

Overview

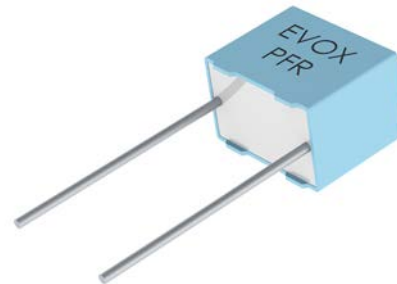
The PFR Series is a capacitor with polypropylene film and metal foil electrodes, encapsulated in self-extinguishing resin in a box of material meeting the requirements of UL 94 V-0.

Applications

Typical applications include high speed applications requiring low losses at high frequencies and high dV/dt , such as electrical ballasts, televisions, video and telecommunications.

Benefits

- Rated voltage: 63 – 1,000 VDC
- Rated voltage: 40 – 250 VAC
- Capacitance range: 0.0001 – 0.022 μ F
- Lead spacing: 5 mm
- Capacitance tolerance: $\pm 1\%$, $\pm 2\%$, $\pm 2.5\%$, $\pm 5\%$, $\pm 10\%$
- Climatic category: 55/100/56, IEC 60068-1
- Tape & Reel packaging in accordance with IEC 60286-2
- RoHS Compliant and lead-free terminations
- Category temperature range of -55°C to $+100^{\circ}\text{C}$



Customer Part Number

| PFR | 5 | 101 | J | 63 | J11 | L4BULK |
|-------------------------|-------------------|--|--|---|---------------------|----------------------------|
| Series | Lead Spacing (mm) | Capacitance Code (pF) | Capacitance Tolerance | Rated Voltage (VDC) | Size Code | Packaging |
| Polypropylene Film/Foil | 5 (Standard) | First two digits represent significant figures. Third digit specifies number of zeros. | F = $\pm 1\%$ G = $\pm 2\%$ H = $\pm 2.5\%$ J = $\pm 5\%$ K = $\pm 10\%$ | 63 = 63 100 = 100 250 = 250 400 = 400 630 = 630 1000 = 1,000 | See Dimension Table | See Ordering Options Table |

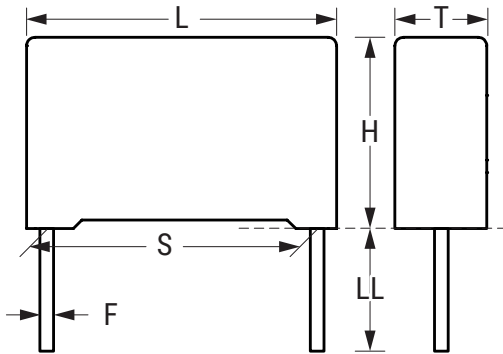
KEMET Internal Part Number

| F | 411 | J | H | 101 | J | 063 | C |
|-----------------|-------------------------|-------------------|---------------------|--|--|---|----------------------------|
| Capacitor Class | Series | Lead Spacing (mm) | Size Code | Capacitance Code (pF) | Capacitance Tolerance | Rated Voltage (VDC) | Packaging |
| F = Film | Polypropylene Film/Foil | J = 5.0 | See Dimension Table | First two digits represent significant figures. Third digit specifies number of zeros. | F = $\pm 1\%$ G = $\pm 2\%$ R = $\pm 2.5\%$ J = $\pm 5\%$ K = $\pm 10\%$ | 063 = 63 100 = 100 250 = 250 400 = 400 630 = 630 1K0 = 1,000 | See Ordering Options Table |

Ordering Options Table

| Lead Spacing Nominal (mm) | Type of Leads and Packaging | Lead Length (mm) | KEMET Lead and Packaging Code | Legacy Lead and Packaging Code |
|-----------------------------------|--|----------------------|-------------------------------|--------------------------------|
| 5 | Standard Lead and Packaging Options | | | |
| | Bulk (Bag) – Short Leads | 4 +1/-0 | C | L4BULK |
| | Tape & Reel (Standard Reel F 360 mm) | $H_0 = 18.5 \pm 0.5$ | L | L16.5TR18 |
| | Other Lead and Packaging Options | | | |
| | Ammo Pack | $H_0 = 16.5 \pm 0.5$ | Q | L16.5TA16 |
| | Ammo Pack | $H_0 = 18.5 \pm 0.5$ | R | L16.5TA18 |
| Tape & Reel (Large Reel F 500 mm) | $H_0 = 18.5 \pm 0.5$ | P | L16.5LR18 | |

Dimensions – Millimeters



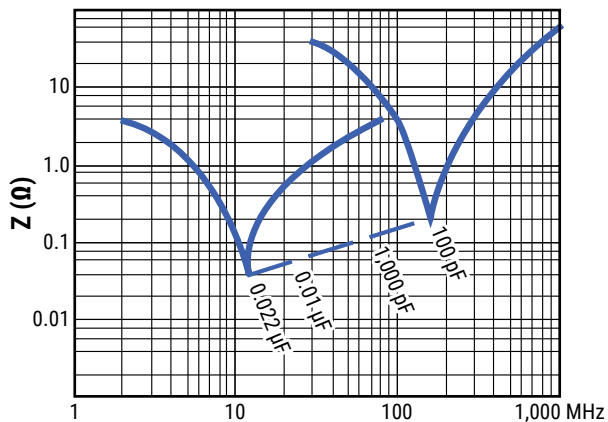
| KEMET Size Code | Legacy Size Code | S | | T | | H | | L | | F | |
|-----------------|------------------|---------|-----------|---------|-----------|---------|-----------|---------|-----------|---------|-----------|
| | | Nominal | Tolerance | Nominal | Tolerance | Nominal | Tolerance | Nominal | Tolerance | Nominal | Tolerance |
| JH | J11 | 5 | -0.4 | 4.5 | 0/-0.5 | 6 | 0/-0.5 | 7.2 | 0/-0.5 | 0.5 | ±0.05 |
| JK | J12 | 5 | -0.4 | 5.5 | 0/-0.5 | 7 | 0/-0.5 | 7.2 | 0/-0.5 | 0.5 | ±0.05 |
| JR | J13 | 5 | -0.4 | 6.5 | 0/-0.5 | 8 | 0/-0.5 | 7.2 | 0/-0.5 | 0.5 | ±0.05 |

Note: See Ordering Options Table for lead length (LL) options.

