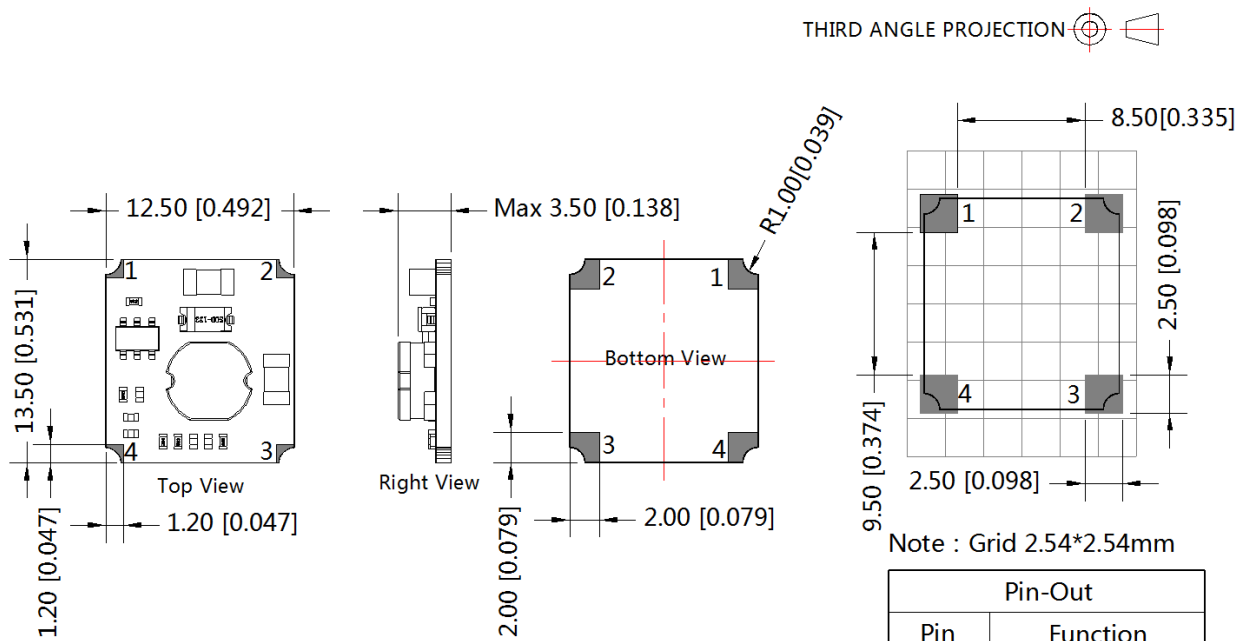
| FUSE   | LDM1       | C0/C3            | C4               | C1/C2           | LDM2       |
|--|------------|------------------|------------------|-----------------|------------|
| Selecting based on the actual input current in application | 82 $\mu$ H | 330 $\mu$ F /50V | Refer to table 1 | 10 $\mu$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

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

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## Dimensions and Recommended Layout



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

| 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 datasheet 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.