## DEKI CAPACITOR

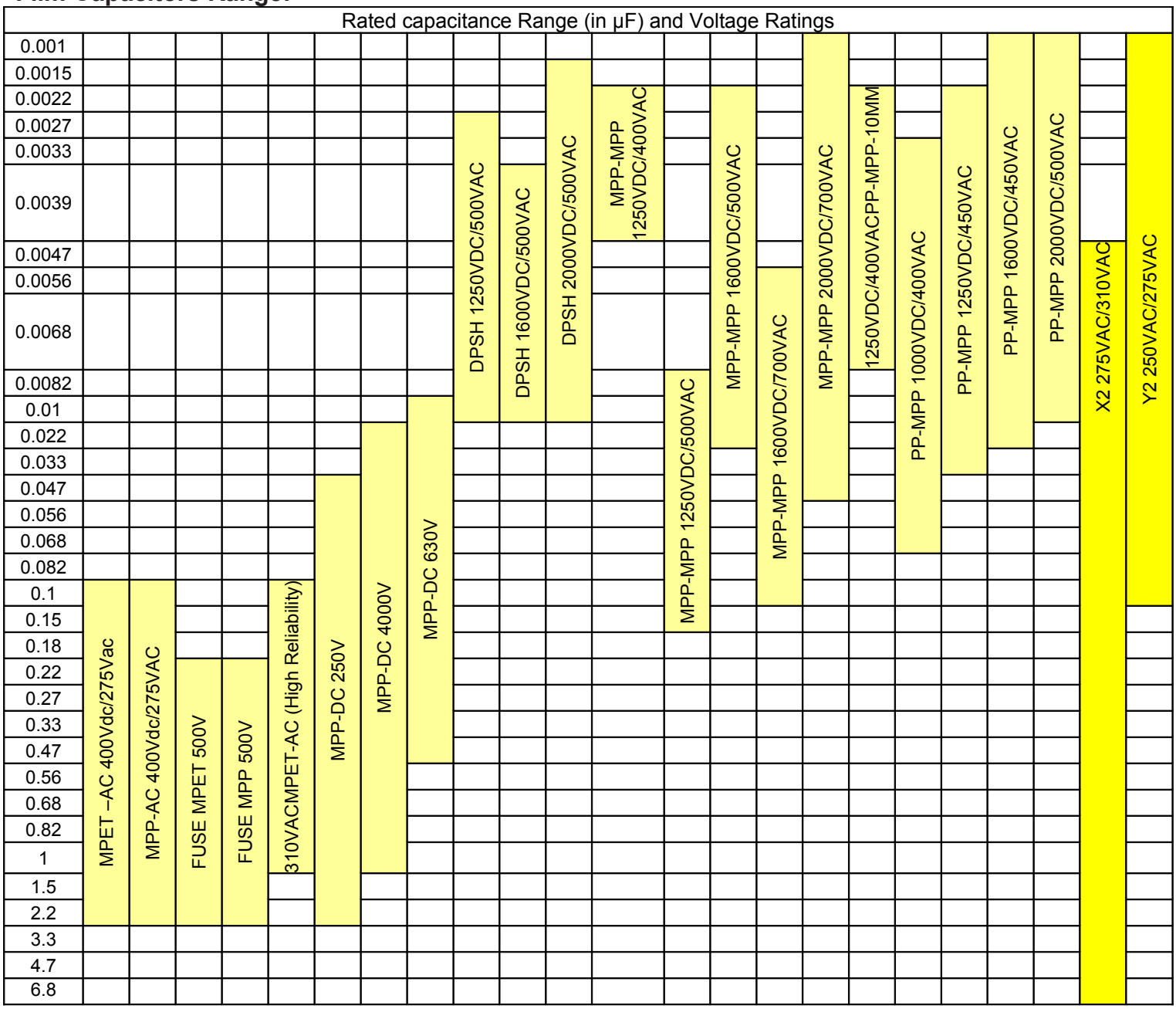
# LED Lighting Applications

A series on topics of relevance and advances from the technical centre, Deki Electronics Ltd, India

# Film Capacitors types



## Film Capacitors Range:



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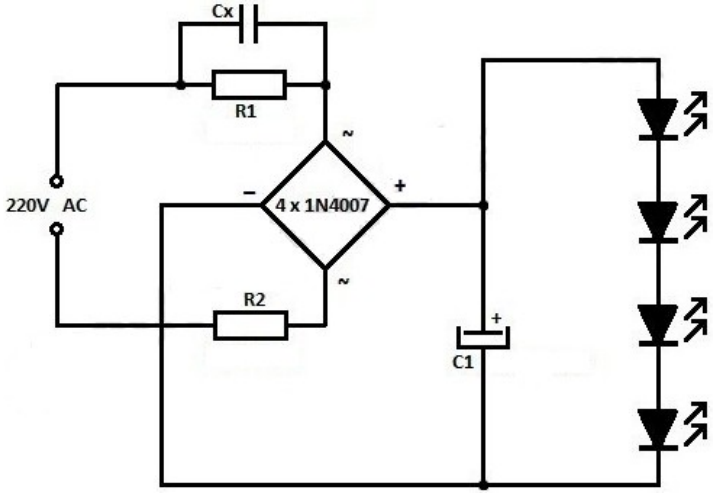
## APPLICATION NOTES

### Low Cost LED Driver

The capacitive power supply is the economic version of low power LED driver. It has less component count and more efficient for low power LED drivers. The capacitor Cx acts as a voltage dropper.

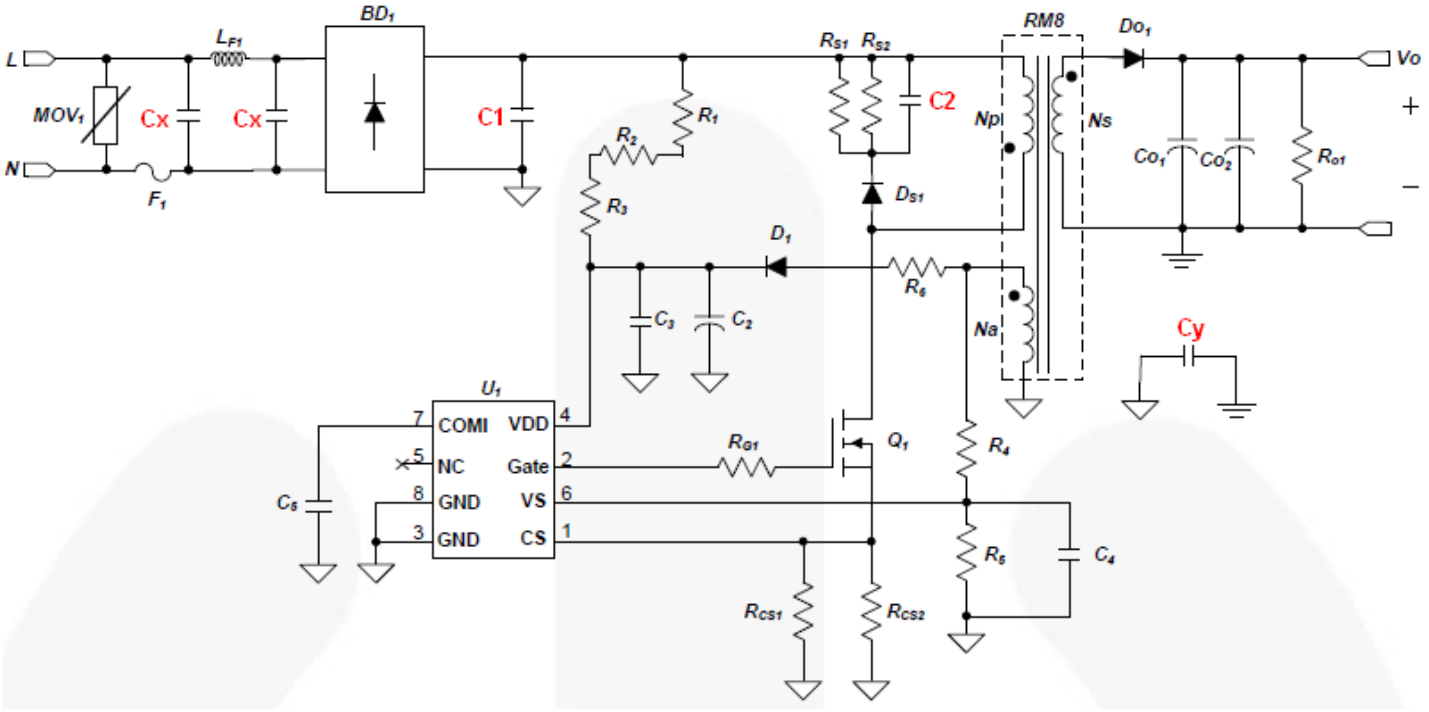



### Film capacitor requirement:

| Cap | Function | Type | Voltage Requirement | Cap Range |
|---|---|---|---|---|
| Cx | Voltage dropping | MPET/MPP-AC/MPET-F/ MPP-F/ MPET-AC (High Reliability) | 400Vdc/500Vdc/275Vac / 305Vac/310Vac | 0.1 to 2.2uF |

### High End LED Driver (Power factor corrected Flyback):

The Flyback power supply is the most commonly used high end LED medium power LED driver upto 150W. It consist of following sections, EMI filter, Input Bridge rectification, PFC and Gate Drive section, Snubber, Power Transformer, Output rectification, Output filter.




**Film capacitor requirement:**

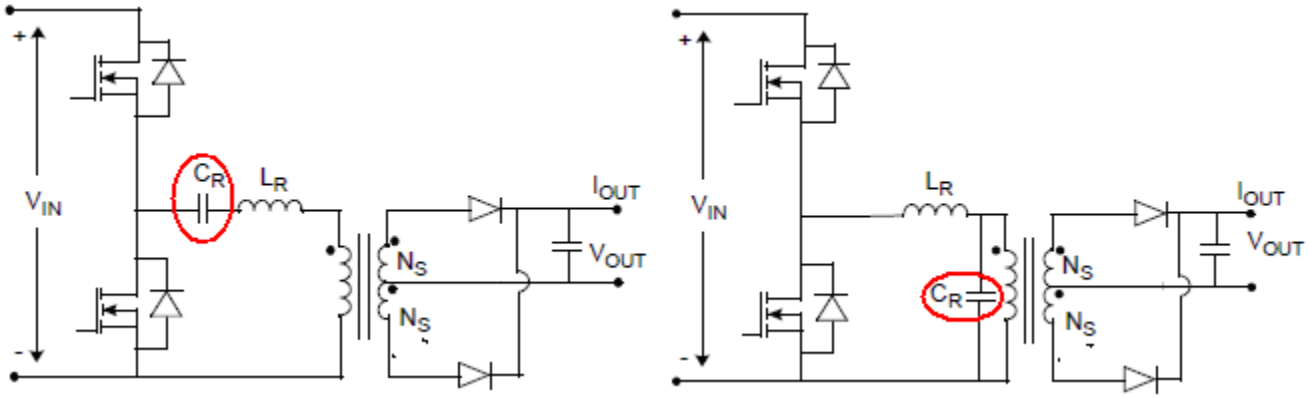
| Cap | Function | Type | Voltage Requirement | Cap Range |
|---|---|---|---|---|
| Cx | EMI Suppression | MKP-X2 | 275/305/310Vac | 0.004 to 10uF |
| Cy | EMI Suppression | MKP-Y2 | 250/275Vac | 0.001 to 0.1uF |
| C1 | Smoothing | MPET/MPP-AC/MPET-F/ MPP-F/MPP-DC | 400/450/500/630Vdc | 0.1 to 2.2uF |
| C2 | Snubber | MPP-DC/PP-MPP | 400/630/1000/1250/1600 Vdc | 0.0022 to 0.47uF |

**High End LED Driver (High Efficiency Resonant Power supply):**

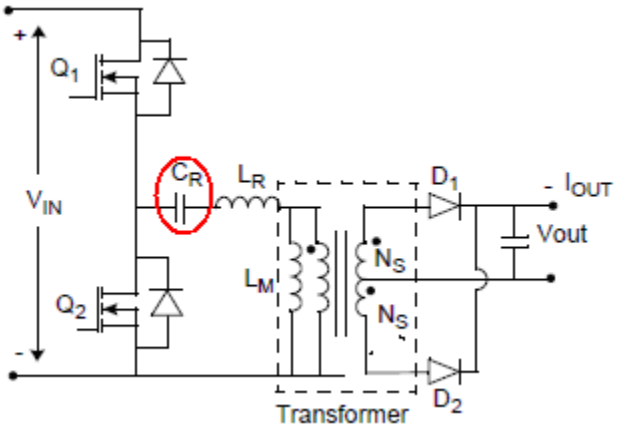
In order to achieve very high efficiency of >95%, a resonance based power supply is employed in the high power LED drivers for street light, High bay light applications, etc. Resonant elements L, C employed. Combination of L and C forms various types of circuits out of which typical popular designs are Series resonant power supply, Parallel resonant power supply, LLC resonant power supply.

**Model 1: Series Resonant circuit**

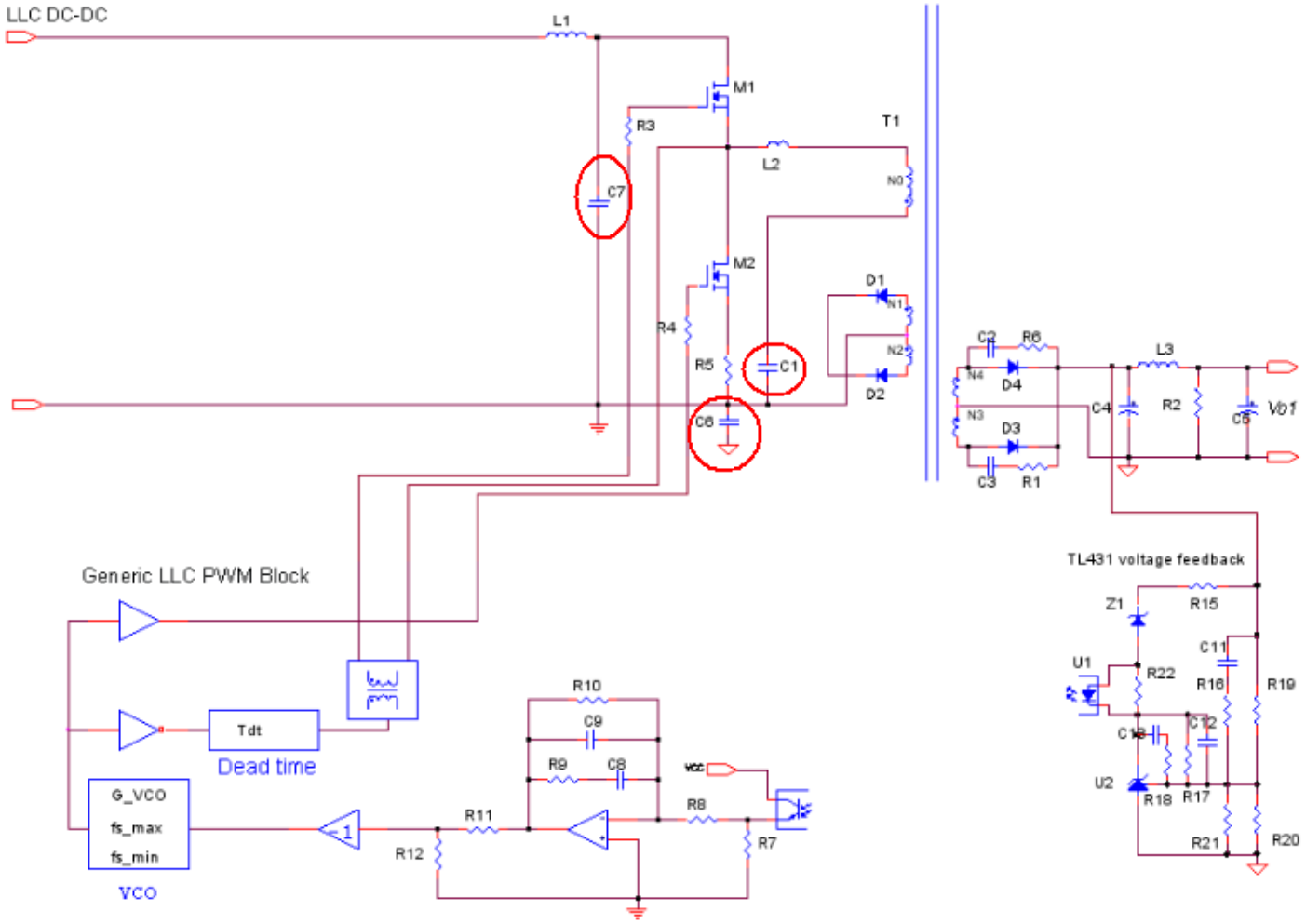
**Model 2: Parallel Resonant circuit**




**Model 3: LLC Resonant circuit**




**LLC- Schematic Circuit**:

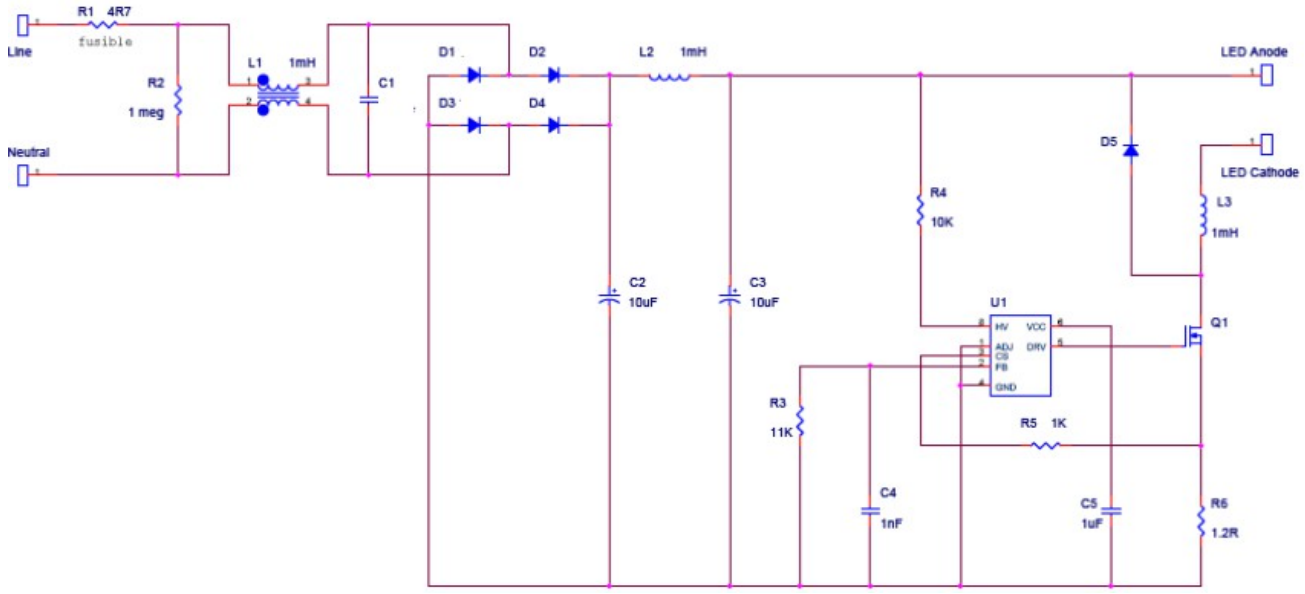



**Film capacitor requirement:**

| Cap | Function | Type | Voltage Requirement | Cap Range |
|---|---|---|---|---|
| C1 | Resonant capacitor | MPP-DC/DPSH/ MPP-MPP/ PP-MPP | 630/1000/1250/1600Vdc | 0.001 to 0.47uF |
| C6 | EMI Suppression | MKP-Y2 | 250/275Vac | 0.001 to 0.1uF |
| C7 | Smoothing | MPET/MPP-AC/MPET-F/ MPP-F/MPP-DC | 400/450/500/630Vdc | 0.1 to 2.2uF |

**High End LED Driver (Buck Power supply):**

In case of high end low power applications where very low output voltage is required, buck based (step down) LED driver is employed to handle larger output currents as well.




| Cap | Function | Type | Voltage Requirement | Cap Range |
|---|---|---|---|---|
| C1 | EMI Suppression | MKP-X2 | 275/305/310Vac | 0.004 to 10uF |

**Recommended Capacitors for Applications:**

| Application/Function | Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 |
|---|---|---|---|---|---|
| Voltage dropping | MPET-AC (High reliability) | MPP-AC | MPP-F | MPET-F | MPET-AC |
| Smoothing | MPP-AC/MPP-DC | MPP-F | MPET-F | MPET-AC | - |
| Snubbing | PP-MPP | MPP-DC | - | - | - |
| Resonance | PP-MPP | MPP-MPP | DPSH | MPP-DC | - |
| EMI Suppression Line to Line | IS/MKP-X2 | MPP-AC | MPET-AC | - | - |
| EMI Suppression Line to Ground | IS/MKP-Y2 | - | - | - | - |

# METALLISED POLYESTER FILM CAPACITORS

MPET-AC(Standard Pitch: 10-22.5 mm)

**MAIN APPLICATION**
Capacitive power supply, Voltage divider/dropper, Low End LED driver

**CONSTRUCTION (DIP TYPE)**
Low inductive cell of metallised polyester film coated with flame retardant epoxy resin or enclosed in flame retardant box.

