

Metallized Polyester Film Capacitors MKT Radial Type



FEATURES

- 10.0 mm to 27.5 mm lead pitch
- Self-healing properties
- Flame retardant case
- Material categorization:
for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE
GREEN
(5-2008)

APPLICATIONS

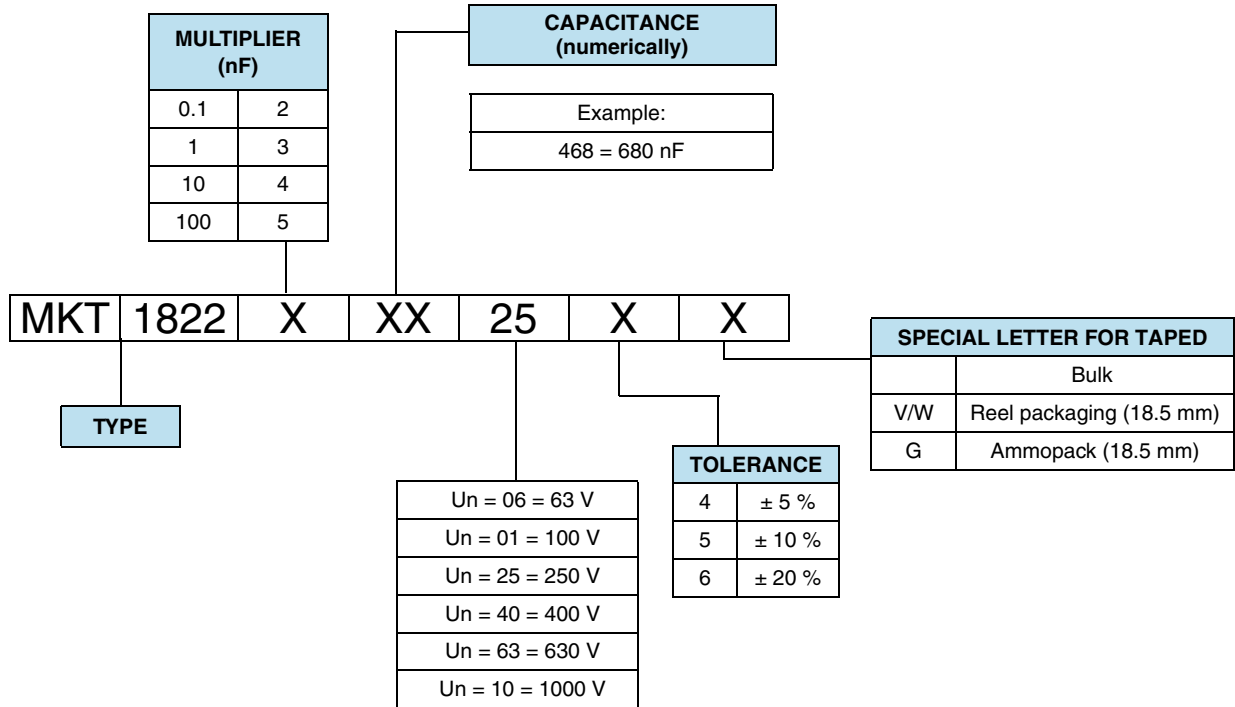
Blocking, bypassing, filtering, timing, coupling and decoupling circuits, interference suppression in low voltage applications.

