

Metallized Polypropylene Film Capacitors (Dipped)



■ Features

- Metallized polypropylene structure
- Low loss at high frequency
- Small inherent temperature rise
- Flame retardant epoxy resin powder coating (UL94 V-0)

■ Typical Applications

- Widely used in high frequency, DC, AC and pulse circuits
- Providing optimum performance with small size in S-correction circuits for colour TV set
- Specially designed for S-correction circuits of large screen monitor and colour TV
- Suitable for the situation where applies high frequency and high current pulse

■ Specifications

| | | | | | |
|---|---|--------------|--------|--------|--------|
| Reference Standard | GB/T 14579(IEC 60384-17) | | | | |
| Climatic Category | 40/105/21 | | | | |
| Rated Temperature | 85°C | | | | |
| Operating Temperature Range | -40°C ~105°C (+85°C to +105°C: decreasing factor 1.25% per °C for U_R) | | | | |
| Rated Voltage | 100V、250V、400V、630V、1 000V、1 250V | | | | |
| Capacitance Range | 0.0010μF ~ 3.3μF | | | | |
| Capacitance Tolerance | ± 5%(J)、± 10%(K)、± 20%(M) | | | | |
| Voltage Proof | 1.6 U_R (5s) | | | | |
| Dissipation Factor | $\leq 10 \times 10^{-4}$ (1kHz, 20°C) | | | | |
| Insulation Resistance | $\geq 100\ 000M\Omega$, $C_N \leq 0.33\mu F$ $\geq 30\ 000s$, $C_N > 0.33\mu F$ (20°C ,100V, 1min) | | | | |
| Maximum Pulse Rise Time(dV/dt): | Pattern II | | | | |
| If the working voltage(U) is lower than the rated voltage(U_R),the capacitor can be worked at a higher dV/dt. In this case, the maximum allowed dV/dt is obtain by multiplying the right value with U_R/U . | $U_R(V)$ | dV/dt (V/μs) | | | |
| | | P=7.5 | P=10.0 | P=15.0 | P=22.5 |
| | 100/250 | 660 | 560 | 310 | 130 |
| | 400 | 900 | 780 | 600 | 300 |
| | 630 | 1 500 | 1 200 | 900 | 400 |
| | 1 000/1 250 | 2 500 | 2 200 | -- | -- |

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Part Number Codes

| | | | | | | | | | | | | | | | |
|----------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| RND 150H | M | P | P | 3 | A | 1 | P | 1 | 0 | K | 0 | I | 2 | 0 | 0 |

1. 1-3 Type of Capacitor:

| | | | |
|------|-----|-----|-----|
| TYPE | MKP | MEF | MPP |
| CODE | MKP | MEF | MPP |

2. 4-6 Rated Voltage:

| | | |
|---------------------|-----------------------|------------------------|
| 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. |

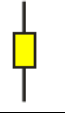

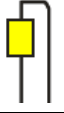











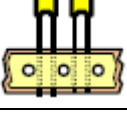
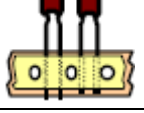
3. 7-9 Symbols of Capacitance in uF:

- 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:

| | | | | | | | | |
|-----------|-----|-----|-----|-----|------|------|----------|----------|
| 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:

| | | | | | | | | | | |
|-----------|---|---|---|---|---|---|---|---|---|--|
| CODE | 0 | | 1 | | 2 | | 3 | | 4 | |
| LEAD TYPE |  |  |  |  |  |  |  |  |  | |
| CODE | 5 | | 6 | | 7 | | A | | B | |
| LEAD TYPE |  |  |  |  |  |  |  | | | |

