# AC/DC Power Modules

## TMLM Series, 4 to 20 Watt

UL 60950-1

### Features

- AC/DC power modules for PCB mounting
- Highest power density
- Fully encapsulated plastic case
- Universal input 90–264 VAC, 47–440 Hz
- High efficiency
- EMI meets EN 55022, class B and FCC, level B
- Low ripple and noise
- Short circuit and overload protection
- 3-year product warranty




The TMLM Series switching power supplies, offer highest power density in a fully encapsulated module which can be soldered directly on to PCBs. This feature makes these modules an ideal solution for all space critical applications in commercial and industrial electronic equipment. International safety approvals qualify the product for worldwide markets. SMD-technology and high efficiency guarantees a high reliability of these Power Supplies.

### Models

| Order Code | Output Power max. | Output 1 | Output 2 |
|---|---|---|---|
| TMLM 04103 | 4.0 Watt | 3.3 VDC / 1200 mA | |
| TMLM 04105 | 4.0 Watt | 5.0 VDC / 800 mA | |
| TMLM 04109 | 4.0 Watt | 9.0 VDC / 444 mA | |
| TMLM 04112 | 4.0 Watt | 12 VDC / 333 mA | |
| TMLM 04115 | 4.0 Watt | 15 VDC / 267 mA | |
| TMLM 04124 | 4.0 Watt | 24 VDC / 167 mA | |
| TMLM 04253 | 3.5 Watt | +5.0 VDC / 600 mA | +3.3 VDC / 150 mA |
| TMLM 04225 | 3.6 Watt | +12 VDC / 250 mA | +5.0 VDC / 120 mA |
| TMLM 05103 | 4.1 Watt | 3.3 VDC / 1250 mA | |
| TMLM 05105 | 5 Watt | 5.0 VDC / 1000 mA | |
| TMLM 05112 | 5 Watt | 12 VDC / 420 mA | |
| TMLM 05115 | 5 Watt | 15 VDC / 333 mA | |
| TMLM 05124 | 5.5 Watt | 24 VDC / 230 mA | |
| TMLM 10103 | 8.2 Watt | 3.3 VDC / 2500 mA | |
| TMLM 10105 | 10 Watt | 5.0 VDC / 2000 mA | |
| TMLM 10112 | 10 Watt | 12 VDC / 833 mA | |
| TMLM 10115 | 10 Watt | 15 VDC / 667 mA | |
| TMLM 10124 | 10 Watt | 24 VDC / 417 mA | |
| TMLM 20103 | 12 Watt | 3.3 VDC / 3600 mA | |
| TMLM 20105 | 18 Watt | 5.0 VDC / 3600 mA | |
| TMLM 20112 | 10 Watt | 12 VDC / 1660 mA | |
| TMLM 20115 | 10 Watt | 15 VDC / 1330 mA | |
| TMLM 20124 | 10 Watt | 24 VDC / 833 mA | |

## Input Specifications

| | | | |
|---|---|---|---|
| Input voltage | – Nominal | | 100 – 240 VAC |
| | – Range | | 90 – 264 VAC (universal input) |
| | – DC range (TMLM 04 & TMLM 05 models only) | | 120 – 370 VDC |
| Input frequency | | | 47 – 440 Hz |
| Input current at full load (115 VAC / 230 VAC) | | TMLM 04 models: | 75 mA / 55 mA typ. |
| | | TMLM 05 models: | 110 mA / 70 mA typ. |
| | | TMLM 10 models: | 220 mA / 150 mA typ. |
| | | TMLM 20 models: | 385 mA / 280 mA typ. |
| Inrush current (<2 ms) (115 VAC / 230 VAC) | | TMLM 04 models: | 15 A max / 25 A max. |
| | | TMLM 05 & TMLM 10 models: | 10 A max / 20 A max. |
| | | TMLM 20 models: | 20 A max / 40 A max. |
| External input fuse required (recommended value) | | | 1.5 A slow blow type |

