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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 55032, class B and FCC, level B
- Protection class II
- 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

* Output floating

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TML Series **20 & 40 Watt**

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	**90 – 264 VAC**
	– DC Input	**100 – 375 VDC**
Input frequency		**47 – 440 Hz**
Input current at full load (115 VAC / 230 VAC nominal input)	TML 20 models:	**400 mA / 270 mA max.**
	TML 40 models:	**860 mA / 460 mA max.**
Leakage current	TML 20 models:	**0.25 mA max.**
	TML 40 models:	**0.75 mA max.**
Recommended Input Fuse	TML 20 models:	**2.0 A** (slow blow)
	TML 40 models:	**1.5 A** (slow blow)
		(The need of an external fuse has to be assessed in the final application.)

Output Specifications

Voltage set accuracy	TML 20 models:	**±2 %**
	TML 40103 model:	**±3 %**
	TML 40 single and symetric dual output models:	**±2 %**
	TML 40 asymetric dual and triple output models:	**±3 %** for output 1, **±5 %** for output 2&3
Minimum load	TML 20 single and dual output models:	**0 %**
	TML 20 triple output models:	**10 %** (each output)
	TML 40 single output models:	**1 %**
	TML 40 symetric dual output models:	**10 %** (each output)
	TML 40 asymetric dual and triple output models:	**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:	**<0.7 % of Vout + 90 mV [Vp-p]**
	TML 40103 model:	**<50 mVp-p**
	TML 40 other models:	**<1 % of Vout [Vp-p]**
Regulation – Input variation	single and symetric dual output models:	**0.5 %** (each output)
	TML 20 triple output models:	**1 %** for output 1, **5 %** for output 2&3
	TML 40 asymetric dual and triple output models:	**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.

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TML Series **20 & 40 Watt**

Output Specifications

Regulation – Load variation	TML 20 single output models:	**1 %,** 0–100 % load
	TML 20 dual output models:	**3 %** (each output), 10–100 % symmetric load
	TML 20 triple output models:	**2 %** for output 1, 20–100 % load
		5 % for output 2&3, 20–100 % symmetric load
	TML 40 single output models:	**0.5 %** 1–100 % load
	TML 40 symmetric dual output models:	**1 %** (each output), 10–100 % symmetric load
	TML 40 asymmetric 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 % symmetric load
Current limitation		**above 105 % of rated output current**
Overvoltage protection (main output only)		**by Zener diode**
Short circuit protection		**hiccup mode, indefinite** (automatic recovery)
Overtemperature protection (TML 40 models only)		**at +100°C**

Max. capacitive load		Model series	
Output:		TML 20	TML 40
Single output models	3.3 VDC	25'000 µF	60'000 µF
	5.0 VDC	13'000 µF	40'000 µF
	12 VDC	920 µF	8'600 µF
	15 VDC	820 µF	6'600 µF
	24 VDC	600 µF	1'400 µF
Dual output models symetric	+5.0 / –5.0 VDC	4'300 / 4'300 µF	12'000 / 12'000 µF
	+12 / –12 VDC	560 / 560 µF	4'400 / 4'400 µF
	+15 / –15 VDC	220 / 220 µF	1'000 / 1'000 µF
Dual output models asymetric	+5.0 / +12 VDC	–	10'000 / 470 µF
	+5.0 / +24 VDC	–	10'000 / 400 µF
Triple output models	+5.0 / +12 / –12 VDC	3'500 / 220 / 220 µF	10'000 / 780 / 780 µF
	+5.0 / +15 / –15VDC	3'500 / 150 / 150 µF	10'000 / 900 / 900 µF

General Specifications

Temperature ranges	– Operating	TML 20 models:	**–25°C to +70°C**
		TML 40 models:	**–40°C to +60°C**
	– Power derating above +50°C	TML 20 models:	**3.75 %/K**
		TML 40 models:	**3.0 %/K**
	– Case max.		**+95°C**
	– Storage (non operating)		**–40°C to +85°C**
Temperature coefficient		TML 20 models:	**0.02 %/K**
		TML 40 models:	**0.01 %/K**
Efficiency			**74 – 84 %** (depending on model)
Humidity (non condensing)			**95 % rel max.**
Altitude during operation		TML 20 models:	**2'000 m max.**
		TML 40 models:	**4'000 m 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**
Working voltage (rated)		TML 20 models:	**274 VAC**
		TML 40 models:	**283 VAC**
Reliability /calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)			**>200'000 h**

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

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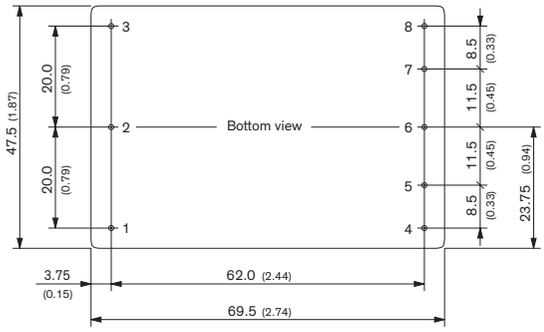
General Specifications

