

# EHBSA

## Conductive polymer hybrid aluminum electrolytic surface mount capacitor



Photo is representative

### Product features

- AEC-Q200
- High ripple current
- Low ESR and low leakage current
- Endurance with ripple current: 4,000 hours at +125 °C
- Wide variety of voltage options
- Surface mount package with multiple size options
- Moisture sensitivity level (MSL): 1

### Applications

- LED headlights
- On-board charger (OBC)
- Battery management systems (BMS)
- ADAS
- 48 V systems
- Engine control unit (ECU)
- Electronic power system (EPS)

### Environmental compliance and general specifications

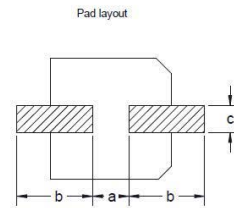
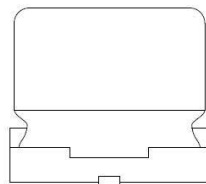
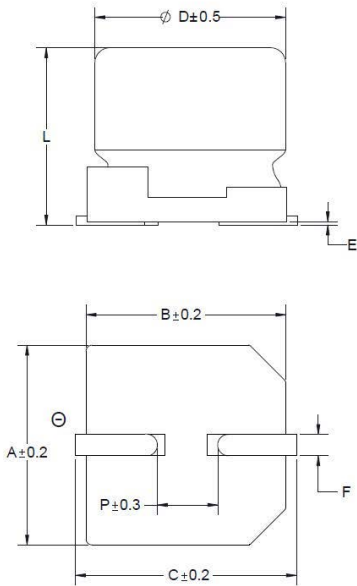
- Storage temperature range (component): -55 °C to +125 °C
- Operating temperature range: -55 °C to +125 °C



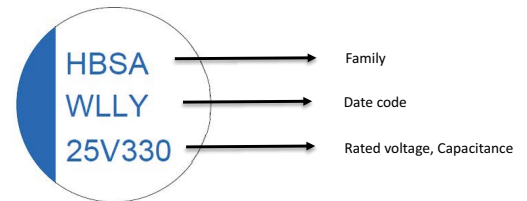
### Part number system

| EHB    | S       | A              | 035                                                                  | M         | 331                                                                                         | 0606                     | T                                   |
|--------|---------|----------------|----------------------------------------------------------------------|-----------|---------------------------------------------------------------------------------------------|--------------------------|-------------------------------------|
| Family | Type    | Grade          | Voltage (V)                                                          | Tolerance | Capacitance (μF)                                                                            | Size code                | Package code                        |
| EHB    | S = SMD | A = automotive | 016 = 16<br>025 = 25<br>035 = 35<br>050 = 50<br>063 = 63<br>080 = 80 | M = ±20%  | First two digits= capacitance value, third digit = number of zeros<br>example: 331 = 330 μF | Refer to size code table | T= Tape and reel, 15" diameter reel |

### Dimensions-mm



### Part marking



### Size code table

| Size code | Dimension - mm |      |             |      |      |     |            |             |     | Pad layout - mm |       |       |
|-----------|----------------|------|-------------|------|------|-----|------------|-------------|-----|-----------------|-------|-------|
|           | Diameter       | L    | L tolerance | A    | B    | C   | F          | E           | P   | a ref           | b ref | c ref |
| 0606      | 6.3            | 5.8  | ±0.2        | 6.6  | 6.6  | 7.3 | 0.5 to 0.8 | 0.3 maximum | 2.1 | 2.1             | 3.5   | 1.6   |
| 0608      | 6.3            | 7.5  | ±0.5        | 6.6  | 6.6  | 7.3 | 0.5 to 0.8 | 0.3 maximum | 2.1 | 2.1             | 3.5   | 1.6   |
| 0810      | 8.0            | 9.7  | ±0.3        | 8.3  | 8.3  | 9.0 | 0.8 to 1.1 | 0.3 maximum | 2.9 | 2.8             | 4.2   | 1.9   |
| 1010      | 10             | 10.2 | ±0.3        | 10.3 | 10.3 | 11  | 0.8 to 1.1 | 0.3 maximum | 4.6 | 4.3             | 4.4   | 1.9   |
| 1012      | 10             | 12.3 | ±0.2        | 10.3 | 10.3 | 11  | 0.8 to 1.1 | 0.3 maximum | 4.6 | 4.3             | 4.4   | 1.9   |
| 1016      | 10             | 16.5 | ±0.3        | 10.3 | 10.3 | 11  | 0.8 to 1.1 | 0.3 maximum | 4.6 | 4.3             | 4.4   | 1.9   |

