



功得電子工業股份有限公司
CONQUER ELECTRONICS CO.,LTD.

規格書

Spec. No. SFA006

Specification For Approval

品名：**ADA/APA-A** 系列 慢速型瓷管保險絲

Type：**ADA/APA-A** *Time-Lag Ceramic Tube Fuse Series*

www.conquer.com.tw

五股廠：新北市五股區五權五路26號(新北產業園區)
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History of Change

| REV. | Description | Date | Drawn | Designed | Checked | Approved |
|------|---|------------|-------|----------|---------|----------|
| 1 | (1)發出 Issue | 2012.09.18 | 廖奕璋 | 邱俊傑 | 蔡進義 | 蔡其湖 |
| 2 | 新增 項目12 標記/安規認證:16A之冷阻值 項目14 建議生產參數 (無鉛焊錫使用) | 2015.06.24 | 廖奕璋 | 邱俊傑 | 蔡進義 | 蔡其湖 |
| 3 | 新增12 標記/安規認證: I^2t 值 刪除12 標記/安規認證:I6A 修正13 系列品名列表→產品描述 新增14 安裝方式及條件 新增16 It曲線圖 新增17 I^2t 曲線圖 | 2016.12.16 | 廖奕璋 | 邱俊傑 | 蔡進義 | 蔡其湖 |

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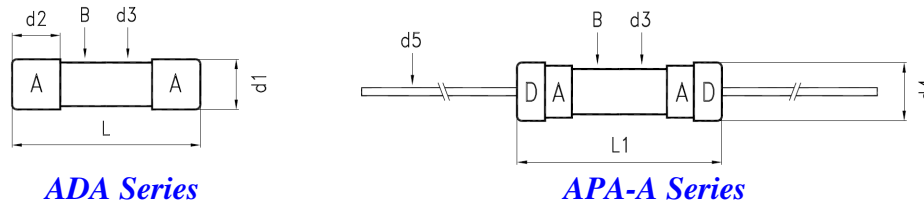
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1 適用範圍 Available Range:

本標準適用於保護儀器、電源供應器和電話機用之筒管式熔斷保險絲。
For protecting instruments, power supplies and telephone sets.

2 形狀及尺寸如下圖 Shape & Size as following illustrations. 單位: mm



ADA Series

APA-A Series

2.1 構造形狀 Structure & Shape : 如上圖 As shown in figure above

2.2 額定電壓 Rated Voltage: 250V

2.3 額定電流 Rated Current: 0.1A~30A

3 材料 Material:

3.1 筒管本體: 不透明瓷管不可破裂或變形。

Tube (Body): Non-Transparent ceramic tube fuse. No breaking or deformation is allowed.

3.2 兩端銅蓋: 需以導電率良好之黃銅為材料。

Two brass end caps: Made of brass of good conductivity.

3.3 銅蓋處理: 銅蓋部份鍍鎳，標示最後若加 "S" 者，表示須鍍銀。

Coating of brass caps: Plating the surface with nickel. If the indication is added with "S", it needs to be plated with silver.

| NO. | Part Name 部品名稱 | Volume 數量 |
|-----|---|-----------|
| A | Brass Cap - Nickel Plating 銅帽 - 鍍鎳 | 2 |
| B | Ceramic Tube - Non-Transparent Ceramic Tube 瓷管 - 不透明瓷管 | 1 |
| C | Fuse Element 可熔體 | 1 |
| D | Cap-on Lead-Cap - Tinned Copper Wire and Cap 銅帽附腳 - 銅蓋加鍍錫銅線 | 2 |
| d1 | Dia. of Cap - 6.35±0.1mm 銅頭直徑 | |
| d2 | Height of Cap - 6.45±0.1mm 銅頭高度 | |
| d3 | Dia. of Ceramic - 5.72±0.2mm 瓷管直徑 | |
| d4 | Dia. of Cap - 7.00±0.3mm 銅帽直徑 | |
| d5 | Dia. of Lead Wire - (註1)±0.05mm 附腳直徑 Length of Lead Wire - 38±2mm 長度 | |
| L | Body of Fuse - 31.75±0.75mm 本體尺寸 | |
| L1 | Total Length W/Cap-on on Both Ends 33.0±0.75mm | |

