

承 認 書
SPECIFICATION FOR APPROVAL

客户名称: 深圳市立创电子商务有限公司
Customer:

产品型号: APB 4UF/1200V 45*45*57.5 P=25mm
Product Type:

产品编码: HAPB1K2W40KT
Product Code:

客户料号: C2913431
Customer Code:

日期: 2021年12月7日

Approval signature:

| AUTHORIZED BY | CHECK BY | VALIDATED BY |
|---------------|----------|--------------|
| | | |

承认后请寄回一份 (Please return one copy after approved)

东莞市弘源电子有限公司

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| | | | |
|--------|---|--------|---|
| 确 认 |  | 制 作 |  |
|--------|---|--------|---|

TYPE: APB

IGBT吸收电容器

Snubber capacitor for IGBT

■ 外形图 Outline Drawing



■ 特点

- 广泛应用于高压高频脉冲电路中
- 损耗小，内部温升小
- 优异的阻燃性能
- 适合作为IGBT的吸收电容

■ Features

- Widely used in high voltage, high frequency circuit
- Low loss and small inherent temperature rise
- Excellent active and passive flame resistant circuit
- Especially designed as snubber capacitor for IGBT

■ 技术要求 Specifications

| | |
|--|--|
| 引用标准 Reference Standard | GB/T 17702 (IEC 61071) |
| 气候类别 Climatic Category | 40/85/56 |
| 额定温度 Rated Temperature | 85°C |
| 工作温度范围(外壳) Operating temperature range(case) | -40°C ~ 85°C |
| 最高允许环境温度 Max permissible ambient temperature | 85°C |
| 额定电压 Rated Voltage | 630V _{d.c} ~ 2 000V _{d.c} |
| 电容量范围 Capacitance Range | 0.22 μF~9.0μF |
| 电容量偏差 Capacitance Tolerance | ± 5%(J), ± 10%(K), ± 20%(M) |
| 耐电压 Voltage Proof | 1.6U _R (10s) |
| 损耗角正切 Dissipation Factor | ≤ 0.001 (0.1%) (20°C, 1KHz) |
| 绝缘电阻 Insulation Resistance | ≤ 100 000MΩ C _R ≤ 0.33μF ≥ 30 000s C _R > 0.33μF (20°C, 100V, 1min) |

产品编码说明 Part number system

16 位产品代码如下:

The 16 digits part number is formed as follow:

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| H | A | P | B | 1 | K | 2 | W | 4 | 0 | K | T | * | * | * | | |

H: 商标代码

1. 1~3 TYPE OF CAPACITOR:

电容器系列

| | | | | | | | | | | | | | |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| TYPE | MKP | MKB | MPP | MPB | PPS | MPS | PPN | MPA | MPB | M61 | MKB | APB | APM |
| CODE | MKP | MKB | MPP | MPB | PPS | MPS | PPN | MPA | MPB | M61 | MKB | APB | APM |
| TYPE | MEK | PEI | MEA | MET | MEF | MEB | AHI | | | | | | |
| CODE | MEK | PEI | MEA | MET | MEF | MEB | AHI | | | | | | |

2. 4~6 RATED VOLTAGE:

额定电压

063: 63VDC/JIS 1J. 400: 400VDC/JIS 2G. 1K6: 1,600VDC/JIS 3C.
 100: 100VDC/JIS 2A. 630: 630VDC/JIS 2J. 1N0: 10,000VDC/JIS 4A.
 250: 250VDC/JIS2E. 1K0: 1,000VDC/JIS 3A. 2A7: 275VAC 3A1:310VAC.

3. 7~9 Symbols of capacitance in uF:

电容器容量代码

A: Indicates tens. EX: 12uF=A12, 10uF=A10.

