

# **Seminar on Power Supply / AV Product**

**Presented by: Suki Zheng**

**August 24, 2007**

**Shenzhen**

**WHEN YOU NEED TO BE SURE**



**SGS**

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- 一、SGS的国际认证服务 SGS International approval
- 二、适用标准介绍 Applicable standards
- 三、产品标识 Label & Marking
- 四、设计要求及测试 Design requirements and tests
- 五、直插式产品插头部分 Plug portion of direct-plug in
- 六、常见问题分析及解决方案 Problems & solutions

## New Promotion

即日起至**2007年12月31日**,为庆祝启用全新的**SGS GS**标志,我们将火热推出**GS**和**CB**测试认证特惠活动!申请**GS**增加**RMB3000**,即可赠送**CB**,敬请垂询!

WHEN YOU NEED TO BE SURE

**SGS**



# 一、 **SGS**的国际认证服务

## **SGS International approval**

## SGS国际认证介绍

1. 国际电工委员会电工产品合格测试与认证组织的**CB**方案  
**IECEE CB-Scheme**



2. 通过**CB**证书/报告，转多国认证（德国**GS**标志、俄罗斯**Gost-R**、阿根廷安全认证、新加坡**PSB**认证、澳大利亚/新西兰安全认证、沙特阿拉伯符合性证书、印度安全认证、韩国**EK mark**认证、美国安全认证标志）



## 二、适用标准介绍

# Applicable standard



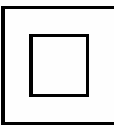
## 用于电源的标准

一般用途的电源	IEC/EN 61558
信息类(ITE)产品电源	IEC/EN 60950-1
音、视频(Audio/video)产品电源	IEC/EN 60065
家用充电器	IEC/EN 60335-2-29
医疗产品电源	IEC/EN 60601-1
测量、控制、实验室设备电源	IEC/EN 61010



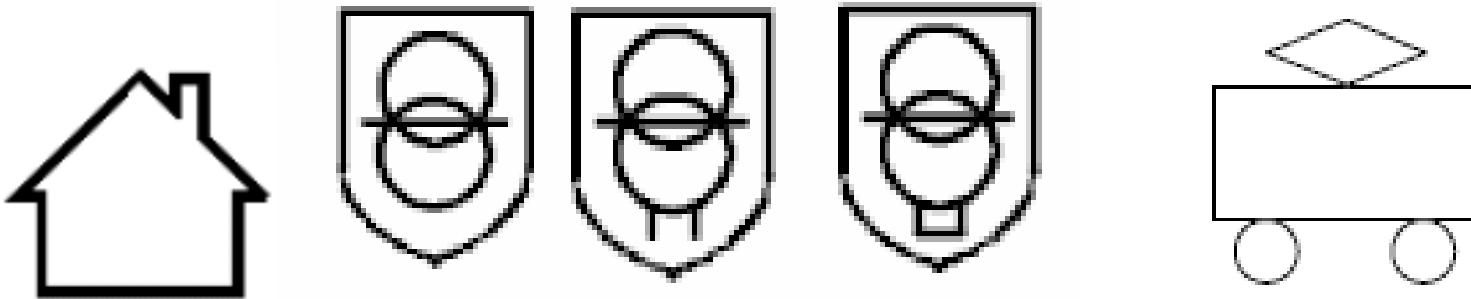
### 三、产品标识 (Label & Marking)

## 通用的标签内容

- 制造商名 (Manufacturer name)或商标 (Trademark)
- 型号 (Model)
- 输入电压 (Input voltage or Voltage range)
- 直流符号 (DC symbol) 
- 交流符号 (AC symbol) 
- 输入电流 (Input current) —— 60065 / 60950
- 输入功率 (Input power) —— 60065
- 额定频率 (Rated frequency)
- 二类产品符号 (Class II equipment) 

## 电源的主要标签内容

- 输出电压 (Output voltage)
- 输出电流 (Output current)
- 输出功率 (Output power)
- 变压器输出保护类型符号 ⇒ Only for 61558
- For indoor use only ⇒ Only for 61558
- IPXX (if not IP20) IP4X (61558-2-7)
- 玩具符号(61558-2-7)



## 其它标识

- 安全接地符号
- 保险丝更换警语: CAUTION - For continued protection against risk of electric, replace only with same type and rating of fuse.
- 保险丝规格: F (快熔), T (慢熔), L (低熔断容量), H (高熔断容量), 电流 (A), 电压 (V)
  - Example ⇒ **T 2A L 250V**
- 开关标示
- 外接电源线端子的标示: L, N
- 直流电输出极性: +, -

## 四、设计要求及测试

# Design requirements and tests

## 产品可能产生的危险

- 电击危险 hazard of electric shock
- 热危险 hazard of excessive temperatures
- 危险能量 hazardous energy
- 机械危险 hazard of mechanical hazards
- 着火危险 hazard of fire

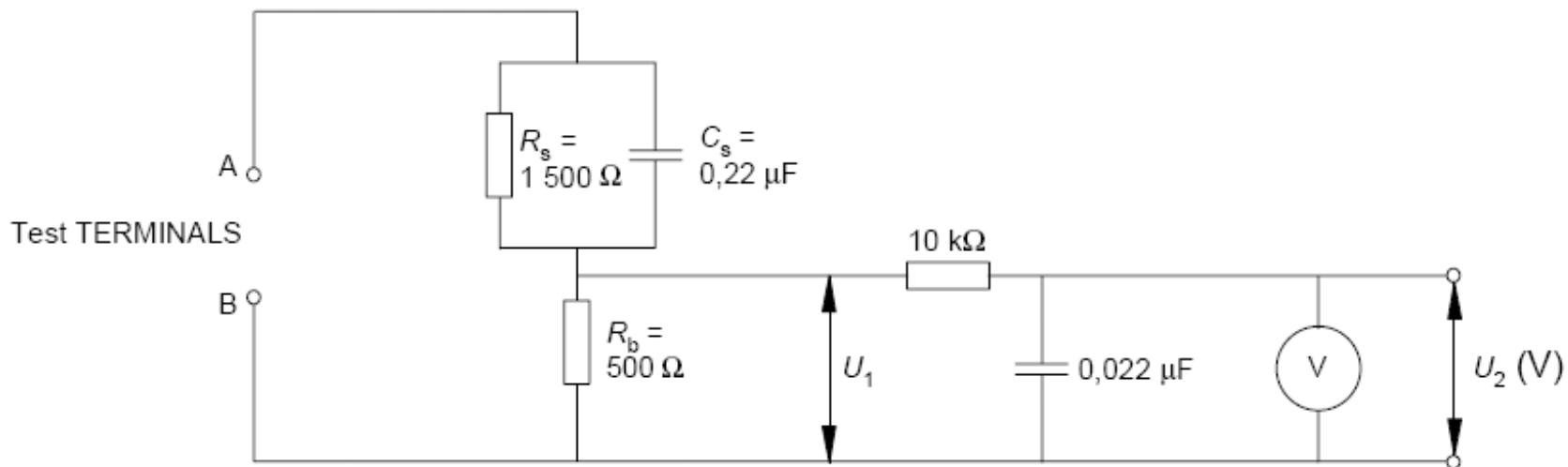
### 防电击的保护等级

- **Class I 设备：** 依靠基本绝缘和保护接地共同提供保护
- **Class II 设备：** 没有保护接地，不仅仅依靠基本绝缘，还依靠额外的绝缘保护（例如双重绝缘或加强绝缘）提供保护
- **Class III 设备：** 产品依靠安全特低电压（SELV）供电，没有危险电压产生

## 结构设计要求（防电击/危险能量）

### ■ 漏电流测试

- 1.06倍或1.1倍额定输入电压
- 测量L/N与地、L/N与端子、L/N与外壳：
- II类产品  $\Rightarrow \leq 0.25\text{mA}$  (60950)
- II类产品  $\Rightarrow \leq 0.7\text{mA}$  (60065 / 61558)
- I类产品  $\Rightarrow \leq 3.5\text{mA}$  (60950 / 60065)





