# FM Series for Automatic Assembly

The FM series includes small, resin-molded electric double-layer capacitors suitable for automatic assembly. These capacitors are ideal as long-time backup devices for minute-current loads in VCRs, audio systems, cordless telephones, and compact electronic systems. (FME types are backup devices adaptable to current consumption mA level.)

## Features

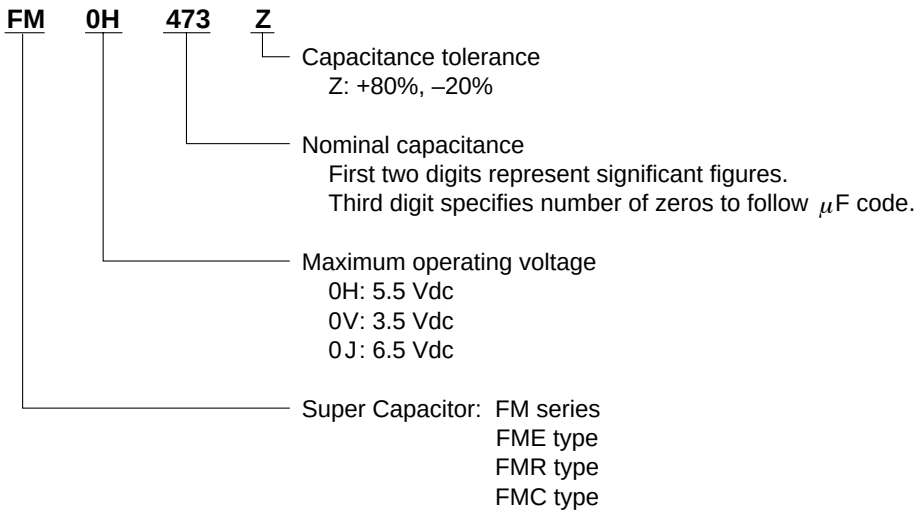
- High adaptability to automatic assembly
- Can be cleaned
- Excellent voltage holding characteristics ideal for long-time supply of 1 $\mu$A to several hundred $\mu$A (Except 3.5 V type, FME type)
- Space saving

## Applications

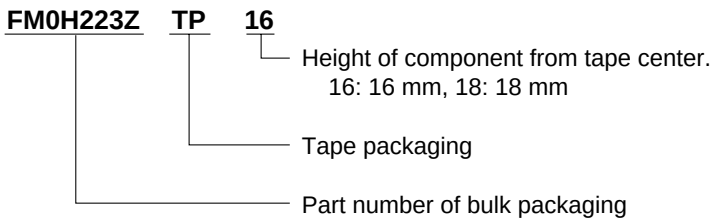
Backup of CMOS microcomputers, static RAMs, and DTSs

## Part Number System

• Bulk



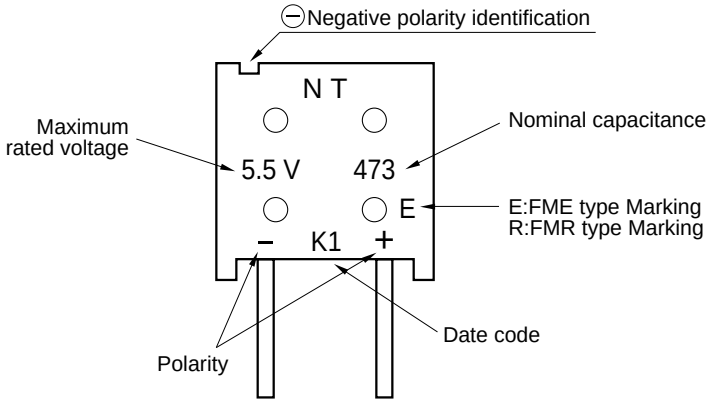

• Tape (Ammo Pack)



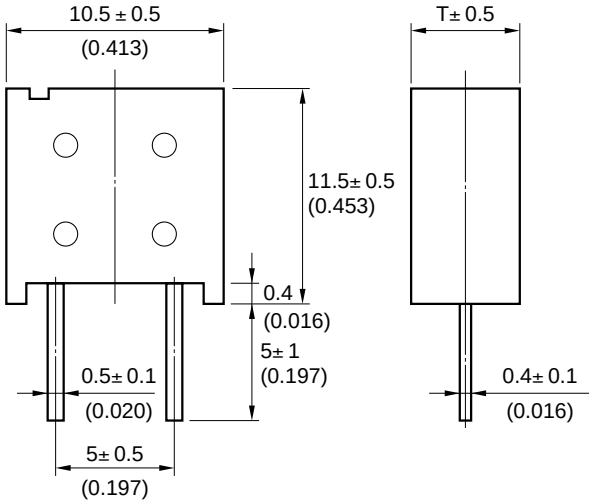

## Number of Packed Capacitors

Tape: 1000 pcs./box

## Markings




## Dimensions And Standard Ratings




Unit: mm
(inch)

### ● 5.5 V Type

| Part Number | | Max. Rated Voltage (VDC) | Nominal Capacitance | | Max. ESR (at 1 kHz) (Ω) | Max. Current at 30 minutes (mA) | Voltage Holding Characteristic Min. (V) | T mm (inch) | Weight g (oz) |
|---|---|---|---|---|---|---|---|---|---|
| | Ammo pack | | Charge System (F) | Discharge System (F) | | | | | |
| FM0H103Z | FM0H103ZTP ( ) | 5.5 | 0.01 | 0.014 | 300 | 0.015 | 4.2 | 5.0 (0.197) | 1.3 (0.046) |
| FM0H223Z | FM0H223ZTP ( ) | 5.5 | 0.022 | 0.028 | 200 | 0.033 | 4.2 | 5.0 (0.197) | 1.3 (0.046) |
| FM0H473Z | FM0H473ZTP ( ) | 5.5 | 0.047 | 0.06 | 200 | 0.071 | 4.2 | 5.0 (0.197) | 1.3 (0.046) |
| FM0H104Z | FM0H104ZTP ( ) | 5.5 | 0.10 | 0.13 | 100 | 0.15 | 4.2 | 6.5 (0.256) | 1.6 (0.056) |
| FM0H224Z | FM0H224ZTP ( ) | 5.5 | – | 0.22 | 100 | 0.33 | 4.2 | 6.5 (0.256) | 1.6 (0.056) |