**CLIMATIC CATEGORY**
40/100/56

**APPLICABLE SPECIFICATION**
IEC 384-2,

**CAPACITANCE VALUE, RATED VOLTAGE**

400Vdc/275Vac

**CAPACITANCE TOLERANCE**
±5%, ±10%

**VOLTAGE PROOF**
Between terminals: 2 times of rated voltage for 2 seconds.

**LIFE TEST CONDITIONS**

(Loading at elevated temperature)
Loaded at 1.25 times of rated dc voltage at 85° C for 1000 hours.

**Criteria after the test:**
**Δc/c:** ≤ 5% of initial value.
**Change in Tan δ:** ≤ 0.003, $C_R$≤1μF; ≤ 0.002, $C_R$>1μF
**Insulation resistance:** ≥ 50% of the value mentioned in IR chart.

**Applicable standard:**
IEC 384-2

**TAN δ (DISSIPATION FACTOR) AT 20°C**

| Frequency (KHz) | $C_R$ < 0.1 μfd | 0.1μfd < $C_R$ ≤ 1 μfd | $C_R$ >1 μfd |
|---|---|---|---|
| At 1 | 0.8% | 1.0% | 1.0% |
| At 10 | 1.5% | 1.5% | - |
| At 100 KHz | 3.0% | 3.0% | |

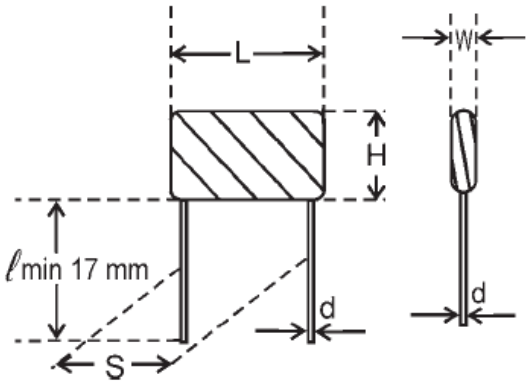
**INSULATION RESISTANCE**

| Minimum Insulation Resistance $R_{IS}$ | $V_R$ | $C_R$ ≤ 0.33 μF | $C_R$ > 0.33μF |
|---|---|---|---|
| (or) time constant $T=C_R \times R_{IS}$ | ≤ 100 V DC | 3750 MΩ | 1250 s |
| at 25° C, relative humidity ≤ 70% | > 100 V DC | 7500 MΩ | 2500 s |

**Ordering code and packing units: Metallised polyester film capacitor (Dip Type)**

| Rated Voltage | Rated Cap.(mfd) | Maximum Dimensions (mm) W | H | L | d 0.05mm | Pitch (S) ±0.5 mm | DV/DT | Ordering code | Packing Units Ammo | Bulk |
|---|---|---|---|---|---|---|---|---|---|---|
| 400 VDC | 0.1 | 6 | 12 | 13 | 0.6 | 10 | 110 | 02 104 +2G 1J | - | 1000 |
| /275Vac | 0.15 | 7 | 12.5 | 13 | 0.6 | 10 | 110 | 02 154 +2G 1J | - | 1000 |
| | 0.18 | 7.5 | 13 | 13 | 0.6 | 10 | 110 | 02 184 +2G 1J | - | 1000 |
| | 0.2 | 8 | 13.5 | 13 | 0.6 | 10 | 110 | 02 204 +2G 1J | - | 1000 |
| | 0.22 | 9 | 14 | 13 | 0.6 | 10 | 110 | 02 224 +2G 1J | - | 1000 |
| | | | | | | | | | | |
| | 0.15 | 5.5 | 10.5 | 19 | 0.8 | 15 | 44 | 02 154 +2G 1J | - | 1000 |
| | 0.18 | 6 | 11 | 19 | 0.8 | 15 | 44 | 02 184 +2G 1J | - | 1000 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | 6 | 11.5 | 19 | 0.8 | 15 | 44 | 02 204 +2G 1J | - | 1000 |
| | 0.22 | 6.5 | 12 | 19 | 0.8 | 15 | 44 | 02 224 +2G 1J | - | 1000 |
| | 0.27 | 7 | 12 | 19 | 0.8 | 15 | 44 | 02 274 +2G 1J | - | 1000 |
| | 0.33 | 7 | 13 | 19 | 0.8 | 15 | 44 | 02 334 +2G 1J | - | 1000 |
| | 0.39 | 7.5 | 13.5 | 19 | 0.8 | 15 | 44 | 02 394 +2G 1J | - | 1000 |
| | 0.41 | 8 | 14 | 19 | 0.8 | 15 | 44 | 02 414 +2G 1J | - | 1000 |
| | 0.47 | 8.5 | 14.5 | 19 | 0.8 | 15 | 44 | 02 474 +2G 1J | - | 1000 |
| | 0.56 | 9 | 15 | 19 | 0.8 | 15 | 44 | 02 564 +2G 1J | - | 1000 |
| | 0.68 | 9.5 | 16.5 | 19 | 0.8 | 15 | 44 | 02 684 +2G 1J | - | 1000 |
| | 0.82 | 11 | 17 | 19 | 0.8 | 15 | 44 | 02 824 +2G 1J | - | 1000 |
| | | | | | | | | | | |
| | 1 | 9 | 16.5 | 26 | 0.8 | 22.5 | 20 | 02 105 +2G 1J | - | 500 |
| | 1.5 | 10 | 19.5 | 26 | 0.8 | 22.5 | 20 | 02 155 +2G 1J | - | 500 |
| | 2.2 | 12.5 | 21.5 | 26 | 0.8 | 22.5 | 20 | 02 225 +2G 1J | - | 500 |




## AC METALLISED POLYPROPYLENE FILM CAPACITORS

(MPP AC Applications)

**MAIN APPLICATION**
This series is specially designed for energy meter applications, Voltage dropper, capacitive power supply, etc

**CONSTRUCTION**
Low inductive wound cell of metallised polypropylene film coated with flame retardant epoxy resin or encased in flame retardant box UL 94 V0 with epoxy resin.

**CLIMATIC CATEGORY**
40/100/56

Between 85° C and 100°C, a voltage derating of 1.25% per °C on the rated voltage has to be applied

**APPLICABLE SPECIFICATION**
IEC 384-16

**CAPACITANCE VALUE RATED VOLTAGE**
275Vac/400Vdc

**CAPACITANCE TOLERANCE**
±5%

**VOLTAGE PROOF**
Between terminals: 1250Vdc for 2 seconds.

**INSULATION RESISTANCE**

Minimum Insulation Resistance $R_{IS}$ $C_R \leq 0.33\ \mu F$ $C_R > 0.33\ \mu F$

(or) time constant $T=C_R \times R_{IS}$ $> 100000\ M\Omega$ $> 30000$ s
at 20° C, relative humidity ≤ 70% RH

**TAN δ**

| Frequency(KHz) | $C_R$<0.1mfd | 0.1mfd<$C_R$≤1mfd |
|---|---|---|
| At 1 | 0.05% | 0.05% |
| At 10 | 0.1% | 0.08% |

## DAMP HEAT TEST (Steady state):

| | |
|---|---|
| Temperature: | +40°C±2 °C |
| Relative humidity: | 93±2% RH |
| Duration: | 1000 hours |

**Criteria after the test**:
**Δc/c:** ≤ 5% of initial value.
**Increase of Tan δ:** ≤ 0.002, $C_R$>1μF
**Insulation resistance:** ≥ 50% of the value mentioned in IR chart.

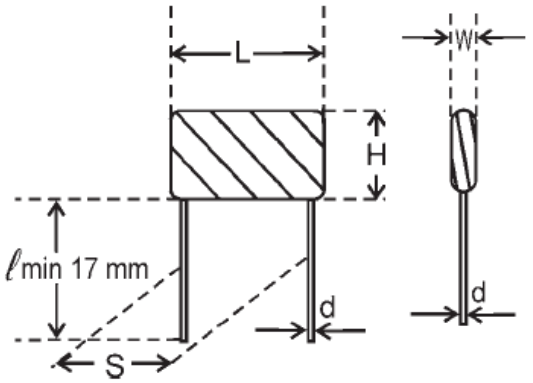
**LIFE TEST CONDITIONS**
(Loading at elevated temperature)
Loaded at 1.25 times of rated voltage at 85° C for 1000 hours.

**Criteria after the test**:
**Δc/c:** ≤ 5% of initial value.
**Increase of Tan δ:** ≤ 0.002, $C_R$>1μF
**Insulation resistance:** ≥ 50% of the value mentioned in IR chart.

**APPROVALS**
Capacitors are tested as per IEC 384-16

Ordering code and packing units: AC &pulse metallised polypropylene film capacitor (Dip type)

| Rated Voltage | Rated Cap.(mfd) | Maximum Dimensions (mm) W | H | L | d 0.05mm | Pitch (S) ±0.5 mm | DV/DT | Ordering code | Packing Units Ammo | Bulk |
|---|---|---|---|---|---|---|---|---|---|---|
| 275Vac | 0.1 | 6 | 11.5 | 13 | 0.6 | 10 | 350 | 17 104 +03 *^ | - | 1000 |
| /400Vdc | 0.15 | 7 | 12.5 | 13 | 0.6 | 10 | 350 | 17 154 +03 *^ | - | 1000 |
| | 0.18 | 7.5 | 13 | 13 | 0.6 | 10 | 350 | 17 184 +03 *^ | - | 1000 |
| | 0.2 | 8 | 13.5 | 13 | 0.6 | 10 | 350 | 17 204 +03 *^ | - | 1000 |
| | 0.22 | 8.5 | 14 | 13 | 0.6 | 10 | 350 | 17 224 +03 *^ | - | 1000 |
| | | | | | | | | | | |
| | 0.15 | 5.5 | 11 | 19 | 0.8 | 15 | 250 | 17 154 +03 *^ | - | 1000 |
| | 0.18 | 6 | 11.5 | 19 | 0.8 | 15 | 250 | 17 184 +03 *^ | - | 1000 |
| | 0.2 | 6.5 | 12 | 19 | 0.8 | 15 | 250 | 17 204 +03 *^ | - | 1000 |
| | 0.22 | 6.5 | 12.5 | 19 | 0.8 | 15 | 250 | 17 224 +03 *^ | - | 1000 |
| | 0.27 | 7 | 13 | 19 | 0.8 | 15 | 250 | 17 274 +03 *^ | - | 1000 |
| | 0.33 | 8 | 13.5 | 19 | 0.8 | 15 | 250 | 17 334 +03 *^ | - | 1000 |
| | 0.39 | 8 | 14.5 | 19 | 0.8 | 15 | 250 | 17 394 +03 *^ | - | 1000 |
| | 0.41 | 8.5 | 14.5 | 19 | 0.8 | 15 | 250 | 17 414 +03 *^ | - | 1000 |
| | 0.47 | 8.5 | 15 | 19 | 0.8 | 15 | 250 | 17 474 +03 *^ | - | 1000 |
| | 0.56 | 9.5 | 16 | 19 | 0.8 | 15 | 250 | 17 564 +03 *^ | - | 1000 |
| | 0.68 | 10 | 17.5 | 19 | 0.8 | 15 | 250 | 17 684 +03 *^ | - | 1000 |
| | 0.82 | 10.5 | 18.5 | 19 | 0.8 | 15 | 250 | 17 824 +03 *^ | - | 1000 |
| | | | | | | | | | | |
| | 1 | 9.5 | 17.5 | 26 | 0.8 | 22.5 | 150 | 17 105 +03 *^ | - | 500 |
| | 1.5 | 11 | 21.5 | 26 | 0.8 | 22.5 | 150 | 17 155 +03 *^ | - | 500 |
| | 2.2 | 13.5 | 23 | 26 | 0.8 | 22.5 | 150 | 17 225 +03 *^ | - | 500 |



# FUSE METALLISED POLYESTER FILM CAPACITORS

(Standard Pitch: 10-22.5 mm)

**MAIN APPLICATION**
Smoothening in Active power factor correction, High End LED driver, Boost PFC, Flyback PFC.

**CONSTRUCTION (DIP TYPE)**
Low inductive cell of metallised polyester film with internal fuses coated with flame retardant epoxy resin

**CLIMATIC CATEGORY**
40/100/56

**APPLICABLE SPECIFICATION**
IEC 384-2,

**CAPACITANCE VALUE, RATED VOLTAGE (DC)**
Refer dimension chart

**CAPACITANCE TOLERANCE**
±5%, ±10%

**VOLTAGE PROOF**
Between terminals: 1.6 times of rated voltage for 2 seconds.

**LIFE TEST CONDITIONS**
(Loading at elevated temperature)
Loaded at 1.25 times of rated voltage at 85° C for 1000 hours.

**Criteria after the test:**
**Δc/c:** ≤ 5% of initial value.
**Change in Tan δ:** ≤ 0.003, $C_R$≤1μF; ≤ 0.002, $C_R$>1μF
**Insulation resistance:** ≥ 50% of the value mentioned in IR chart.

**TAN δ (DISSIPATION FACTOR) AT 20°C**

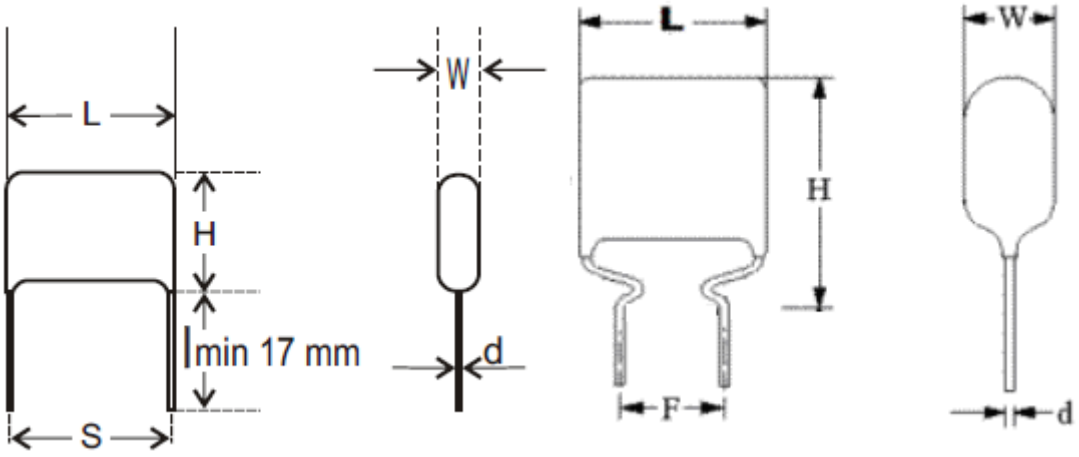
| Frequency (KHz) | $C_R$ < 0.1 μfd | 0.1μfd < $C_R$ ≤ 1 μfd | $C_R$ >1 μfd |
|---|---|---|---|
| At 1 | 0.8% | 1.0% | 1.0% |
| At 10 | 1.5% | 1.5% | - |
| At 100 KHz | 3.0% | 3.0% | |

**INSULATION RESISTANCE**

| | | | |
|---|---|---|---|
| Minimum Insulation Resistance $R_{IS}$ | $V_R$ | $C_R \leq 0.33\ \mu F$ | $C_R > 0.33\mu F$ |
| (or) time constant $T=C_R \times R_{IS}$ | $\leq$ 100 V DC | 3750 MΩ | 1250 s |
| at 25° C, relative humidity $\leq$ 70% | $>$ 100 V DC | 7500 MΩ | 2500 s |

**Ordering code and packing units: Fuse Metallised polyester film capacitors (Dip Type)**

| Rated Voltage | Rated Cap.(mfd) | Maximum Dimensions (mm) W | H | L | d 0.05mm | Pitch (S) ±0.5 mm | Ordering code | Packing Units Ammo | Bulk |
|---|---|---|---|---|---|---|---|---|---|
| 500Vdc | 0.22 | 7 | 12 | 13 | 0.6 | 10 | 88 224 +2l *^ | - | 1000 |
| | 0.33 | 8.5 | 13.5 | 13 | 0.6 | 10 | 88 334 +2l *^ | - | 1000 |
| | 0.47 | 8 | 18.5 | 13 | 0.6 | 10 | 88 474 +2l *^ | - | 1000 |
| | | | | | | | | | |
| | 0.47 | 6.5 | 14 | 18 | 0.8 | 15 | 88 474 +2l *^ | - | 1000 |
| | 0.56 | 7 | 14.5 | 18 | 0.8 | 15 | 88 564 +2l *^ | - | 1000 |
| | 0.68 | 7.5 | 15 | 18 | 0.8 | 15 | 88 684 +2l *^ | - | 1000 |
| | 0.82 | 8.5 | 16 | 18 | 0.8 | 15 | 88 824 +2l *^ | - | 1000 |
| | 1 | 9 | 16.5 | 18 | 0.8 | 15 | 88 105 +2l *^ | - | 1000 |
| | | | | | | | | | |
| | 1.5 | 8 | 18.5 | 26 | 0.8 | 22.5 | 88 155 +2l *^ | - | 1000 |
| | 2.2 | 20 | 20.5 | 26 | 0.8 | 22.5 | 88 225 +2l *^ | - | 1000 |




## FUSE METALLISED POLYPROPYLENE FILM CAPACITORS

**MAIN APPLICATION**
Smoothening in Active power factor correction, High End LED driver, Boost PFC, Flyback PFC.

**CONSTRUCTION**
Low inductive wound cell of metallised polypropylene film with internal fuses coated with flame retardant epoxy resin

**CLIMATIC CATEGORY**
40/100/56

**APPLICABLE SPECIFICATION**
IEC 384-16

**CAPACITANCE VALUE RATED VOLTAGE (DC)**
Refer dimension chart.

**CAPACITANCE TOLERANCE**
±5%

**VOLTAGE PROOF**
Between terminals: 1.6 times the rated voltage for 2 seconds.

**TAN δ**

| Frequency(KHz) | $C_R$<0.1mfd | 0.1mfd<$C_R$≤1mfd | $C_R$>1mfd |
|---|---|---|---|
| At 1 | 0.05% | 0.05% | 0.08% |
| At 10 | 0.1% | 0.08% | 0.1% |
| At 100 | 0.3% | 0.8% | 1.0% |

**LIFE TEST CONDITIONS**
(Loading at elevated temperature)
Loaded at 1.25 times of rated voltage at 85° C for 1000 hours.