### ■ 插头电容放电测试 (Plug discharge test)

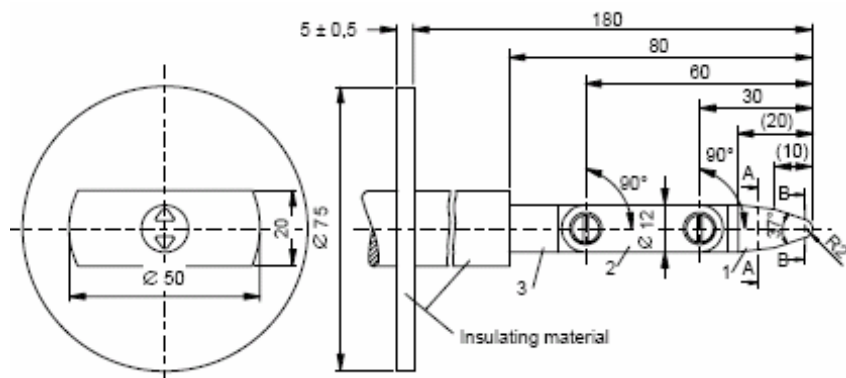
- 当电源两端接的 X电容值大于0.1uF时, 应测试其放电速度
- 放电时间与电压值之要求:
  - 1s, 37% original value (60950)
  - 2s, 35Vpeak (60065)
  - No requirement (61558)

### ■ 手指测试 (Finger test)

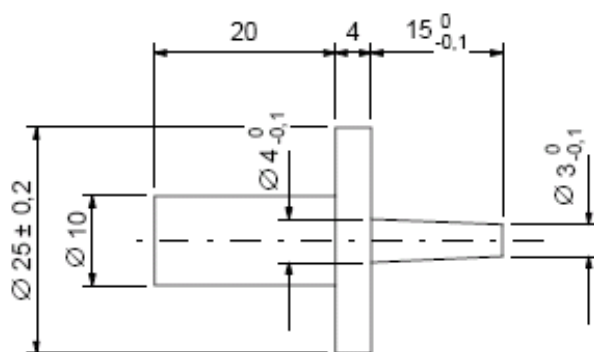
- 手指探棒不得接触到：
  - 危险电压及带有危险能量的带电部件
  - 只有基本绝缘的元件
  - 锐边
  - 危险运动部件

## 结构设计要求（防电击/危险能量）

### 测试手指



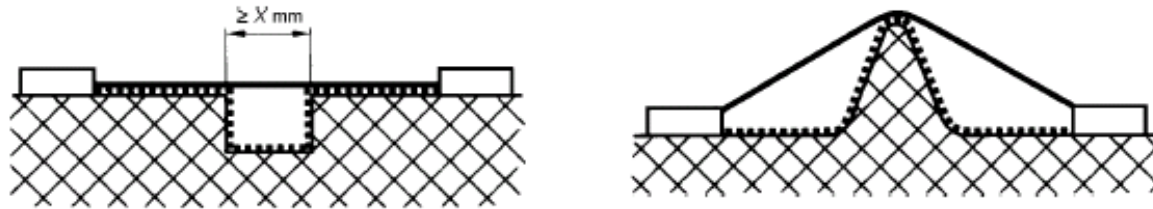
### 测试针



## 结构设计要求（防电击/危险能量）

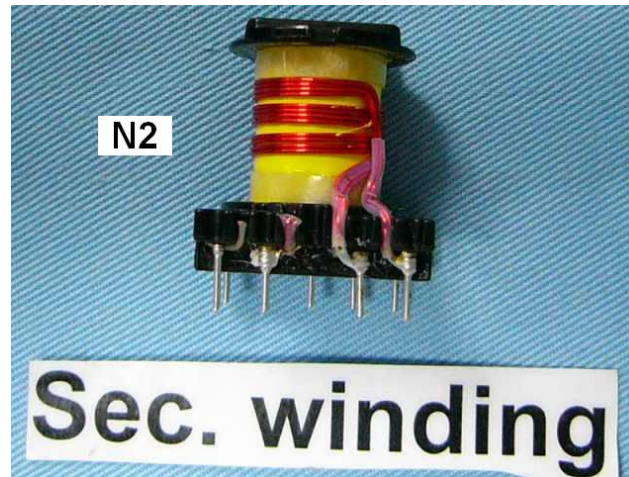
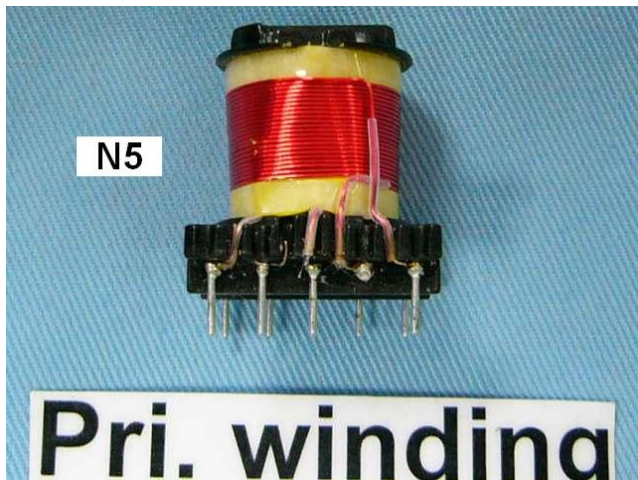
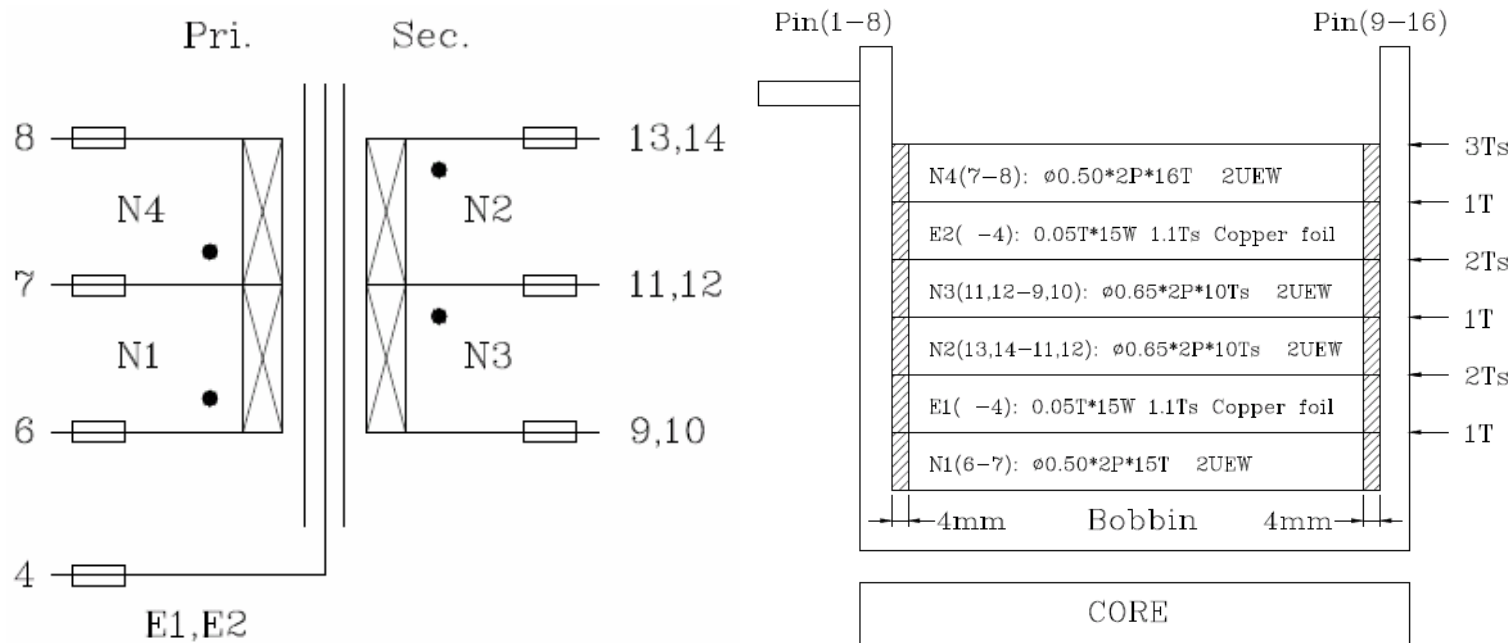
提供绝缘的方式：

