LEX0323

12 V 2000mA

Power Supply -European

Revision Status			
Version	Author	Date	Change
1.0		03/12/10	First Draft
1.1		06/12/10	Update label

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1 GENERAL

1.1 Description

This specification defines the performance and characteristics of a adaptor, single-phase **24**watts. Single output level power supply. This specification also define world wide safety requirements and manufactures process test requirements.

- Simple design philosophy.
- Overload Auto-recover protection during either (a) specified power threshold requirements or (b) short circuit condition.
- Reliability level of 50K hours MTBF @ 25° C(rated input voltage，and using the BELLCORE SR-332 method).
- DC output voltage must be Safe Extra Low Voltage (SELV) & Limited Power as defined by IEC60950-1:2005.

The maximum room ambient temperature (T_{mra}), as mentioned in clause 1.4.12 of IEC 60950-1:2005, for the external power supply is **45** °C.

1.2 DC Output Requirements

The power supply shall have one regulated DC outputs of +12V.
The table below defines the total regulation band for the output , which includes line regulation , load regulation ,and effects due to environmental conditions and aging . Voltage shall be measured at the power supply output connector.

Output	Output Current Range		Output Voltage Range		Ripple & Noise
	Min.	Max.	Min.	Max.	Max.
+12V	0.0A	2.0A	11.4V	12.6V	120mV

Ripple & Noise Test : Add 0.1uF/50V ceramic capacitor and 10uF/50V aluminum electrolytic capacitor across the output terminal. Measured with 20MHz Bandwidth Oscilloscope.

2 INPUT REQUIREMENTS

2.1 Input Conditions

The Supply shall operate over the voltage ranges as follows:

Rated Input Voltage	200-240Vac
Operating Range	180-264Vac
Rated Input Frequency	50/60Hz +/- 3Hz
Rated Input current	0.6A Max.
Maximum input power	50W
Input current (No Loading)	⩽15mA
Power Consumption (No Loading)	Max. 0.3W

2.2 AC Inrush Current

Peak inrush current shall be limited to 60A for a cold start. Under both cold & warm start conditions, there shall be no immediate damage or long term impact on the reliability of the Supply. The conformance test for this requirement shall be performed at +12.5% of the rated input voltage. Voltage and current waveforms will be observed on an oscilloscope following closure of the external power switch. Switch closure will be repeated until the waveforms show closure coincident with a voltage peak. The current measured during this occurrence will be defined as the peak inrush current.

2.3 Brownout and Brownout Recovery

The supply shall be subjected to the following tests while under maximum rated load No component damage is permitted

2.3.1 BROWNOUT

180 Vac 50 Hz to 0 Vac @ 50 Hz in 1 volt decrements in 30 sec. (Continental Europe. United Kingdom and Australian

2.3.2 BROWNOUT RECOVERY

0 vac 50 Hz to 180 Vac @ 50 Hz in 1 volt decrements in 30 sec. (continental Europe United Kingdom and Australian)

After completion of the test, power will be reapplied within the rated line voltage ranges and normal operation is expected.

2.4 Efficiency

The efficiency of the Supply shall meet the following requirements:

Supply:	Load:	Input voltage	Average IEfficiency
Universal	25%,50%,75%,100% rated load	180-264 Vac	≥82.2%

2.5 On/Off and On/Standby Cycling

The Supply shall be subjected to the following test to ensure proper turn on and reliability.

The four conditions are:

175 Vac 50 Hz (Continental Europe, United Kingdom and Australian)

The Supply shall be cycled between:

"On" and "Off" using an external switching device which interrupts the current into the Supply.

The cycle profile shall use the following sequence:

Step Number	***Procedure Step***	***Repetitions***	***Output Load***
1	0.5 seconds ON, 0.5 seconds Off	4	Rated Output Current
2	1.0 seconds ON, 1.0 seconds Off	4	Rated Output Current
3	2.0 seconds ON, 2.0 seconds Off	4	Rated Output Current
4	4.0 seconds ON, 4.0 seconds Off	4	Rated Output Current
5	8.0 seconds ON, 8.0 seconds Off	4	Rated Output Current
6	16 seconds ON, 16 seconds Off	4	Rated Output Current
7	32 seconds ON, 32 seconds Off	4	Rated Output Current

3 OUTPUT REQUIREMENTS

3.1 Output Voltage , Current

Output#	Voltage	Min load	Max load	Peak load
1	+12V	0.0A	2.0A	*

3.2 Load/Line Regulation

The output voltage shall be statically regulated for all combinations of load, line and environment including cross regulation as shown.

Output#	Normal Voltage	Min. Voltage	Max. Voltage	Tolerance
	+12V	+11.4V	+12.6V	+/-5%

3.3 Light Load Output Voltage

The output voltage shall be within the specified limits shown when subjected to the following conditions:

Line voltage: 180 Vac – 264 Vac 50 & 60 Hz (Universal)

Load: Io ≤ 5mA dc

Ambient temperature: 0° C – 45° C

Output voltage: 12Vdc +/-5%

No damage or hazardous condition will occur with the DC output connector disconnected from the load under all input line conditions.