Performance Characteristics

| | | | | | | |
|-------------------------------------|--|----------------------------|---|--------------------------|-----------------|----------------|
| Voltage Range (VDC) | 63 | 100 | 250 | 400 | 630 | 1,000 |
| Voltage Range (VAC) | 40 | 63 | 160 | 220 | 250 | 250 |
| Capacitance Range (μF) | 0.0001 – 0.022 | 0.0001 – 0.01 | 0.0001 – 0.0068 | 0.0001 – 0.0068 | 0.0001 – 0.0047 | 0.0001 – 0.001 |
| Capacitance Values | In accordance with IEC E12 series | | | | | |
| Capacitance Tolerance | $\pm 1\%$, $\pm 2\%$, $\pm 2.5\%$, $\pm 5\%$, $\pm 10\%$ | | | | | |
| Category Temperature Range | -55°C to +100°C. An operating temperature up to +105°C is allowed under certain conditions. Please consult KEMET for details | | | | | |
| Climatic Category | IEC 60068-1, 55/100/56 | | | | | |
| Capacitance Drift | Maximum 0.3% after a 2 year storage period at a temperature of +10°C to +40°C and a relative humidity of 40% to 60% | | | | | |
| Temperature Coefficient | -200 (+50, -100) ppm/°C at 1 kHz | | | | | |
| Self-Inductance | Approximately 6 nH/cm for the total length of capacitor winding and the leads | | | | | |
| Dissipation Factor $\tan\delta$ | Maximum Values at +23°C | | | | | |
| | | $C \leq 0.001 \mu\text{F}$ | $0.001 \mu\text{F} < C \leq 0.0047 \mu\text{F}$ | $C > 0.0047 \mu\text{F}$ | | |
| | 1 kHz | 0.0004 | 0.0004 | 0.0004 | | |
| | 10 kHz | 0.0004 | 0.0005 | 0.0007 | | |
| | 100 kHz | 0.0005 | 0.0007 | - | | |
| Insulation Resistance | Measured at +20°C, according to IEC 60384-13 | | | | | |
| | Between Terminals: | | | | | |
| | $\geq 100,000 \text{ M}\Omega$ | | | | | |

Resonance Frequencies



Environmental Test Data

| Test | IEC Publication | Procedure | Requirements |
|------------------------------|-------------------------|--|--|
| Voltage Proof | 60384-1 Clause 4.6 | $1.6 \times V_R$ after 60 seconds | The capacitors must withstand the voltage without breakdowns or flashovers and without decreased insulation resistance below the value in each detail specification. No visible damage |
| | Clause 4.6 2.3 | $2 \times V_R$ (minimum 400 VDC to case) after 60 seconds | As above |
| Vibration | 60068-2-6 Test Fc | 6 hours with 10 – 500 Hz and 0.75 mm amplitude or 98 m/s ² depending on frequency | No visible damage $\tan\delta \leq 1.2 \times$ stated value at 100 kHz $\Delta C/C \leq \pm 0.5\%$ |
| Bump | 60068-2-29 Test Eb | 4,000 bumps with 390 m/s ² mounted on PCB | $\Delta C/C \leq \pm 0.5\%$ $\tan\delta \leq 1.2 \times$ stated value at 100 kHz Insulation resistance: $\geq 100,000 \text{ M}\Omega$ for $C_R \leq 0.33 \mu\text{F}$ $\geq 30,000 \text{ M}\Omega, \mu\text{F}$ for $C_R > 0.33 \mu\text{F}$ |
| Resistance to Soldering Heat | 60068-2-20 Method 1A | Solder bath at + 260°C $\pm 5^\circ\text{C}$ with screening | Immersion of the terminations into the solder bath shall be completed in a time not exceeding 1 second and the terminations shall remain immersed to the specified depth for 10 + 1 second and then be withdrawn. $\Delta C/C \leq \pm 1.0\%$ $\tan\delta$ increase < 0.001 No visible damage |
| Climatic Sequence | 60384-1 Paragraph 4:21 | 60068-2.2 dry heat 16 hours 60068-2-34 damp heat, one cycle 60068-2-1 Test Aa 2 hours | Insulation resistance: $\geq 100,000 \text{ M}\Omega$ for $C_R \leq 0.33 \mu\text{F}$ $\geq 30,000 \text{ M}\Omega, \mu\text{F}$ for $C_R > 0.33 \mu\text{F}$ $\Delta C/C \leq \pm 0.5\%$ $\tan\delta \leq 1.2 \times$ stated value at 100 kHz |
| Damp Heat Steady State | 60068-2-3 Test Ca | +40°C and 90 – 95% RH | 56 days no visible damage Insulation resistance: $\geq 50,000 \text{ M}\Omega$ for $C_R \leq 0.33 \mu\text{F}$ $\geq 15,000 \text{ M}\Omega, \mu\text{F}$ for $C_R > 0.33 \mu\text{F}$ $\Delta C/C \leq \pm 1\%$ $\tan\delta \leq 1.2 \times$ stated value at 100 kHz |
| Endurance, AC | | 1,000 hours at +85°C and $1.25 \times V_R$ AC | No visible damage $\Delta C/C \leq \pm 3\%$ $\tan\delta \leq 1.5 \times$ stated value at 100 kHz Insulation resistance: $\geq 100,000 \text{ M}\Omega$ for $C_R \leq 0.33 \mu\text{F}$ $\geq 30,000 \text{ M}\Omega, \mu\text{F}$ for $C_R > 0.33 \mu\text{F}$ |
| Charge and Discharge | 60384-17 Paragraph 4.13 | 10,000 pulses and with (2 x) dV/dt according to detail specification | $\tan\delta$ (100 kHz) $\leq 2 \times$ stated value (100 kHz) $\Delta C/C \leq \pm 0.5\%$ Insulation resistance: $\geq 50,000 \text{ M}\Omega$ for $C_R \leq 0.33 \mu\text{F}$ $\geq 15,000 \text{ M}\Omega \cdot \mu\text{F}$ for $C_R > 0.33 \mu\text{F}$ |