- 电气间隙和爬电距离（Clearance & creepage）



- 固体绝缘（0,4 mm for 60065/60950; 1,0 mm for 61558）例：  
Bobbin, 塑料外壳
- 薄层绝缘

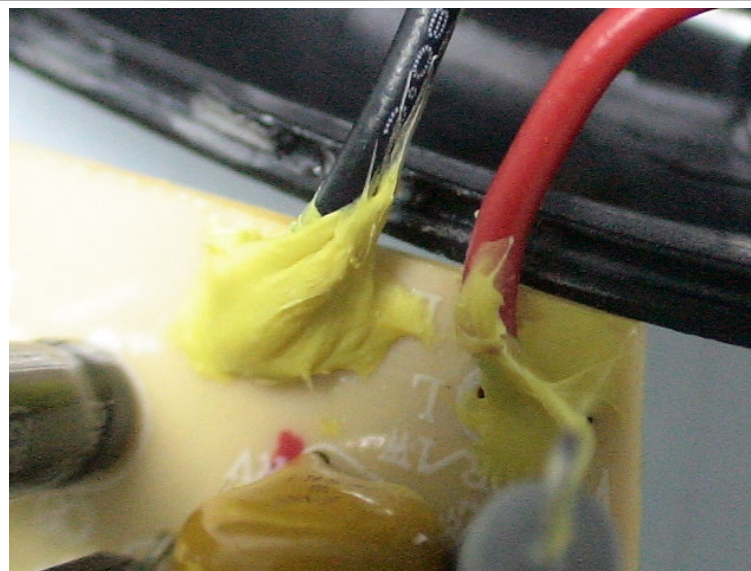
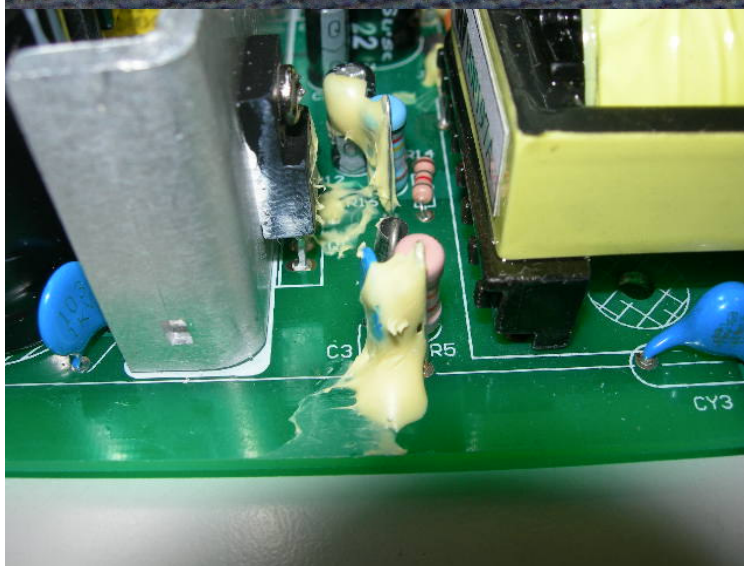
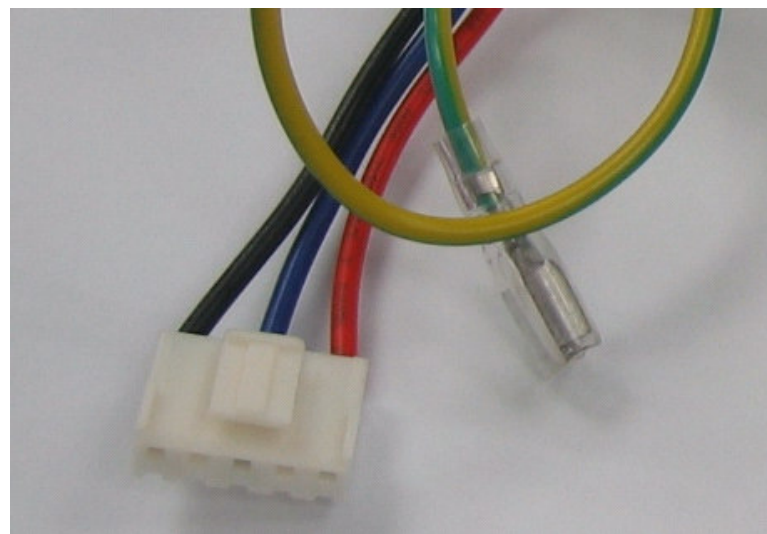
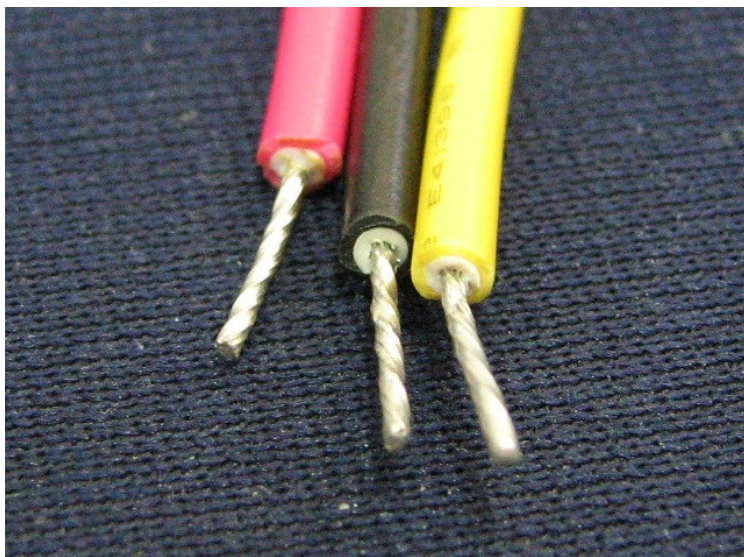
## 结构设计要求 (防电击/危险能量)



