AC/DC Power Modules

TML Series, 20 & 40 Watt

CB Scheme CE LVD cULus UL 60950-1

Features

- Encapsulated power supplies with increased power density
- Replaces TML 15 and TML 30 series
- PCB mount or chassis mount with screw terminals
- Single, dual and triple output models
- Universal input 90–264 VAC, 47–440 Hz
- EMI meets EN 55022, class B and FCC, level B
- Protection class II for TML 40 models
- Short circuit and overload protection
- 3-year product warranty

Also see:
TMLM Series, 4 to 20 Watt
highest power density, PCB mount.
www.tracopower.com/products/tmlm.pdf

Referance datasheet for primary TML models, see:
www.tracopower.com/products/tml-primary.pdf
(not recommended for new design in)

The TML series are ultra compact AC/DC power supplies in a fully encapsulated plastic case. They feature versions with screw terminals for easy installation or with solder pins for direct PCB mounting. International safety approvals qualify this product for worldwide markets. The TML series AC/DC modules offer an interesting solution for many space critical applications in commercial and industrial electronic equipment.

20 Watt Models

Order code		Output power max.	Output 1	Output 2	Output 3
PCB mount	Chassis mount				
TML 20103	TML 20103C	14.9 W	3.3 VDC/4500 mA		
TML 20105	TML 20105C	20 W	5.0 VDC/4000 mA		
TML 20112	TML 20112C		12 VDC/1670 mA		
TML 20115	TML 20115C		15 VDC/1340 mA		
TML 20124	TML 20124C		24 VDC/840 mA		
TML 20205	TML 20205C		+5.0 VDC/2000 mA	–5.0 VDC/2000 mA	
TML 20212	TML 20212C		+12 VDC/833 mA	–12 VDC/833 mA	
TML 20215	TML 20215C		+15 VDC/667 mA	–15 VDC/667 mA	
TML 20512	TML 20512C		5 VDC/2800 mA	+12 VDC/250 mA	–12 VDC/250 mA
TML 20515	TML 20515C		5 VDC/2800 mA	+15 VDC/200 mA	–15 VDC/200 mA

40 Watt Models

Order code PCB mount	Order code Chassis mount	Output power max.	Output 1	Output 2	Output 3
TML 40103	TML 40103C	26.4 W	3.3 VDC/8000 mA		
TML 40105	TML 40105C	40 W	5.0 VDC/8000 mA		
TML 40112	TML 40112C		12 VDC/3333 mA		
TML 40115	TML 40115C		15 VDC/2666 mA		
TML 40124	TML 40124C		24 VDC/1667 mA		
TML 40205	TML 40205C		+5.0 VDC/4000 mA	–5.0 VDC/4000 mA	
TML 40212	TML 40212C		+12 VDC/1666 mA	–12 VDC/1666 mA	
TML 40215	TML 40215C		+15 VDC/1333 mA	–15 VDC/1333 mA	
TML 40252	TML 40252C		*5.0 VDC/5000 mA	*12 VDC/1250 mA	
TML 40254	TML 40254C		*5.0 VDC/5000 mA	*24 VDC/625 mA	
TML 40512	TML 40512C		*5.0 VDC/5000 mA	+12 VDC/600 mA	–12 VDC/600 mA
TML 40515	TML 40515C		*5.0 VDC/5000 mA	+15 VDC/500 mA	–15 VDC/500 mA

* Output floating

Input Specifications

Input voltage ranges	– AC input – DC Input	90 – 264 VAC 100 – 375 VDC
Input frequency		47 – 440 Hz
Input current at full load (115 VAC / 230 VAC nominal input)	TML 20 models: TML 40 models:	400 mA / 270 mA typ. 860 mA / 460 mA typ
Leakage current		0.75 mA max.
External fuse (required)		1.5 A slow blow type (recommendation)

Output Specifications

Voltage set accuracy	TML 20 models: TML 40 single and symetric dual output models: TML 40 asymetric dual and triple output models:	±2 % ±2 % ±3 % for output 1, ±5 % for output 2&3
Minimum load	TML 20 single and dual output models: TML 20 triple output models: TML 40 single output models: TML 40 symetric dual output models: TML 40 asymetric dual and triple output models:	0 % 10 % (each output) 1 % 10 % (each output) 25 % (each output) operation at lower load condition will not damage these power supplies, however, they may not meet all listed specifications.
Ripple and noise (20 MHz bandwidth)	TML 20 models: TML 40, 3.3 VDC model: TML 40 other models:	<0.7 % of Vout +90 mV [Vp-p] <50 mVp-p <1 % of Vout [Vp-p]
Regulation – Input variation	single and symetric dual output models: TML 20 triple output models: TML 40 asymetric dual and triple output models:	0.5 % (each output) 1 % for output 1, 5 % for output 2&3 ±0.5 % for output 1, ±5 % for output 2&3