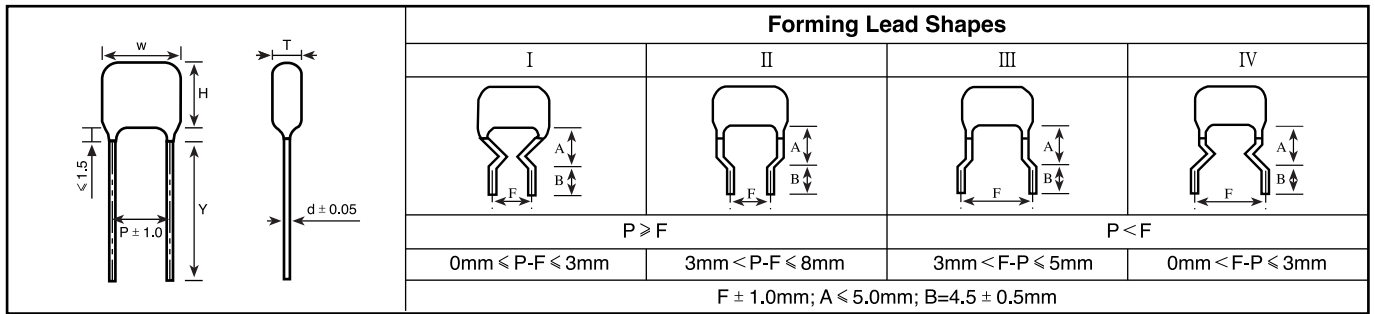
6. 12 Lead Space (mm)

| | | | | | | | | | | | | | | | | | |
|-------|------|------|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|---|
| 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 Lead Length 3A=3.5 4A=4.5 05=5mm 5A=5.5 20=20mm
- 8. 15 Feature Codes 0:RoHS A:Halogen Free B:Capacitive Divider

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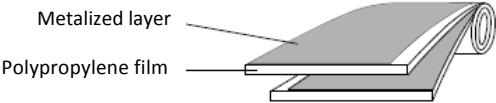
Dimensions(mm)