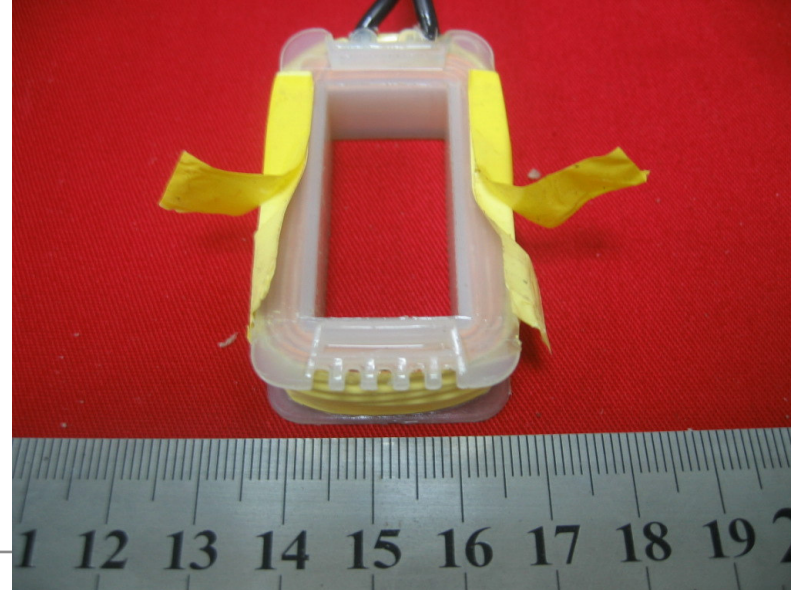
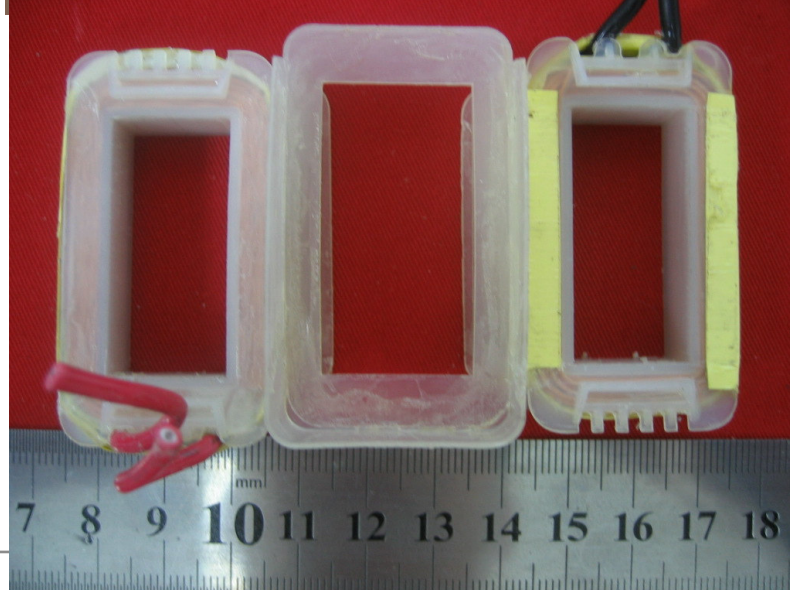
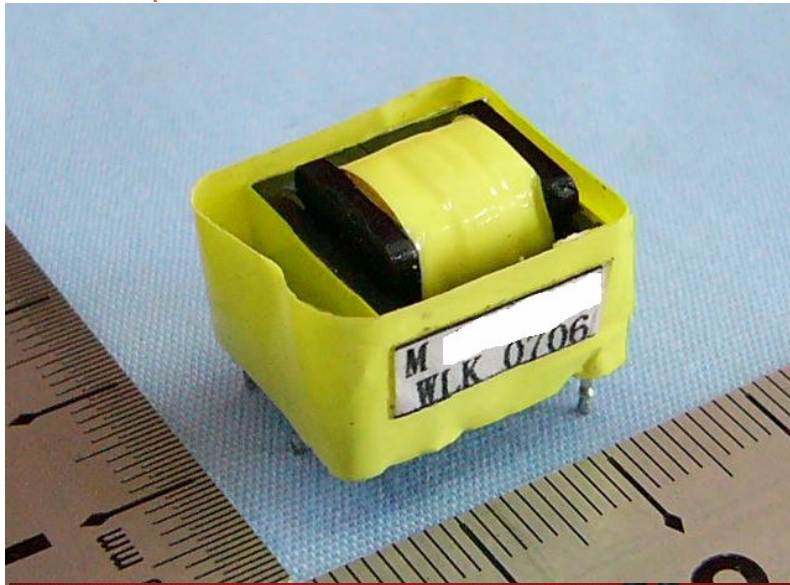
## 结构设计要求（防电击/危险能量）

- 线材要求: 初级侧线材, 若在正常使用下可以接触到次级元件, 则应考虑用双绝缘线或加绝缘套管
- 线材要求: 若一端脱落可以造成初级线接触次级, 次级线接触初级时, 应以双机械式固定方式
- 间距要求: 初级元件与铁心/地(BI); 初级元件与次级元件(RI); 次级元件与铁心(SI)均应保持适当距离
- 间距要求: 初级保险丝 (Thermal fuse or Current fuse)的两端 (本体或PCB)应保持适当距离(BI)
- 小型开关电源: 可于次级采用三层绝缘线(TIW), 宜注意此时铁心是当成一次侧元件, 铁心与次级侧所有零件均应保持距离; 次级之pin常发现与铁心未保持加强绝缘的距离
- 线性变压器: 时常次级与铁心未保持(SI)距离要求, 此时铁心当成次级元件, 初级应与铁心保持(RI)距离要求, Bobbin 厚度要求尤其重要 (0.4mm for 60950 & 60065; 1.0mm for 61558 & 60335-2-29)

## Photo examples



## Photo examples





## 结构设计要求（防电击/危险能量）

### ■ 湿度测试 (Humidity test)

- 整体待测物放入恒温恒湿槽内
- 48小时, 28-30° C, 91-95%相对湿度（对普通产品）
- 120小时, 38-42° C, 90-95%相对湿度（对销往热带地区的产品，如沙特、新加坡、阿根廷、巴西等）
- 在完成此项测试后应马上进行耐电压测试和绝缘阻抗测量

### ■ 雷击测试——60065

- 防止产品天线收到雷击影响绝缘性能
- 对II类电源的输出端子与输入端进行测试
- 10kV, 50次, 12次/分, 用1nF电容放电
- 在完成此项测试后应马上进行耐电压测试和绝缘阻抗测量

## 结构设计要求（防电击/危险能量）

### ■ 耐压测试 (60950/61558/60065)

- (加强绝缘) 初级 & 次级: 3000Vac/3750Vac/4242Vdc
- (基本绝缘) 初级 & 地: 1500Vac/1250Vac/2121Vdc
- (基本绝缘) 初级 & 变压器铁芯: 1500Vac/1250Vac/2121Vdc
- (附加绝缘) 次级 & 变压器铁芯: 1500Vac/2500Vac/2121Vdc
- (加强绝缘) 初级 & 可接触部分: 3000Vac/3750Vac/4242Vdc
- 测试时间: 1分钟.

## 结构设计要求（防电击/危险能量）

### ■ 绝缘阻抗测试 (只对 60065 & 61558)

- 500Vdc, 1 min.
- 测量点:
  - (加强绝缘)初级 & 次级:  $\geq 5\text{M}\Omega$  (61558),  $4\text{M}\Omega$  (60065)
  - (基本绝缘)初级 & 地:  $\geq 2\text{M}\Omega$
  - (基本绝缘)初级 & 变压器铁芯:  $\geq 2\text{M}\Omega$
  - (附加绝缘)次级 & 变压器铁芯:  $\geq 2\text{M}\Omega$
  - (基本绝缘)初级 & 可接触部分:  $\geq 7\text{M}\Omega$  (61558),  $4\text{M}\Omega$  (60065)

