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## 1 SCOPE

This document describes basic electrical characteristics and mechanical characteristic of 60 W power adapters.

## 2 ELECTRICAL SPECIFICATION

### 2.1 INPUT REQUIREMENT

#### 2.1.1 INPUT VOLTAGE RANGE

Industrial power supply shall operate within input specification from 90Vac to 264Vac or provide automatic switching between high line and low line input ranges. The table below shows common input voltage range.

| Input Range | Minimum | Nominal    | Maximum | Unit    |
|-------------|---------|------------|---------|---------|
|             | 90 V    | 100V- 240V | 264V    | Vac Rms |

Table 1 - Input Voltage Range

#### 2.1.2 INPUT FREQUENCY RANGE

The industrial power supply shall operate within specification from 47 to 63 Hz.

#### 2.1.3 AC INRUSH CURRENT

Peak inrush current should not exceed 100 A at 240Vac, 50Hz, 25 degrees C, cold start. It should not interrupt line fuse or cause damage to the industrial power supply either at cold or warm start.

Peak inrush current should not exceed 60 A at 100Vac, 60Hz, 25 degrees C, cold start. It should not interrupt line fuse or cause damage to the industrial power supply either at cold or warm start.

The inrush current must be limited to the extent that no damage is done to the supply under any specified line, load, and temperature conditions. The inrush current shall not cause any external protection devices (i.e. fuses) to trip.

#### 2.1.4 INPUT CURRENT

Maximum steady state input current shall not exceed 1.7 A for any line voltage specified in 2.1.1.

|                        |                   |  |
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### 2.1.5 LEAKAGE CURRENT

0.75mA maximum at 240Vac 50Hz

### 2.1.6 INSULATION RESISTANCE

Insulation resistance shall be more than 50M ohm between primary and secondary.

### 2.1.7 LOW POWER CONSUMPTION

| Vin                        | Load | Power consumption |
|----------------------------|------|-------------------|
| 240Vac/50Hz<br>100Vac/60Hz | 0A   | ≤ 0.15 W          |

## 2.2 INPUT PROTECTION

### 2.2.1 INPUT CURRENT PROTECTION

A fuse with rating of 3.15 A / 250 V (Time Lag type) shall be installed on the input line side near the input connector and no any electrical components before.

## 2.3 OUTPUT REQUIREMENT

### 2.3.1 OUTPUT POWER

The total output power, under steady state conditions, shall not exceed 60 W.

### 2.3.2 OUTPUT VOLTAGE AND CURRENT

Under any combination of line and load variation and environmental conditions, all outputs shall remain within tolerance as defined in Table 2. Output voltage(s) shall be measured at the load side of output connector.

| Output Voltage | Voltage Range |             | Current Range |                 |         |
|----------------|---------------|-------------|---------------|-----------------|---------|
|                | Lower Limit   | Upper Limit | Minimum Load  | Full rated load | PK Load |
| +24.0V         | 22.80V        | 25.20V      | 0.0A          | 2.5A            | --      |

Table 2 - Output Voltage and Current

|                        |                   |  |
|------------------------|-------------------|--|
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### 2.3.3 RIPPLE AND NOISE

Measurements shall be made with an oscilloscope with minimum of 20MHz bandwidth and 1:1 scope Probe, Output shall be bypassed at the connector with a 0.1 $\mu$ F ceramic disk capacitor and a 47 $\mu$ F electrolytic capacitor for general testing purpose.

| Output Voltage | Maximum Ripple & Noise (Vp-p) |
|----------------|-------------------------------|
| +24.0V         | 150mV                         |

Table 3 – Ripple and Noise

### 2.3.4 OVER VOLTAGE PROTECTION

The power supply shall provide with over voltage protection such that under any single component failure.

The power supply provides output over voltage protected in latch off by zener diode, and no damage to customer device.

### 2.3.5 OVER CURRENT PROTECTION

The power supply shall be protected when operating any output in overload condition. The power supply shall be shut down and no any damage when the over current condition occurs on the output, and It will be auto-recovered when the failure is removed.

| Output Voltage | Over current protection |             | Test condition                            |
|----------------|-------------------------|-------------|---|
|                | Lower Limit             | Upper Limit |   |
| +24.0V         | 3.2A                    | 5.5A        | Input voltage:100Vac 60Hz or 240Vac 50Hz. |

Table 4 –Over current protection

### 2.3.6 OVERSHOOT

During turn on or turn off, the output overshoot shall not exceed nominal output voltage by more than 5%, and output shall not change its polarity with respect to its return line.