**Note:** To complete part number, insert lead length H. (16 or 18 mm: Refer to Taping Specification on page 34.)

## ● 3.5 V Type

| Part Number | | Max. Rated Voltage (VDC) | Nominal Capacitance | | Max. ESR (at 1 kHz) (Ω) | Max. Current at 30 minutes (mA) | T mm (inch) | Weight g (oz) |
|---|---|---|---|---|---|---|---|---|
| | Ammo pack | | Charge System (F) | Discharge System (F) | | | | |
| FM0V473Z | FM0V473ZTP ( ) | 3.5 | 0.047 | 0.06 | 200 | 0.042 | 5.0 (0.197) | 1.3 (0.046) |
| FM0V104Z | FM0V104ZTP ( ) | 3.5 | 0.10 | 0.13 | 100 | 0.090 | 5.0 (0.197) | 1.3 (0.046) |
| FM0V224Z | FM0V224ZTP ( ) | 3.5 | 0.22 | 0.30 | 100 | 0.20 | 6.5 (0.256) | 1.6 (0.056) |

**Note:** To complete part number, insert lead length H. (16 or 18 mm: Refer to Taping Specification on page 34.)

## ● FME Type ( Backup Large Current , mA Order )

| Part Number | | Max. Rated Voltage (VDC) | Nominal Capacitance | | Max. ESR (at 1 kHz) (Ω) | Max. Current at 30 minutes (mA) | T mm (inch) | Weight g (oz) |
|---|---|---|---|---|---|---|---|---|
| | Ammo pack | | Charge System (F) | Discharge System (F) | | | | |
| FME0H223Z | FME0H223ZTP ( ) | 5.5 | 0.022 | 0.028 | 40 | 0.033 | 5.0 (0.197) | 1.3 (0.046) |
| FME0H473Z | FME0H473ZTP ( ) | 5.5 | 0.047 | 0.06 | 20 | 0.071 | 5.0 (0.197) | 1.3 (0.046) |

**Note:** To complete part number, insert lead length H. (16 or 18 mm: Refer to Taping Specification on page 34.)

## ● FMR Type ( Extended Operating Temperature range )

| Part Number | | Max. Rated Voltage (VDC) | Nominal Capacitance | | Max. ESR (at 1 kHz) (Ω) | Max. Current at 30 minutes (mA) | Voltage Holding Characteristic Min.(V) | T mm (inch) | Weight g (oz) |
|---|---|---|---|---|---|---|---|---|---|
| | Ammo pack | | Charge System (F) | Discharge System (F) | | | | | |
| FMR0H473Z | FMR0H473ZTP ( ) | 5.5 | 0.047 | 0.062 | 200 | 0.071 | 4.2 | 6.5 | 1.6 |

**Note:** To complete part number, insert lead length H. (16 or 18 mm: Refer to Taping Specification on page 34.)

## ● FM 6.5V Type

| Part Number | | Max. Rated Voltage (VDC) | Nominal Capacitance | | Max. ESR (at 1 kHz) (Ω) | Max. Current at 30 minutes (mA) | T mm (inch) | Weight g (oz) |
|---|---|---|---|---|---|---|---|---|
| | Ammo pack | | Charge System (F) | Discharge System (F) | | | | |
| FM0J473Z | FM0J473ZTP ( ) | 6.5 | 0.047 | 0.062 | 200 | 0.085 | 6.5 | 1.6 |

**Note:** To complete part number, insert lead length H. (16 or 18 mm: Refer to Taping Specification on page 34.)

# Specifications 5.5 V Type

| Item | | Standard | | Test Conditions Conforming to JIS C 5102-1994 |
|---|---|---|---|---|
| Operating Temperature Range | | –25°C to +70°C | | |
| Maximum Operating Voltage | | 5.5 VDC | | |
| Nominal Capacitance Range | | See standard list | | |
| Capacitance Allowance | | +80%, –20% | | See characteristics measuring method. |
| Equivalent Series Resistance | | See standard list | | See characteristics measuring method. |
| Current (30-minutes value) | | See standard list | | See characteristics measuring method. |
| Surge Voltage | | Capacitance | More than 90% of initial requirement | Conforms to 7.14<br>Surge Voltage: 6.3 V<br>Temperature: 70 ± 2°C<br>Charge: 30 sec.<br>Discharge: 9 min. 30 sec.<br>Number of cycles 1000 cycles.<br>Series resistance:<br>0.01F: 1500 Ω 0.22F: 56 Ω<br>0.022 F: 560 Ω<br>0.047 F: 300 Ω<br>0.10 F: 150 Ω<br>Discharge resistance: 0 Ω |
| | | Equivalent series resistance | Not to exceed 120% of initial requirement | |
| | | Current (30-minute value) | Not to exceed 120% of initial requirement | |
| | | Appearance | No obvious abnormality. | |
| Temperature Variation of Characteristics | Phase 2 | Capacitance | 50% or higher of initial value | Conforms to 7.12<br>Phase 1: +25 ± 2°C<br>Phase 2: –25 ± 2°C<br>Phase 3: –40 ± 2°C<br>Phase 4: +25 ± 2°C<br>Phase 5: +70 ± 2°C<br>Phase 6: +25 ± 2°C |
| | | Equivalent series resistance | 4 or less times initial value | |
| | Phase 5 | Capacitance | 200% or below of initial value | |
| | | Equivalent series resistance | Satisty initial standard value | |
| | | Current (30-minute value) | 1.5 CV (mA) or below | |
| | Phase 6 | Capacitance | Within ±20% of initial value | |
| | | Equivalent series resistance | Satisty initial standard value | |
| | | Current (30-minute value) | Satisty initial standard value | |
| Lead Strengh (Tensile) | | No loosening nor permanent damage of the leads | | Conforms to 8.1.2 (1)<br>1 kg 10sec. |
| Vibration Resistance | | Capacitance | Satisty initial standard value | Conforms to 8.2.3<br>Frequency : 10 to 55 Hz<br>Test duration : 6 hours |
| | | Equivalent series resistance | | |
| | | Current (30-minute value) | | |
| | | Appearance | No obvious abnormality | |
| Solderability | | 3/4 or more of the pin surface should be covered with new solder | | Conforms to 8.4<br>Solder temperature: 230 ± 5°C<br>Dipping duration: 5 ± 0.5 sec.<br>Dipped up to 1.6 mm from the lower end of the capacitor. |
| Soldering Heat Resistance | | Capacitance | Satisty initial standard value | Conforms to 8.5<br>Solder temperature: 260 ± 10°C<br>Dipping duration: 10 ± 1 sec.<br>Dipped up to 1.6 mm from the lower end of the capacitor. |
| | | Equivalent series resistance | | |
| | | Current (30-minute value) | | |
| | | Appearance | No obvious abnormality | |
| Temperature Cycle | | Capacitance | Satisty initial standard value | Conforms to 9.3<br>Temperature condition:<br>–25°C → normal temperature<br>→ +70°C → normal temperature<br>Number of cycles: 5 cycles |
| | | Equivalent series resistance | | |
| | | Current (30-minute value) | | |
| | | Appearance | No obvious abnormality | |
| Humidity Resistance | | Capacitance | Within 20% of initial value | Conforms to 9.5<br>Temperature: 40 ± 2°C<br>Relative humidity: 90 to 95% RH<br>Test duration: 240 ± 8 hours |
| | | Equivalent series resistance | 1.2 or less times initial standard value | |
| | | Current (30-minute value) | 1.2 or less times initial standard value | |
| | | Appearance | No obuious abnormality | |
| High Temperature Load | | Capacitance | Within 30% of initial value | Conforms to 9.10<br>Temperature: 70 ± 2°C<br>Voltage applied: 5.5 Vdc<br>Series protection resistance: 0 Ω<br>Test duration: $1000^{+48}_{0}$ hours |
| | | Equivalent series resistance | Twice or less times initial standard value | |
| | | Current (30-minute value) | Twice or less times initial standard value | |
| | | Appearance | No obvious abnormality | |
| Voltage Holding Characteristics (Self Discharge ) | | Voltage between terminal leads higher than 4.2 V | | Charging condition: Voltage applied: 5.0 VDC<br>Series resistance: 0 Ω<br>Charging time: 24hours |
| | | | | Storage: Time: 24hours<br>Temperature:Lower than 25°C<br>Humidity:Lower than 70%RH |