### ■ 接地电阻测试

- 25A 电流
- 保护接地端子到接地的金属部分
- $\Rightarrow$  接地电阻  $\leq 0.1\Omega$

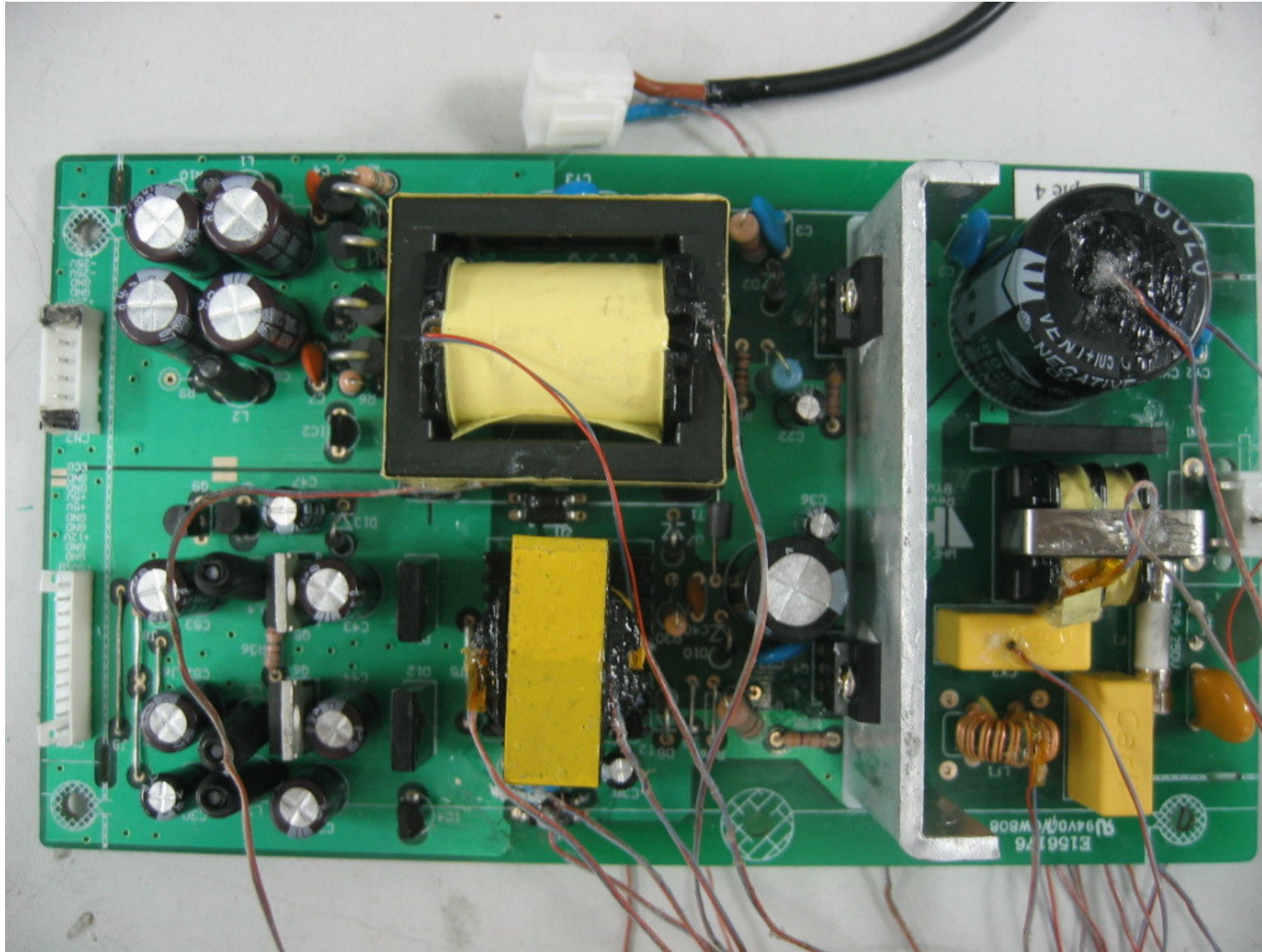
## 结构设计要求（防热/防火）

### ■ 温升测试

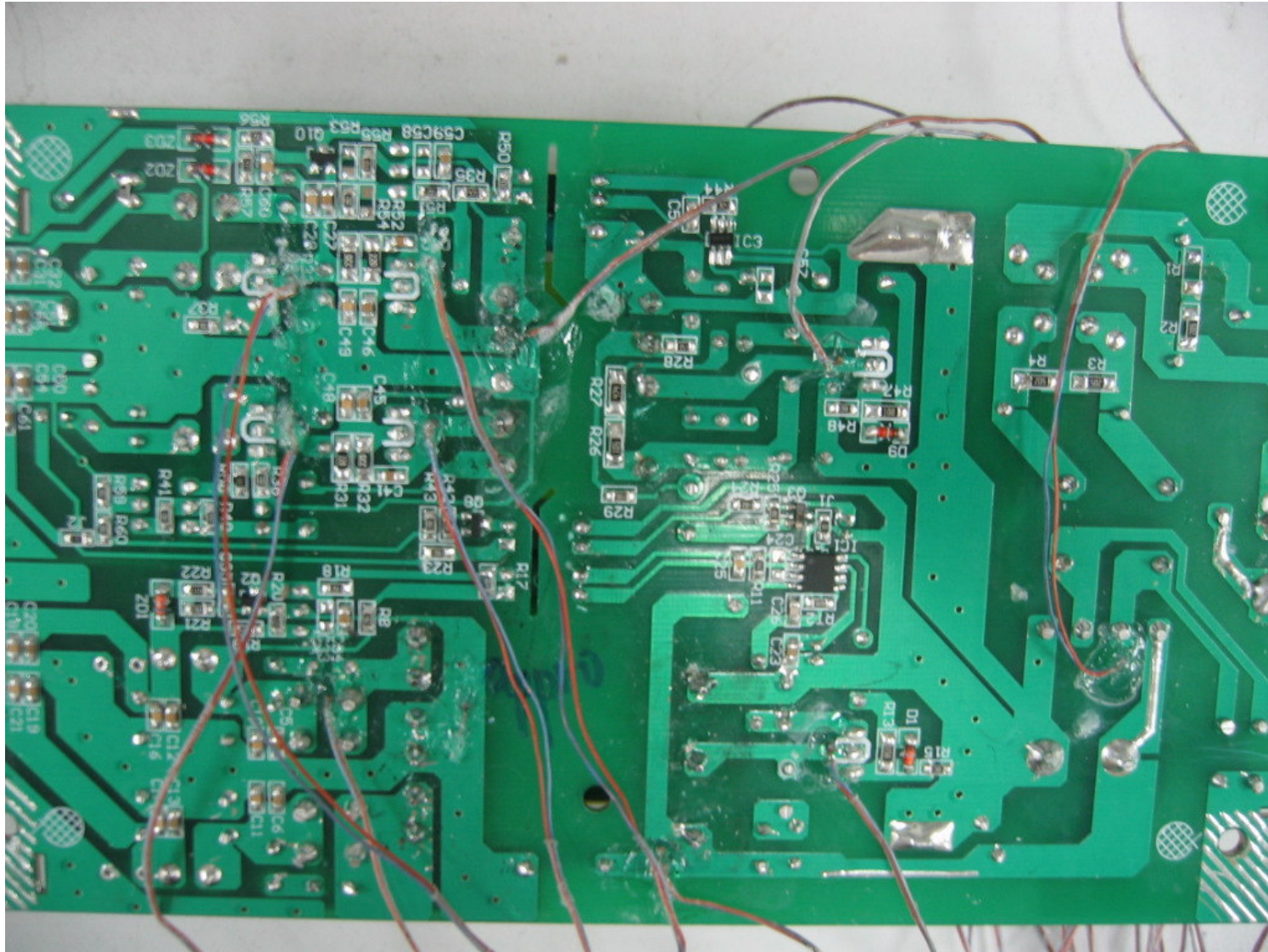
- 输入电压**1.06 / 1.1**倍，带额定输出
- 用热电偶测量产品关键元器件（如变压器、印制板、X/Y电容、光耦、导线、外壳等）的温升，变压器绕组的温升用电阻法测量

Part	Maximum temperature ( $T_{max}$ ) °C
Insulation, including winding insulation: <ul style="list-style-type: none"> <li>- of Class A material</li> <li>- of Class E material</li> <li>- of Class B material</li> <li>- of Class F material</li> <li>- of Class H material</li> </ul>	100 1), 2), 3) 115 1), 2), 3) 120 1), 2), 3) 140 1), 2), 3) 165 1), 2), 3)
Synthetic rubber or PVC insulation of internal and external wiring, including power supply cords: <ul style="list-style-type: none"> <li>- without temperature marking</li> <li>- with temperature marking</li> </ul>	75 Temperature marking minus 25
Other thermoplastic insulation	4)
Terminals, including earthing terminals for external earthing conductors of STATIONARY EQUIPMENT, unless provided with a NON-DETACHABLE POWER SUPPLY CORD	85
Parts in contact with a flammable liquid	See 4.3.12
Components	See 1.5.1