### 2.3.7 SHORT CIRCUIT POTECTION

Power supply shall have self-limiting protection to protect against short circuit or overload conditions. No damage to the power supply shall result from a continuous or intermittent short circuit condition. It will be auto-recovered when the failure is removed.

|                        |                   |  |
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### 2.3.8 AUDIBLE NOISE

There is no audible noise canned been heard when it work with rated spec.

## 2.4 PERFORMANCE REQUIREMENT

### 2.4.1 EFFICIENCY

Efficiency (watt out / watt in) shall be a minimum of 89 % at active average mode.

Complies to EPA standard Version 5.0 Energy Star EPS specification (Level VI).

calculate the model is single average active mode efficiency for each test voltage by testing at 100%,75%,50%,and 25% of rated current output and then computing the simple arithmetic average of these four values respectively at 115V/60HZ and 230V/50HZ test result for reference.

Efficiency (watt out / watt in) shall be a minimum of 79 % at 10% full load.

Note: when testing efficiency, adapter needs to electrify to perform after full load 30 minutes

Input voltage 115Vac 60Hz or 230Vac 50Hz

### 2.4.2 TURN ON DELAY TIME

Output shall reach steady state within 3 seconds of turn on at 100Vac or greater.

### 2.4.3 HOLD-UP TIME

Hold-up time shall be a minimum of 8 mS at 100Vac / 60Hz input.

### 2.4.4 DYNAMIC LOAD

Power supply output voltage tolerance shall be complied with  $\pm 5\%$ .

Step load change: from 50% to100% Load on the output.

Dwell Time: 100Hz & 1 KHz 50% duty.

Slew rate: 0.5A/uses

## 3 ENVIRONMENTAL SPECIFICATION

### 3.1 TEMPERATURE

Operation within specification: -10 to 45 degrees C.

Storage: -20 to 85 degrees C

|                        |                   |  |
|------------------------|-------------------|--|
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### 3.2 HUMIDITY

Operation: 10% to 90% relative humidity, non-condensation.

Storage: 5% to 95% relative humidity, including condensation.

### 3.3 VIBRATION AND SHOCK

The power supply shall be designed to withstand normal transportation vibration per MIL-STD-810F, method 514 and procedures X, as it is mounted in the chassis assembly and packed for shipping.

### 3.4 ALTITUDE

The power supply shall operate properly at any altitude between 0 ~ 16,404 feet (5000 meter) above sea level, and withstand storage at 50,000 feet.

### 3.5 CALCULATED MEAN TIME BETWEEN FAILURES (MTBF)

The MTBF for the power adapter shall equal or exceed **100,000** hours when operated at full rated load in an ambient temperature of 25 degree C.

### 3.6 BURN-IN

**Burn-in test:**

Test condition: 110Vac / 220Vac 50Hz, with 100% maximum load at 45 ±5°C ambient temperature.

Test method: burn-in 110 minutes; and 30 seconds "ON", 30 seconds "OFF" within 5 minutes, then 5 minutes "ON"

Test criteria: during this conditioning the power supply output normal and no damage or hazardous condition will occur.

**ORT and life test:**

Input condition: 110Vac / 220Vac 50Hz, "ON/OFF" 10 times within 5 minutes,45 minutes "ON"  
45 minutes "OFF",

Test condition: cycle by cycle test 168 hours with 100% maximum load at 45 ±5°C ambient temperature.

Test criteria: during this conditioning the power supply output normal and no damage or hazardous condition will occur.

|                        |                   |  |
|------------------------|-------------------|--|
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#### 4 RELATED SPECIFICATION

##### 4.1.1 EMI

VCCI Class-B

FCC 15(Class-B, 115Vac operation)

CISPR 22 Class-B limits

EN55022 (1998+A1:2000+A2:2003 Class-B limits)

47 CFR Part 15, Subpart B, Class B limits

GB 9254 ITE Emissions Latest Edition

##### 4.1.2 DIELECTRIC STRENGTH—(HI-POT)

Primary to secondary: 1500VAC.

Test time: 60 second

Cut-off current: 5mA max

Arcing current: 10mA max

##### 4.1.3 SURGE

It is referring to EN61000-4-5 IEC61000-4-5:2001 Level 4.

Differential mode surge immunity: 2KV

Common-mode Surge Immunity: 4KV

\* Determination level: Criteria A (Product testing and testing before and after any change in function is not).