| QUICK REFERENCE DATA | |
|--|---|
| Capacitance range (E12 series) | 1000 pF to 15 μ F (preferred values according to E6) |
| Capacitance tolerance | $\pm 20\%$ (M), $\pm 10\%$ (K), $\pm 5\%$ (J) (on request) |
| Climatic testing class according to IEC 60068 | 55/100/56 |
| Reference standards | IEC 60384-2 |
| Dielectric | Polyester film |
| Electrodes | Vacuum deposited aluminum |
| Construction | Extended metallized film |
| Encapsulation | Flame retardant plastic case UL-class 94 V-0 |
| Leads | Tinned wire |
| Marking | Manufacturer's logo; type; C-value; rated voltage; tolerance; date of manufacture |
| Temperature range | -55 °C to +100 °C |
| Rated DC voltage | 63 V _{DC} , 100 V _{DC} , 250 V _{DC} , 400 V _{DC} , 630 V _{DC} , 1000 V _{DC} |
| Permissible AC voltages (RMS) up to 60 Hz | 40 V _{AC} , 63 V _{AC} , 160 V _{AC} , 200 V _{AC} , 220 V _{AC} |
| Capacitance drift | Up to +40 °C, $\pm 1.5\%$ for a period of two years |
| Derating for DC and AC category voltage U _C | At +85 °C: U _C = 1.0 U _R At +100 °C: U _C = 0.8 U _R |
| Self inductance | ~ 6 nH measured with 2 mm long leads |
| Pull test on leads | ≥ 30 N in direction of leads according to IEC 60068-2-21 |

Note

- For more detailed data and test requirements, contact dc-film@vishay.com

| DIMENSIONS in millimeters |
|---------------------------|
| |

COMPOSITION OF CATALOG NUMBER

Note

- For detailed tape specifications refer to packaging information www.vishay.com/doc?28139 or "Recommended Packaging" table

| SPECIFIC REFERENCE DATA | | | | | | |
|---|--|---------------------|---------------------|-----------------------|--------------------------------|-----------------------|
| DESCRIPTION | | | | MAX. VALUE | | |
| Tangent of loss angle: C ≤ 0.1 μF 0.1 μF < C ≤ 1.0 μF C > 1.0 μF | | | | at 1 kHz | at 10 kHz | at 100 kHz |
| | | | | 8 x 10 ⁻³ | 15 x 10 ⁻³ | 25 x 10 ⁻³ |
| | | | | 8 x 10 ⁻³ | 15 x 10 ⁻³ | - |
| | | | | 10 x 10 ⁻³ | - | - |
| PCM (mm) | MAXIMUM PULSE RISE TIME (dV/dt) [V/μs] | | | | | |
| | 63 V _{DC} | 100 V _{DC} | 250 V _{DC} | 400 V _{DC} | 630 V _{DC} | 1000 V _{DC} |
| 10 | 11 | 13 | 22 | 37 | 60 | 130 |
| 15 | 7 | 8 | 13 | 21 | 33 | 65 |
| 22.5 | 4 | 5 | 8 | 13 | 19 | 34 |
| 27.5 | 3 | 4 | 6 | 10 | 14 | 25 |
| If the maximum pulse voltage is less than the rated voltage higher dV/dt values can be permitted. | | | | | | |
| R between leads, for C ≤ 0.33 μF and U _R ≤ 100 V | | | | | > 15 000 MΩ | |
| R between leads, for C ≤ 0.33 μF and U _R > 100 V | | | | | > 30 000 MΩ | |
| RC between leads, for C > 0.33 μF and U _R ≤ 100 V | | | | | > 5000 s | |
| RC between leads, for C > 0.33 μF and U _R > 100 V | | | | | > 10 000 s | |
| R between leads and case, 100 V; (foil method) | | | | | > 30 000 MΩ | |
| Withstanding (DC) voltage (cut off current 10 mA); rise time < 1000 V/s | | | | | 1.6 x U _{RDC} , 1 min | |
| Withstanding (DC) voltage between leads and case | | | | | 2 x U _{RDC} , 1 min | |
| Maximum application temperature | | | | | 100 °C | |



