



Specification for Approval

Customer : **Energy Access(PG)**

Part name : **Medical power supply**

Description : **48.0 Volts / 3.3 Amps**

Model no. : **ATM160T-P480 (LEVEL VI)**

Customer P / N :

Product P / N :

Issued date : **07 - Nov. - 2022**

Version : **01**

Issued stamp :

Customer's approval signature

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Factory (China) : BOAYANG ELECTRONICS CO., LTD.



158.4 W
Medical power supply
Specification

Model no. : **ATM160T-P480**

Description : **48.0 Volts / 3.3 Amps**

Part no. :

Version : **01**

Date : **07 - Nov. - 2022**

Approved	Reviewed	Checked	Prepared	Sales



■ Approval documents/spec. revised records

■ Customer : Energy Access(PG)

■ Model no. : ATM160T-P480

■ Original documents content : Spec. 10 pages, Attachment 0 pages.

Revised Records : No.	Date	Description (Before / After)	Page(s) revised	Revised By (Adapter/Customer)	Version
1	Nov./07/2022	Issue	-	Tienyu	01
2					
3					
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1. Feature :

- ◆ **Input** : Universal 100 – 240 Vac / 50 – 60 Hz Input, without any slide switch.
- ◆ **Output** : +48.0 V / 0 – 3.3A
- ◆ **Case dimension** : 183.2 (L) * 81.0 (W) * 42.3 (H) mm.
- ◆ **Efficiency** : Eff(av) $\geq$ 88%
Eff $\geq$ 79% @ 10% load
- ◆ **Safety** : UL / cUL / TUV mark
- ◆ **EMC** : CE / FCC (conduction & radiation Class B)
- ◆ **Protection** : OVP (Over voltage protection), SCP (Short circuit protection),
OCP (Over current protection), OTP (Over temperature protection)
- ◆ **Suitable for usage at I.T.E., industrial controller, medical.**
- ◆ **Meet DoE Level VI / ErP (Lot 7)**

2. Input :

2.1 Voltage	Universal 100 – 240 Vac, single phase
2.2 Frequency	50 – 60 Hz
2.3 Current	1.8 - 0.9 A
2.4 Inrush current	100 A Max. / 230 Vac (cold start at 25 °C, full load) (ac source chroma 6530)
2.5 Efficiency	Eff (av) $\geq$ 88% (at 115 Vac & 230 Vac) Eff $\geq$ 79% @ 10% load (at 230 Vac)
2.6 Power consumption	Pi $\leq$ 0.21 W (at 230 Vac & No load)
2.7 Power factor (PF)	PF $\geq$ 0.9 (at full load)

$$\text{※Eff (av)} = \frac{E_1 + E_2 + E_3 + E_4}{4}$$

E₁=efficiency with 25% rated load, E₂= efficiency with 50% rated load
E₃=efficiency with 75% rated load, E₄= efficiency with 100% rated load

3. Output :

3.1 DC Output	Voltage	+48.00 V $\pm$ 5%
	Current	3.3 A Max.
	Regulation	45.6 Vmin. ~ 48.0 Vtyp. ~ 50.4 Vmax.
	Ripple & Noise	960 mV Max.
	Total Power	158.4 W Max.

Remark: For ripple & noise measurement, use a 20 MHz bandwidth frequency oscilloscope, and add a 0.1 μ F multilayer cap. and a low ESR electrolytic Cap. (47 μ F) at output connector terminals. (at nominal line voltage, full load)



4. Protection :

4.1 Over voltage protection (OVP)	V out * 150% Max., Shut down
4.2 Short circuit protection (SCP)	Autorecovery
4.3 Over current protection (OCP)	I out * 150% Max., Autorecovery
4.4 Over temperature protection (OTP)	Shut down.

Remark : When short circuit protection or over current protection is activated, the power supply will shutdown automatically.
Once the abnormal condition resulting in the failure being removed, the power supply will restart accordingly.
When over voltage protection is activated, the power supply will shut down.

