LOW PROFILE 2X4", FORCED AIR CONDUCTION CONVECTION COOLING, 300 W AC-DC MEDICAL GRADE POWER SUPPLY

LPM300 Series

Certifications

Applications

Medical

High Efficiency

5 YEARS Warranty

FEATURES

- 85 – 264 V_{AC} Universal input voltage range
- 300 W rated power
- 1.00" low profile package actor (32.1 W/in3)
- High efficiency (up to 94%)
- No-load low power consumption < 0.3 W for all output variants
- Low earth leakage current (<300 µA)
- Over temperature protection, auto-recovery
- Output over voltage latch off protection
- Overload and short circuit hiccup protections
- Metallic protecting cage on semi-potted PWA
- IEC safety installation Class I and Class II
- Certified to the latest IEC/EN/ANSI-AAMI 60601-1 edition
- Medical safety approval to IEC 60601-1 3rd edition, 2xMoPP protection grade BF appliances compatible.
- IEC 60601-1-2 4th edition EMC compliant.
- Compliant to EN 55011 and certified to CFR FCC Class B
- Operating Altitude up to 5000 m
- RoHS-3 compliant (EU directive 2015/863)
- 5 years warranty

MARKET SEGMENTS AND APPLICATIONS

- Diagnostic equipment
- Imaging equipment
- Portable devices
- Therapy appliances
- Dental equipment
- Dermatology aesthetic medicine

PRODUCT DESCRIPTION

The LPM300 is a series of Medical grade power supplies designed to offer the high-power density and high efficiency that space constrained and power demanding systems need. Available in 12, 24, and 48 V_{DC} outputs, this series of high-performance AC-DC power supplies provides up to 300 W steady output power with moving air, or from 190 W upwards with convection cooling over the 110 – 240 V_{AC} nominal input voltage range, all in a compact 2.28 x 4.09 x 1.00" form factor package. The semi-potted base-plate package allows thermal management through conduction cooling particularly needed in those installations where the heat can be dispelled solely through solid thermal path.
The series also includes 15, 28, 30, 36 and 54V versions whose availability will be assessed upon demand.
With 94% typical efficiency and extremely low (< 0.3 W) power consumption at no-load, the LPM300 facilitates thermal management and equipment design, including compatibility with the latest environmental legislations. The LPM300 series meets the EN 55011 and EN 60601-1-2 EMC limits of Class B, CFR FCC certified, for conducted and radiated emissions as well as the IEC/EN61000-3, for harmonic and flicker, and IEC/EN 60601-1-2 4th edition for EMC immunity standards.
The LPM300 power supplies can be installed as IEC protective Class I or Class II.

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Model Coding and Output Ratings

Model Number	Output Voltage V_{OUT} [V]	Voltage Accuracy (1) [%]	I_{OUT} Current Forced Air (2) [A]	I_{OUT} Current Convection [A]	I_{OUT} Current Conduction (3) [A]	V_{OUT} Ripple (4) [mV]	Typical Efficiency (5) [%]
LPM300-12-SP	12	±1	25.00.00	13.12	21.12	150	93
LPM300-15-SP	15	±1	20.12	11.12	17.12	150	93
LPM300-24-SP	24	±1	12.12	7.12	10.12	240	94
LPM300-28-SP	28	±1	10.7	6.12	9.12	280	94
LPM300-30-SP	30	±1	10.12	5.12	8.12	300	94
LPM300-48-SP	48	±1	6.12	3.12	5.12	480	94
LPM300-54-SP	54	±1	5.12	3.12	5.12	540	93

Notes:

1. At full load
2. 14 CFM forced air cooling at >115 V_{AC}
3. Thermal contact with 228 x 228 x 2 mm metallic plate
4. 0.1 µF ceramic capacitor and 10 µF electrolytic capacitor in parallel at load, 20 MHz BW
5. Typical values at 230 V_{AC}, full load, 25 °C ambient temperature

Input Specifications

Specification	Test Conditions / Notes	Min.	Nominal	Max.	Units
AC Input Voltage		85	100-240	264	V_{AC}
Input Frequency		47	50/60	63	Hz
Input Current	RMS at 100 V_{AC}, maximum load	-	-	5.0	A
Inrush Current (peak)	240 V_{AC}, 25 °C ambient, cold start	-	-	105	A
Fusing	Time Lag, 3.15 A, 250 V on both L and N	-	5	-	A
Efficiency	At 230 V_{AC}, 100 % rated load, 25 °C T_{AMB} 12, 15 V_{DC} 24, 28, 30, 48 V_{DC} 54 V_{DC}	 - - -	 93 94 93	 - - -	%
No-load Power Consumption	At 115-230 V_{RMS}, no load, all variants	-	-	0.3	W
Power Factor	At full rated load, 230 V_{AC}, 50 Hz input voltage	-	1.12	-	-
Harmonic Current Fluctuations and Flicker	Complies with EN-61000-3-2, Classes A, D Complies with EN-61000-3-3 at nominal voltages and full load				
Earth Leakage Current	Normal conditions, 264 V_{AC}, 60 Hz	-	-	300	µA
Touch Leakage Current	Normal conditions, 264 V_{AC}, 60 Hz	-	-	100	µA

