

MORNSUN®

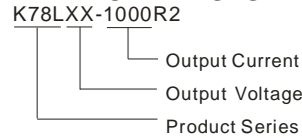
K78LXX-1000R2 Series

**WIDE INPUT NON-ISOLATED & REGULATED
SINGLE OUTPUT**



Patent Protection RoHS

PART NUMBER SYSTEM



FEATURES

- Efficiency up to 91%
- Operating temperature range: -40°C ~ +85°C
- Pin-out compatible with LM78XX linears
- Short circuit protection, thermal shutdown
- Low ripple and noise
- Sip package, meet UL94-V0
- Low temperature rise
- Industry standard pinout
- Low-cost

APPLICATIONS

K78LXX-1000R2 series high efficiency switching regulators are ideally suited to replace 78xx linear regulators and are pin compatible.

SELECTION GUIDE

| Model | Input Voltage(VDC) | | Output Voltage (VDC) | Output Current (mA) | Efficiency (% max) | |
|---------------|--------------------|---------|----------------------|---------------------|--------------------|-----------|
| | Nominal | Range | | | Vin(Min) | Vin (Max) |
| K78L01-1000R2 | 12 | 4.75-18 | 1.5 | 1000 | 76 | 72 |
| K78LX2-1000R2 | 12 | 4.75-18 | 1.8 | 1000 | 78 | 75 |
| K78L02-1000R2 | 12 | 4.75-18 | 2.5 | 1000 | 83 | 80 |
| K78L03-1000R2 | 12 | 4.75-18 | 3.3 | 1000 | 86 | 83 |
| K78L05-1000R2 | 12 | 6.5-18 | 5.0 | 1000 | 91 | 88 |

INPUT SPECIFICATIONS

| Item | Test Conditions | Min. | Typ. | Max. | Unit |
|------------------------|---------------------|---------------------------|------|------|------|
| No-load Input Power | Input voltage range | -- | -- | 0.27 | W |
| Reverse Polarity Input | | Forbidden | | | |
| Input Filter | | Capacitance Filter (10μF) | | | |

OUTPUT SPECIFICATIONS

| Item | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------------------------|------------------------------------|--------------------------------|------|--------|-------|
| Output Voltage accuracy | 100% load, input voltage range | -- | ±2 | ±3 | % |
| Line Regulation | Input voltage range | -- | ±0.4 | ±0.75 | |
| Load Regulation | From 10% to 100% full load | -- | ±0.5 | ±1.0 | |
| Switching Frequency | 100% load, input Voltage Range | 350 | 400 | 450 | KHz |
| Output Current Limit | | -- | -- | 2800 | mA |
| Temperature Drift | -40°C ~ +85 °C | -- | -- | ±0.025 | %/°C |
| Ripple & Noise* | 20MHz bandwidth(refer to figure 4) | -- | 20 | 35 | mVp-p |
| Over Temperature Protection | IC inside | -- | -- | 160 | °C |
| Short circuit input power | Input Voltage Range | -- | 0.3 | 1.8 | W |
| Short circuit protection | | Continuous, automatic recovery | | | |
| Max. Capacitive Load | | -- | -- | 1000 | μF |

Note:* Ripple and noise tested by "parallel cable" method. See detailed operation instructions at Testing of Power Converter section, application notes.

COMMON SPECIFICATIONS

| Item | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------|---------------------|-------------------|------|------|---------|
| MTBF | MIL-HDBK-217F @25°C | 1000 | -- | -- | K hours |
| Case material | | Plastic (UL94-V0) | | | |
| Dimensions | | 11.60*7.50*10.20 | | | mm |
| Weight | | -- | 2.0 | -- | g |

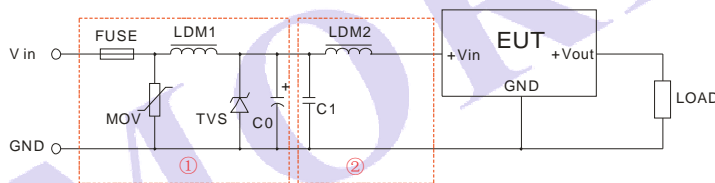
ENVIRONMENTAL SPECIFICATIONS

| Item | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------------------|-----------------------------------|---------------------|------|------|------|
| Storage Humidity | Non condensing | -- | -- | 95 | % |
| Operating Temperature | Power derating(above 55°C) | -40 | -- | 85 | °C |
| Storage Temperature | | -55 | -- | 125 | |
| The Max. Case Temperature | Operating temperature curve range | -- | -- | 100 | |
| Lead Temperature | 1.5mm from case for 10 seconds | -- | -- | 300 | |
| Cooling | | Free air convection | | | |