**Criteria after the tes**t:
**Δc/c:** ≤ 5% of initial value.
**Increase of Tan δ:** ≤ 0.002, $C_R$>1μF
**Insulation resistance:** ≥ 50% of the value mentioned in IR chart.

**APPROVALS**
Capacitors are tested as per IEC 384-16

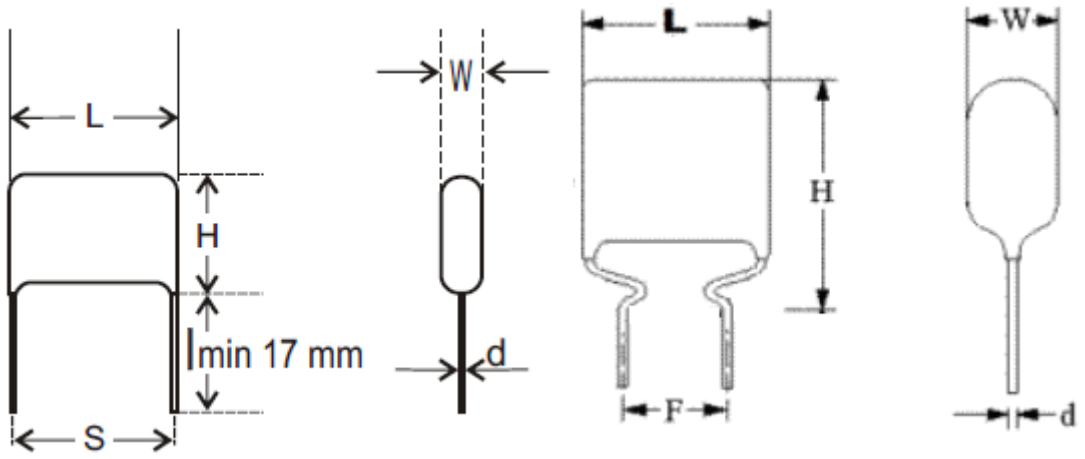
**INSULATION RESISTANCE**

| | | |
|---|---|---|
| Minimum Insulation Resistance $R_{IS}$ | $C_R \leq 0.33$ μF | $C_R > 0.33$ μF |
| (or) time constant $T=C_R \times R_{IS}$ | > 30000 MΩ | > 10000 s |

at 20° C, relative humidity ≤ 70%

Ordering code and packing units: Fuse metallised polypropylene film capacitor (Dip type)

| Rated Voltage | Rated Cap.(mfd) | Maximum Dimensions (mm) W | H | L | d 0.05mm | Pitch (S) ±0.5 mm | Ordering code | Packing Units Ammo | Bulk |
|---|---|---|---|---|---|---|---|---|---|
| 500Vdc | 0.22 | 8 | 13 | 13 | 0.6 | 10 | 92 224 +2l *^ | - | 1000 |
| | 0.33 | 9.5 | 14 | 13 | 0.6 | 10 | 92 334 +2l *^ | - | 1000 |
| | 0.47 | 10 | 17.5 | 13 | 0.6 | 10 | 92 474 +2l *^ | - | 1000 |
| | | | | | | | | | |
| | 0.47 | 6.5 | 15.5 | 18 | 0.8 | 15 | 92 474 +2l *^ | - | 1000 |
| | 0.56 | 7 | 16 | 18 | 0.8 | 15 | 92 564 +2l *^ | - | 1000 |
| | 0.68 | 8 | 17 | 18 | 0.8 | 15 | 92 684 +2l *^ | - | 1000 |
| | 0.82 | 8.5 | 17 | 18 | 0.8 | 15 | 92 824 +2l *^ | - | 1000 |
| | 1 | 9.5 | 18.5 | 18 | 0.8 | 15 | 92 105 +2l *^ | - | 1000 |
| | | | | | | | | | |
| | 1.5 | 9 | 19.5 | 26 | 0.8 | 22.5 | 92 155 +2l *^ | - | 1000 |
| | 2.2 | 11 | 21.5 | 26 | 0.8 | 22.5 | 92 225 +2l *^ | - | 1000 |



# High Capacitance Stability Designed for AC Applications
# MPET AC (High Reliability)

**APPLICATION**: This series is specially designed for energy meter applications, Voltage dropper, capacitive power supply and Low end LED driver application for long stability of capacitance value.

**CONSTRUCTION**:
Series constructed metallized polyester film and normal metallized polyester film as internal electrodes which are protected with solvent resistant & flame retardant epoxy resin

**CLIMATIC CATEGORY**:
55/100/56 as per IEC 60068-1.

**OPERATING TEMPERATURE RANGE**:
-55ºC to 100ºC

**RELATED STANDARD**: IEC 384-2.

**ELECTRICAL CHARACTERISTICS**:
**Rated Voltage**: 310Vac / 560Vdc

**Temperature derating**:
For temperatures between +85°C and +100°C a decreasing factor of 1.25% per degree Celsius on the rated voltage is applied.

**Capacitance tolerance**: ±5%, ±10%, ±20%

**Voltage proof between terminals (DC)**:
1.6*Ur for 2 sec.

**INSULATION RESISTANCE**:
**Test conditions**:
Temperature: +25ºC±2ºC
Voltage applied: 100Vdc for 1min.

**Criteria after the test**:
For C ≤ 0.33µf, IR ≥ 30000MΩ
For C > 0.33µf, τ ≥ 10000S (τ=IR*C)

**Tanδ** at +25ºC±2ºC:

| Frequency kHz | C<1 µf | C>1 µf. |
|---|---|---|
| 1 | 0.01 | 0.01 |
| 10 | 0.015 | 0.03 |

**DAMP HEAT TEST** (Steady state):

**Test 1:**
Temperature: +40ºC±2ºC
Relative humidity: 93±2% RH
Duration: 1000 hours

**Test 2:**
Temperature: +40ºC±2 ºC
Voltage: 250Vac
Relative humidity: 93±2% RH
Duration: 1000 hours

**Criteria after the test**:
Capacitance change (ΔC/C): ≤5%
ΔTanδ: ≤0.005 at 1kHz
Insulation resistance: ≥50% of initial limit

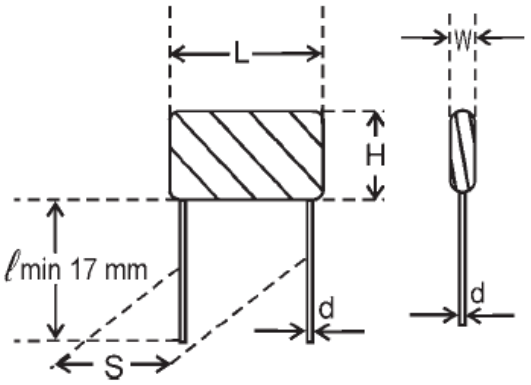
Temperature: +85 ºC±2 ºC
Voltage applied: 1.25 * Ur~
Duration: 1000 hours

**Criteria after the test**:
Capacitance change (ΔC/C): ≤8%
ΔTanδ: ≤0.003 at 1kHz
Insulation resistance: ≥50% of initial limit

**LIFE TEST**:
**Test conditions**

Ordering code and packing units: High Capacitance Stability Designed for AC Applications (Dip type)

| Rated Voltage | Rated Cap. (mfd) | Dimensions (mm) Maximum W | H | L | d ±0.05 | S ±0.5 | F +0.8/-0.2 | DV/DT V/µS | Ordering code | Packing Units Bulk |
|---|---|---|---|---|---|---|---|---|---|---|
| 310Vac | 0.1 | 6.5 | 12 | 18 | 0.8 | 15 | 15 | 300 | 24 104 +05*^ | 500 |
| | 0.15 | 7.5 | 13 | 18 | 0.8 | 15 | 15 | 300 | 24 154 +05*^ | 500 |
| | 0.18 | 8.5 | 13.5 | 18 | 0.8 | 15 | 15 | 300 | 24 184 +05*^ | 500 |
| | 0.22 | 9 | 14 | 18 | 0.8 | 15 | 15 | 300 | 24 224 + 05*^ | 500 |
| | 0.27 | 10 | 15 | 18 | 0.8 | 15 | 15 | 300 | 24 274 + 05*^ | 500 |
| | 0.33 | 11 | 16 | 18 | 0.8 | 15 | 15 | 300 | 24 334 + 05*^ | 500 |
| | 0.39 | 11.5 | 17 | 18 | 0.8 | 15 | 15 | 300 | 24 394 + 05*^ | 500 |
| 310Vac | 0.18 | 6.5 | 12 | 25 | 0.8 | 22.5 | 22.5 | 200 | 24 184 +05*^ | 500 |
| | 0.22 | 7 | 12.5 | 25 | 0.8 | 22.5 | 22.5 | 200 | 24 224 + 05*^ | 500 |
| | 0.27 | 7.5 | 13 | 25 | 0.8 | 22.5 | 22.5 | 200 | 24 274 + 05*^ | 500 |
| | 0.33 | 7.5 | 14.5 | 25 | 0.8 | 22.5 | 22.5 | 200 | 24 334 + 05*^ | 500 |
| | 0.39 | 8 | 15 | 25 | 0.8 | 22.5 | 22.5 | 200 | 24 394 + 05*^ | 500 |
| | 0.41 | 8.5 | 15.5 | 25 | 0.8 | 22.5 | 22.5 | 200 | 24 414 + 05*^ | 500 |
| | 0.47 | 9 | 16 | 25 | 0.8 | 22.5 | 22.5 | 200 | 24 474 + 05*^ | 500 |
| | 0.56 | 9.5 | 16.5 | 25 | 0.8 | 22.5 | 22.5 | 200 | 24 564 + 05*^ | 500 |
| | 0.68 | 10.5 | 17.5 | 25 | 0.8 | 22.5 | 22.5 | 200 | 24 684 + 05*^ | 500 |
| | 1 | 12.5 | 19.5 | 25 | 0.8 | 22.5 | 22.5 | 200 | 24 105 + 05*^ | 500 |
| | | | | | | | | | | |




## AC & PULSE METALLISED POLYPROPYLENE FILM CAPACITORS

(MPP-DC Series)

**MAIN APPLICATION**
Medium voltage snubbers in smps, LED drivers,

**CONSTRUCTION**
Low inductive wound cell of metallised polypropylene film coated with flame epoxy resin

**CLIMATIC CATEGORY**
40/100/56

**APPLICABLE SPECIFICATION**
IEC 384-16

**CAPACITANCE VALUE RATED VOLTAGE (DC)**
Refer dimension chart.

**CAPACITANCE TOLERANCE**
±5%

**VOLTAGE PROOF**
Between terminals: 1.6 times the rated voltage for 2 seconds.

**TAN δ**

| Frequency(KHz) | $C_R$<0.1mfd | 0.1mfd<$C_R$≤1mfd | $C_R$>1mfd |
|---|---|---|---|
| At 1 | 0.05% | 0.05% | 0.08% |
| At 10 | 0.1% | 0.08% | 0.1% |
| At 100 | 0.3% | 0.8% | 1.0% |

**LIFE TEST CONDITIONS**
(Loading at elevated temperature)
Loaded at 1.25 times of rated voltage at 85° C or 1.25 times of category voltage at 100° C for 1000 hours. Category voltage is 80% of the rated voltage at 100 °C.

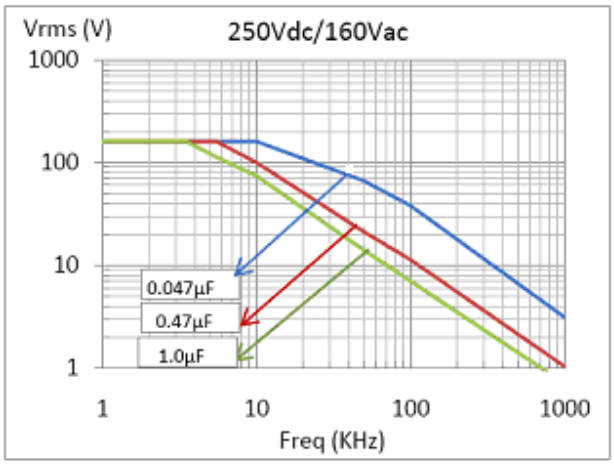
**Criteria after the tes**t:
**Δc/c:** ≤ 5% of initial value.
**Increase of Tan δ:** ≤ 0.002, $C_R$>1μF
**Insulation resistance:** ≥ 50% of the value mentioned in IR chart.

**APPROVALS**
Capacitors are tested as per IEC 384-16

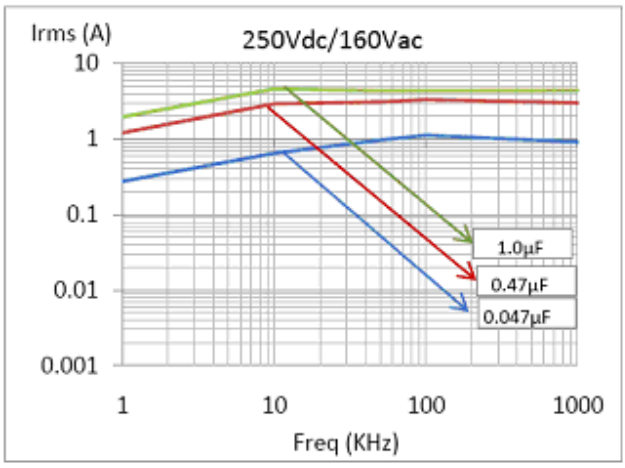
**INSULATION RESISTANCE**

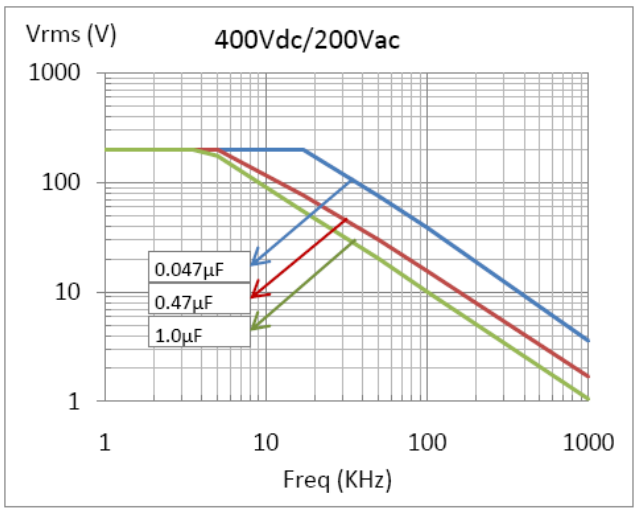
| | | |
|---|---|---|
| Minimum Insulation Resistance $R_{IS}$ | $C_R \leq 0.33$ μF | $C_R > 0.33$ μF |
| (or) time constant $T=C_R \times R_{IS}$ | > 100000 MΩ | > 10000 s |
| at 20° C, relative humidity ≤ 70% | | |

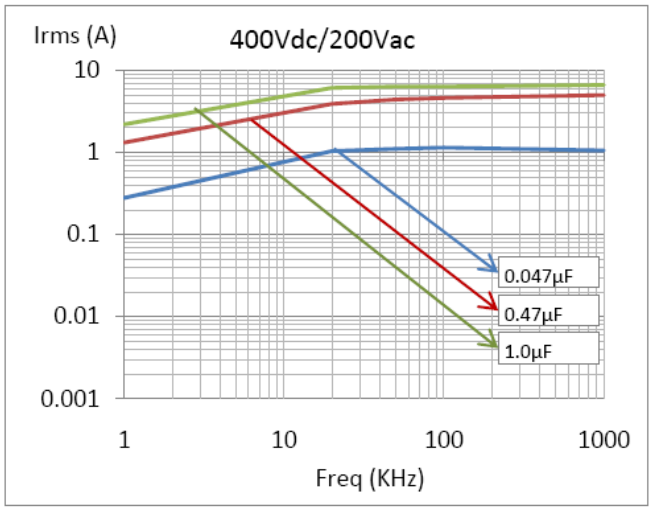
Max.Voltage (Vrms) Vs Frequency
(Sinusoidal Waveform at T ≤ 85°C)