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Output Specifications

Specification	Test Conditions / Notes	Min.	Nom.	Max.	Units
Output Voltage	±1 % set point accuracy for all voltage variants. At 100 % load, 25 °C T_{AMB}, 100-240 V_{AC}	- - - - - - -	12 15 24 28 30 48 54	- - - - - - -	V
Output Voltage Adjustment	$P_{OUT} \leq P_{RATED}$	-5	-	5	%
Rated Currents	**≥ 110 V_{AC}, 14 CFM air flow** 12 V_{DC} 15 V_{DC} 24 V_{DC} 28 V_{DC} 30 V_{DC} 48 V_{DC} 54 V_{DC} See output power de-rating curves below	- - - - - - -	- - - - - - -	25.00 20.00 12.50 10.7 10.00 6.25 5.56	A
	≥ 110 V_{AC}, free air 12 V_{DC} 15 V_{DC} 24 V_{DC} 28 V_{DC} 30 V_{DC} 48 V_{DC} 54 V_{DC} See output power de-rating curves below	- - - - - - -	- - - - - - -	13.34 10.67 6.67 5.71 5.33 3.33 2.96	A
	≥ 110 V_{AC}, Conduction (18 x 18 x 2 mm plate) 12 V_{DC} 15 V_{DC} 24 V_{DC} 28 V_{DC} 30 V_{DC} 48 V_{DC} 54 V_{DC} See output power de-rating curves below	- - - - - - -	- - - - - - -	20.83 16.60 10.40 8.90 8.33 5.20 4.63	A
Load Regulation	90 – 264 V_{AC} 10 – 100 % full load	-	-	±0.5	$\%V_{OUT}$
Line Regulation	Full load V_{AC}: 100 – 240 V_{RMS}	-	-	±0.3	$\%V_{OUT}$
Transient Response	25% load changes at 1 A/µs 12 V_{DC} at 2200 µF Load / I_{OUT}> 0.5 A 24 V_{DC} at 1000 µF Load / I_{OUT}> 0.5 A 48 V_{DC} at 560 µF Load / I_{OUT}> 0.5 A	-	-	±5	$\%V_{OUT}$
Ripple and Noise	12, 15 V_{DC} 24, 28, 30, 48, 54 V_{DC} Peak-to-peak, 20 MHz BW. 100 nF ceramic and 10 µF electrolytic caps at the load	- -	- -	150 10	mV %
Turn-on Overshoot		-	-	TBV	$\%V_{OUT}$
Hold-up Time	At 115 V_{IN}, full load, for all models	-	12	-	ms
Minimum Load	All models	0	-	-	A
Maximum Load Capacitance	**At nominal V_{IN}, 25 °C ambient, max load** 12 V_{DC} 15 V_{DC} 24 V_{DC} 28 V_{DC} 30 V_{DC} 48 V_{DC} 54 V_{DC}	- - - - - - -	- - - - - - -	15400 12200 7800 6600 6200 3870 3400	µF
Temperature Drift		-1.55.00	-	_+0.05	%V/°C
Output Power Ratings / De-ratings					

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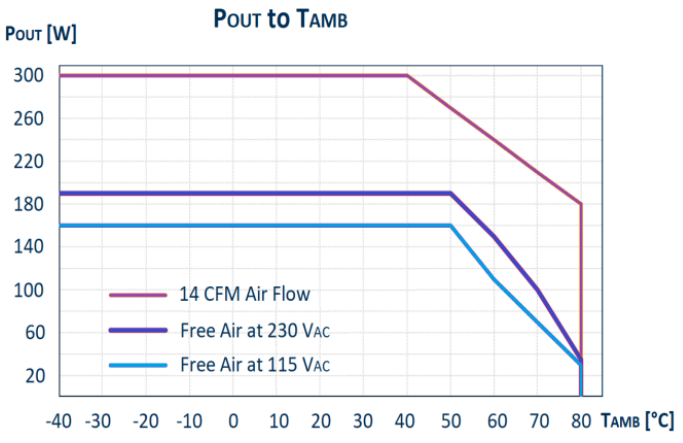
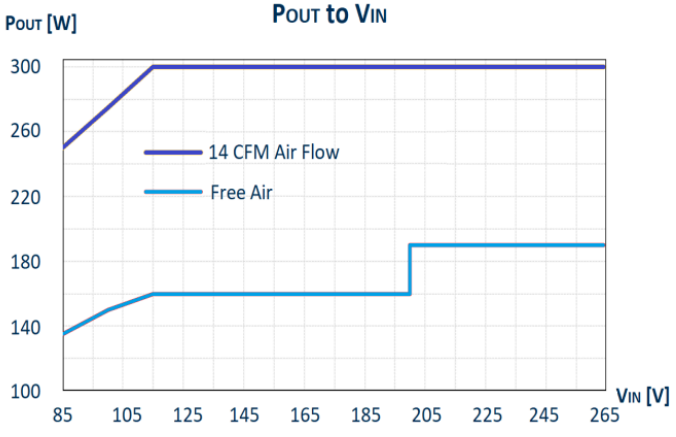
Output Power Ratings / De-ratings





