# SPECIFICATIONS FOR APPROVAL

## Metallized Polypropylene Film Capacitor (CBB22 Powder Coated Type)

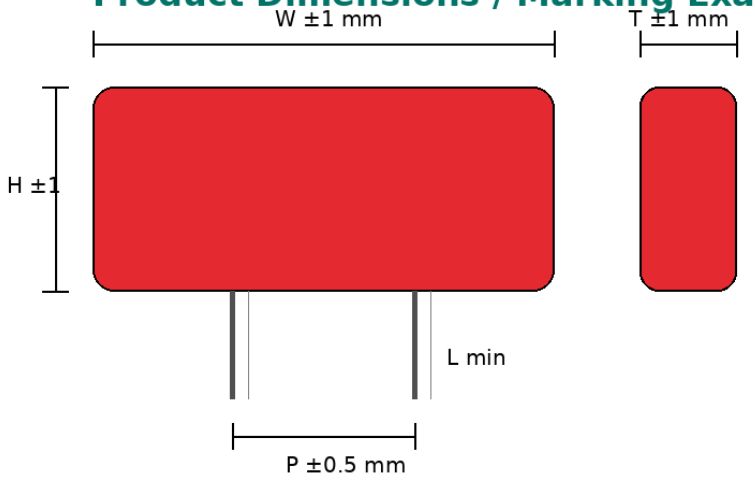
| | |
|---|---|
| **Customer** | |
| **Description** | MPP: Metallized Polypropylene Film Capacitor (CBB22 Powder Coated Type) |
| | |
| **Customer P/N** | |
| **Approval No.** | 2019040601 |
| **Issued Date** | 2019/04/06 |
| **Manufacturer** | |
| **Brand** | |

## Customer Approval

| Prepared By | Checked By | Approved By |
|---|---|---|
| | | |

This specification will be invalidated if it is not accepted and returned within six months from the date of issue.

## Product Dimensions / Marking Example





| Customer P/N | Cap. (uF) | Symbol | Tol. ±% | R.V. (VDC) | W ±1 | H ±1 | T ±1 | P ±0.5 | d ±0.05 |
|---|---|---|---|---|---|---|---|---|---|
| | 1.0 | 105 | 5 | 630 | 22.5 | 16 | 8.5 | 20 | 0.8 |

# 2. Product Code Comparative Table

| Type Code | Capacitance Code | Tolerance | Rated Voltage | Lead Space | Internal Code |
|---|---|---|---|---|---|
| LR | 105 | J | 2J | 20 | 02 |

## 2.1 Type of Capacitor

| MPP | MPR | CBB21 | CBB22 | MER | CL21 | PPS | CBB81 | CBB28 | PPN | CBB13 | X2 | MPB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LR | LR | LR | LR | PE | PE | PS | PS | PS | PN | PN | PX | PC |

## 2.2 Capacitance Code (EIA Code)

| Code | Capacitance |
|---|---|
| 101 | 100pF / 0.1nF / 0.0001uF |
| 102 | 1,000pF / 1nF / 0.001uF |
| 103 | 10,000pF / 10nF / 0.01uF |
| 104 | 100,000pF / 100nF / 0.1uF |
| 105 | 1,000,000pF / 1,000nF / 1uF |
| 106 | 10,000,000pF / 10,000nF / 10uF |

## 2.3 Tolerance and Rated Voltage Codes

| Tolerance | ±1% | ±2% | ±3% | ±5% | ±10% | ±20% | -10%~0% | 0%~+10% | -5%~+10% | -10%~+5% | 0%~+20% |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | F | G | I | J | K | M | L | P | U | V | W |
| Voltage Code | 1J=63V | 2A=100V | 2B=125V | 2E=250V | 2C=275V | 2H=310V | 2K=350V | 2L=380V | 2G=400V | 2W=450V | 2J=630V |

## 2.4 Usage Guidelines for Plastic Film Capacitors

Plastic film capacitors use organic films as dielectrics. When damaged by over-voltage or over-current, depending on circuit conditions, they may fume or flame. Use only within correct circuit conditions.