5. Safety Requirement :

5.1. Dielectric Strength : Cut off current 10 mA

(1)	Primary to secondary	4000 Vac (RMS) for 1 minute
(2)	Primary to frame ground	1770 Vac (RMS) for 1 minute
※ Secondary return isolated to FG		

5.2. Insulation Resistance :

(1)	Primary to secondary	10 M ohm for 500 Vdc
(2)	Primary to frame ground	10 M ohm for 500 Vdc
※ Secondary return isolated to FG		

5.3 Leakage Current : Less than 100 uA.

5.4 Grounding test : < 0.1 Ω

6. Operation and environment performance :

6.1 Temperature range

Operating	- 20°C – + 40°C
Storage	- 20°C – + 80°C

6.2 Humidity range(non-condensing)

Operating	20% – 80% RH
Storage	10% – 90% RH

6.3 Cooling : By natural air.

7. M.T.B.F. : 300000Hrs.(Calculated hours at 25°C, by telcordia SR-332)

8. Mechanical :

8.1 Weight : 820 g Ref.

8.2 Cable type : Black UL2464 18AWG * 4C
(wire + plug)

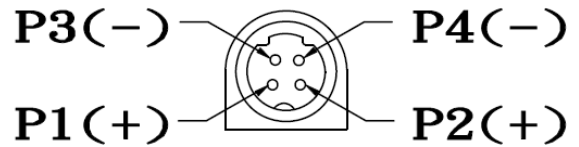
Plug : 4 pin din

8.3 Cable length : 1500 mm

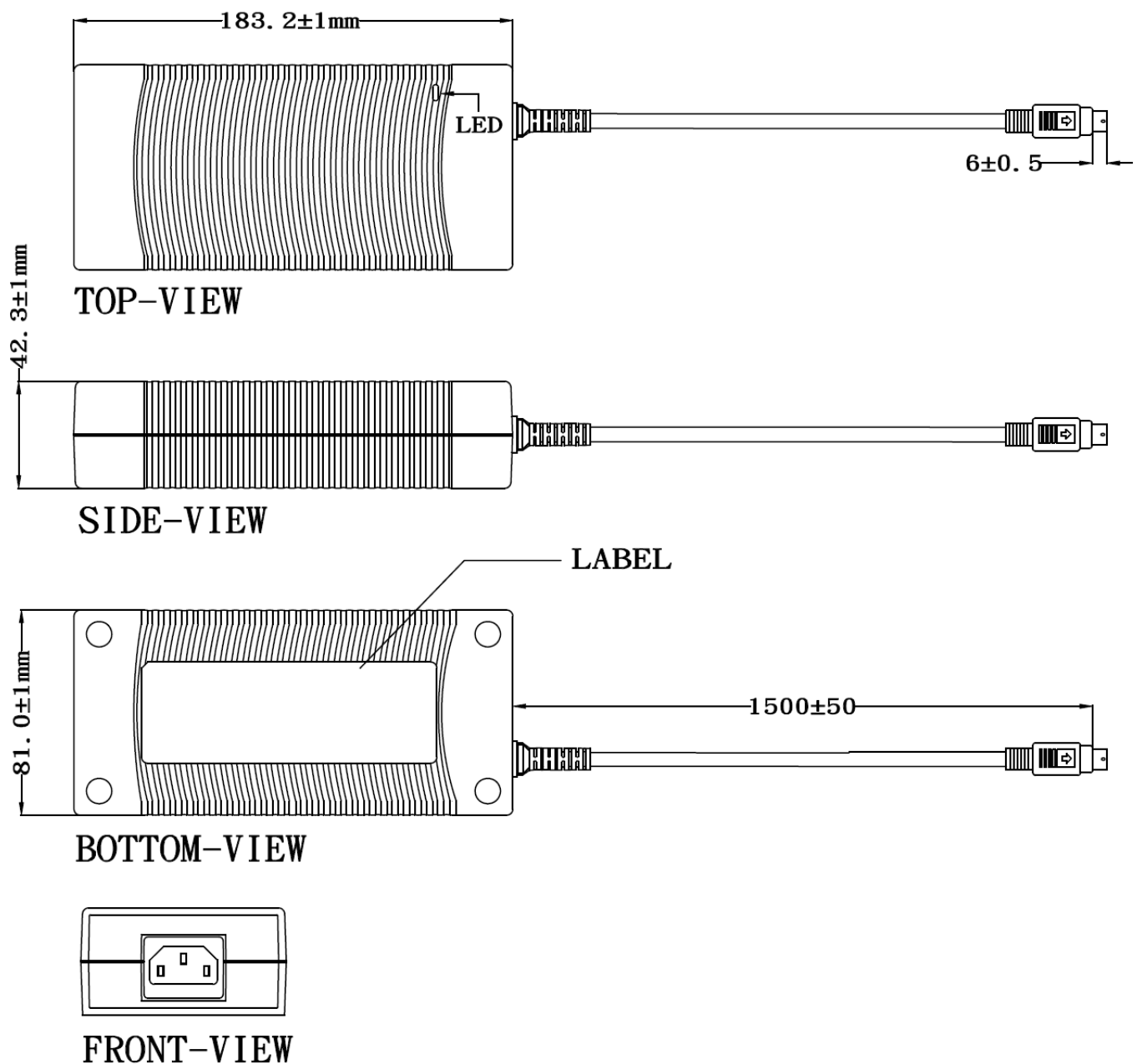
8.4 Case dimension : 183.2 (L) * 81.0 (W) * 42.3 (H) mm