Environmental Compliance

All KEMET pulse capacitors are RoHS Compliant.



Table 1 – Ratings & Part Number Reference

| VDC | VAC | Cap Value (µF) | Maximum Dimensions in mm | | | Lead Spacing (S) | dV/dt (V/µs) | Size Code (New/Legacy) | KEMET Part Number | Legacy Part Number |
|-----|-----|----------------|--------------------------|--------|--------|------------------|--------------|------------------------|--------------------|---------------------|
| | | | T | H | L | | | | | |
| 63 | 40 | 0.00010 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH101(3)063(2) | PFR5101(1)63J11(2) |
| 63 | 40 | 0.00015 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH151(3)063(2) | PFR5151(1)63J11(2) |
| 63 | 40 | 0.00022 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH221(3)063(2) | PFR5221(1)63J11(2) |
| 63 | 40 | 0.00033 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH331(3)063(2) | PFR5331(1)63J11(2) |
| 63 | 40 | 0.00047 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH471(3)063(2) | PFR5471(1)63J11(2) |
| 63 | 40 | 0.00068 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH681(3)063(2) | PFR5681(1)63J11(2) |
| 63 | 40 | 0.0010 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH102(3)063(2) | PFR5102(1)63J11(2) |
| 63 | 40 | 0.0015 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH152(3)063(2) | PFR5152(1)63J11(2) |
| 63 | 40 | 0.0022 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH222(3)063(2) | PFR5222(1)63J11(2) |
| 63 | 40 | 0.0033 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH332(3)063(2) | PFR5332(1)63J11(2) |
| 63 | 40 | 0.0047 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH472(3)063(2) | PFR5472(1)63J11(2) |
| 63 | 40 | 0.0068 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH682(3)063(2) | PFR5682(1)63J11(2) |
| 63 | 40 | 0.010 | 5.5 | 7.0 | 7.2 | 5 | 1,000 | JK/J12 | F411JK103(3)063(2) | PFR5103(1)63J12(2) |
| 63 | 40 | 0.015 | 6.5 | 8.0 | 7.2 | 5 | 1,000 | JR/J13 | F411JR153(3)063(2) | PFR5153(1)63J13(2) |
| 63 | 40 | 0.020 | 6.5 | 8.0 | 7.2 | 5 | 1,000 | JR/J13 | F411JR203(3)063(2) | PFR5203(1)63J13(2) |
| 63 | 40 | 0.022 | 6.5 | 8.0 | 7.2 | 5 | 1,000 | JR/J13 | F411JR223(3)063(2) | PFR5223(1)63J13(2) |
| 100 | 63 | 0.00010 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH101(3)100(2) | PFR5101(1)100J11(2) |
| 100 | 63 | 0.00015 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH151(3)100(2) | PFR5151(1)100J11(2) |
| 100 | 63 | 0.00022 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH221(3)100(2) | PFR5221(1)100J11(2) |
| 100 | 63 | 0.00033 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH331(3)100(2) | PFR5331(1)100J11(2) |
| 100 | 63 | 0.00047 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH471(3)100(2) | PFR5471(1)100J11(2) |
| 100 | 63 | 0.00068 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH681(3)100(2) | PFR5681(1)100J11(2) |
| 100 | 63 | 0.0010 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH102(3)100(2) | PFR5102(1)100J11(2) |
| 100 | 63 | 0.0015 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH152(3)100(2) | PFR5152(1)100J11(2) |
| 100 | 63 | 0.0022 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH222(3)100(2) | PFR5222(1)100J11(2) |
| 100 | 63 | 0.0033 | 5.5 | 7.0 | 7.2 | 5 | 1,000 | JK/J12 | F411JK332(3)100(2) | PFR5332(1)100J12(2) |
| 100 | 63 | 0.0047 | 5.5 | 7.0 | 7.2 | 5 | 1,000 | JK/J12 | F411JK472(3)100(2) | PFR5472(1)100J12(2) |
| 100 | 63 | 0.0068 | 6.5 | 8.0 | 7.2 | 5 | 1,000 | JR/J13 | F411JR682(3)100(2) | PFR5682(1)100J13(2) |
| 100 | 63 | 0.010 | 6.5 | 8.0 | 7.2 | 5 | 1,000 | JR/J13 | F411JR103(3)100(2) | PFR5103(1)100J13(2) |
| 250 | 160 | 0.00010 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH101(3)250(2) | PFR5101(1)250J11(2) |
| 250 | 160 | 0.00015 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH151(3)250(2) | PFR5151(1)250J11(2) |
| 250 | 160 | 0.00022 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH221(3)250(2) | PFR5221(1)250J11(2) |
| 250 | 160 | 0.00033 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH331(3)250(2) | PFR5331(1)250J11(2) |
| 250 | 160 | 0.00047 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH471(3)250(2) | PFR5471(1)250J11(2) |
| 250 | 160 | 0.00068 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH681(3)250(2) | PFR5681(1)250J11(2) |
| VDC | VAC | Cap Value (µF) | T (mm) | H (mm) | L (mm) | Lead Spacing (S) | dV/dt (V/µs) | Size Code (New/Legacy) | KEMET Part Number | Legacy Part Number |

