Printed Circuit Board Mount Power Film Capacitors

# C4AQ-P, Radial, 2 or 4 Leads, 450 – 1,100 VDC, for DC Link (Automotive Grade) - 125°C with Long Life

## Overview

The C4AQ-P capacitor is a polypropylene metallized film capacitor with a rectangular, plastic box-type design filled with resin, and uses 2 or 4 tinned wires.

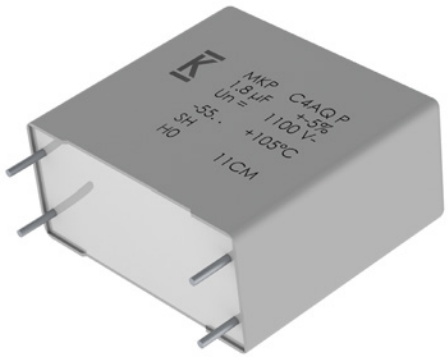
Automotive grade devices meet the demanding Automotive Electronics Council's AEC-Q200 qualification requirements with longer life performances at 125°C.

## Applications

Typical applications include DC filtering, DC link, power electronics, energy storage, renewable energy grid interface, motor drives, and automotive applications.

## Benefits

- Long life at 125°C
- Self-healing
- Low loss
- Low ESL
- Low profile dimensions available
- High ripple current
- High dV/dt
- High capacitance density
- High contact reliability
- Suitable for high frequency applications
- Automotive Grades (AEC-Q200)




## Part Number System

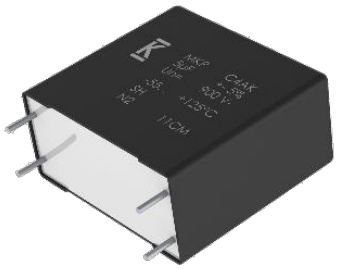
| C4 | A | Q | Q | B | W | 5270 | P | 3 | N | J |
|---|---|---|---|---|---|---|---|---|---|---|
| Series | Type | Application | Rated Voltage (VDC) | Case | Terminals Code | Capacitance Code (pF) | Release | Lead Diameter (mm) | Size Code: B x H x L (mm) | Tolerance |
| C4 = MKP power capacitors | A = Box, wire terminals | Q = DC link Automotive Grade | G = 450<br>H = 600<br>J = 700<br>O = 900<br>Q = 1,100 | B, E = Box plastic case<br>L = Low Profile box, plastic case | U = 2 pins<br>W = 4 pins | Digits 2 – 4 indicate the first three digits of the capacitance value. First digit indicates the number of zeros to be added. | P = Long performance life at 125°C | 1 = 0.8<br>2 = 1.0<br>3 = 1.2 | See dimensions table below for valid case sizes | J = 5%<br>K = 10% |



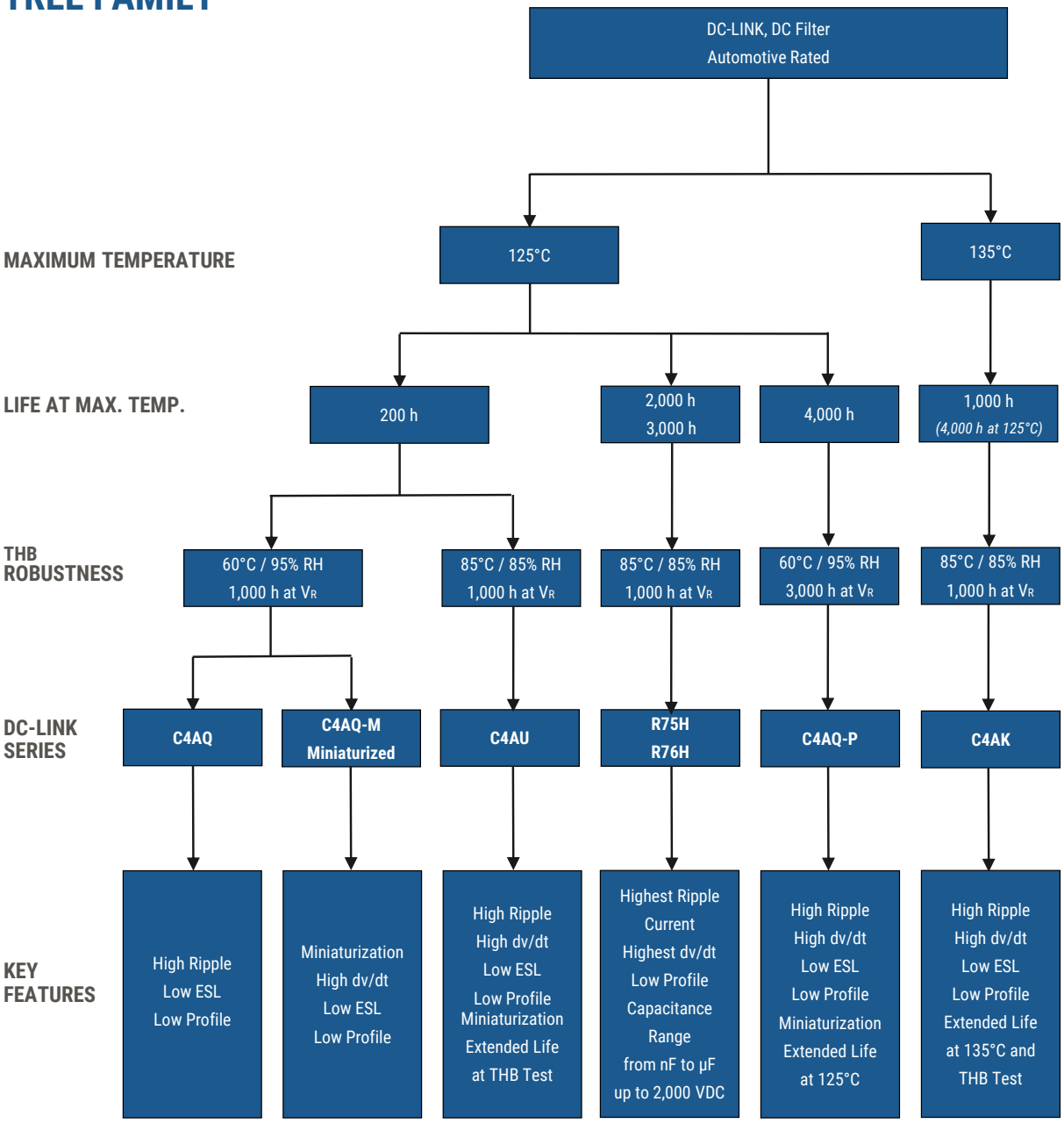
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## Series Selection