8.5 Material flammability : UL 94V-0

8.6 External appearance : As drawing below (Scale → mm)



Output cable plug pin assignment

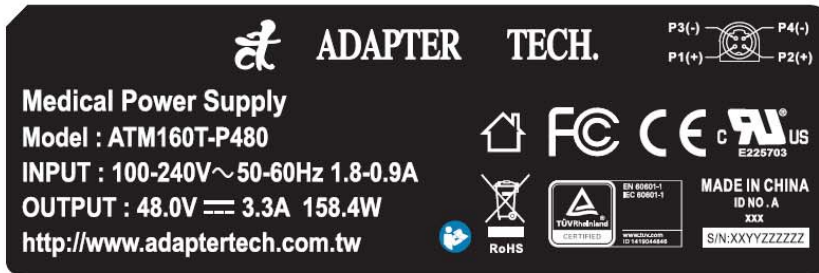




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8.7 Spec Label Materials : Metalized Polyester Label (Silver Gloss)
Color : Black Background with Silver Printing
Manual / booklet is blue background(3005C) with Silver Printing
Label Dimension : 39mm(H)*119mm(W)
Label Thickness : #75

100%



"XXX"

Label supplier's code
It is accurate that the number
of words depends on the real
finished product

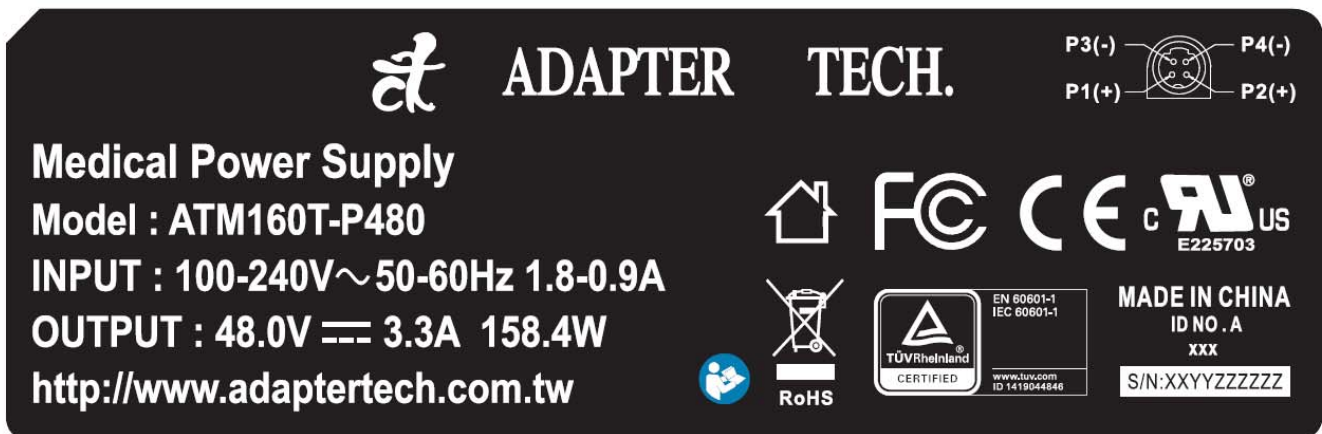
S/N:XXYYZZZZZZ

XX=Year=2022=22

YY=Week=44

ZZZZZZ=Serial number
=000001~999999

160%



A. Line regulation test

Test result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
90Vac / 50% Load	45.6 V – 50.2 V	48.06 V	48.23 V	48.11 V
115Vac / 50% Load	45.6 V – 50.2 V	48.06 V	48.23 V	48.11 V
132Vac / 50% Load	45.6 V – 50.2 V	48.06 V	48.23 V	48.11 V
180Vac / 50% Load	45.6 V – 50.2 V	48.06 V	48.23 V	48.11 V
230Vac / 50% Load	45.6 V – 50.2 V	48.06 V	48.23 V	48.11 V
264Vac / 50% Load	45.6 V – 50.2 V	48.06 V	48.23 V	48.11 V

B. Efficiency test

Test result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
115Vac	88% Min.	91.82%	92.12 %	91.11 %
230Vac	88% Min.	94.07%	94.20%	93.97%
230Vac@10%load	79% Min.	87.05%	87.15%	86.98%

$$\text{Eff (av)} = \frac{E_1 + E_2 + E_3 + E_4}{4}$$