Circuit Design: Use capacitors within their rated characteristic range after confirming operating and mounting environments. Select the capacitor that fits the actual operating conditions. Applied voltage including surge and ripple peak must not exceed the rated voltage. Do not apply current over the permissible level. Avoid rapid charge and discharge that may degrade characteristics or damage the capacitor.

Mounting: Do not apply excessive tension or torsion to lead wires during mounting. Mount the capacitor where it will not contact heating parts, high voltage parts or other interfering components. Conduct soldering according to specified conditions.

Storing and Handling: Store indoors at -10 to +30 deg C and relative humidity under 75%, avoiding sudden temperature changes, direct sunlight and corrosive gas. Do not apply excessive vibration, shock or pressure. If storage exceeds 3 months under normal conditions, all capacitor characteristics should be checked before production and use.

# 3. Product Specifications

| No. | Item | Description |
|---|---|---|
| 1 | Scope | This specification covers Metallized Polypropylene Film Capacitor MPP/MPR/CBB21/CBB22. |
| 2 | Ambient Temperature | 15 deg C to 35 deg C. If there is doubt on results, measurements shall be made at +20 ±5 deg C. |
| 3 | Relative Humidity | 45% to 75%. If there is doubt on results, measurements shall be made at 60% to 70% R.H. |
| 4 | Air Pressure | 86 kPa to 106 kPa. |
| 5 | Operating Temperature Range | -40 deg C to +100 deg C, continuous operation at rated voltage. |
| 6 | Dielectric | Metallized Polypropylene Film. |
| 7 | Metal Spray | Special solder. |
| 8 | Lead Wire | Tin-plated copper-clad steel wire. |
| 9 | Epoxy Resin | UL V-0 flame retardant grade. |
| 10 | Plastic Case | UL V-0 flame retardant grade. |
| 11 | | |
| 12 | Type or Material | MPP stands for Metallized Polypropylene Film. |
| 13 | Capacitor Class | CBB22 stands for CBB class. |
| 14 | Nominal Capacitance | Capacitance expressed in 3-digit EIA code. |
| 15 | Tolerance | J (±5%), K (±10%), M (±20%). |
| 16 | Rated Voltage | 100, 250, 400, 450, 630 VDC. |
| 17 | Operating Temperature Range | -40 deg C to +100 deg C. |
| 18 | Dissipation Factor | Max. 0.1% at 1kHz, 25 deg C. |
| 19 | Insulation Resistance | CR≤0.33uF: IR≥10000MΩ; CR>0.33uF: IR≥5000MΩ·uF/C. |

# 4. Electrical Characteristics

| No. | Item | Descriptions / Test Conditions |
|---|---|---|
| 5.1 | Withstand Voltage Between Terminals | Shall be no abnormality. Apply 1.5*Ur (DC) for 60 sec. Voltage rise rate should be no more than 150V/s. At the end, voltage should be reduced to zero and capacitor discharged through an appropriate resistor. |
| 5.2 | Withstand Voltage Between Terminals & Enclosure | Shall be no abnormality. Apply 2*Ur + 500V for 2 to 5 sec. Minimum 1,000VDC. |
| 5.3 | Dissipation Factor | ≤0.001 (0.1%) at 1kHz. Measuring frequency: ±2%; measuring voltage: ≤1Vrms. |
| 5.4 | Capacitance | Within the tolerance specified at +20 ±5 deg C. Measuring frequency: ±2%; measuring voltage: ≤1Vrms. |
| 5.5 | Insulation Resistance | C≤0.33uF: ≥10,000MΩ. C>0.33uF: ≥5,000MΩ*uF/C. Test voltage 100VDC. Charge time: 60±5 sec. |
| 5.6 | Soldering Property | More than 90% of circumferential surface of lead wire shall be covered with new solder. Soldering temperature: +260 ±5 deg C. Immersion duration: 2 ±0.5 sec. |

# 5. Mechanical Characteristics

| No. | Item | Descriptions / Test Conditions |
|---|---|---|
| 6.1 | Terminal Strength / Tensile Strength | Shall be no abnormality. Apply 1.0kg for 10 ±1 sec. to the terminal in the axial direction and away from the body. |

