

DESCRIPTION: Wide Input Non-Isolated & Regulated Single Output

TP78LXX-1 series switching regulators are ideal replacement for TP78xx linear regulators and LDOs. The efficiency of up to 97% means that very little energy is wasted as heat so there is no need for any heat sinks with their additional space and mounting costs. They are widely used in industrial control, instrumentation, and electric power applications.

FEATURES

| | | |
|--|--|--------------------------|
| ROHS Compliant | Wide input non-isolated, regulated single output | Efficiency up to 97% |
| Short circuit protection, Thermal shutdown | Temperature range: -40°C ~ +85°C | Low ripple noise |
| SIP package | No heat sink required | Industry standard pinout |

SELECTION GUIDE

| Part Number | Input Voltage (VDC) | | Output | | Efficiency (%) | |
|-------------|---------------------|---------|---------------|--------------|----------------|----------|
| | Nominal | Range | Voltage (VDC) | Current (mA) | Vin (Min) | Vin(Max) |
| TP78L1.5-1 | 12 | 4.75~26 | 1.5 | 1000 | 80 | 71 |
| TP78L1.8-1 | 12 | 4.75~26 | 1.8 | 1000 | 83 | 74 |
| TP78L2.5-1 | 12 | 4.75~28 | 2.5 | 1000 | 88 | 80 |
| TP78L3.3-1 | 24 | 4.75~28 | 3.3 | 1000 | 90 | 83 |
| TP78L5.0-1 | 24 | 6.5~32 | 5.0 | 1000 | 93 | 88 |
| TP78L6.5-1 | 24 | 9.0~32 | 6.5 | 1000 | 94 | 90 |
| TP78L9.0-1 | 24 | 12~32 | 9.0 | 1000 | 95 | 92 |
| TP78L12-1 | 24 | 16~32 | 12 | 1000 | 96 | 94 |
| TP78L15-1 | 24 | 20~32 | 15 | 1000 | 97 | 94 |

The above part number with "L" Suffix are 90° bent pins power converters, for example TP78L1.5-1L.

OUTPUT CHARACTERISTICS

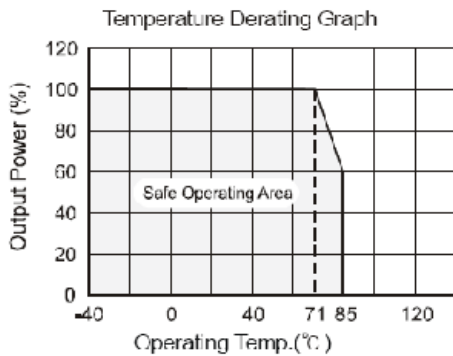
| Parameter | Conditions | Min | Typ. | Max. | Units |
|---------------------------|--|-----|--------------------------------|-------|-------|
| Output voltage accuracy | 100% full load | | ±2 | ±3 | |
| Line regulation | Vin=min. to max, at full load | | ±0.2 | ±0.4 | % |
| Load regulation | 10% to 100% load | | ±0.4 | ±0.6 | |
| Ripple & Noise | 20MHz bandwidth | | 25 | 35 | mvp-p |
| Short circuit input power | | | 0.5 | 1.8 | W |
| Short circuit protection | | | Continuous, automatic recovery | | |
| Thermal shutdown | Internal IC junction | | 150 | | °C |
| Switching frequency | 100% full load | 280 | 330 | 450 | KHz |
| Output current limit | Vin= min. to max.(at full load) Vout:1.5V~3.3V | | | 3000 | mA |
| Output current limit | Vin= min. to max.(at full load) Vout:5V~15V | | | 2000 | mA |
| Quiescent current | | | 5 | 8 | mA |
| Temperature coefficient | -40°C~+85°C ambient | | | ±0.02 | %/°C |
| Max capacitance load | | | | 1000 | µF |

All specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified.

COMMON SPECIFICATIONS

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|-----------------------|--------------------------------|---------------------|------|------|---------|
| Storage humidity | | | | 95 | |
| Operating temperature | Power derating (above 71°C) | -40 | | 85 | °C |
| Operating case temp | | | | 100 | |
| Storage temperature | | -55 | | 125 | |
| Lead temperature | 1.5mm from case for 10 seconds | | | 300 | |
| Cooling | | Free air convection | | | |
| Case material | | Plastic (UL94-V0) | | | |
| MTBF | 25°C (MIL-HDBK-217F) | 2000 | | | k hours |
| Weight | | | 3.7 | | g |