W(Word): Indicates unit. EX: 1.5uF=W15

P(Point): Digits following the decimal point. EX: 0.22uF=P22

S(Single Zero): Digits following the decimal point followed by one zero. EX: 0.015uF=S15

D(Double Zeroes): Digits following the decimal point followed by two zeroes. EX: 0.0047uF=D47

T(Triple Zeroes): Digits following the decimal point followed by three zeroes. EX: 0.00068uF=T68

4. 10 Symbols of capacitance Tolerance:

容量公差代码

| | | | | | | | | |
|-----------|-----|-----|-----|-----|------|------|----------|----------|
| TOLERANCE | ±1% | ±2% | ±3% | ±5% | ±10% | ±20% | +80%-20% | +100%-0% |
| CODE | F | G | H | J | K | M | Z | P |

5. 11 Lead Style Code:

引脚方式

| | | | | | | | | | | |
|-----------|---------|--|--------|--|---------|--|--------|-------|---------------------------------------|--|
| CODE | 0(不加工) | | 1(内弯) | | 2(外弯) | | 3(内外弯) | | 4(切脚) | |
| LEAD TYPE | | | | | | | | | | |
| CODE | 5(内弯切脚) | | 6 外弯切脚 | | 7 内外弯切脚 | | A直角编带 | B弯脚编带 | T 特殊引脚 | |
| LEAD TYPE | | | | | | | | | 端子、端片、导线等；如11码为T时，12~16码为空。详细尺寸承认书中注明 | |

6. 12 Lead Space (mm)

引线脚距

| | | | | | | | | | | | | | | | | | |
|-------|------|------|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|---|
| SPACE | 3.5 | 4.0 | 5.0 | 6.0 | 7.5 | 10.0 | 12.5 | 15.0 | 20.0 | 22.5 | 27.5 | 30.0 | 31.5 | 32.0 | 37.5 | 42.5 | |
| CODE | A | B | C | E | D | F | V | I | M | N | R | U | S | T | Q | W | O |
| SPACE | 47.5 | 52.5 | | | | | | | | | | | | | | | |
| CODE | P | Y | | | | | | | | | | | | | | | |

7. 13~14 引线脚长 Lead Length 3A=3.5 4A=4.5 05=5mm 5A=5.5 20=20mm

8. 15 特征码 Feature Codes ROHS: 0 Halogen Free: A capacitive divider: B

9. 16 内部码 Internal Codes

**Metallized Polypropylene Film
Snubber Capacitors – FSB Series (For IGBT Protection)**






Applications

- Widely used in high voltage, high frequency and pulse circuit
- Electronic ballasts and compact lamps
- Snubber and SCR commutating circuits

Features

- High ripple current
- Self-healing property
- Low losses
- Small inherent temperature rise
- High contact reliability

Marking

-  stand for Aihua Film Capacitor
- "APB" stands for FSB type
-  Rated Capacitance
-  Capacitance Tolerance
-  Rated Voltage
-  Date Code: Year(*) & Month(*)


Dimension

- Width (W): 45 ± 1.0 mm
- Height (H): 45.0 ± 1.0 mm
- Thickness (T): 57.5 ± 1.0 mm
- Distance Between Lugs: P1(25 mm±2) P2(11mm±1)
- Terminal Code: Type N
- Fixing Slot Size: M6(6.5*10)



