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AC/DC Power Modules

TML Series, 5 to 30 Watt

LVD UL 60950-1

Features

- Encapsulated power Supplies
- PCB mount or chassis mount with screw terminals
- Single, dual and triple output models
- Universal input 85–264 VAC, 47–440 Hz
- EMI meets EN 55022, class B and FCC, level B
- Low ripple and noise
- Short circuit and overload protection
- 3-year product warranty

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.

Models

Order Code	Output Power max.	Output 1	Output 2	Output 3
TML 05105	5 Watt	5 VDC/1000 mA		
TML 05112		12 VDC/416 mA		
TML 05115		15 VDC/333 mA		
TML 05124		24 VDC/200 mA		
TML 05205		5 VDC/500 mA	–5 VDC/500 mA	
TML 05212		12 VDC/200 mA	–12 VDC/200 mA	
TML 05215		15 VDC/160 mA	–15 VDC/160 mA	
TML 10105	10 Watt	5 VDC/2000 mA		
TML 10112		12 VDC/833 mA		
TML 10115		15 VDC/666 mA		
TML 10124		24 VDC/416 mA		
TML 10205		5 VDC/800 mA	–5 VDC/800 mA	
TML 10212		12 VDC/380 mA	–12 VDC/380 mA	
TML 10215		15 VDC/300 mA	–15 VDC/300 mA	

Models

Order Code PCB-mounting	Chassis mounting	Output Power max.	Output 1	Output 2	Output 3
TML 15105	TML 15105C		5 VDC/3000 mA		
TML 15112	TML 15112C		12 VDC/1250 mA		
TML 15115	TML 15115C		15 VDC/1000 mA		
TML 15124	TML 15124C		24 VDC/625 mA		
TML 15205	TML 15205C	15 Watt	5 VDC/1500 mA	–5 VDC/1500 mA	
TML 15212	TML 15212C		12 VDC/650 mA	–12 VDC/650 mA	
TML 15215	TML 15215C		15 VDC/500 mA	–15 VDC/500 mA	
TML 15512	TML 15512C		5 VDC/2000 mA	12 VDC/200 mA	–12 VDC/200 mA
TML 15515	TML 15515C		5 VDC/2000 mA	15 VDC/150 mA	–15 VDC/150 mA
TML 30103	TML 30103C		3.3 VDC/6000 mA		
TML 30105	TML 30105C		5 VDC/6000 mA		
TML 30112	TML 30112C		12 VDC/2500 mA		
TML 30115	TML 30115C		15 VDC/2000 mA		
TML 30124	TML 30124C		24 VDC/1250 mA		
TML 30205	TML 30205C	30 Watt	5 VDC/3000 mA	–5 VDC/3000 mA	
TML 30212	TML 30212C		12 VDC/1300 mA	–12 VDC/1300 mA	
TML 30215	TML 30215C		15 VDC/1000 mA	–15 VDC/1000 mA	
TML 30252	TML 30252C		*5 VDC/3000 mA	*12 VDC/1250 mA	
TML 30512	TML 30512C		* 5 VDC/3000 mA	12 VDC/630 mA	–12 VDC/630 mA
TML 30515	TML 30515C		*5 VDC/3000 mA	15 VDC/500 mA	–15 VDC/500 mA

* Output floating

Input Specifications

Input voltage ranges	– AC input		90 – 264 VAC
	– DC Input	TML 30 models:	100 – 370 VDC
			output power derating 1 %/V below 110 VDC
		other models:	85 – 370 VDC
			output power derating 0.8 %/V below 110 VDC
Input frequency			47 – 440 Hz
Input current no load			115 VAC / 230 VAC
		TML 5 models:	10 mA / 15 mA typ
		TML 10 models:	15 mA / 20 mA typ
		TML 15 models:	18 mA / 25 mA typ.
		TML 30 models:	30 mA / 55 mA typ.
Input current full load			115 VAC / 230 VAC
		TML 5 models:	120 mA / 70 mA max.
		TML 10 models:	200 mA / 130 mA max.
		TML 15 models:	310 mA / 170 mA max.
		TML 30 models:	520 mA / 320 mA max.
External fuse (required)			1.5 A slow blow type (recommendation)