- (1) F = ±1%, G = ±2%, H = ±2.5%, J = ±5%, K = ±10% for Legacy Part Number.
 (2) Insert lead and packaging code. See table for available options.
 (3) F = ±1%, G = ±2%, R = ±2.5%, J = ±5%, K = ±10% for New Kemet Part Number.

Table 1 – Ratings & Part Number Reference cont.

| VDC | VAC | Cap Value (µF) | Maximum Dimensions in mm | | | Lead Spacing (S) | dV/dt (V/µs) | Size Code (New/Legacy) | KEMET Part Number | Legacy Part Number |
|------|-----|----------------|--------------------------|--------|--------|------------------|--------------|------------------------|--------------------|----------------------|
| | | | T | H | L | | | | | |
| 250 | 160 | 0.0010 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH102(3)250(2) | PFR5102(1)250J11(2) |
| 250 | 160 | 0.0015 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH152(3)250(2) | PFR5152(1)250J11(2) |
| 250 | 160 | 0.0022 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH222(3)250(2) | PFR5222(1)250J11(2) |
| 250 | 160 | 0.0033 | 5.5 | 7.0 | 7.2 | 5 | 1,000 | JK/J12 | F411JK332(3)250(2) | PFR5332(1)250J12(2) |
| 250 | 160 | 0.0047 | 6.5 | 8.0 | 7.2 | 5 | 1,000 | JR/J13 | F411JR472(3)250(2) | PFR5472(1)250J13(2) |
| 250 | 160 | 0.0068 | 6.5 | 8.0 | 7.2 | 5 | 1,000 | JR/J13 | F411JR682(3)250(2) | PFR5682(1)250J13(2) |
| 400 | 220 | 0.00010 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH101(3)400(2) | PFR5101(1)400J11(2) |
| 400 | 220 | 0.00015 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH151(3)400(2) | PFR5151(1)400J11(2) |
| 400 | 220 | 0.00022 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH221(3)400(2) | PFR5221(1)400J11(2) |
| 400 | 220 | 0.00033 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH331(3)400(2) | PFR5331(1)400J11(2) |
| 400 | 220 | 0.00047 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH471(3)400(2) | PFR5471(1)400J11(2) |
| 400 | 220 | 0.00068 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH681(3)400(2) | PFR5681(1)400J11(2) |
| 400 | 220 | 0.0010 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH102(3)400(2) | PFR5102(1)400J11(2) |
| 400 | 220 | 0.0015 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH152(3)400(2) | PFR5152(1)400J11(2) |
| 400 | 220 | 0.0022 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH222(3)400(2) | PFR5222(1)400J11(2) |
| 400 | 220 | 0.0033 | 5.5 | 7.0 | 7.2 | 5 | 1,000 | JK/J12 | F411JK332(3)400(2) | PFR5332(1)400J12(2) |
| 400 | 220 | 0.0047 | 6.5 | 8.0 | 7.2 | 5 | 1,000 | JR/J13 | F411JR472(3)400(2) | PFR5472(1)400J13(2) |
| 400 | 220 | 0.0068 | 6.5 | 8.0 | 7.2 | 5 | 1,000 | JR/J13 | F411JR682(3)400(2) | PFR5682(1)400J13(2) |
| 630 | 250 | 0.00010 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH101(3)630(2) | PFR5101(1)630J11(2) |
| 630 | 250 | 0.00015 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH151(3)630(2) | PFR5151(1)630J11(2) |
| 630 | 250 | 0.00022 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH221(3)630(2) | PFR5221(1)630J11(2) |
| 630 | 250 | 0.00033 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH331(3)630(2) | PFR5331(1)630J11(2) |
| 630 | 250 | 0.00047 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH471(3)630(2) | PFR5471(1)630J11(2) |
| 630 | 250 | 0.00068 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH681(3)630(2) | PFR5681(1)630J11(2) |
| 630 | 250 | 0.0010 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH102(3)630(2) | PFR5102(1)630J11(2) |
| 630 | 250 | 0.0015 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH152(3)630(2) | PFR5152(1)630J11(2) |
| 630 | 250 | 0.0022 | 5.5 | 7.0 | 7.2 | 5 | 1,000 | JK/J12 | F411JK222(3)630(2) | PFR5222(1)630J12(2) |
| 630 | 250 | 0.0033 | 6.5 | 8.0 | 7.2 | 5 | 1,000 | JR/J13 | F411JR332(3)630(2) | PFR5332(1)630J13(2) |
| 630 | 250 | 0.0047 | 6.5 | 8.0 | 7.2 | 5 | 1,000 | JR/J13 | F411JR472(3)630(2) | PFR5472(1)630J13(2) |
| 1000 | 250 | 0.00010 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH101(3)1K0(2) | PFR5101(1)1000J11(2) |
| 1000 | 250 | 0.00015 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH151(3)1K0(2) | PFR5151(1)1000J11(2) |
| 1000 | 250 | 0.00022 | 4.5 | 6.0 | 7.2 | 5 | 1,000 | JH/J11 | F411JH221(3)1K0(2) | PFR5221(1)1000J11(2) |
| 1000 | 250 | 0.00033 | 5.5 | 7.0 | 7.2 | 5 | 1,000 | JK/J12 | F411JK331(3)1K0(2) | PFR5331(1)1000J12(2) |
| 1000 | 250 | 0.00047 | 5.5 | 7.0 | 7.2 | 5 | 1,000 | JK/J12 | F411JK471(3)1K0(2) | PFR5471(1)1000J12(2) |
| 1000 | 250 | 0.00068 | 5.5 | 7.0 | 7.2 | 5 | 1,000 | JK/J12 | F411JK681(3)1K0(2) | PFR5681(1)1000J12(2) |
| 1000 | 250 | 0.0010 | 6.5 | 8.0 | 7.2 | 5 | 1,000 | JR/J13 | F411JR102(3)1K0(2) | PFR5102(1)1000J13(2) |
| VDC | VAC | Cap Value (µF) | T (mm) | H (mm) | L (mm) | Lead Spacing (S) | dV/dt (V/µs) | Size Code (New/Legacy) | KEMET Part Number | Legacy Part Number |