| ELECTRICAL DATA | | | | | | |
|-------------------------|--------------|---------------------|--------------------|-----------------|-------------------------|------|
| U _{RDC} (V) | CAP. (μF) | CAPACITANCE CODE | VOLTAGE CODE | V _{AC} | DIMENSIONS W x H x L | PCM |
| 63 | 0.22 | -422 | 06 | 40 | 4.0 x 9.0 x 13.0 | 10 |
| | 0.33 | -433 | | | 4.0 x 9.0 x 13.0 | 10 |
| | 0.47 | -447 | | | 5.5 x 10.5 x 13.0 | 10 |
| | 0.68 | -468 | | | 5.5 x 10.5 x 18.0 | 15 |
| | 1.0 | -510 | | | 5.5 x 10.5 x 18.0 | 15 |
| | 1.5 | -515 | | | 6.5 x 12.5 x 18.0 | 15 |
| | 2.2 | -522 | | | 7.5 x 13.5 x 18.0 | 15 |
| | 3.3 | -533 | | | 7.5 x 15.5 x 26.5 | 22.5 |
| | 4.7 | -547 | | | 8.5 x 16.5 x 26.5 | 22.5 |
| | 6.8 | -568 | | | 10.5 x 18.5 x 26.5 | 22.5 |
| | 10.0 | -610 | | | 11.5 x 20.5 x 31.5 | 27.5 |
| | 15.0 | -615 | | | 13.5 x 23.5 x 31.5 | 27.5 |
| 100 | 0.068 | -368 | 01 | 63 | 4.0 x 9.0 x 13.0 | 10 |
| | 0.10 | -410 | | | 4.0 x 9.0 x 13.0 | 10 |
| | 0.15 | -415 | | | 4.0 x 9.0 x 13.0 | 10 |
| | 0.22 | -422 | | | 4.5 x 9.5 x 13.0 | 10 |
| | 0.33 | -433 | | | 5.5 x 10.5 x 18.0 | 15 |
| | 0.47 | -447 | | | 5.5 x 10.5 x 18.0 | 15 |
| | 0.68 | -468 | | | 6.5 x 12.5 x 18.0 | 15 |
| | 1.0 | -510 | | | 7.5 x 13.5 x 18.0 | 15 |
| | 1.5 | -515 | | | 7.5 x 15.5 x 26.5 | 22.5 |
| | 2.2 | -522 | | | 8.5 x 16.5 x 26.5 | 22.5 |
| | 3.3 | -533 | | | 10.5 x 18.5 x 26.5 | 22.5 |
| | 4.7 | -547 | | | 11.5 x 20.5 x 31.5 | 27.5 |
| | 6.8 | -568 | | | 13.5 x 23.5 x 31.5 | 27.5 |
| | 10.0 | -610 | | | 15.0 x 24.5 x 31.5 | 27.5 |
| | 15.0 | -615 | | | 16.5 x 29.5 x 31.5 | 27.5 |
| 250 | 0.033 | -333 | 25 | 160 | 4.0 x 9.0 x 13.0 | 10 |
| | 0.047 | -347 | | | 4.0 x 9.0 x 13.0 | 10 |
| | 0.068 | -368 | | | 4.5 x 9.5 x 13.0 | 10 |
| | 0.10 | -410 | | | 5.5 x 10.5 x 18.0 | 15 |
| | 0.15 | -415 | | | 5.5 x 10.5 x 18.0 | 15 |
| | 0.22 | -422 | | | 5.5 x 10.5 x 18.0 | 15 |
| | 0.33 | -433 | | | 6.5 x 12.5 x 18.0 | 15 |
| | 0.47 | -447 | | | 6.5 x 14.5 x 26.5 | 22.5 |
| | 0.68 | -468 | | | 7.5 x 15.5 x 26.5 | 22.5 |
| | 1.0 | -510 | | | 8.5 x 16.5 x 26.5 | 22.5 |
| | 1.5 | -515 | | | 9.0 x 18.5 x 31.5 | 27.5 |
| | 2.2 | -522 | | | 11.5 x 20.5 x 31.5 | 27.5 |
| | 3.3 | -533 | | | 13.5 x 23.5 x 31.5 | 27.5 |
| | 400 | 0.0010 | | | -210 | 40 |
| 0.0015 | | -215 | 4.0 x 9.0 x 13.0 | 10 | | |
| 0.0022 | | -222 | 4.0 x 9.0 x 13.0 | 10 | | |
| 0.0033 | | -233 | 4.0 x 9.0 x 13.0 | 10 | | |
| 0.0047 | | -247 | 4.0 x 9.0 x 13.0 | 10 | | |
| 0.0068 | | -268 | 4.0 x 9.0 x 13.0 | 10 | | |
| 0.010 | | -310 | 4.0 x 9.0 x 13.0 | 10 | | |
| 0.015 | | -315 | 4.0 x 9.0 x 13.0 | 10 | | |
| 0.022 | | -322 | 4.0 x 9.0 x 13.0 | 10 | | |
| 0.033 | | -333 | 4.0 x 9.0 x 13.0 | 10 | | |
| 0.047 | | -347 | 5.5 x 10.5 x 18.0 | 15 | | |
| 0.068 | | -368 | 5.5 x 10.5 x 18.0 | 15 | | |
| 0.10 | | -410 | 5.5 x 10.5 x 18.0 | 15 | | |
| 0.15 | | -415 | 6.5 x 12.5 x 18.0 | 15 | | |
| 0.22 | | -422 | 7.5 x 15.5 x 26.5 | 22.5 | | |
| 0.33 | | -433 | 8.5 x 16.5 x 26.5 | 22.5 | | |
| 0.47 | | -447 | 10.5 x 18.5 x 26.5 | 22.5 | | |
| 0.68 | | -468 | 11.5 x 20.5 x 31.5 | 27.5 | | |
| 1.0 | | -510 | 11.5 x 20.5 x 31.5 | 27.5 | | |
| 1.5 | | -515 | 13.5 x 23.5 x 31.5 | 27.5 | | |