# Specifications 3.5 V Type

| Item | | Standard | | Test Conditions Conforming to JIS C 5102-1994 |
|---|---|---|---|---|
| Operating Temperature Range | | –25°C to +70°C | | |
| Maximum Operating Voltage | | 3.5 VDC | | |
| Nominal Capacitance Range | | See standard list | | |
| Capacitance Allowance | | +80%, –20% | | See characteristics measuring method. |
| Equivalent Series Resistance | | See standard list | | See characteristics measuring method. |
| Current (30-minutes value) | | See standard list | | See characteristics measuring method. |
| Surge Voltage | | Capacitance | More than 90% of initial requirement | Conforms to 7.14<br>Surge voltage: 4.0 V<br>Temperature: 70 ± 2°C<br>Charge: 30 sec.<br>Discharge: 9 min. 30 sec.<br>Number of cycles 1000 cycles.<br>Series resistance:<br>0.047 F: 300 Ω<br>0.10 F: 150 Ω<br>0.22 F: 56 Ω<br>Discharge resistance: 0 Ω |
| | | Equivalent series resistance | Not to exceed 120% of initial requirement | |
| | | Current (30-minute value) | Not to exceed 120% of initial requirement | |
| | | Appearance | No obvious abnormality | |
| Temperature Variation of Characteristics | Phase 2 | Capacitance | 50% or higher of initial value | Conforms to 7.12<br>Phase 1: +25 ± 2°C<br>Phase 2: –25 ± 2°C<br>Phase 3: –40 ± 2°C<br>Phase 4: +25 ± 2°C<br>Phase 5: +70 ± 2°C<br>Phase 6: +25 ± 2°C |
| | | Equivalent series resistance | 4 or less times initial value | |
| | Phase 5 | Capacitance | 200% or below of initial value | |
| | | Equivalent series resistance | Satisty initial standard value | |
| | | Current (30-minute value) | 1.5 CV (mA) or below | |
| | Phase 6 | Capacitance | Within ±20% of initial value | |
| | | Equivalent series resistance | Satisty initial standard value | |
| | | Current (30-minute value) | Satisty initial standard value | |
| Lead Strengh (Tensile) | | No loosening nor permanent damage of the leads | | Conforms to 8.1.2 (1)<br>1 kg 10 sec |
| Vibration Resistance | | Capacitance | Satisty initial standard value | Conforms to 8.2.3<br>Frequency: 10 to 55 Hz<br>Test duration: 6 hours |
| | | Equivalent series resistance | | |
| | | Current (30-minute value) | | |
| | | Appearance | No considerable abnormality | |
| Solderability | | 3/4 or more of the pin surface should be covered with new solder | | Conforms to 8.4<br>Solder temperature: 230 ± 5°C<br>Dipping duration: 5 ± 0.5 sec.<br>Dipped up to 1.6 mm from for the lower end of the capacitor. |
| Soldering Heat Resistance | | Capacitance | Satisty initial standard value | Conforms to 8.5<br>Solder temperature: 260 ± 10°C<br>Dipping duration: 10 ± 1 sec.<br>Dipped up to 1.6 mm from for the lower end of the capacitor. |
| | | Equivalent series resistance | | |
| | | Current (30-minute value) | | |
| | | Appearance | No obvious abnormality | |
| Temperature Cycle | | Capacitance | Satisty initial standard value | Conforms to 9.3<br>Temperature condition:<br>–25°C → normal temperature<br>→ +70°C → normal temperature<br>Number of cycles: 5 cycles |
| | | Equivalent series resistance | | |
| | | Current (30-minute value) | | |
| | | Appearance | No obvious abnormality | |
| Humidity Resistance | | Capacitance | Within ±20% of initial value | Conforms to 9.5<br>Temperature: 40 ± 2°C<br>Relative humidity: 90 to 95% RH<br>Test duration: 240 ± 8 hours |
| | | Equivalent series resistance | 1.2 or less times initial standard value | |
| | | Current (30-minute value) | 1.2 or less times initial standard value | |
| | | Appearance | No obvious abnormality | |
| High Temperature Load | | Capacitance | Within 30% of initial value | Conforms to 9.10<br>Temperature: 70 ± 2°C<br>Voltage applied: 3.5 Vdc<br>Series protection resistance: 0 Ω<br>Test duration: $1000^{+48}_{0}$ hours |
| | | Equivalent series resistance | Twice or less times initial standard value | |
| | | Current (30-minute value) | Twice or less times initial standard value | |
| | | Appearance | No obvious abnormality | |