## 结构设计要求（防热/防火）



## 结构设计要求（防热/防火）



## 结构设计要求（防热/防火）

可接触部分的温度要求：

■ 60065:

a) <i>ACCESSIBLE parts</i>		
Knobs, handles, etc. if		
– metallic	30	65
– non-metallic <sup>c</sup>	50	65
Enclosures if		
– metallic <sup>a</sup>	40	65
– non-metallic <sup>b + c</sup>	60	65

<sup>b</sup> For parts not likely to be touched during intended use, temperature rises up to 65 K are allowed under normal operating conditions. The wooden test box of 4.1.4 shall not be used when evaluating access to parts likely to be touched. The following parts are considered not likely to be touched:

- rear and bottom panels, except those incorporating switches or controls handled during normal use,
- external heatsinks and metallic parts directly covering external heatsinks, except those on surfaces incorporating switches or controls handled during normal use,

**注：音频产品的可接触金属散热片要尤为注意**

## 结构设计要求（防热/防火）

可接触部分的温度要求：

■ 60950:

Parts in OPERATOR ACCESS AREAS	Maximum temperature ( $T_{max}$ )		
	°C		
	Metal	Glass, porcelain and vitreous material	Plastic and rubber <sup>3)</sup>
Handles, knobs, grips, etc., held or touched for short periods only	60	70	85
Handles, knobs, grips, etc., continuously held in normal use	55	65	75
External surfaces of equipment which may be touched <sup>5)</sup>	70	80	95
Parts inside the equipment which may be touched <sup>6)</sup>	70	80	95



## 结构设计要求（防热/防火）

可接触部分的温度要求：

### ■ 61558:

External <b>enclosures</b> <sup>3)</sup> (which can be touched with the standard test finger) of <b>stationary transformers</b> , if of:	
– metal	70
– other material	80
External <b>enclosures</b> <sup>3)</sup> (which cannot be touched with the standard test finger) of <b>stationary transformers</b>	85
External <b>enclosures</b> <sup>3)</sup> , handles and the like of <b>portable transformers</b> :	
– if, in normal use, these parts are continuously held (for example for <b>hand held transformers</b> ):	
• of metal	55
• of other material	75
– if, in normal use, these parts are not continuously held:	
• of metal	60
• of other material	80

## 结构设计要求（防热/防火）

可接触部分的温度要求：

■ 61558-2-7:

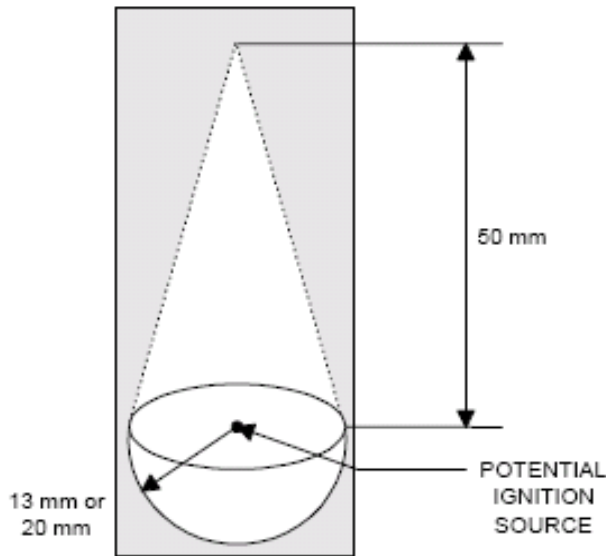
Parts	Temperature °C
External enclosures which can be touched with the small test finger of Figure 101), handles and the like, if made of	
• metal;	50
• other material.	60
External enclosures (which cannot be touched with the small test finger of Figure 101).	85

## 结构设计要求（防热/防火）

- 对塑料外壳热应力测试（正常状态下外壳最高温度+10°C，不低于70°C）—— 60065 / 60950
- 对塑料外壳的球压测试（正常状态下外壳最高温度+40°C，不低于70°C）—— 61558
- 支撑初级带电部件的绝缘材料的球压测试（125°C）—— 61558 / 60950
- 防火外壳要求V-1等级或通过V-1燃烧测试 —— 60950
- 外壳通过650° C灼热丝试验 ——61558

## 结构设计要求 (防热/防火)

### ■ 防火材料——60065

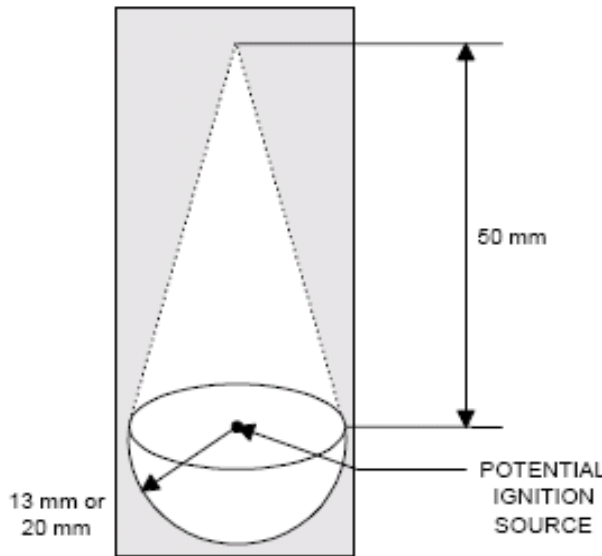


Open-circuit voltage of the POTENTIAL IGNITION SOURCE	For apparatus containing voltages not exceeding 4 kV				For apparatus containing voltages exceeding 4 kV			
	Minimum distance from POTENTIAL IGNITION SOURCES to the components or parts  (see figure 13)		Flammability category of components and parts according to IEC 60707, if the distance is less than the minimum distance required in the previous column	Minimum distance from POTENTIAL IGNITION SOURCE to non-metallic barrier  Barrier flammability category, if other than metal	Minimum distance from POTENTIAL IGNITION SOURCES to the components or parts  (see figure 13)		Flammability category of components and parts according to IEC 60707, if the distance is less than the minimum distance required in the previous column	Minimum distance from POTENTIAL IGNITION SOURCE to non-metallic barrier  Barrier flammability category, if other than metal
	Downwards or side-ways	Up-wards			Downwards or side-ways	Up-wards		
V (peak) a.c. or d.c.								
>50 up to and including 400	13 mm	50 mm	HB75	No requirement	13 mm	50 mm	V-1	5 mm V-1
>400 up to and including 4 000	13 mm	50 mm	V-1	5 mm V-1	20 mm	50 mm	V-1	5 mm V-0
>4 000					See 20.2			

- 澳大利亚(AU)对材料的防火要求：
  - 塑料外壳要
    - 正常温升+40°C，但至少75°C的球压测试
    - 550°C的灼热丝测试
  - 支撑初级原件的绝缘材料
    - 正常温升+40°C，但至少125°C的球压测试（变压器bobbin）
    - 750°C的灼热丝测试