| Rated Cap. | 100/160VDC | | | | | 200/250VDC | | | | | 400VDC | | | | | 630VDC | | | | |
|------------|------------|------|------|-----------|------------|------------|------|------|-----------|------------|--------|------|------|-----------|------------|--------|------|------|-----------|------------|
| | W | H | T | P | d | W | H | T | P | d | W | H | T | P | d | W | H | T | P | d |
| | max | max | max | ± 1.0 | ± 0.05 | max | max | max | ± 1.0 | ± 0.05 | max | max | max | ± 1.0 | ± 0.05 | max | max | max | ± 1.0 | ± 0.05 |
| 4700pF | | | | | | | | | | | | | | | | 13.0 | 9.0 | 5.0 | 10.0 | 0.6 |
| 5600pF | | | | | | | | | | | | | | | | 13.0 | 9.5 | 5.0 | 10.0 | 0.6 |
| 6800pF | | | | | | 12.0 | 7.5 | 4.0 | 10.0 | 0.6 | | | | | | 13.0 | 10.0 | 5.0 | 10.0 | 0.6 |
| 8200pF | | | | | | | | | | | | | | | | 13.0 | 11.0 | 5.5 | 10.0 | 0.6 |
| 0.010uF | | | | | | 12.0 | 8.0 | 4.5 | 10.0 | 0.6 | 12.0 | 8.0 | 4.5 | 10.0 | 0.6 | 12.0 | 8.0 | 5.0 | 10.0 | 0.6 |
| 0.012uF | | | | | | 10.5 | 10.0 | 5.5 | 7.5 | 0.6 | 10.5 | 10.5 | 6.0 | 7.5 | 0.6 | 13.0 | 12.0 | 6.5 | 10.0 | 0.6 |
| 0.015uF | | | | | | 10.5 | 10.5 | 5.5 | 7.5 | 0.6 | 10.5 | 11.0 | 6.5 | 7.5 | 0.6 | 13.0 | 12.5 | 7.0 | 10.0 | 0.6 |
| 0.018uF | | | | | | 10.5 | 10.5 | 5.5 | 7.5 | 0.6 | 10.5 | 11.5 | 7.0 | 7.5 | 0.6 | 13.0 | 13.0 | 7.5 | 10.0 | 0.6 |
| 0.022uF | 10.5 | 9.0 | 5.5 | 7.5 | 0.6 | 12.0 | 8.0 | 4.5 | 10.0 | 0.6 | 10.5 | 12.0 | 8.0 | 7.5 | 0.6 | 13.0 | 13.5 | 8.0 | 10.0 | 0.6 |
| 0.027uF | 10.5 | 9.0 | 5.5 | 7.5 | 0.6 | 10.5 | 11.0 | 6.5 | 7.5 | 0.6 | 13.0 | 12.0 | 6.5 | 10.0 | 0.6 | 13.0 | 14.0 | 8.5 | 10.0 | 0.6 |
| 0.033uF | 10.5 | 9.0 | 5.5 | 7.5 | 0.6 | 12.0 | 8.0 | 4.5 | 10.0 | 0.6 | 13.0 | 12.5 | 6.5 | 10.0 | 0.6 | 12.0 | 9.0 | 4.0 | 10.0 | 0.6 |
| 0.039uF | 10.5 | 9.5 | 5.5 | 7.5 | 0.6 | 10.5 | 12.0 | 7.5 | 7.5 | 0.6 | 13.0 | 13.0 | 7.5 | 10.0 | 0.6 | 18.0 | 14.0 | 8.0 | 15.0 | 0.8 |
| 0.047uF | 10.5 | 9.5 | 5.5 | 7.5 | 0.6 | 12.0 | 7.0 | 4.5 | 10.0 | 0.6 | 12.0 | 8.0 | 4.5 | 10.0 | 0.6 | 12.0 | 8.0 | 4.5 | 10.0 | 0.6 |
| 0.056uF | 10.5 | 10.0 | 6.0 | 7.5 | 0.6 | 13.0 | 12.0 | 7.0 | 10.0 | 0.6 | 13.0 | 14.5 | 8.5 | 10.0 | 0.6 | 18.0 | 15.0 | 8.5 | 15.0 | 0.8 |
| 0.068uF | 10.5 | 10.0 | 6.5 | 7.5 | 0.6 | 12.0 | 9.0 | 5.5 | 10.0 | 0.6 | 12.0 | 8.0 | 4.5 | 10.0 | 0.6 | 12.0 | 9.0 | 5.5 | 10.0 | 0.6 |