| ELECTRICAL DATA | | | | | | |
|-------------------------|--------------|---------------------|-------------------|-----------------|-------------------------|------|
| U _{RDC} (V) | CAP. (µF) | CAPACITANCE CODE | VOLTAGE CODE | V _{AC} | DIMENSIONS W x H x L | PCM |
| 630 | 0.0010 | -210 | 63 ⁽¹⁾ | 220 | 4.0 x 9.0 x 13.0 | 10 |
| | 0.0015 | -215 | | | 4.0 x 9.0 x 13.0 | 10 |
| | 0.0022 | -222 | | | 4.0 x 9.0 x 13.0 | 10 |
| | 0.0033 | -233 | | | 4.0 x 9.0 x 13.0 | 10 |
| | 0.0047 | -247 | | | 4.0 x 9.0 x 13.0 | 10 |
| | 0.0068 | -268 | | | 4.0 x 9.0 x 13.0 | 10 |
| | 0.010 | -310 | | | 4.0 x 9.0 x 13.0 | 10 |
| | 0.015 | -315 | | | 5.5 x 10.5 x 13.0 | 10 |
| | 0.022 | -322 | | | 6.5 x 11.5 x 13.0 | 10 |
| | 0.033 | -333 | | | 5.5 x 10.5 x 18.0 | 15 |
| | 0.047 | -347 | | | 6.5 x 12.5 x 18.0 | 15 |
| | 0.068 | -368 | | | 7.5 x 13.5 x 18.0 | 15 |
| | 0.10 | -410 | | | 6.5 x 14.5 x 26.5 | 22.5 |
| | 0.15 | -415 | | | 7.5 x 15.5 x 26.5 | 22.5 |
| | 0.22 | -422 | | | 8.5 x 16.5 x 26.5 | 22.5 |
| | 0.33 | -433 | | | 11.5 x 20.5 x 31.5 | 27.5 |
| | 0.47 | -447 | | | 11.5 x 20.5 x 31.5 | 27.5 |
| | 0.68 | -468 | | | 13.5 x 23.5 x 31.5 | 27.5 |
| 1.0 | -510 | 15.0 x 24.5 x 31.5 | 27.5 | | | |
| 1000 | 0.0010 | -210 | 10 ⁽¹⁾ | 220 | 4.0 x 9.0 x 13.0 | 10 |
| | 0.0015 | -215 | | | 4.0 x 9.0 x 13.0 | 10 |
| | 0.0022 | -222 | | | 4.0 x 9.0 x 13.0 | 10 |
| | 0.0033 | -233 | | | 4.0 x 9.0 x 13.0 | 10 |
| | 0.0047 | -247 | | | 5.5 x 10.5 x 13.0 | 10 |
| | 0.0068 | -268 | | | 6.5 x 11.5 x 13.0 | 10 |
| | 0.010 | -310 | | | 5.5 x 10.5 x 18.0 | 15 |
| | 0.015 | -315 | | | 6.5 x 12.5 x 18.0 | 15 |
| | 0.022 | -322 | | | 7.5 x 13.5 x 18.0 | 15 |
| | 0.033 | -333 | | | 6.5 x 14.5 x 26.5 | 22.5 |
| | 0.047 | -347 | | | 7.5 x 15.5 x 26.5 | 22.5 |
| | 0.068 | -368 | | | 8.5 x 16.5 x 26.5 | 22.5 |
| | 0.10 | -410 | | | 10.5 x 18.5 x 26.5 | 22.5 |
| | 0.15 | -415 | | | 11.5 x 20.5 x 31.5 | 27.5 |
| | 0.22 | -422 | | | 13.5 x 23.5 x 31.5 | 27.5 |
| | 0.33 | -433 | | | 16.5 x 29.5 x 31.5 | 27.5 |
| | 0.47 | -447 | | | 20.0 x 35.0 x 31.5 | 27.5 |