※註1 (Note1)

| 安培數 | 腳徑 |
|---------------|-----------|
| Ampere Rating | Lead Wire |
| ≤12A | φ 0.8 mm |
| 13A~19A | φ 1.0 mm |
| ≥20A | φ 1.2 mm |

4 電氣特性 Electrical Characteristics:

4.1 負載容量: 通過額定電流值 100 % (亦即 1.0 x In A), 能繼續通電至少 4小時無任何熔化現象。
Loading Capacity: Loading 100% Rated Current (i.e. 1.0 x In A) for flowing, and it's available to let current keep on flowing at least 4 hour without any melting. (Can keep 4 Hour minimum)

4.2 溫度特性: 通過額定電流值100%(亦即 1.0 x In A)1.5小時, 繼續維持原加之電流, 每隔十分鐘測試一次, 連續測三次, 溫度不得升高, 若使用熱偶式測量方法。
(Thermocouple method) 則本體溫升在 (※註2)°C 以下。

Temperature: Loading the 100 % (1.0 x In A) for 1.5 hours, keep testing it with the original current every 10 minutes. Continue to test it for 3 times. The temperature is not allowed to be higher. The main temperature rise is below (※Note2)°C by way of Thermocouple Method.

※註2 (Note2)

0.1A~15A (75°C)

其餘 Other(100°C)

4.3 過載熔斷: 請參照下表。

Melting due to overloading: Details as follows Table.

※最大熔斷時限 Operating Characteristics

| 安培數 Rating | 100% Rating | | 135% Rating | | 200% Rating | |
|---------------|-------------|------|-------------|-------|-------------|---------|
| | Min. | Max. | Min. | Max. | Min. | Max. |
| 0.1A~30A | 4 Hrs | | | 1 Hrs | 2 sec | 120 sec |

5 機械特性 Mechanical Properties:

5.1 拉力強度: 當施加軸拉力720g/cm於兩端附腳(或銅帽), 無鬆動或損壞現象發生。
Terminal Strength: Leads and/or caps are soldered (adhered) to withstand axial pulling force of 720g/cm without loosening or any harmfulness to firmly attachment.

5.2 彎折強度:

(1) 銅帽附腳腳徑1.0mm(含)以下, 經過兩次反向之彎折後(彎折90度再折回原位謂謂之一次彎折)不發生損壞。

Bending Strength:

Diameter of lead wire ≤ 1.0 mm: After two bends of opposite directions (bending through an angle of 90° and back is defined as one bend) of lead, no damage is to be visualized.



(2) 銅帽附腳腳徑1.2mm(含)以上，距離銅帽附腳卯合處10mm以上，作一次90度之彎折，不發生損壞。

Diameter of lead wire ≥ 1.2 mm: Only one bend of an angle of 90° without back shall be tested for each lead wire and the bending position shall be at least 10mm a way from the cap-on. After the test there shall be no damage to be visualized.

6 突波實驗 Pulse Test:

為適應電感或電容性電路所產之暫態電流，本品於10倍額定電流的熔斷時間最少為3ms。

In order to stand transient current caused by inductive or capacitive, the fuses are designed to have minimum clearing time of 3 millisecond at 1000% rated current.

7 脈波實驗 Cycle Test (On-Off Test):

本實驗乃保證產品之壽命與可靠度，施加60%額定電流之脈波，1分鐘ON，2分鐘OFF，1000次以後，本品不熔斷且內阻變化20%以下。

This test is designed to assure a reliable fuse, Controls are set giving 60% of rated ampere.

1 minute ON, 2 minutes OFF per time, the fuse will not open before 1000 times and the internal resistance change will be below 20%.

8 高溫效應 Derating Test:

本品置於70°C之高溫中，4.1之負載容量將降至室溫之80%(For UL Listed)。

Derating Test: In an air circulating oven at 70°C, the carry capacity will be derated to 80% of current specified in item 4.1(For UL Listed).