KEMET a YAGEO company

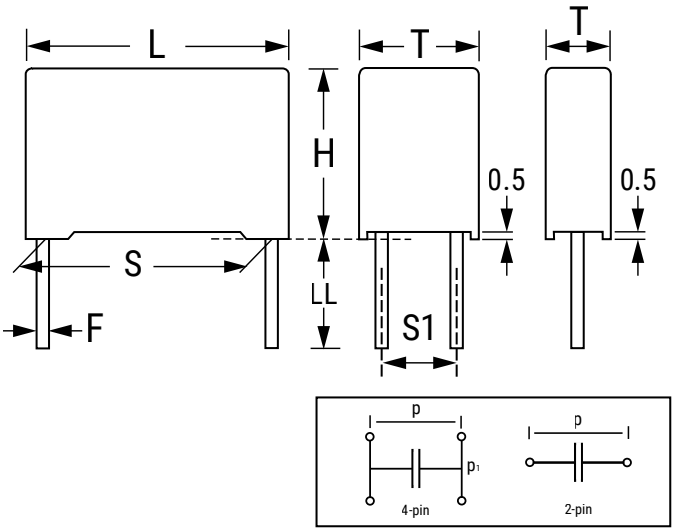


# DC-LINK, DC FILTER TREE FAMILY




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## Dimensions – Millimeters




| Size Code | | S | | S1 | | T | | H | | L | | LL | | F | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Digit 6 | Digit 14 | Nominal | Tolerance | Nominal | Tolerance | Nominal | Tolerance | Nominal | Tolerance | Nominal | Tolerance | Nominal | Tolerance | Nominal | Tolerance |
| B | W | 27.5 | ±0.4 | - | - | 11.0 | +0.3/-0.7 | 20.0 | +0.2/-0.7 | 31.5 | +0.5/-0.7 | 6 | +0/-2 | 0.8 | ±0.05 |
| B | X | 27.5 | ±0.4 | - | - | 13.0 | +0.3/-0.7 | 25.0 | +0.2/-0.7 | 31.5 | +0.5/-0.7 | 6 | +0/-2 | 0.8 | ±0.05 |
| B | Y | 27.5 | ±0.4 | - | - | 14.0 | +0.3/-0.7 | 28.0 | +0.2/-0.7 | 31.5 | +0.5/-0.7 | 6 | +0/-2 | 0.8 | ±0.05 |
| B | 1 | 27.5 | ±0.4 | - | - | 19.0 | +0.3/-0.7 | 29.0 | +0.2/-0.7 | 31.5 | +0.5/-0.7 | 6 | +0/-2 | 0.8 | ±0.05 |
| B | 2 | 27.5 | ±0.4 | - | - | 22.0 | +0.3/-0.7 | 37.0 | +0.2/-0.7 | 31.5 | +0.5/-0.7 | 6 | +0/-2 | 0.8 | ±0.05 |
| B | F | 37.5 | ±0.4 | 10.2 | ±0.4 | 20.0 | +0.4/-0.7 | 40.0 | +0.2/-0.7 | 42.0 | +0.6/-0.7 | 6 | +0/-2 | 1.2 | ±0.05 |
| B | J | 37.5 | ±0.4 | 10.2 | ±0.4 | 28.0 | +0.4/-0.7 | 37.0 | +0.2/-0.7 | 42.0 | +0.6/-0.7 | 6 | +0/-2 | 1.2 | ±0.05 |
| B | L | 37.5 | ±0.4 | 20.3 | ±0.4 | 30.0 | +0.4/-0.7 | 45.0 | +0.2/-0.7 | 42.0 | +0.6/-0.7 | 6 | +0/-2 | 1.2 | ±0.05 |
| B | O | 37.5 | ±0.4 | 20.3 | ±0.4 | 35.0 | +0.4/-0.7 | 50.0 | +0.2/-0.7 | 42.0 | +0.6/-0.7 | 6 | +0/-2 | 1.2 | ±0.05 |
| B | M | 52.5 | ±0.4 | 20.3 | ±0.4 | 30.0 | +0.5/-0.7 | 45.0 | +0.3/-0.7 | 57.5 | +0.8/-0.7 | 6 | +0/-2 | 1.2 | ±0.05 |
| B | N | 52.5 | ±0.4 | 20.3 | ±0.4 | 35.0 | +0.5/-0.7 | 50.0 | +0.3/-0.7 | 57.5 | +0.8/-0.7 | 6 | +0/-2 | 1.2 | ±0.05 |
| E | A | 52.5 | ±0.4 | 20.3 | ±0.4 | 45.0 | +0.5/-0.7 | 56.0 | +0.3/-0.7 | 57.5 | +0.8/-0.7 | 6 | +0/-2 | 1.2 | ±0.05 |
| E | B | 52.5 | ±0.4 | 20.3 | ±0.4 | 45.0 | +0.5/-0.7 | 65.0 | +0.3/-0.7 | 57.5 | +0.8/-0.7 | 6 | +0/-2 | 1.2 | ±0.05 |
| L | 1 | 27.5 | ±0.4 | - | - | 21.0 | +0.3/-0.7 | 12.5 | +0.2/-0.7 | 32.0 | +0.5/-0.7 | 6 | +0/-2 | 0.8 | ±0.05 |
| L | 2 | 27.5 | ±0.4 | - | - | 24.0 | +0.3/-0.7 | 15.0 | +0.2/-0.7 | 32.0 | +0.5/-0.7 | 6 | +0/-2 | 0.8 | ±0.05 |
| L | 3 | 37.5 | ±0.4 | 10.2 | ±0.4 | 24.0 | +0.4/-0.7 | 19.0 | +0.2/-0.7 | 41.5 | +0.6/-0.7 | 6 | +0/-2 | 1.2 | ±0.05 |
| L | 4 | 37.5 | ±0.4 | 10.2 | ±0.4 | 24.0 | +0.4/-0.7 | 15.0 | +0.2/-0.7 | 41.5 | +0.6/-0.7 | 6 | +0/-2 | 1.2 | ±0.05 |
| L | 6 | 37.5 | ±0.4 | 20.3 | ±0.4 | 35.0 | +0.4/-0.7 | 24.0 | +0.2/-0.7 | 42.0 | +0.6/-0.7 | 6 | +0/-2 | 1.2 | ±0.05 |
| L | 8 | 37.5 | ±0.4 | 20.3 | ±0.4 | 43.0 | +0.4/-0.7 | 25.0 | +0.2/-0.7 | 42.0 | +0.6/-0.7 | 6 | +0/-2 | 1.2 | ±0.05 |
| L | 9 | 27.5 | ±0.4 | - | - | 31.0 | +0.3/-0.7 | 19.0 | +0.2/-0.7 | 32.0 | +0.5/-0.7 | 6 | +0/-2 | 0.8 | ±0.05 |

## Qualification

| | |
|---|---|
| Reference Standards | IEC 61071, EN 61071, VDE0560 |
| Climatic Category | 55/105/56 according to IEC 60068-1 |

*Automotive grade products meet or exceed the requirements outlined by the Automotive Electronics Council. Details regarding test methods and conditions are referenced in document AEC-Q200, Stress Test Qualification for Passive Components. For additional information regarding the Automotive Electronics Council and AEC-Q200, visit the AEC website at www.aecouncil.com.*

## General Technical Data

| | |
|---|---|
| Dielectric | Polypropylene metallized film, non-inductive type, self-healing property |
| Application | DC filtering, DC link |
| Special Features | AEC–Q200 qualified |
| Climatic Category | 55/105/56 IEC 60068–1 |
| Temperature Range | –55°C to +125°C |
| Endurance Test | 500 hours at 1.3 x VOP + C/D + 500 hours at 1.3 x VOP at 85°C/105/125 |
| Standard | IEC 61071, EN 61071, VDE0560, AEC–Q200 |
| Protection | Solvent resistant plastic case UL 94 V–0 compliant<br>Thermosetting resin sealing UL 94 V–0 compliant |
| Installation | Any position |
| Leads | Tinned wires, standard lead wire length 6 (+0/–2) mm |
| Packaging | Packed in cardboard trays with protection for the terminals |
| RoHS Compliance | Compliant with Directive 2002/95/EC and Directive 2011/65/EU of the European Parliament and the Council of the EU on 8 June 2011, including the Commission Delegated Directive (EU) 2015/863 that amended Annex II to Directive 2011/65/EU. |

## Electrical Characteristics

| | |
|---|---|
| Rated Capacitance Range | 1 – 210 µF |
| Rated Voltage ($V_{NDC}$) Range | 450 – 1,100 VDC |
| Capacitance Tolerance | ±5% (J) or ±10% (K) measured at T = +25°C ±5°C |
| Dissipation Factor PP Typical ($tg\delta_0$) | ≤ 0.0002 at 10 kHz with T = 25°C ±5°C |
| Surge Voltage | 1.5 * $V_{NDC}$ for maximum 10 times in a lifetime at 25°C ±5°C |
| Overvoltage (IEC 61071) | 1.15 * $V_{NDC}$ for maximum 30 minutes, once per day |
| | 1.3 * $V_{NDC}$ for maximum 1 minute, once per day |
| Peak Non-Repetitive Current | 1.5 * $I_{PKR}$ for maximum 1,000 times in a lifetime |
| Insulation Resistance | IR x C ≥ 30,000 seconds at 100 VDC 1 minute at T = +25°C ±5°C |
| Capacitance Deviation in Operation | ±3.0% maximum on capacitance value measured at T = +25°C ±5°C |
| Temperature Storage | −40 to +80°C |
| Storage time | ≤ 36 months from the date marked on the label glued to the package |
| Permissible Relative Humidity - Storage | Annual average ≤ 70%, 85% on 30 days/year randomly distributed throughout year. Dewing not admissible. |

## Life Expectancy

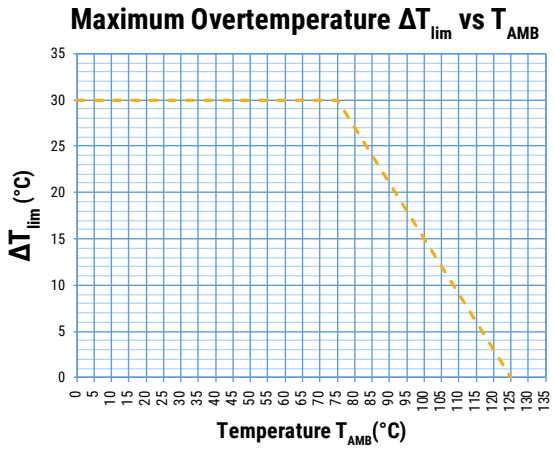
| | |
|---|---|
| Life Expectancy | 100,000 hours at $V_{NDC}$ at hot spot temperature $T_{HS}$ = +85°C |
| | 30,000 hours at $V_{OP105}$ at hot spot temperature $T_{HS}$ = +105°C |
| | 4,000 hours at $V_{OP125}$ at hot spot temperature $T_{HS}$ = +125°C |
| Capacitance Drop at End of Life | −5% (typical) |
| Failure Rate IEC 61709 | ≤ 140 FIT at $V_{NDC}$ at hot spot temperature $T_{HS}$ = +85°C |

