

Specification for Approval

Customer :

Part Name : AC ADAPTER

Description : 24 Volts / 6.6 Amps

Part No. : MDS160T-P240 (LEVEL VI)

Serial No. : MDS160T-P240-1830

Product P / N :

Issued Date : 08 – Jan. – 2016

Version : 01

Issued Stamp :

Customer's Approval Signature

160 W
Switching Power Adapter
SPECIFICATION

Part No. : **MDS160T-P240 (LEVEL V)**

Description : **24 Volts / 6.6 Amps**

Part No. :

Version : **01**

Date : **08 – Jan. – 2016**

Approved	Reviewed	Checked	Prepared	Sales

■ Customer :
■ Part No. : MDS160T-P240
■ Original Documents Content : Spec. 10 Pages, Attachment 0 Pages

Tel: 732-249-2656 www.MEGAElectronics.com Fax: 732-249-7442 Page 3 of 11

1. Feature :

- ◆ **Input** : Universal 100 - 240 Vac / 50 - 60 Hz Input, without any slide switch.
- ◆ **Output** : +24 V / 0 – 6.6 A
- ◆ **Case Dimension** : 175.2 (L) * 74 (W) * 42 (H) mm
- ◆ **Efficiency** : Eff (av) $\geq$ 88%
- ◆ **Safety** : CUL / UL / GS / PSE / BSMI / RCM
- ◆ **EMI** : CE / FCC Class B, Conduction & Radiation Met.
- ◆ **Protection** : OVP (Over Voltage Protection), SCP (Short Circuit Protection), OCP (Over Current Protection), OTP (Over Temperature Protection)
- ◆ High frequency design, less power consumption.
- ◆ Suitable for usage at Telecommunication, Computer, Industrial Controller, & OA System.
- ◆ Meet Energy Star V / ErP (Stage 2) / MEPS V .

2. Input :

2.1 Voltage	Universal 100 - 240Vac, single phase
2.2 Frequency	50 - 60 Hz
2.3 Current	2.2 A Max.
2.4 Inrush Current	100 A Max. / 230 Vac (Cold start at 25 °C, full load)
2.5 Efficiency	Eff (av) $\geq$ 88% (At 115 Vac & 230 Vac)
2.6 Power Consumption	Pi $\leq$ 0.21 W (At 230Vac & No load)
2.7 Power Factor (PF)	Pi $\geq$ 0.9 (At Full load)

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

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

3. Output :

3.1 DC Output	Voltage	+24.00 V $\pm$ 5%
	Current	6.6 A Max.
	Regulation	22.8 Vmin. ~ 24.0 Vtyp. ~ 25.2 Vmax.
	Ripple & Noise	240 mV Max.
	Total Power	160 W Max.

Remark : For ripple & noise measurement, use a 20MHz bandwidth frequency oscilloscope, and add a 0.1 μ F multilayer Cap. and a Low ESR Electrolytic Cap. (10 μ F) at output connector terminals. (At nominal line voltage, full load)

4. Protection :

4.1 Over Voltage Protection (OVP)	Vout *150% Max.
4.2 Short Circuit Protection (SCP)	Automatic recovery after short-circuit fault being removed
4.3 Over Current Protection (OCP)	Iout *150% Max.
4.4 Over Temperature Protection (OTP)	Latch protection.

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 latch.

5. Safety、EMI and EMC Requirement :

5.1 Safety Requirement

a. Safety : CUL / UL / GS / PSE / BSMI / RCM

b. Dielectric Strength : Cut off current 10 mA

(1)	Primary to Secondary	3000 Vac for 1 Minute
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c. Insulation Resistance :

(1)	Primary to Secondary	10 M ohm for 500Vdc
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5.2 EMI Requirement : CE / FCC Class B, Conduction & Radiation Met.

