

## DESCRIPTION

The TM110 series of compact, open PCB constructed, AC-DC switching power supplies are specially designed for medical applications. They are capable of delivering 72 to 110 watts of continuous power at 25 CFM forced air cooling or 80 watts at convection cooling. They operate at 85 to 264VAC input voltage without the need of changing jumper. All models meet the safety requirements of UL, CSA and IEC for medical applications.

## FEATURES

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

## INPUT SPECIFICATIONS

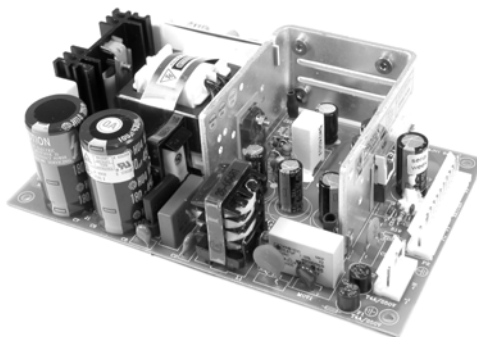
Input voltage : 85 to 264VAC  
 Input frequency : 47 to 63 Hz  
 Input current : 3.20A (rms) for 115VAC  
 1.80A (rms) for 230VAC  
 Earth leakage current : 90µA max. @ 115VAC, 60Hz  
 150µA max. @ 230VAC, 50Hz

## OUTPUT SPECIFICATIONS

Output voltage/current: See rating chart  
 Total output power: 110 watts maximum at 25 CFM forced air cooling or 80 watts maximum at convection cooling  
 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 ±0.04%/°C max.  
 Transient response: Maximum excursion of 4% or better on all models, recovering to 1% of final value within 500µs after a 25% step load change  
 PFD signal: TTL logic high for normal operation and TTL logic low upon loss of input power. This signal appears at least 1ms prior to +5V output dropping 5% below its nominal value. This signal also provides a minimum delay of 100ms after +5V is within regulation

## TM110 SERIES

CE (LVD)  
RoHS



## Safety Standard Approvals :



UL 2601-1



CSA C22.2 No. 601.1



TÜV EN60601-1

## ENVIRONMENTAL SPECIFICATIONS

Operating temperature: 0°C to +70°C  
 Storage temperature: -40°C to +85°C  
 Relative humidity : 5% to 95% non-condensing  
 Derate from 100% at +50°C linearly to 50% at +70°C  
 110 watts continuous output power at 25 CFM forced air cooling or 80 watts at convection cooling

## GENERAL SPECIFICATIONS

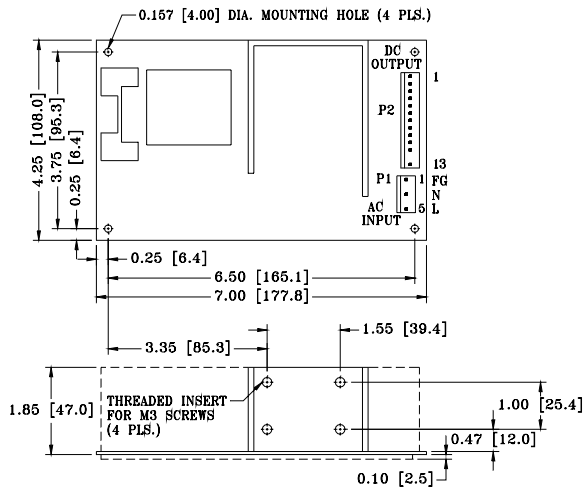
Switching frequency: 20KHz to 250KHz, varies with load and line  
 Efficiency: 70% minimum on single output models with  $V_o \geq 12V$ , 65% minimum on the others  
 Hold-up time: 12 msec minimum at 110VAC  
 Line regulation: ±0.5% maximum at full load  
 Inrush current: 15 amps @115VAC or 30 amps @ 230VAC at 25°C cold start  
 Withstand voltage: 4000VAC from input to output  
 1500VAC from input to ground  
 500VAC from output to ground  
 MTBF: 400,000 hours minimum at full load at 25°C ambient, calculated per MIL-HDBK-217F, excluding DC fan.  
**EMC Performance (EN60601-1-2: 2001)**  
 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, ±8KV air and ±6KV contact  
 EN61000-4-3: Radiated immunity, 3V/m for 80-2500MHz  
 EN61000-4-4: Fast transient/burst, ±2KV  
 EN61000-4-5: Surge, ±1KV diff, ±2KV com.  
 EN61000-4-6: Conducted immunity, 3Vrms  
 EN61000-4-8: Magnetic field immunity, 3A/m  
 EN61000-4-11: Voltage dips, 30% reduction for 500ms, 60% reduction for 100ms and >95% reduction for 10ms