Protection Features

Specification	Test Conditions / Notes	Min.	Nominal	Max.	Units
Input Fuse	Time Lag, 3.15 A, 250 V on L1 and L2	-	5	-	A
Over Current	At nominal input voltages Hiccup mode, auto-recovering	125	145	165	$\%I1_{MAX}$
Short Circuit	At nominal input voltages Hiccup mode, auto-recovering	-	-	-	
Over Voltage	12 V_{DC}	-	-	16	V
	15 V_{DC}	-	-	20	
	24 V_{DC}	-	-	32	
	28 V_{DC}	-	-	35	
	30 V_{DC}	-	-	36	
	48 V_{DC}	-	-	59	
	54 V_{DC}	-	-	63	
	Unit shut down and latch off (AC recycle)				
Over Temperature	Hiccup mode, auto-recovering	-	-	-	
Isolation Primary-to- Secondary	Reinforced	4250	-	-	V_{AC}
Isolation Input-to-PE	Basic	2000			V_{AC}
Isolation Output-to-PE	Basic	2000	-	-	V_{AC}

Environmental Specifications

Specification	Test Conditions / Notes	Min	Nominal	Max	Units
Operating Temperature Range	Ambient temperature	-40	-	80	°C
	Case Temperature (TC centre of base plate)	-40	-	90	
Storage Temperature Range		-40	-	85	°C
Humidity	RH, Non-condensing Operating	-	-	93	%
	Non-operating			95	%
Operating Altitude		-	-	5000	m
Shock	Meet MIL-STD-810F Table 516.5, Table 516.5-I 10 ms, each axis (±X, ±Y, ±Z), 3 times				
Vibration	Meet MIL-STD-810F Table 514.5C-VIII, 15÷2000 Hz, X-Y-Z axis, 1 hour each, total 3 hour				
MTBF	Full Load, 115 V_{AC}, 25 °C ambient GB, MIL-HDBK-217F	450	-	-	K hours
Useful Life	Low line range, 75% rated load, 40 °C ambient, natural convention, 100% duty cycle	26	-	-	K hours
Thermal Considerations	The output power de-rating curves relevant to forced and free air cooling are herein provided. These curves can be used as a guideline to assess the limit in performance of a power supply once installed in a system providing controlled air flow at a certain input voltage and ambient temperature. Conduction cooling installation thermal performance should be verified and assessed physically in any specific case.				

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Electromagnetic Compatibility (EMC) – Emissions

Phenomenon	Conditions / Notes	Standard	Equipment Performance Class
Conducted	115 V_{RMS}, 230 V_{RMS}. Maximum load.	47 CFR FCC Part 15 EN 55011 (IMS)	B
Radiated		47 CFR FCC Part 15 EN 55011 (IMS)	B
Line Voltage Fluctuation and Flicker	At 2 0%, 50 % and 100 % maximum load. Nominal input voltages.	EN 61000-3-3	A
Harmonic Current Emission	At nominal input voltages	EN 61000-3-2	A, D

Electromagnetic Compatibility (EMC) – Immunity

Phenomenon	Conditions / Notes	Standard	Test Level	Performance criteria
Reference standard for Medical equipment: EN 60601-1-2 Ed. 4.1				
ESD	15 kV air discharge, 8 kV contact, at any point of the system.	EN 61000-4-2	3	A
Radiated Field	10 V/m, 80-1000 MHz, 1 KHz 80% AM	EN 61000-4-3	3	A
Electric Fast Transient	±2 kV on AC power port for 1 minute	EN 61000-4-4	3	A
Surge	± 2 kV line to line; ± 4 KV line to earth; on AC power port	EN 61000-4-5	3	A A
Conducted RF Immunity	10 V_{RMS}, 0,15-80 MHz, 1 KHz, 80 % AM	EN 61000-4-6	3	A
Dips and Interruptions	100 – 240 V_{AC} 30% Dip, 10 ms 60% Dip, 100 ms >95% Dip, 5000 5s Interrupts > 95 % for 5 s	 EN61000-4-11 EN61000-4-11 EN61000-4-11 EN61000-4-11		 A A A B

