

Specification for Approval

Customer :

Part Name : AC ADAPTER

Description : 24 Volts / 6.6 Amps

Part No. : MD-24066 (LEVEL V)

Serial No. :

Product P / N :

Issued Date : **29 - Nov. - 2013**

Version : 01

Issued Stamp :

Customer's Approval Signature

160 W
AC ADAPTER
SPECIFICATION

Part No. : **MD-24066 (LEVEL V)**

Description : **24 Volts / 6.6 Amps**

Part No. :

Version : **01**

Date : **29 - Nov. - 2013**

Approved	Reviewed	Checked	Prepared	Sales

■ Customer :
■ Model No. : MD-24066
■ Original Documents Content : Spec. 10 Pages, Attachment 0 Pages

[illegible]

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) $\geq$ 87%
- ◆ **Safety** : CUL / UL / GS / PSE / BSMI
- ◆ **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) $\geq$ 87% (At 115 Vac & 230 Vac)
2.6 Power Consumption	Pi $\leq$ 0.5 W (At 230Vac & No load)
2.7 Power Factor (PF)	Pi $\geq$ 0.9 (At Full load)

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

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	+24.00 V $\pm$ 5%
	Current	6.6 A Max.
	Regulation	22.8 Vmin. ~ 24.0 Vtyp. ~ 25.2 Vmax.
	Ripple & Noise	480 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

b. Dielectric Strength : Cut off current 10 mA

(1)	Primary to Secondary	1800 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 AWG16
(Wire + Plug)

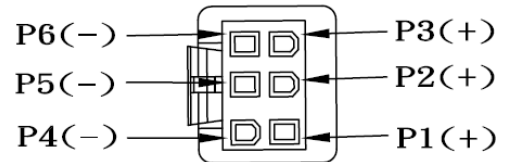
Plug : 6 PIN HOUSING

8.3 Cable Length : 1500mm

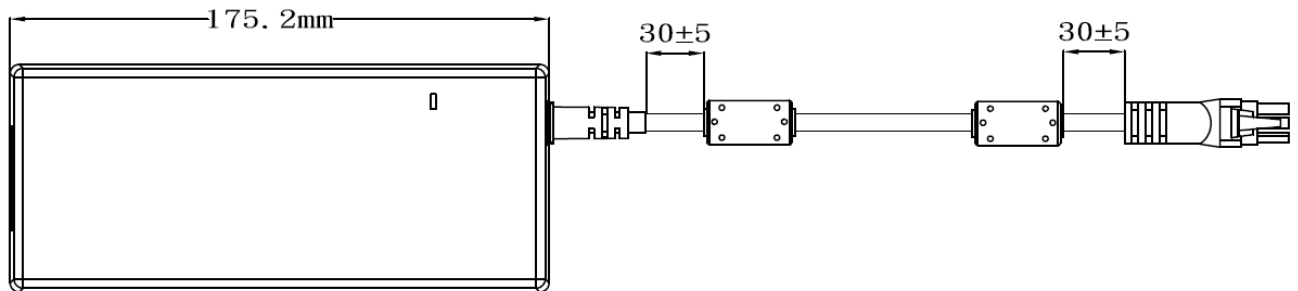
8.4 Case Dimension : 175.2mm(L)*74mm(W)*42mm(H)

8.5 Material Flammability : UL 94V-0

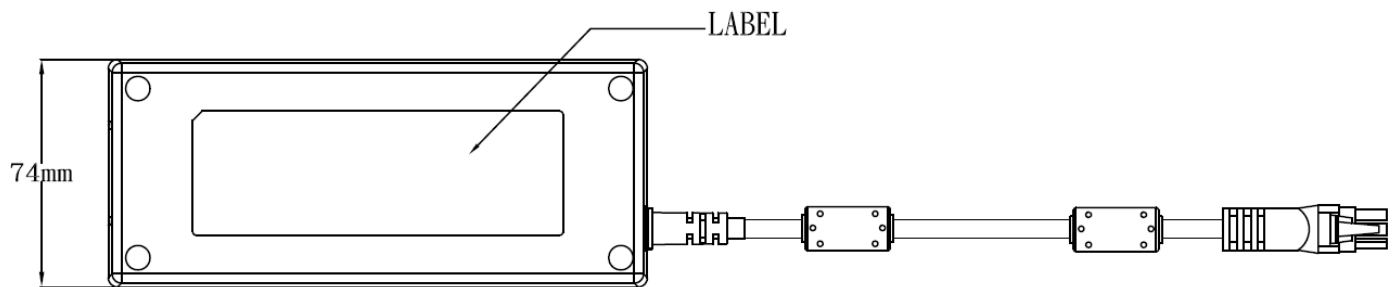
8.6 External Apperance : As drawing below (Scale → mm)