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

Output Specifications

Voltage set accuracy		5 & 10 W models:	±2%
		single output 15 & 30 W models:	±2%
		dual output 15 & 30 W models:	±5%
		triple output 15 W models:	±3%
		triple output 30 W models:	±2% (output 1)
		triple output 30 W models:	±5% (output 2 & 3)
Regulation	– Input variation		0.3 % max.
	– Load variation (10–100%)		
		single output models:	1.0 % max.
		dual / triple output models:	5 % max.
Minimum load		single output models:	5 %
		dual output models:	3 % (each output)
		triple output 15 W models:	10 % (main output only)
		triple output 30 W models:	20 % (each output)
Ripple and noise (20 MHz bandwidth)		– 3.3 & 5 VDC output models:	<1.5 % of Vout
		– other models:	<1.0 % of Vout
Current limitation			120– 80 % fold back
Short circuit protection			hiccup mode, indefinite (automatic recovery)
Maximum capacitive load			470–50'000 µF depending on model

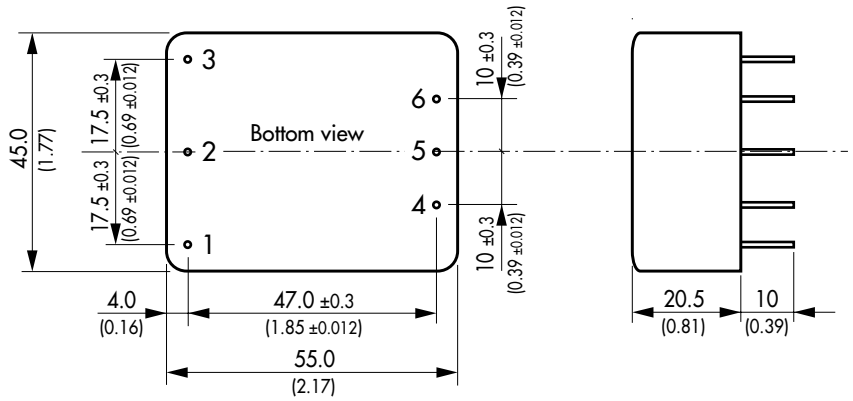
General Specifications

Temperature ranges	– Operating	–25 °C to +60 °C
	– Power derating above 50 °C	3.75 %/°C
	– Storage (non operating)	–40 °C to +85 °C
Temperature coefficient		0.02 %/°C
Efficiency		72–80 % (depending on model)
Humidity (non condensing)		95 % rel max.
Switching frequency		100 kHz typ. (pulse width modulation PWM)
Hold-up time		40 ms min. (Vin 115...230 VAC)
Isolation voltage	– Input/Output	3'000 VAC
Reliability /calculated MTBF (MIL-HDBK-217F at +25°C, ground benign)		>660'000 h
EMI / RFI conducted		EN 55022, class B, FCC part 15, level B
EMC compliance	– Electrostatic discharge ESD	IEC / EN 61000-4-2 4 kV / 8 kV
	– RF field susceptibility	IEC / EN 61000-4-3 3 V/m
	– Electrical fast transients/bursts on mainsline	IEC / EN 61000-4-4 1 kV
Safety class II (only 30 watt models)		to IEC / EN 60536
Safety standards	– UL/cUL 60950-1	UL 60950-1 and CSA C22.2 No. 60950-1-07
	– IEC/EN 60950-1 re-aprroval June 2016 according:	EN 60950-1:2006/A11:2009/A1:2010/ A12:2011/A2:2013 IEC 60950-1 (ed.2), Am 1&2
	No re-approval according further amendments and safety-standard releases!	
Safety approval	– cUL/UL 60950-1 online certification File E188913	www.ul.com -> certifications
	– IEC/EN 60950-1 CB test certificate	www.tracopower.com/products/tml-primary-certification.zip (new in July 2016 as a last version)
Case material		plastic resin + fiberglass (flammability to UL 94-V0)
Environmental compliance	– Reach	www.tracopower.com/products/tml-reach.pdf
	– RoHS	RoHS directive 2011/65/EU

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

Outline Dimensions

TML 5 Models



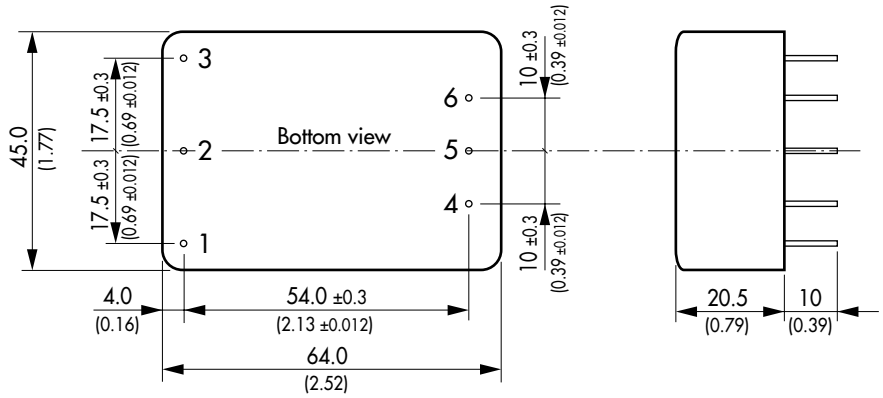
Pin-Out		
Pin	**Single**	**Dual**
1	FG	FG
2	AC(N)	AC(N)
3	AC(L)	AC(L)
4	–V out	–V out
5	NC	Common
6	+V out	+V out