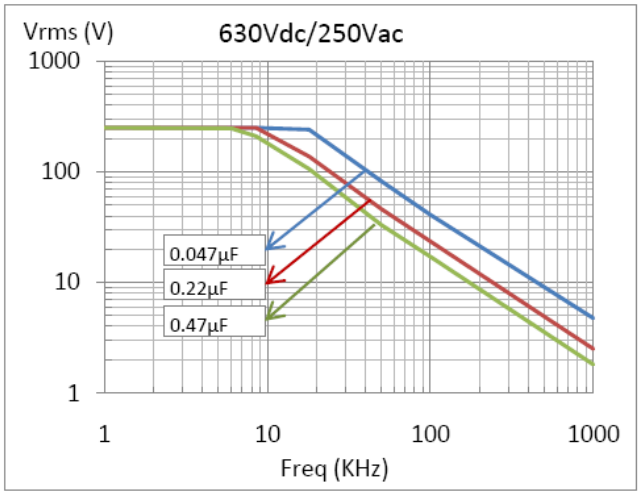


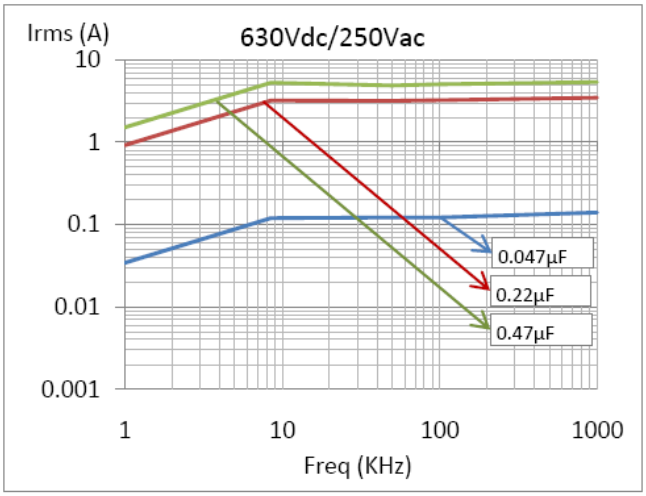

Max. Current (Irms) Vs Frequency
(Sinusoidal Waveform at T ≤ 85°C)




Ordering code and packing units:Ac &pulse metallised polypropylene film capacitor(Dip type)

| Rated | Rated | Dimensions (mm) Maximum | Packing Units |
|---|---|---|---|

| Voltage | Cap. (mfd) | W | H | L | d ±0.05 | S ±0.5 | F -4 | DV/DT | Wt. | Ordering code | Bulk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 250 VDC | 0.047 | 6 | 15 | 13 | 0.6 | 10 | 10 | 70 | 0.9 | 04 473 +2E*^ | 1000 |
| | 0.068 | 7 | 12 | 13 | 0.6 | 10 | 10 | 70 | 0.9 | 04 683 +2E*^ | 1000 |
| | 0.082 | 6.5 | 12 | 13 | 0.6 | 10 | 10 | 70 | 0.9 | 04 823 +2E*^ | 1000 |
| | 0.1 | 6 | 12 | 13 | 0.6 | 10 | 10 | 70 | 1 | 04 104 +2E*^ | 1000 |
| | 0.15 | 7 | 12 | 19 | 0.8 | 15 | 15 | 60 | 1.3 | 04 154 +2E*^ | 1000 |
| | 0.22 | 8 | 12 | 19 | 0.8 | 15 | 15 | 60 | 1.3 | 04 224 +2E*^ | 1000 |
| | 0.33 | 8 | 15 | 27 | 0.8 | 22.5 | 22.5 | 60 | 1.6 | 04 334 +2E*^ | 1250 |
| | 0.47 | 10 | 17 | 27 | 0.8 | 22.5 | 22.5 | 60 | 2.5 | 04 474 +2E*^ | 900 |
| | 0.56 | 9 | 17 | 27 | 0.8 | 22.5 | 22.5 | 30 | 1.8 | 04 564+2E*^ | 650 |
| | 0.68 | 9.5 | 17 | 27 | 0.8 | 22.5 | 22.5 | 30 | 1.9 | 04 684 +2E*^ | 600 |
| | 0.82 | 10 | 18.5 | 27 | 0.8 | 22.5 | 22.5 | 30 | 2.1 | 04 824 +2E*^ | 500 |
| | 1 | 11 | 19.5 | 27 | 0.8 | 22.5 | 22.5 | 30 | 2.5 | 04 105 +2E*^ | 450 |
| | 1.5 | 10.5 | 20.5 | 32 | 0.8 | 27.5 | - | 20 | 5 | 04 155 +2E*^ | 450 |
| | 2.2 | 13 | 21 | 31 | 0.8 | 27.5 | - | 20 | 6.5 | 04 225 +2E*^ | 300 |
| 400 VDC | 0.022 | 6 | 12 | 13 | 0.6 | 10 | 10 | 80 | 0.9 | 04 223 +2G*^ | 1000 |
| | 0.033 | 6 | 12 | 13 | 0.6 | 10 | 10 | 80 | 0.9 | 04 333 +2G*^ | 1000 |
| | 0.047 | 6 | 12 | 13 | 0.6 | 10 | 10 | 80 | 0.9 | 04 473 +2G*^ | 1000 |
| | 0.068 | 6 | 12.5 | 19 | 0.8 | 15 | 15 | 70 | 1.3 | 04 683 +2G*^ | 1500 |
| | 0.082 | 7 | 12.5 | 19 | 0.8 | 15 | 15 | 70 | 1.3 | 04 823 +2G*^ | 1500 |
| | 0.1 | 7 | 14 | 19 | 0.8 | 15 | 15 | 70 | 1.4 | 04 104 +2G*^ | 1250 |
| | 0.15 | 8 | 13 | 19 | 0.8 | 15 | 15 | 70 | 1.5 | 04 154 +2G*^ | 1250 |
| | 0.22 | 8 | 16 | 19 | 0.8 | 15 | 15 | 70 | 1.8 | 04 224 +2G*^ | 1000 |
| | 0.27 | 7 | 14 | 27 | 0.8 | 22.5 | 22.5 | 35 | 1.8 | 04 274 +2G*^ | 750 |
| | 0.33 | 8 | 17.5 | 27 | 0.8 | 22.5 | 22.5 | 35 | 1.9 | 04 334 +2G*^ | 600 |
| | 0.47 | 9 | 21.5 | 27 | 0.8 | 22.5 | 22.5 | 35 | 2.4 | 04 474 +2G*^ | 450 |
| | 0.56 | 10 | 19 | 27 | 0.8 | 22.5 | 22.5 | 35 | 2.6 | 04 564 +2G*^ | 450 |
| | 0.68 | 9 | 18 | 31 | 0.8 | 27.5 | - | 29 | 5 | 04 684 +2G*^ | 450 |
| | 0.82 | 11 | 21 | 31 | 0.8 | 27.5 | - | 29 | 5.5 | 04 824 +2G*^ | 400 |
| | 1 | 12 | 22 | 31 | 0.8 | 27.5 | - | 29 | 6 | 04 105 +2G*^ | 350 |
| 630VDC | 0.01 | 6 | 12 | 13 | 0.6 | 10 | 10 | 100 | 0.9 | 04 103 +2J*^ | 1000 |
| | 0.015 | 7 | 12 | 13 | 0.6 | 10 | 10 | 100 | 0.9 | 04 153 +2J*^ | 1000 |
| | 0.022 | 7 | 12 | 13 | 0.6 | 10 | 10 | 100 | 0.9 | 04 223 +2J*^ | 1000 |
| | 0.033 | 6.5 | 16.5 | 19 | 0.8 | 15 | 15 | 90 | 1.3 | 04 333 +2J*^ | 1500 |
| | 0.047 | 7 | 13 | 19 | 0.8 | 15 | 15 | 90 | 1.3 | 04 473 +2J*^ | 1500 |
| | 0.068 | 8 | 14 | 19 | 0.8 | 15 | 15 | 90 | 1.5 | 04 683 +2J*^ | 1250 |
| | 0.082 | 8 | 14 | 19 | 0.8 | 15 | 15 | 90 | 1.6 | 04 823 +2J*^ | 1250 |
| | 0.1 | 9 | 15 | 19 | 0.8 | 15 | 15 | 90 | 1.8 | 04 104 +2J*^ | 1000 |
| | 0.12 | 7 | 15 | 27 | 0.8 | 22.5 | 22.5 | 45 | 1.7 | 04 124 +2J*^ | 750 |
| | 0.15 | 8 | 16.5 | 27 | 0.8 | 22.5 | 22.5 | 45 | 1.9 | 04 154 +2J*^ | 600 |
| | 0.22 | 10 | 17 | 27 | 0.8 | 22.5 | 22.5 | 45 | 2.4 | 04 224 +2J*^ | 450 |
| | 0.33 | 9.5 | 19.5 | 31 | 0.8 | 27.5 | - | 30 | 5 | 04 334 +2J*^ | 550 |
| | 0.47 | 13 | 21.5 | 31 | 0.8 | 27.5 | - | 30 | 5.5 | 04 474 +2J*^ | 450 |

# INDUCTIVE SELF HEALING POLYPROPYLENE CAPACITOR
# DPSH CAPACITORS

**Application:**
**Resonant capacitor in LED drivers, smps, etc**

**Construction**:
Film/foil inductive type internally series construction with aluminum foil as electrode and polypropylene (PP) film dielectric and MPP Film as connecting electrode, coated with flame retardant epoxy resin.

**Capacitance range:**
0.001 µF to 0.01 µF

**Rated voltages:**
1250 VDC / 500 VAC , 1600 VDC /500 VAC , 2000VDC /500 VAC

**Capacitance tolerances:**
±5%, ±10%

**Applicable specification:**
IEC 384-17

**Operating temperature range:**
-40°C to +105°C

**PITCH:**
5 MM, 7.5 MM

**Voltage proof:**
1.6 times the rated voltage for 2 sec

**Insulation resistance** at +20°C: > 100000 MΩ

**Tan δ:** 0.1% at 1 kHz and 0.4% at 100 kHz.

**Voltage derating:**
For temperatures between +85°C and +105°C a decreasing factor of 1.25% per degree °C on the rated voltage Ur (d.c. and a.c.) has to be applied.

**Endurance Test:**

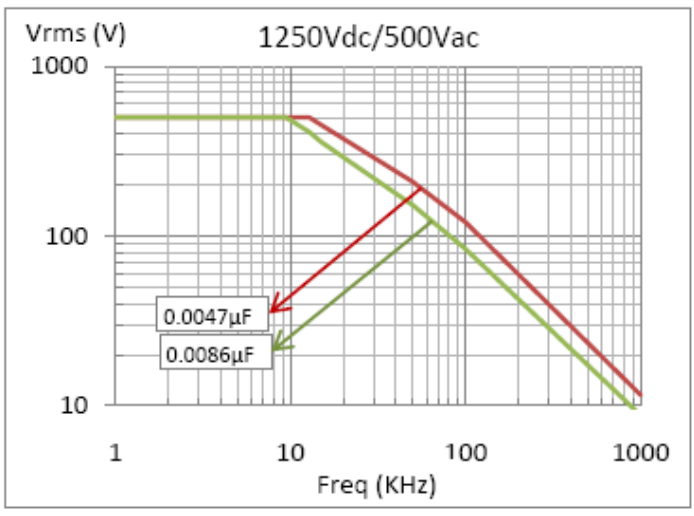
**Test conditions (DC)**
Temperature : +85°C±2°C
Test duration : 1000 h
Voltage applied: 1.25 x $U_R$ (DC)

**Performance**
Capacitance change |ΔC/C| : ≤5%
DF change (Δtgδ) : 1.4 times value measured before the test.
Insulation resistance : ≥50% of initial limit.

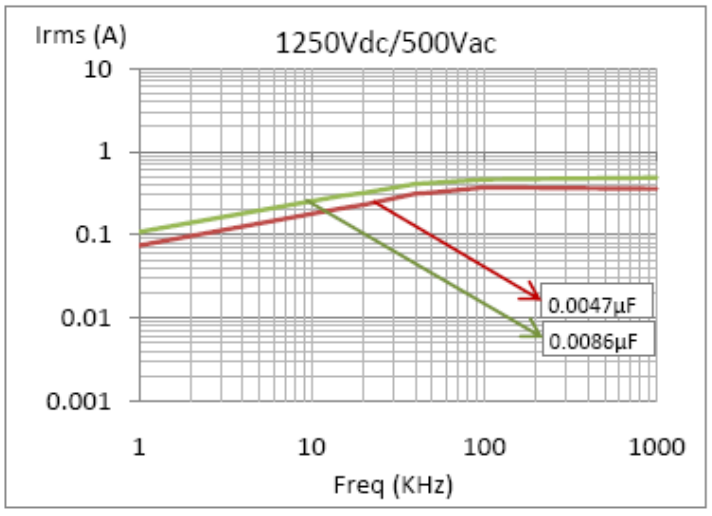
**Test conditions ( AC)**
Temperature : +85°C±2°C
Test duration : 1000 h
Voltage applied: 1.25 x $U_R$(AC)

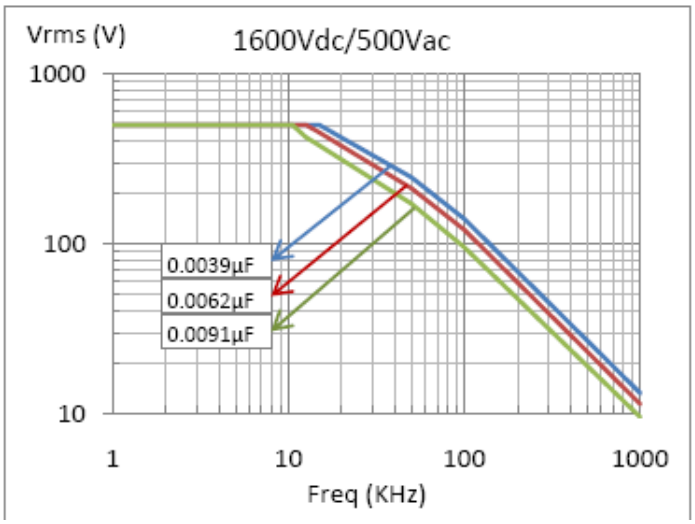
**Performance**
Capacitance change |ΔC/C|: ≤5%
DF change (Δtgδ) : 1.4 times value measured before the test.
Insulation resistance : ≥50% of initial limit.

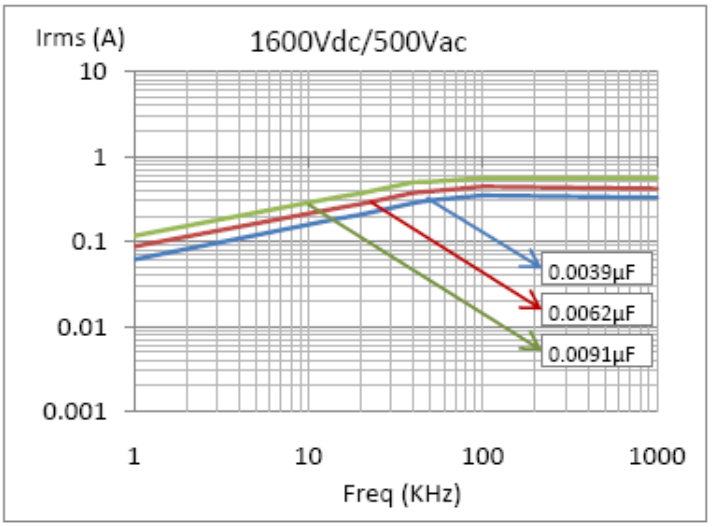
Max.Voltage (Vrms) Vs Frequency
(Sinusoidal Waveform at T ≤ 40°C)

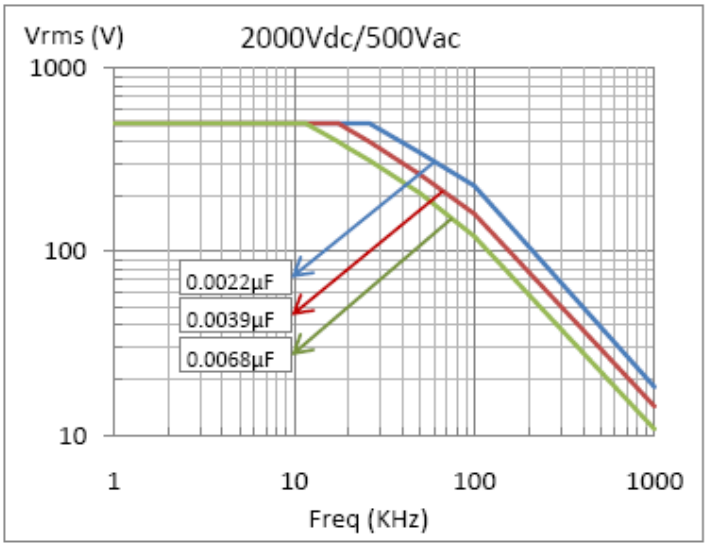


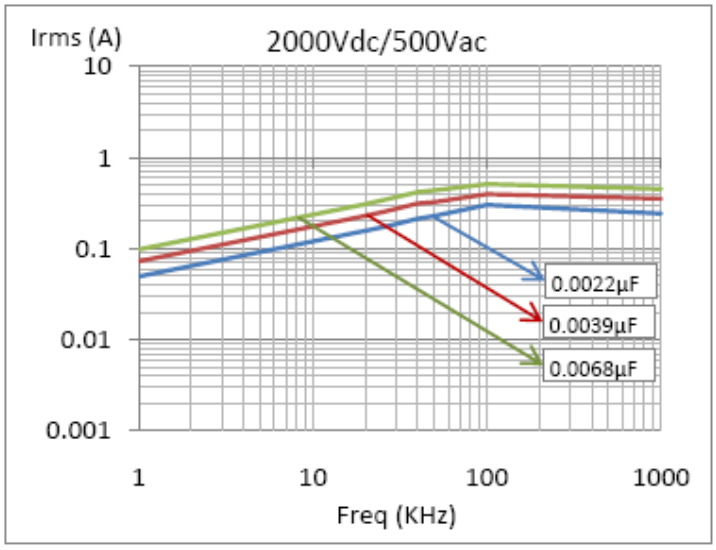

Max. Current (Irms) Vs Frequency
(Sinusoidal Waveform at T ≤ 40°C)