3.4 Over Current Protection

The adapter has to be protected against overcurrent conditions. No damage allowed. The adapter must come back to nominal working without on / off powering after removal of the over current condition.

3.5 Short Circuit Protection

The power supply shall have self-limiting protection. The output shall be protected against short circuit conditions.

3.6 Rise Time

The Supply shall have a start-up rise time of less than 20 msec to rise to within regulation limits for all DC outputs.

3.7 Hold Up Time

When power off , DC output +12V must be maintain 10 msec in regulation limit at 198Vac and full load.

3.8 Turn On Delay Time

3000 msec @ Full load

3.9 Output Ripple

Maximum Ripple must be less than 120mVpp when subjected to the following conditions:

Bandwidth: Limited 1Hz to 20MHz (PARD)
Line voltage: 200Vac-240Vac 50 & 60 Hz (Universal)
Output Load: Full Load

3.10 Overshoot

During either Turn-On (230Vac) or Turn-Off (AC voltage absent) of the power supply, the output voltage shall not exceed 12.84 Vdc. No voltage of opposite polarity shall be present on the output during turn-on or turn-off.

3.11 Dynamic Response

The power supply output voltage shall not undershoot or overshoot beyond the specified limits shown after applying load changes with a 0.15A/μsec slew rate on the output. The load change will be applied with a 50% duty cycle.

Voltage Limits		Load Change
Minimum	Maximum	
11.4Vdc	12.6Vdc	20% to 80% load and back to 20%

3.12 Components Thermal Derating

All magnetic components shall not exceed their designed safety rated temperatures for the insulation.

3.13 Stability with capacitive load

Stability is required on any DC load without capacitive load or any load in parallel with a 6800 uF capacitor or with 13600uF

3.14 Switching Frequency

Fixed frequency switching is mandatory

4 MECHANICAL

4.1 Enclosure And Layout

The Power Supply enclosure shall have no openings to its enclosure. The enclosure plastic shall be UL recognized flammability rating 94V-1 or better and white in color.

Casing Mechanical layout and material acc. To EN60950, UL94V-1(housing)
Weight : 110g (Max.)
Dimensions: 88*43.5*31mm
Colour : **WT-19**(REACH+ROHS)

4.2 Input and Output Configuration

Input Pin: **European** Pin
Output Connector : DC Plug Type JACK-PLUG: **5.5*2.5*9.5mm FORK AND GROOVE " L"**
Polarity: Center:"+"
Cable: **6FT VW-1 80℃ 300V 2468 20AWG 2C WT-19(CORE) (REACH+ROHS)**

4.3 Strain Relief Pull Test

Put the DC cable connector in fixture and apply 30N force on the cable 25 times at 1 time per second. The cable shall not disengage.Long term stretch test is made with 30N for 1 hour.

4.4 Strain Relief Bend Test

Put the DC cable connector in appropriate fixture and apply 300g/f load to the cable. Then swing the
DC cable connector 1,000 times from 60° to -60° at a rate of 40 cycles per minute .Any crake in the strain relief is not allowed, the strain relief shall not detach form DC cable connector, and the conduction resistance shall not change by more than 10% from initial.

4.5 Label or Marking

- Marking shall be legible and locate within specified area.
- Attachment test: stick 3 M 600 scotch tape on test area for 30 seconds. Then remove tape in vertical direction. no removal of marking is allowed.
- Durability test : test according to IEC950 paragraph 1.7.15. The rubbing shall be to and fro 5 times on test area. After the test the marking shall be legible without fading.

5 REGULATORY COMPLIANCE

5.1 EMC Specifications

The power supply must be compliant to the requirements of the following specifications :

Radiated Emission (30 MHz to 1000 MHz) :

- Compliance to EN 55022 Class B
- Compliance to FCC Part15 Class B

Conducted Emission (0.01 MHz to 30 MHz) :

- Compliance to EN 55022 Class B
- Compliance to FCC Part15 Class B

ESD Immunity:

- EN 61000-4-2
- EN 55024 ESD Class B (8 KV in air – 4 KV by contact)
- ETSI ES 201468 Level 2 (15 KV in air – 8 KV by contact)

Field immunity

- EN 61000-4-3
- EN 55024 80-1000 MHz 3V/m 80% AM 1000 Hz
- ETSI ES 201468 Level 2 80-1000 MHz 10V/m 80% AM 1000 Hz

Fast transient immunity

- EN 61000-4-4
- EN 55024 1 KV 5ns/ 50ns Rep freq : 5 KHz
- ETSI ES 201468 1 KV 5ns/ 50ns Rep freq : 5 KHz

Surge immunity (1)

- EN 61000-4-5
- EN 55024 1.2 / 50 us 1 KV Line to Line
  1.2 / 50 us 2 KV Line to Line
- ETSI ES 201468 1.2 / 50 us 2 KV Line to Line
  1.2 / 50 us 4 kV Line to Ground

SURGE IMMUNITY(2)

ITU K.21

- 1.2/50 usec Open Circuit voltage
- 8/20 usec Short Circuit current
- Power line: 6kV
- Line to Earth: 6kV

Lighting Surge Voltage of differential and common modes shall be applies across AC input lines and cross input and frame ground.

