

## DESCRIPTION

The PM110 series of compact, open PCB constructed, AC-DC switching power supplies are specially designed for medical applications. They are capable of delivering 72-110 watts of continuous power at 25 CFM forced air cooling or 60-80 watts at convection cooling. They operate at 85-264 VAC input voltage without the need of a selector strap. All models meet the safety requirements of UL, CSA and IEC for medical equipment.

## FEATURES

- Low safety ground leakage current
- Meet EN55011 and FCC Class B
- Small size, light weigh
- 100% burn-in
- Wide input range 85-264 VAC
- Input surge current protection
- Overvoltage protection
- Overcurrent protection
- Compliant with RoHS requirements

## INPUT SPECIFICATIONS

Input voltage:	85-264 VAC
Input frequency:	47-63 Hz
Input current:	3.20 A (rms) for 115 VAC 1.80 A (rms) for 230 VAC
Earth leakage current:	220 $\mu$ A max. @ 264 VAC, 63 Hz
Touch current:	100 $\mu$ A max. @ 264 VAC, 63 Hz

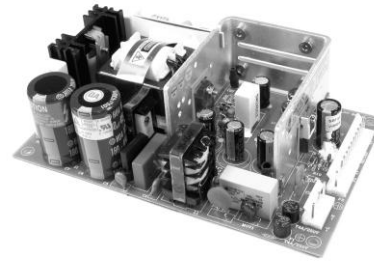
## OUTPUT SPECIFICATIONS

Output voltage/current:	See rating chart.
Maximum output power:	See rating chart.
Ripple and noise:	1% peak to peak maximum
Overvoltage protection:	Provided on output #1 only; set at 112-132% of its nominal output voltage
Overcurrent protection:	All outputs protected to short circuit conditions
Temperature coefficient:	All outputs $\pm 0.04\%$ / $^{\circ}$ C maximum
Transient response:	Maximum excursion of 4% or better on all models, recovering to 1% of final value within 500 $\mu$ s after a 25% step load change

## INTERFACE SIGNALS

PFD:	TTL logic high for normal operation and TTL logic low upon loss of input power. This signal appears at least 1 ms prior to V1 output dropping 5% below its nominal value. This signal also provides a minimum delay of 100 ms after V1 is within regulation
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## PM110 SERIES



CE

RoHS

## SAFETY STANDARD APPROVALS



UL ES 60601-1, CSA C22.2 No. 60601-1  
File No. E178020



TÜV EN 60601-1

## ENVIRONMENTAL SPECIFICATIONS

Operating temperature:	-10 $^{\circ}$ C to +70 $^{\circ}$ C
Storage temperature:	-40 $^{\circ}$ C to +85 $^{\circ}$ C
Relative humidity:	5% to 95% non-condensing
Derating:	Derate from 100% at +50 $^{\circ}$ C linearly to 50% at +70 $^{\circ}$ C
Cooling:	72-110 watts continuous output power at 25 CFM forced air cooling or 60-80 watts at convection cooling

## GENERAL SPECIFICATIONS

Switching frequency:	20-250 KHz, varied with load and line
Efficiency:	70% minimum on single output model with $V_o \geq 12$ V, 65% minimum on the others
Hold-up time:	12 ms minimum at 110 VAC
Line regulation:	$\pm 0.5\%$ maximum at full load
Inrush current:	15 A @ 115 VAC or 30 A @ 230 VAC, at 25 $^{\circ}$ C cold start
Withstand voltage:	5600 VDC from input to output (2 MOPP) 2100 VDC from input to ground (1 MOPP) 700 VDC from output to ground (To verify AC strength, get correct test method to avoid power supply damage.)
MTBF:	400,000 hours at full load at 25 $^{\circ}$ C ambient, calculated per MIL-HDBK-217F
EMC Performance (EN60601-1-2)	
EN55011:	Class B conducted, class B radiated
FCC:	Class B conducted, class B radiated
VCCI:	Class B conducted, class B radiated
EN61000-3-2:	Harmonic distortion, class A
EN61000-3-3:	Line flicker
EN61000-4-2:	ESD, $\pm 15$ KV air and $\pm 8$ KV contact
EN61000-4-3:	Radiated immunity, 10 V/m
EN61000-4-4:	Fast transient/burst, $\pm 2$ KV
EN61000-4-5:	Surge, $\pm 1$ KV diff., $\pm 2$ KV com
EN61000-4-6:	Conducted immunity, 10 Vrms
EN61000-4-8:	Magnetic field immunity, 30 A/m
EN61000-4-11:	Voltage dip immunity, 30% reduction for 500 ms, 100% reduction for 10 ms

