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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	Efficiency
TMLM 04103	4.0 Watt	3.3 VDC / 1200 mA		67 %
TMLM 04105	4.0 Watt	5.0 VDC / 800 mA		69 %
TMLM 04109	4.0 Watt	9.0 VDC / 444 mA		72 %
TMLM 04112	4.0 Watt	12 VDC / 333 mA		70 %
TMLM 04115	4.0 Watt	15 VDC / 267 mA		74 %
TMLM 04124	4.0 Watt	24 VDC / 167 mA		73 %
TMLM 04253	3.5 Watt	+5.0 VDC / 600 mA	+3.3 VDC / 150 mA	69 %
TMLM 04225	3.6 Watt	+12 VDC / 250 mA	+5.0 VDC / 120 mA	69 %
TMLM 05103	4.1 Watt	3.3 VDC / 1250 mA		68 %
TMLM 05105	5 Watt	5.0 VDC / 1000 mA		71 %
TMLM 05112	5 Watt	12 VDC / 420 mA		75 %
TMLM 05115	5 Watt	15 VDC / 333 mA		75 %
TMLM 05124	5.5 Watt	24 VDC / 230 mA		77 %
TMLM 10103	8.2 Watt	3.3 VDC / 2500 mA		74 %
TMLM 10105	10 Watt	5.0 VDC / 2000 mA		79 %
TMLM 10112	10 Watt	12 VDC / 833 mA		82 %
TMLM 10115	10 Watt	15 VDC / 667 mA		78 %
TMLM 10124	10 Watt	24 VDC / 417 mA		80 %
TMLM 20103	12 Watt	3.3 VDC / 3600 mA		74 %
TMLM 20105	18 Watt	5.0 VDC / 3600 mA		78 %
TMLM 20112	20 Watt	12 VDC / 1660 mA		82 %
TMLM 20115	20 Watt	15 VDC / 1330 mA		83 %
TMLM 20124	20 Watt	24 VDC / 833 mA		83 %

Input Specifications

Input voltage	– Nominal		100 – 240 VAC
	– Range		90 – 264 VAC (universal input)
	– DC range		120 – 370 VDC
Input frequency			47 – 440 Hz
Input current at full load (115 VAC / 230 VAC)		TMLM 04 models:	110 mA / 70 mA typ.
		TMLM 05 models:	110 mA / 70 mA typ.
		TMLM 10 models:	220 mA / 150 mA typ.
		TMLM 20 models:	385 mA / 250 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)			3.15 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 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. (25–100% load)
		TMLM 05 & TMLM 10 models:	0.5 % max. (5–100% load)
		TMLM 20 models:	1.0 % max. (5–100% load)
Minimum load			0 % (25% for dual output models) 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)		TMLM 04; 3.3 VDC models:	<250 mV
		TMLM 04; 5.0 VDC models:	<200 mV
		TMLM 04; other models:	<100 mV
		TMLM 05 & TMLM 10; 3.3 & 5.0 VDC models:	<130 mV
		TMLM 05 & TMLM 10; 12 & 15 VDC models:	<210 mV
		TMLM 05 & TMLM 10; 24 VDC models:	<280 mV
		TMLM 20; 3.3 & 5.0 VDC models:	<200 mV
		TMLM 20; 12 VDC model:	<240 mV
		TMLM 20; 15 VDC model:	<300 mV
		TMLM 20; 24 VDC model:	<480 mV
	– Ripple & noise measured with:		0.1 uF & 47 uF parallel capacitor
Current limitation			120 – 180 %, hiccup technique
Short circuit protection			hiccup mode, 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	14'000	13'800	75'000	4'500
	5.0 VDC	8'000	6'000	40'000	3'500
	9.0 VDC	2'400	-	-	-
	12 VDC	1'000	1'400	8'500	1'800
	15 VDC	700	1'000	3'500	1'500
	24 VDC	220	170	1'200	1'200
Dual output models:	5.0 VDC / 3.3 VDC	5'600 / 4'700	-	-	-
	12 VDC / 5.0 VDC	330 / 4'700	-	-	-

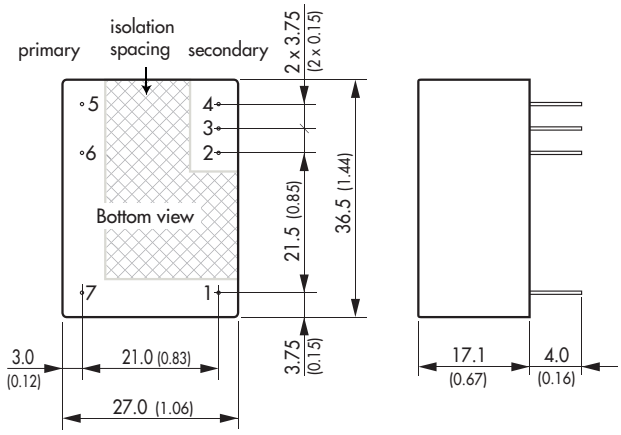
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