PRODUCT SPECIFICATION

TECHNICAL PARAMETERS

| No | Item | Characteristics |
|----|---|--|
| 1 | Reference standard | IEC 61071 |
| 2 | Construction material | |
| | Metallized film | OPP & Al (Single Side Metallized and Double Sided Metallized) |
| | Dielectric | Polypropylene Film |
| | Metal sprayed | Sn/Zn Alloy |
| | Connection electrode | Tin-plated Copper Lug Terminal |
| | Plastic Case | Plastic Case (UL94V-0) |
| | Filling | Epoxy Resin (UL94V-0) |
| | Construction |  Internal Series Connection |
| 3 | Standard atmospheric conditions for static test | |
| | Ambient temperature | 15°C to 35°C (If there is any doubt on the results, the measurements shall be made at +20 +/- 5°C) |
| | Relative humidity | 45% to 75% (If there is any doubt on the results, the measurements shall be made at 60% to 70 %.) |
| | Air pressure | 86 kPa to 106 kPa. |
| 4 | Capacitance | Measuring Frequency at 1kHz Measuring Voltage: 1±0.2V, |
| 5 | Rated capacitance | 4.0µF +0% ~ -10% |
| 6 | Maximum applicable peak to Peak ripple voltage (URac) | 550 Vac |
| 7 | Rated DC voltage (URdc) 85°C | 1200 Vdc |
| 8 | Voltage between terminals U_{TT} | 1.5 x V_R VDC for 10 seconds (between terminations) @ +25°C ±5°C |
| 9 | Voltage between terminals and case U_{TC} | 3000VAC, 60s (at+20+/-2°C) |
| 10 | Dielectric dissipation factor $tg\delta_0$ | $\leq 2 \times 10^{-4}$ |
| 11 | Dissipation factor | 0.0010 (0.1%) at 25°C, 1KHz |
| 12 | ESR (100KHz) | 4.5mΩ MAX |
| 13 | Irms (100KHz) | 30.0A max @70°C |
| 14 | Self-Inductance | < 1nH per mm of lead spacing |
| 15 | Peak current | 3800A |
| 16 | Surge current | 7200A |
| 17 | dv/dt | 950V/us |

PRODUCT SPECIFICATION

| | | |
|----|-----------------------------|---|
| 18 | Insulation resistance | R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 min $> 100\,000 \text{ M}\Omega$ RC between leads, for $C > 0.33 \mu\text{F}$ at 100 V; 1 min $> 30\,000 \text{ s}$ |
| 19 | Storage Conditions | Storage time: ≤ 24 months from the date marked on the label package Average relative humidity per year $\leq 70\%$ RH $\leq 85\%$ for 30 days randomly distributed throughout the year Dew is absent Temperature: $-40^\circ\text{C} \sim +85^\circ\text{C}$ |
| 20 | Operating temperature Range | $-40^\circ\text{C} \sim +105^\circ\text{C}$ ($85^\circ\text{C} \sim 105^\circ\text{C}$, decreasing factor 1.25% per $^\circ\text{C}$ for Urms) |
| 21 | Hot-spot | $\leq 85^\circ\text{C}$ |
| 22 | Life expectancy | 100 000 hours (U_R , $\Theta_{\text{hotspot}}=85^\circ\text{C}$) |
| 23 | Failure rate | 100 Fit |
| 24 | Max. Altitude | 2000 m |
| 25 | Resistance to solvent | Re: IEC 60068-2-45 test XA method 1 Solvent: propanol (isopropyl-alcohol) Temperature: $23 \pm 5^\circ\text{C}$ Immersion time: 5 ± 0.5 min Drying time: 5 min Mechanical treatment: 10 rubbing (with cotton-wool) |
| 26 | Terminal Strength | Tensile: Testing method per IEC 68-2-21. Apply 1.0 kg for 10 +/- 1 sec. to the terminal in the axial direction and acting in a direction away from the body. Shall be no abnormality. Bending: Apply 0.5 kg for 2 cycles. 90° once, return to its initial position for 2-3 sec., and then to the opposite direction once. Shall be no abnormality. |
| 27 | Solderability | Test Conditions: Soldering temperature: $+245 \pm 5^\circ\text{C}$. Immersion duration: 2 ± 0.5 sec. Performance: More than 95% of circumferential surface of lead wire shall be covered with new solder. |
| 28 | Soldering Heat Resistance | Test Conditions: Flow soldering: Preheat temp $100 \sim 120^\circ\text{C}$, Preheat Duration: 100 sec. max. Soldering Temperature: $+260 \pm 5^\circ\text{C}$. Immersion Duration: ≤ 10 sec. Immersion Depth: 1.5 ± 0.5 mm from roots. Iron soldering: Soldering Temperature: $+400^\circ\text{C}$. Immersion Duration: ≤ 3 sec. After test, allow it stay alone for 1.5 ± 0.5 hrs. at standard temperature and humidity before making measurements. Performance: Capacitance Change Rate ($\Delta C/C$): $\leq \pm 2\%$ DF change ($\Delta \text{tg}\delta$): $\leq 50 \cdot 10^{-4}$ at 1 KHz. Insulation Resistance: $\geq 50\%$ of initial limit |
| 29 | Humidity Resistance | Test Conditions: Testing method per IEC 68-2-3 Ca. Test Temperature: $+40 \pm 2^\circ\text{C}$. Test Humidity: 90% to 95% R.H. Test Duration: $1344 \pm 24/0$ hrs (56 days) Performance: Capacitance Change Rate ($\Delta C/C$): $\leq \pm 5\%$ DF change ($\Delta \text{tg}\delta$): $\leq 12 \cdot 10^{-4}$ at 1 KHz. Insulation Resistance: $\geq 50\%$ of initial limit |