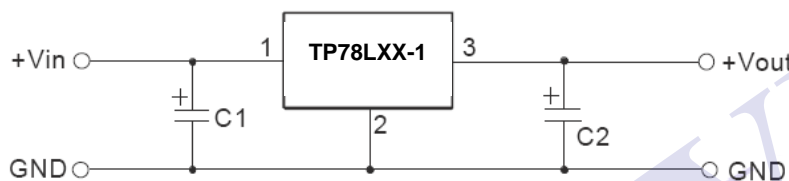
TEMPERATURE DERATING GRAPHS



EXTERNAL CAPACITOR TABLE

| Part Number | C1(Ceramic Capacitor) | C2(Ceramic Capacitor) |
|-------------|-----------------------|-----------------------|
| TP78L1.5-1 | 10 μ F/50V | 22 μ F/6.3V |
| TP78L1.8-1 | 10 μ F/50V | 22 μ F/6.3V |
| TP78L2.5-1 | 10 μ F/50V | 22 μ F/6.3V |
| TP78L3.3-1 | 10 μ F/50V | 22 μ F/6.3V |
| TP78L5.0-1 | 10 μ F/50V | 22 μ F/16V |
| TP78L6.5-1 | 10 μ F/50V | 10 μ F/16V |
| TP78L9.0-1 | 10 μ F/50V | 10 μ F/16V |
| TP78L12-1 | 10 μ F/50V | 10 μ F/25V |
| TP78L15-1 | 10 μ F/50V | 10 μ F/25V |

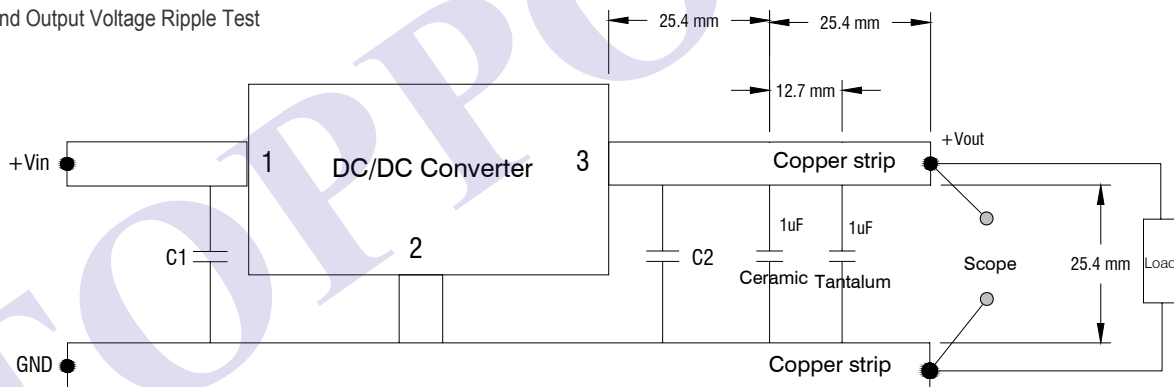
STANDARD APPLICATION CIRCUIT



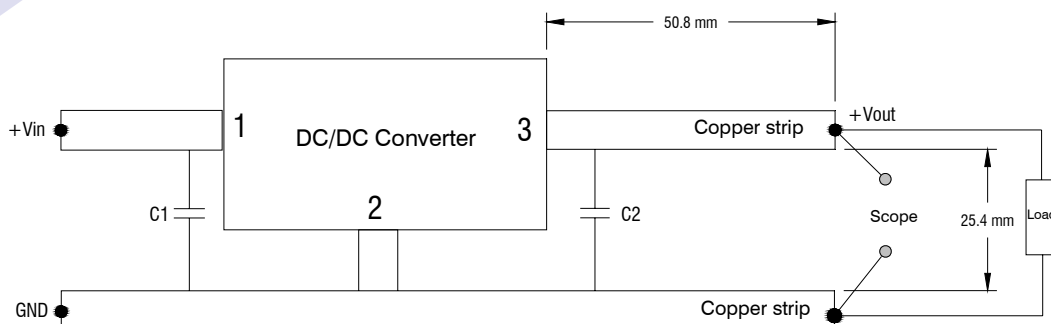
- Note:
1. C1 and C2 are required and should be fitted close to the converter pins.
 2. The capacitance of C1,C2 sees external capacitor table, it can be increased properly if required, and tantalum or low ESR electrolytic capacitors may also suffice.
 3. No parallel connection or plug and play.