NC = Not to connect

Pin diameter ø 1.0 mm

Weight: 80 g (2.8 oz)

TML 10 Models



Pin-Out		
Pin	**Single**	**Dual**
1	FG	FG
2	AC(N)	AC(N)
3	AC(L)	AC(L)
4	–V out	–V out
5	NC	Common
6	+V out	+V out

NC = Not to connect

Pin diameter ø 1.0 mm

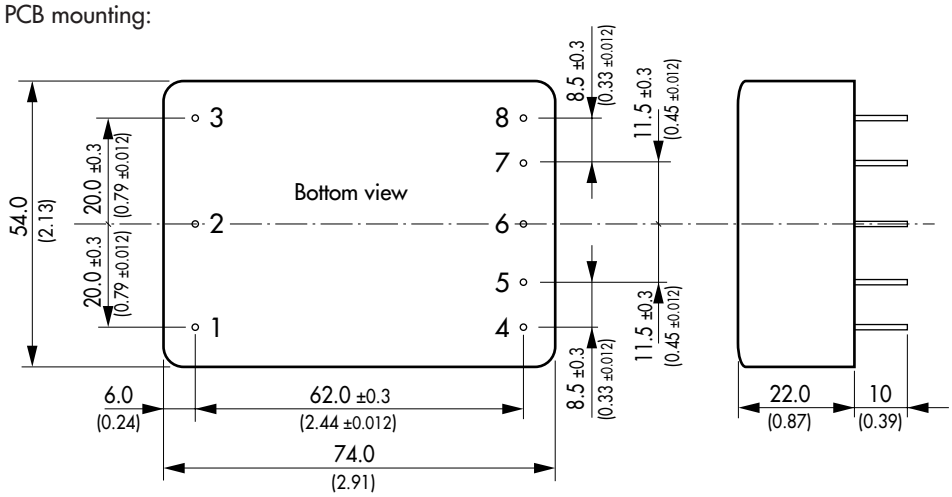
Weight: 95 g (3.4 oz)

( ) = Inches
Tolerances = 0.5mm (0.02)

Outline Dimensions

TML 15 Models

PCB mounting:



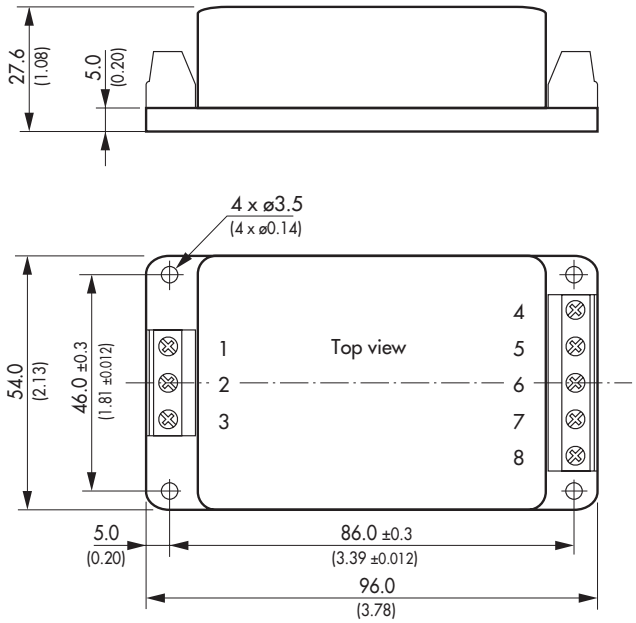
Pin diameter ø 1.0 mm

Weight: 120 g (4.2 oz)

Pin-Out			
Pin	**Single**	**Dual**	**Triple**
1	FG	FG	FG
2	AC(N)	AC(N)	AC(N)
3	AC(L)	AC(L)	AC(L)
4	No Pin	No Pin	–V out 3
5	–V out	–V out	Com. 2/3
6	No Pin	Common	+V out 2
7	+V out	+V out	–V out 1
8	No Pin	No Pin	+V out 1