PRODUCT SPECIFICATION

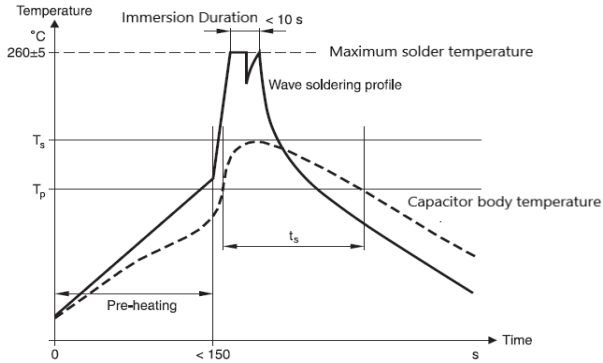
| | | |
|----|--------------------------|--|
| 30 | Cold Resistance | <p>Test Conditions: Test Temperature: -40 +/- 2 °C Test Duration: 2 +/- 0 hrs.</p> <p>Performance: Capacitance Change Rate ($\Delta C/C$): $\leq \pm 3\%$ DF change($\Delta \text{tg}\delta$) : $\leq 12 \times 10^{-4}$ at 1 KHz. Insulation Resistance: $\geq 50\%$ of initial limit</p> |
| 31 | Dry Heat Resistance | <p>Test Conditions: Test Temperature: +105 +/- 2 °C Test Duration: 16 +/- 0 hrs.</p> <p>Performance: Capacitance Change Rate ($\Delta C/C$): $\leq \pm 3\%$ DF change($\Delta \text{tg}\delta$) : $\leq 12 \times 10^{-4}$ at 1 KHz. Insulation Resistance: $\geq 50\%$ of initial limit</p> |
| 32 | Rapid Temperature Change | <p>Test Conditions: Testing method per IEC 68-2-14 Na. Test Temperature Cycle: Total 5 cycles. High Temperature: +105 +/- 5 °C Low Temperature: -40 +/- 5 °C 30 min +/- 10% for each temperature.</p> <p>Performance: Capacitance Change Rate ($\Delta C/C$): $\leq \pm 5\%$ DF change($\Delta \text{tg}\delta$) : $\leq 12 \times 10^{-4}$ at 1 KHz. Insulation Resistance: $\geq 50\%$ of initial limit</p> |
| 33 | High Temperature Loading | <p>Test Conditions: Testing method per IEC 61071 Test Temperature: +85 +/- 2 °C. Apply 125% of rated voltage for 1,000 +/- 0 hrs;</p> <p>Performance: Capacitance Change Rate ($\Delta C/C$): $\leq \pm 5\%$ DF change($\Delta \text{tg}\delta$) : $\leq 12 \times 10^{-4}$ at 1 KHz. Insulation Resistance: $\geq 50\%$ of initial limit</p> |
| 34 | Bump | <p>Test Conditions: 1000times, Acceleration: 390m/s² Pulse duration: 6ms</p> <p>Performance: Capacitance Change Rate ($\Delta C/C$): $\leq \pm 3\%$ DF change($\Delta \text{tg}\delta$) : $\leq 12 \times 10^{-4}$ at 1 KHz. Insulation Resistance: $\geq 50\%$ of initial limit</p> |
| 35 | Vibration Resistance | <p>Test Conditions: Testing method per IEC 68-2-6 Fc. Frequency Change: 10--55--10 Hz. Vibration Distance: 1.5 mm. Test Direction : X, Y, Z. Test Duration: 2 +/- 0 hrs each direction.</p> <p>Performance: Connection Strength: Shall be no open nor short-circuiting. The connection shall be stable Appearance: Shall be no mechanical damage.</p> |
| 36 | Temperature Cycle | <p>Test Conditions: Test Temperature Cycle: Total 5 cycles. Each cycle includes:</p> <ol style="list-style-type: none"> 1. +20 +/- 2 °C for 3min. 2. -40 +/- 3 °C for 30 min. 3. +20 +/- 2 °C for 3min. 4. +105 +/- 0 °C for 30 min. 5. +20 +/- 2 °C for 3 min. <p>Performance: Capacitance Change Rate ($\Delta C/C$): $\leq \pm 3\%$ DF change($\Delta \text{tg}\delta$) : $\leq 12 \times 10^{-4}$ at 1 KHz. Insulation Resistance: $\geq 50\%$ of initial limit</p> |