| 0.082uF | 10.5 | 11.0 | 6.5 | 7.5 | 0.6 | 13.0 | 13.5 | 8.0 | 10.0 | 0.6 | 18.0 | 14.5 | 7.5 | 15.0 | 0.8 | 24.0 | 17.0 | 9.5 | 20.0 | 0.8 |
| 0.10uF | 10.5 | 12.0 | 7.0 | 7.5 | 0.6 | 12.0 | 8.0 | 4.5 | 10.0 | 0.6 | 12.0 | 9.0 | 6.0 | 10.0 | 0.6 | 18.0 | 8.0 | 5.0 | 15.0 | 0.8 |
| 0.10uF | | | | | | 18.0 | 9.0 | 6.0 | 15.0 | 0.8 | 18.0 | 15.5 | 8.5 | 15.0 | 0.8 | 24.0 | 18.5 | 11.0 | 20.0 | 0.8 |
| 0.15uF | 13.0 | 12.0 | 7.0 | 10.0 | 0.6 | 12.0 | 9.0 | 5.0 | 10.0 | 0.6 | 12.0 | 10.0 | 6.0 | 10.0 | 0.6 | 24.0 | 19.0 | 12.0 | 20.0 | 0.8 |
| 0.18uF | 13.0 | 12.5 | 7.0 | 10.0 | 0.6 | 18.0 | 14.0 | 7.5 | 15.0 | 0.8 | 24.0 | 14.5 | 8.5 | 20.0 | 0.8 | 24.0 | 20.0 | 12.5 | 20.0 | 0.8 |
| 0.22uF | 13.0 | 13.0 | 7.5 | 10.0 | 0.6 | 12.0 | 10.0 | 6.0 | 10.0 | 0.6 | 12.0 | 12.0 | 7.0 | 10.0 | 0.6 | 18.0 | 12.0 | 6.5 | 15.0 | 0.8 |
| 0.22uF | | | | | | 18.0 | 10.5 | 6.0 | 15.0 | 0.8 | 24.0 | 15.5 | 10.0 | 20.0 | 0.8 | 30.0 | 23.0 | 12.5 | 25.0 | 0.8 |
| 0.33uF | 18.0 | 13.0 | 7.5 | 15.0 | 0.8 | 18.0 | 9.0 | 5.5 | 15.0 | 0.8 | 18.0 | 12.0 | 6.5 | 15.0 | 0.8 | 18.0 | 13.5 | 8.0 | 15.0 | 0.8 |
| 0.33uF | | | | | | 12.0 | 11.0 | 4.5 | 10.0 | 0.6 | | | | | | | | | | |
| 0.47uF | 18.0 | 14.0 | 8.5 | 15.0 | 0.8 | 24.0 | 16.0 | 9.0 | 20.0 | 0.8 | 18.0 | 13.0 | 8.0 | 15.0 | 0.8 | 18.0 | 16.0 | 9.0 | 15.0 | 0.8 |
| 0.47uF | | | | | | | | | | | | | | | | 25.0 | 14.0 | 7.0 | 22.5 | 0.8 |
| 0.68uF | 18.0 | 16.5 | 10.0 | 15.0 | 0.8 | 18.0 | 14.0 | 8.0 | 15.0 | 0.8 | | | | | | 25.0 | 15.0 | 8.5 | 22.5 | 0.8 |
| 0.68uF | | | | | | 12.0 | 16.5 | 9.0 | 10.0 | 0.6 | 18.0 | 16.5 | 8.5 | 15.0 | 0.8 | 18.0 | 19.0 | 10.5 | 15.0 | 0.8 |
| 0.82uF | | | | | | 12.0 | 16.5 | 10.0 | 10.0 | 0.6 | | | | | | 25.0 | 17.5 | 8.5 | 22.5 | 0.8 |
| 1.0uF | 24.0 | 18.0 | 11.0 | 20.0 | 0.8 | 18.0 | 13.0 | 8.0 | 15.0 | 0.8 | 18.0 | 17.0 | 10.0 | 15.0 | 0.8 | 26.5 | 16.5 | 10.0 | 22.5 | 0.8 |
| 1.0uF | | | | | | 25.0 | 13.5 | 6.5 | 22.5 | 0.8 | | | | | | | | | | |
| 1.5uF | 24.0 | 19.5 | 11.0 | 20.0 | 0.8 | 25.0 | 15.0 | 8.0 | 22.5 | 0.8 | 18.0 | 21.5 | 13.0 | 15.0 | 0.8 | 25.0 | 20.0 | 13.0 | 22.5 | 0.8 |
| 1.5uF | | | | | | | | | | | 25.0 | 17.5 | 10.5 | 22.5 | 0.8 | | | | | |
| 2.2uF | 24.0 | 21.0 | 12.5 | 20.0 | 0.8 | 25.0 | 18.0 | 9.5 | 22.5 | 0.8 | 25.0 | 19.5 | 13.0 | 22.5 | 0.8 | | | | | |
| 3.3uF | | | | | | 25.0 | 25.0 | 14.5 | 22.5 | 0.8 | | | | | | 25.0 | 28.0 | 18.0 | 22.5 | 0.8 |