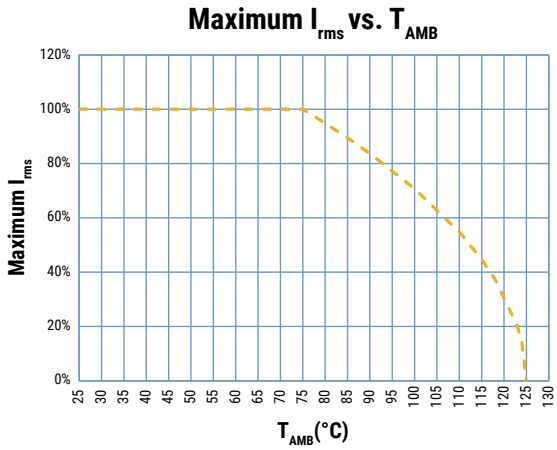
## Test Method

| | |
|---|---|
| Test Voltage Between Terminals | 1.5 * $V_{NDC}$ for 10 seconds or 1.65 * $V_{NDC}$ for 2 seconds, at T = +25°C ±5°C |
| Test Voltage Between Terminals and Case | 3.2 k VAC 50 Hz for 2 seconds |
| Damp Heat | IEC 60068-2-78 |
| Change of Temperature | IEC 60068-2-14 |
| Biased Humidity Test 40°C/93% R.H. at $V_{NDC}$ - 1,000 hours | $\|\Delta C/C_0\| \leq 5\%$<br>$\|\Delta DF/DF_0\| \leq 200\%$ (at 10 kHz)<br>IR ≥ 50% of initial limit |
| Biased Humidity Test 60°C/95% R.H. at $V_{NDC}$ - 1,000 hours | $\|\Delta C/C_0\| \leq 5\%$<br>$\|\Delta DF/DF_0\| \leq 200\%$ (at 10 kHz)<br>IR ≥ 100 MΩ |
| Biased Humidity Test 60°C/95% R.H. at $V_{NDC}$ - 3,000 hours | $\|\Delta C/C_0\| \leq 10\%$<br>$\|\Delta DF\| \leq 0.015$ (at 1 kHz)<br>IR ≥ 100 MΩ |
| Biased Humidity Test 85°C/85% R.H. at 0.55 x $V_{NDC}$ - 1,000 hours | $\|\Delta C/C_0\| \leq 5\%$<br>$\|\Delta DF\| \leq 0.005$ (at 1 kHz)<br>IR ≥ 100 MΩ |
| Biased Humidity Test 85°C/85% R.H. at VNDC - 500 hours | upon request |

## Operative Voltage Derating

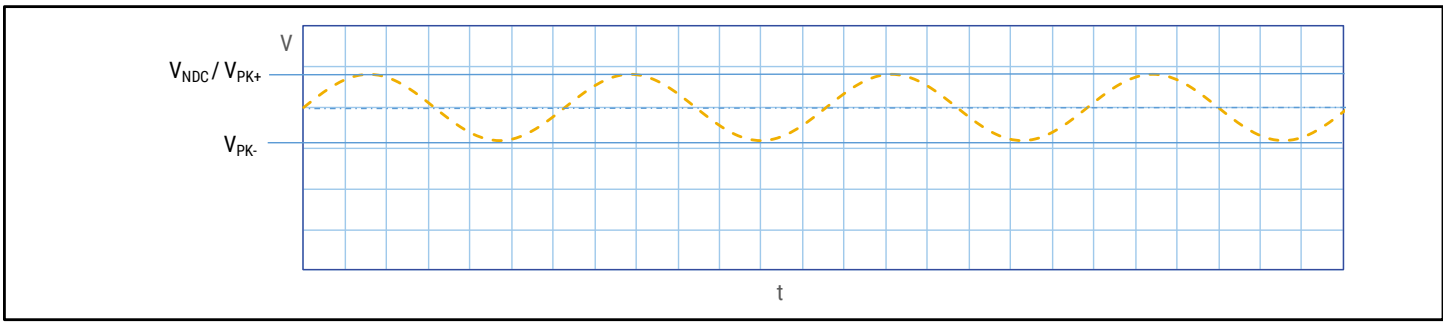
| | Symbol | Voltage (VDC) | | | | |
|---|---|---|---|---|---|---|
| Operating Voltage at 70°C ($T_{HS}$) | $V_{OP70}$ | 540 | 720 | 840 | 1080 | 1,320 |
| Rated Voltage at 85°C ($T_{HS}$) | $V_{NDC}$ | 450 | 600 | 700 | 900 | 1,100 |
| Operating Voltage at 105°C ($T_{HS}$) | $V_{OP105}$ | 360 | 480 | 560 | 720 | 880 |
| Operating Voltage at 115°C ($T_{HS}$) | $V_{OP115}$ | 315 | 420 | 490 | 630 | 770 |
| Operating Voltage at 125°C ($T_{HS}$) | $V_{OP125}$ | 270 | 360 | 420 | 540 | 660 |

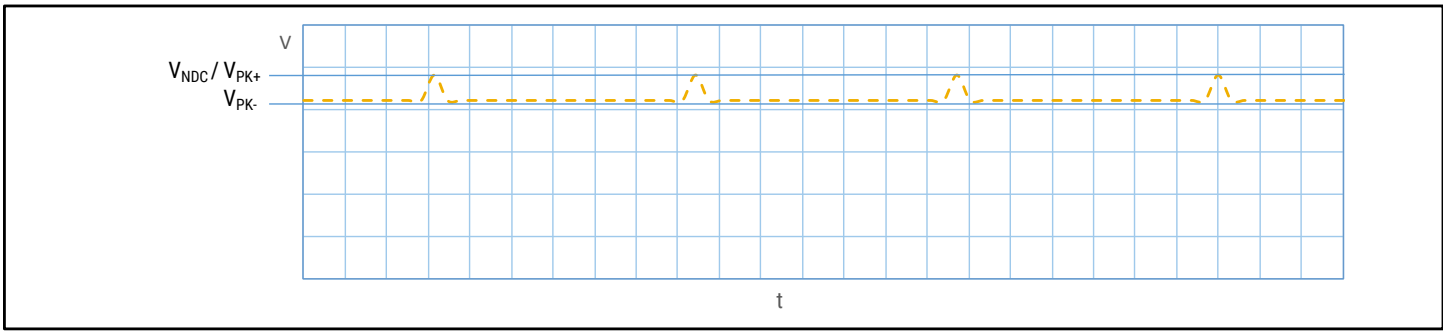


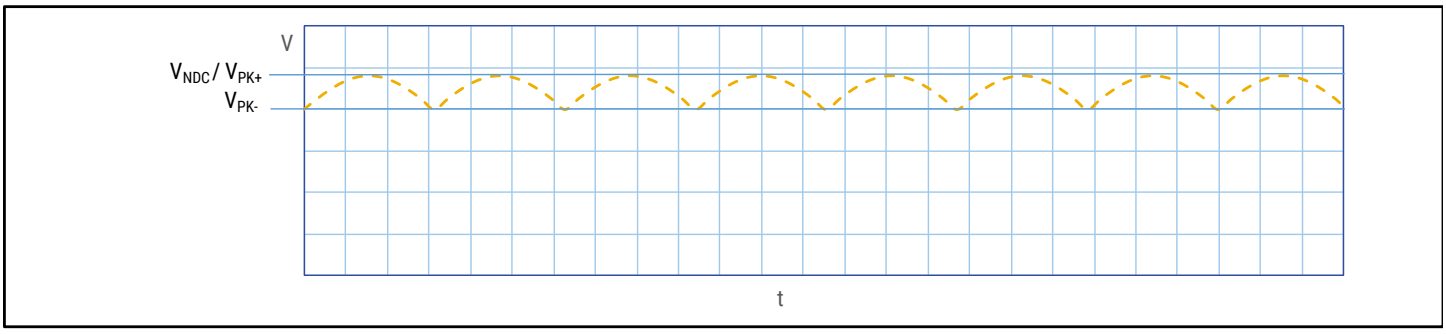




*$T_{AMB}$ is the maximum ambient temperature surrounding the capacitor or hottest contact point (e.g. tracks), whichever is higher, in the worst operation conditions in °C.*