5.3 Leakage Current : Less than 3.5 mA

5.4 Grounding Test : Resistance 0.1 ohm Max. @ 25 A

6. Operation and Environment Performance :

6.1 Temperature Range

Operating	+ 0°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.** : 300,000Hrs.(Calculated Hours at 25°C , By Telcordia SR-332)

8. Mechanical :

8.1 **Weight** : 700g Typical

8.2 **Cable Type** : Black UL2464 16AWG*4C
(Wire + Plug)

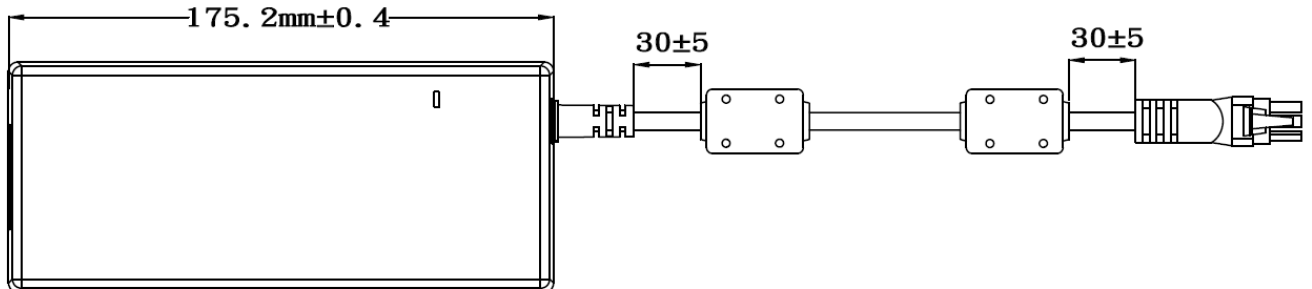
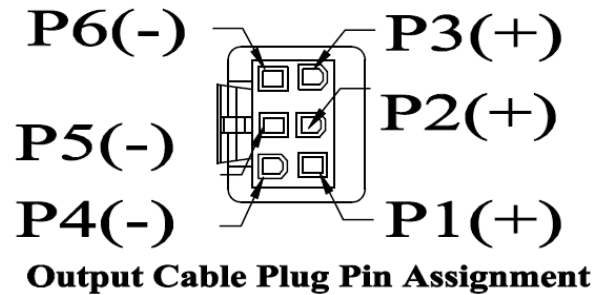
Plug : Molex 6PIN

8.3 **Cable Length** : 1500mm

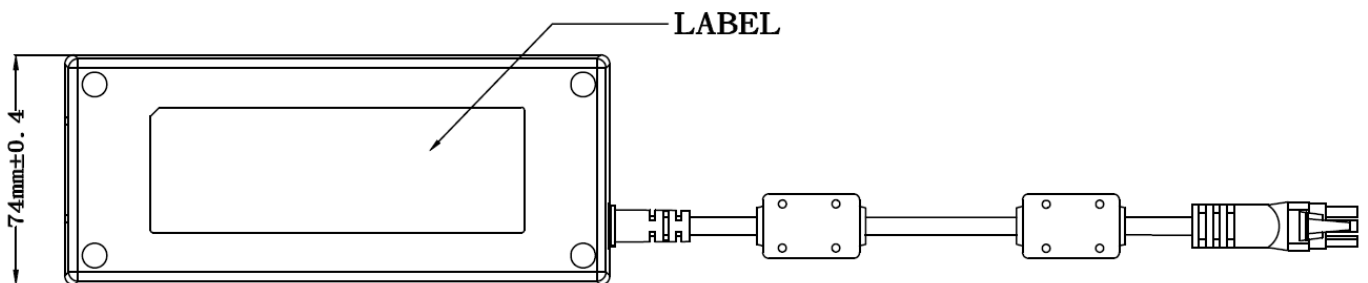
8.4 **Case Dimension** : 175.2mm(L)*74mm(W)*42mm(H)

8.5 **Material Flammability** : UL 94V-0

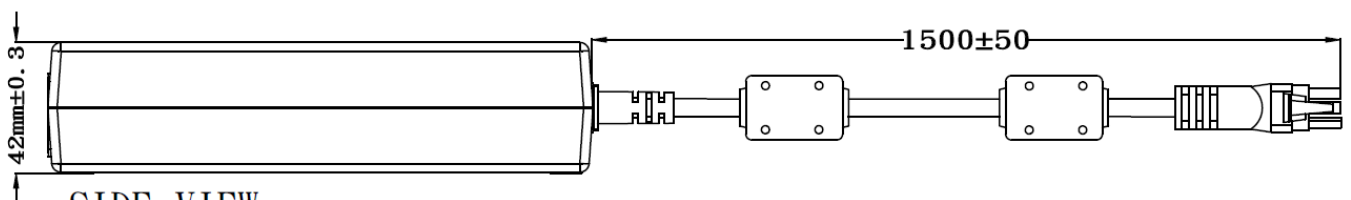
8.6 **External Apperance** : As drawing below (Scale → mm)