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

Output Specifications

Regulation – Load variation	TML 20 single output models:	1 %, 0–100 % load
	TML 20 dual output models:	3 % (each output), 10–100 % symetric load
	TML 20 triple output models:	2 % for output 1, 20–100 % load
		5 % for output 2&3, 20–100 % symetric load
	TML 40 single output models:	0.5 % 1–100 % load
	TML 40 symetric dual output models:	3 % (each output), 10–100 % symetric load
	TML 40 asymetric dual output models:	2 % for output 1, 25–100 % load
		6 % for output 2, 25–100 % load
	TML 40 triple output models:	3 % for output 1, 25–100 % load
		7 % for output 2&3, 25–100 % symetric load
Current limitation		above 105 % of rated output current.
Overvoltage protection by Zehner diode (main output only)		120 % of Vout typ.
Short circuit protection		hiccup mode, indefinite (automatic recovery)
Overtemperature protection (TML 40 models only)		at +100°C

Max. capacitive load [µF]		Model series	
Output:		TML 20	TML 40
Single output models	3.3 VDC	25'000	60'000
	5.0 VDC	13'000	40'000
	12 VDC	920	8'600
	15 VDC	820	6'600
	24 VDC	600	1400
Dual output models symetric	+5.0 / –5.0 VDC	4300 / 4300	12'000 / 12'000
	+12 / –12 VDC	560 /560	4'400 / 4'400
	+15 / –15 VDC	220 /220	1'000 / 1'000
Dual output models asymetric	+5.0 / +12 VDC	–	10'000 / 470
	+5.0 / +24 VDC	–	10'000 / 400
Triple output models	+5.0 / +12 / –12 VDC	3'500 / 220 / 220	10'000 / 780 / 780
	+5.0 / +15 / –15VDC	3'500 / 150 / 150	10'000 / 900 / 900

General Specifications

Temperature ranges	– Operating	TML 20 models:	–25°C to +60°C
		TML 40 models:	–40°C to +60°C
	– Power derating above +50°C		3.0 %/K
	– Case max.		+95°C
	– Storage (non operating)		–40°C to +85°C
Temperature coefficient			0.02 %/°C
Efficiency			75 – 84 % (depending on model)
Humidity (non condensing)			95 % rel max.
Switching frequency (pulse width modulation PWM)		TML 20 models:	100 kHz typ.
		TML 40 models:	132 kHz typ.
Hold-up time			10 ms min.
Isolation voltage	– Input/Output		3'000 VAC
Reliability /calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)			>200'000 h
EMI / RFI conducted			EN 55022, class B, FCC part 15, level B
EMC compliance			EN 55024
Protection class		TML 20 models:	class I
		TML 40 models:	class II to IEC/EN 60536

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

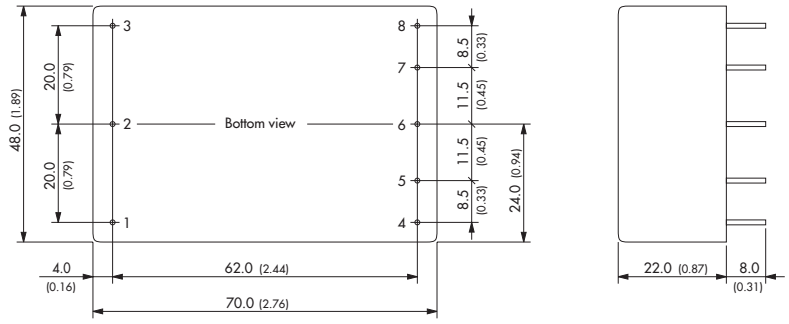
General Specifications

Safety standards		UL 60950-1, IEC/EN 60950-1
Safety approvals	– CB certificate for IEC 60950-1 – UL/cUL 60950-1	www.tracopower.com/products/tml-cb.pdf www.ul.com -> certifications -> File e188913
Casing material		plastic resin + fiberglass (UL 94V-0 rated)
Environmental compliance	– Reach – RoHS	www.tracopower.com/products/tml-reach.pdf RoHS directive 2002/95/EC

Outline Dimensions

TML 20 models

for PCB mount:

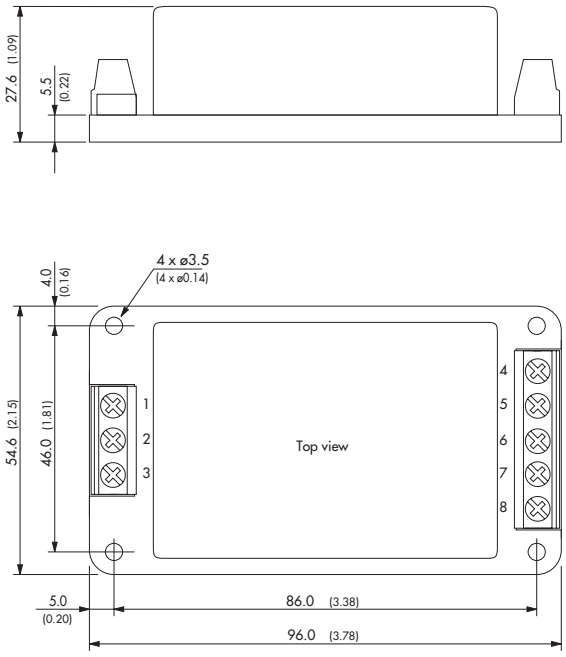


Pin diameter ø 1.0 mm (0.039)