## Typical Waveforms

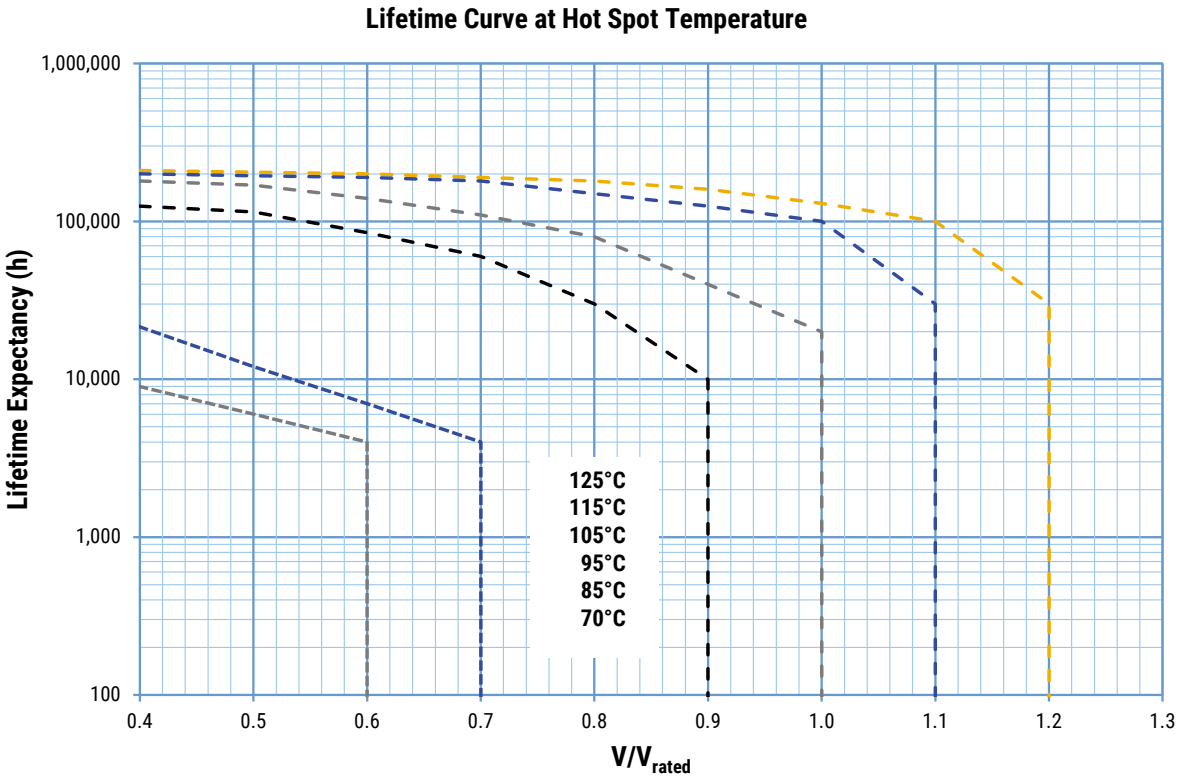


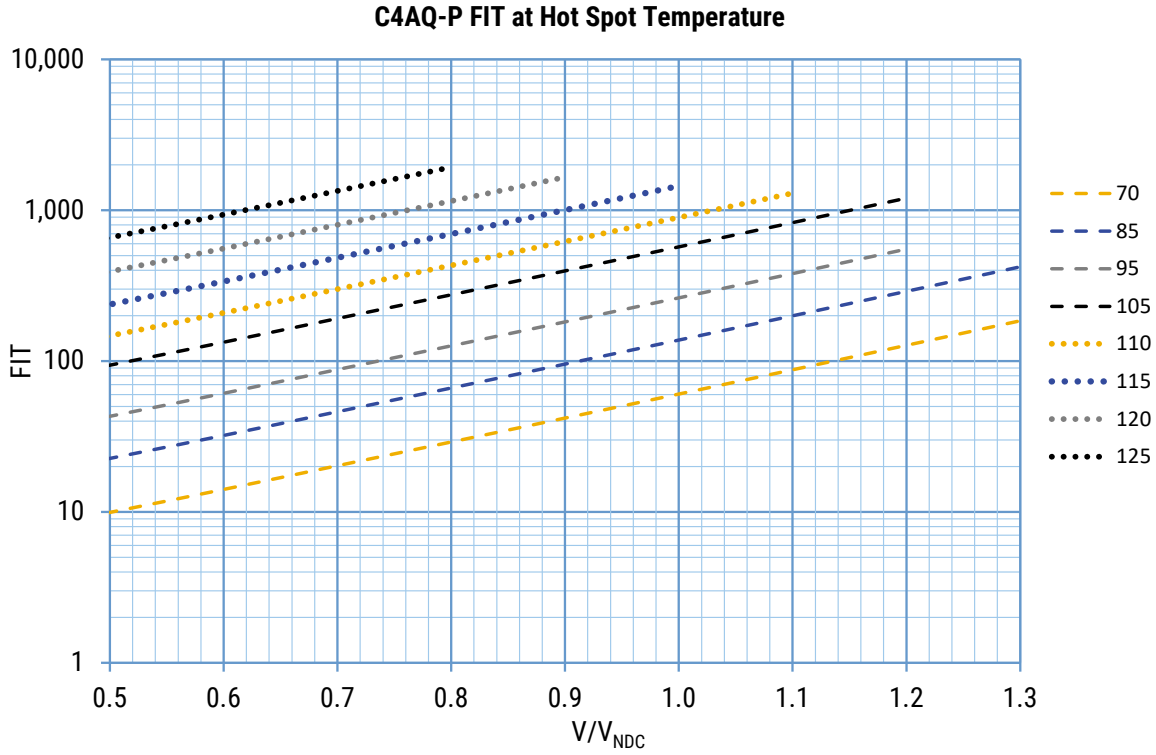




*The applied peak-to-peak ripple voltage shall not exceed 0.2 x $V_{NDC}$.*
*The peak voltage shall not exceed the rated voltage $V_{NDC}$.*

## Life Expectancy/Failure Quota Graphs



## Environmental Compliance

As a leading global supplier of electronic components and an environmentally conscious company, KEMET continually aspires to improve the environmental effects of our manufacturing processes and our finished electronic components.

In Europe (RoHS Directive) and in some other geographical areas such as China (China RoHS), legislation has been enacted to prevent or otherwise limit the use of certain hazardous materials, including lead (Pb), in electronic equipment. KEMET monitors legislation globally to ensure compliance and endeavors to adjust our manufacturing processes and/or electronic components as may be required by applicable law.

For military, medical, automotive, and some commercial applications, the use of lead (Pb) in the termination is necessary and/or required by design. KEMET is committed to communicating RoHS compliance to our customers. Information related to RoHS compliance will be provided in data sheets and using specific identifiers on the packaging labels.

All KEMET power film capacitors are RoHS compliant.

## Materials & Environment

The selection of raw materials that KEMET uses for the production of its electronic components is the result of extensive experience. KEMET directs specific attention toward environmental protection. KEMET selects its suppliers according to ISO 9001 standards and performs statistical analyses on raw materials before acceptance for use in manufacturing our electronic components. All materials are, to the best of KEMET's knowledge, non-toxic and free from cadmium; mercury; chrome and compounds; polychlorine triphenyl (PCB); bromide and chlorinedioxins bromurate clorurate; CFC and HCFC; and asbestos.

## Dissipation Factor

Dissipation factor is a complex function involved with capacitor inefficiency. The tgδ may vary up and down with increased temperature. For more information, refer to Performance Characteristics.

## Sealing

**Hermetically Sealed Capacitors**
As the temperature increases, the pressure inside the capacitor increases. If the internal pressure is high enough, it can cause a breach in the capacitor. Such a breach can result in leakage, impregnation, filling fluid, or moisture susceptibility.

**Barometric Pressure**
The altitude at which hermetically sealed capacitors are operated controls the capacitor's voltage rating. As the barometric pressure decreases, the susceptibility to terminal arc-over increases. Non-hermetic capacitors can be affected by internal stresses due to pressure changes. These effects can be in the form of capacitance changes, dielectric arc-over, and/or low insulation resistance. Altitude can also affect heat transfer. Heat that is generated in an operation cannot be dissipated properly, and high $RI^2$ losses and eventual failure can result.