EMC SPECIFICATIONS

| | | | | |
|--|-------|-------------------|--------------|---|
| EMI | CE | CISPR22/EN55022 | CLASS B | (External Circuit Refer to Figure1-②) |
| | RE | CISPR22/EN55022 | CLASS B | (External Circuit Refer to Figure1-②) |
| EMS | 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 | ±2KV | perf. Criteria B (External Circuit Refer to Figure 1-①) |
| | Surge | IEC/EN 61000-4-5 | ±2KV | perf. Criteria B (External Circuit Refer to Figure 1-①) |
| | CS | IEC/EN 61000-4-6 | 3Vr.ms | perf. Criteria A |
| Voltage dips, short and interruptions immunity | | IEC/EN 61000-4-29 | 0%-70% | perf. Criteria B |

EMC RECOMMENDED CIRCUIT



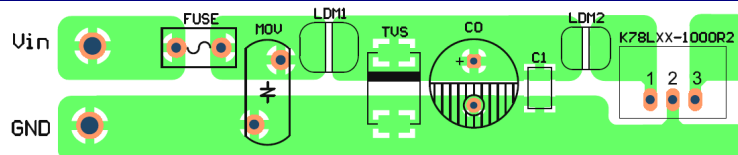
(Figure 1) EMC Recommended Circuit

Note: In Figure 1, part ① is EMS recommended external circuit, part ② is EMI recommended external circuit. Choose according to requirements.

Recommended external circuit parameters:

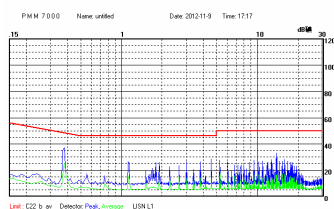
| Components | Standard Parameter |
|------------|---|
| FUSE | Choose according to practical input current |
| MOV | 10D560 |
| LDM1 | 82μH |
| TVS | SMCJ36A |
| C0 | 470μF/25V |
| C1 | 4.7μF/50V |

EMC RECOMMENDED CIRCUIT PCB LAYOUT

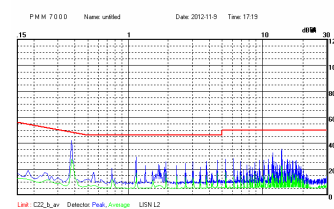


(图 2)

EMC TEST WAVEFORM(CLASS B APPLY CIRCUIT)

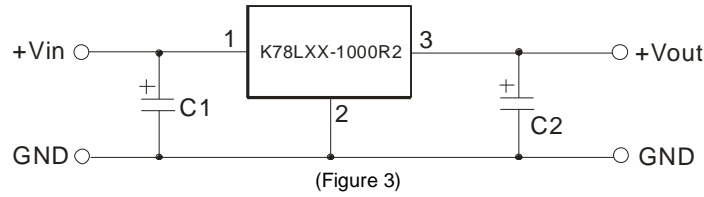


K78L05-1000R2 CE (Positive line)



K78L05-1000R2 CE (Negative line)

TYPICAL APPLICATION CIRCUIT



EXTERNAL CAPACITOR TABLE

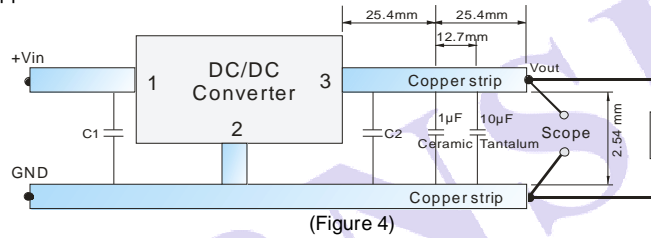
| Model | C1 (Ceramic Capacitor) | C2 (Ceramic Capacitor) |
|---------------|------------------------------|------------------------------|
| K78L03-1000R2 | 10 μ F/25V | 10 μ F/6.3V |
| K78L05-1000R2 | | 10 μ F/10V |

Note:

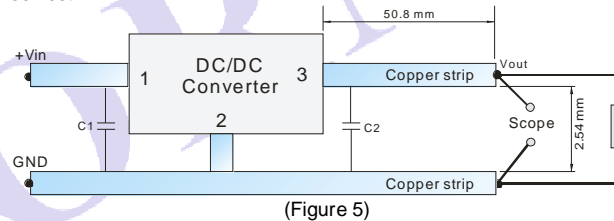
- General apply to the application-environment, C1 and C2 can be added in the circuit, and they should be placed as near as the products' footprints.
- The capacitance of C1,C2 sees external capacitor table, it can be increased properly if required, and tantalum or low ESR electrolytic capacitors may also suffice.
- Cannot use in parallel for output and hot swap for input.