##### 4.1.4 ELECTROSTATIC DISCHARGE ESD

It is referring to EN61000-4-2, IEC61000-4-2:2001, IEC801-2 Level 3.

Contact electrostatic discharge: + - 6KV.

Air electrostatic discharge: + - 8KV.

\* Determination level: Criteria A (Product testing and testing before and after any change in function is not).

##### 4.1.5 RF IMMUNITY

It is referring to IEC61000-4-3 Class A 3V/m

|                        |                   |  |
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**4.1.6 ENVIRONMENT STANDARDS**

RoHS Regulation

The RoHS compliance symbol will be included on the data plate.

**4.1.7 ELECTRICAL FAST TRANSIENTS (EFT)**

It is referring to IEC61000-4-4 Class B Test Voltage: 2KV

**5 MECHANICAL**

**5.1 INPUT CONNECTOR AND OUTPUT CABLE**

**5.1.1 INPUT CONNECTOR**

AC Input connector shall be IEC320 C14 power connector.

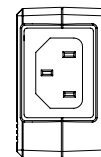
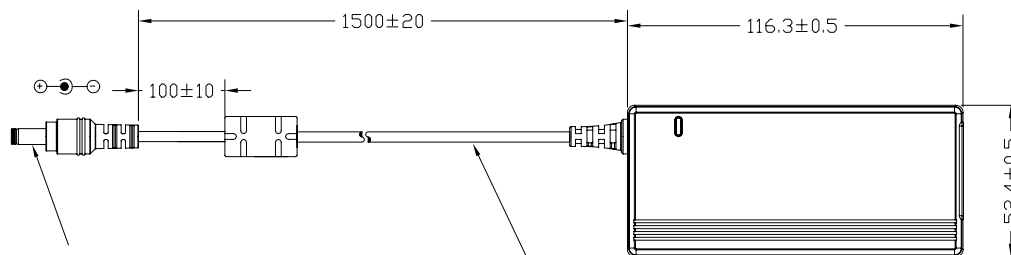
**5.1.2 OUTPUT CABLE**

The output cable shall be **UL1185#18AWG 1500 +/- 30mm.**

**5.2 AC ADAPTER EXTERNAL DIMENSION**

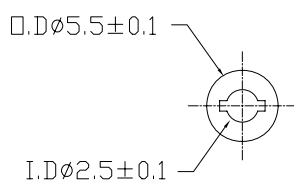
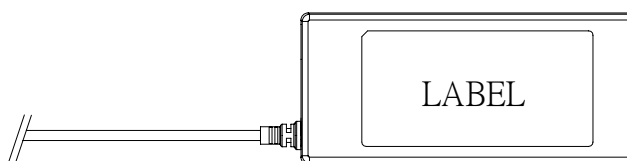
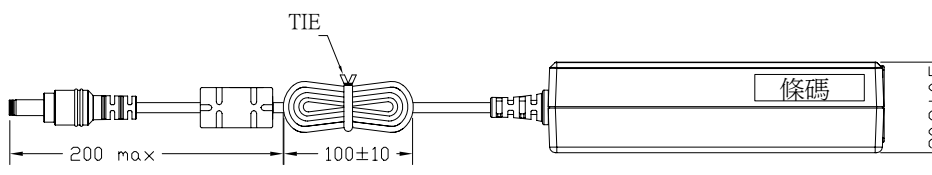
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| REV. | REVISE THE CONTENT | REVISER | DATE       |
|------|--------------------|---------|------------|
| 0.1  | NEW DRAWING        | cy,cai  | 2017.08.30 |
|      |                    |         |            |
|      |                    |         |            |



PLUG TYPE: \*OD5.5XID2.5X11.5X180° Insert a tuning fork hook type,  
(Tuning fork type in crinkle of 0.5mm)

\*UL 1185 #雙16AWG\*1C+S BLACK



VIEW "A"  
(SCALE 3:1)

NOTES:

1. CASE & CABLE COLOR : BLACK
2. CABLE SPEC.:CABLE ARE UL 1185 18AWG\*1C+S BLACK
3. MODEL:E99-KPL060M-L065
4. PART NO.:G18-BCA315A-MR00