Note

⁽¹⁾ Not suitable for mains applications

| RECOMMENDED PACKAGING | | | | | | | |
|-----------------------|----------------------|-----------------------|--------------------------|---------------------------|-----------|-----------|---------------------|
| LETTER CODE | TYPE OF PACKAGING | HEIGHT (H) (mm) | REEL DIAMETER (mm) | ORDERING CODE EXAMPLES | PCM 10 | PCM 15 | PCM 22.5 TO 27.5 |
| G | Ammo | 18.5 | S ⁽¹⁾ | MKT1822-422-065-G | X | X | - |
| W | Reel | 18.5 | 350 | MKT1822-422-065-W | X | X | - |
| V | Reel | 18.5 | 500 | MKT1822-510-255-V | - | X | X |
| G | Ammo | 18.5 | L ⁽²⁾ | MKT1822-510-255-G | - | - | X |
| - | Bulk | - | - | MKT1822-510-255 | X | X | X |
| - | Bulk | - | - | MKT1822-522-255 | X | - | X |

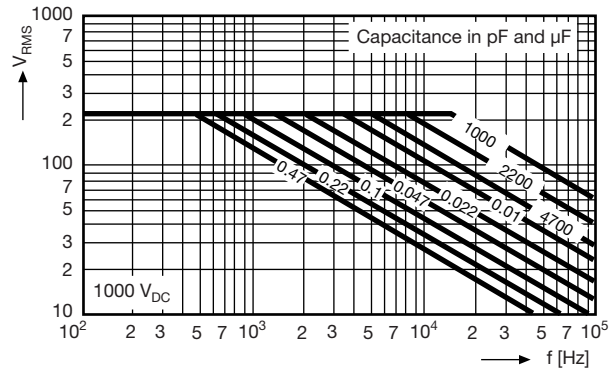
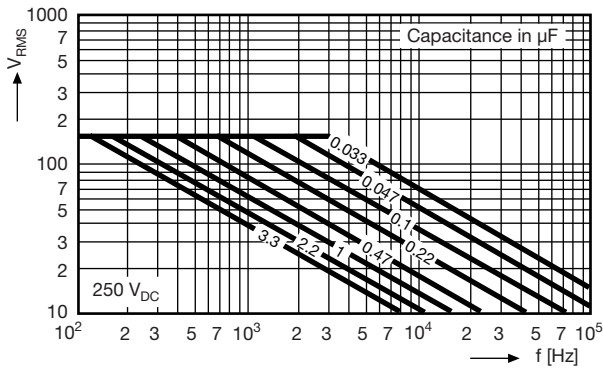
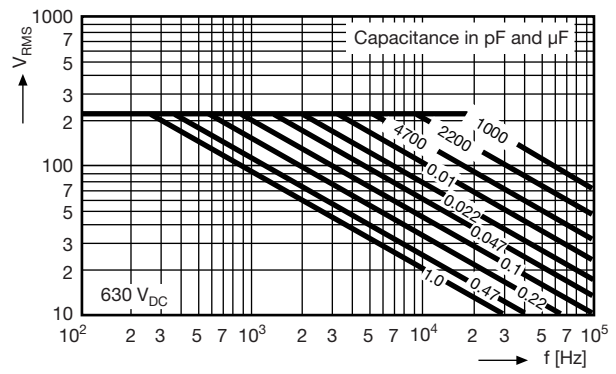
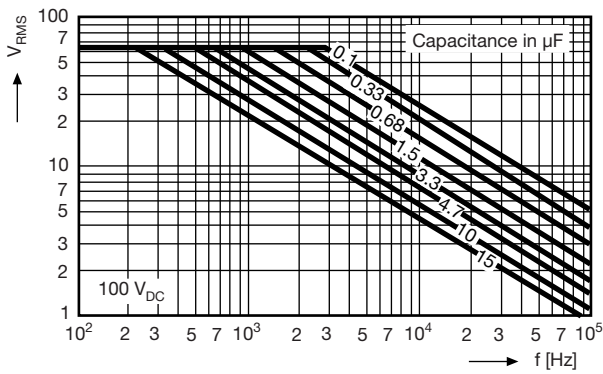
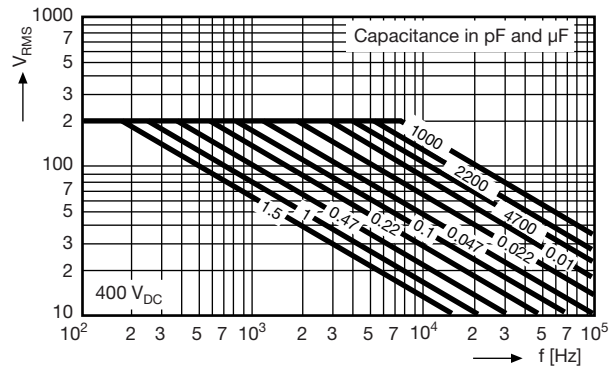
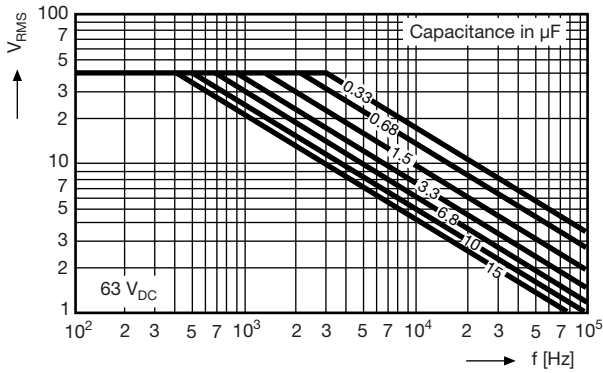
Notes

⁽¹⁾ S = Box size 55 mm x 210 mm x 340 mm (W x H x L)

⁽²⁾ L = Box size 60 mm x 360 mm x 510 mm (W x H x L)



PERMISSIBLE AC VOLTAGE VS. FREQUENCY





APPLICATION NOTE AND LIMITING CONDITIONS

These capacitors are not suitable for mains applications as across-the-line capacitors without additional protection, as described hereunder. These mains applications are strictly regulated in safety standards and therefore electromagnetic interference suppression capacitors conforming the standards must be used.