All soldering surfaces to be coplanar within 0.1 millimeters

## Rating and part number

| Rated voltage (Vdc) | Surge voltage (Vdc) | Capacitance <sup>1</sup> @ 120 Hz (μF) | Leakage current <sup>1</sup> (μA) | Dissipation factor <sup>1</sup> (tanδ) @ 120 Hz | ESR <sup>1</sup> @ 100 kHz (mΩ) | Ripple current @ 100 kHz, +125 °C (A) | Size code | Part number       |
|---------------------|---------------------|----------------------------------------|-----------------------------------|-------------------------------------------------|---------------------------------|---------------------------------------|-----------|-------------------|
| 16                  | 20                  | 820                                    | 131.2                             | 0.16                                            | 18                              | 2.8                                   | 1010      | EHBSA016M8211010T |
|                     |                     | 47                                     | 11.8                              | 0.14                                            | 50                              | 0.9                                   | 0606      | EHBSA025M4700606T |
|                     |                     | 56                                     | 14                                | 0.14                                            | 50                              | 0.9                                   | 0606      | EHBSA025M5600606T |
|                     |                     | 68                                     | 17                                | 0.14                                            | 50                              | 1.1                                   | 0606      | EHBSA025M6800606T |
|                     |                     | 100                                    | 25                                | 0.14                                            | 50                              | 1.3                                   | 0606      | EHBSA025M1010606T |
|                     |                     | 100                                    | 25                                | 0.14                                            | 30                              | 1.4                                   | 0608      | EHBSA025M1010608T |
|                     |                     | 150                                    | 37.5                              | 0.14                                            | 30                              | 1.8                                   | 0608      | EHBSA025M1510608T |
|                     |                     | 180                                    | 45                                | 0.14                                            | 30                              | 1.8                                   | 0608      | EHBSA025M1810608T |
|                     |                     | 220                                    | 55                                | 0.14                                            | 27                              | 2.9                                   | 0810      | EHBSA025M2210810T |
|                     |                     | 270                                    | 67.5                              | 0.14                                            | 27                              | 2.9                                   | 0810      | EHBSA025M2710810T |
|                     |                     | 330                                    | 82.5                              | 0.14                                            | 20                              | 3.5                                   | 1010      | EHBSA025M3311010T |
|                     |                     | 470                                    | 117.5                             | 0.14                                            | 20                              | 3.5                                   | 1010      | EHBSA025M4711010T |
|                     |                     | 470                                    | 117.5                             | 0.14                                            | 14                              | 3.5                                   | 1012      | EHBSA025M4711012T |
|                     |                     | 27                                     | 9.5                               | 0.12                                            | 60                              | 0.9                                   | 0606      | EHBSA035M2700606T |
| 25                  | 31.3                | 47                                     | 16.5                              | 0.12                                            | 60                              | 0.9                                   | 0606      | EHBSA035M4700606T |
|                     |                     | 47                                     | 16.5                              | 0.12                                            | 35                              | 1.4                                   | 0608      | EHBSA035M4700608T |
|                     |                     | 68                                     | 23.8                              | 0.12                                            | 35                              | 1.4                                   | 0608      | EHBSA035M6800608T |
|                     |                     | 100                                    | 35                                | 0.12                                            | 35                              | 1.7                                   | 0608      | EHBSA035M1010608T |
|                     |                     | 100                                    | 35                                | 0.12                                            | 27                              | 1.9                                   | 0810      | EHBSA035M1010810T |
|                     |                     | 120                                    | 42                                | 0.12                                            | 35                              | 1.7                                   | 0608      | EHBSA035M1210608T |
|                     |                     | 150                                    | 52.5                              | 0.12                                            | 27                              | 2.9                                   | 0810      | EHBSA035M1510810T |
|                     |                     | 180                                    | 63                                | 0.12                                            | 27                              | 2.9                                   | 0810      | EHBSA035M1810810T |
|                     |                     | 220                                    | 77                                | 0.12                                            | 20                              | 2.8                                   | 1010      | EHBSA035M2211010T |
|                     |                     | 270                                    | 94.5                              | 0.12                                            | 20                              | 3.5                                   | 1010      | EHBSA035M2711010T |
|                     |                     | 330                                    | 115.5                             | 0.12                                            | 20                              | 3.5                                   | 1010      | EHBSA035M3311010T |
|                     |                     | 330                                    | 115.5                             | 0.12                                            | 14                              | 3.5                                   | 1012      | EHBSA035M3311012T |
|                     |                     | 390                                    | 136.5                             | 0.12                                            | 20                              | 3.5                                   | 1010      | EHBSA035M3911010T |
|                     |                     | 470                                    | 164.5                             | 0.12                                            | 14                              | 3.5                                   | 1012      | EHBSA035M4711012T |
| 35                  | 43.8                | 470                                    | 164.5                             | 0.12                                            | 11                              | 4.0                                   | 1016      | EHBSA035M4711016T |
|                     |                     | 22                                     | 11                                | 0.1                                             | 80                              | 0.75                                  | 0606      | EHBSA050M2200606T |
|                     |                     | 33                                     | 16.5                              | 0.1                                             | 40                              | 1.1                                   | 0608      | EHBSA050M3300608T |
|                     |                     | 47                                     | 23.5                              | 0.1                                             | 30                              | 1.25                                  | 0810      | EHBSA050M4700810T |
|                     |                     | 68                                     | 34                                | 0.1                                             | 30                              | 2.7                                   | 0810      | EHBSA050M6800810T |
|                     |                     | 100                                    | 50                                | 0.1                                             | 23                              | 2.9                                   | 1010      | EHBSA050M1011010T |
|                     |                     | 120                                    | 60                                | 0.1                                             | 25                              | 2.9                                   | 1010      | EHBSA050M1211010T |
|                     |                     | 150                                    | 75                                | 0.1                                             | 17                              | 2.0                                   | 1012      | EHBSA050M1511012T |
|                     |                     | 180                                    | 90                                | 0.1                                             | 17                              | 3.2                                   | 1012      | EHBSA050M1811012T |
|                     |                     | 220                                    | 110                               | 0.1                                             | 13                              | 3.7                                   | 1016      | EHBSA050M2211016T |
| 50                  | 62.5                |                                        |                                   |                                                 |                                 |                                       |           |                   |
|                     |                     |                                        |                                   |                                                 |                                 |                                       |           |                   |
|                     |                     |                                        |                                   |                                                 |                                 |                                       |           |                   |
|                     |                     |                                        |                                   |                                                 |                                 |                                       |           |                   |
|                     |                     |                                        |                                   |                                                 |                                 |                                       |           |                   |
|                     |                     |                                        |                                   |                                                 |                                 |                                       |           |                   |
|                     |                     |                                        |                                   |                                                 |                                 |                                       |           |                   |
|                     |                     |                                        |                                   |                                                 |                                 |                                       |           |                   |