PRODUCT SPECIFICATION

| | | |
|----|--|---|
| 37 | Overvoltage Apply 110% of rated voltage Apply 115% of rated voltage Apply 120% of rated voltage Apply 130% of rated voltage | Maximum duration within one day 30 % of on-load duration 30 min 5 min 1 min |
| 38 | Application note and limiting conditions | These capacitors are designed only for DC voltage so should not be used for AC line The continuous peak voltage shall not exceed the rated DC voltage rating |

PRODUCT SPECIFICATION

WAVE SOLDERING RECOMMENDATIONS



Ts: Capacitor body maximum temperature at wave soldering

Tp: Capacitor body maximum temperature at pre-heating

PP Capacitor

During pre-heating: $T_p \leq 110^\circ\text{C}$

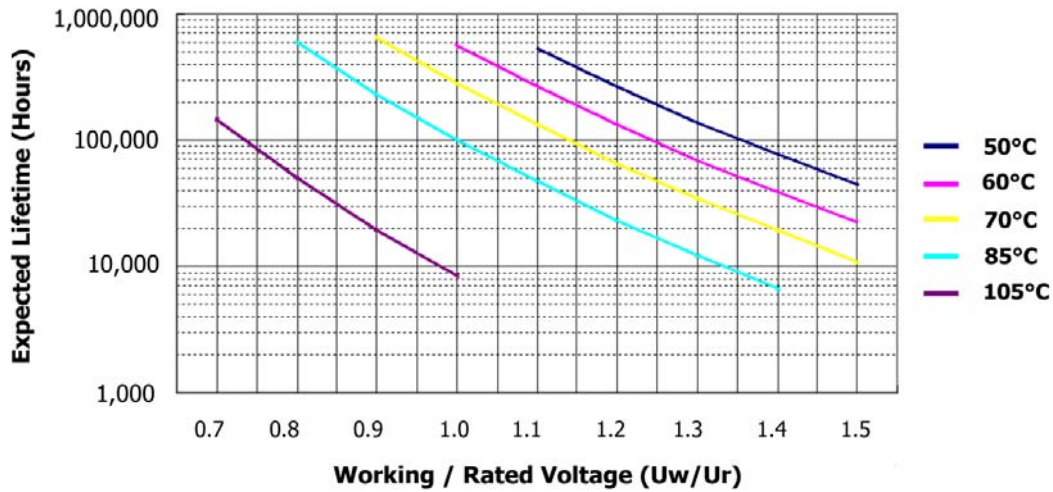
During soldering: $T_s \leq 120^\circ\text{C}$, $t_s \leq 60\text{s}$

PE Capacitor

During pre-heating: $T_p \leq 130^\circ\text{C}$

During soldering: $T_s \leq 160^\circ\text{C}$, $t_s \leq 60\text{s}$

EXPECTED LIFE CURVE



DERATING OF RATED VOLTAGE TO TEMPERATURE