# Specifications FME Type

| Item | | Standard | | Test Conditions Conforming JIS C 5102-1994 |
|---|---|---|---|---|
| Operating Temperature Range | | –25°C to +70°C | | |
| Maximum Operating Voltage | | 5.5 VDC | | |
| Nominal Capacitance Range | | See standard list | | |
| Capacitance Allowance | | +80%, –20% | | See characteristics measuring method. |
| Equivalent Series Resistance | | See standard list | | See characteristics measuring method. |
| Current (30-minutes value) | | See standard list | | See characteristics measuring method. |
| Surge Voltage | | Capacitance | More than 90% of initial requirement | Conforms to 7.14<br>Surge Voltage: 7.4 V<br>Temperature: 70 ± 2°C<br>Chargs: 30 sec.<br>Dischargs: 9 min. 30 sec.<br>Number of cycles 1000 cycles.<br>Series resistance:<br>0.022 F: 560 Ω<br>0.047 F: 300 Ω<br>Discharge resistance: 0 Ω |
| | | Equivalent series resistance | Not to exceed 120% of initial requirement | |
| | | Current (30-minute value) | Not to exceed 120% of initial requirement | |
| | | Appearance | No obvious abnormality | |
| Temperature Variation of Characteristics | Phase 2 | Capacitance | 50% or higher of initial value | Conforms to 7.12<br>Phase 1: +25 ± 2°C<br>Phase 2: –25 ± 2°C<br>Phase 3: –40 ± 2°C<br>Phase 4: +25 ± 2°C<br>Phase 5: +70 ± 2°C<br>Phase 6: +25 ± 2°C |
| | | Equivalent series resistance | 3 or less times initial value | |
| | Phase 5 | Capacitance | 150% or below of initial value | |
| | | Equivalent series resistance | Satisty initial standard value | |
| | | Current (30-minute value) | 1.5 CV (mA) or below | |
| | Phase 6 | Capacitance | Within ±20% of initial value | |
| | | Equivalent series resistance | Satisty initial standard value | |
| | | Current (30-minute value) | Satisty initial standard value | |
| Lead Strengh (Tensile) | | No loosening nor permanent damage of the leads | | Conforms to 8.1.2 (1)<br>1 kg 10 sec |
| Vibration Resistance | | Capacitance | Should satisty initial standard value | Conforms to 8.2.3<br>Frequency: 10 to 55 Hz<br>Test duration: 6 hours |
| | | Equivalent series resistance | | |
| | | Current (30-minute value) | | |
| | | Appearance | There should be no considerable abnormality | |
| Solderability | | 3/4 or more of the pin surface should be covered with new solder | | Conforms to 8.4<br>Solder temperature: 230 ± 5°C<br>Dipping duration: 5 ± 0.5 sec.<br>Dipped up to 1.6 mm from the lower end of the capacitor. |
| Soldering Heat Resistance | | Capacitance | Satisty initial standard value | Conforms to 8.5<br>Solder temperature: 260 ± 10°C<br>Dipping duration: 10 ± 1 sec.<br>Dipped up to 1.6 mm from the lower end of the capacitor. |
| | | Equivalent series resistance | | |
| | | Current (30-minute value) | | |
| | | Appearance | No obvious abnormality | |
| Temperature Cycle | | Capacitance | Satisty initial standard value | Conforms to 9.3<br>Temperature condition:<br>–25°C → normal temperature<br>→ +70°C → normal temperature<br>Number of cycles: 5 cycles |
| | | Equivalent series resistance | | |
| | | Current (30-minute value) | | |
| | | Appearance | No obvious abnormality | |
| Humidity Resistance | | Capacitance | Within ±20% of initial value | Conforms to 9.5<br>Temperature: 40 ± 2°C<br>Relative humidity: 90 to 95% RH<br>Test duration: 240 ± 8 hours |
| | | Equivalent series resistance | 1.2 or less times initial standard value | |
| | | Current (30-minute value) | 1.2 or less times initial standard value | |
| | | Appearance | No obvious abnormality | |
| High Temperature Load | | Capacitance | Within 30% of initial value | Conforms to 9.10<br>Temperature: 70 ± 2°C<br>Voltage applied: 5.5 Vdc<br>Series protection resistance: 0 Ω<br>Test duration: $1000\ ^{+48}_{0}$ hours |
| | | Equivalent series resistance | Twice or less times initial standard value | |
| | | Current (30-minute value) | Twice or less times initial standard value | |
| | | Appearance | No obvious abnormality | |

# Specifications FMR Type

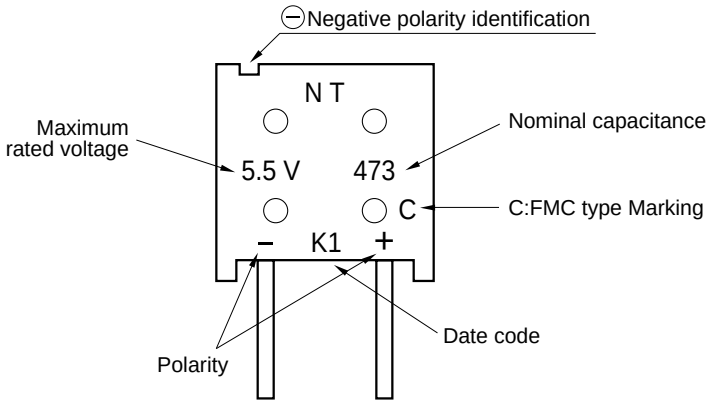
| Item | | Standard | | Test Conditions Conforming to JIS C 5102-1994 |
|---|---|---|---|---|
| Operating Temperature Range | | –40°C to +85°C | | |
| Maximum Operating Voltage | | 5.5 VDC | | |
| Nominal Capacitance Range | | See standard list | | |
| Capacitance Allowance | | +80%, –20% | | See characteristics measuring method. |
| Equivalent Series Resistance | | See standard list | | See characteristics measuring method. |
| Current (30-minutes value) | | See standard list | | See characteristics measuring method. |
| Surge Voltage | | Capacitance | More than 90% of initial requirement | Conforms to 7.14<br>Surge Voltage: 6.3 V<br>Temperature: 85 ± 2°C<br>Charge: 30 sec.<br>Discharge: 9 min. 30 sec.<br>Number of cycles 1000 cycles.<br>Series resistance:<br>0.047 F: 300 Ω<br>Discharge resistance: 0 Ω |
| | | Equivalent series resistance | Not to exceed 120% of initial requirement | |
| | | Current (30-minute value) | Not to exceed 120% of initial requirement | |
| | | Appearance | No obvious abnormality | |
| Temperature Variation of Characteristics | Phase 2 | Capacitance | 50% or higher initial value | Conforms to 7.12<br>Phase 1: +25 ± 2°C<br>Phase 2: –25 ± 2°C<br>Phase 3: –40 ± 2°C<br>Phase 4: +25 ± 2°C<br>Phase 5: +85 ± 2°C<br>Phase 6: +25 ± 2°C |
| | | Equivalent series resistance | 4 or less times initial value | |
| | Phase 3 | Capacitance | 30% or higher initial value | |
| | | Equivalent series resistance | 7 or less times initial value | |
| | Phase 5 | Capacitance | 200% or higher initial value | |
| | | Equivalent series resistance | Satisfy initial standard value | |
| | | Current (30-minute value) | 1.5 CV (mA) or below | |
| | Phase 6 | Capacitance | Within ±20% of initial standard value | |
| | | Equivalent series resistance | Satisfy initial standard value | |
| | | Current (30-minute value) | Satisfy initial standard value | |
| Lead Strengh (Tensile) | | No loosening nor permanent damage of the leads | | Conforms to 8.1.2 (1)<br>1 kg 10sec. |
| Vibration Resistance | | Capacitance | Satisty initial standard value | Conforms to 8.2.3<br>Frequency : 10 to 55 Hz<br>Test duration : 6 hours |
| | | Equivalent series resistance | | |
| | | Current (30-minute value) | | |
| | | Appearance | No obvious abnormality | |
| Solderability | | 3/4 or more of the pin surface should be covered with new solder. | | Conforms to 8.4<br>Solder temperature: 230 ± 5°C<br>Dipping duration: 5 ± 0.5 sec.<br>Dipped up to 1.6 mm from the lower end of the capacitor. |
| Soldering Heat Resistance | | Capacitance | Satisty initial standard value | Conforms to 8.5<br>Solder temperature: 260 ± 10°C<br>Dipping duration: 10 ± 1 sec.<br>Dipped up to 1.6 mm from the lower end of the capacitor. |
| | | Equivalent series resistance | | |
| | | Current (30-minute value) | | |
| | | Appearance | No obvious abnormality | |
| Temperature Cycle | | Capacitance | Satisty initial standard value | Conforms to 9.3<br>Temperature condition:<br>–40°C → normal temperature<br>→ +85°C → normal temperature<br>Number of cycles: 5 cycles |
| | | Equivalent series resistance | | |
| | | Current (30-minute value) | | |
| | | Appearance | No obvious abnormality | |
| Humidity Resistance | | Capacitance | Within 20% of initial value | Conforms to 9.5<br>Temperature: 40 ± 2°C<br>Relative humidity: 90 to 95% RH<br>Test duration: 240 ± 8 hours |
| | | Equivalent series resistance | 1.2 or less times initial standard value | |
| | | Current (30-minute value) | 1.2 or less times initial standard value | |
| | | Appearance | No obuious abnormality | |
| High Temperature Load | | Capacitance | Within 30% of initial value | Conforms to 9.10<br>Temperature: 85 ± 2°C<br>Voltage applied: 5.5 Vdc<br>Series protection resistance: 0 Ω<br>Test duration: $1000\ ^{+48}_{0}$ hours |
| | | Equivalent series resistance | Twice or less times initial standard value | |
| | | Current (30-minute value) | Twice or less times initial standard value | |
| | | Appearance | No obvious abnormality | |
| Voltage Holding Characteristics (Self Discharge ) | | Voltage between terminal leads higher than 4.2 V | | Charging condition: Voltage applied: 5.0 VDC<br>Series resistance: 0 Ω<br>Charging time: 24hours |
| | | | | Storage: Time: 24hours<br>Temperature:Lower than 25°C<br>Humidity:Lower than 70%RH |