1. +20 °C ±2 °C.

## Rating and part number

| Rated voltage (Vdc) | Surge voltage (Vdc) | Capacitance <sup>1</sup> @ 120 Hz (μF) | Leakage current <sup>1</sup> (μA) | Dissipation factor <sup>1</sup> (tanδ) @ 120 Hz | ESR <sup>1</sup> @ 100 kHz (mΩ) | Ripple current @ 100 kHz, +125 °C (A) | Size code | Part number       |
|---------------------|---------------------|----------------------------------------|-----------------------------------|-------------------------------------------------|---------------------------------|---------------------------------------|-----------|-------------------|
| 63                  | 78.8                | 10                                     | 6.3                               | 0.08                                            | 120                             | 0.7                                   | 0606      | EHBSA063M1000606T |
|                     |                     | 22                                     | 13.9                              | 0.08                                            | 80                              | 0.9                                   | 0608      | EHBSA063M2200608T |
|                     |                     | 33                                     | 20.8                              | 0.08                                            | 40                              | 1.1                                   | 0810      | EHBSA063M3300810T |
|                     |                     | 47                                     | 29.6                              | 0.08                                            | 32                              | 2.4                                   | 0810      | EHBSA063M4700810T |
|                     |                     | 56                                     | 35.3                              | 0.08                                            | 30                              | 2.8                                   | 1010      | EHBSA063M5601010T |
|                     |                     | 68                                     | 42.8                              | 0.08                                            | 30                              | 2.8                                   | 1010      | EHBSA063M6801010T |
|                     |                     | 82                                     | 51.7                              | 0.08                                            | 30                              | 2.8                                   | 1010      | EHBSA063M8201010T |
|                     |                     | 100                                    | 63                                | 0.08                                            | 30                              | 2.8                                   | 1010      | EHBSA063M1011010T |
|                     |                     | 120                                    | 75.6                              | 0.08                                            | 19                              | 3.0                                   | 1012      | EHBSA063M1211012T |
|                     |                     | 150                                    | 94.5                              | 0.08                                            | 15                              | 3.5                                   | 1016      | EHBSA063M1511016T |
| 80                  | 100                 | 22                                     | 17.6                              | 0.08                                            | 45                              | 1.05                                  | 0810      | EHBSA080M2200810T |
|                     |                     | 47                                     | 37.6                              | 0.08                                            | 33                              | 1.36                                  | 1010      | EHBSA080M4701010T |
|                     |                     | 56                                     | 44.8                              | 0.08                                            | 33                              | 1.36                                  | 1010      | EHBSA080M5601010T |