Ordering code:

| Rated Voltage | Rated Cap (µf.) | Dimension Max (mm) W | H | L | d ±0.05 | S ±0.05 | Dv/dt V/µs | wt gm | Ordering Code | Packing units Bulk |
|---|---|---|---|---|---|---|---|---|---|---|
| 1250 VDC | 0.0027 | 5 | 17.5 | 8 | 0.5 | 5±0.5 | 10000 | 0.5 | 70 272 + 3B * ^ | 500 |
| | 0.0033 | 5 | 17.5 | 8 | 0.5 | 5±0.5 | 10000 | 0.57 | 70 332 + 3B * ^ | 500 |
| | 0.0039 | 5.5 | 17.5 | 8.5 | 0.5 | 5±0.5 | 10000 | 0.68 | 70 392 + 3B * ^ | 500 |
| | 0.0047 | 5.5 | 17.5 | 9 | 0.5 | 5±0.5 | 10000 | 0.77 | 70 472 + 3B * ^ | 500 |
| | 0.0056 | 5.5 | 17.5 | 9.5 | 0.5 | 5±0.5 | 10000 | 0.82 | 70 562 + 3B * ^ | 500 |
| | 0.0068 | 6.5 | 17.5 | 10 | 0.5 | 7±0.5 | 10000 | 0.91 | 70 682 + 3B * ^ | 500 |
| | 0.0086 | 6.5 | 17.5 | 10 | 0.5 | 7±0.5 | 10000 | 1.07 | 70 862 + 3B * ^ | 500 |
| | 0.01 | 7 | 17.5 | 10.5 | 0.5 | 7.5±0.5 | 10000 | 1.19 | 70 103 + 3B * | 500 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 2 | ^ | |
| 1600 VDC | 0.0039 | 6.5 | 17.5 | 9.5 | 0.5 | 5.0±0.5 | 10000 | 0.86 | 70 392 + 3C * ^ | 500 |
| | 0.0047 | 5.17 | 15.97 | 8.72 | 0.5 | 5.0±0.5 | 10000 | 0.97 | 70 472 + 3C * ^ | 500 |
| | 0.0056 | 6.5 | 17.5 | 11 | 0.5 | 7.0±0.5 | 10000 | 1.07 | 70 562 + 3C * ^ | 500 |
| | 0.0062 | 6.5 | 17.5 | 11 | 0.5 | 7.5±0.5 | 10000 | 1.1 | 70 622 + 3C * ^ | 500 |
| | 0.0068 | 7 | 17.5 | 11 | 0.5 | 7±0.5 | 10000 | 1.14 | 70 682 + 3C * ^ | 500 |
| | 0.0082 | 7.5 | 17.5 | 11 | 0.5 | 7±0.5 | 10000 | 1.27 | 70 822 + 3C * ^ | 500 |
| | 0.0086 | 8 | 17.5 | 11.5 | 0.5 | 7±0.5 | 10000 | 1.34 | 70 862 + 3C * ^ | 500 |
| | 0.01 | 8.5 | 18 | 12.5 | 0.5 | 7±0.5 | 10000 | 1.49 | 70 103 + 3C * ^ | 500 |
| 2000 VDC | 0.0015 | 5.5 | 18 | 8.5 | 0.5 | 5.0±0.5 | 10000 | 0.55 | 70 152 + 3D * ^ | 500 |
| | 0.0022 | 6 | 18 | 9 | 0.5 | 5.0±0.5 | 10000 | 0.64 | 70 222 + 3D * ^ | 500 |
| | 0.0033 | 6.5 | 18 | 10 | 0.5 | 5.0±0.5 | 10000 | 0.82 | 70 332 + 3D * ^ | 500 |
| | 0.0047 | 7.5 | 18 | 11 | 0.5 | 7.5±0.5 | 10000 | 1.13 | 70 472 + 3D * ^ | 500 |
| | 0.0056 | 8.5 | 18 | 11.5 | 0.5 | 7.5±0.5 | 10000 | 1.24 | 70 562 + 3D * ^ | 500 |
| | 0.0068 | 9.5 | 18 | 12.5 | 0.5 | 7.5±0.5 | 10000 | 1.33 | 70 682 + 3D * ^ | 500 |
| | 0.01 | 10 | 18 | 14 | 0.5 | 7.5±0.5 | 10000 | 1.74 | 70 103 + 3D * ^ | 500 |

## ADVANTAGES:

- Self healing
- Available in 5 mm and 7.5 mm pitch
- Improved AC rating,
- High IR
- Good current carrying capability
- Better reliability

## AC & PULSE METALLISED POLYPROPYLENE FILM CAPACITORS (MPP/MPP) – D.C Application

**MAIN APPLICATION:** Resonant capacitor in LED drivers, smps, etc with High voltage and High Current.

**CONSTRUCTION:** Series constructed, Low inductive wound cell of metallised polypropylene film as Electrodes coated with flame retardant epoxy resin

**CLIMATIC CATEGORY:** 40/100/56

**APPLICABLE SPECIFICATION:** IEC 384-16

**CAPACITANCE VALUE, RATED VOLTAGE (DC):** Refer dimension chart.

**CAPACITANCE TOLERANCE:** ± 5%, ± 10%, ± 20%

**VOLTAGE PROOF**: Between terminals: 1.6 times the rated voltage for 2 seconds.

**INSULATION RESISTANCE**

Between leads for $C_R \leq 1\ \mu F$ ≥100,000 MΩ

Between connected terminals and case >100,000MΩ

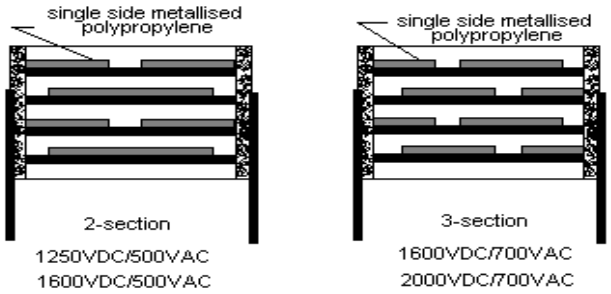
**TAN δ**

| Frequency (kHz) | Cr < 0.1 μf | 0.1μfd < Cr ≤ 1 μf |
|---|---|---|
| At 1 | 0. 05% | 0.05% |
| At 10 | 0. 08% | 0.08% |
| At 100 | 0. 23% | -_____ |

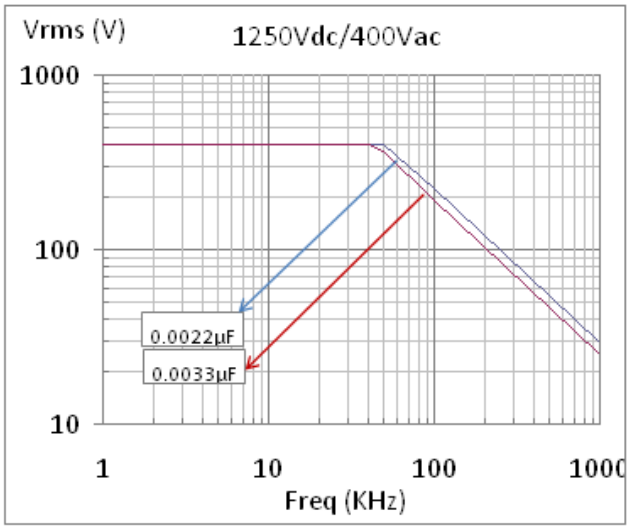
**LIFE TEST CONDITIONS**
(Loading at elevated temperature)
Loaded at 1.25 times of rated DC voltage at 85° for 1000 hours.

**Criteria after the test:**
**Δc/c:** ≤ 5% of initial value.
**Increase of Tan δ:** ≤ 0.002
**Insulation resistance:** ≥ 50% of the value mentioned in IR chart.

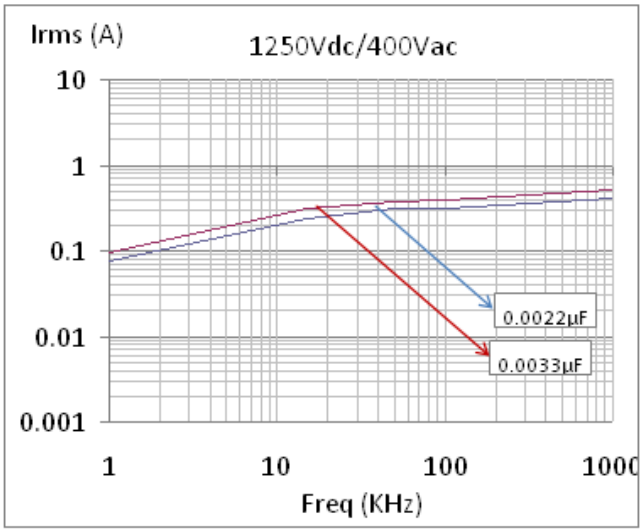
## Construction:

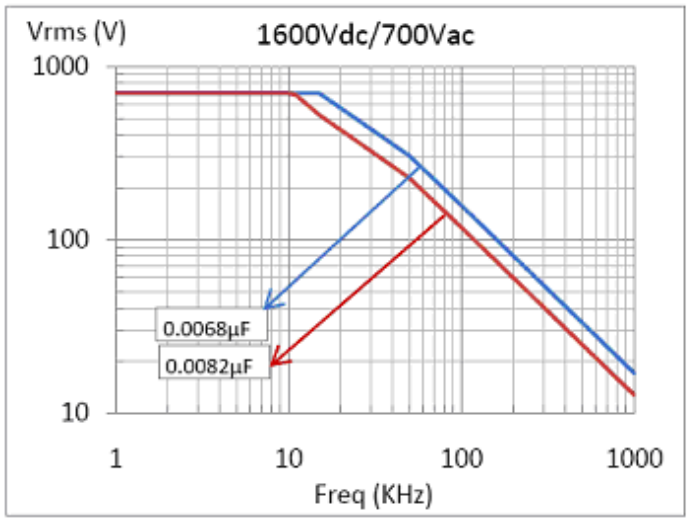


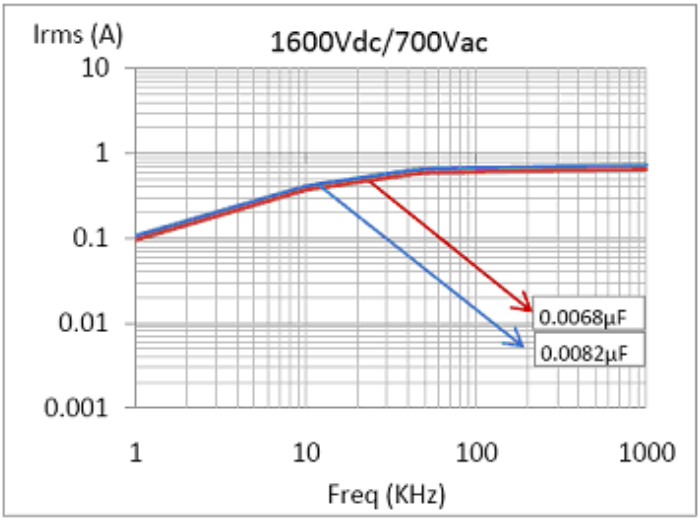

Max.Voltage (Vrms) Vs Frequency
(Sinusoidal Waveform at T ≤ 85°C)

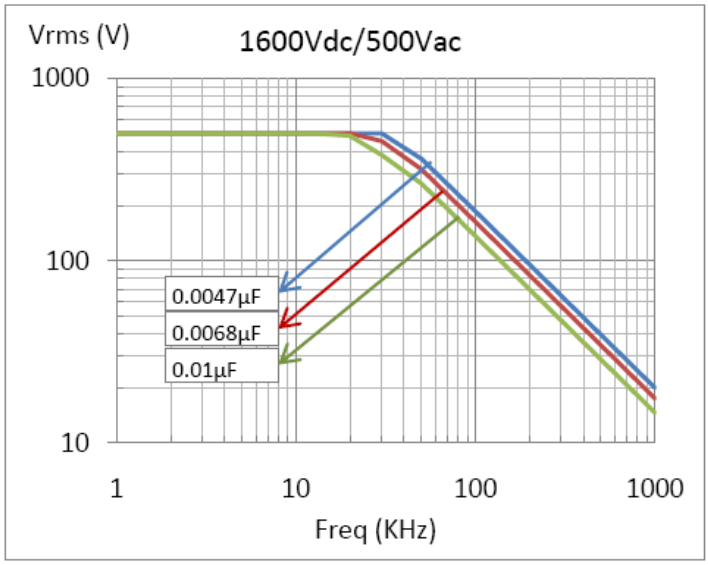


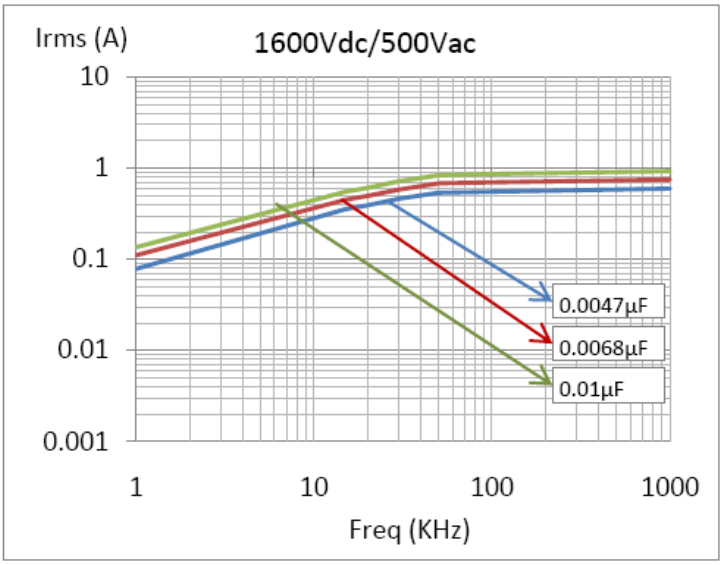

Max. Current (Irms) Vs Frequency
(Sinusoidal Waveform at T ≤ 85°C)

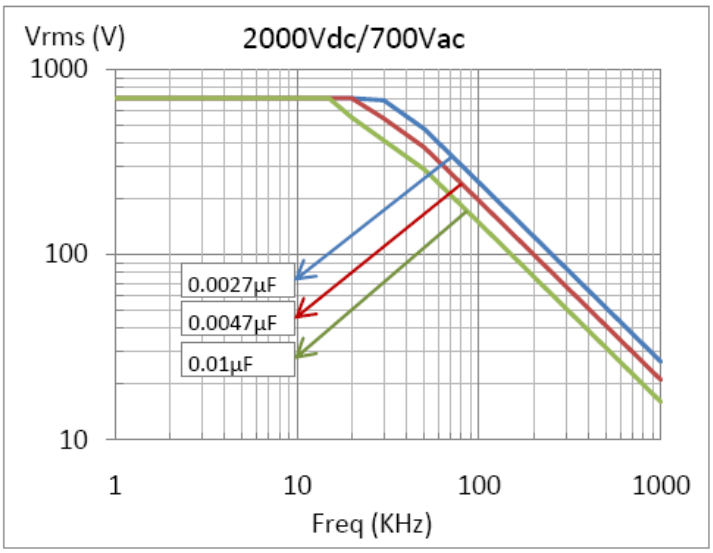


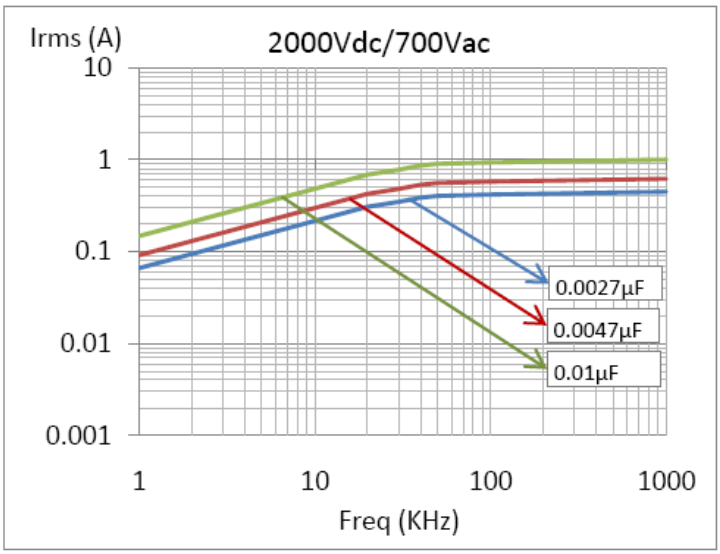

Vrms (V)
1600Vdc/700Vac
1000
100
10
0.0068μF
0.0082μF
1
10
100
1000
Freq (KHz)


Irms (A)
1600Vdc/700Vac
10
1
0.1
0.01
0.001
0.0068μF
0.0082μF
1
10
100
1000
Freq (KHz)


Vrms (V)
1600Vdc/500Vac
1000
100
10
0.0047μF
0.0068μF
0.01μF
1
10
100
1000
Freq (KHz)


Irms (A)
1600Vdc/500Vac
10
1
0.1
0.01
0.001
0.0047μF
0.0068μF
0.01μF
1
10
100
1000
Freq (KHz)


Vrms (V)
2000Vdc/700Vac
1000
100
10
0.0027μF
0.0047μF
0.01μF
1
10
100
1000
Freq (KHz)


Irms (A)
2000Vdc/700Vac
10
1
0.1
0.01
0.001
0.0027μF
0.0047μF
0.01μF
1
10
100
1000
Freq (KHz)