# Specifications FM 6.5V Type

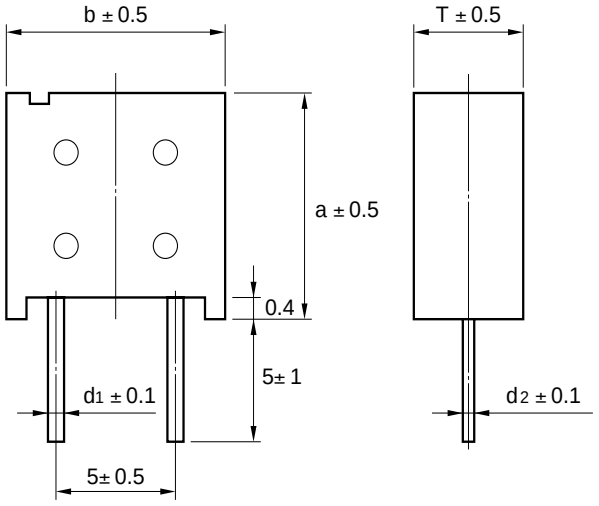
| Item | | Standard | | Test Conditions Conforming to JIS C 5102-1994 |
|---|---|---|---|---|
| Operating Temperature Range | | –25°C to +70°C | | |
| Maximum Operating Voltage | | 6.5 VDC | | |
| Nominal Capacitance Range | | See standard list | | |
| Capacitance Allowance | | +80%, –20% | | See characteristics measuring method. |
| Equivalent Series Resistance | | See standard list | | See characteristics measuring method. |
| Current (30-minutes value) | | See standard list | | See characteristics measuring method. |
| Surge Voltage | | Capacitance | More than 90% of initial requirement | Conforms to 7.14<br>Surge Voltage: 7.4 V<br>Temperature: 70 ± 2°C<br>Charge: 30 sec.<br>Discharge: 9 min. 30 sec.<br>Number of cycles 1000 cycles.<br>Series resistance:<br>0.047 F: 300 Ω<br>Discharge resistance: 0 Ω |
| | | Equivalent series resistance | Not to exceed 120% of initial requirement | |
| | | Current (30-minute value) | Not to exceed 120% of initial requirement | |
| | | Appearance | No obvious abnormality | |
| Temperature Variation of Characteristics | Phase 2 | Capacitance | 50% or higher of initial value | Conforms to 7.12<br>Phase 1: +25 ± 2°C<br>Phase 2: –25 ± 2°C<br>Phase 3: –40 ± 2°C<br>Phase 4: +25 ± 2°C<br>Phase 5: +70 ± 2°C<br>Phase 6: +25 ± 2°C |
| | | Equivalent series resistance | 4 or less times initial value | |
| | Phase 5 | Capacitance | 200% or below of initial value | |
| | | Equivalent series resistance | Satisty initial standard value | |
| | | Current (30-minute value) | 1.5 CV (mA) or below | |
| | Phase 6 | Capacitance | Within ±20% of initial value | |
| | | Equivalent series resistance | Satisty initial standard value | |
| | | Current (30-minute value) | Satisty initial standard value | |
| Lead Strengh (Tensile) | | No loosening nor permanent damage of the leads | | Conforms to 8.1.2 (1)<br>1 kg 10sec. |
| Vibration Resistance | | Capacitance | Satisty initial standard value | Conforms to 8.2.3<br>Frequency : 10 to 55 Hz<br>Test duration : 6 hours |
| | | Equivalent series resistance | | |
| | | Current (30-minute value) | | |
| | | Appearance | No obvious abnormality | |
| Solderability | | 3/4 or more of the pin surface should be covered with new solder | | Conforms to 8.4<br>Solder temperature: 230 ± 5°C<br>Dipping duration: 5 ± 0.5 sec.<br>Dipped up to 1.6 mm from the lower end of the capacitor. |
| Soldering Heat Resistance | | Capacitance | Satisty initial standard value | Conforms to 8.5<br>Solder temperature: 260 ± 10°C<br>Dipping duration: 10 ± 1 sec.<br>Dipped up to 1.6 mm from the lower end of the capacitor. |
| | | Equivalent series resistance | | |
| | | Current (30-minute value) | | |
| | | Appearance | No obvious abnormality | |
| Temperature Cycle | | Capacitance | Satisty initial standard value | Conforms to 9.3<br>Temperature condition:<br>–25°C → normal temperature<br>→ +70°C → normal temperature<br>Number of cycles: 5 cycles |
| | | Equivalent series resistance | | |
| | | Current (30-minute value) | | |
| | | Appearance | No obvious abnormality | |
| Humidity Resistance | | Capacitance | Within 20% of initial value | Conforms to 9.5<br>Temperature: 40 ± 2°C<br>Relative humidity: 90 to 95% RH<br>Test duration: 240 ± 8 hours |
| | | Equivalent series resistance | 1.2 or less times initial standard value | |
| | | Current (30-minute value) | 1.2 or less times initial standard value | |
| | | Appearance | No obuious abnormality | |
| High Temperature Load | | Capacitance | Within 30% of initial value | Conforms to 9.10<br>Temperature: 70 ± 2°C<br>Voltage applied: 6.5 Vdc<br>Series protection resistance: 0 Ω<br>Test duration: $1000\ ^{+48}_{0}$ hours |
| | | Equivalent series resistance | Twice or less times initial standard value | |
| | | Current (30-minute value) | Twice or less times initial standard value | |
| | | Appearance | No obvious abnormality | |