Metallized Polypropylene Film Capacitors (Dipped)

Construction of Component



| Item | Component | Material | RoHS Requirements |
|------|-------------------|-------------------------------------|---------------------|
| 1 | Element | Metallized OPP film | Compliant with RoHS |
| 2 | Metal spray layer | Zn and Zn-Tin alloy wire | Compliant with RoHS |
| 3 | Leads | Tinned copper-base alloy wire | Compliant with RoHS |
| 4 | Coating | Flame retardant epoxy resin(UL940V) | Compliant with RoHS |
| 5 | Marking | Inks | Compliant with RoHS |
| | | Laser | |

Metallized Polypropylene Film Capacitors (Dipped)

2. Technical Specification

| No. | Test item | Performance | Test method (refer to IEC60384-16) |
|-----|-----------------------|---|--|
| 1 | Withstand voltage | | Ref 4.2.1 clause |
| | (T-T) | No permanent breakdown or flashover | Apply 150% of rated voltage / 60sec |
| | Terminal case | | Apply 200% of rated voltage for 2 to 5 sec. |
| 2 | Insulation resistance | $C_R \leq 0.33\mu\text{f}$; $IR > 30000M\Omega$ | Ref 4.2.4 clause Charge voltage 100VDC |
| | | $C_R > 0.33\mu\text{f}$; $IR > 10000S$ | Charge time 60sec |
| 3 | Capacitance | $J \pm 5\%$; $K \pm 10\%$; $M \pm 20\%$ | Ref 4.2.2 clause 1V, 1KHZ |
| 4 | Dissipation factor | ≤ 0.001 (0.10%) at 1 KHz. ≤ 0.005 (0.50%) at 10 KHz. $C_R \leq 1.0\mu\text{f}$, | Ref 4.2.3 clause 1V, 1KHZ |
| 5 | Solderability | At least 90% immersed lead wire should be covered new solder. | Ref 4.5 clause Test Ta Solder temperature : $235 \pm 5^\circ\text{C}$ Immersion time: 2 ± 0.5 sec |
| 6 | Terminal strength | There shall be no visible damage | Ref 4.3 clause $0.5 < d \leq 0.8$,10N $0.8 < d \leq 1.25$,20N Ub: $0.5 < d \leq 0.8$,5N $0.8 < d \leq 1.25$,10N Tense: $0.5 < d \leq 0.8$,5N $0.8 < d \leq 1.25$,10N Bend: $0.5 < d \leq 0.8$,5N $0.8 < d \leq 1.25$,10N Bent 2 times each direction |

2. Technical Specification

| No. | Test item | Performance | Test method (refer to IEC60384-16) |
|-----|-----------------------------|---|--|
| 7 | Resistance to Solder heat | There should be no visible damage, $\Delta C/C < \pm 3\%$ | Ref 4.4 clause Tb , method 1A Solder temperature $260 \pm 5^\circ\text{C}$ Immersion time: $10 \pm 1\text{sec}$ |
| 8 | Initial measurement | Capacitance, $\text{Tan}\delta$ | |
| | Rapid change of temperature | There should be no visible damage, | Ref 4.6 clause $\theta_A = -40^\circ\text{C}$, $\theta_B = +85^\circ\text{C}$ Duration=30min |
| | Vibration | There should be no visible damage. | Ref 4.7 clause Amplitude 0.75mm or acceleration 0.98m/s^2 ,(whichever is the smaller values) 10~500HZ 2h each direction, total 6h |
| | Bump | There should be no visible damage, $\Delta C/C < \pm 3\%$ | Ref 4.8 clause 4000 times ,acceleration 390m/s^2 Pulse duration 6ms |
| | Final measurement | There should be no visible damage, $\Delta C/C < \pm 3\%$ | |

Metallized Polypropylene Film Capacitors (Dipped)