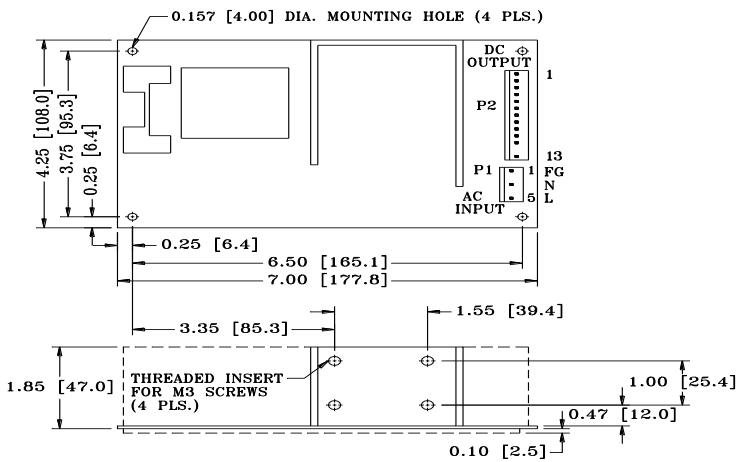
## OUTPUT VOLTAGE/CURRENT RATING CHART

Model <sup>(1)</sup>	Output #1 <sup>(2)</sup>				Output #2					Output #3				Output #4				Max. Output Power <sup>(3)</sup>
	V1	Imin.	Imax.	Tol.	V2	Imin.	Imax.	Ipeak <sup>(4)</sup>	Tol.	V3	Imin.	Imax.	Tol.	V4	Imin.	Imax.	Tol.	
PM110-10-1A	3.3 V	0 A	22 A	±3%	(N/A)					(N/A)				(N/A)				60 W /72 W
PM110-10A	5.0 V	0 A	22 A	±3%	(N/A)					(N/A)				(N/A)				80 W /110 W
PM110-12A	12 V	0 A	9.0 A	±2%	(N/A)					(N/A)				(N/A)				80 W /110 W
PM110-13A	15 V	0 A	7.5 A	±2%	(N/A)					(N/A)				(N/A)				80 W /110 W
PM110-14A	24 V	0 A	4.5 A	±2%	(N/A)					(N/A)				(N/A)				80 W /110 W
PM110-16A	30 V	0 A	3.6 A	±3%	(N/A)					(N/A)				(N/A)				80 W /110 W
PM110-23A	+5.1 V	0 A	10 A	±3%	+12 V	0 A	5 A	9.0 A	±3%	(N/A)				(N/A)				80 W /110 W
PM110-31A	+5.1 V	0 A	10 A	±3%	+12 V	0 A	5 A	9.0 A	±3%	-12 V	0 A	1 A	±4%	(N/A)				80 W /110 W
PM110-32A	+5.1 V	0 A	10 A	±3%	+15 V	0 A	4 A	7.5 A	±3%	-15 V	0 A	1 A	±4%	(N/A)				80 W /110 W
PM110-40A	+5.1 V	0 A	10 A	±3%	+12 V	0 A	5 A	9.0 A	±3%	-12 V	0 A	1 A	±4%	-5 V	0 A	1 A	±4%	80 W /110 W
PM110-41A	+5.1 V	0 A	10 A	±3%	+15 V	0 A	4 A	7.5 A	±3%	-15 V	0 A	1 A	±4%	+24 V	0 A	1 A	±4%	80 W /110 W
PM110-42A	+5.1 V	0 A	10 A	±3%	+12 V	0 A	5 A	9.0 A	±3%	-12 V	0 A	1 A	±4%	+12 V	0 A	1 A	±4%	80 W /110 W
PM110-45A	+5.1 V	0 A	10 A	±3%	+12 V	0 A	5 A	9.0 A	±3%	-12 V	0 A	1 A	±4%	+24 V	0 A	1 A	±4%	80 W /110 W
PM110-45-1A	+5.1 V	2 A	10 A	±3%	+12 V	0 A	5 A	9.0 A	±3%	-12 V	0 A	1 A	±4%	+24 V	1.5 A	3 A	±10%	80 W /110 W
PM110-45-2A	+5.1 V	0 A	10 A	±3%	+24 V	0 A	3 A	5.0 A	±3%	-12 V	0 A	1 A	±4%	+12 V	0 A	1 A	±4%	80 W /110 W
PM110-46A	+5.1 V	0 A	10 A	±3%	+15 V	0 A	4 A	7.5 A	±3%	-15 V	0 A	1 A	±4%	-5 V	0 A	1 A	±4%	80 W /110 W

### NOTES:

- Safety agency approvals are for the above listed models in PCB format. To order a model with a metallic L-bracket or box, change suffix "A" to "B" for L-bracket format, to "C" for enclosed form with cover, e.g. PM110-14C. (mechanical details shown in Annex H)
- The output #1 of model PM110-45-1A needs a minimum current of 2A to support the other outputs at their maximum rated load.
- 110 watts maximum at 25 CFM forced air cooling or 80 watts maximum at convection cooling, except model PM110-10-1A which is rated at 60 watts maximum at convection cooling or 72 watts maximum at 25 CFM forced air cooling.
- Peak output current with 10% maximum duty cycle for less than 60 seconds. Total peak power must not exceed 130 watts.
- All models may be operated at no-load. At no-load, output voltage tolerance increases to ±10%.
- Ripple and noise is maximum peak to peak voltage value measured at output within 20 MHz bandwidth, at rated line voltage and output load ranges, and with a 10 µF tantalum capacitor in parallel with a 0.1 µF ceramic capacitor across the output.

## MECHANICAL SPECIFICATIONS



### NOTES:

- Dimensions shown in inches [mm]
- Tolerance 0.02 [0.5] maximum
- Connector P1: Molex header 09-65-2058 or equivalent, mating with Molex housing 09-50-1051 or equivalent.
- Connector P2 mates with Molex 09-50-3131 or equivalent.
- The copper pad of the mounting hole near P1 is for system grounding through a metallic stand-off to system chassis.
- Weight : 640 grams (1.408 lbs.)

## PIN CHART

MODEL	PIN	1, 2, 3	4, 5	6, 7	8, 9	10	11	12	13
PM110-10-1A	PM110-13A	+V1	V1 Return	V1 Return	+V1	PFD	N.C.	KEY	N.C.
PM110-10A	PM110-14A								
PM110-12A	PM110-16A								
PM110-23A		V1	Common Return	Common Return	V2	PFD	N.C.	KEY	N.C.
PM110-31A	PM110-32A	V1	Common Return	Common Return	V2	PFD	V3	KEY	N.C.
PM110-40A	PM110-45-1A	V1	Common Return	Common Return	V2	PFD	V3	KEY	V4
PM110-41A	PM110-45-2A								
PM110-42A	PM110-46A								
PM110-45A									

## OUTPUT POWER DERATING CURVE