● **FMC Type**

## Markings




## Dimensions And Standard Ratings




Unit: mm

| Part Number | | Max. Rated Voltage (VDC) | Nominal Capacitance Charge System ( F ) | Discharge System ( F ) | Max. ESR (at 1 kHz) ( Ω ) | Max. Current at 30 minutes ( mA ) | Voltage Holding Characteristic Min. ( V ) | a (mm) | b (mm) | T (mm) | $d_1$ (mm) | $d_2$ (mm) | Weight ( g ) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ammo pack | | | | | | | | | | | | |
| FMC0H473Z | FMC0H473ZTP( ) | 5.5 | 0.047 | 0.062 | less than 100 | less than 0.071 | more than 4.2V | 11.5 | 10.5 | 5.0 | 0.5 | 0.4 | 1.3 |
| FMC0H104Z | FMC0H104ZTP( ) | 5.5 | 0.10 | 0.13 | less than 50 | less than 0.15 | more than 4.2V | 11.5 | 10.5 | 6.5 | 0.5 | 0.4 | 1.6 |
| FMC0H334Z | FMC0H334ZTP( ) | 5.5 | – | 0.33 | less than 25 | less than 0.50 | more than 4.2V | 15.0 | 14.0 | 9.0 | 0.6 | 0.6 | 3.5 |

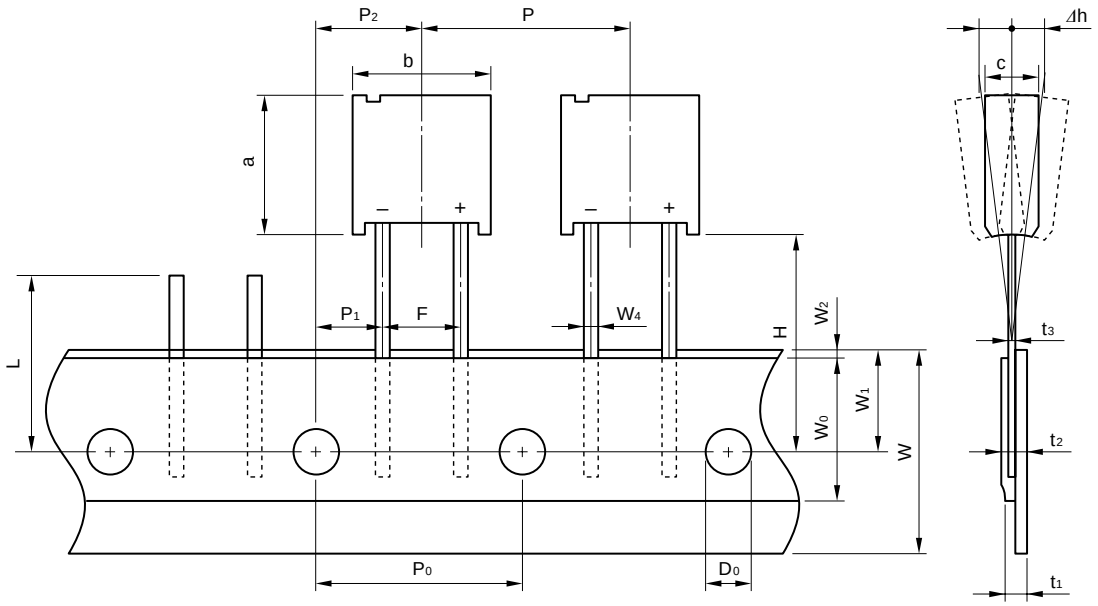
Chip parts applicable to treatment in bond hardening furnace (160 ± 5°C for 120 ±10 seconds)

Note: To complete part number, insert lead length H. (16 or 18 mm: Refer to Taping Specification on page 34 or 35.)