TML 15-C Models

Chassis mounting:

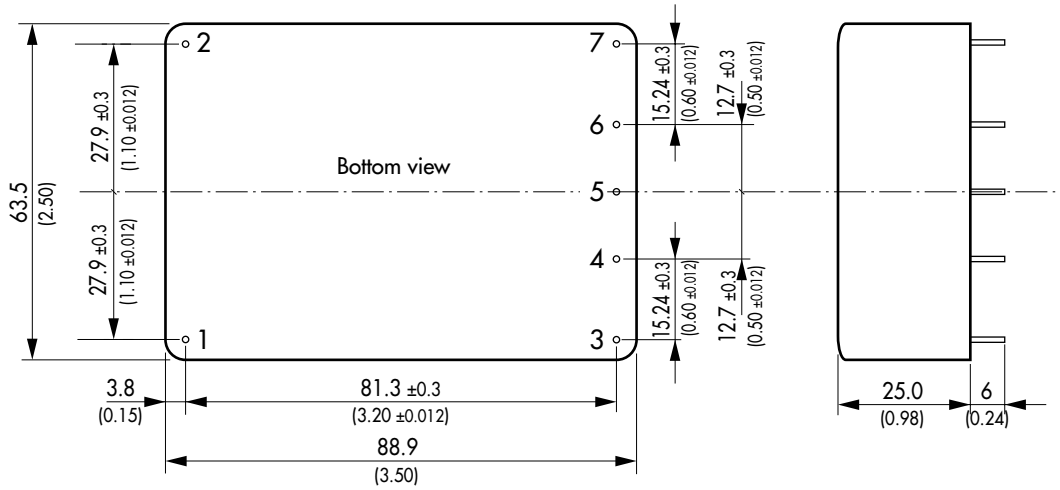


Weight: 150 g (5.3 oz)

Outline Dimensions

TML 30 Models

PCB mounting:

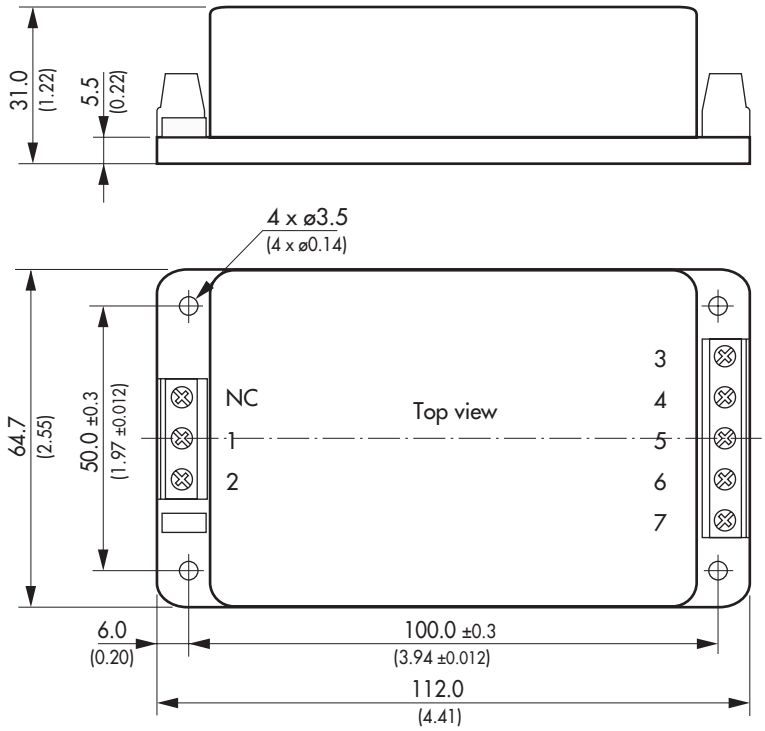


Pin diameter ø 1.0 mm

Weight : 230 g (8.1 oz)

TML 30-C Models

Chassis mounting:



Weight : 275 g (9.7 oz)

Pin-Out

Pin	Single	Dual sym.	Dual asym.	Triple
1	AC(N)	AC(N)	AC(N)	AC(N)
2	AC(L)	AC(L)	AC(L)	AC(L)
3	+V out	+V out	+V out 2	+V out 2
4	No Pin	No Pin	+V out 1	+V out 1
5	–V out	Common	–V out 2	Com. 2/3
6	No Pin	No Pin	–V out 1	–V out 1
7	NC.	–V out	NC.	–V out 3

NC = Not to connect

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

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