E_1 =efficiency with 25% rated load, E_2 = efficiency with 50% rated load
 E_3 =efficiency with 75% rated load, E_4 = efficiency with 100% rated load

C. Load regulation test

Test result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
115Vac / 0% Load	45.6 V – 50.2 V	48.33V	48.37 V	48.34V
115Vac / 50% Load	45.6 V – 50.2 V	48.06 V	48.23 V	48.11 V
115Vac / 100% Load	45.6 V – 50.2 V	48.08 V	48.00 V	48.01 V
230Vac / 0% Load	45.6 V – 50.2 V	48.33 V	48.37 V	48.34 V
230Vac / 50% Load	45.6 V – 50.2 V	48.06 V	48.23 V	48.11 V
230Vac / 100% Load	45.6 V – 50.2 V	48.08V	48.00 V	48.01V

D. Ripple & Noise test

Test result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
115Vac / 100% Load	960 mV Max.	180 mV	182 mV	182 mV
230Vac / 100% Load	960 mV Max.	183 mV	182 mV	182 mV

E. Inrush current

Test Result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
230Vac / 100% Load	100A Max.	79 A	77 A	79 A

F. Over voltage protection

Test result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
115Vac / 50% Load	Vout*150 Max.	121%	121%	122%
230Vac / 50% Load	Vout*150 Max.	121%	121%	122%

G. Over current protection

Test Result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
115Vac / 100% Load	Iout*150 Max.	119%	118%	118%
230Vac / 100% Load	Iout*150 Max.	119%	118%	118%

H. Short circuit protection

Test result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
115Vac / 100% Load	Auto Recovery	OK	OK	OK
230Vac / 100% Load	Auto Recovery	OK	OK	OK