## 结构设计要求（防热/防火）

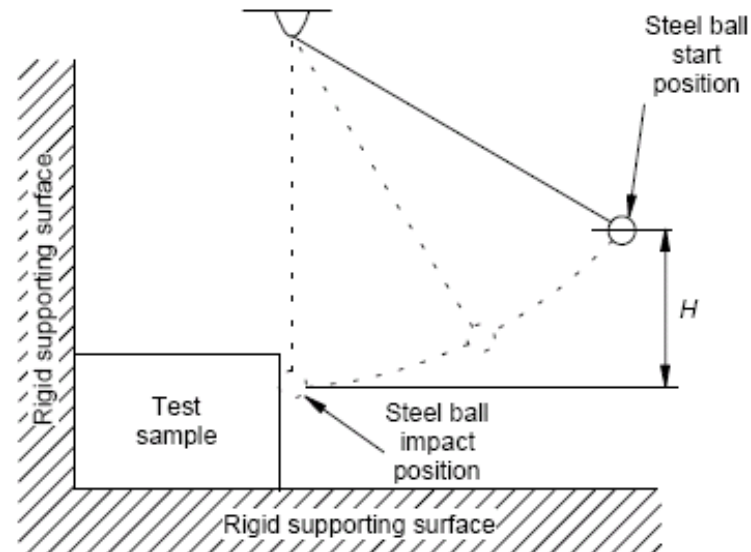
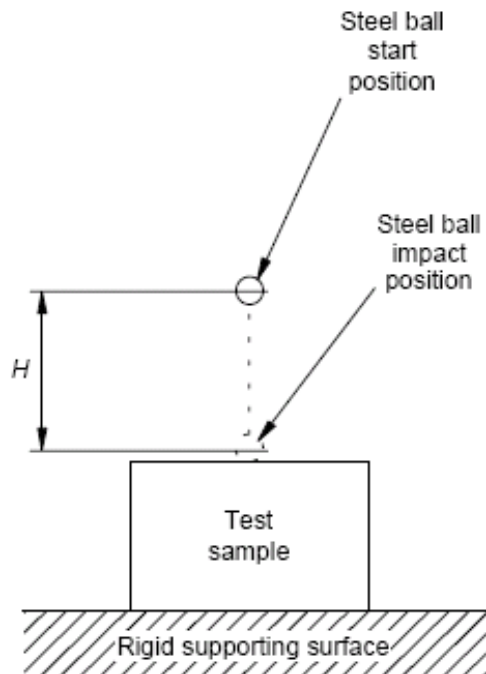
### ■ 澳大利亚(AU)对材料的防火要求:



Open-circuit voltage of the POTENTIAL IGNITION SOURCE	For apparatus containing voltages not exceeding 4 kV				For apparatus containing voltages exceeding 4 kV					
	Minimum distance from POTENTIAL IGNITION SOURCES to the components or parts (see figure 13)		Flammability category of components and parts according to IEC 60707, if the distance is less than the minimum distance required in the previous column	Minimum distance from POTENTIAL IGNITION SOURCE to non-metallic barrier	Barrier flammability category, if other than metal	Minimum distance from POTENTIAL IGNITION SOURCES to the components or parts (see figure 13)		Flammability category of components and parts according to IEC 60707, if the distance is less than the minimum distance required in the previous column	Minimum distance from POTENTIAL IGNITION SOURCE to non-metallic barrier.	Barrier flammability category, if other than metal
	Downwards or side-ways	Up-wards				Downwards or side-ways	Up-wards			
V (peak) a.c. or d.c.										
>50 up to and including 400	13 mm	50 mm	HB75 V-1	No requirement V-1	13 mm	50 mm	V-1	5 mm V-1		
>400 up to and including 4 000	13 mm	50 mm	V-1	5 mm V-1	20 mm	50 mm	V-1	5 mm V-0		
>4 000					See 20.2					

## 结构设计要求（防机械危险）

- 钢球撞击测试 (桌上型产品)
- 跌落测试 (便携/直插式产品)
- 冲击锤测试 (非 60950)



### ■ 螺丝测试

- 锁外壳的螺丝应通过此测试
- 螺丝完全旋入再完全退出
- 10次(非金属螺纹); 5次 (金属螺纹)
- 2.8-3.0mm  $\Rightarrow$  0.5Nm; 3.0-3.2mm  $\Rightarrow$  0.6Nm  
3.2-3.6mm  $\Rightarrow$  0.8Nm; 3.6-4.1mm  $\Rightarrow$  1.2Nm
- 螺丝不得滑丝



## 其他电气测试项目

### ■ 输入测试

- $U=U_n$ ,  $F=F_n$ ,
- Sec. Full load. (电源产品)
- 1/8 of max. non-clipping output with standard signal input (音频产品)
- $\Rightarrow +10\%$  Deviation of  $I_n$

### ■ 输出电压测试 (only for 61558)

- $U=U_n$ ,  $F=F_n$ , Sec. Load is rated impedance until temperature stable
- $V_{out}$  shall not differ: 5-15% of rating.

■ 无载输出电压测试:

- $U=U_n$ ,  $F=F_n$
- Output voltage shall
  - $\leq 42.4V_{peak}$ ,  $\leq 60V_{dc}$  (60950)
  - $\leq 35V_{peak}$ ,  $\leq 60V_{dc}$  (60065)
  - $\leq 50V_{rms}$  ac,  $\leq 120V_{dc}$  (61558-2-6)

- 额定输出电压与无载电压比值: (只对 61558)
  - $(U_{\text{no-load}} - U_{\text{load}}) / U_{\text{load}} \times 100\%$
  - 0-10 VA  $\Rightarrow$  100%
  - 10-25 VA  $\Rightarrow$  50%
  - 25-63 VA  $\Rightarrow$  20%
  - 63-250 VA  $\Rightarrow$  15%
  
- 限功率源测试 (Limited Power Source)
  - 60950 所特有的测试
  - 是否通过均不影响认证
  - 若通过则使用此电源的产品可以用较差等级的外壳 (HB)

### ■ 异常测试

- 电子元件的短路与开路
- 线圈短路
- 二次侧输出短路与过载
- 马达风扇堵转

### ■ Note:

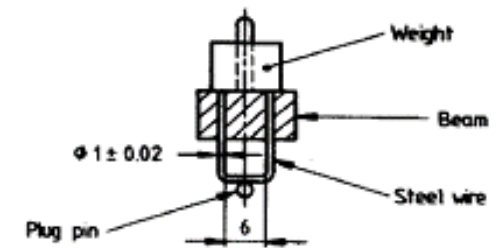
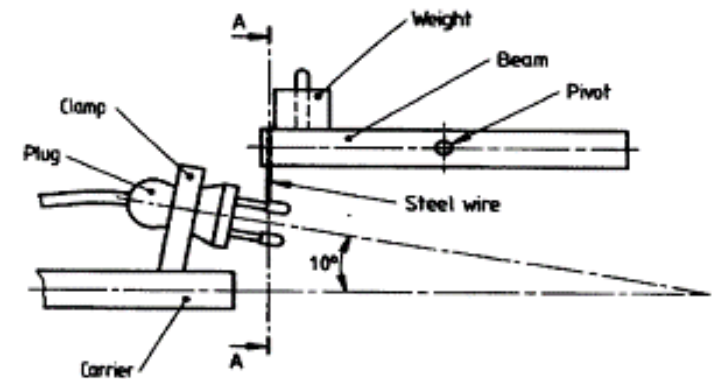
- 一次只做一个异常
- 损坏机器不算 **Fail**
- 若有疑问则做到温度稳定
- 不得有起火燃烧绝缘过热绝缘失效

五、直插式产品插头部分  
**Plug portion of direct-plug in**

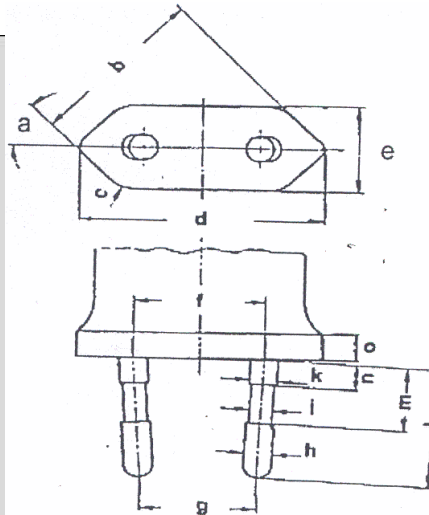
### ■ 插头测试

#### ● 欧洲插头(EN50075):

- Pin 转动测试: 0.4Nm, 1min.
- Pin 拉力测试: 70°C, 40N
- Pin sleeve 球压测试: 125°C, 1h
- Pin sleeve 灼热丝测试: 750°C, 30s
- Pin sleeve 耐磨试验: 20 000 次