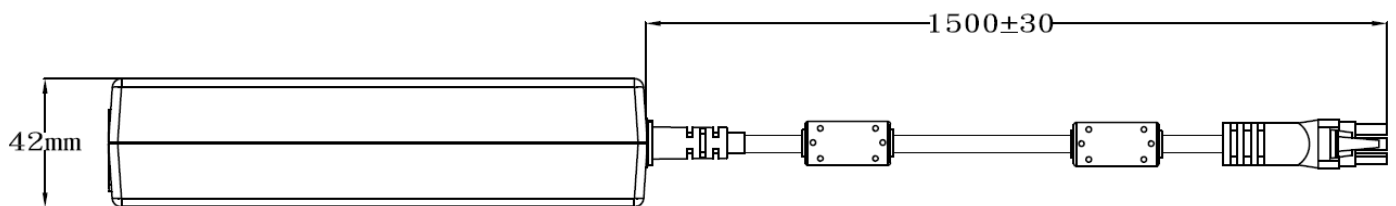
Output Cable Plug Pin Assignment



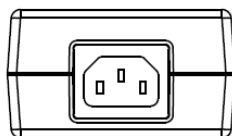
TOP-VIEW



BOTTOM-VIEW



SIDE-VIEW



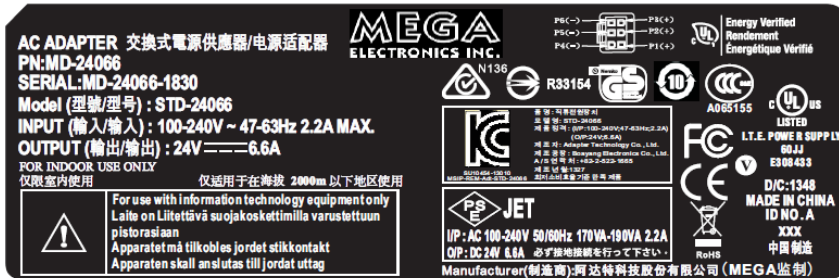
FRONT-VIEW

8.7 Spec Label Materials : Metalized Polyester Label (Silver Gloss)

Color : Black Background with Silver Printing

Label Dimension : 39mm(H)*119mm(W)

100%

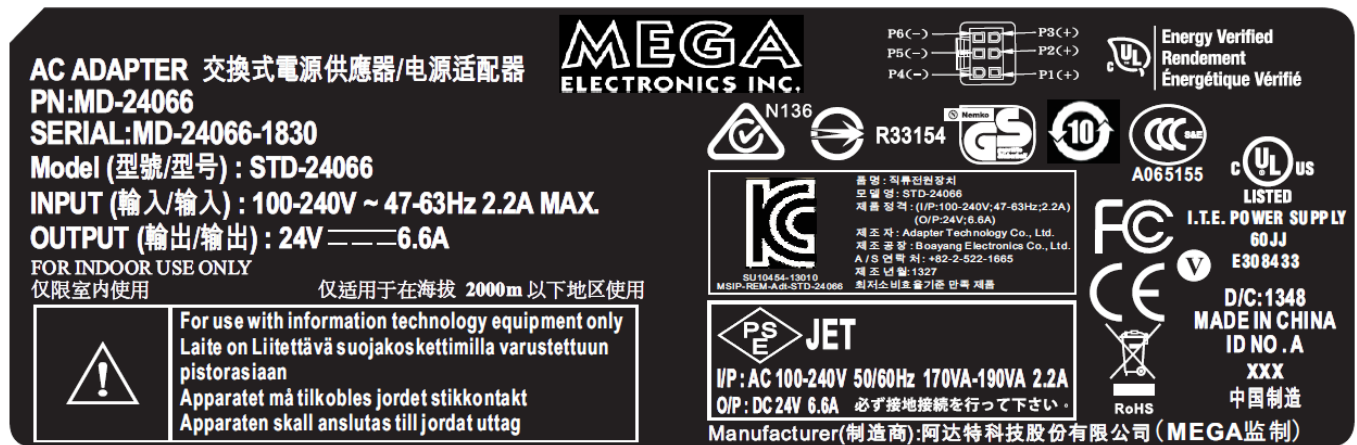


"XXX"

Label supplier's code

It is accurate that the number of words depends on the real finished product

160%



Label Part No:

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	23.87 V	24.04 V	
115 Vac / 50 % Load	22.8 V ~ 25.2 V	23.87 V	24.04 V	
132 Vac / 50 % Load	22.8 V ~ 25.2 V	23.87 V	24.04 V	
180 Vac / 50 % Load	22.8 V ~ 25.2 V	23.87 V	24.04 V	
230 Vac / 50 % Load	22.8 V ~ 25.2 V	23.87 V	24.04 V	
264 Vac / 50 % Load	22.8 V ~ 25.2 V	23.87 V	24.04 V	

B. Efficiency Test

Test Result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
115 Vac	87 % Min.	89.88%	90.43%	
230 Vac	87 % Min.	91.31%	91.19%	

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

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	23.99 V	24.14 V	
115 Vac / 50 % Load	22.8 V ~ 25.2 V	23.87 V	24.04 V	
115 Vac / 100 % Load	22.8 V ~ 25.2 V	23.75 V	23.92 V	
230 Vac / 0 % Load	22.8 V ~ 25.2 V	23.99 V	24.14 V	
230 Vac / 50 % Load	22.8 V ~ 25.2 V	23.87 V	24.04 V	
230 Vac / 100 % Load	22.8 V ~ 25.2 V	23.75 V	23.92 V	

D. Ripple & Noise Test

Test Result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
115 Vac / 100 % Load	480 mV Max.	139 mV	136 mV	
230 Vac / 100 % Load	480 mV Max.	142 mV	144 mV	

E. Inrush Current

Test Result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
230 Vac / 100 % Load	100 A Max.	78 A	79 A	

F. Over Voltage Protection

Test Result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
115 Vac / 100 % Load	Vout*150% Max.	125%	120%	
230 Vac / 100 % Load	Vout*150% Max.	125%	120%	

G. Over Current Protection

Test Result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
115 Vac / 100 % Load	Iout*150% Max.	115%	115%	
230 Vac / 100 % Load	Iout*150% Max.	116%	115%	

H. Short Circuit Protection

Test Result :

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

I. Input Power Consumption(No Load)

Test Result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
230 Vac / 0 % Load	≤ 0.5 W	0.38W	0.37W	

J. Power Factor

Test Result :

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

Efficiency Test Report

- A. Part Number : MD-24066
- B. DC Power Cord : UL2464, 16AWG, 1500 mm
- C. Average Efficiency :
 Energy Star V 87 % Min.
 Erp (Stage 2) 87 % Min.
 MEPS V 87 % Min.
- D. NO Load Power Consumption :
 Energy Star V 0.5W max.
 Erp (Stage 2) 0.5W max.
 MEPS V 0.5W max.
- E. Testing Dequpiment :
 1. AC Power Source : " APE " 2700M-10
 2. Electronic Load : " PRODIGIT " 3302C
 3. Power Meter : " YOKOGAWA " WT-210
 4. Digital Meter : " FLUKE " 179
- 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)	23.750V	23.810V	23.870V	23.930V	23.990V
Active Output Power(W)	156.75W	117.86W	78.77W	39.48W	0.00W
Rms Input Voltage(V)	115V	115V	115V	115V	115V
Rms Input Current(A)	1.514A	1.137A	0.777A	0.407A	0.034A
Rms Input Power(W)	173.00W	129.50W	87.00W	45.20W	0.36W
Voltage T.H.D.(%)	0.19	0.17	0.15	0.10	0.09
True Power Factor	0.991	0.990	0.972	0.961	0.098
Power Consumed by UUT(W)	16.25W	11.64W	8.23W	5.72W	0.36W
Efficiency	90.61%	91.01%	90.54%	87.36%	*
Average Efficiency	89.88%				*

- 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)	23.750V	23.810V	23.870V	23.930V	23.990V
Active Output Power(W)	156.75W	117.86W	78.77W	39.48W	0.00W
Rms Input Voltage(V)	230V	230V	230V	230V	230V
Rms Input Current(A)	0.773A	0.593A	0.414A	0.230A	0.035A
Rms Input Power(W)	169.70W	127.60W	86.00W	44.40W	0.35W
Voltage T.H.D.(%)	0.17	0.15	0.12	0.11	0.09
True Power Factor	0.956	0.936	0.905	0.840	0.043
Power Consumed by UUT(W)	12.95W	0.43W	7.23W	4.92W	0.35W
Efficiency	92.37%	92.37%	91.59%	88.93%	*
Average Efficiency	91.31%				*

Tester : *Satoshi*