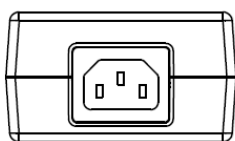
TOP-VIEW



BOTTOM-VIEW



SIDE-VIEW



FRONT-VIEW

8.7 Spec Label Materials : Metalized Polyester Label (Silver Gloss)
Color : Black Background with Silver Printing
Label Dimension : 39mm(H)*119mm(W)

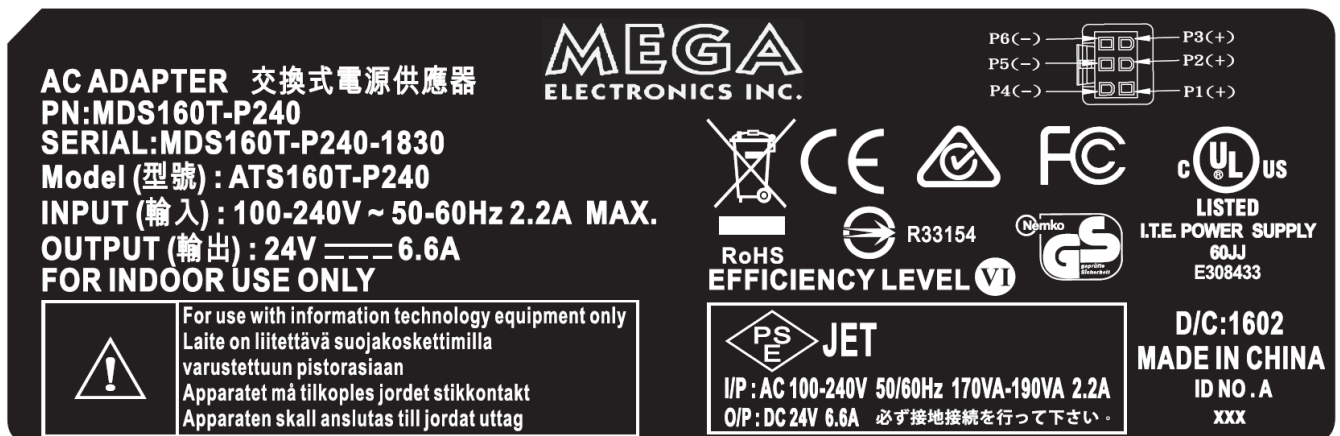
100%



"XXX"

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

160%



A. Line Regulation Test

Test Result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
90 Vac / 50 % Load	22.8 V ~ 25.2 V	23.81V	23.69V	24.04V
115 Vac / 50 % Load	22.8 V ~ 25.2 V	23.81V	23.69V	24.04V
132 Vac / 50 % Load	22.8 V ~ 25.2 V	23.81V	23.69V	24.04V
180 Vac / 50 % Load	22.8 V ~ 25.2 V	23.81V	23.69V	24.04V
230 Vac / 50 % Load	22.8 V ~ 25.2 V	23.81V	23.69V	24.04V
264 Vac / 50 % Load	22.8 V ~ 25.2 V	23.81V	23.69V	24.04V

B. Efficiency Test

Test Result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
115 Vac	88 % Min.	91.19%	90.78%	91.19%
230 Vac	88 % Min.	92.36%	92.01%	92.36%

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

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
115 Vac / 0 % Load	22.8 V ~ 25.2 V	23.95V	23.83V	24.15V
115 Vac / 50 % Load	22.8 V ~ 25.2 V	23.81V	23.69V	24.04V
115 Vac / 100 % Load	22.8 V ~ 25.2 V	23.68V	23.55V	23.92V
230 Vac / 0 % Load	22.8 V ~ 25.2 V	23.95V	23.83V	24.16V
230 Vac / 50 % Load	22.8 V ~ 25.2 V	23.82V	23.69V	24.04V
230 Vac / 100 % Load	22.8 V ~ 25.2 V	23.68V	23.55V	23.92V