## Output Specifications

| | | | |
|---|---|---|---|
| Voltage set accuracy | | | ±2 % |
| Regulation | – Input variation | | 0.3 % max. (0.5% max. for TMLM 20 models, 3.0 % max for output 2) |
| | – Load variation | TMLM 04; 3.3 – 9.0 VDC models: | 1.0 % max. (0–100% load) |
| | | TMLM 04 other models output 1: | 0.5 % max. (0–100% load) |
| | | TMLM 04 output 2: | 5.0 % max. (1–100% load) |
| | | TMLM 05 & TMLM 10 models: | 0.5 % max. (5–100% load) |
| | | TMLM 20 models: | 1.0 % max. (5–100% load) |
| Minimum load | | TMLM 04 models: | 0 % (1% for output 2) |
| | | other models: | 5 %, operation at 0-load condition will not damage these power supplies, however, they may not meet all listed specifications. |
| Ripple and noise (20 MHz bandwidth) | | 3.3 – 9.0 VDC models: | <100 mV |
| | | 12 & 15 VDC models: | <150 mV |
| | | 24 VDC models: | <220 mV |
| Current limitation | | | 120 – 180 % fold back |
| Short circuit protection | | | indefinite (automatic recovery) |
| Overvoltage protection by Zehner diode (main output only) | | | 120 % of Vout typ. |

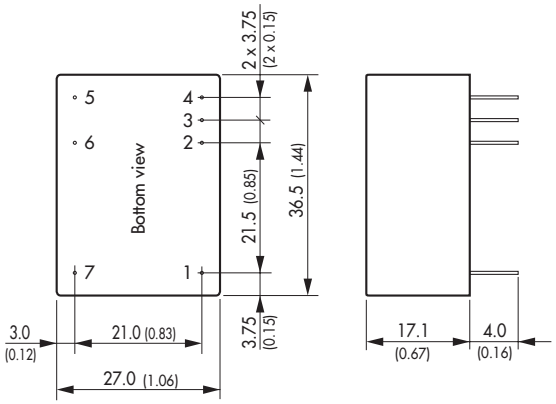
| Max. capacitive load [µF] | | Model series | | | |
|---|---|---|---|---|---|
| Output: | | TMLM 04 | TMLM 05 | TMLM 10 | TMLM 20 |
| Single output models: | 3.3 VDC | 1200 | 23'000 | 23'000 | 3000 |
| | 5.0 VDC | 800 | tba | tba | 2200 |
| | 9.0 VDC | 440 | - | - | - |
| | 12 VDC | 330 | tba | tba | 1200 |
| | 15 VDC | 260 | tba | tba | 1000 |
| | 24 VDC | 160 | 470 | 470 | 800 |
| Dual output models: | 5.0 VDC / 3.3 VDC | 5600 / 4700 | - | - | - |
| | 12 VDC / 5.0 VDC | 330 / 4700 | - | - | - |

## General Specifications

| | | | |
|---|---|---|---|
| Temperature ranges | – Operating<br>– Storage (non operating) | | –25°C to +60°C<br>–40°C to +85°C |
| Derating | | | 3.75 %/K above +50°C<br>TMLM 20 models: 2.5 %/K above 40°C |
| Temperature coefficient | | | 0.02 %/K |
| Humidity (non condensing) | | | 95 % rel max. |
| Efficiency | | | 75 % typ. (depending on model) |
| Switching frequency | | | 130 kHz typ. (pulse width modulation PWM) |
| Hold-up time | | | 15 ms min. |
| Isolation voltage (60 sec) | – Input/ Output | | 3'000 VAC |
| Leakage current | | TMLM 04 models:<br>TMLM 05 models:<br>TMLM 10 models:<br>TMLM 20 models: | 0.30 mA max.<br>0.75 mA max.<br>0.25 mA max.<br>0.75 mA max. |
| Reliability /calculated MTBF (MIL-HDBK-217F, at 25°C, ground benign) | | | >330'000 h<br>TMLM 20 models: >250'000 h |
| Electromagnetic compatibility (EMC), emissions | | | EN 55022, class B, FCC part 15, level B |
| Electromagnetic compatibility (EMC), immunity | | | EN 61000-6-2: 2005 |
| Degre of protection | | | class II to IEC/EN 60536 |
| Safety standards | | | UL 60950-1, IEC/EN 60950-1 |
| Safety approval | | | cUL /UL File E188913 (TMLM 20 pending)<br>www.ul.com -> certifications |
| Environment | – Vibration acc. IEC 60068-2-6;<br>– Shock acc. IEC 60068-2-27 | | 3 axis, sine sweep, 10-55Hz, 1g, 1oct/min<br>3 axis, 15g half sine, 11msShock<br>20 G (3 directions each 3 times) |
| Casing material | | | Plastic resin + fiberglass<br>(flammability UL 94V-0 rated) |