Ordering code and packing units:AC and pulse metallised polypropylene film capacitor(MPP/MPP-Dip Type)

| Rated voltage | Rated Cap. (mfd) | Maximum Dimensions(mm) W | H | L | d ±0.02 | S ±0.5 | F 0.8/-0.2 | Dv/dt V /µs | Weight in gm | Ordering code | Packing Ammo | Bulk |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1250VDC | 0.0022 | 5.5 | 10 | 10.5 | 0.6 | 7.5 | 7.5 | 2500 | - | 18 222 +3B*^ | 1100 | 1000 |
| 400VAC | 0.0027 | 5.5 | 10.5 | 10.5 | 0.6 | 7.5 | 7.5 | 2500 | - | 18 272 +3B*^ | 1100 | 1000 |
| | 0.003 | 6 | 10.5 | 10.5 | 0.6 | 7.5 | 7.5 | 2500 | - | 18 302 +3B*^ | 1100 | 1000 |
| | 0.0033 | 6 | 11 | 10.5 | 0.6 | 7.5 | 7.5 | 2500 | - | 18 332 +3B*^ | 1100 | 1000 |
| | 0.0039 | 6.5 | 11 | 10.5 | 0.6 | 7.5 | 7.5 | 2500 | - | 18 392 +3B*^ | 1100 | 1000 |
| 1250VDC | 0.0082 | 5.5 | 11.5 | 19 | 0.8 | 15 | 15 | 3300 | 1.4 | 18 822 +3B*^ | 1100 | 1000 |
| 500VAC | 0.01 | 5.5 | 11.5 | 19 | 0.8 | 15 | 15 | 3300 | 1.4 | 18 103 +3B*^ | 1100 | 1000 |
| | 0.012 | 6.5 | 12.5 | 19 | 0.8 | 15 | 15 | 3300 | 1.5 | 18 123 +3B*^ | 1100 | 1000 |
| | 0.015 | 6.5 | 12.5 | 19 | 0.8 | 15 | 15 | 3300 | 1.6 | 18 153 +3B*^ | 1100 | 1000 |
| | 0.018 | 8 | 14 | 19 | 0.8 | 15 | 15 | 3300 | 2 | 18 183 +3B*^ | 900 | 1000 |
| | 0.022 | 8 | 14 | 19 | 0.8 | 15 | 15 | 3300 | 2 | 18 223 +3B*^ | 900 | 1000 |
| | 0.027 | 9 | 15 | 19 | 0.8 | 15 | 15 | 3300 | 2.4 | 18 273 +3B*^ | 700 | 1000 |
| | 0.033 | 10.5 | 16.5 | 19 | 0.8 | 15 | 15 | 3300 | 2.6 | 18 333 +3B*^ | 700 | 1000 |
| | 0.039 | 10.5 | 16.5 | 19 | 0.8 | 15 | 15 | 3300 | 2.6 | 18 393 +3B*^ | 700 | 1000 |
| | 0.047 | 10.5 | 17 | 19 | 0.8 | 15 | 15 | 3300 | 2.6 | 18 473 +3B*^ | 700 | 1000 |
| | 0.033 | 6.5 | 15.5 | 27 | 0.8 | 22.5 | 22.5 | 2100 | 2.5 | 18 333 +3B*^ | 650 | 400 |
| | 0.039 | 6.5 | 15.5 | 27 | 0.8 | 22.5 | 22.5 | 2100 | 2.5 | 18 393 +3B*^ | 650 | 400 |
| | 0.047 | 7.5 | 16.5 | 27 | 0.8 | 22.5 | 22.5 | 2100 | 3.2 | 18 473 +3B*^ | 650 | 400 |
| | 0.056 | 7.5 | 16.5 | 27 | 0.8 | 22.5 | 22.5 | 2100 | 3.2 | 18 563 +3B*^ | 650 | 400 |
| | 0.068 | 8.5 | 17.5 | 27 | 0.8 | 22.5 | 22.5 | 2100 | 4.1 | 18 683 +3B*^ | 650 | 400 |
| | 0.082 | 10.5 | 19 | 27 | 0.8 | 22.5 | 22.5 | 2100 | 5 | 18 823 +3B*^ | 650 | 400 |
| | 0.1 | 10.5 | 19 | 27 | 0.8 | 22.5 | 22.5 | 2100 | 5 | 18 104 +3B*^ | 500 | 400 |
| | 0.12 | 11 | 20 | 27 | 0.8 | 22.5 | 22.5 | 2100 | 5 | 18 124 +3B*^ | 500 | 400 |
| | 0.15 | 13 | 21 | 27 | 0.8 | 22.5 | 22.5 | 2100 | 5.2 | 18 154 +3B*^ | - | 200 |
| 1600VDC | 0.0022 | 5.5 | 12 | 19 | 0.8 | 15 | 15 | 4500 | 1.1 | 30 222 +3C*^ | 1100 | 1000 |
| 500VAC | 0.0033 | 5.5 | 12 | 19 | 0.8 | 15 | 15 | 4500 | 1.1 | 30 332 +3C*^ | 1100 | 1000 |
| | 0.0039 | 6 | 12 | 19 | 0.8 | 15 | 15 | 4500 | 1.5 | 30 392 +3C*^ | 1100 | 1000 |
| | 0.0047 | 7 | 12 | 19 | 0.8 | 15 | 15 | 4500 | 1.5 | 30 473 +3C*^ | 1100 | 1000 |
| | 0.0056 | 7 | 13 | 19 | 0.8 | 15 | 15 | 4500 | 1.5 | 30 563 +3C*^ | 1100 | 1000 |
| | 0.0068 | 6.5 | 14 | 19 | 0.8 | 15 | 15 | 4500 | 1.5 | 30 683 +3C*^ | 1100 | 1000 |
| | 0.0082 | 8 | 14 | 19 | 0.8 | 15 | 15 | 4500 | 2 | 30 823 +3C*^ | 1100 | 1000 |
| | 0.01 | 7 | 16 | 19 | 0.8 | 15 | 15 | 4500 | 2 | 30 103 +3C*^ | 900 | 1000 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.015 | 9 | 15 | 19 | 0.8 | 15 | 15 | 4500 | 2.6 | 30 153 +3C*^ | 700 | 1000 |
| | 0.022 | 10.5 | 16.5 | 19 | 0.8 | 15 | 15 | 4500 | 2.8 | 30 223 +3C*^ | 700 | 1000 |
| 1600VDC | 0.0056 | 7 | 13 | 19 | 0.8 | 15 | 15 | 6000 | 1.1 | 18 562 +3C*^ | 1100 | 1000 |
| 700VAC | 0.0068 | 6.5 | 14 | 19 | 0.8 | 15 | 15 | 6000 | 1.1 | 18 682 +3C*^ | 1100 | 1000 |
| | 0.0082 | 8 | 14 | 19 | 0.8 | 15 | 15 | 6000 | 1.5 | 18 822 +3C*^ | 1100 | 1000 |
| | 0.01 | 7 | 16 | 19 | 0.8 | 15 | 15 | 6000 | 1.5 | 18 103 +3C*^ | 1100 | 1000 |
| | 0.012 | 9 | 16 | 19 | 0.8 | 15 | 15 | 6000 | 2 | 18 123 +3C*^ | 1100 | 1000 |
| | 0.015 | 8 | 14 | 19 | 0.8 | 15 | 15 | 6000 | 2 | 18 153 +3C*^ | 1100 | 1000 |
| | 0.018 | 8.5 | 15 | 19 | 0.8 | 15 | 15 | 6000 | 2.4 | 18 183 +3C*^ | 1100 | 1000 |
| | 0.022 | 10.5 | 16.5 | 19 | 0.8 | 15 | 15 | 6000 | 2.6 | 18 223 +3C*^ | 1100 | 1000 |
| | 0.027 | 10.5 | 16.5 | 19 | 0.8 | 15 | 15 | 6000 | 2.6 | 18 273 +3C*^ | 900 | 1000 |
| | 0.033 | 11 | 18 | 19 | 0.8 | 15 | 15 | 6000 | 2.6 | 18 333 +3C*^ | 900 | 1000 |
| | 0.027 | 6.5 | 15.5 | 27 | 0.8 | 22.5 | 22.5 | 3000 | 2.6 | 18 273 +3C*^ | 650 | 400 |
| | 0.033 | 7.5 | 16.5 | 27 | 0.8 | 22.5 | 22.5 | 3000 | 3.2 | 18 333 +3C*^ | 650 | 400 |
| | 0.039 | 7.5 | 16.5 | 27 | 0.8 | 22.5 | 22.5 | 3000 | 3.2 | 18 393 +3C*^ | 650 | 400 |
| | 0.047 | 9 | 17.5 | 27 | 0.8 | 22.5 | 22.5 | 3000 | 4.1 | 18 473 +3C*^ | 500 | 400 |
| | 0.056 | 10.5 | 19 | 27 | 0.8 | 22.5 | 22.5 | 3000 | 5 | 18 563 +3C*^ | 500 | 400 |
| | 0.068 | 10.5 | 19 | 27 | 0.8 | 22.5 | 22.5 | 3000 | 5 | 18 683 +3C*^ | - | 200 |
| | 0.082 | 11 | 19 | 27 | 0.8 | 22.5 | 22.5 | 3000 | 5 | 18 823 +3C*^ | - | 200 |
| | 0.1 | 12 | 21 | 27 | 0.8 | 22.5 | 22.5 | 3000 | 5.2 | 18 104 +3C*^ | - | 200 |
| | 0.12 | 13 | 22 | 27 | 0.8 | 22.5 | 22.5 | 3000 | 5.2 | 18 124 +3C*^ | - | 200 |
| 2000VDC | 0.001 | 5.5 | 11.5 | 19 | 0.8 | 15 | 15 | 9500 | 1.1 | 18 102 +3D*^ | 1100 | 1000 |
| 700VAC | 0.0012 | 5.5 | 11.5 | 19 | 0.8 | 15 | 15 | 9500 | 1.1 | 18 122 +3D*^ | 1100 | 1000 |
| | 0.0015 | 6 | 15 | 18.5 | 0.8 | 15 | 15 | 9500 | 1.1 | 18 152 +3D*^ | 1100 | 1000 |
| | 0.0018 | 7 | 17 | 19 | 0.8 | 15 | 15 | 9500 | 1.1 | 18 182 +3D*^ | 1100 | 1000 |
| | 0.0022 | 6 | 15 | 19 | 0.8 | 15 | 15 | 9500 | 1.1 | 18 222 +3D*^ | 1100 | 1000 |
| | 0.0027 | 6 | 15 | 19 | 0.8 | 15 | 15 | 9500 | 1.1 | 18 272 +3D*^ | 1100 | 1000 |
| | 0.0033 | 7 | 13 | 19 | 0.8 | 15 | 15 | 9500 | 1.1 | 18 332 +3D*^ | 1100 | 1000 |
| | 0.0039 | 6 | 15 | 19 | 0.8 | 15 | 15 | 9500 | 1.1 | 18 392 +3D*^ | 1100 | 1000 |
| | 0.0047 | 7 | 15 | 19 | 0.8 | 15 | 15 | 9500 | 1.1 | 18 472 +3D*^ | 1100 | 1000 |
| | 0.0056 | 7 | 15 | 19 | 0.8 | 15 | 15 | 9500 | 1.5 | 18 562 +3D*^ | 900 | 1000 |
| | 0.0068 | 8 | 16 | 19 | 0.8 | 15 | 15 | 9500 | 1.5 | 18 682 +3D*^ | 900 | 1000 |
| | 0.0082 | 9 | 18 | 19 | 0.8 | 15 | 15 | 9500 | 2 | 18 822 +3D*^ | 900 | 1000 |
| | 0.01 | 10 | 17 | 19 | 0.8 | 15 | 15 | 9500 | 2 | 18 103 +3D*^ | 900 | 1000 |
| | 0.012 | 11 | 18 | 19 | 0.8 | 15 | 15 | 9500 | 2.4 | 18 123 +3D*^ | 700 | 1000 |
| | 0.015 | 9 | 15 | 19 | 0.8 | 15 | 15 | 9500 | 2.4 | 18 153 +3D*^ | 700 | 1000 |
| | 0.018 | 10. | 16. | 19 | 0. | 15 | 15 | 950 | 2.4 | 18 183 | 700 | 100 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 5 | 5 | | 8 | | | 0 | | +3D*^ | | 0 |
| | 0.022 | 10.5 | 19 | 19 | 0.8 | 15 | 15 | 9500 | 2.6 | 18 223 +3D*^ | - | 1000 |
| | 0.027 | 11 | 20 | 19 | 0.8 | 15 | 15 | 9500 | 2.6 | 18 273 +3D*^ | - | 1000 |
| | 0.0047 | 7 | 15 | 27 | 0.8 | 22.5 | 22.5 | 3500 | 2.6 | 18 472 +3D*^ | 650 | 400 |
| | 0.0056 | 6.5 | 15.5 | 27 | 0.8 | 22.5 | 22.5 | 3500 | 2.6 | 18 562 +3D*^ | 650 | 400 |
| | 0.0068 | 6.5 | 15.5 | 27 | 0.8 | 22.5 | 22.5 | 3500 | 2.6 | 18 682 +3D*^ | 650 | 400 |
| | 0.0082 | 6.5 | 15.5 | 27 | 0.8 | 22.5 | 22.5 | 3500 | 2.6 | 18 822 +3D*^ | 650 | 400 |
| | 0.01 | 6.5 | 15.5 | 27 | 0.8 | 22.5 | 22.5 | 3500 | 2.6 | 18 103 +3D*^ | 650 | 400 |
| | 0.012 | 6.5 | 15.5 | 27 | 0.8 | 22.5 | 22.5 | 3500 | 2.6 | 18 123 +3D*^ | 650 | 400 |
| | 0.015 | 6.5 | 15.5 | 27 | 0.8 | 22.5 | 22.5 | 3500 | 2.6 | 18 153 +3D*^ | 650 | 400 |
| | 0.018 | 6.5 | 15.5 | 27 | 0.8 | 22.5 | 22.5 | 3500 | 2.6 | 18 183 +3D*^ | 650 | 400 |
| | 0.022 | 6.5 | 15.5 | 27 | 0.8 | 22.5 | 22.5 | 3500 | 2.6 | 18 223 +3D*^ | 650 | 400 |
| | 0.027 | 7.5 | 16.5 | 27 | 0.8 | 22.5 | 22.5 | 3500 | 3.2 | 18 273 +3D*^ | 500 | 400 |
| | 0.033 | 9 | 17.5 | 27 | 0.8 | 22.5 | 22.5 | 3500 | 4.1 | 18 333 +3D*^ | 500 | 400 |
| | 0.039 | 10.5 | 19 | 27 | 0.8 | 22.5 | 22.5 | 3500 | 5 | 18 393 +3D*^ | - | 200 |
| | 0.047 | 10.5 | 19 | 27 | 0.8 | 22.5 | 22.5 | 3500 | 5 | 18 473 +3D*^ | - | 200 |

* The dv/dt test is carried out for 2 times above value

# AC PULSE & METALLISED POLYPROPYLENE FILM CAPACITORS
## (PP/MPP Reduced Pitch)

**MAIN APPLICATION**
LED drivers, SMPS, Electronic ballast, Resonant capacitor, Snubber application with High voltage and High current.

**CONSTRUCTION**
Series constructed, impregnated polypropylene Film, aluminum foil and metallized polypropylene film as internal electrodes coated by hard, water repellant, solvent resistant epoxy resin

**CLIMATIC CATEGORY**
40/100/56

**APPLICABLE SPECIFICATION**
IEC 384-16,

**CAPACITANCE VALUE & RATED VOLTAGE (DC)**
Refer dimension chart.

**CAPACITANCE TOLERANCE**
±5%, ±10%

**VOLTAGE PROOF**
Between terminals: 1.6 times of rated voltage for 2 seconds.

**INSULATIONRESISTANCE**
Between leads > 100000 MΩ
Between interconnected leads and case >100000MΩ

**TAN δ (DISSIPATION FACTOR) AT 20°C (Dip type)**

| Frequency (kHz) | $C_R < 0.1$ mfd | 0.1mfd < $C_R \leq 1$ mfd |
|---|---|---|
| At 1 | 0.05% | 0.08% |
| At 10 | 0.1% | 0.1% |
| At 100 KHz | 0.3% | 0.5% |

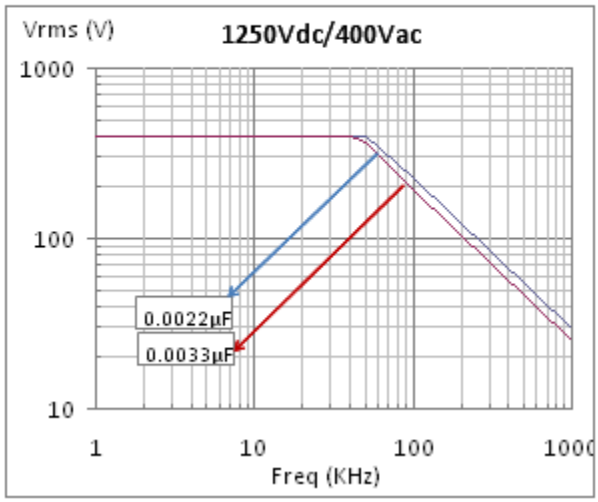
**LIFE TEST CONDITIONS (DC):**(Loading at elevated temperature) Loaded at 1.25 times the rated DC voltage at 85° C for 1000 hours.

**Criteria after the test**:
**Δc/c:** ≤ 5% of initial value.
**Increase of Tan δ:** ≤ 0.003

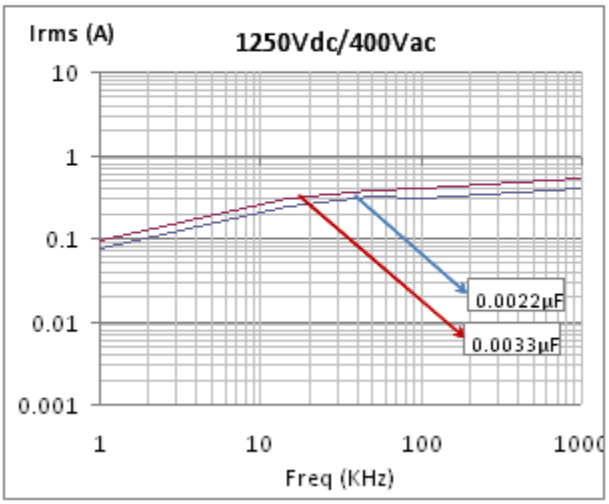
**Insulation resistance:** ≥ 50% of the value mentioned in IR chart.

**APPROVALS**
Capacitors are tested as per IEC 384-16

Max.Voltage (Vrms) Vs Frequency
(Sinusoidal Waveform at T ≤ 85°C)

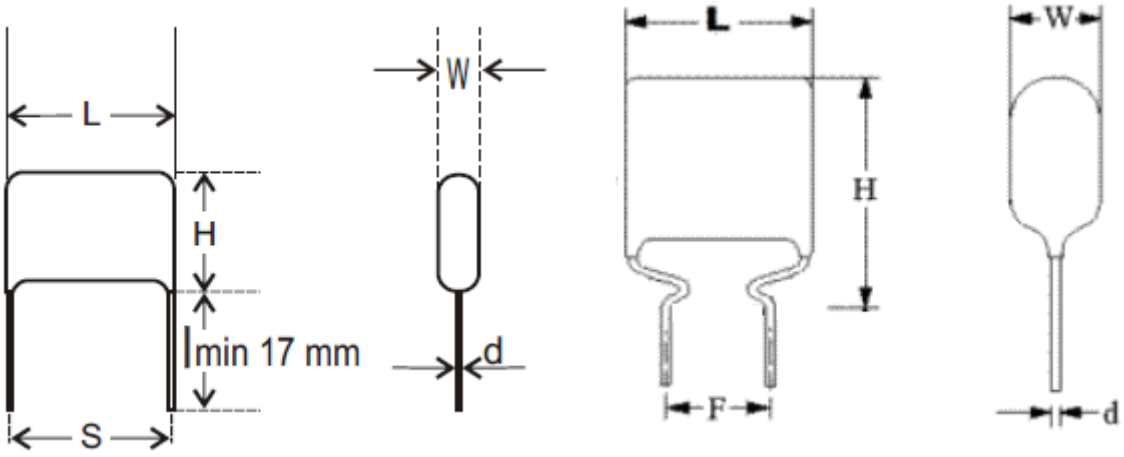



Max. Current (Irms) Vs Frequency
(Sinusoidal Waveform at T ≤ 85°C)




Ordering code and packing units: AC and pulse PP/MPP capacitor (Dip type)

| Rated voltage | Rated Cap.(µfd) | Maximum Dimensions(mm) W | H | L | d ±0.02 | S ±0.5 | F 0.8/-0.2 | Dv/dt V /µs | Weight in gm | Ordering code | Packing Ammo | Bulk |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1250VDC | **0.0022** | 6 | 12 | 13 | 0.6 | 12.5 | 10 | 30000 | - | 63 222 +3B*^ | - | 1000 |
| 400VAC | **0.0027** | 6 | 12 | 13 | 0.6 | 12.5 | 10 | 30000 | - | 63 272 +3B*^ | - | 1000 |
| | **0.0033** | 6 | 12 | 13 | 0.6 | 12.5 | 10 | 30000 | - | 63 332 +3B*^ | - | 1000 |
| | **0.0039** | 6 | 12 | 13 | 0.6 | 12.5 | 10 | 30000 | - | 63 392 +3B*^ | - | 1000 |
| | **0.0047** | 6 | 12 | 13 | 0.6 | 12.5 | 10 | 30000 | - | 63 472 +3B*^ | - | 1000 |
| | **0.0056** | 6 | 12.5 | 13 | 0.6 | 12.5 | 10 | 30000 | - | 63 562 +3B*^ | - | 1000 |
| | **0.0068** | 6 | 13 | 13 | 0.6 | 12.5 | 10 | 30000 | - | 63 682 +3B*^ | - | 1000 |




# AC PULSE & METALLISED POLYPROPYLENE FILM APACITORS
## (PP/MPP)

**MAIN APPLICATION**
LED drivers, SMPS, Motor control circuits, Deflection circuit in T.V sets (fly back) and monitors Electronic ballast, Snubber and SCR commutating circuits & application with High voltage and High current.