D. Ripple & Noise Test

Test Result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
115 Vac / 100 % Load	240 mV Max.	41.2 mV	53.1mV	45.1mV
230 Vac / 100 % Load	240 mV Max.	46.6 mV	55.6mV	50.6mV

E. Inrush Current

Test Result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
230 Vac / 100 % Load	100 A Max.	71.8A	69.8A	70.1A

F. Over Voltage Protection

Test Result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
115 Vac / 100 % Load	Vout*150% Max.	118%	119%	118%
230 Vac / 100 % Load	Vout*150% Max.	117%	119%	119%

G. Over Current Protection

Test Result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
115 Vac / 100 % Load	Iout*150% Max.	127%	127%	129%
230 Vac / 100 % Load	Iout*150% Max.	128%	128%	129%

H. Short Circuit Protection

Test Result :

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

I. Input Power Consumption(No Load)

Test Result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
230 Vac / 0 % Load	$\leq$ 0.21 W	0.150W	0.149W	0.151W

J. Power Factor

Test Result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
115 Vac / 100 % Load	$\geq$ 0.9	0.991	0.991	0.991
230 Vac / 100 % Load	$\geq$ 0.9	0.948	0.964	0.954

Efficiency Test Report

- A. **Part Number** : MDS160T-P240
- B. **DC Power Cord** : UL2464 , 16AWG , 1.5M
- C. **Average Efficiency** :
- Energy Star VI : 88% min.
- Erp (Stage 2) : 87% min.
- MEPS V : 87% min.
- D. **NO Load Power Consumption** :
- Energy Star VI : 0.21W max.
- Erp (Stage 2) : 0.5W max.
- MEPS V : 0.5W max.
- E. **Testing Dequpment** :
1. AC Power Source : "APE" APW-110N
2. Electronic Load : " PRODIGIT " 3356
3. Power Meter : "YOKOGAWA" WT210
4. Digital Meter : " FLUKE " 45
- F. **AC Input Voltage** : 115Vac/60Hz

Load Conditions Reported Quantity	100%* I ₀	75%* I ₀	50%* I ₀	25%* I ₀	0%* I ₀
Rms Output Current(mA)	6600mA	4950mA	3300mA	1650mA	0mA
Rms Output Voltage(V)	23.680V	23.750V	23.820V	23.890V	23.960V
Active Output Power(W)	156.29W	117.56W	78.61W	39.42W	0.00W
Rms Input Voltage(V)	115V	115V	115V	115V	115V
Rms Input Current(A)	1.526A	1.139A	0.762A	0.394A	0.023A
Rms Input Power(W)	173.01W	128.83W	85.62W	43.43W	0.12W
Voltage T.H.D.(%)	0.11	0.10	0.10	0.10	0.08
True Power Factor	0.991	0.988	0.981	0.960	0.063
Power Consumed by UUT(W)	16.72W	11.27W	7.01W	4.01W	0.12W
Efficiency	90.33%	91.25%	91.81%	90.76%	*
Average Efficiency	91.04%				

- G. **AC Input Voltage** : 230Vac/50Hz

Load Conditions Reported Quantity	100%* I ₀	75%* I ₀	50%* I ₀	25%* I ₀	0%* I ₀
Rms Output Current(mA)	6600mA	4950mA	3300mA	1650mA	0mA
Rms Output Voltage(V)	23.680V	23.750V	23.820V	23.890V	23.960V
Active Output Power(W)	156.29W	117.56W	78.61W	39.42W	0.00W
Rms Input Voltage(V)	230V	230V	230V	230V	230V
Rms Input Current(A)	0.781A	0.582A	0.400A	0.240A	0.033A
Rms Input Power(W)	170.06W	127.29W	85.30W	42.58W	0.15W
Voltage T.H.D.(%)	0.11	0.11	0.10	0.11	0.09
True Power Factor	0.948	0.953	0.929	0.772	0.027
Power Consumed by UUT(W)	0.95W	9.73W	6.69W	3.16W	0.15W
Efficiency	91.90%	92.36%	92.15%	92.58%	*
Average Efficiency	92.25%				*

Tester : Ray