- (1) F = ±1%, G = ±2%, H = ±2.5%, J = ±5%, K = ±10% for Legacy Part Number.
(2) Insert lead and packaging code. See table for available options.
(3) F = ±1%, G = ±2%, R = ±2.5%, J = ±5%, K = ±10% for New Kemet Part Number.

Soldering Process

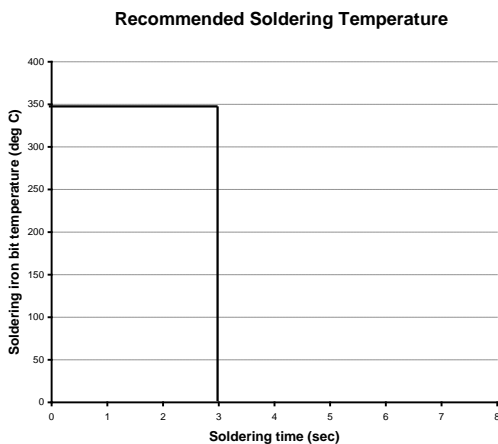
The implementation of the RoHS directive has resulted in the selection of SnAgCu (SAC) alloys or SnCu alloys as primary solder. This has increased the liquidus temperature from that of 183°C for SnPb eutectic alloy to 217 – 221°C for the new alloys. As a result, the heat stress to the components, even 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 mm to 15 mm), and great care has to be taken during soldering. The recommended solder profiles from KEMET should be used. Please consult 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. Please see Figure 1.

Reflow soldering is not recommended for through-hole film capacitors. Exposing capacitors to a soldering profile in excess of the above the recommended limits may result to 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 the curing of surface mount parts. Consult 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. Please allow time for the capacitor surface temperature to return to a normal temperature before the second soldering cycle.

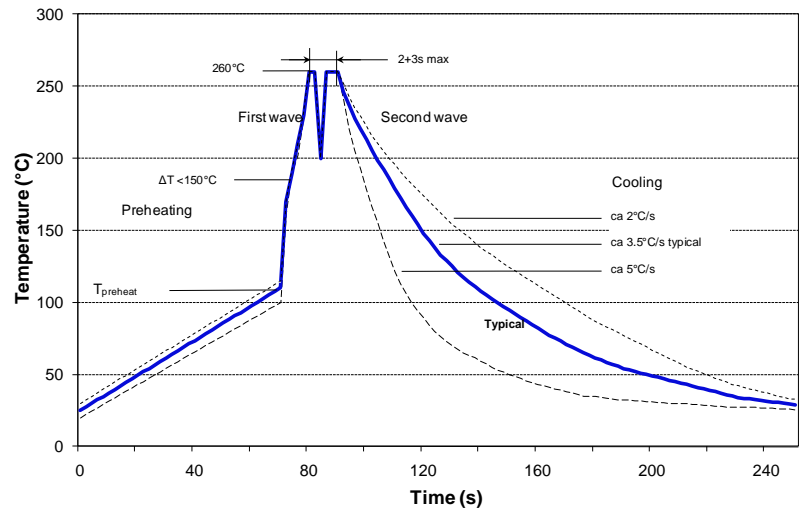
Manual Soldering Recommendations

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.

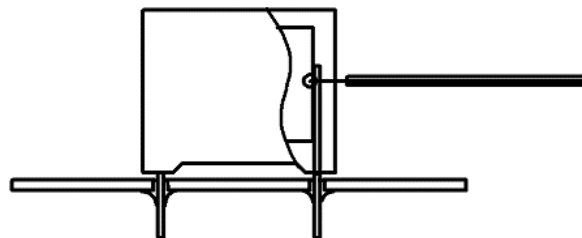
1. The table indicates the maximum set-up temperature of the soldering process
Figure 1

| Dielectric Film Material | Maximum Preheat Temperature | | | Maximum Peak Soldering Temperature | |
|--------------------------|-----------------------------|-------------------------|-------------------------|------------------------------------|-------------------------|
| | Capacitor Pitch ≤ 10 mm | Capacitor Pitch = 15 mm | Capacitor Pitch > 15 mm | Capacitor Pitch ≤ 15 mm | Capacitor Pitch > 15 mm |
| Polyester | 130°C | 130°C | 130°C | 270°C | 270°C |
| Polypropylene | 100°C | 110°C | 130°C | 260°C | 270°C |
| Paper | 130°C | 130°C | 140°C | 270°C | 270°C |
| Polyphenylene Sulphide | 150°C | 150°C | 160°C | 270°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 |
|--------------------------|---|
| Polyester | 160°C |
| Polypropylene | 110°C |
| Paper | 160°C |
| Polyphenylene Sulphide | 160°C |