5.2 Immunity

5.2.1 RADIATED FIELD IMMUNITY

EN 55024:1998+A1:2001+A2:2003, EN 61000-4-3
Frequency Range: 80-1000MHz
Field Strength: 3 V/m with 80% amplitude modulation of 1kHz
Performance Criteria A
Radio-frequency electromagnetic field susceptibility test, RS 80-1000MHz, 3V/m, 80%AM(1KHz).

5.2.2 CLIMATIC/MECHANICAL

The power supply must comply to the requirements of the following classes of ETS 300 019 specification.

Operating : ETS 300 019-1-3 Class 3.2 (Indoor Use) ; Temperature : - 5°C / + 45°C

Storage conditions : ETS 300 019-1-1 Classe 1.1

Temperature : - 25°C / + 55°C

Transport conditions : ETS 300 019-1-2 Classe 2.3

Temperature : - 40°C / + 70°C
NB : Tests have to be done in both horizontal and vertical position.

Physico-chemical environment specifications

The power supply must comply to the requirements of the ETS 300 019 specification in the same classes as above.

Mechanical environment specifications

The power supply must comply :

- to all applying requirements of the EN 60950 / UL 1950 specifications.
- to the requirements of the ETS 300 019 specification in the same classes as described above.

5.3 Safety Requirements and Certification

5.3.1 REGULATORY STANDARD

The power supply shall complied the following international regulatory standards

	Country	Certified Status	Standard/標準
TUV	Europe/歐洲		TUV/VDE-EN60950-1
CE	Europe/歐洲		Declared& CE Mark

5.3.2 ADDITIONAL SAFETY REQUIREMENTS

- Dielectric Withstand Voltage, Primary(input AC short)-to-Secondary(output DC short): 4242Vdc or 3000 Vac. 5mA. 1 MINUTE for QA 3S.
- Insulation Resistance, Input to output: 10M OHM at 500 VDC.
- Reinforced insulation system, Primary-to-Ground and Primary-to-Secondary.

- Leakage Current: 0.25 mA maximum, at nominal AC input voltage and frequency..

6 ENVIRONMENTAL REQUIREMENTS

6.1 Temperature

- Operating: 0 °C- +45 °C
- Non-Operating -20 °C- +80 °C

6.2 Humidity

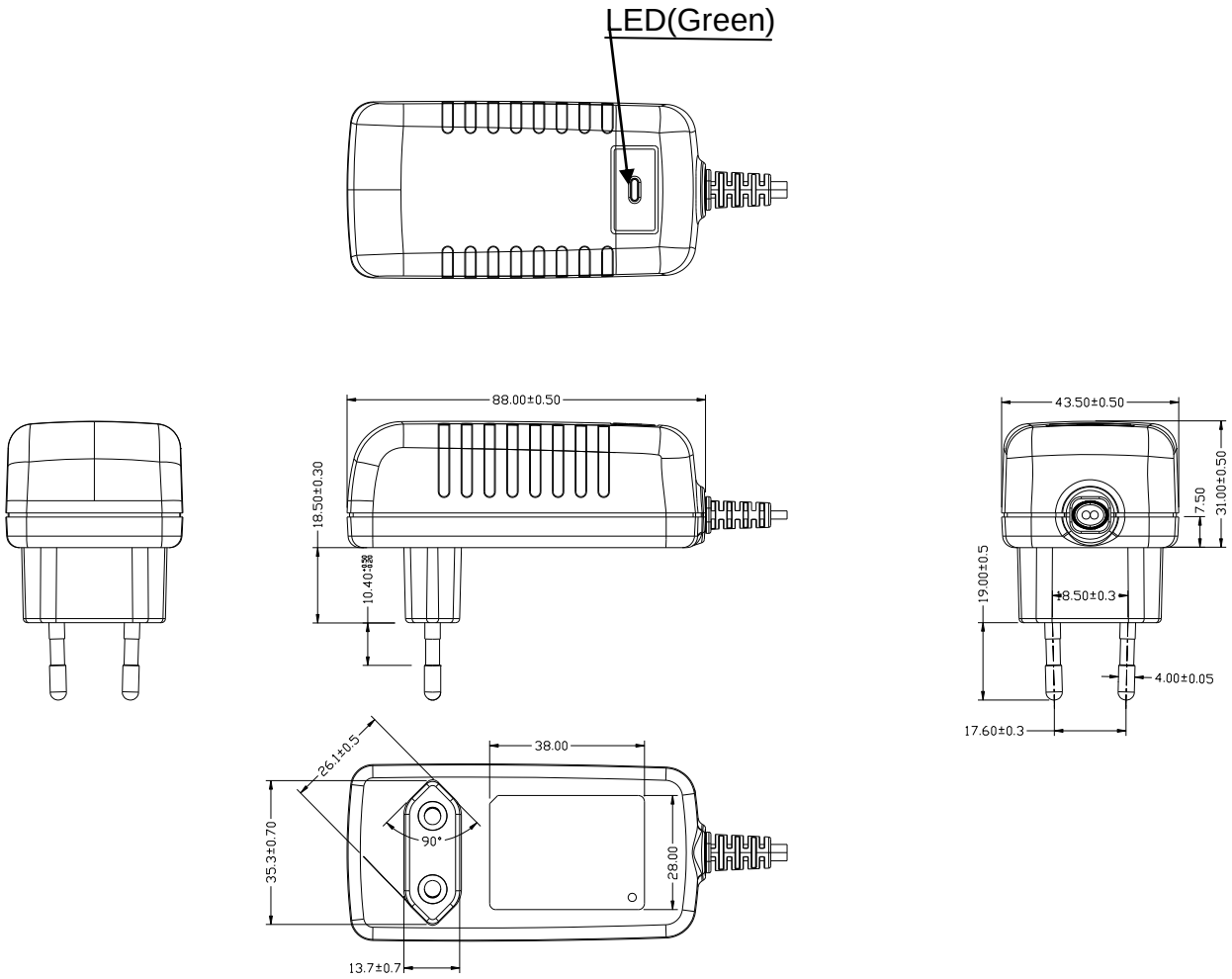
- Operating: 5% - 90% (Non Condensing)