2. Technical Specification

| No. | Test item | Performance | Test method (refer to IEC60384-16) |
|-----|------------------------|--|---|
| 8 | Final measurement | Increase of Tan δ CR \leq 1uf: \leq 0.0015 IR>50% *Rate value | |
| 9 | Initial measurement | | Ref 4.10clause |
| | Dry heat | | +85°C, 16h |
| | Cold | | -40°C, 2h |
| | Damp heat, cyclic | | Test Db, remaining cycles |
| | Final measurement | There should be no visible damage, legible marking. Capacitance change $\Delta C/C < \pm 3\%$ Increase of Tan δ CR \leq 1uf: \leq 0.0015 IR>50% *Rate value | |
| 10 | Damp heat steady state | There should be no visible damage, legible marking. Capacitance change $\Delta C/C < \pm 3\%$ Increase of Tan δ : CR \leq 1uf: \leq 0.001 | Ref 4.11clause Temperature: 40 \pm 2% Humidity: 93 \pm ² ₃ %RH Duration: 21 days |

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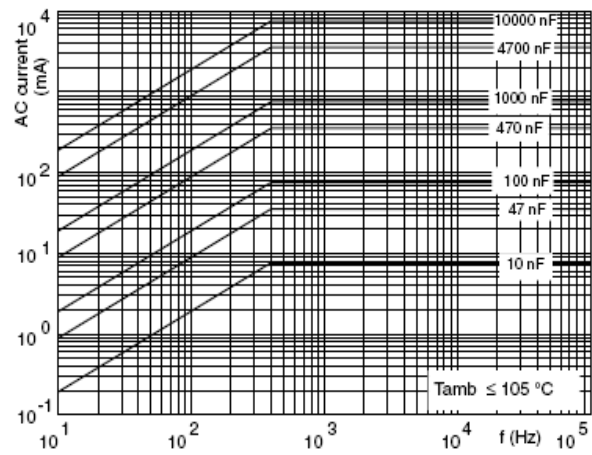
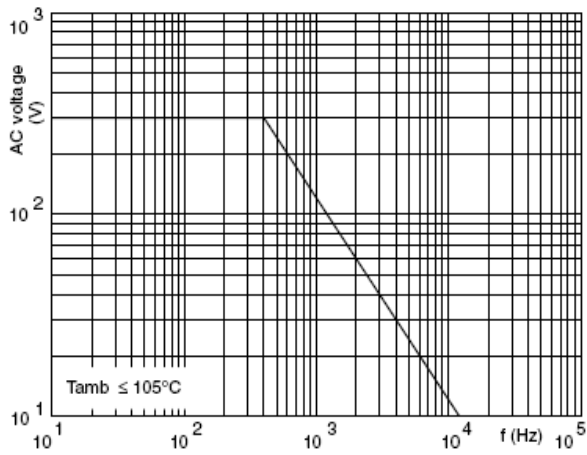
2. Technical Specification

| No. | Test item | Performance | Test method (refer to IEC60384-16) |
|-----|---------------------------|--|---|
| 11 | Endurance | There should be no visible damage, legible marking. Capacitance change $\Delta C/C \leq 3\%$ Increase of $\tan\delta$: $C_R \leq 1\mu\text{f}$: ≤ 0.002 $IR > 50\%$ *Rate value | Ref 4.12 clause $(1.25 \cdot U_R)$ at 105°C , 1000h |
| 12 | Charge and discharge | Capacitance change $\Delta C/C \leq 3\%$ Increase of $\tan\delta$: $C_R \leq 1\mu\text{f}$: ≤ 0.003 $IR > 50\%$ *Rate value | Ref 4.13 clause $\frac{10 \times 10^{-6}}{C_R} \Omega$ $R = \frac{U}{C \frac{dU}{dt}}$ Times: 10000 Duration of charge: 0.5sec Duration of discharge: 0.5sec |
| 13 | Inherent temperature rise | Inherent temperature rise | Test temperature: normal room temperature |