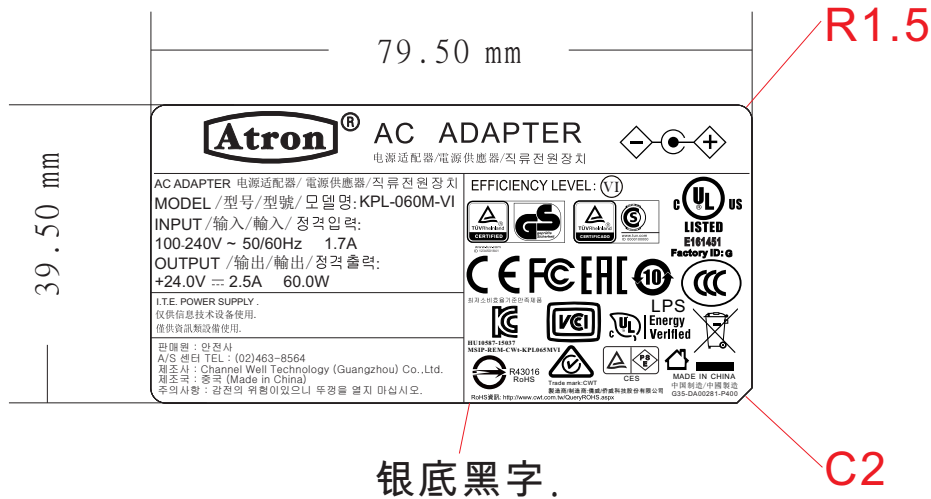
MODEL No.: KPL-060M-VI

料號: G35-DA00281-P400

REV: D

### 工作要點

- 1.材質: 100#消銀龍+OPP(UL安規)(厚度0.12~0.15mm)
- 2.SIZE:79.5\*39.5mm(+0/-0.2mm)
- 3.顏色:銀底黑字.
- 4.印刷字體大小,位置,內容詳見drawing.
- 5.印刷必須清晰不得有斷線,模糊不清等不良現象.
- 6.背膠必須耐溫80°C,2H不會產生翹起,起泡等不良現象.
- 7.請參照RoHS and REACH環保標準生產.
- 8.UL必須符合PGDQ2.
- 9.最小包裝上必須有廠商名稱或LOGO,產品名稱,產品型號,規格,UL Mark以及UL Number.



2020.03.03 依歐盟ERP最新要求更新OUTPUT規格,更新PSE MARK  
 190424 更新TUV ID/更新DC PLUG為菱形/取消3C的S&E Nickole  
 2018.02.26 修改TUV ID,增加BSMI ROHS及網址

ISSUE BY:

王艷麗

CHECK BY:

宋書軍

APPROVED:

黃照云

1

2

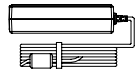
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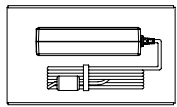
5

6

STEP1:將成品及線材整理如下圖

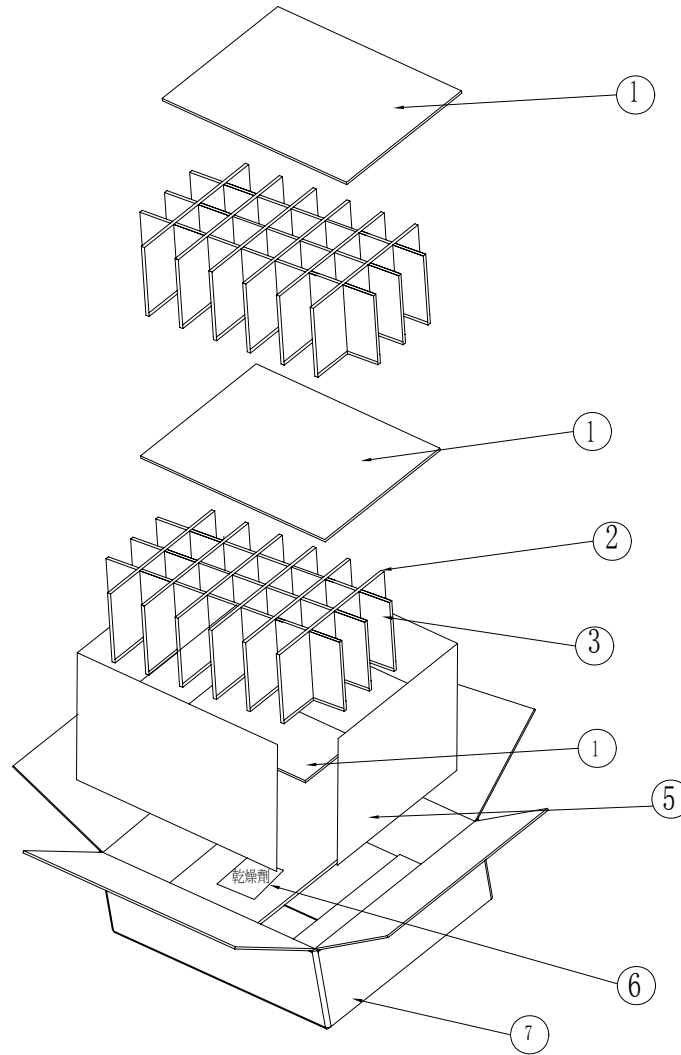
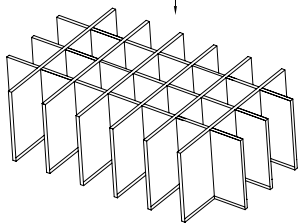
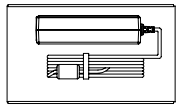