6.3 Vibration

	Frequency	**Slope**	**Power Spectra Density**
Random	3 to 100 Hz	0	0.015 g2 /Hz
	100 to 137 Hz	-6dB/octave	--
	137 to 357 Hz	0	0.0080 g2 /Hz
	350 to 500 Hz	-6dB/octave	--
	500Hz (~2.41Grms)	--	0.0039 g2 /Hz

15 minutes/axis along all three axes

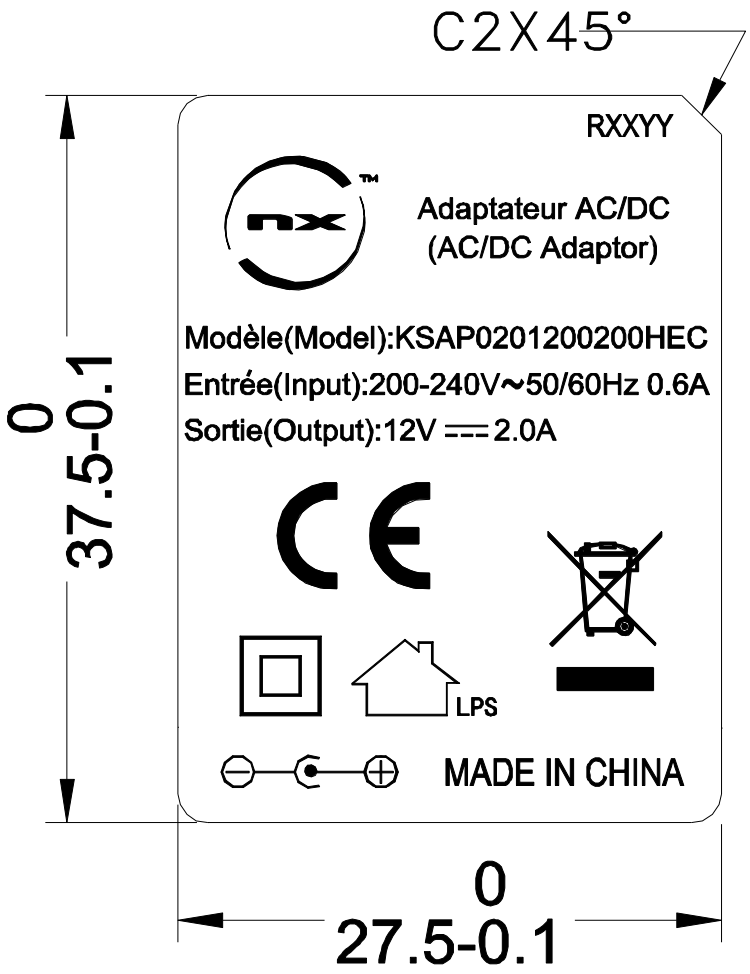
7 Appearance Drawing: (Unit: mm)



NOTE:1. Case cover & chassis material:
PPHOX (UL94V-1 A 料) **WT-19** (NO KTEC)
2. AC PIN MATERIAL:BRASS (NI PLATED)
3. REACH+ROHS