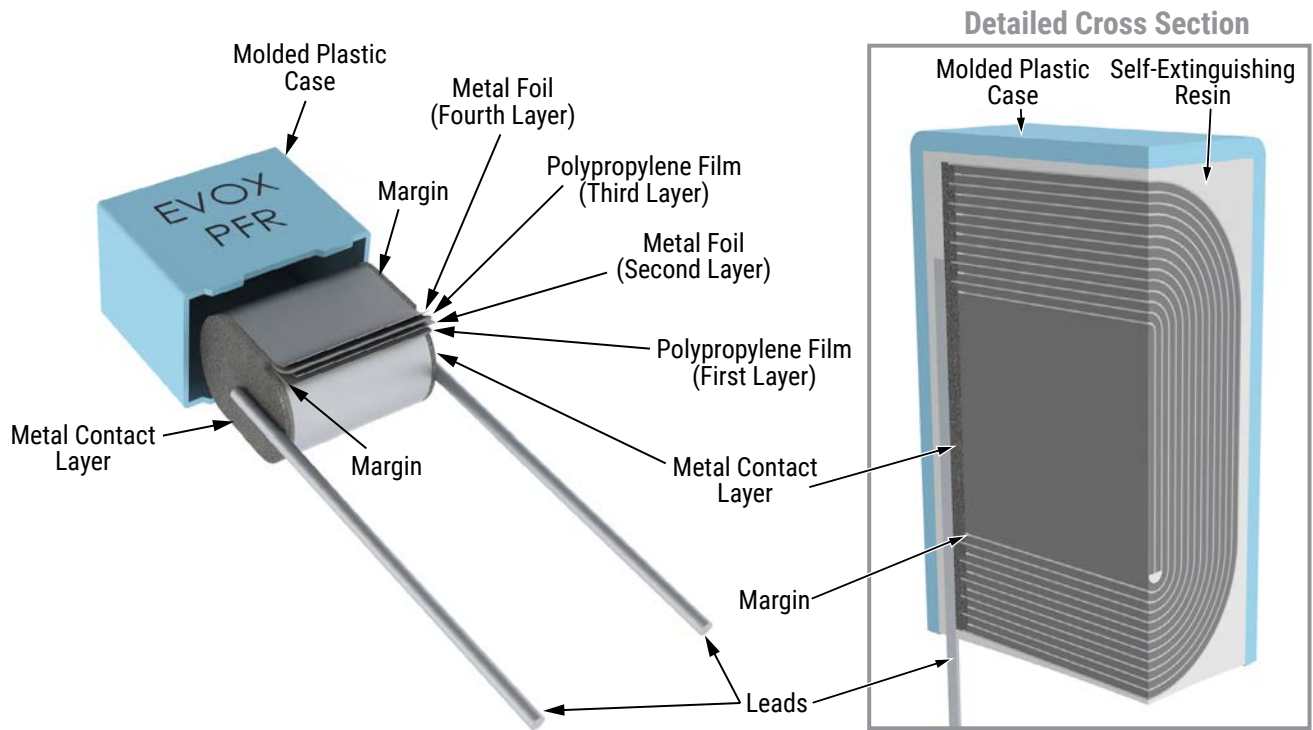
Temperature monitored inside the capacitor.

Selective Soldering Recommendations

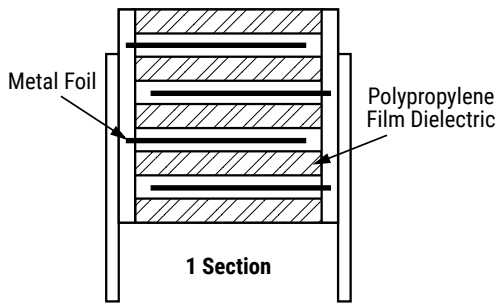
Selective dip soldering is a variation of reflow soldering. In this method, the printed circuit board with through-hole components to be soldered is preheated and transported over the solder bath as in normal flow soldering without touching the solder. When the board is over the bath, it is stopped and 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 bath with a time from 3 to 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 are not overheated.