TEST CONFIGURATIONS (TA=25°C)

1. Efficiency and Output Voltage Ripple Test

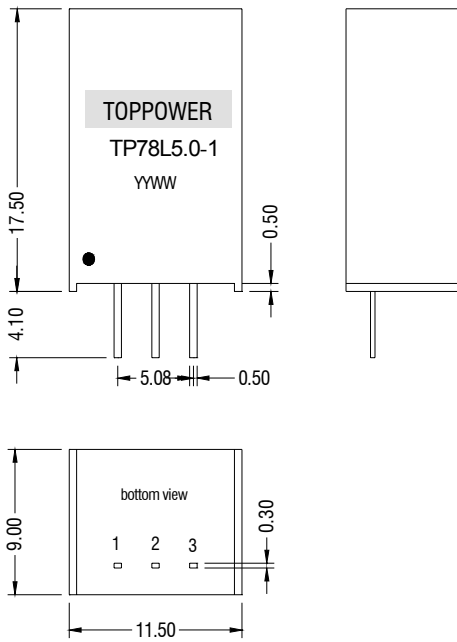


2. Start-up and Load Transient Response Test



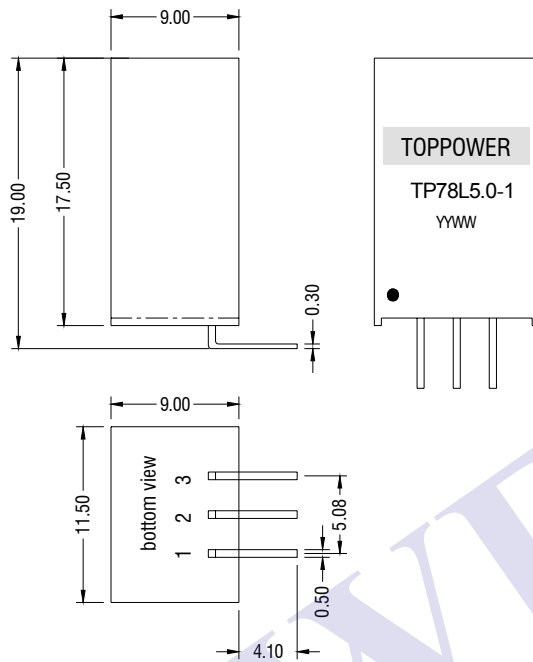
MECHANICAL DIMENSIONS

SIP Package



All dimensions in mm ± 0.25 . All pins on a 2.54mm pitch.

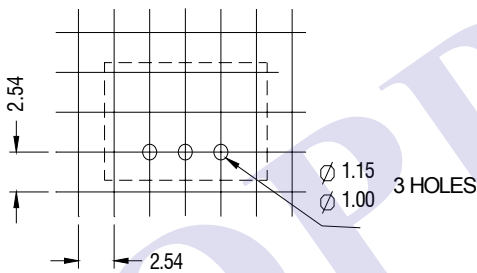
90° bent pins power converters(part number with "L" Suffix)



PIN CONNECTIONS

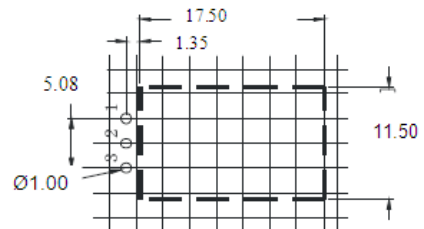
| Pin | Function |
|-----|----------|
| 1 | +Vin |
| 2 | GND |
| 3 | +Vout |

RECOMMENDED FOOTPRINT DETAILS



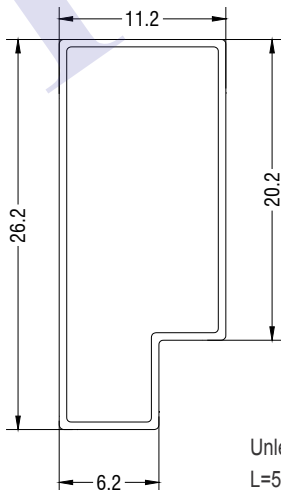
Unless otherwise stated all dimensions in mm ± 0.5 mm.

90° bent pins power converters(part number with "L" Suffix)

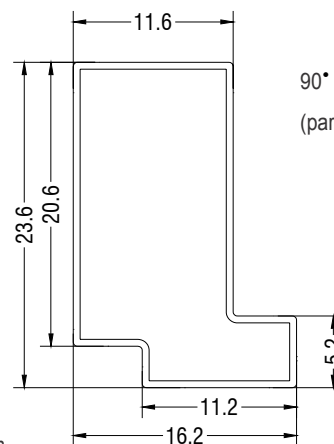


Unless otherwise stated all dimensions in mm ± 0.5 mm.

TUBE OUTLINE DIMENSIONS



Unless otherwise stated all dimensions in mm ± 0.5 mm.
 L=520mm ± 2 mm Packaging quantity:44PCS
 L=220mm ± 2 mm Packaging quantity:17PCS



90° bent pins power converters
 (part number with "L" Suffix)