8 NAME PLATE

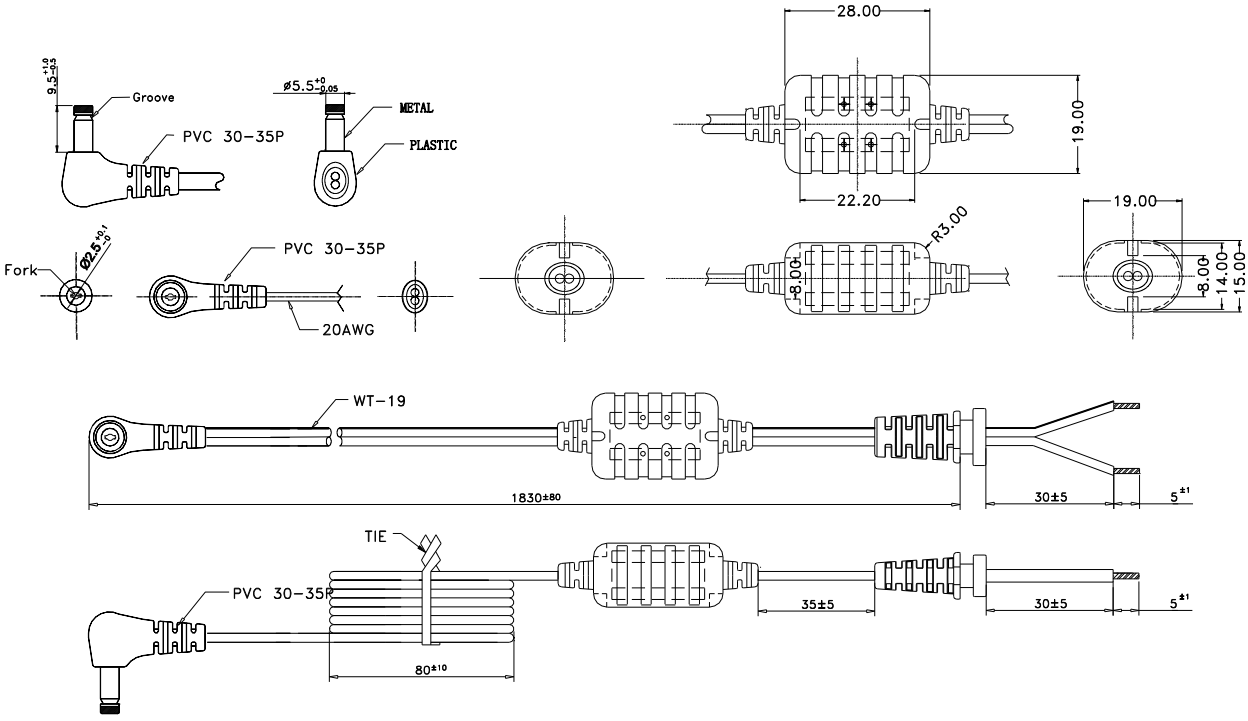
8.1 Dimension of name plate (Unit: mm)



Note: ☐ **1. MATERIAL: POLYESTER+PVC; COATING:0.25+-0.05mm**
Black characters White background
REACH+ROHS