# 6. Endurance Characteristics

| No. / Item | Performance | Test Conditions |
|---|---|---|
| 7.1 Temperature Cycle | Appearance: no remarkable change. Withstand voltage shall satisfy No.5.1. Capacitance change within ±5%. Dissipation factor max. 0.002 (0.2%) at 1kHz. Insulation resistance ≥50% of limit value of No.5.4. | Total 5 cycles: 20±2 deg C for 3 min; -40±3 deg C for 10 min; 20±2 deg C for 3 min; +100±2 deg C for 10 min; 20±2 deg C for 3 min. After test, allow 1.5±0.5 hrs at ordinary condition before measurements. |
| 7.2 Dry Heat Resistance | Appearance: no remarkable change. Withstand voltage shall satisfy No.5.1. Capacitance change within ±5%. DF max. 0.002 (0.2%) at 1kHz. IR ≥50% of limit value of No.5.4. | Test temperature: +100±2 deg C. Test duration: 16 +1/-0 hrs. |
| 7.3 Cold Resistance | Appearance: no remarkable change. Withstand voltage shall satisfy No.5.1. Capacitance change within ±5%. DF max. 0.002 (0.2%) at 1kHz. IR ≥50% of limit value of No.5.4. | Test temperature: -40±3 deg C. Test duration: 2±1 hrs. |

# 6. Endurance Characteristics (Continued)

| No. / Item | Performance | Test Conditions |
|---|---|---|
| 7.4 Damp Heat | Appearance: no remarkable change. Withstand voltage shall satisfy No.5.1. Capacitance change within ±5%. DF max. 0.002 (0.2%) at 1kHz. IR ≥50% of limit value of No.5.4. | Test temperature: +40±2 deg C. Test humidity: 90% to 95% R.H. Test duration: 2±1 hrs. After test, allow 1.5±0.5 hrs at ordinary condition before measurements. |
| 7.5 Vibration Resistance | Appearance: no mechanical damage. Connection strength: no short circuit or open; connection shall be stable. | Frequency change: 10-55-10Hz. Vibration distance: 1.5mm. Test direction: X, Y, Z. Test duration: 2±1 hrs each direction. |
| 7.6 Soldering Heat Resistance | Appearance: no remarkable change; marking shall be legible. Withstand voltage shall satisfy No.5.1. Capacitance change within ±3%. DF max. 0.002 (0.2%) at 1kHz. IR ≥50% of limit value of No.5.4. Element connection shall be stable. | Preheat: 85-100 deg C, 60 sec max. Temperature increase max. 3 deg C/sec. Soldering temperature +260±5 deg C. Immersion duration 2±1 sec. Immersion depth 4±0.8mm from roots. After test, allow 1.5±0.5 hrs before measurements. |

# 6. Endurance Characteristics (Final)

| No. / Item | Performance | Test Conditions |
|---|---|---|
| 7.7 Endurance | Appearance: no remarkable change. Withstand voltage shall satisfy No.5.1. Capacitance change within ±10%. Dissipation factor at 1kHz: Cr≤1uF max. 0.008 (0.8%); Cr>1uF max. 0.005 (0.5%). IR ≥50% of limit value of No.5.4. | Test temperature: +85±2 deg C. Test voltage: 100% rated voltage. Test duration: 16 hrs. Once every hour, the test voltage is applied to each capacitor individually for 0.1 sec through a resistor of 47Ω±5%. |
| 7.8 Moisture Resistant Loading | Appearance: no remarkable change. Withstand voltage shall satisfy No.5.1. Capacitance change within ±5%. DF max. 0.002 (0.2%) at 1kHz. IR ≥50% of limit value of No.5.4. | Test temperature: +40±2 deg C. Test humidity: 87% to 93% R.H. Test voltage: rated voltage. Test duration: 16 hrs. After test, allow 1.5±0.5 hrs at ordinary condition before measurements. |

## 7. Document Control

The technical parameters, test methods and product dimensional data are retained according to the original specification document.