9 遮斷能力 Interrupting Rating:

0.1A~30A: 10000 amperes at 125V AC

0.1A~1A: 35 amperes at 250V AC

1.25A~3.5A: 100 amperes at 250V AC

3.75A~10A: 200 amperes at 250V AC

10.1A~15A: 750 amperes at 250V AC

15.1A~20A: 400 amperes at 250V AC (APA)

15.1A~20A: 1500 amperes at 250V AC (ADA)

20.1A~30A: 1500 amperes at 250V AC

20.1A~30A: 10000 amperes at 125V DC

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10 包裝 Packing:

ADA-500 PCS/盒 ; APA-250 PCS/盒 內盒印明下列標示:料號、額定(電壓、電流、遮斷能力)及安規名稱。包裝材料均符合RoHS或者HF的環保要求,且包裝材料不會和零件發生化學反應,造成不良。

ADA-500 pcs in an inner box. ; APA-250 pcs in an inner box. The following items indicated on the box. Mark: Catalog number; ratings (voltage, current, interrupting capacity), and safety mark. The packing material conforms to ROHS or the HF environmental protection request. And the packing material can't have the chemical reaction with the components.

11 其他 Other:

11.1 除非另有指定，上述機械、電器特性，係於常溫，標準狀況下測試之。

Unless otherwise, specified, all tests to be performed at 25±5°C and 35-75% RH.

11.2 於標準狀況下儲放一年，本品乃確保上述機械與電氣之特性。

After one year's storage under normal condition, this item is guaranteed to meet the requirements mentioned above.

12 標記/安規認證 Mark/ Safety Certification:

ADA Series

| Mark Approvals | | | | | | | Nominal Resistance Cold Ohms | Nominal Melting I ² t A ² Sec |
|-------------------|----|--|----|--|--|--|---------------------------------|--|
| 100 mA | ** | | ** | | | | 16.570 | 0.0200 |
| 125 mA | ** | | ** | | | | 10.705 | 0.0313 |
| 150 mA | ** | | ** | | | | 9.5450 | 0.0563 |
| 160 mA | ** | | ** | | | | 8.3850 | 0.0640 |
| 175 mA | ** | | ** | | | | 7.2250 | 0.0766 |
| 180 mA | ** | | ** | | | | 6.0650 | 0.0879 |
| 200 mA | ** | | ** | | | | 4.9050 | 0.1400 |
| 250 mA | ** | | ** | | | | 4.3940 | 0.1875 |
| 300 mA | ** | | ** | | | | 3.8881 | 0.7477 |
| 315 mA | ** | | ** | | | | 3.8821 | 0.7520 |
| 350 mA | ** | | ** | | | | 2.8762 | 0.9211 |
| 375 mA | ** | | ** | | | | 2.2000 | 1.0078 |
| 400 mA | ** | | ** | | | | 1.5237 | 1.0944 |
| 500 mA | ** | | ** | | | | 0.8705 | 4.5000 |
| 600 mA | ** | | ** | | | | 0.5779 | 0.4970 |
| 700 mA | ** | | ** | | | | 0.4208 | 0.7610 |
| 750 mA | ** | | ** | | | | 0.3801 | 0.9455 |
| 800 mA | ** | | ** | | | | 0.3425 | 1.3788 |
| 1 A | ** | | ** | | | | 0.2394 | 2.4644 |
| 1.25 A | ** | | ** | | | | 0.1667 | 5.3063 |
| 1.5 A | ** | | ** | | | | 0.1234 | 7.5265 |