## Table 1 – Ratings & Part Number Reference

| Cap Value (µF) | VDC | Dimensions (mm) | | | | | dV/dt | Ipkr | ESL | $ESR_{typ}$ at 10 kHz | Irms* 75°C at 10 kHz | Rth (HS/Amb) | Packaging Quantity | PART NUMBER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T | H | L | S | S1 | V/µs | Apk | nH | mΩ | Arms | (°C/W) | | |
| $V_{NDC}$ at 85°C = 450 VDC; $V_{OP105}$ at 105°C = 360 VDC; $V_{OP115}$ at 115°C = 315 VDC; $V_{OP125}$ at 125°C = 270 VDC | | | | | | | | | | | | | | |
| 5.6 | 450 | 11 | 20 | 31.5 | 27.5 | \ | 65 | 364 | 17 | 14.0 | 6.8 | 44 | 256 | C4AQGBU4560P1WK |
| 10 | 450 | 13 | 25 | 31.5 | 27.5 | \ | 65 | 650 | 22 | 8.6 | 9.6 | 36 | 234 | C4AQGBU5100P1XK |
| 12.5 | 450 | 14 | 28 | 31.5 | 27.5 | \ | 65 | 813 | 24 | 7.4 | 11.0 | 33 | 96 | C4AQGBU5125P1YK |
| 15 | 450 | 19 | 29 | 31.5 | 27.5 | \ | 65 | 975 | 25 | 6.4 | 12.6 | 29 | 72 | C4AQGBU5150P11K |
| 25 | 450 | 22 | 37 | 31.5 | 27.5 | \ | 65 | 1625 | 28 | 4.8 | 16.0 | 23 | 64 | C4AQGBU5250P12K |
| 40 | 450 | 20 | 40 | 42 | 37.5 | 10.2 | 30 | 1200 | 12 | 3.7 | 19.6 | 20 | 58 | C4AQGBW5400P3FK |
| 50 | 450 | 28 | 37 | 42 | 37.5 | 10.2 | 30 | 1500 | 10 | 3.1 | 22.8 | 18 | 36 | C4AQGBW5500P3JK |
| 70 | 450 | 30 | 45 | 42 | 37.5 | 20.3 | 30 | 2100 | 13 | 2.3 | 29.1 | 15 | 36 | C4AQGBW5700P3LK |
| 90 | 450 | 35 | 50 | 42 | 37.5 | 20.3 | 30 | 2700 | 14 | 1.9 | 35.1 | 13 | 30 | C4AQGBW5900P3OK |
| 100 | 450 | 30 | 45 | 57.5 | 52.5 | 20.3 | 15 | 1500 | 13 | 3.2 | 27.4 | 12 | 27 | C4AQGBW6100P3MK |
| 130 | 450 | 35 | 50 | 57.5 | 52.5 | 20.3 | 15 | 1950 | 15 | 2.5 | 33.3 | 10 | 23 | C4AQGBW6130P3NK |
| 170 | 450 | 45 | 56 | 57.5 | 52.5 | 20.3 | 15 | 2550 | 17 | 2.0 | 41.6 | 8 | 18 | C4AQGEW6170P3AK |
| 210 | 450 | 45 | 65 | 57.5 | 52.5 | 20.3 | 15 | 3150 | 19 | 1.8 | 47.7 | 7 | 18 | C4AQGEW6210P3BK |
| $V_{NDC}$ at 85°C = 600 VDC; $V_{OP105}$ at 105°C = 480 VDC; $V_{OP115}$ at 115°C = 420 VDC; $V_{OP125}$ at 125°C = 360 VDC | | | | | | | | | | | | | | |
| 3.3 | 600 | 11 | 20 | 31.5 | 27.5 | \ | 65 | 215 | 17 | 18.7 | 5.9 | 44 | 256 | C4AQHBU4330P1WJ |
| 5.6 | 600 | 13 | 25 | 31.5 | 27.5 | \ | 65 | 364 | 22 | 11.8 | 8.2 | 36 | 234 | C4AQHBU4560P1XJ |
| 7 | 600 | 14 | 28 | 31.5 | 27.5 | \ | 65 | 455 | 24 | 9.9 | 9.5 | 33 | 96 | C4AQHBU4700P1YJ |
| 10 | 600 | 19 | 29 | 31.5 | 27.5 | \ | 65 | 650 | 25 | 7.5 | 11.7 | 29 | 72 | C4AQHBU5100P11J |
| 15 | 600 | 22 | 37 | 31.5 | 27.5 | \ | 65 | 975 | 28 | 5.8 | 14.6 | 23 | 64 | C4AQHBU5150P12J |
| 20 | 600 | 20 | 40 | 42 | 37.5 | 10.2 | 30 | 600 | 12 | 5.8 | 15.6 | 20 | 58 | C4AQHBW5200P3FJ |
| 30 | 600 | 28 | 37 | 42 | 37.5 | 10.2 | 30 | 900 | 10 | 4.0 | 19.9 | 18 | 36 | C4AQHBW5300P3JJ |
| 40 | 600 | 30 | 45 | 42 | 37.5 | 20.3 | 30 | 1200 | 13 | 3.1 | 24.9 | 15 | 36 | C4AQHBW5400P3LJ |
| 50 | 600 | 35 | 50 | 42 | 37.5 | 20.3 | 30 | 1500 | 14 | 2.5 | 29.9 | 13 | 30 | C4AQHBW5500P3OJ |
| 55 | 600 | 30 | 45 | 57.5 | 52.5 | 20.3 | 15 | 825 | 13 | 4.5 | 23.0 | 12 | 27 | C4AQHBW5550P3MJ |
| 75 | 600 | 35 | 50 | 57.5 | 52.5 | 20.3 | 15 | 1125 | 15 | 3.4 | 28.7 | 10 | 23 | C4AQHBW5750P3NJ |
| 110 | 600 | 45 | 56 | 57.5 | 52.5 | 20.3 | 15 | 1650 | 17 | 2.4 | 37.9 | 8 | 18 | C4AQHEW6110P3AJ |
| 130 | 600 | 45 | 65 | 57.5 | 52.5 | 20.3 | 15 | 1950 | 19 | 2.1 | 42.9 | 7 | 18 | C4AQHEW6130P3BJ |
| $V_{NDC}$ at 85°C = 700 VDC; $V_{OP105}$ at 105°C = 560 VDC; $V_{OP115}$ at 115°C = 490 VDC; $V_{OP125}$ at 125°C = 420 VDC | | | | | | | | | | | | | | |
| 2.7 | 700 | 11 | 20 | 31.5 | 27.5 | \ | 65 | 176 | 17 | 20.1 | 5.7 | 44 | 256 | C4AQJBU4270P1WJ |
| 4 | 700 | 13 | 25 | 31.5 | 27.5 | \ | 65 | 260 | 22 | 14.2 | 7.5 | 36 | 234 | C4AQJBU4400P1XJ |
| 5 | 700 | 14 | 28 | 31.5 | 27.5 | \ | 65 | 325 | 24 | 11.8 | 8.7 | 33 | 96 | C4AQJBU4500P1YJ |
| 8 | 700 | 19 | 29 | 31.5 | 27.5 | \ | 65 | 520 | 25 | 8.0 | 11.2 | 29 | 72 | C4AQJBU4800P11J |
| 12.5 | 700 | 22 | 37 | 31.5 | 27.5 | \ | 65 | 813 | 28 | 6.1 | 14.1 | 23 | 64 | C4AQJBU5125P12J |
| 15 | 700 | 20 | 40 | 42 | 37.5 | 10.2 | 30 | 450 | 12 | 6.8 | 14.5 | 20 | 58 | C4AQJBW5150P3FJ |
| 20 | 700 | 28 | 37 | 42 | 37.5 | 10.2 | 30 | 600 | 10 | 5.2 | 17.4 | 18 | 36 | C4AQJBW5200P3JJ |
| 30 | 700 | 30 | 45 | 42 | 37.5 | 20.3 | 30 | 900 | 13 | 3.5 | 23.2 | 15 | 36 | C4AQJBW5300P3LJ |
| 40 | 700 | 35 | 50 | 42 | 37.5 | 20.3 | 30 | 1200 | 14 | 2.8 | 28.7 | 13 | 30 | C4AQJBW5400P3OJ |
| 45 | 700 | 30 | 45 | 57.5 | 52.5 | 20.3 | 15 | 675 | 13 | 4.8 | 22.3 | 12 | 27 | C4AQJBW5450P3MJ |
| 55 | 700 | 35 | 50 | 57.5 | 52.5 | 20.3 | 15 | 825 | 15 | 4.0 | 26.4 | 10 | 23 | C4AQJBW5550P3NJ |
| 60 | 700 | 35 | 50 | 57.5 | 52.5 | 20.3 | 15 | 900 | 15 | 3.6 | 27.5 | 10 | 23 | C4AQJBW5600P3NJ |
| 85 | 700 | 45 | 56 | 57.5 | 52.5 | 20.3 | 15 | 1275 | 17 | 2.8 | 35.8 | 8 | 18 | C4AQJEW5850P3AJ |
| 100 | 700 | 45 | 65 | 57.5 | 52.5 | 20.3 | 15 | 1500 | 19 | 2.4 | 40.6 | 7 | 18 | C4AQJEW6100P3BJ |
| Cap Value (µF) | VDC | T | H | L | S | S1 | V/µs | Apk | nH | mΩ | Arms | (°C/W) | Packaging Quantity | PART NUMBER |
| | | Dimensions (mm) | | | | | dV/dt | Ipkr | ESL | $ESR_{typ}$ at 10 kHz | Irms* 75°C at 10 kHz | Rth (HS/Amb) | | |

*(*) $I_{rms}$ value that leads to a ΔT of ≈ 30°C in the hot spot > $T_{HS} = T_{AMB} + \Delta T$ = 75°C + 30°C = 105°C. Attention: Hot spot at 105°C reduced the life time!*