☑ **2. Laser (镭射)**
RXXYY (R=ROHS XX=WEEK YY=YEAR) 按实际生产日期

9 Dimension of output plug & DC cord (Unit: mm)



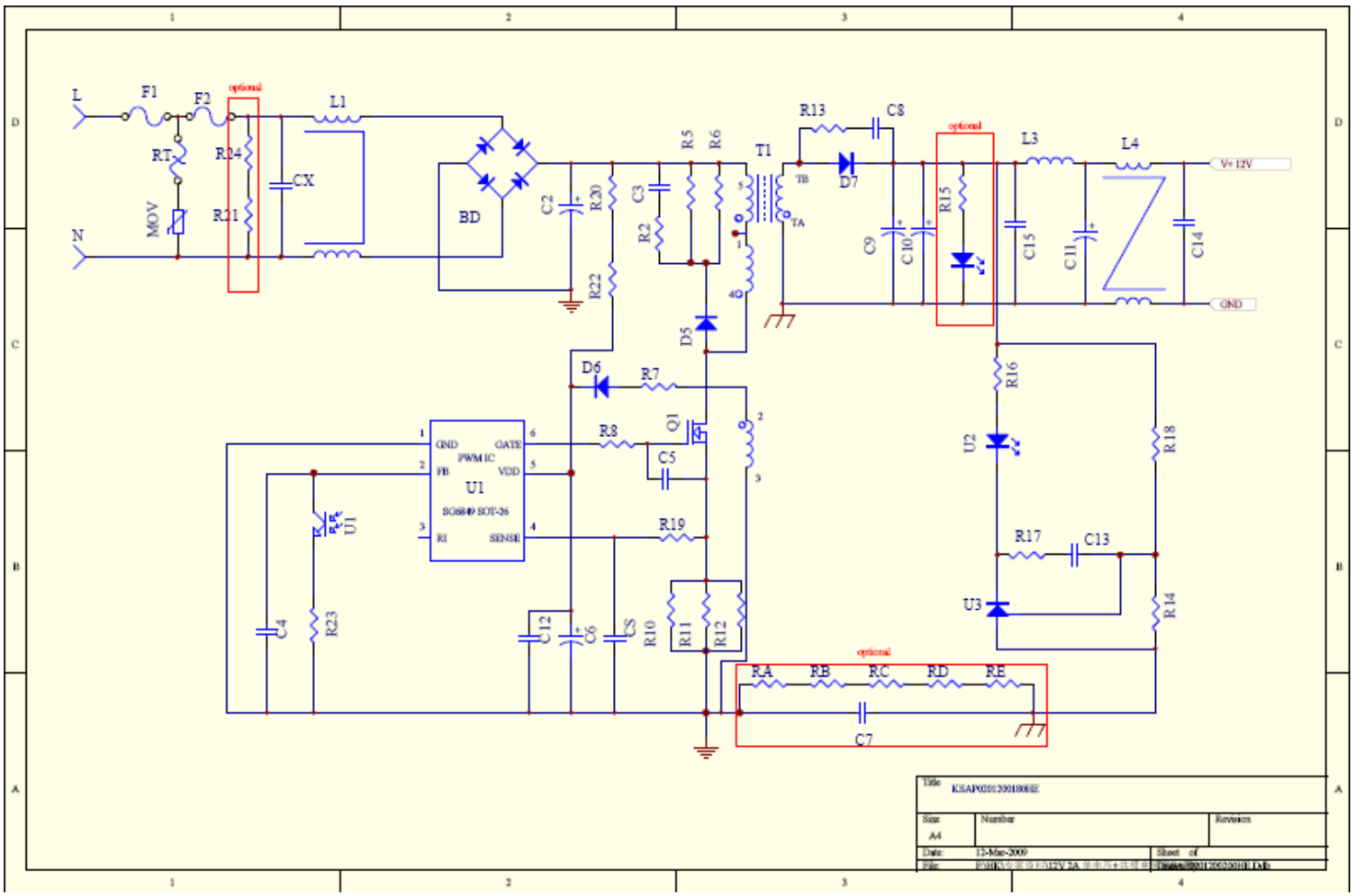
NOTE: (unit:mm)

1).WIRE TYPE:2468 VW-1 80°C 300V L=6FT(1830mm) 2C 20AWG WT-19(ADD CORE)
WHITE AND BLACK----Positive WHITE----Negative