## Outline Dimensions

**TMLM 04 Models:**




Pin diameter: 0.5 (0.02)

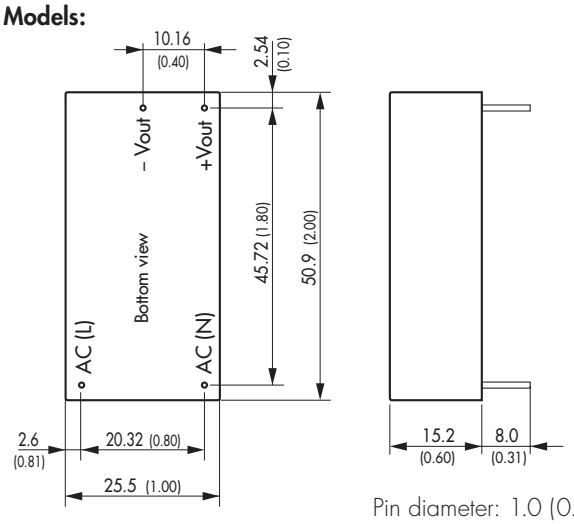
| Pin-Out | | |
|---|---|---|
| **Pin** | **Single** | **Dual** |
| **1** | No con | No con |
| **2** | +Vout | Vout 1 |
| **3** | –Vout | Common |
| **4** | No con. | Vout 2 |
| **5** | AC (L) | AC (L) |
| **6** | AC (N) | AC (N) |
| **7** | No con. | No con. |

**Weight:** 26 g (0.92 oz)

All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

## Outline Dimensions

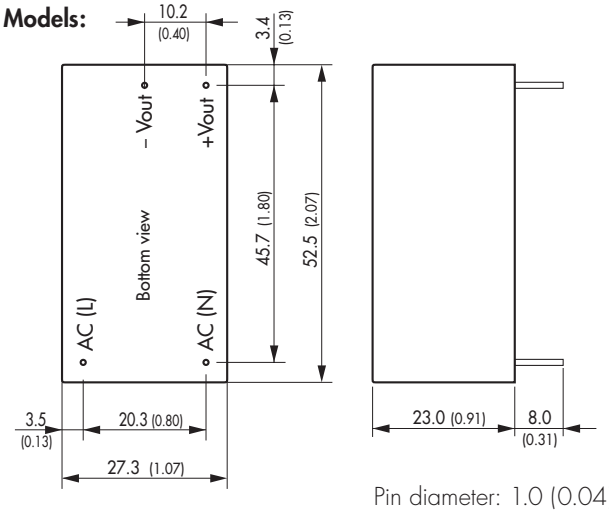
**TMLM 05 Models:**




**Weight:** 30 g (1.06 oz)

Pin diameter: 1.0 (0.04)

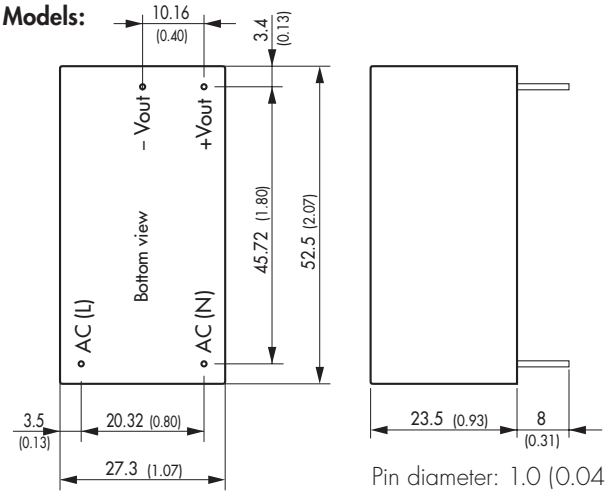
**TMLM 10 Models:**




**Weight:** 54 g (1.91 oz)

Pin diameter: 1.0 (0.04)

**TMLM 20 Models:**




**Weight:** 59 g (2.08 oz)

Pin diameter: 1.0 (0.04)

Dimensions in [mm], () = Inch
Tolerances: ±0.5 (±0.02)
Pin pitch tolerance: ±0.3 (±0.012)

Specifications can be changed any time without notice



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