## Table 1 – Ratings & Part Number Reference cont.

| Cap Value (µF) | VDC | Dimensions (mm) | | | | | dV/dt | Ipkr | ESL | $ESR_{typ}$ at 10 kHz | Irms* 75°C at 10 kHz | Rth (HS/Amb) | Packaging Quantity | PART NUMBER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T | H | L | S | S1 | V/µs | Apk | nH | mΩ | Arms | (°C/W) | | |
| $V_{NDC}$ at 85°C = 900 VDC; $V_{OP105}$ at 105°C = 720 VDC; $V_{OP115}$ at 115°C = 630 VDC; $V_{OP125}$ at 125°C = 540 VDC | | | | | | | | | | | | | | |
| 1.5 | 900 | 11 | 20 | 31.5 | 27.5 | \ | 70 | 105 | 17 | 28.9 | 4.8 | 44 | 256 | C4AQOBU4150P1WJ |
| 2.7 | 900 | 13 | 25 | 31.5 | 27.5 | \ | 70 | 189 | 22 | 16.8 | 6.9 | 36 | 234 | C4AQOBU4270P1XJ |
| 3.3 | 900 | 14 | 28 | 31.5 | 27.5 | \ | 70 | 231 | 24 | 14.2 | 7.9 | 33 | 96 | C4AQOBU4330P1YJ |
| 5 | 900 | 19 | 29 | 31.5 | 27.5 | \ | 70 | 350 | 25 | 10.0 | 10.1 | 29 | 72 | C4AQOBU4500P11J |
| 8 | 900 | 22 | 37 | 31.5 | 27.5 | \ | 70 | 560 | 28 | 7.3 | 13.2 | 23 | 64 | C4AQOBU4800P12J |
| 12 | 900 | 20 | 40 | 42 | 37.5 | 10.2 | 35 | 420 | 12 | 6.9 | 14.4 | 20 | 58 | C4AQOBW5120P3FJ |
| 14 | 900 | 28 | 37 | 42 | 37.5 | 10.2 | 35 | 490 | 10 | 5.9 | 16.3 | 18 | 36 | C4AQOBW5140P3JJ |
| 20 | 900 | 30 | 45 | 42 | 37.5 | 20.3 | 35 | 700 | 13 | 4.3 | 21.2 | 15 | 36 | C4AQOBW5200P3LJ |
| 25 | 900 | 35 | 50 | 42 | 37.5 | 20.3 | 35 | 875 | 14 | 3.5 | 25.5 | 13 | 30 | C4AQOBW5250P3OJ |
| 30 | 900 | 30 | 45 | 57.5 | 52.5 | 20.3 | 15 | 450 | 13 | 5.7 | 20.4 | 12 | 27 | C4AQOBW5300P3MJ |
| 40 | 900 | 35 | 50 | 57.5 | 52.5 | 20.3 | 15 | 600 | 15 | 4.4 | 25.2 | 10 | 23 | C4AQOBW5400P3NJ |
| 55 | 900 | 45 | 56 | 57.5 | 52.5 | 20.3 | 15 | 825 | 17 | 3.3 | 32.5 | 8 | 18 | C4AQOEW5550P3AJ |
| 65 | 900 | 45 | 65 | 57.5 | 52.5 | 20.3 | 15 | 975 | 19 | 2.9 | 37.0 | 7 | 18 | C4AQOEW5650P3BJ |
| $V_{NDC}$ at 85°C = 1,100 VDC; $V_{OP105}$ at 105°C = 880 VDC; $V_{OP115}$ at 115°C = 770 VDC; $V_{OP125}$ at 125°C = 660 VDC | | | | | | | | | | | | | | |
| 1 | 1,100 | 11 | 20 | 31.5 | 27.5 | \ | 80 | 80 | 17 | 36.4 | 4.2 | 44 | 256 | C4AQQBU4100P1WJ |
| 1.8 | 1,100 | 13 | 25 | 31.5 | 27.5 | \ | 80 | 144 | 22 | 21.0 | 6.2 | 36 | 234 | C4AQQBU4180P1XJ |
| 2.2 | 1,100 | 14 | 28 | 31.5 | 27.5 | \ | 80 | 176 | 24 | 17.6 | 7.1 | 33 | 96 | C4AQQBU4220P1YJ |
| 3.3 | 1,100 | 19 | 29 | 31.5 | 27.5 | \ | 80 | 264 | 25 | 12.3 | 9.1 | 29 | 72 | C4AQQBU4330P11J |
| 5 | 1,100 | 22 | 37 | 31.5 | 27.5 | \ | 80 | 400 | 28 | 9.0 | 11.8 | 23 | 64 | C4AQQBU4500P12J |
| 8 | 1,100 | 20 | 40 | 42 | 37.5 | 10.2 | 40 | 320 | 12 | 8.7 | 12.9 | 20 | 58 | C4AQQBW4800P3FJ |
| 10 | 1,100 | 28 | 37 | 42 | 37.5 | 10.2 | 40 | 400 | 10 | 6.9 | 15.0 | 18 | 36 | C4AQQBW5100P3JJ |
| 12 | 1,100 | 30 | 45 | 42 | 37.5 | 20.3 | 40 | 480 | 13 | 5.8 | 18.1 | 15 | 36 | C4AQQBW5120P3LJ |
| 18 | 1,100 | 35 | 50 | 42 | 37.5 | 20.3 | 40 | 720 | 14 | 4.1 | 23.7 | 13 | 30 | C4AQQBW5180P3OJ |
| 20 | 1,100 | 30 | 45 | 57.5 | 52.5 | 20.3 | 20 | 400 | 13 | 7.2 | 18.3 | 12 | 27 | C4AQQBW5200P3MJ |
| 25 | 1,100 | 35 | 50 | 57.5 | 52.5 | 20.3 | 20 | 500 | 15 | 5.7 | 22.0 | 10 | 23 | C4AQQBW5250P3NJ |
| 27 | 1,100 | 35 | 50 | 57.5 | 52.5 | 20.3 | 20 | 540 | 15 | 5.4 | 22.8 | 10 | 23 | C4AQQBW5270P3NJ |
| 38 | 1,100 | 45 | 56 | 57.5 | 52.5 | 20.3 | 20 | 760 | 17 | 4.0 | 29.8 | 8 | 18 | C4AQQEW5380P3AJ |
| 45 | 1,100 | 45 | 65 | 57.5 | 52.5 | 20.3 | 20 | 900 | 19 | 3.4 | 34.0 | 7 | 18 | C4AQQEW5450P3BJ |
| Cap Value (µF) | VDC | T | H | L | S | S1 | V/µs | Apk | nH | mΩ | Arms | (°C/W) | Packaging Quantity | PART NUMBER |
| | | Dimensions (mm) | | | | | dV/dt | Ipkr | ESL | $ESR_{typ}$ at 10 kHz | Irms* 75°C at 10 kHz | Rth (HS/Amb) | | |

*(*) $I_{rms}$ value that leads to a ΔT of ≈ 30°C in the hot spot > $T_{HS} = T_{AMB} + \Delta T = 75°C + 30°C = 105°C$. Attention: Hot spot at 105°C reduced the life time!*