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ADA Series

| Mark Approvals | | | | | | | Nominal Resistance Cold Ohms | Nominal Melting I ² t A ² Sec |
|-------------------|----|--|----|----|----|----|---------------------------------|--|
| 1.6 A | ** | | ** | | | | 0.1126 | 11.748 |
| 2 A | ** | | ** | | | | 0.1993 | 7.8624 |
| 2.5 A | ** | | ** | | | | 0.1208 | 11.674 |
| 3 A | ** | | ** | | | | 0.0885 | 16.061 |
| 3.5 A | ** | | ** | | | | 0.0823 | 28.190 |
| 4 A | ** | | ** | | | | 0.0592 | 40.320 |
| 4.5 A | ** | | ** | | | | 0.0453 | 56.984 |
| 5 A | ** | | ** | | | | 0.0401 | 73.647 |
| 6 A | ** | | ** | | ** | | 0.0308 | 116.96 |
| 6.3 A | ** | | ** | | ** | | 0.0293 | 117.30 |
| 7 A | ** | | ** | | ** | | 0.0156 | 119.50 |
| 8 A | ** | | ** | | ** | | 0.0132 | 150.00 |
| 10 A | ** | | ** | | ** | | 0.0098 | 270.00 |
| 12 A | ** | | ** | | ** | | 0.0080 | 417.32 |
| 13 A | ** | | ** | | ** | | 0.0076 | 587.91 |
| 15 A | ** | | ** | | ** | | 0.0054 | 777.44 |
| 20 A | ** | | | ** | | | 0.0043 | 1296.0 |
| 25 A | | | | | | ** | 0.0030 | 2715.8 |
| 30 A | | | | | | ** | 0.0024 | 4446.1 |

* : 有安規認證 Have safety certify

** : 有安規認證及銅帽上有安規印字標記 Have safety certify and safety mark on the cap

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APA-A Series

| Mark Approvals | | | | | | | Nominal Resistance Cold Ohms | Nominal Melting I ² t A ² Sec |
|-------------------|----|--|----|--|----|--|---------------------------------|--|
| 100 mA | ** | | ** | | | | 16.570 | 0.0200 |
| 125 mA | ** | | ** | | | | 10.705 | 0.0313 |
| 150 mA | ** | | ** | | | | 9.5450 | 0.0563 |
| 160 mA | ** | | ** | | | | 8.3850 | 0.0640 |
| 175 mA | ** | | ** | | | | 7.2250 | 0.0766 |
| 180 mA | ** | | ** | | | | 6.0650 | 0.0879 |
| 200 mA | ** | | ** | | | | 4.9050 | 0.1400 |
| 250 mA | ** | | ** | | | | 4.3940 | 0.1875 |
| 300 mA | ** | | ** | | | | 3.8881 | 0.7477 |
| 315 mA | ** | | ** | | | | 3.8821 | 0.7520 |
| 350 mA | ** | | ** | | | | 2.8762 | 0.9211 |
| 375 mA | ** | | ** | | | | 2.2000 | 1.0078 |
| 400 mA | ** | | ** | | | | 1.5237 | 1.0944 |
| 500 mA | ** | | ** | | | | 0.8705 | 4.5000 |
| 600 mA | ** | | ** | | | | 0.5779 | 0.4970 |
| 700 mA | ** | | ** | | | | 0.4208 | 0.7610 |
| 750 mA | ** | | ** | | | | 0.3801 | 0.9455 |
| 800 mA | ** | | ** | | | | 0.3425 | 1.3788 |
| 1 A | ** | | ** | | | | 0.2394 | 2.4644 |
| 1.25 A | ** | | ** | | | | 0.1667 | 5.3063 |
| 1.5 A | ** | | ** | | | | 0.1234 | 7.5265 |
| 1.6 A | ** | | ** | | | | 0.1126 | 11.748 |
| 2 A | ** | | ** | | | | 0.1993 | 7.8624 |
| 2.5 A | ** | | ** | | | | 0.1208 | 11.674 |
| 3 A | ** | | ** | | | | 0.0885 | 16.061 |
| 3.5 A | ** | | ** | | | | 0.0823 | 28.190 |
| 4 A | ** | | ** | | | | 0.0592 | 40.320 |
| 4.5 A | ** | | ** | | | | 0.0453 | 56.984 |
| 5 A | ** | | ** | | | | 0.0401 | 73.647 |
| 6 A | ** | | ** | | ** | | 0.0308 | 116.96 |
| 6.3 A | ** | | ** | | ** | | 0.0293 | 117.30 |
| 7 A | ** | | ** | | ** | | 0.0156 | 119.50 |
| 8 A | ** | | ** | | ** | | 0.0132 | 150.00 |
| 10 A | ** | | ** | | ** | | 0.0098 | 270.00 |
| 12 A | ** | | ** | | ** | | 0.0080 | 417.32 |
| 13 A | ** | | ** | | ** | | 0.0076 | 587.91 |
| 15 A | ** | | ** | | ** | | 0.0054 | 777.44 |