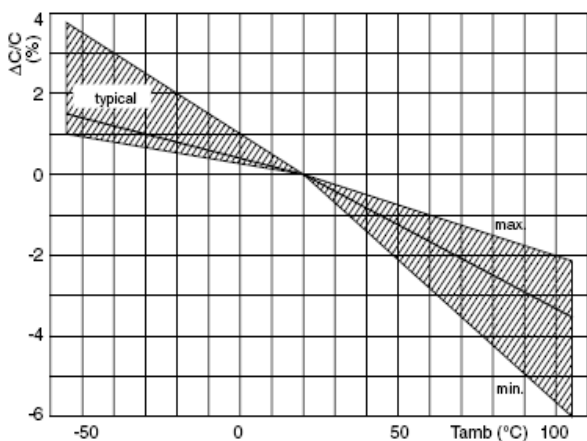
Metallized Polypropylene Film Capacitors (Dipped)

Characteristic Curve

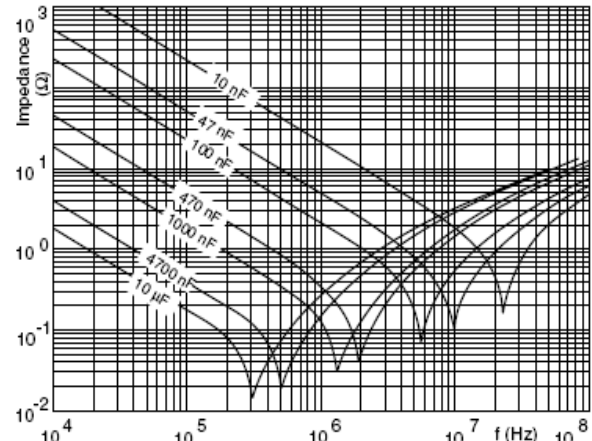
MAXIMUM RMS VOLTAGE AND AC CURRENT (SENEWAVE) AS A FUNCTION OF FREQUENCY



CAPACITANCE



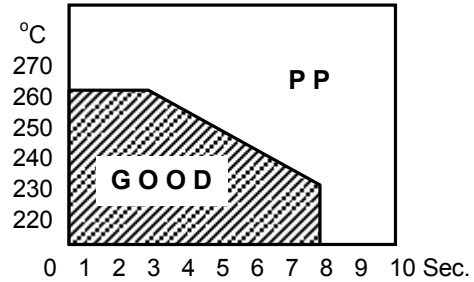
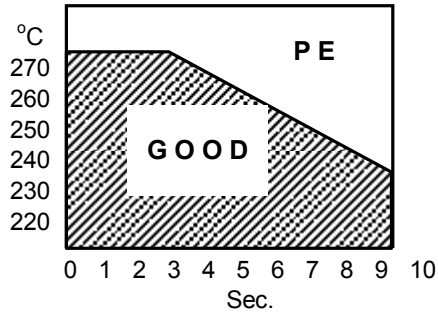
IMPEDANCE



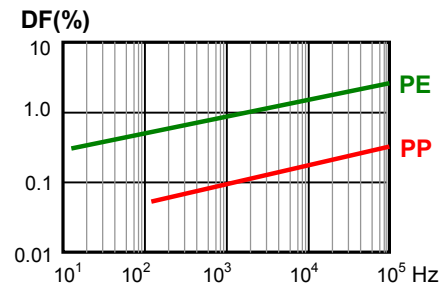
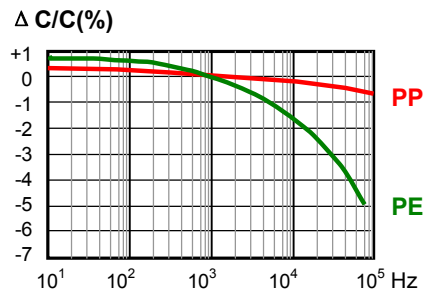
Metalized Polypropylene Film Capacitors (Dipped)

Characteristics Reference

Soldering Temperature VS Time



Frequency Characteristics



Temperature Characteristics