# Specifications FMC Type

| Item | | Standard | | Test Conditions Conforming to JIS C 5102-1994 |
|---|---|---|---|---|
| Operating Temperature Range | | –25°C to +70˚C | | |
| Maximum Operating Voltage | | 5.5 VDC | | |
| Nominal Capacitance Range | | 0.047F , 0.10F , 0.33F | | |
| Capacitance Allowance | | +80%, –20% | | See characteristics measuring method. |
| Equivalent Series Resistance | | See standard list | | See characteristics measuring method. |
| Current (30-minutes value) | | See standard list | | See characteristics measuring method. |
| Surge Voltage | | Capacitance | More than 90% of initial requirement | Conforms to 7.14<br>Surge Voltage: 6.3 V<br>Temperature: 70 ± 2°C<br>Chargs: 30 sec.<br>Dischargs: 9 min. 30 sec.<br>Number of cycles 1000 cycles.<br>Series resistance:<br>0.047 F: 300 Ω<br>0.1 F: 150 Ω<br>0.33 F: 51 Ω<br>Discharge resistance: 0 Ω |
| | | Equivalent series resistance | Not to exceed 120% of initial requirement | |
| | | Current (30-minute value) | Not to exceed 120% of initial requirement | |
| | | Appearance | No obvious abnormality. | |
| Temperature Variation of Characteristics | Phase 2 | Capacitance | 50% or higher of initial value | Conforms to 7.12<br>Phase 1: +25 ± 2°C<br>Phase 2: –25 ± 2°C<br>Phase 3: –40 ± 2°C<br>Phase 4: +25 ± 2°C<br>Phase 5: +70 ± 2°C<br>Phase 6: +25 ± 2°C |
| | | Equivalent series resistance | 4 or less times initial value | |
| | Phase 5 | Capacitance | 200% or below of initial value | |
| | | Equivalent series resistance | Satisty initial standard value | |
| | | Current (30-minute value) | 1.5 CV (mA) or below | |
| | Phase 6 | Capacitance | Within ±20% of initial value | |
| | | Equivalent series resistance | Satisty initial standard value | |
| | | Current (30-minute value) | Satisty initial standard value | |
| Lead Strengh (Tenile) | | No loosening nor permanent damage of the leads | | Conforms to 8.1.2 (1)<br>1 kg 10 sec |
| Vibration Resistance | | Capacitance | Should satisty initial standard value | Conforms to 8.2.3<br>Frequency: 10 to 55 Hz<br>Test duration: 6 hours |
| | | Equivalent series resistance | | |
| | | Current (30-minute value) | | |
| | | Appearance | There should be no considerable abnormality | |
| Solderability | | 3/4 or more of the pin surface should be covered with new solder | | Conforms to 8.4<br>Solder temperature: 230 ± 5°C<br>Dipping duration: 5 ± 0.5 sec.<br>Dipped up to 1.6 mm from the lower end of the capacitor. |
| Soldering Heat Resistance | | Capacitance | Satisty initial standard value | Conforms to 8.5<br>Solder temperature: 260 ± 10°C<br>Dipping duration: 10 ± 1 sec.<br>Dipped up to 1.6 mm from the lower end of the capacitor. |
| | | Equivalent series resistance | | |
| | | Current (30-minute value) | | |
| | | Appearance | No obvious abnormality | |
| Temperature Cycle | | Capacitance | Satisty initial standard value | Conforms to 9.3<br>Temperature condition:<br>–25°C → normal temperature<br>→ +70°C → normal temperature<br>Number of cycles: 5 cycles |
| | | Equivalent series resistance | | |
| | | Current (30-minute value) | | |
| | | Appearance | No obvious abnormality | |
| Humidity Resistance | | Capacitance | Within ±20% of initial value | Conforms to 9.5<br>Temperature: 40 ± 2°C<br>Relative humidity: 90 to 95% RH<br>Test duration: 240 ± 8 hours |
| | | Equivalent series resistance | 1.2 or less times initial standard value | |
| | | Current (30-minute value) | 1.2 or less times initial standard value | |
| | | Appearance | No obvious abnormality | |
| High Temperature Load | | Capacitance | Within 30% of initial value | Conforms to 9.10<br>Temperature: 70 ± 2°C<br>Voltage applied: 5.5 Vdc<br>Series protection resistance: 0 Ω<br>Test duration: $1000^{+48}_{0}$ hours |
| | | Equivalent series resistance | Twice or less times initial standard value | |
| | | Current (30-minute value) | Twice or less times initial standard value | |
| | | Appearance | No obvious abnormality | |
| Voltage Holding Characteristics (Self Dischage) | | Voltage between terminal leads higher then 4.2V | | Charging condition: Voltage applied: 5.0 VDC<br>Series resistance: 0 Ω<br>Charging time: 24hours |
| | | | | Storage: Time: 24hours<br>Temperature:Lower than 25°C<br>Humidity:Lower than 70%RH |