TEST CONFIGURATIONS (TA=25°C)

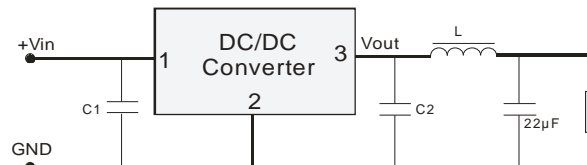
1. Efficiency and Output Voltage Ripple Test



2. Start-up and Load Transient Response Test

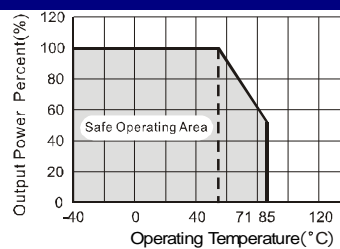


OUTPUT RIPPLE REDUCTION

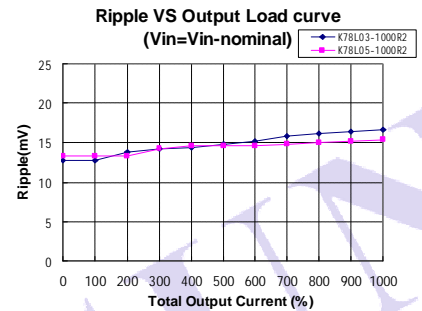
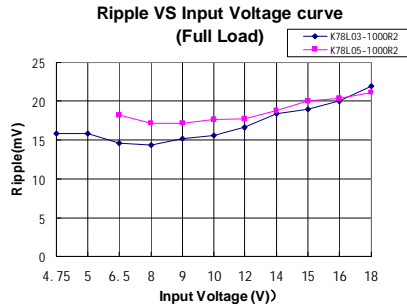
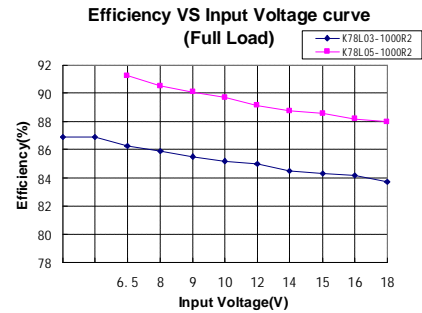
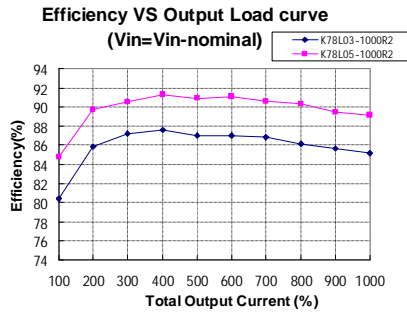


To reduce output ripple, it is recommended to add a LC filter in output port.
L: Recommended parameter 10 μ H ~ 47 μ H.
(Figure 6)

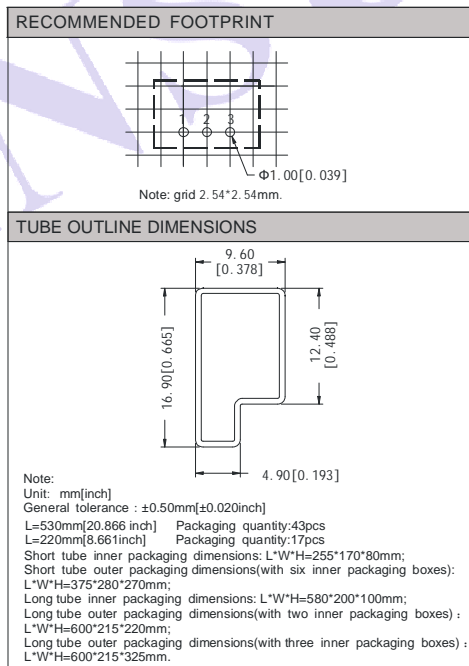
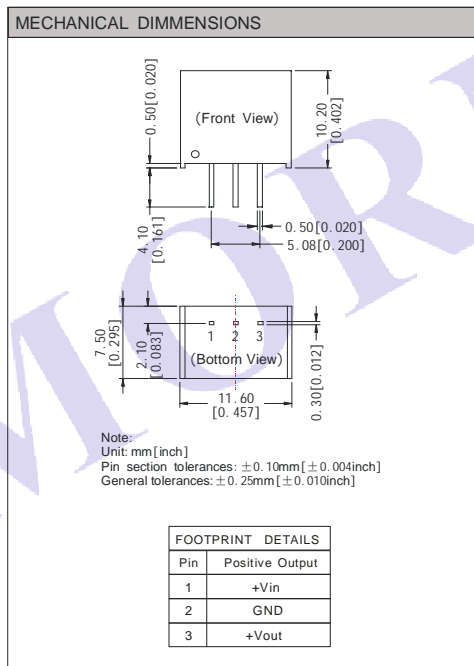
TYPICAL DERATING CURVE



TYPICAL CHARACTER CURVE



OUTLINE DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING



Note:

1. Max. Capacitive Load tested at input voltage range and full load.
2. All specifications measured at $T_a=25^\circ\text{C}$, 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 our corporate standards.
4. All characteristics are for listed model, non-standard models may perform differently, please contact our technical person for more detail.
5. Contact us for your specific requirement.
6. Specifications subject to change without prior notice.

MORNSUN Science & Technology Co.,Ltd.

Address: No. 5, Kehui St. 1, Kehui development center, Science Ave., Guangzhou Science City, Luogang district, Guangzhou, P.R.China.

Tel: 86-20-38601850

Fax: 86-20-38601272

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