Safety Agencies Approvals

Certification Body	Safety Standards and file numbers	Category
ANSI/AAMI	ES 60601-1 Ed. 3TH	Medical
IEC IECEE CB Certification	IEC/EN 60601-1 Ed. 3TH	Medical
CE	Directive 2014/35/EU: Electrical Safety: Low Voltage electrical equipment (LVD)	Medical
	Directive 2014/30/EU: Electromagnetic Compatibility (EMC)	
	Regulation 2017/745/EU: Medical device regulation (MDR)	
	Directive EU 2015/863 (RoHS 3)	

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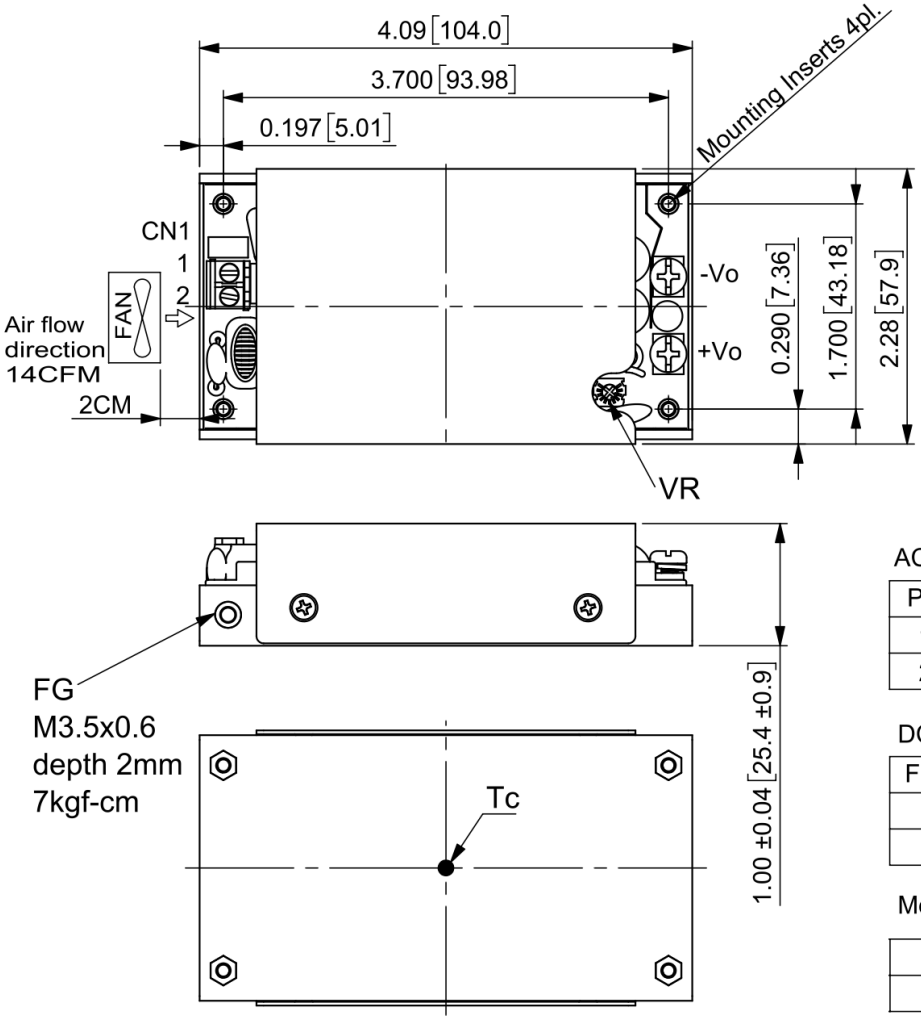
Outline Drawing and Connections

OVERALL DIMENSIONS: 57.9 x 104.0 x 25.4 mm (2.28 x 4.09 x 1.00 in)
WEIGHT: 280 g (0.62 lb)



AC Input Connector(CN1):ECE ETB22

Pin	Function	Mating Wire Range
1	ACL	14~18 AWG
2	ACN	

DC Output Connector: KANG YANG PCB-58M4

Function	The screw locked torque
+Vo	M4 7kgf-cm
-Vo	

Mounting Inserts Option

∅3.2 Through depth 10.5mm
M3x0.5 Threaded depth 10.5mm

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