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APA-A Series

| Mark Approvals | UL | RU | SA | SA | PS E JET 250V | UL us | Nominal Resistance Cold Ohms | Nominal Melting I ² t A ² Sec |
|-------------------|----|----|----|----|------------------|-------|---------------------------------|--|
| 20 A | | ** | | ** | | | 0.0043 | 1296.0 |
| 25 A | | | | | | ** | 0.0030 | 2715.8 |
| 30 A | | | | | | ** | 0.0024 | 4446.1 |

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** : 有安規認證及銅帽上有安規印字標記 Have safety certify and safety mark on the cap

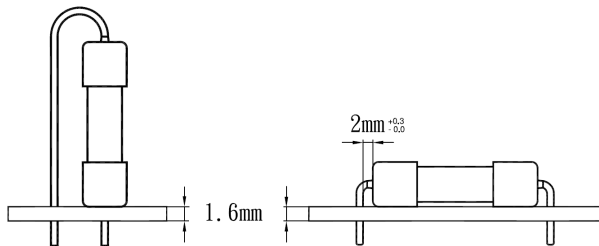
13 產品描述 Product Description :

| 描述 Description | 安培數 Ampere Rating |
|--|----------------------|
| U/C ADA ___A ___V(PF) U/C APA-A ___A ___V(PF) | 0.1A~15A |
| U/C ADA ___A ___V(PF) RU APA-A ___A ___V(PF) | 15.1A~20A |
| CRU ADA ___A ___V(PF) CRU APA-A ___A ___V(PF) | 20.1A~30A |

例:
 1 2 3 4 5

- 1 安規認證 Safety Approval
- 2 系列品名 Series Model : ADA / APA-A
- 3 安培數 Ampere Rating : 0.1A~30A
- 4 伏特數 Voltage : 250V
- 5 無鉛標示 Pb Free : (PF)

14 安裝方式及條件 Installation Way and Parameters:





15 建議生產參數(無鉛焊錫使用)

Recommended Process Parameters(for the action to Lead-free solder alloy) :

| | | |
|---|---|--|
| 15.1 波峰參數 Wave Parameter | 預熱溫度 Preheat temperature 最低溫度：100度 Temperature Minimum : 100℃ 最高溫度：150度 Temperature Maximum : 150℃ | 錫槽溫度 Solder Pot Temperature 260度 Maximum 260℃ Maximum 焊接時間 2~5 seconds Solder Dwell Time: 2~5 seconds |
| 15.2 建議手持烙鐵焊接參數 Recommended Hand-Solder Parameters | 烙鐵溫度：350℃±5℃ Solder Iron Temperature : 350℃±5℃ 加熱時間：5 seconds max. Heating Time : 5 seconds max. | |