STEP2:將成品如圖般放入PE袋子內



④

STEP3:將成品如圖般放入格板內



1.組件:

1.1.:平卡:420\*308mm

用量:3PCS

1.2.:三刀卡:422\*146mm

用量:12PCS

1.3.:六刀卡:309\*146mm

用量:6PCS

1.4.:PE袋:220\*180mm

用量:56PCS

1.5.:圍板:435\*321\*312mm

用量:1PCS

1.6.乾燥劑:60\*45mm ±5% 包裝材質網型紙

用量:3PCS

1.7.:外箱:452\*334\*330mm

用量:1PCS

Q'TY.: 56 PCS

N.W.: KGS

G.W.: KGS

環保材料標準:

| No | 有害物質名稱          | 含量標準       | SHEET METAL TOLERANCE<br>(UNLESS OTHERWISE SPECIFIED) |          |         |         |
|----|-----------------|------------|---|----------|---------|---------|
|    |                 |            | DIMENSION   | PIERCING | BENDING | ANGULAR |
| 1  | 鎘 (Cd)          | <75ppm     | X < 8   | ±0.1     | ±0.15   | ±0.3°   |
| 2  | 鉛 (Pb)          | <800ppm    | 8 ≤ X < 25  | ±0.1     | ±0.2    | ±0.5°   |
| 3  | 汞 (Hg)          | <800ppm    | 25 ≤ X < 100  | ±0.15    | ±0.25   | ±0.5°   |
| 4  | 六價鉻 (Cr)        | <800ppm    | 100 ≤ X < 300   | ±0.2     | ±0.3    | ±1°     |
| 5  | 多溴聯苯 (PBB)      | <800ppm    | 300 ≤ X < 800   | ±0.3     | ±0.5    | ±1.5°   |
| 6  | 多溴二苯醚 (PBDE)    | <800ppm    |   |          |         |         |
| 7  | 鎘,鉛,汞,六價鉻(包裝材料) | 總含量<100ppm |   |          |         |         |

|          |         |                        |                              |
|----------|---------|------------------------|------------------------------|
| 0.1      | 新制      |                        |                              |
| REV.     |         | DESCRIPTION            |                              |
|          |         | UNIT: mm               | MODEL NO.: KPL               |
|          |         | MATERIAL               | PART NO.: KPL-452-334-330-01 |
|          |         | *****                  | DRAWING NO.:                 |
| APPROVED | CHECKED | DESIGNED               |                              |
| DATE:    | DATE:   | DATE: 2017.12.11       | SCALE:  SHEET 1 OF 1         |
|          |         | THIRD ANGLE PROJECTION | M/A4L                        |