I. Input power consumption(no load)

Test result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
230Vac / 0% Load	$\leq 0.21W$	0.16W	0.15W	0.17W

J. Power factor

Test result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
115 Vac / 100% Load	≥ 0.9	0.99	0.99	0.99
230 Vac / 100% Load	≥ 0.9	0.95	0.95	0.95



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Efficiency Test Report

A.	Model Number	: ATM160T-P480	48.0V	3.30A	158.40W
B.	DC Power Cord	: UL2464 18AWG * 4C, 1.5M			
C.	Average Efficiency	:			
	Erp (LOT 7)	88.0%	Min.		
	DoE Level VI	88.0%	Min.		
	GEMS Level VI	88.0%	Min.		
	CoC Tier 2	89.0%	Min.		
	CoC Tier 2 (10% Load)	79.0%	Min.		
D.	NO Load Power Consumption	:			
	Erp (LOT 7)	0.21W Max.			
	DoE Level VI	0.21W Max.			
	GEMS Level VI	0.21W Max.			
	CoC Tier 2	0.15W Max.			
E.	Testing Equipiment	:			
	a. AC Power Source	: " EEC "	6600		
	b. Electronic Load	: " PRODIGIT "	3311F		
	c. Power Meter	: " YOKOGAWA "	WT-210		
	d. Digital Meter	: " FLUKE "	45		
F.	AC Input Voltage	: 115Vac/60Hz			

Load Conditions	100% * I ₀	75% * I ₀	50% * I ₀	25% * I ₀	10% * I ₀	0% * I ₀
Reported Quantity						
Rms Output Current(mA)	3300mA	2475mA	1650mA	825mA	330mA	0mA
Rms Output Voltage(V)	48.124V	48.169V	48.215V	48.260V	48.288V	48.307V
Active Output Power(W)	158.81W	119.22W	79.55W	39.81W	15.94W	0.00W
Rms Input Voltage(V)	115V	115V	115V	115V	115V	115V
Rms Input Current(A)	1.506A	1.129A	0.760A	0.401A	0.189A	0.088A
Rms Input Power(W)	170.860W	127.670W	85.140W	43.500W	18.025W	0.140W
True Power Factor (PF)	0.990	0.986	0.976	0.943	0.832	0.002
Total Harmonic Distortion of the input current	11.7A%	13.8A%	16.8A%	25.3A%	36.8A%	10.3A%
Power Consumed by UUT(W)	12.051W	8.452W	5.585W	3.686W	2.090W	0.140W
Active Efficiency	92.947%	93.380%	93.440%	91.528%	88.405%	*
Average Efficiency	92.824%				88.405%	*

G. AC Input Voltage : 230Vac/50Hz

Load Conditions	100% * I ₀	75% * I ₀	50% * I ₀	25% * I ₀	10% * I ₀	0% * I ₀
Reported Quantity						
Rms Output Current(mA)	3300mA	2475mA	1650mA	825mA	330mA	0mA
Rms Output Voltage(V)	48.125V	48.169V	48.215V	48.262V	48.289V	48.300V
Active Output Power(W)	158.81W	119.22W	79.55W	39.82W	15.94W	0.00W
Rms Input Voltage(V)	230V	230V	230V	230V	230V	230V
Rms Input Current(A)	0.769A	0.592A	0.416A	0.240A	0.149A	0.110A
Rms Input Power(W)	167.900W	125.940W	84.370W	43.330W	18.198W	0.180W
True Power Factor (PF)	0.950	0.926	0.883	0.783	0.529	0.002
Total Harmonic Distortion of the input current	24.7A%	29.9A%	36.0A%	38.0A%	44.5A%	4.6A%
Power Consumed by UUT(W)	9.088W	6.722W	4.815W	3.514W	2.263W	0.180W
Active Efficiency	94.588%	94.663%	94.293%	91.890%	87.567%	*
Average Efficiency	93.858%				87.567%	*

Tester : Kenny