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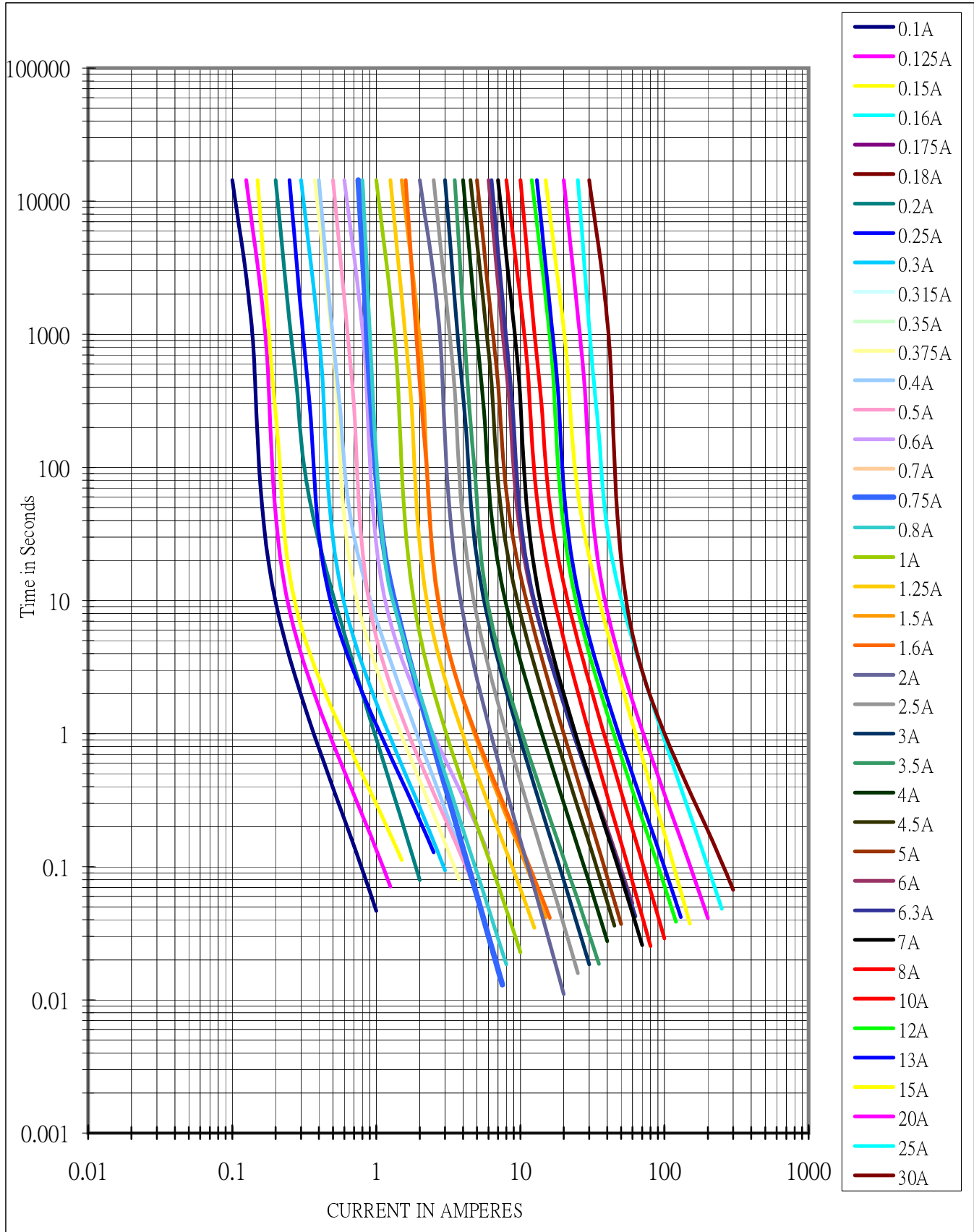
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16 It曲線圖 Clear Time Curve(I vs t curve)