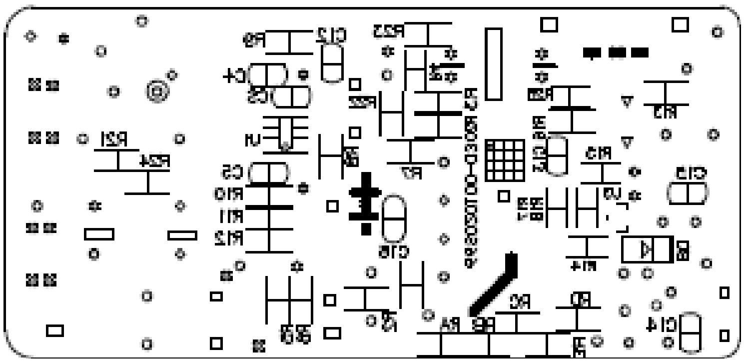
2).THE POLARITY: ⊖—⊙—⊕

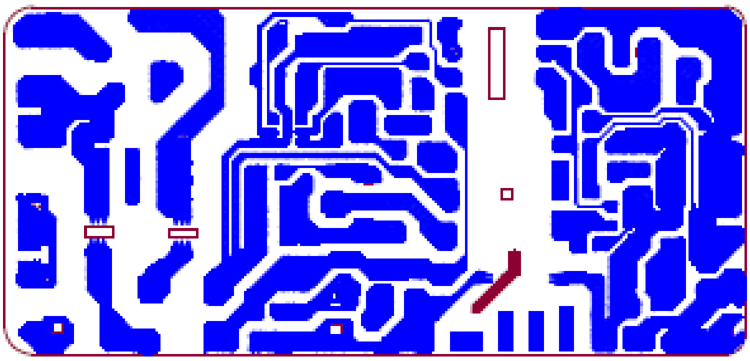
3).REACH+ROHS

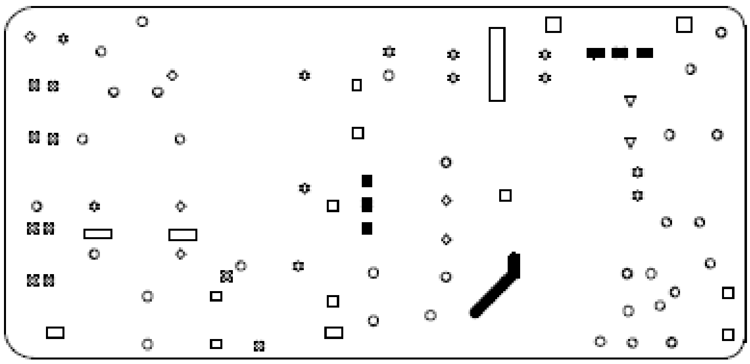
10 CIRCUIT DIAGRAM

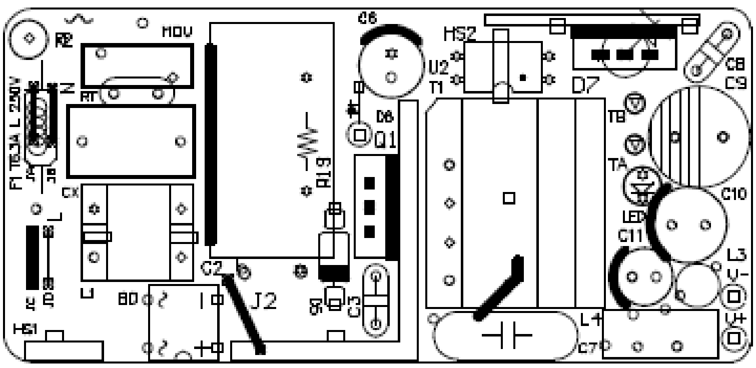


11 PCB

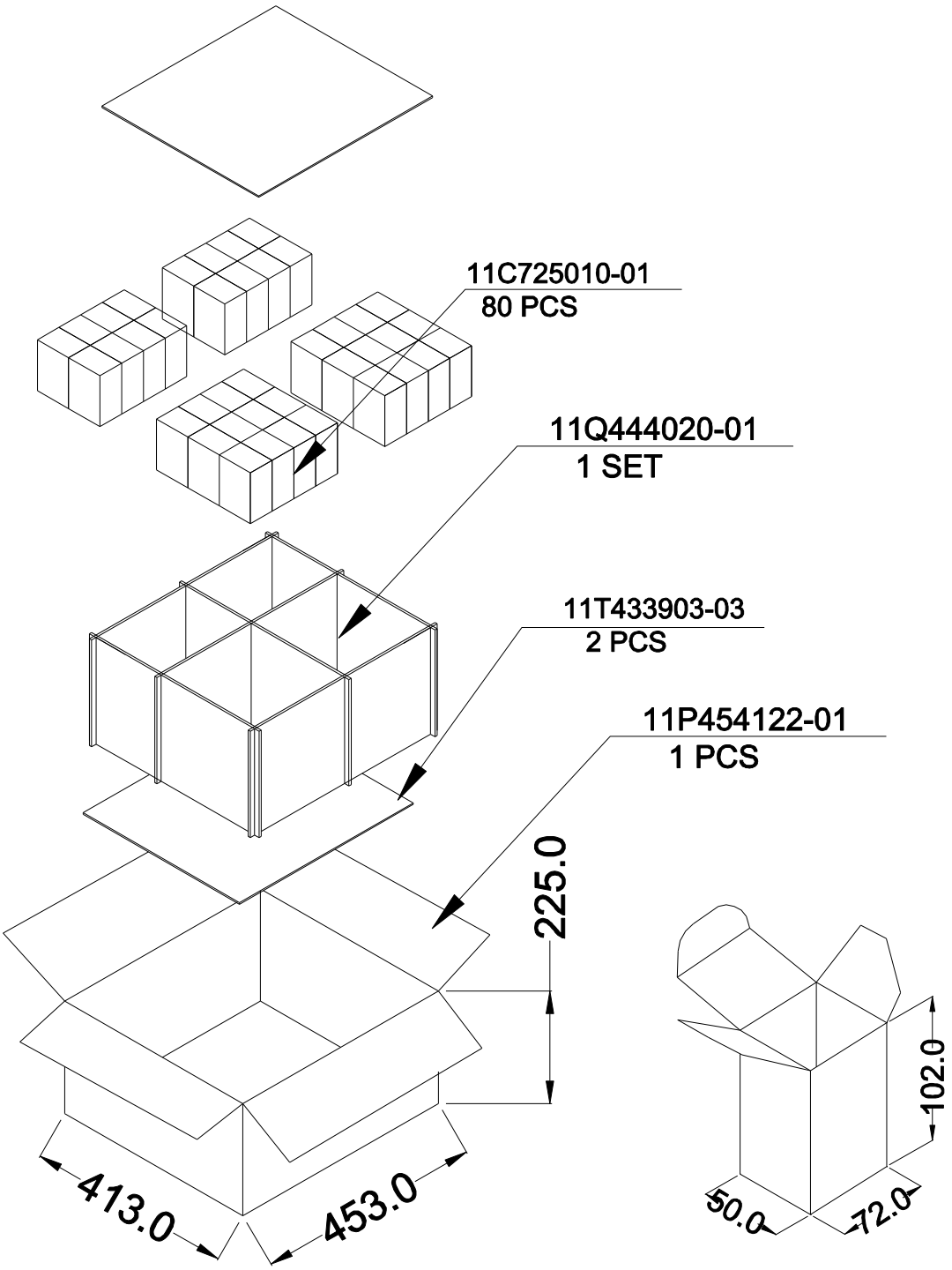







MOV
C6
HS2
U2
T1
D7
C8
C9
TB
TA
C10
LED
C11
L3
D8
Q1
R19
C2
J2
C3
CX
BD
L4
C7
HS1
RT

12 Packing(unit:MM)



13 Critical part list

品名	规格	单位	数量	插件位置	供应商
电感	COMMON CHOKE"EE10 11mH"MIN"KSLFC"GP	EA	1.0000	L1	KTEC
电感	环形电感 INDUCTOR;BR3*12;1.5uH "15W""GP	EA	1.0000	L3	KTEC
环形电感	COMMON CHORE T8*4*3 80 uH min(zhi)"GP	EA	1.0000	L4	KTEC/Urite
光耦	PHOTOCOUPLER;817;DIP-4 GP	EA	1.0000	U2	Everligh Fairchild Lite-on Cosmo Bright led
桥式二级管	DIODE BRIDGE 1A 600V	EA	1.0000	BD	LT /PEC
保险管	FUSE:T6.3A/250V 3.5*10mm	EA	1.0000	F1	WALTER CONQUER BUSSMANN
保险丝电阻	RES/FR 2ohm 5% 2W S-Size	EA	1.0000	F2	KHX / VIS KAYOCOTA CHANGSHENG
自动断路器	5A/250V 150'C(FOOT:100mm)	EA	1.0000	RT	AUPO
陶瓷电容	C/CAP 680PF 1KV 20% Y5P P：5mm"立式"KING TYPE"GP	EA	1.0000	C8	Success JUNHOU SINY XIANGTAI HAOHUA
涤纶電容	C/CAP 2200pF 5% 400V"涤纶电容"P:5mm"编带"PIN:5mm	EA	1.0000	C3	jinghao DAIN
安规电容	C/Y1;1000pF;400V 20% Y5U；P：10mm"GP	EA	1.0000	C7	Success Jya-nay Teruixiang haohua