# Taping Specification (Ammo pack) (except FMC0H334ZTP( ))



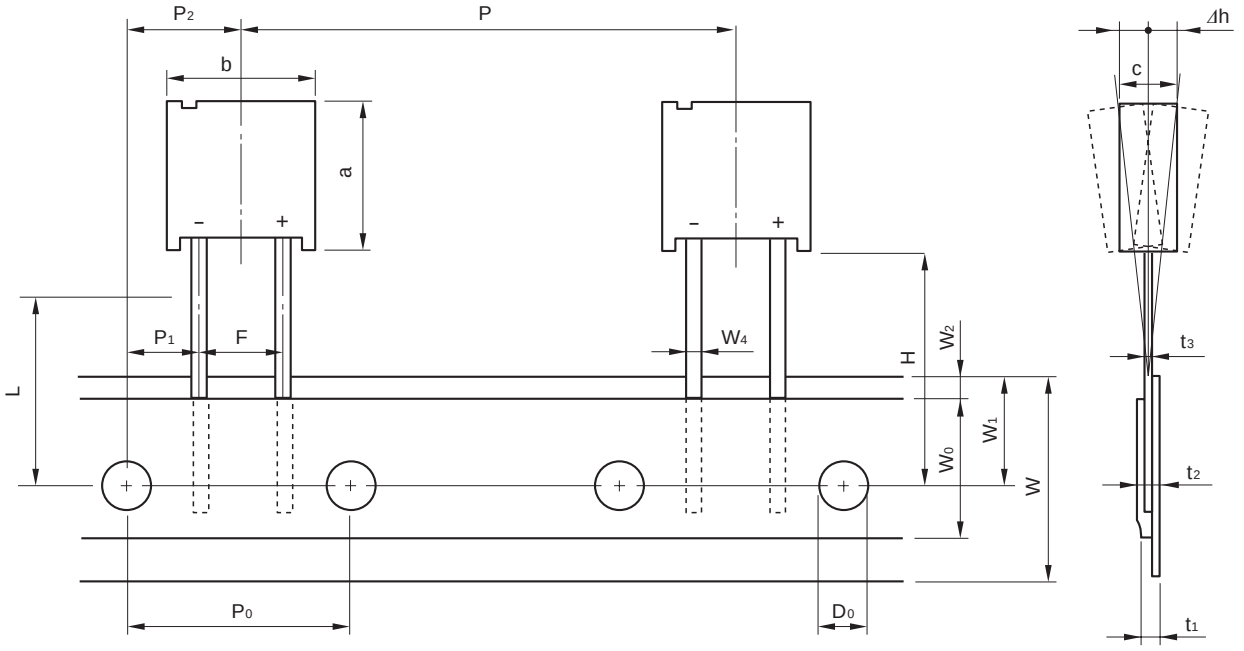

Unit : mm

| Item | Symbol | Value | Tolerance | Remarks |
|---|---|---|---|---|
| Component Height | a | 11.5 | ±0.5 | |
| Component Width | b | 10.5 | ±0.5 | |
| Component Thickness | C | – | ±0.5 | 5.5 V Type: 5.0/0.010 F~0.047 F, 6.5/0.10 F~0.22 F<br>3.5 V Type: 5.0/0.047 F~0.10 F, 6.5/0.22 F<br>FME Type: 5.0/0.022 F~0.047 F<br>6.5 Type: 6.5/0.022 F<br>FMR Type: 6.5/0.047 F<br>FMC Type: 5.0/0.047 F, 6.5/0.10 F |
| Lead-wire Width | $W_4$ | 0.5 | ±0.1 | |
| Lead-wire Thickness $t_3$ | $t_3$ | 0.4 | ±0.1 | |
| Pitch of Component | P | 12.7 | ±1.0 | |
| Sprocket Pitch | $P_0$ | 12.7 | ±0.3 | |
| Sprocket Hole Center to Lead | $P_1$ | 3.85 | ±0.7 | |
| Sprocket Hole to Component Center | $P_2$ | 6.35 | ±1.3 | |
| Lead Spacing | F | 5.0 | ±0.5 | |
| Component Alignment | $\Delta$h | 2.0 Max. | – | Including tiltiing caused by bending of lead wire |
| Tape Width | W | 18.0 | $^{+1.0}_{-0.5}$ | |
| Hold-down tape Width | $W_0$ | 12.5 Min. | – | |
| Sprocket Hole Position | $W_1$ | 9.0 | ±0.5 | |
| Hold-down Tape Position | $W_2$ | 3.0 Max. | – | No protrusion of tape |
| Height of Component from Tape Center | H | 16.0 | ±0.5 | |
| | | 18.0 | ±0.5 | |
| Sprocket Hole Diameter | $D_0$ | $\phi$4.0 | ±0.2 | |
| Total Tape Thickness | $t_1$ | 0.7 | ±0.2 | |
| | $t_2$ | 1.5 Max. | – | |
| Length of Shipped Lead | L | 11.0 Max. | – | |

# Packing Quantity

1000 pcs. / box

# Taping Specifications [FMC0H334ZTP( )]



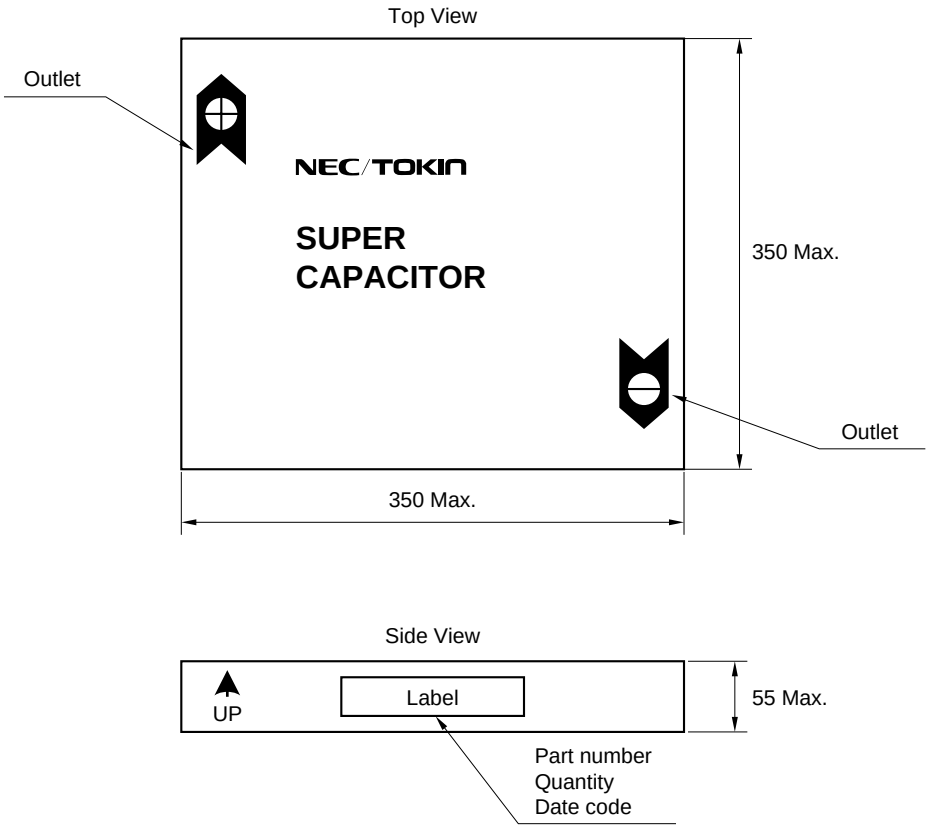

Unit : mm

| Item | Symbol | Value | Tolerance | Remarks |
|---|---|---|---|---|
| Component Height | a | 15.0 | ±0.5 | |
| Component Width | b | 14.0 | ±0.5 | |
| Component Thickness | c | 9.0 | ±0.5 | |
| Lead-wire Width | $W_4$ | 0.6 | ±0.1 | |
| Lead-wire Thickness | $t_3$ | 0.6 | ±0.1 | |
| Pitch of Component | P | 25.4 | ±1.0 | |
| Sprocket Pitch | $P_0$ | 12.7 | ±0.3 | |
| Sprocket Hole Center to Lead | $P_1$ | 3.85 | ±0.7 | |
| Sprocket Hole to Component Center | $P_2$ | 6.35 | ±1.3 | |
| Lead Spacing | F | 5.0 | ±0.5 | |
| Component Alignment | $\Delta$ h | 2.0 Max. | – | Including tiltiing caused by bending of lead wire |
| Tape Width | W | 18.0 | $^{+1.0}_{-0.5}$ | |
| Hold-down tape Width | $W_0$ | 12.5 Min. | – | |
| Sprocket Hole Position | $W_1$ | 9.0 | ±0.5 | |
| Hold-down Tape Position | $W_2$ | 3.0 Max. | – | No protrusion of tape |
| Height of Component from Tape Center | H | 16.0 | ±0.5 | |
| | | 18.0 | ±0.5 | |
| Sprocket Hole Diameter | $D_0$ | $\phi$4.0 | ±0.2 | |
| Total tape thickness | $t_1$ | 0.67 | ±0.2 | |
| | $t_2$ | 1.7 Max. | – | |
| Length of Shipped Lead | L | 11.0 Max. | – | |

# Packing Quantity

400 pcs. / box

## Packing dimensions




## Marking of Box

Marking shows the following items.

(a) Terminal direction
(b) Part number
(c) Quantity
(d) Date code
(e) Company logo

## Packing Quantity :

1000 pcs. / box (Except FMC0H334ZTP( ))
400 pcs. / box (FMC0H334ZTP( ))