## Table 2 – Ratings & Part Number Reference for Low Profile Design

| Cap Value (µF) | VDC | Dimensions (mm) | | | | | dV/dt | Ipkr | ESL | $ESR_{typ}$ at 10 kHz | Irms* 75°C at 10 kHz | Rth (HS/Amb) | Packaging Quantity | PART NUMBER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T | H | L | S | S1 | V/µs | Apk | nH | mΩ | Arms | (°C/W) | | |
| $V_{NDC}$ at 85°C = 450 VDC; $V_{OP105}$ at 105°C = 360 VDC; $V_{OP115}$ at 115°C = 315 VDC; $V_{OP125}$ at 125°C = 270 VDC | | | | | | | | | | | | | | |
| 5.6 | 450 | 21 | 12.5 | 32 | 27.5 | \ | 65 | 364 | 11 | 13.6 | 6.8 | 46 | 192 | C4AQGLU4560P11K |
| 8 | 450 | 24 | 15 | 32 | 27.5 | \ | 65 | 520 | 13 | 10.0 | 8.6 | 39 | 168 | C4AQGLU4800P12K |
| 15 | 450 | 31 | 19 | 32 | 27.5 | \ | 65 | 975 | 16 | 6.1 | 12.6 | 30 | 80 | C4AQGLU5150P19K |
| 12 | 450 | 24 | 15 | 41.5 | 37.5 | 10.2 | 30 | 360 | 7 | 11.8 | 8.6 | 33 | 132 | C4AQGLW5120P34K |
| 16 | 450 | 24 | 19 | 41.5 | 37.5 | 10.2 | 30 | 480 | 8 | 8.9 | 10.5 | 29 | 88 | C4AQGLW5160P33K |
| 36 | 450 | 35 | 24 | 42 | 37.5 | 20.3 | 30 | 1080 | 9 | 4.1 | 17.8 | 23 | 60 | C4AQGLW5360P36K |
| 45 | 450 | 43 | 25 | 42 | 37.5 | 20.3 | 30 | 1350 | 9 | 3.3 | 21.4 | 19 | 48 | C4AQGLW5450P38K |
| $V_{NDC}$ at 85°C = 600 VDC; $V_{OP105}$ at 105°C = 480 VDC; $V_{OP115}$ at 115°C = 420 VDC; $V_{OP125}$ at 125°C = 360 VDC | | | | | | | | | | | | | | |
| 3.3 | 600 | 21 | 12.5 | 32 | 27.5 | \ | 65 | 215 | 11 | 18.5 | 5.8 | 46 | 192 | C4AQHLU4330P11J |
| 5 | 600 | 24 | 15 | 32 | 27.5 | \ | 65 | 325 | 13 | 12.7 | 7.7 | 39 | 168 | C4AQHLU4500P12J |
| 10 | 600 | 31 | 19 | 32 | 27.5 | \ | 65 | 650 | 16 | 7.0 | 11.7 | 30 | 80 | C4AQHLU5100P19J |
| 7.5 | 600 | 24 | 15 | 41.5 | 37.5 | 10.2 | 30 | 225 | 7 | 15.2 | 7.6 | 33 | 132 | C4AQHLW4750P34J |
| 10 | 600 | 24 | 19 | 41.5 | 37.5 | 10.2 | 30 | 300 | 8 | 11.4 | 9.3 | 29 | 88 | C4AQHLW5100P33J |
| 20 | 600 | 35 | 24 | 42 | 37.5 | 20.3 | 30 | 600 | 10 | 5.8 | 14.8 | 23 | 60 | C4AQHLW5200P36J |
| 30 | 600 | 43 | 25 | 42 | 37.5 | 20.3 | 30 | 900 | 9 | 4.0 | 19.5 | 19 | 48 | C4AQHLW5300P38K |
| $V_{NDC}$ at 85°C = 700 VDC; $V_{OP105}$ at 105°C = 560 VDC; $V_{OP115}$ at 115°C = 490 VDC; $V_{OP125}$ at 125°C = 420 VDC | | | | | | | | | | | | | | |
| 2.7 | 700 | 21 | 12.5 | 32 | 27.5 | \ | 65 | 176 | 11 | 19.8 | 5.6 | 46 | 192 | C4AQJLU4270P11J |
| 3.8 | 700 | 24 | 15 | 32 | 27.5 | \ | 65 | 247 | 13 | 14.5 | 7.1 | 39 | 168 | C4AQJLU4380P12J |
| 7.5 | 700 | 31 | 19 | 32 | 27.5 | \ | 65 | 488 | 16 | 8.0 | 10.9 | 30 | 80 | C4AQJLU4750P19J |
| 5.8 | 700 | 24 | 15 | 41.5 | 37.5 | 10.2 | 30 | 174 | 7 | 17.3 | 7.1 | 33 | 132 | C4AQJLW4580P34J |
| 8 | 700 | 24 | 19 | 41.5 | 37.5 | 10.2 | 30 | 240 | 8 | 12.5 | 8.9 | 29 | 88 | C4AQJLW4800P33J |
| 15 | 700 | 35 | 24 | 42 | 37.5 | 20.3 | 30 | 450 | 9 | 6.8 | 13.7 | 23 | 60 | C4AQJLW5150P36J |
| 22 | 700 | 43 | 25 | 42 | 37.5 | 20.3 | 30 | 660 | 9 | 4.7 | 17.9 | 19 | 48 | C4AQJLW5220P38J |
| $V_{NDC}$ at 85°C = 900 VDC; $V_{OP105}$ at 105°C = 720 VDC; $V_{OP115}$ at 115°C = 630 VDC; $V_{OP125}$ at 125°C = 540 VDC | | | | | | | | | | | | | | |
| 1.5 | 900 | 21 | 12.5 | 32 | 27.5 | \ | 70 | 105 | 11 | 28.6 | 4.7 | 46 | 192 | C4AQOLU4150P11J |
| 2.5 | 900 | 24 | 15 | 32 | 27.5 | \ | 70 | 175 | 13 | 17.7 | 6.5 | 39 | 168 | C4AQOLU4250P12J |
| 4.8 | 900 | 31 | 19 | 32 | 27.5 | \ | 70 | 336 | 16 | 9.9 | 9.8 | 30 | 80 | C4AQOLU4480P19J |
| 3.8 | 900 | 24 | 15 | 41.5 | 37.5 | 10.2 | 35 | 133 | 7 | 21.2 | 6.4 | 33 | 132 | C4AQOLW4380P34J |
| 5 | 900 | 24 | 19 | 41.5 | 37.5 | 10.2 | 35 | 175 | 8 | 16.2 | 7.8 | 29 | 88 | C4AQOLW4500P33J |
| 10 | 900 | 35 | 24 | 42 | 37.5 | 20.3 | 35 | 350 | 9 | 8.1 | 12.5 | 23 | 60 | C4AQOLW5100P36J |
| 14 | 900 | 43 | 25 | 42 | 37.5 | 20.3 | 35 | 490 | 9 | 5.9 | 15.9 | 19 | 48 | C4AQOLW5140P38J |
| $V_{NDC}$ at 85°C = 1,100 VDC; $V_{OP105}$ at 105°C = 880 VDC; $V_{OP115}$ at 115°C = 770 VDC; $V_{OP125}$ at 125°C = 660 VDC | | | | | | | | | | | | | | |
| 1 | 1,100 | 21 | 12.5 | 32 | 27.5 | \ | 80 | 80 | 11 | 36.2 | 4.2 | 46 | 192 | C4AQQLU4100P11J |
| 1.8 | 1,100 | 24 | 15 | 32 | 27.5 | \ | 80 | 144 | 13 | 20.7 | 6.0 | 39 | 168 | C4AQQLU4180P12J |
| 3.3 | 1,100 | 31 | 19 | 32 | 27.5 | \ | 80 | 264 | 16 | 11.9 | 9.0 | 30 | 80 | C4AQQLU4330P19J |
| 2.6 | 1,100 | 24 | 15 | 41.5 | 37.5 | 10.2 | 40 | 104 | 7 | 26.1 | 5.8 | 33 | 132 | C4AQQLW4260P34J |
| 3.5 | 1,100 | 24 | 19 | 41.5 | 37.5 | 10.2 | 40 | 140 | 8 | 19.4 | 7.1 | 29 | 88 | C4AQQLW4350P33J |
| 7.5 | 1,100 | 35 | 24 | 42 | 37.5 | 20.3 | 40 | 300 | 9 | 9.1 | 11.8 | 23 | 60 | C4AQQLW4750P36J |
| 10 | 1,100 | 43 | 25 | 42 | 37.5 | 20.3 | 40 | 400 | 9 | 6.9 | 14.7 | 19 | 48 | C4AQQLW5100P38J |
| Cap Value (µF) | VDC | T | H | L | S | S1 | V/µs | Apk | nH | mΩ | Arms | (°C/W) | Packaging Quantity | PART NUMBER |
| | | Dimensions (mm) | | | | | dV/dt | Ipkr | ESL | $ESR_{typ}$ at 10 kHz | Irms* 75°C at 10 kHz | Rth (HS/Amb) | | |

*(*) $I_{rms}$ value that leads to a ΔT of ≈ 30°C in the hot spot > $T_{HS}$ = $T_{AMB}$ + ΔT = 75°C + 30°C = 105°C. Attention: Hot spot at 105°C reduced the life time!*

## Soldering Process

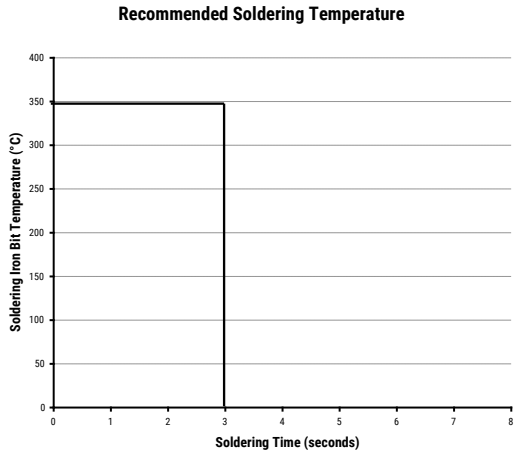
The implementation of the RoHS directive has resulted in the selection of SnAuCu (SAC) alloys, or SnCu alloys, as the primary solder material. This has increased the liquidus temperature from 183°C for a SnPb eutectic alloy to 217 – 221°C for new alloys. As a result, the heat stress to the components, even in wave soldering, has increased considerably due to higher pre-heat and wave temperatures. Polypropylene capacitors are especially sensitive to heat (the melting point of polypropylene is 160 – 170°C). Wave soldering can be destructive, especially for mechanically small polypropylene capacitors (with lead spacing of 5 – 15 mm), and great care must be taken during soldering. The recommended solder profiles from KEMET should be used. Contact KEMET with any questions. In general, the wave soldering curve from IEC Publication 61760–1 Edition 2 serves as a solid guideline for successful soldering. See Figure 1.

Reflow soldering is not recommended for through-hole film capacitors. Exposing capacitors to a soldering profile in excess of the recommended limits may result in degradation or permanent damage to the capacitors.

Do not place the polypropylene capacitor through an adhesive curing oven to cure resin for surface mount components. Insert through-hole parts after curing the surface mount parts. Contact KEMET to discuss the actual temperature profile in the oven, if through-hole components must pass through the adhesive curing process. A maximum two soldering cycles is recommended. Allow time for the capacitor surface temperature to return to normal before the second soldering cycle.

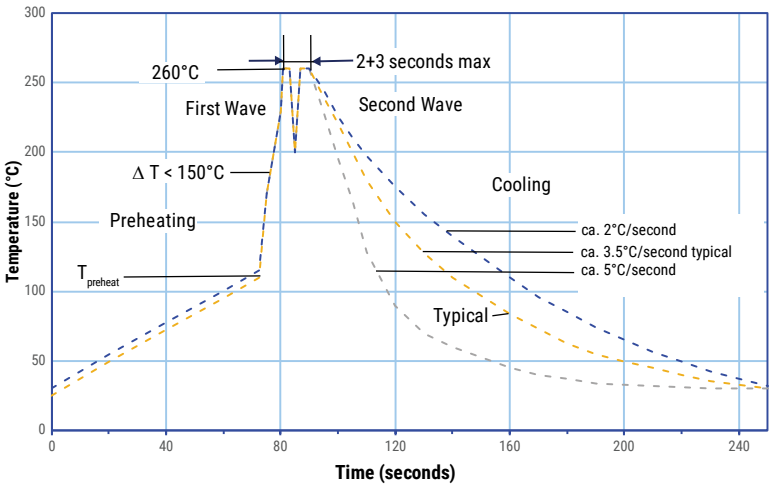
### Manual Soldering Recommendations

Following is the recommendation for manual soldering with a soldering iron.




The soldering iron tip temperature should be set at 350°C (+10°C maximum) with the soldering duration not to exceed more than 3 seconds.