Weight: 110 g (3.9 oz)

TML 20C models

for chassis mount:



Weight: 155 g (5.5 oz)

Pinout / Connection

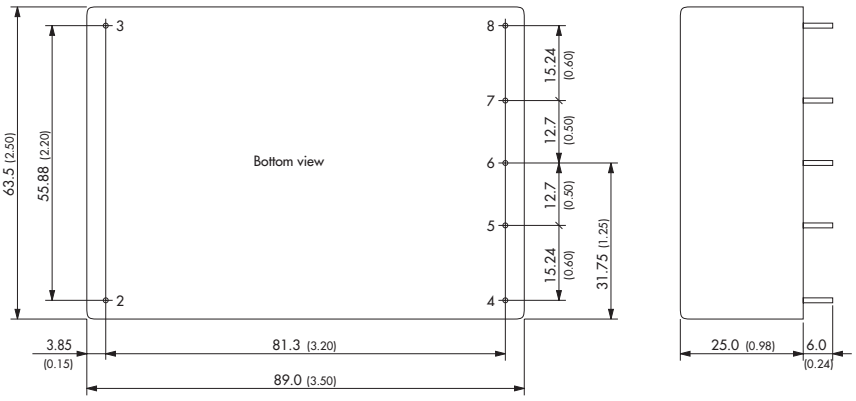
Pin/ con.	Single output	Dual output	Triple output
1	FG		
2	AC in (N)		
3	AC in (L)		
4	no pin / nc	no pin / nc	Vout 3
5	–Vout 1	Vout 2	com. 2/3
6	no pin	com. 1/2	Vout 2
7	+Vout 1	+Vout 1	–Vout 1
8	no pin	no pin	+Vout 1

nc = not to connect

Dimensions in[mm], () = Inches
Tolerances = 0.5mm (0.02)

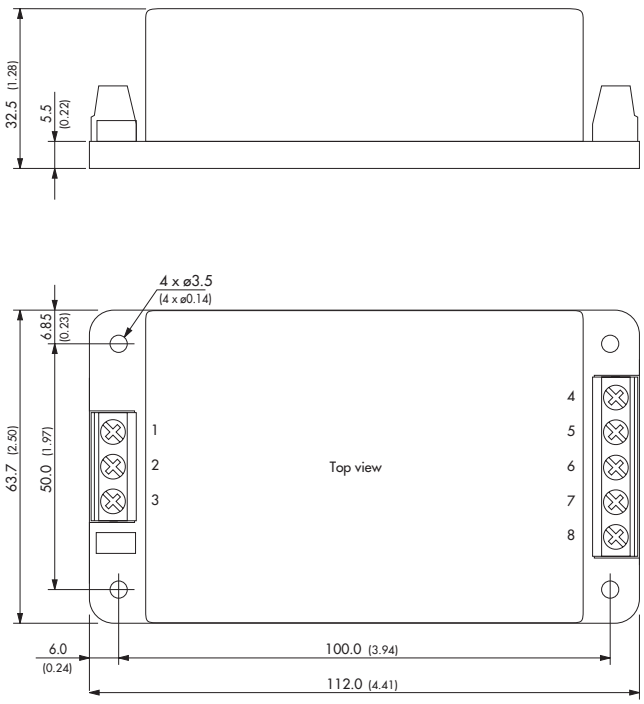
Outline Dimensions

TML 40 models
for PCB mount:



Pin diameter ø 1.2 mm (0.047) **Weight :** 280 g (9.9 oz)

TML 40C models
for chassis mount:



Weight : 325 g (11.5 oz)

Pinout / Connection				
Pin/ con.	**Single output**	**Dual sym. output**	**Dual asym. output**	**Triple output**
1	no pin / nc			
2	AC in (L)			
3	AC in (N)			
4	+Vout 1	Vout 1	+Vout 2	Vout 2
5	no pin / nc	no pin / nc	+Vout 1	+Vout 1
6	–Vout 1	com. 1/2	–Vout 2	com. 2/3
7	no pin / nc	no pin / nc	–Vout 1	–Vout 1
8	nc	Vout 2	no pin / nc	Vout 3

nc = not to connect

Dimensions in[mm], () = Inches
Tolerances = 0.5mm (0.02)

Specifications can be changed any time without notice.

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