For capacitors connected in parallel, normally the proof voltage and possibly the rated voltage must be reduced. For information depending of the capacitance value and the number of parallel connections contact: dc-film@vishay.com

To select the capacitor for a certain application, the following conditions must be checked:

- 1. The peak voltage (Up) shall not be greater than the rated DC voltage (URDC)
2. The peak-to-peak voltage (Up-p) shall not be greater than 2*sqrt(2) * URAC to avoid the ionization inception level
3. The voltage pulse slope (dU/dt) shall not exceed the rated voltage pulse slope in an RC-circuit at rated voltage and without ringing.

For all other pulses following equation must be fulfilled:

2 x integral from 0 to T of (dU/dt)^2 x dt < URDC x (dU/dt)_rated

T is the pulse duration.

The rated voltage pulse slope is valid for ambient temperatures up to 85 °C. For higher temperatures a derating factor of 3 % per K shall be applied.

- 4. The maximum component surface temperature rise must be lower than the limits (see graph "Max. allowed component temperature rise").
5. Since in circuits used at voltages over 280 V peak-to-peak the risk for an intrinsically active flammability after a capacitor breakdown (short circuit) increases, it is recommended that the power to the component is limited to 100 times the values mentioned in the table: "Heat Conductivity"
6. When using these capacitors as across-the-line capacitor in the input filter for mains applications the applicant must guarantee that the following conditions are fulfilled in any case (spikes and surge voltages from the mains included).
7. For continuous use as series connection with an impedance to the mains, please refer to application note www.vishay.com/doc?28153

Table with 3 columns: ALLOWED VOLTAGES, Tamb <= 85 °C, 85 °C < Tamb <= 105 °C. Rows include Maximum continuous RMS voltage, Maximum temperature RMS-overvoltage (< 24 h), and Maximum peak voltage (Vo-p) (< 2 s).

Example

C = 3300 nF - 100 V used for the voltage signal shown in next drawing.

Up-p = 80 V; Up = 70 V; T1 = 0.5 ms; T2 = 1 ms

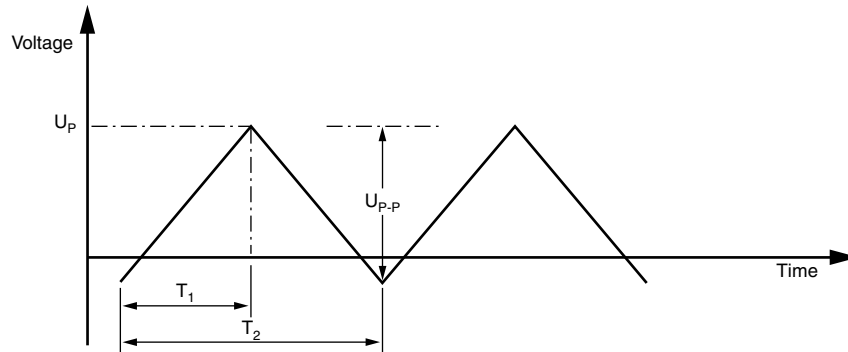
The ambient temperature is 35 °C

Checking conditions:

- 1. The peak voltage Up = 70 V is lower than 100 VDC
2. The peak-to-peak voltage 80 V is lower than 2*sqrt(2) * 63 VAC = 178 Up-p
3. The voltage pulse slope (dU/dt) = 80 V/500 us = 0.16 V/us. This is lower than 8 V/us (see specific reference data for each version)
4. The dissipated power is 60 mW as calculated with fourier terms. The temperature rise for wmax = 8.5 mm and pitch = 22.5 mm will be 60 mW/8 mW/°C = 3.3 °C. This is lower than 15 °C temperature rise at 35 °C, according figure "Max. allowed component temperature rise"
5. Not applicable
6. Not applicable
7. Not applicable



Voltage Signal





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