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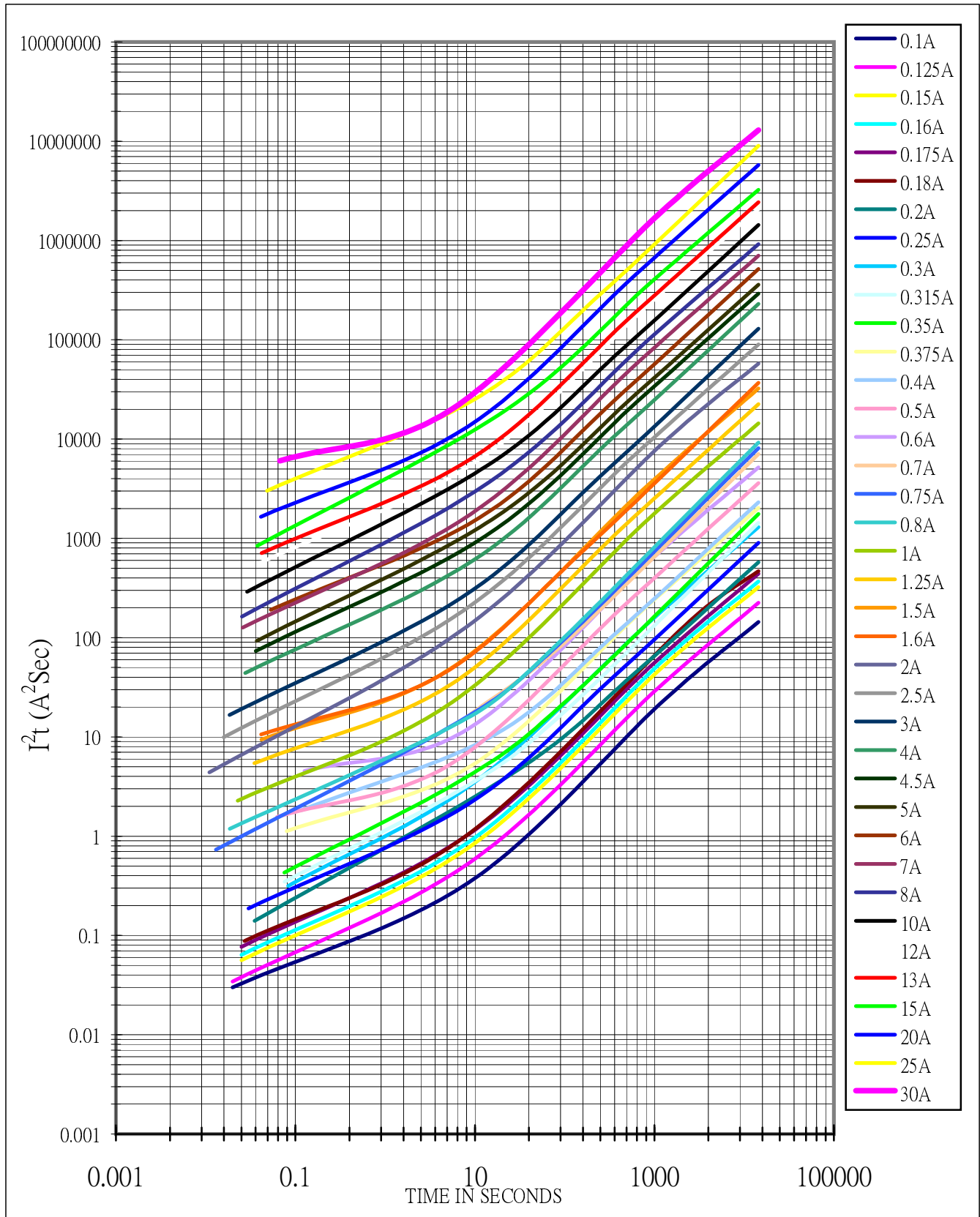
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17 I^2t 曲線圖 Standing Pulse (I^2t vs t curve)



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Product Characteristics & Reliability Tests

| Test item | Test Description & Reference |
|---------------------------------------|--|
| Humidity unload test | MIL-STD-202G , Method 103B , Test Condition A Heat (40±0.5°C) & High Humidity (95±1 % RH), 240 hours , ΔR<15% |
| Thermal shock test | MIL-STD-202G, Method 107g , Test Condition B Temperature setup : 25°C ~ -65°C ~ 25°C ~ 125°C Time setup : -65°C (30min)~25°C (5min)~125°C (30min)~ 25°C (5min) 5 cycles , ΔR<15% |
| Vibration test | MIL-STD-202G , Method 201A Frequency setup : 10 ~ 55 ~ 10 Hz Time setup : 1 Minutes/cycle (X-Y-Z,120 Cycles) 6hrs, ΔR<15% |
| Salt spray Test | MIL-STD-202G , Method 101E , Test Condition A Salt spray concentration : 5 ± 1% Test liquid temperature : 35 ± 0.5°C 96hrs, ΔR<15% |
| Solderability test | Reference IEC 60068-2-20 Temperature setup : 250 ± 3°C, 3 ± 0.3 sec After test terminal electrode wetting area must be greater than 95% |
| Resistance to Solder Heat Test | Reference IEC 60068-2-20 Temperature setup : 260± 3°C, 10± 1 sec ΔR<15% |