**CONSTRUCTION**
Series constructed, impregnated polypropylene Film, aluminum foil and metallized polypropylene film as internal electrodes coated by hard, water repellant, solvent resistant epoxy

**CLIMATIC CATEGORY**
40/100/56

**APPLICABLE SPECIFICATION**
IEC 384-17,

**CAPACITANCE VALUE & RATED VOLTAGE (DC)**
Refer dimension chart.

**CAPACITANCE TOLERANCE**
±2%, ±5%, ±10%

**VOLTAGE PROOF**
Between terminals: 1.6 times of rated voltage for 2 seconds.

**INSULATIONRESISTANCE**
Between leads > 100000 MΩ
Between interconnected leads and case >100000MΩ

**TAN δ (DISSIPATION FACTOR) AT 20°C (Dip type)**

| Frequency (kHz) | $C_R < 0.1$ mfd | 0.1mfd < $C_R \leq 1$ mfd |
|---|---|---|
| At 1 | 0.05% | 0.08% |
| At 10 | 0.1% | 0.1% |
| At 100 KHz | 0.3% | 0.5% |

**LIFE TEST CONDITIONS (DC):**(Loading at elevated temperature) Loaded at 1.25 times the rated DC voltage at 85° C for 1000 hours.

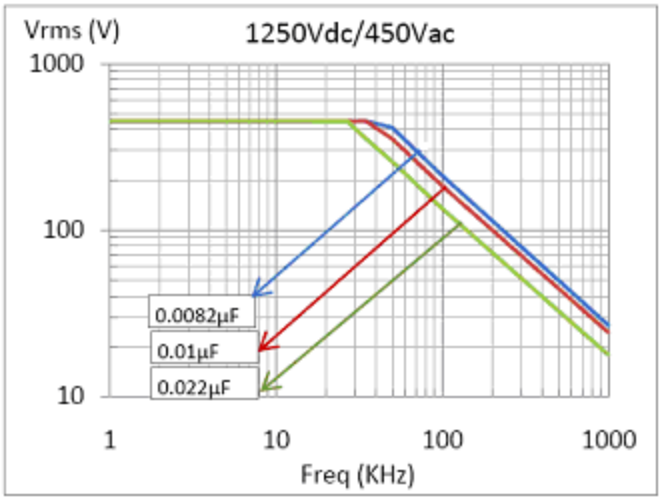
**Criteria after the test**:
**Δc/c:** ≤ 5% of initial value.
**Increase of Tan δ:** ≤ 0.002
**Insulation resistance:** ≥ 50% of the value mentioned in IR chart.

**LIFE TEST CONDITIONS (AC):**(Loading at elevated temperature) Loaded at 1.25 times of rated AC voltage at 70° C for 1000 hours.

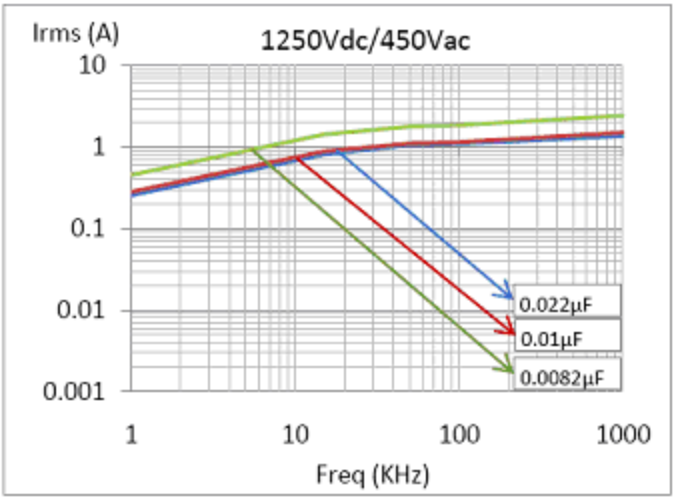
**Criteria after the test**:
**Δc/c:** ≤ 5% of initial value.
**Increase of Tan δ:** ≤ 0.002, $C_R \leq 1\mu F$
**Insulation resistance:** ≥ 50% of the value mentioned in IR chart.

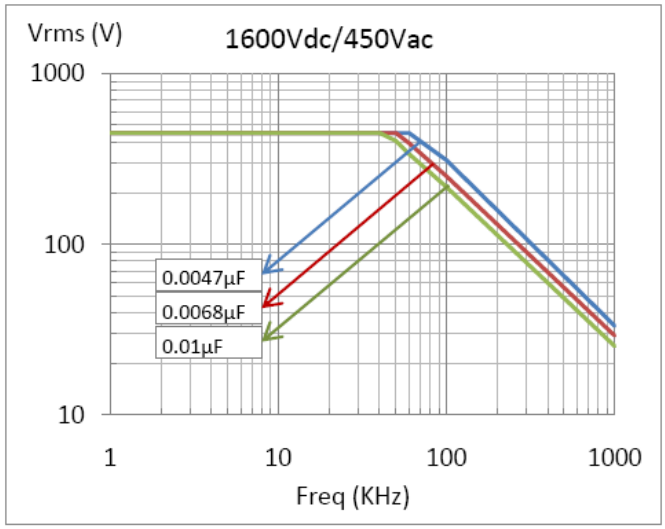
**APPROVALS**
Capacitors are tested as per IEC 384-17

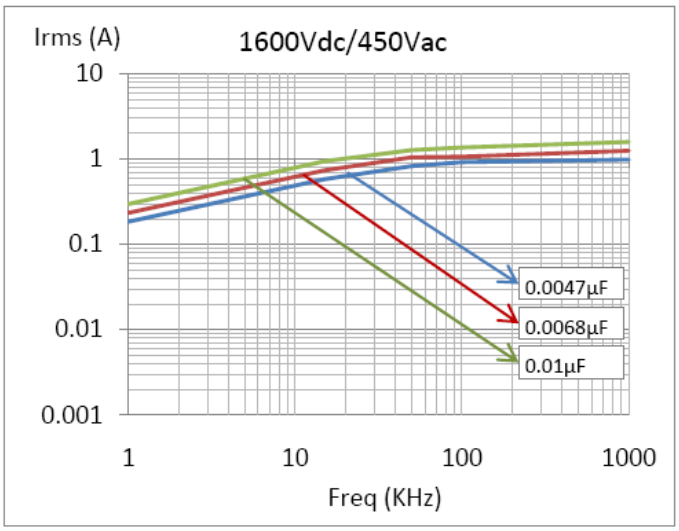
Max.Voltage (Vrms) Vs Frequency
(Sinusoidal Waveform at T ≤ 85°C)

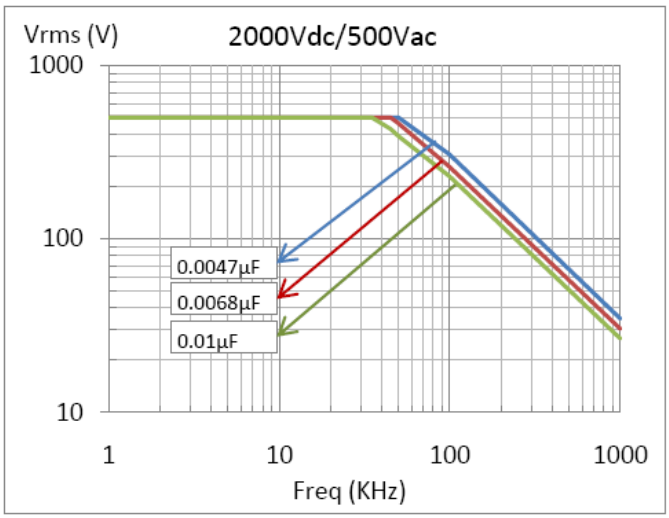


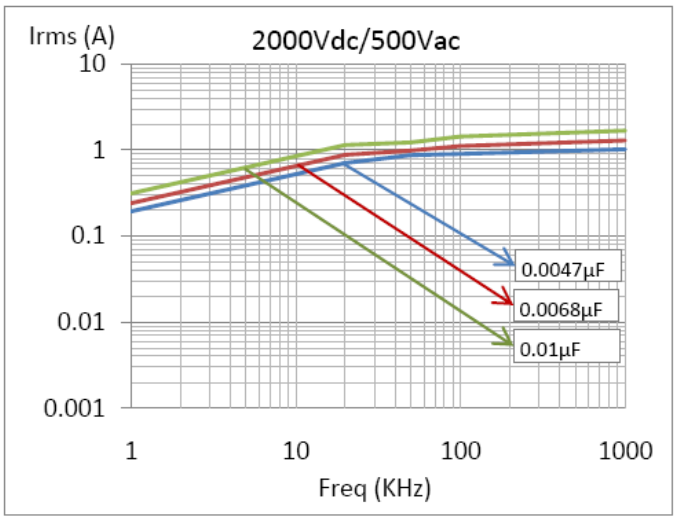

Max. Current (Irms) Vs Frequency
(Sinusoidal Waveform at T ≤ 85°C)






Ordering code and packing units: AC and pulse PP/MPP capacitor (Dip type)

| Rated voltage | Rated Cap.(µfd) | Maximum Dimensions(mm) W | H | L | d ±0.02 | S ±0.5 | F 0.8/-0.2 | Dv/dt V /µs | Weight in gm | Ordering code | Packing Ammo | Bulk |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1000VDC | **0.0033** | 5 | 10 | 19 | 0.8 | 15 | 15 | 28000 | 1.1 | 05 332 +3A*^ | 1100 | 1000 |
| 400VAC | **0.0039** | 5 | 10 | 19 | 0.8 | 15 | 15 | 28000 | 1.1 | 05 392 +3A*^ | 1100 | 1000 |
| | **0.0047** | 5 | 10 | 19 | 0.8 | 15 | 15 | 28000 | 1.1 | 05 472 +3A*^ | 1100 | 1000 |
| | **0.0056** | 5 | 10 | 19 | 0.8 | 15 | 15 | 28000 | 1.1 | 05 562 +3A*^ | 1100 | 1000 |
| | **0.0068** | 5 | 10 | 19 | 0.8 | 15 | 15 | 28000 | 1.1 | 05 682 +3A*^ | 1100 | 1000 |
| | **0.0082** | 6 | 11 | 19 | 0.8 | 15 | 15 | 28000 | 1.5 | 05 822 +3A*^ | 1100 | 1000 |
| | **0.01** | 6 | 11 | 19 | 0.8 | 15 | 15 | 28000 | 1.5 | 05 103 +3A*^ | 1100 | 1000 |
| | **0.012** | 6 | 11 | 19 | 0.8 | 15 | 15 | 28000 | 1.5 | 05 123 +3A*^ | 1100 | 1000 |
| | **0.015** | 6 | 13 | 19 | 0.8 | 15 | 15 | 28000 | 2.6 | 05 153 +3A*^ | 1100 | 1000 |
| | **0.018** | 7 | 14 | 19 | 0.8 | 15 | 15 | 28000 | 2.6 | 05 183 +3A*^ | 900 | 1000 |
| | **0.022** | 8 | 14 | 19 | 0.8 | 15 | 15 | 28000 | 3 | 05 223 +3A*^ | 700 | 1000 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **0.027** | 8 | 15 | 19 | 0.8 | 15 | 15 | 28000 | 3.5 | 05 273 +3A*^ | 700 | 1000 |
| | **0.015** | 5 | 12 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 2.4 | 05 153 +3A*^ | 650 | 400 |
| | **0.018** | 6 | 12 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 2.5 | 05 183 +3A*^ | 650 | 400 |
| | **0.022** | 6 | 13 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 2.7 | 05 223 +3A*^ | 650 | 400 |
| | **0.027** | 6 | 13 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 3.2 | 05 273 +3A*^ | 650 | 400 |
| | **0.033** | 7 | 14 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 3.5 | 05 333 +3A*^ | 650 | 400 |
| | **0.039** | 8 | 14 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 3.8 | 05 393 +3A*^ | 650 | 400 |
| | **0.047** | 8 | 15 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 4.2 | 05 473 +3A*^ | 500 | 400 |
| | **0.056** | 9 | 16 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 4.7 | 05 563 +3A*^ | 500 | 400 |
| | **0.068** | 10 | 16 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 5.3 | 05 683 +3A*^ | - | 200 |
| 1250VDC | **0.0022** | 5 | 10 | 19 | 0.8 | 15 | 15 | 30000 | 1.1 | 05 222 +3B*^ | 1100 | 1000 |
| 450VAC | **0.0027** | 5 | 10 | 19 | 0.8 | 15 | 15 | 30000 | 1.1 | 05 272 +3B*^ | 1100 | 1000 |
| | **0.0033** | 5 | 10 | 19 | 0.8 | 15 | 15 | 30000 | 1.1 | 05 332 +3B*^ | 1100 | 1000 |
| | **0.0039** | 5 | 10 | 19 | 0.8 | 15 | 15 | 30000 | 1.1 | 05 392 +3B*^ | 1100 | 1000 |
| | **0.0047** | 5 | 10 | 19 | 0.8 | 15 | 15 | 30000 | 1.1 | 05 472 +3B*^ | 1100 | 1000 |
| | **0.0056** | 5 | 12 | 19 | 0.8 | 15 | 15 | 30000 | 1.5 | 05 562 +3B*^ | 1100 | 1000 |
| | **0.0068** | 5 | 12 | 19 | 0.8 | 15 | 15 | 30000 | 1.5 | 05 682 +3B*^ | 1100 | 1000 |
| | **0.0082** | 6 | 12 | 19 | 0.8 | 15 | 15 | 30000 | 1.5 | 05 822 +3B*^ | 1100 | 1000 |
| | **0.0082** | 5 | 12 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 2.2 | 05 822 +3B*^ | 650 | 400 |
| | **0.01** | 5 | 12 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 2.3 | 05 103 +3B*^ | 650 | 400 |
| | **0.012** | 5 | 12 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 2.5 | 05 123 +3B*^ | 650 | 400 |
| | **0.015** | 6 | 13 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 2.9 | 05 153 +3B*^ | 650 | 400 |
| | **0.018** | 6 | 13 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 3.1 | 05 183 +3B*^ | 650 | 400 |
| | **0.022** | 7 | 14 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 3.3 | 05 223 +3B*^ | 650 | 400 |
| | **0.027** | 8 | 14 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 3.7 | 05 273 +3B*^ | 500 | 400 |
| | **0.033** | 8 | 15 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 4.1 | 05 333 +3B*^ | 500 | 400 |
| 1600VDC | **0.001** | 5 | 10 | 19 | 0.8 | 15 | 15 | 34000 | 1.1 | 05 102 +3C*^ | 1100 | 1000 |
| 450VAC | **0.0012** | 5 | 10 | 19 | 0.8 | 15 | 15 | 34000 | 1.1 | 05 122 +3C*^ | 1100 | 1000 |
| | **0.0015** | 5 | 10 | 19 | 0.8 | 15 | 15 | 34000 | 1.1 | 05 152 +3C*^ | 1100 | 1000 |
| | **0.0018** | 5 | 10 | 19 | 0.8 | 15 | 15 | 34000 | 1.1 | 05 182 +3C*^ | 1100 | 1000 |
| | **0.0022** | 6 | 11 | 19 | 0.8 | 15 | 15 | 34000 | 1.5 | 05 222 +3C*^ | 1100 | 1000 |
| | **0.0027** | 6 | 12 | 19 | 0.8 | 15 | 15 | 34000 | 1.5 | 05 272 +3C*^ | 1100 | 1000 |
| | **0.0033** | 6 | 13 | 19 | 0.8 | 15 | 15 | 34000 | 1.5 | 05 332 +3C*^ | 1100 | 1000 |
| | **0.0039** | 6 | 13 | 19 | 0.8 | 15 | 15 | 34000 | 2.3 | 05 392 +3C*^ | 1100 | 1000 |
| | **0.0047** | 7 | 13 | 19 | 0.8 | 15 | 15 | 34000 | 2.4 | 05 472 +3C*^ | 900 | 1000 |
| | **0.0056** | 7 | 14 | 19 | 0.8 | 15 | 15 | 34000 | 2.6 | 05 562 +3C*^ | 900 | 1000 |
| | **0.0068** | 8 | 15 | 19 | 0.8 | 15 | 15 | 34000 | 3 | 05 682 +3C*^ | 700 | 1000 |
| | **0.0056** | 6 | 12 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 2.4 | 05 562 +3C*^ | 650 | 400 |
| | **0.0068** | 6 | 12 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 2.5 | 05 682 +3C*^ | 650 | 400 |
| | **0.0082** | 6 | 13 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 2.7 | 05 822 +3C*^ | 650 | 400 |
| | **0.01** | 7 | 13 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 2.9 | 05 103 +3C*^ | 650 | 400 |
| | **0.012** | 7 | 14 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 3.2 | 05 123 +3C*^ | 500 | 400 |
| | **0.015** | 8 | 15 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 3.8 | 05 153 +3C*^ | 500 | 400 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **0.018** | 9 | 16 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 4.2 | 05 183 +3C*^ | 500 | 400 |
| | **0.022** | 10 | 16 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 4.7 | 05 223 +3C*^ | - | 200 |
| 2000VDC | **0.0001** | 4 | 9 | 19 | 0.8 | 15 | 15 | 54000 | 1.1 | 05 101 +3D*^ | 1100 | 1000 |
| 500VAC | **0.0002** | 4 | 9 | 19 | 0.8 | 15 | 15 | 54000 | 1.1 | 05 151 +3D*^ | 1100 | 1000 |
| | **0.0002** | 4 | 9 | 19 | 0.8 | 15 | 15 | 54000 | 1.1 | 05 221 +3D*^ | 1100 | 1000 |
| | **0.0003** | 5 | 10 | 19 | 0.8 | 15 | 15 | 54000 | 1.1 | 05 331 +3D*^ | 1100 | 1000 |
| | **0.0005** | 5 | 10 | 19 | 0.8 | 15 | 15 | 54000 | 1.1 | 05 471 +3D*^ | 1100 | 1000 |
| | **0.0007** | 5 | 12 | 19 | 0.8 | 15 | 15 | 54000 | 1.1 | 05 681 +3D*^ | 1100 | 1000 |
| | **0.001** | 6 | 12 | 19 | 0.8 | 15 | 15 | 54000 | 1.5 | 05 102 +3D*^ | 1100 | 1000 |
| | **0.0012** | 5 | 12 | 19 | 0.8 | 15 | 15 | 54000 | 1.5 | 05 122 +3D*^ | 1100 | 1000 |
| | **0.0015** | 6.5 | 12.5 | 19 | 0.8 | 15 | 15 | 54000 | 1.5 | 05 152 +3D*^ | 1100 | 1000 |
| | **0.0018** | 6 | 12 | 19 | 0.8 | 15 | 15 | 54000 | 1.5 | 05 182 +3D*^ | 1100 | 1000 |
| | **0.0022** | 7.5 | 17.5 | 19 | 0.8 | 15 | 15 | 54000 | 2.2 | 05 222 +3D*^ | 1100 | 1000 |
| | **0.0027** | 7 | 13 | 19 | 0.8 | 15 | 15 | 54000 | 2.4 | 05 272 +3D*^ | 900 | 1000 |
| | **0.0027** | 5 | 12 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 2.2 | 05 272 +3D*^ | 650 | 400 |
| | **0.0033** | 7 | 15 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 2.3 | 05 332 +3D*^ | 650 | 400 |
| | **0.0039** | 6 | 12 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 2.4 | 05 392 +3D*^ | 650 | 400 |
| | **0.0047** | 7.5 | 16.5 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 2.7 | 05 472 +3D*^ | 650 | 400 |
| | **0.0056** | 8.5 | 18 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 2.9 | 05 562 +3D*^ | 650 | 400 |
| | **0.0068** | 7 | 14 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 3.1 | 05 682 +3D*^ | 650 | 400 |
| | **0.0082** | 7 | 14 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 3.3 | 05 822 +3D*^ | 650 | 400 |
| | **0.01** | 10.5 | 19 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 3.7 | 05 103 +3D*^ | 500 | 400 |
| | **0.012** | 10 | 20 | 27 | 0.8 | 22.5 | 22.5 | 11000 | 4 | 05 123 +3D*^ | 500 | 400 |