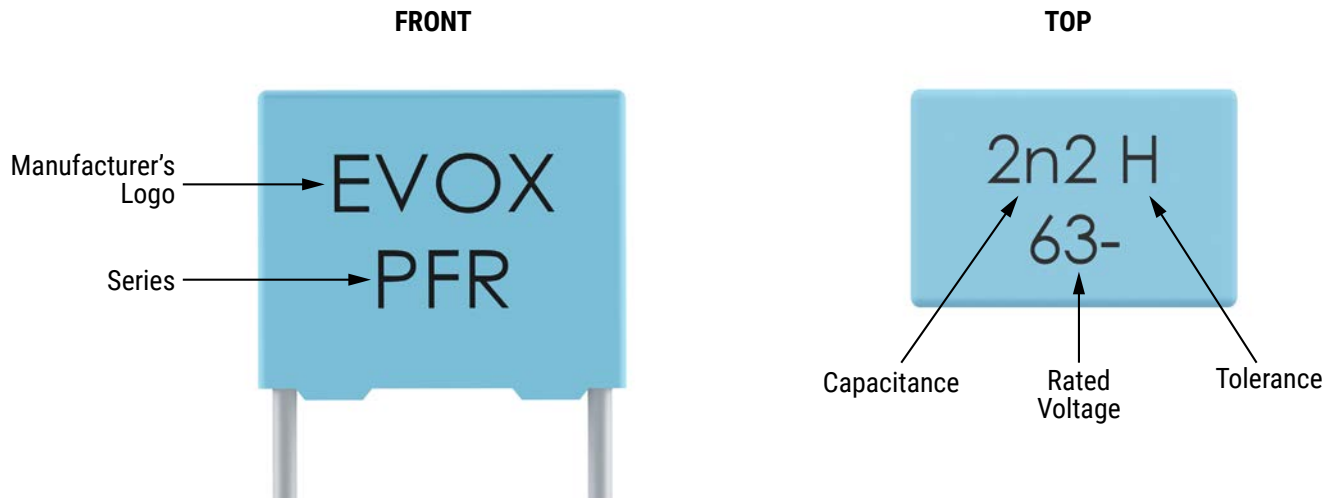
Construction



Winding Scheme



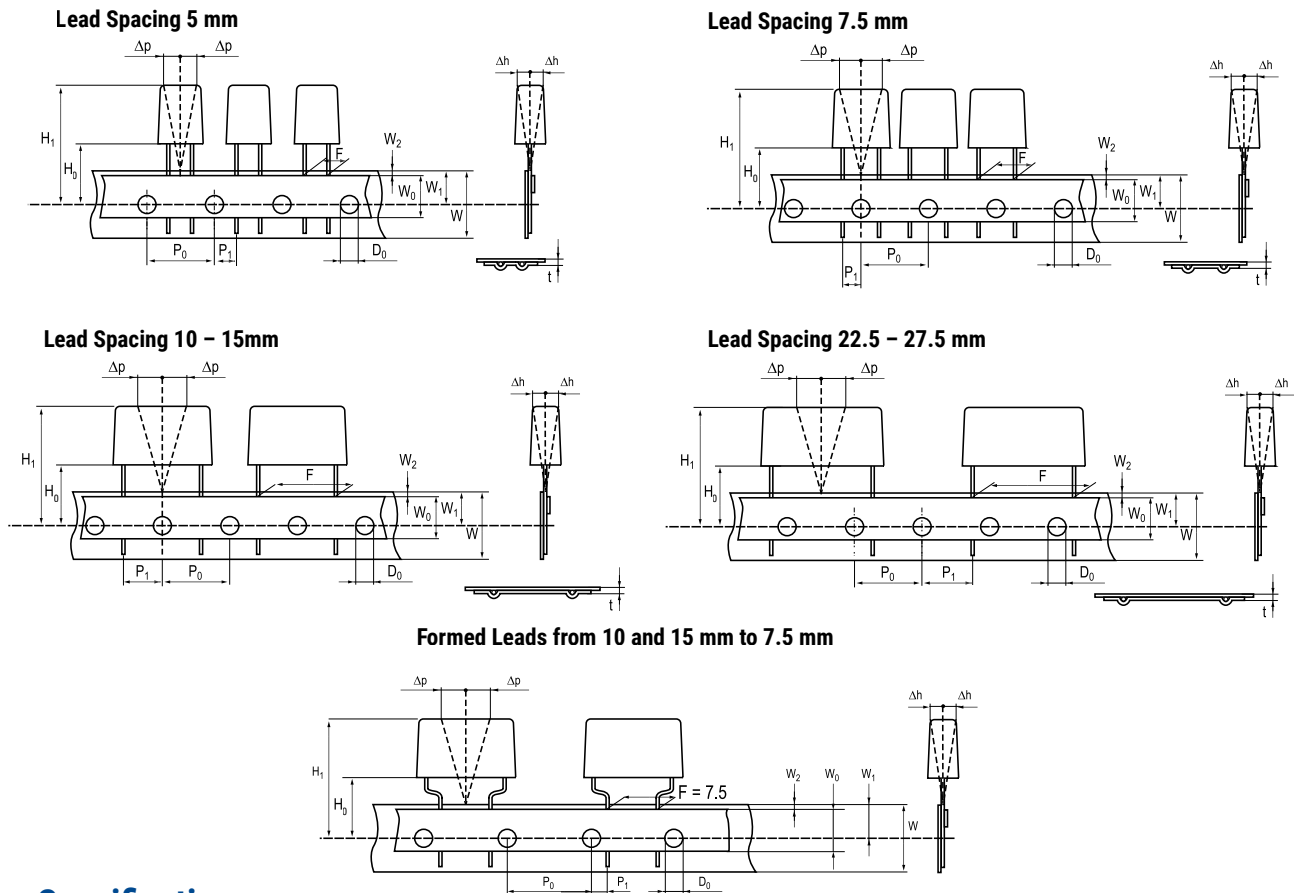
Marking



Packaging Quantities

| KEMET Size Code | Legacy Size Code | Lead Spacing | Thickness (mm) | Height (mm) | Length (mm) | Bulk Short Leads | Bulk Long Leads | Standard Reel ø 360 mm | Large Reel ø 500 mm | Ammo |
|-----------------|------------------|--------------|----------------|-------------|-------------|------------------|-----------------|---------------------------|------------------------|-------|
| JF | J01 | 5 | 2.5 | 6.5 | 7.2 | 2,000 | 2,000 | 2,500 | 5,000 | 3,000 |
| JJ | J02 | | 3.5 | 8 | 7.2 | 2,000 | 2,000 | 2,000 | 4,000 | 2,000 |
| JL | J03 | | 4.5 | 9 | 7.2 | 1,000 | 1,000 | 1,500 | 3,000 | 1,700 |
| JQ | J04 | | 5 | 10 | 7.2 | 1,000 | 1,000 | 1,300 | 2,600 | 1,500 |
| JT | J05 | | 6 | 11 | 7.2 | 1,000 | 1,000 | 1,000 | 2,000 | 1,200 |
| JU | J06 | | 7.2 | 13 | 7.2 | 1,000 | 1,000 | 800 | 1,600 | - |
| JH | J11 | | 4.5 | 6 | 7.2 | 1,000 | 1,000 | 1,500 | 3,000 | 1,700 |
| JK | J12 | | 5.5 | 7 | 7.2 | 1,000 | 1,000 | 1,200 | 2,400 | 1,300 |
| JR | J13 | | 6.5 | 8 | 7.2 | 1,000 | 1,000 | 900 | 1,800 | 1,100 |