EMI / RFI conducted		EN 55032, class B, FCC part 15, level B
EMC compliance		EN 55024 & EN 55035
Protection class		class II to IEC/EN 60536
Safety standards		UL/cUL 60950-1, IEC/EN 60950-1 UL/cUL 62368-1, IEC/EN 62368-1
	– Certification documents	www.tracopower.com/overview/tml
Casing material		plastic resin + fiberglass (UL 94V-0 rated)
Environmental compliance	– Reach	www.tracopower.com/products/reach-declaration.pdf
	– RoHS	RoHS directive 2011/65/EU

Outline Dimensions

TML 20 models

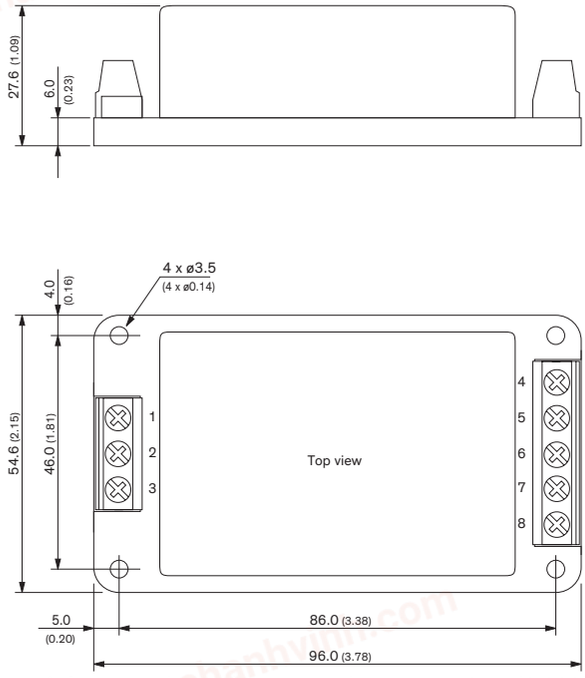
for PCB mount:



Pin diameter ø 1.0 mm (0.039) **Weight:** 110 g (3.9 oz) Tolerances = 0.5mm (0.020)

TML 20C models

for chassis mount:



Weight: 155 g (5.5 oz) Tolerances = 1.0mm (0.039)

Pinout / Connection

Pin/ con.	Single output	Dual output	Triple output
1	NC		
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 connected

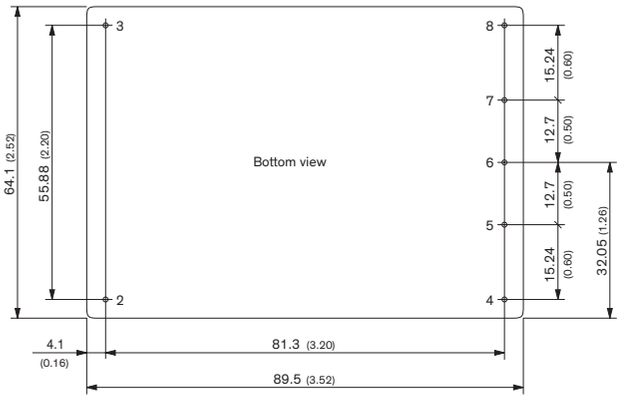
Dimensions in[mm], () = Inches

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Outline Dimensions

TML 40 models

for PCB mount:



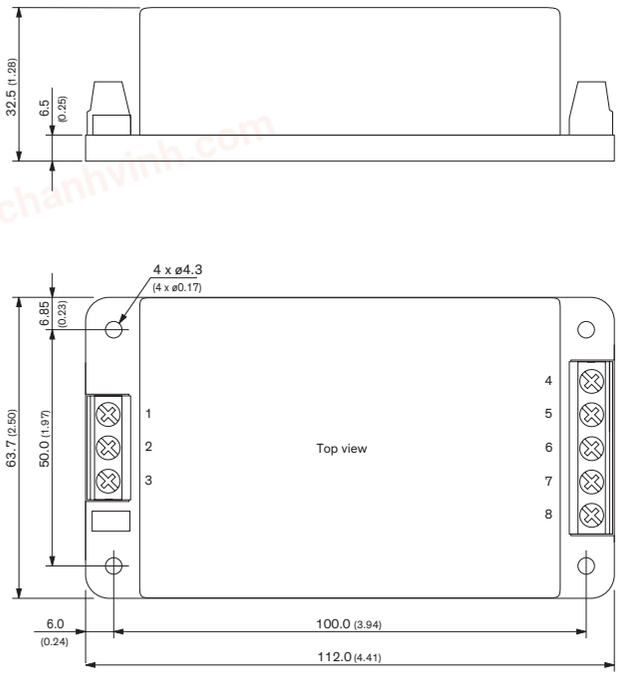
Tolerances = 0.5mm (0.020)
Dimensions in[mm], () = Inches

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)

Tolerances = 1.0mm (0.039)
Dimensions in[mm], () = Inches

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 connected