# INTERFERENCE SUPPRESSION CAPACITORS

(Safety Capacitors) Class X2 Miniature Series

**MAIN APPLICATION**
Suitable for radio suppression in small household appliances, audio and TV circuits, Lighting, SMPS, LED drivers, general industrial applications.

**CONSTRUCTION**
Low inductive cell of metallised polypropylene film encased in flame retardant grade UL 94 V-0 box potted with flame retardant UL 94 V-0 epoxy resin.

**CLIMATIC CATEGORY**
40/105/56/B

**MAXIMUM OPERATING TEMPERATURE**
+105°C

**APPLICABLE SPECIFICATION**
IEC 384-14,

**CAPACITANCE VALUE**
Refer dimension chart.

**RATED VOLTAGE (AC)**
275/310 V,

**CAPACITANCE TOLERANCE**
±10%, ±20%

**VOLTAGE PROOF (V DC)**
2100 VDC for 2 S.

**TAN δ**

0.1% (maximum) at 1 kHz
0.3% (maximum) at 10 kHz

**LIFE TEST CONDITIONS**
(Loading at elevated temperature)
Loaded at 1.25 times of rated voltage at 100 °C for 1000 hours. Once per hour; 0.1 S.1000 V (RMS) via resistor of 47 Ω ±5%.

**Criteria after the test**:
**Δc/c:** ≤ 10%.
**Increase of Tan δ:** ≤ 0.008, $C_R$≤1μF; ≤ 0.005, $C_R$>1μF at 1kHz.
**Insulation resistance:** > 50% of the Initial value

**INSULATION RESISTANCE**

| | $C_R \leq 0.33$ μF | $C_R > 0.33$ μF |
|---|---|---|
| Minimum Insulation Resistance $R_{IS}$ | | |
| (or) time constant $T=C_R \times R_{IS}$ | > 30000 MΩ | > 10000 S |
| at 20° C, relative humidity ≤ 65% | | |

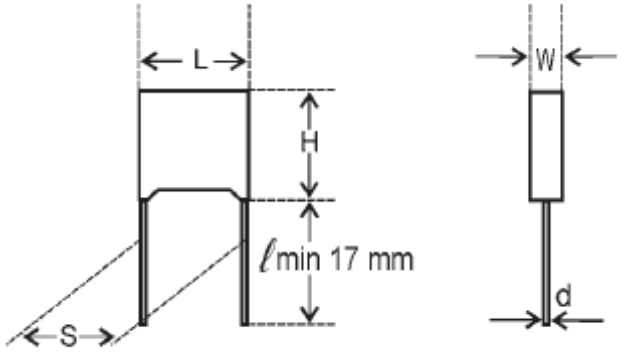
**APPROVALS:**

| Safety Approval X2 | Voltage | Value | Certificate Number |
|---|---|---|---|
| **UL 1414** | **275/310Vac** | **0.0047μf to 10μf** | **E253651** |

Ordering code and packing units: Interference suppression capacitor (X2)

| Rated | Rated | Dimensions (mm) | | | | | | | Packing units | Remarks / |
|---|---|---|---|---|---|---|---|---|---|---|
| Voltage | Cap. | W | H | L | d | S | DV/DT | Ordering | Bulk | Approval |
| | (mfd) | ± 0.5 | ± 0.5 | ± 0.5 | ±0.05 | ±0.5 | V/μs | code | | |
| 275/310Vac | 0.0047 | 5 | 9 | 10 | 0.6 | 7.5 | 400 | 20 472 +05* ^ | 500 | UL |
| | 0.0047 | 5 | 9 | 13 | 0.6 | 10 | 350 | 20 472 +05* ^ | 500 | UL |
| | 0.0056 | 5 | 9 | 10 | 0.6 | 7.5 | 400 | 20 562 +05* ^ | 500 | UL |
| | 0.0056 | 5 | 10 | 13 | 0.6 | 10 | 350 | 20 562 +05* ^ | 500 | UL |
| | 0.0068 | 5 | 9 | 10 | 0.6 | 7.5 | 400 | 20 682 +05* ^ | 500 | UL |
| | 0.0068 | 5 | 10 | 13 | 0.6 | 10 | 350 | 20 682 +05* ^ | 500 | UL |
| | 0.0082 | 5 | 9 | 10 | 0.6 | 7.5 | 400 | 20 822 +05* ^ | 500 | UL |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.0082 | 5 | 10 | 13 | 0.6 | 10 | 350 | 20 822 +05* ^ | 500 | UL |
| | 0.01 | 5 | 9 | 10 | 0.6 | 7.5 | 400 | 20 103 +05* ^ | 500 | UL |
| | 0.01 | 5 | 9 | 13 | 0.6 | 10 | 350 | 20 103 +05* ^ | 500 | UL |
| | 0.012 | 5 | 11 | 13 | 0.6 | 10 | 350 | 20 123 +05* ^ | 500 | UL |
| | 0.015 | 4.5 | 9 | 10 | 0.6 | 7.5 | 400 | 20 153 +05* ^ | 500 | UL |
| | 0.015 | 4.5 | 9.5 | 13 | 0.6 | 10 | 350 | 20 153 +05* ^ | 500 | UL |
| | 0.018 | 5 | 11 | 13 | 0.6 | 10 | 350 | 20 183 +05* ^ | 500 | UL |
| | 0.022 | 4.5 | 9.5 | 13 | 0.6 | 10 | 350 | 20 223 +05* ^ | 500 | UL |
| | 0.027 | 5 | 11 | 18 | 0.8 | 15 | 250 | 20 273 +05* ^ | 500 | UL |
| | 0.033 | 5.5 | 10.5 | 10 | 0.6 | 7.5 | 400 | 20 333 +05* ^ | 500 | UL |
| | 0.033 | 4.5 | 10 | 13 | 0.6 | 10 | 350 | 20 333 +05* ^ | 500 | UL |
| | 0.039 | 5 | 11 | 18 | 0.8 | 15 | 250 | 20 393 +05* ^ | 500 | UL |
| | 0.047 | 7 | 13 | 13 | 0.6 | 10 | 350 | 20 473 +05* ^ | 500 | UL |
| | 0.047 | 4.5 | 9.5 | 18 | 0.6 | 15 | 250 | 20 473 +05* ^ | 500 | UL |
| | 0.056 | 5 | 10 | 13 | 0.6 | 10 | 350 | 20 563 +05* ^ | 500 | UL |
| | 0.056 | 4.5 | 9.5 | 18 | 0.6 | 15 | 250 | 20 563 +05* ^ | 500 | UL |
| | 0.068 | 5.5 | 10.5 | 13 | 0.6 | 10 | 350 | 20 683 +05* ^ | 500 | UL |
| | 0.068 | 4.5 | 10 | 18 | 0.8 | 15 | 250 | 20 683 +05* ^ | 500 | UL |
| | 0.082 | 6 | 11.5 | 13 | 0.6 | 10 | 350 | 20 823 +05* ^ | 500 | UL |
| | 0.082 | 5.5 | 10.5 | 18 | 0.8 | 15 | 250 | 20 823 +05* ^ | 500 | UL |
| | 0.1 | 7 | 13 | 13 | 0.6 | 10 | 350 | 20 104 +05* ^ | 500 | UL |
| | 0.1 | 6 | 12 | 18 | 0.8 | 15 | 250 | 20 104 +05* ^ | 500 | UL |
| | 0.12 | 7.5 | 13.5 | 18 | 0.8 | 15 | 250 | 20 124 +05* ^ | 500 | UL |
| | 0.15 | 7.5 | 13.5 | 18 | 0.8 | 15 | 250 | 20 154 +05* ^ | 500 | UL |
| | 0.15 | 5 | 11 | 26 | 0.8 | 22.5 | 150 | 20 154 +05* ^ | 500 | UL |
| | 0.18 | 8.5 | 14.5 | 18 | 0.8 | 15 | 250 | 20 184 +05* ^ | 500 | UL |
| | 0.22 | 8.5 | 14.5 | 18 | 0.8 | 15 | 250 | 20 224 +05* ^ | 500 | UL |
| | 0.22 | 6 | 15 | 26 | 0.8 | 22.5 | 150 | 20 224 +05* ^ | 500 | UL |
| | 0.27 | 8.5 | 15.5 | 18 | 0.8 | 15 | 250 | 20 274 +05* ^ | 500 | UL |
| | 0.27 | 8.5 | 17 | 26.5 | 0.8 | 22.5 | 150 | 20 274 +05* ^ | 500 | UL |
| | 0.33 | 10 | 17.5 | 18 | 0.8 | 15 | 250 | 20 334 +05* ^ | 500 | UL |
| | 0.33 | 7 | 17 | 26 | 0.8 | 22.5 | 150 | 20 334 +05* ^ | 500 | UL |
| | 0.39 | 10 | 19 | 26.5 | 0.8 | 22.5 | 150 | 20 394 +05* ^ | 500 | UL |
| | 0.47 | 8.5 | 17 | 26 | 0.8 | 22.5 | 150 | 20 474 +05* ^ | 250 | UL |
| | 0.56 | 9.5 | 17 | 26 | 0.8 | 22.5 | 150 | 20 564 +05* ^ | 250 | UL |
| | 0.68 | 10.5 | 20 | 32 | 0.8 | 37.5 | 80 | 20 684 +05* ^ | 250 | UL |
| | 0.82 | 11 | 20 | 26 | 0.8 | 22.5 | 150 | 20 824 +05* ^ | 250 | UL |
| | 1 | 12 | 22 | 26 | 0.8 | 22.5 | 150 | 20 105 +05* ^ | 250 | UL |
| | 1.2 | 15 | 24 | 32 | 0.8 | 37.5 | 80 | 20 125 +05* ^ | 250 | UL |
| | 1.5 | 14 | 24 | 32 | 0.8 | 37.5 | 80 | 20 155 +05* ^ | 100 | UL |
| | 1.8 | 16.5 | 27 | 32 | 0.8 | 37.5 | 80 | 20 185 +05* ^ | 100 | UL |
| | 2.2 | 16.5 | 26 | 31 | 0.8 | 27.5 | 100 | 20 225 +05* ^ | 100 | UL |
| | 3.3 | 20 | 31 | 31 | 0.8 | 27.5 | 100 | 20 335 +05* ^ | 100 | UL |
| | 3.3 | 17 | 28 | 41.5 | 0.8 | 37.5 | 80 | 20 335 +05* ^ | 100 | UL |
| | 3.9 | 19 | 28 | 31 | 0.8 | 27.5 | 100 | 20 395 +05* ^ | 100 | UL |
| | 4.7 | 20 | 31 | 41.5 | 0.8 | 37.5 | 80 | 20 475 +05* ^ | 100 | UL |
| | 5.6 | 22.5 | 36.5 | 41.5 | 0.8 | 37.5 | 80 | 20 565 +05* ^ | 50 | UL |
| | 6.8 | 22.5 | 35.5 | 41.5 | 0.8 | 37.5 | 80 | 20 685 +05* ^ | 50 | UL |
| | 8.2 | 25 | 38 | 41.5 | 0.8 | 37.5 | 80 | 20 825 +05* ^ | 50 | UL |
| | 10 | 28 | 41.5 | 41.5 | 0.8 | 37.5 | 80 | 20 106 +05* ^ | 50 | UL |




# INTERFERENCE SUPPRESSION CAPACITORS

(Safety Capacitors) Class Y2

**MAIN APPLICATION**
Suitable for radio suppression in small household appliances, audio & TV circuits, SMPS, Lighting, LED drivers, general industrial applications.

**CONSTRUCTION**
Low inductive cell of metallised polypropylene film encased in flame retardant box potted with flame retardant epoxy.

**CLIMATIC CATEGORY**
40/100/21

**APPLICABLE SPECIFICATION**
IEC 384-14,

**CAPACITANCE VALUE**
Refer dimension chart.

**RATED VOLTAGE (AC)**
250/275 V,

**CAPACITANCE TOLERANCE**

±10%, ±20%

**VOLTAGE PROOF (V DC)**
2100 VDC for 2 S.

**TAN δ**
0.1% (max) at 1kHz and 0.3% (max) at 10 kHz

**LIFE TEST CONDITIONS**
(Loading at elevated temperature)

Loaded at 1.25 times of rated voltage at 85 °C for 1000 hours. Once per hour; 0.1 S.1000 V (RMS) via resistor of 47 Ω ±5%.

**Criteria after the test**:
**Δc/c:** ≤ 10%.
**Increase of Tan δ:** ≤ 0.008, $C_R$≤1μF
**Insulation resistance:** ≥ 50% of specified value.

**APPROVALS**
Capacitors are tested at **ERTL (North)** as per IEC 384-14

**INSULATION RESISTANCE**

Minimum Insulation Resistance $R_{IS}$ $C_R \leq 0.33$ μF
(or) time constant $T=C_R \times R_{IS}$ >30000 MΩ
at 20° C, relative humidity ≤ 65%

Ordering code and packing units: Interference suppression capacitor (Class Y2)

| Rated Voltage | Rated Cap. (mfd) | Dimensions (mm) Maximum W | H | L | d ±0.05 | S ±0.5 | DV/DT V/μs | Wt. g. | Ordering code | Packing Units Bulk |
|---|---|---|---|---|---|---|---|---|---|---|
| 250/275 | 0.001 | 4 | 9 | 13 | 0.6 | 10 | 1000 | - | 33 102 +02* ^ | 500 |
| VAC | 0.0015 | 4 | 9 | 13 | 0.6 | 10 | 1000 | - | 33 152 +02* ^ | 500 |
| | 0.0022 | 4 | 9 | 13 | 0.6 | 10 | 1000 | - | 33 222 +02* ^ | 500 |
| | 0.0025 | 4 | 9 | 13 | 0.6 | 10 | 1000 | - | 33 252 +02* ^ | 500 |
| | 0.0033 | 4 | 11 | 13 | 0.6 | 10 | 1000 | - | 33 332 +02* ^ | 500 |
| | 0.0047 | 5 | 11 | 13 | 0.6 | 10 | 1000 | - | 33 472 +02* ^ | 500 |
| | 0.0056 | 5 | 11 | 13 | 0.6 | 10 | 1000 | - | 33 562 +02* ^ | 500 |
| | 0.0068 | 6 | 12 | 13 | 0.6 | 10 | 1000 | - | 33 682 +02* ^ | 500 |
| | 0.01 | 5 | 11 | 18 | 0.6 | 10 | 1000 | - | 33 103 +02* ^ | 500 |
| | 0.015 | 5 | 11 | 18 | 0.8 | 15 | 1000 | - | 33 153 +02* ^ | 500 |
| | 0.022 | 6 | 12 | 18 | 0.8 | 15 | 1000 | - | 33 223 +02* ^ | 500 |
| | 0.027 | 7 | 13 | 18 | 0.8 | 15 | 1000 | - | 33 273 +02* ^ | 500 |
| | 0.033 | 7 | 13 | 18 | 0.8 | 15 | 1000 | - | 33 333 +02* ^ | 500 |
| | 0.047 | 8.5 | 14.5 | 18 | 0.8 | 15 | 1000 | - | 33 473 +02* ^ | 500 |
| | 0.068 | 10 | 18 | 18 | 0.8 | 15 | 1000 | - | 33 683 +02* ^ | 500 |
| | 0.068 | 7 | 16.5 | 26.5 | 0.8 | 22.5 | 1000 | - | 33 683 +02* ^ | 250 |
| | 0.1 | 8.5 | 17 | 26 | 0.8 | 22.5 | 1000 | - | 33 104 +02* ^ | 250 |