General Specifications

Temperature ranges	– Operating – Storage (non operating)		–25°C to +60°C –40°C to +85°C
Derating			3.75 %/K above +50°C TMLM 20 models: 2.5 %/K above +40°C
Temperature coefficient			0.02 %/K
Humidity (non condensing)			95 % rel max.
Switching frequency			132 ±8 kHz
Hold-up time (115 VAC / 230 VAC)		TMLM 20 models: other models:	12 ms / 56 ms 15 ms min.
Isolation voltage (60 sec.)	– Input/ Output		3'000 VAC
Leakage current		TMLM 04 models: TMLM 05 models: TMLM 10 models: TMLM 20 models:	0.25 mA max. 0.75 mA max. 0.25 mA max. tba.
Reliability /calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)			>330'000 h TMLM 20 models: >250'000 h
Electromagnetic compatibility (EMC), emissions			EN 55022, class B, FCC part 15, level B
Electromagnetic compatibility (EMC), immunity			EN 55024, EN 61000-6-2: 2005
Degree of protection			class II to IEC/EN 60536
Safety standards			UL 60950-1, IEC/EN 60950-1
Safety approvals	– UL/cUL 60950-1 – CB test certificate IEC 60950-1		www.ul.com -> certifications -> File e188913 www.tracopower.com/overview/tmlm
Environment	– Vibration acc. IEC 60068-2-6; – Shock acc. IEC 60068-2-27		3 axes, sine sweep, 10-55 Hz, 1g, 1oct/min. 20 G (3 directions each 3 times)
Environmental compliance	– Reach – RoHS		www.tracopower.com/products/tmlm-reach.pdf RoHS directive 2011/65/EU
Casing material			Plastic resin with fiberglass (UL 94V-0 rated)

Outline Dimensions

TMLM 04 Models:



Weight: 26 g (0.92 oz) Pin diameter: 0.5 (0.02)

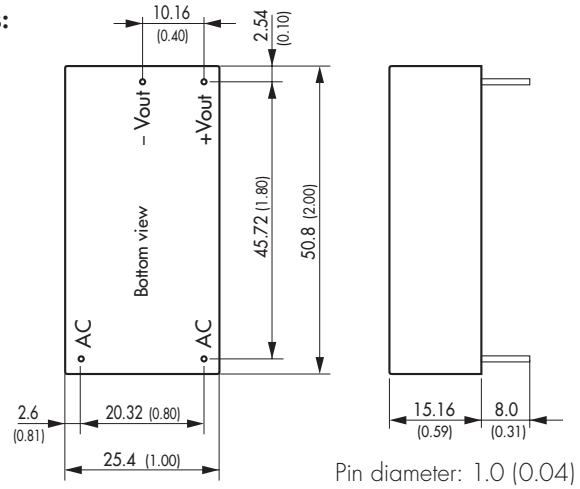
Pin-Out		
Pin	**Single**	**Dual**
1	nc	nc
2	+Vout	Vout 1
3	–Vout	Common
4	nc	Vout 2
5	AC (L)	AC (L)
6	AC (N)	AC (N)
7	nc	nc

nc = no internal connection.
Keep pin 1 & 7 isolated from secondary circuit layout and pin 4 isolated from primary circuit layout.

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

Outline Dimensions

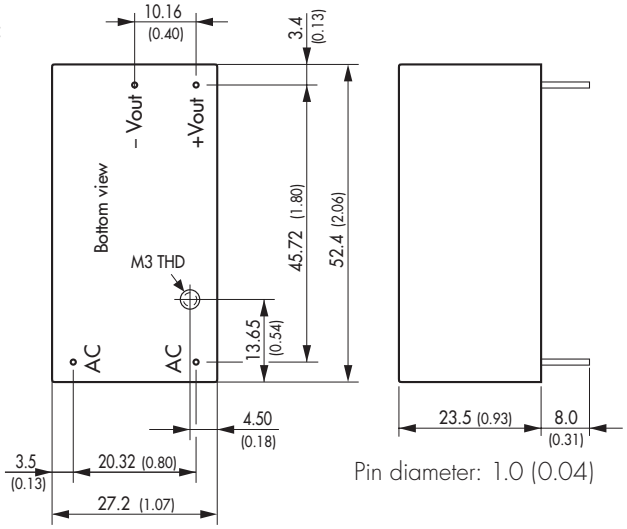
TMLM 05 Models:



Pin diameter: 1.0 (0.04)

Weight: 30 g (1.06 oz)

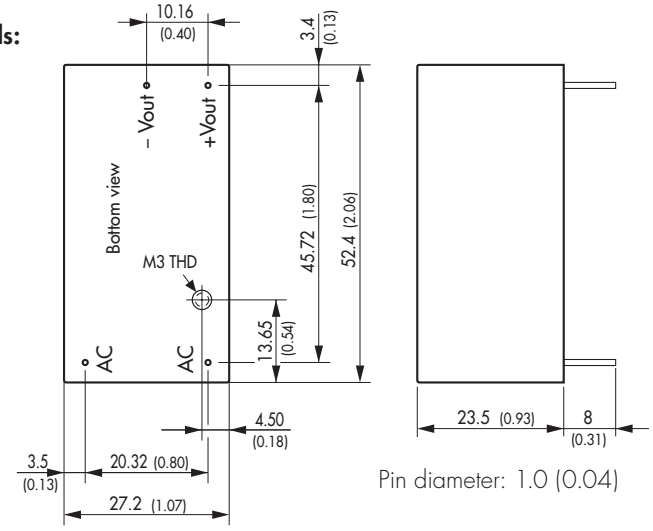
TMLM 10 Models:



Pin diameter: 1.0 (0.04)

Weight: 54 g (1.91 oz)

TMLM 20 Models:



Pin diameter: 1.0 (0.04)

Weight: 59 g (2.08 oz)

Dimensions in [mm], () = Inch
Tolerances: ±0.5 (±0.02)
Pin pitch tolerance: ±0.3 (±0.012)
Max mounting screw penetration: 3.0 mm (0.12)