A

B

C

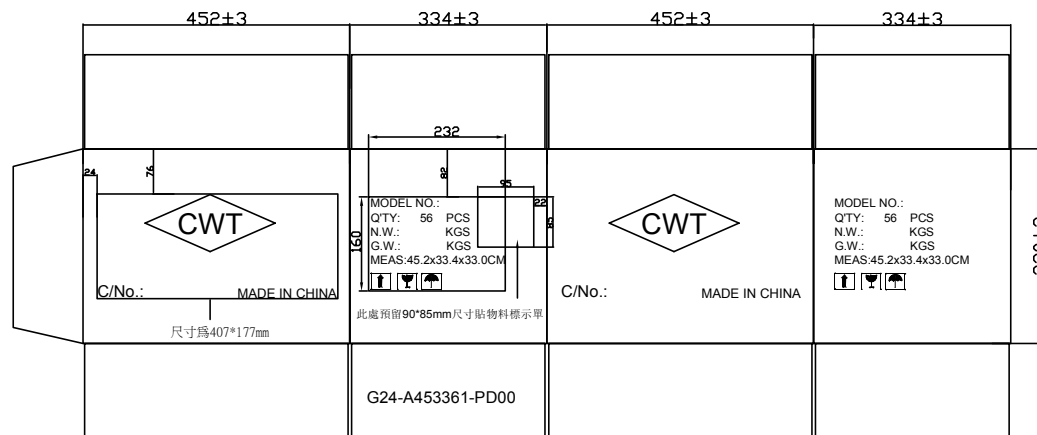
D

A

B

C

D



**以上符號印刷為紅色**  
**其他印刷為黑色**

側麥印刷尺寸大小  
 週邊線不需印刷

232

160

MODEL NO.:  
 QTY: 56 PCS  
 N.W.: KGS  
 G.W.: KGS  
 MEAS: 45.2x33.4x33.0CM

綠色方框與字體無需印刷

NOTES:

1. 材質：五層瓦楞紙A//A(B+C楞), 破裂強度11.0KGS(MIN); 抗壓強度310KGS(MIN); 邊壓強度4.5KN/M(MIN)
2. 厚度：6±0.5mm.
3. 搭配誤差：與格板之間間隙要大於2mm, 小於6mm.
4. 警告標志印刷顏色：紅色(PANTONE 1788C), 其它字體印刷黑色.
5. 虛線為預折壓痕.
6. 請依圖面標示尺寸制作.
7. 公差: 其它未標注公差
- ★ 圖形及字體公差: 10mm以下為+/-1mm, 11~50mm為+/-3mm, 51mm以上為+/-5mm, 特殊情況除外.
- ★ 偏移公差: 10mm以下為+/-2mm, 11~50mm為+/-3mm, 51mm以上為+/-5mm, 特殊情況除外.
8. 結合方式(一體成形): 打釘.  
外箱最少要打三排釘; 外箱尺寸較高時, 打釘數要保證兩釘之間的距離要小於100mm, 且間距保持基本均勻(公差+10/-10mm)
9. 所有材料需符合RoHS環保要求.
10. 每箱裝56PCS  
N.W≈15.5Kg, G.W≈18Kg

配套:

- 三刀卡(每箱配12PCS)  
料號: G24-B421431-PD00
- 六刀卡(每箱配6PCS)  
料號: G24-B301441-PD00
- 平卡(每箱配3PCS)  
料號: G24-C423031-PD00
- 圍板(每箱配1PCS)  
料號: G24-R433211-PD00

環保材料標準

| No | 有害物質名稱                 | 含量標準       | SHEET METAL TOLERANCE<br>(UNLESS OTHERWISE SPECIFIED) |          |         | 單重:g  | 0.1 | REV | DESCRIPTION |  |
|----|------------------------|------------|---|----------|---------|-------|-----|-----|-------------|--|
|    |                        |            | DIMENSION   | PIERCING | BENDING |       |     |     |             |  |
| 1  | 鎘(Cd)                  | <75ppm     |   |          |         |       |     |     |             |  |
| 2  | 鉛(Pb)                  | <800ppm    |   |          |         |       |     |     |             |  |
| 3  | 汞(Hg)                  | <800ppm    | X < 8   | ±0.1     | ±0.15   | ±0.3* |     |     |             |  |
| 4  | 六價鉻(Cr <sup>6+</sup> ) | <800ppm    | 8 ≤ X < 25  | ±0.1     | ±0.2    | ±0.5* |     |     |             |  |
| 5  | 多溴聯苯 (PBB)             | <800ppm    | 25 ≤ X < 100  | ±0.15    | ±0.25   | ±0.5* |     |     |             |  |
| 6  | 多溴二苯醚 (PBDE)           | <800ppm    | 100 ≤ X < 300   | ±0.2     | ±0.3    | ±1*   |     |     |             |  |
| 7  | 鎘鉛汞六價鉻(包裝材料)           | 總含量<100ppm | 300 ≤ X < 800   | ±0.3     | ±0.5    | ±1.5* |     |     |             |  |

**僑威科技**

|                  |                  |                  |
|------------------|------------------|------------------|
| APPROVED         | CHECKED          | DESIGNED         |
| ym. xie          | df. guan         | liniro           |
| DATE: 2017-09-14 | DATE: 2017-09-14 | DATE: 2017-09-14 |

UNIT: mm

MODEL NO.: KPLxxx

MATERIAL

PART NO.: G24-A453361-PD00

DRAWING NO.:

KPL 蜂槽裝

SCALE:

SHEET M / A4L

1 OF 1

THIRD ANGLE PROJECTION