## OUTPUT VOLTAGE/ CURRENT RATING CHART

Product No.	Output #1				Output #2				Output #3				Output #4				Maximum Output Power	
	Vnom.	Imin.	Imax.	Tol.	Vnom.	Imin.	Imax.	Ipeak	Tol.	Vnom.	Imin.	Imax.	Tol.	Vnom.	Imin.	Imax.		Tol.
TM110-S3.3	3.3V	0A	22A	3%			(N/A)					(N/A)				(N/A)		72W
TM110-S5.0	5.0V	0A	22A	3%			(N/A)					(N/A)				(N/A)		110W
TM110-S12	12V	0A	9.0A	2%			(N/A)					(N/A)				(N/A)		110W
TM110-S15	15V	0A	7.5A	2%			(N/A)					(N/A)				(N/A)		110W
TM110-S24	24V	0A	4.5A	2%			(N/A)					(N/A)				(N/A)		110W
TM110-S30	30V	0A	3.6A	2%			(N/A)					(N/A)				(N/A)		110W
TM110-D23	+5.1V	0A	10A	3%	+12V	0A	5A	9.0A	3%			(N/A)				(N/A)		110W
TM110-T31	+5.1V	0A	10A	3%	+12V	0A	5A	9.0A	3%	-12V	0A	1A	4%			(N/A)		110W
TM110-T32	+5.1V	0A	10A	3%	+15V	0A	4A	7.5A	3%	-15V	0A	1A	4%			(N/A)		110W
TM110-Q40	+5.1V	0A	10A	3%	+12V	0A	5A	9.0A	3%	-12V	0A	1A	4%	-5V	0A	1A	4%	110W
TM110-Q41	+5.1V	0A	10A	3%	+15V	0A	4A	7.5A	3%	-15V	0A	1A	4%	+24V	0A	1A	4%	110W
TM110-Q42	+5.1V	0A	10A	3%	+12V	0A	5A	9.0A	3%	-12V	0A	1A	4%	+12V	0A	1A	4%	110W
TM110-Q45	+5.1V	0A	10A	3%	+12V	0A	5A	9.0A	3%	-12V	0A	1A	4%	+24V	0A	1A	4%	110W
TM110-Q45-1	+5.1V	2A	10A	3%	+12V	0A	5A	9.0A	3%	-12V	0A	1A	4%	+24V	1.5A	3A	10%	110W
TM110-Q45-2	+5.1V	0A	10A	3%	+24V	0A	3A	5.0A	3%	-12V	0A	1A	4%	+12V	0A	1A	4%	110W
TM110-Q46	+5.1V	0A	10A	3%	+15V	0A	4A	7.5A	3%	-15V	0A	1A	4%	-5V	0A	1A	4%	110W

- NOTES:
1. Peak output current with 10% maximum duty cycle for less than 60 seconds. Total peak power must not exceed 130 watts.
  2. 110 watts maximum at 25 CFM forced air cooling or 80 watts maximum at convection cooling, except model TM110-S3.3 which is rated maximum 60 watts at convection cooling or 72 watts at 25 CFM forced air cooling.
  3. Safety agency approvals are for the above listed models in PCB format. To order models with metallic L-bracket or box, add suffix "B" for L-bracket format, or "C" for enclosed format, e.g. TM110-S24C.
  4. The output #1 of model TM110-Q45-1 needs a minimum current of 2A to support the other outputs at their maximum rated loads.

## MECHANICAL SPECIFICATIONS



### NOTES:

1. Dimensions shown in inch [mm]
2. Tolerance 0.02 [0.5] maximum
3. Input connector mates with Molex housing 09-50-3051 and Molex 2878 series crimp terminal.
4. Output connector mates with Molex housing 09-50-3131 and Molex 2878 series crimp terminal.
5. Weight: 640 grams (PCB format)
6. The copper pad of the mounting hole near P1 is for system grounding through a metallic stand-off to system chassis.

## PIN CHART

Product No.	PIN	1, 2, 3	4, 5	6, 7	8, 9	10	11	12	13
TM110-S3.3	TM110-S5.0	OUTPUT #1	RETURN	RETURN	OUTPUT #1	P.F.D	N.C.	KEY	N.C.
TM110-S12	TM110-S15								
TM110-S24	TM110-S30								
TM110-D23		OUTPUT #1	COMMON RETURN	COMMON RETURN	OUTPUT #2	P.F.D	N.C.	KEY	N.C.
TM110-T31	TM110-T32	OUTPUT #1	COMMON RETURN	COMMON RETURN	OUTPUT #2	P.F.D	OUTPUT #3	KEY	N.C.
TM110-Q40	TM110-Q41	OUTPUT #1	COMMON RETURN	COMMON RETURN	OUTPUT #2	P.F.D	OUTPUT #3	KEY	OUTPUT #4
TM110-Q42	TM110-Q45								
TM110-Q45-1	TM110-Q45-2								
TM110-Q46									