### Wave Soldering Recommendations



## Soldering Process cont.

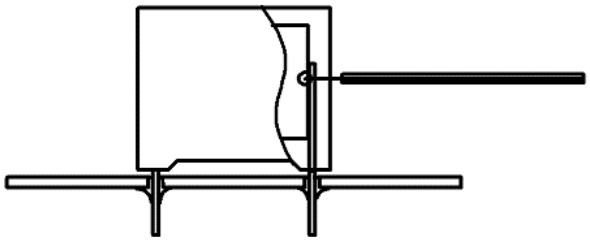
**Wave Soldering Recommendations cont.**

1. The tables indicates the maximum set-up temperature of the soldering process

| Dielectric Film Material | Maximum Preheat Temperature | Maximum Peak Soldering Temperature |
|---|---|---|
| Polypropylene | 130°C | 270°C |

2. The maximum temperature measured inside the capacitor: set the temperature so that inside the element the maximum temperature is below the limit.

| Dielectric Film Material | Maximum Temperature Measured Inside the Element |
|---|---|
| Polypropylene | 125°C |



*Temperature monitored inside the capacitor.*

**Selective Soldering Recommendations**

Selective dip soldering is a variation of reflow soldering. In this method, the printed circuit board with through-hole components to be soldered is pre-heated and transported over the solder bath, as in normal flow soldering, without touching the solder. When the board is over the bath, it is stopped. Pre-designed solder pots are lifted from the bath with molten solder, only at the places of the selected components, and pressed against the lower surface of the board to solder the components.

The temperature profile for selective soldering is similar to the double wave flow soldering outlined in this document. However, instead of two baths, there is only one with a time from 3 – 10 seconds. In selective soldering, the risk of overheating is greater than in double wave flow soldering, and great care must be taken so that the parts do not overheat.

## Mounting

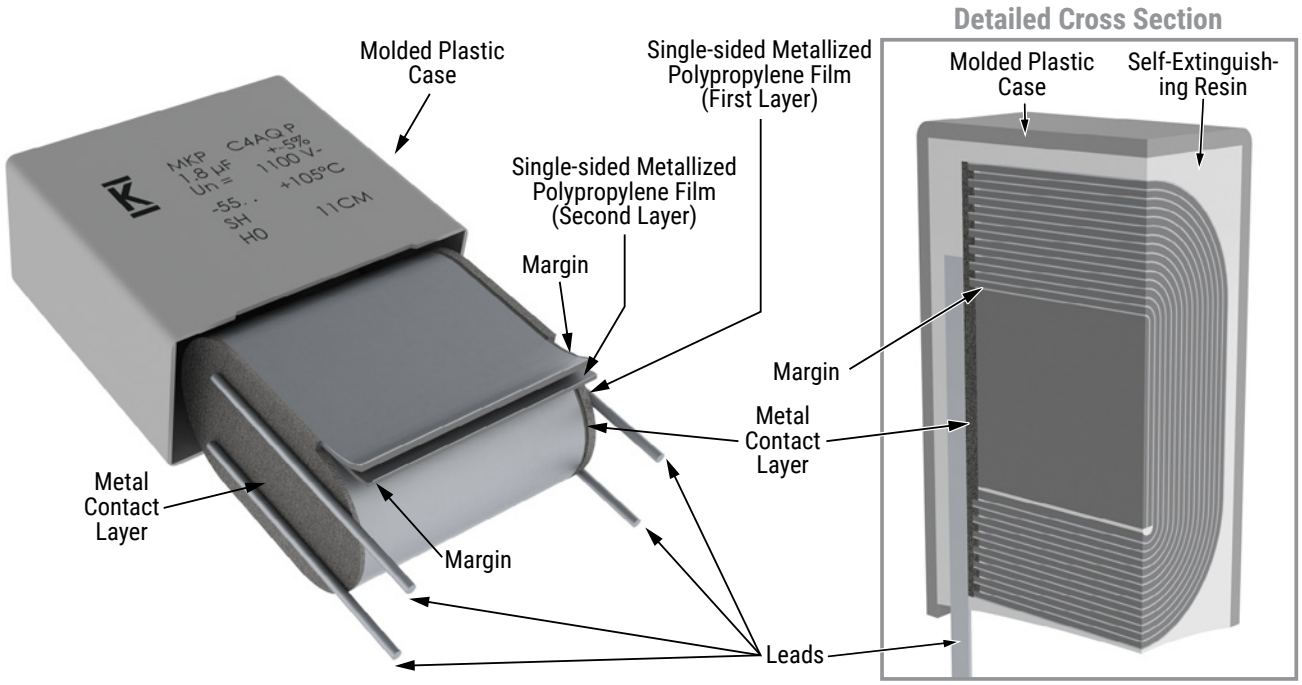
### Resistance to Vibration and Mechanical Shock

AEC-Q200 Rev. E, Mechanical Stress Tests:

| | | |
|---|---|---|
| **Mechanical Shock** | **MIL-SDT-202 Method 213** | Figure 1 of Method 213<br>• THT: Condition C<br>• SMD: Condition C<br>• Tested per the Supplier's recommended mounting method |
| **Vibration** | **MIL-SDT-202 Method 204** | • 5 g for 20 minutes, 12 cycles each of 3 orientations<br>• Tested per the Supplier's recommended mounting method<br>• Verification of transfer load: during setup, verify that with the selected PCB design (size, thickness and secure points), or an alternative mount, that the transferred load onto the component corresponds to the requested load. This verification can be achieved using a laser vibrometer or other adequate measuring device<br>• Test from 10 Hz – 2,000 Hz. |

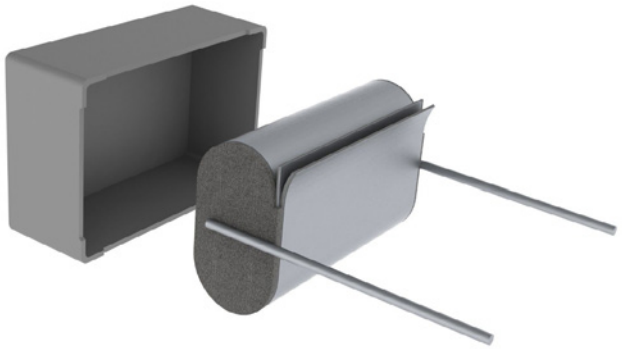
The capacitors are designed for PCB mounting.
The stand-off pipes must be in good contact with the printed circuit board.
The capacitor body has to be properly fixed (e.g. clamped or glued).

## Construction

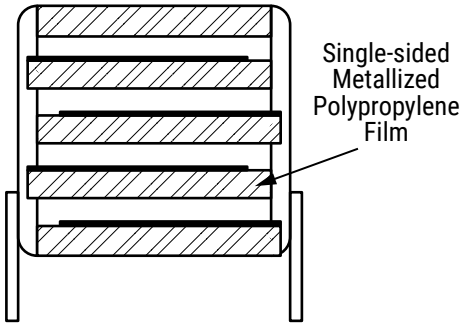


## Construction cont.

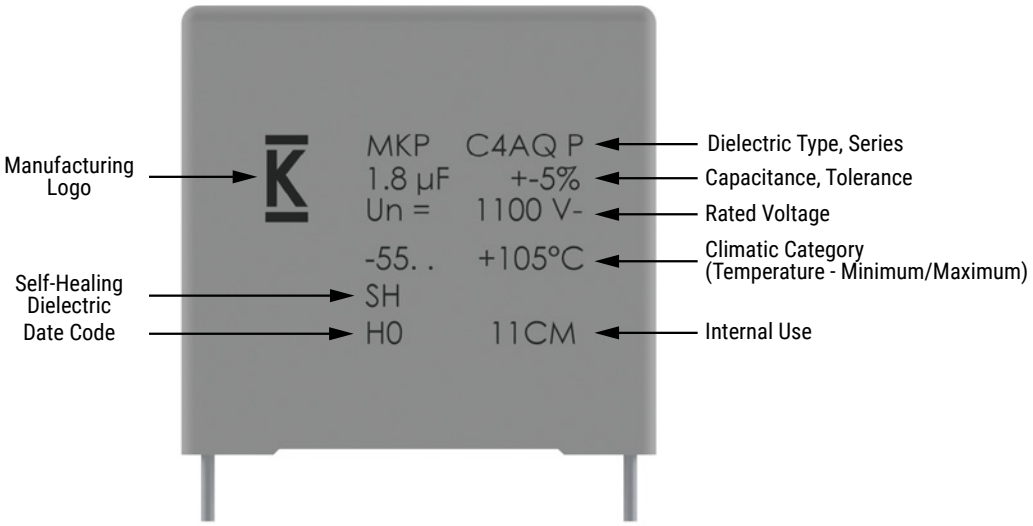
### Low Profile Version:



### Winding Scheme:




## Marking




*Slight change in the layout can be possible but this does not affect the content of the information of the current marking.*
*This change will be achieved without impact to product form, fit or function, as the products are equivalent with respect to physical, mechanical, quality and reliability characteristics*

| Manufacturing Date Code (IEC–60062) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Year | Code | Year | Code | Year | Code | Month | Code | Month | Code |
| 2010 | A | 2017 | J | 2024 | S | January | 1 | July | 7 |
| 2011 | B | 2018 | K | 2025 | T | February | 2 | August | 8 |
| 2012 | C | 2019 | L | 2026 | U | March | 3 | September | 9 |
| 2013 | D | 2020 | M | 2027 | V | April | 4 | October | O |
| 2014 | E | 2021 | N | 2028 | W | May | 5 | November | N |
| 2015 | F | 2022 | P | 2029 | X | June | 6 | December | D |
| 2016 | H | 2023 | R | 2030 | A | | | | |

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