安规电容	C/C/X2 0.22uF 20% 280V 13*14*8mm PL:8mm	EA	1.0000	CX	Jinghao Carli Dain zhongxing
压敏电阻	VARISTOR；MOV471KD14 5mm"GP	EA	1.0000	MOV	Song Long Littlefuse thinking Walsin ceramate
指示灯	3Q 绿色"高亮度“GP	EA	1.0000	LED	EVERLIGHT
MOS-FET 电晶体	MOSFET (Q1) 4A/600V TO-220FP"GP	EA	1.0000	Q1	ST/Onsemi/magana
肖特基 二极管	DIODE SCHOTTKY 10A 100V；TO-220AB DIODE/SCHOTTKY S20C100C/MBR20100CT 20A/100V TO-220AB GP DIODE/SCHOTTKY S10C100C/MBR10100CT 10A/100V TO-220AB GP	EA	1.0000	D7	ST/MOSPEC/LTYS
变压器	X‘F ASSY；EEX22；KSAP1200150W1"GP	EA	1.0000	T1	KTEC
快速二极管	DIODE/FAST; 1A/1000V 卧式/编带 GP	EA	2.0000	D5.D6	PEC TSC
电解电容	E/CAP;33uF 400V;20%;105'C;;D13*25"15mm"负极向左	EA	1.0000	C2	Su'scon SAMXON LTEC TAICON
电解电容	E/CAP;1000uF 16V;20%;105'C; LZG D10*16mm"4mm	EA	1.0000	C9	
电解电容	E/CAP;10uF 50V;20%;125'C; ;D5*11 "编带脚距:5mm"GP	EA	1.0000	C6	
电解电容	E/CAP;470uF 16V;20%;105'C; D8*12.5mm "5mm	EA	1.0000	C10	
电解电容	E/CAP 100uF 25V 20% 105'C D6.3*11mm "4mm"	EA	1.0000	C11	
电阻	CR 1Kohm 1/8W 5%"GP	EA	1.0000	R19	
SMD 集成 电路	IC;40V;0.4%;SOT-23-3;125'C; 431 AN-A"GP	EA	1.0000	U3	AAC

贴片 IC	IC;LD7550BBL SOT-26"GP IC;SG6849 SOT-26"GP	EA	1.0000	U1	LEADTREND OR SYSTEM GENERAL
PCB	PCB 20W"77.4*36.5*1.6mm 10Z CEM-1"GP	EA	1.0000		Chih hsien WUZHOU DONGJIAN
跳线	COPPER JUMPER 0.5Q"宏冠"GP	g	0.1000	JA.JB.JC.J2	HONGGUAN