Lead Taping & Packaging (IEC 60286-2)



Taping Specification

| Dimensions in mm | | | | | | | | | | Standard IEC 60286-2 |
|-------------------------------|-----------|------------|----------|----------|------------|----------|----------|-------------|-------------|----------------------|
| Lead Spacing | +0.6/-0.1 | F | 5 | 7.5 | Formed 7.5 | 10 | 15 | 22.5 | 27.5 | F |
| Carrier Tape Width | ±0.5 | W | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18±1/-0.5 |
| Hold-down Tape Width | Minimum | W_0 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | |
| Position of Sprocket Hole | ±0.5 | W_1 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9±0.75/-0.5 |
| Distance Between Tapes | Maximum | W_2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Sprocket Hole Diameter | ±0.2 | D_0 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Feed Hole Lead Spacing | ±0.3 | P_0 (1) | 12.7 | 12.7 | 12.7 (4) | 12.7 | 12.7 | 12.7 | 12.7 | 12.7 |
| Distance Lead - Feed Hole | ±0.7 | P_1 | 3.85 | 3.75 | 3.75 | 7.7 | 5.2 | 5.3 | 5.3 | P1 |
| Deviation Tape - Plane | Maximum | Δp | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 |
| Lateral Deviation | Maximum | Δh | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Total Thickness | ±0.2 | t | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.9 Maximum | 0.9 Maximum | 0.9 Maximum |
| Sprocket Hole/Cap Body | Nominal | H_0 (2) | 18.5±0.5 | 18.5±0.5 | 18.5±0.5 | 18.5±0.5 | 18.5±0.5 | 18.5±0.5 | 18.5±0.5 | 18.0±2/-0 |
| Sprocket Hole/Top of Cap Body | Maximum | H_1 (3) | 32 | 31 | 43 | 43 | 43 | 58 | 58 | 58 Maximum |

(1) Maximum cumulative feed hole error, 1 mm per 20 parts

(2) 16.5 mm available on request

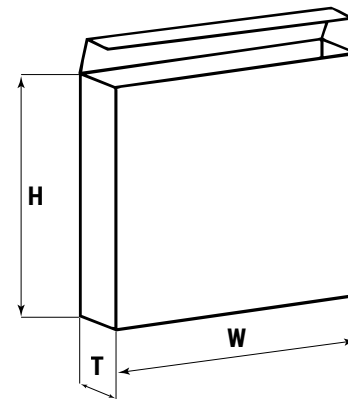
(3) Depending on case size

(4) 15 mm available on request

Lead Taping & Packaging (IEC 60286-2) cont.

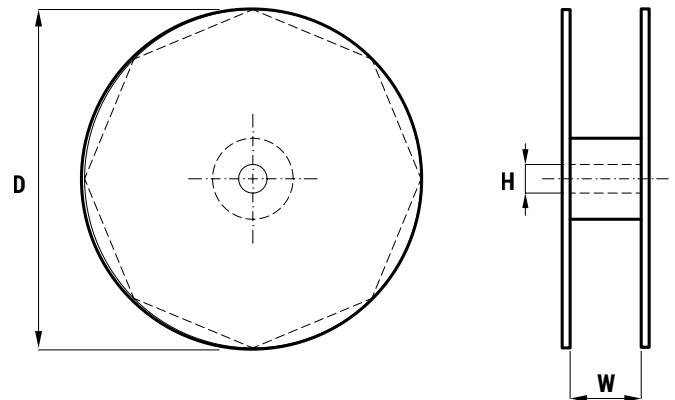
Ammo Specifications

| Series | Dimensions (mm) | | |
|--------------------------------------|-----------------|-----|----|
| | H | W | T |
| R4x, R4x+R, R7x, RSB | 360 | 340 | 59 |
| F5A, F5B, F5D | | | |
| F6xx, F8xx | | | |
| PHExxx, PMExxx, PMRxxx, SMR & PFR | 330 | 330 | 50 |



Reel Specifications

| Series | Dimensions (mm) | | |
|--------------------------------------|-----------------|----|----------|
| | D | H | W |
| R4x, R4x+R, R7x, RSB | 355 500 | 30 | 55 (Max) |
| F5A, F5B, F5D | | 25 | |
| F6xx, F8xx | | | |
| PHExxx, PMExxx, PMRxxx, SMR & PFR | 360 500 | 30 | 46 (Max) |



Manufacturing Date Code (IEC-60062)

| Y = Year, Z = Month | | | |
|---------------------|------|-----------|------|
| Year | Code | Month | Code |
| 2010 | A | January | 1 |
| 2011 | B | February | 2 |
| 2012 | C | March | 3 |
| 2013 | D | April | 4 |
| 2014 | E | May | 5 |
| 2015 | F | June | 6 |
| 2016 | H | July | 7 |
| 2017 | J | August | 8 |
| 2018 | K | September | 9 |
| 2019 | L | October | 0 |
| 2020 | M | November | N |
| 2021 | N | December | D |
| 2022 | P | | |
| 2023 | R | | |
| 2024 | S | | |
| 2025 | T | | |
| 2026 | U | | |
| 2027 | V | | |
| 2028 | W | | |
| 2029 | X | | |
| 2030 | A | | |

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