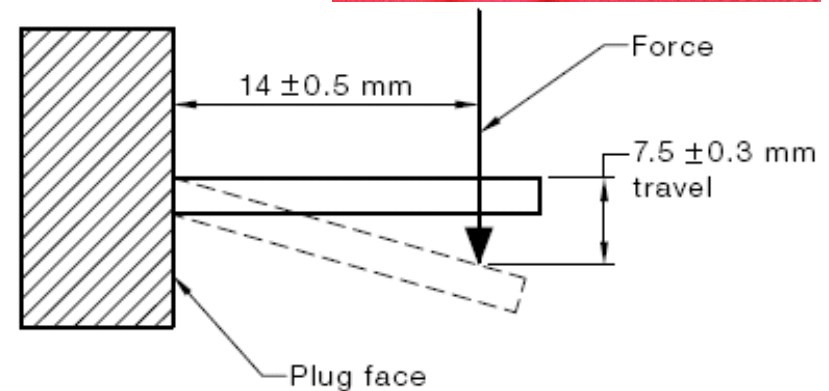
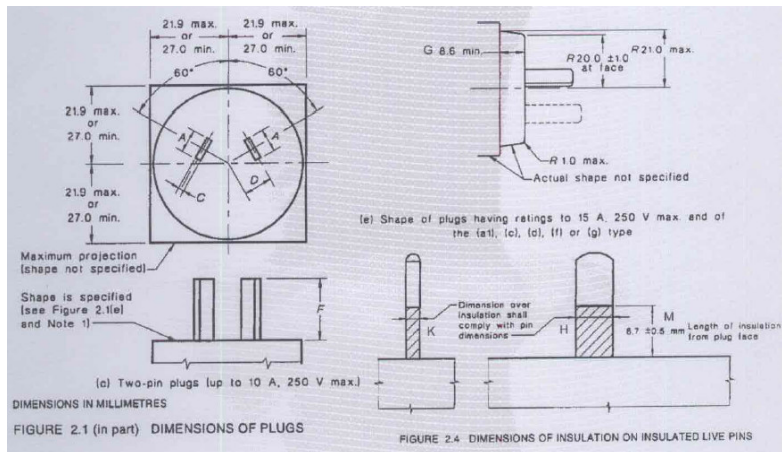
Enlarged part of section A-A showing steel wire



## 直插式产品插头部分

### ■ 插头测试

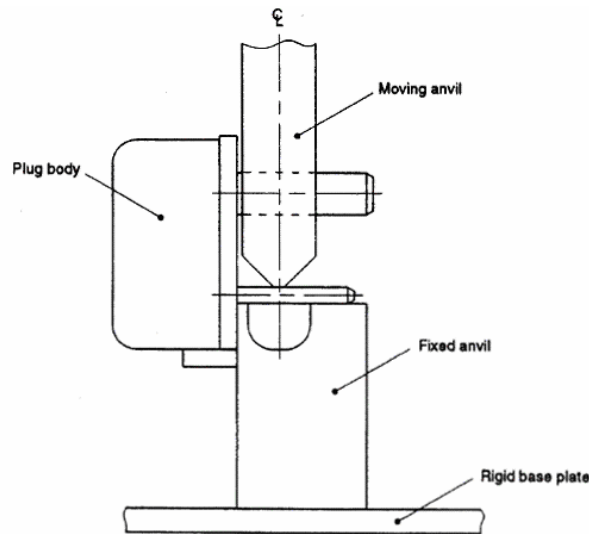
- 澳洲插头(Annex J of AS/NZS 3112):
  - Tumbling barrel 滚筒测试 <250g 250 times; > 250g 500 times
  - Pin bending 弯折测试
  - Pin sleeve 绝缘层压力测试: 160°C, 2h, 2.5N
  - Impact 冲击测试: 100g, 100mm, 4 impacts
  - Abrasion 耐磨测试: 4N, 20000 movements



## 直插式产品插头部分

### ■ 插头测试

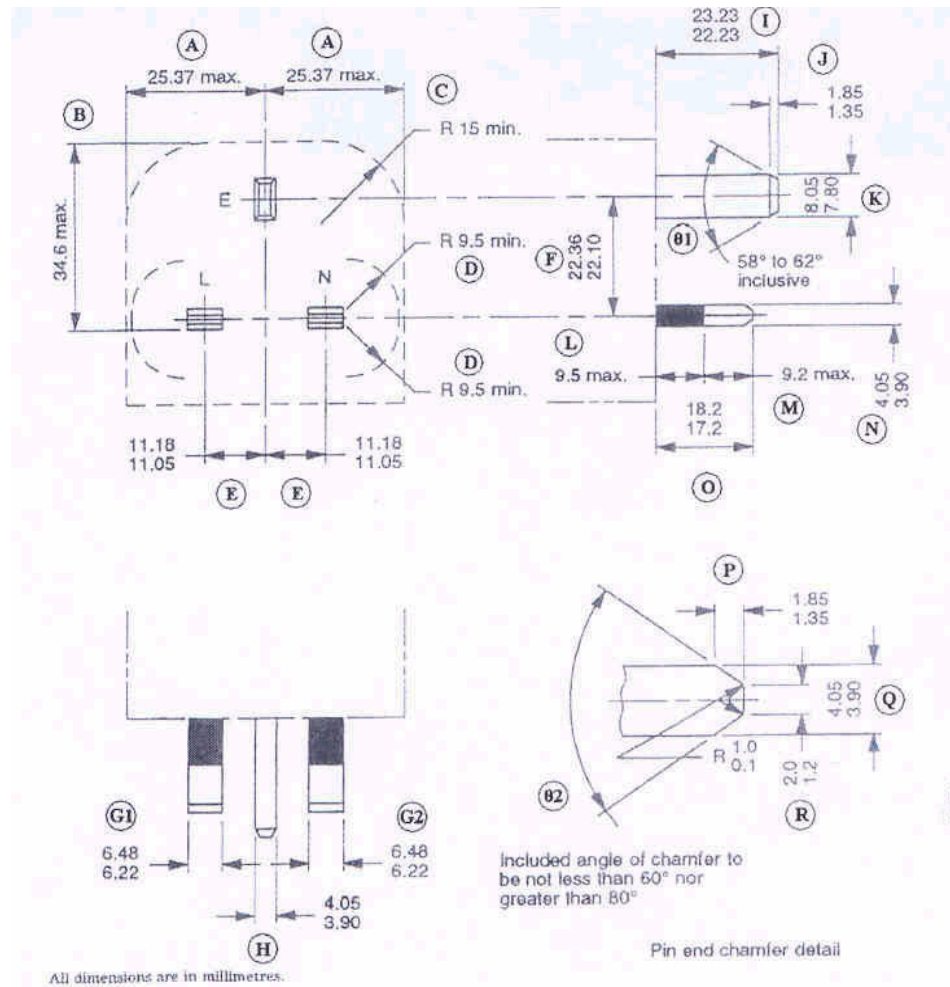
- 英式插头(BS 1363):
  - Pin pressure 压力测试: 1100N<sub>-10N</sub>
  - Pin torque 扭力测试: 1Nm, 60s
  - Pin fixing 固定测试: 70°C, 1h, 100N (pull), 1min
  - Pin sleeve 耐高温测试: 125°C, 120min
  - Pin sleeve 耐磨试验: 20 000 次





## 直插式产品插头部分

### ■ 插头测试



## 六、常见问题分析及解决方案

# Problems & solutions

## 常见问题分析及解决方案

- 温升超过限制（变压器、外壳、散热片）
- 热应力测试不能通过（尤其对桌面型电源和大功率音频功放）
- 电气间隙/爬电距离不符合要求（初级保险丝、变压器内部、PCB板）
- 内部线/端子连接不可靠（初级线与PCB板的固定）
- 非正常测试不能通过（温升、电容漏液、绝缘系统被破坏）
- 机械测试不能通过（冲击、跌落、振动）

**SGS**

Question & Answer ?

**SGS**

**Thank you!**

**谢谢!**