1. +20 °C ±2 °C.

### Frequency coefficient of rated ripple current

| Frequency   | 120 Hz | 1 kHz | 10 kHz | 50 kHz | 100 kHz to 300 kHz |
|-------------|--------|-------|--------|--------|--------------------|
| Coefficient | 0.05   | 0.30  | 0.70   | 0.85   | 1.0                |

### Impedance at low temperature

| Impedance ratio                       | Performance |
|---------------------------------------|-------------|
| $Z(-55\text{ °C}) / Z(+20\text{ °C})$ | $\leq 2.0$  |
| $Z(-40\text{ °C}) / Z(+20\text{ °C})$ | $\leq 1.5$  |

Impedance at 100 kHz at -55 °C  $\pm$  3 °C or -40 °C  $\pm$  2 °C

### Endurance

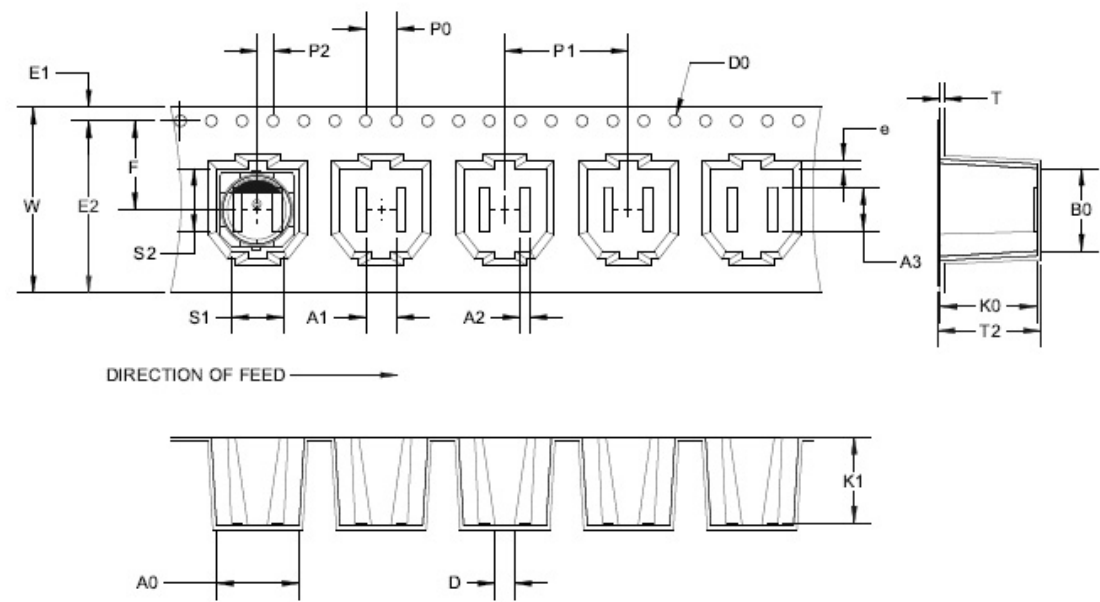
| Characteristics                 | Performance                                 |
|---------------------------------|---------------------------------------------|
| Appearance                      | No significant damage                       |
| Capacitance                     | $\leq \pm 30\%$ of the initial value        |
| Dissipation factor $\tan\delta$ | $\leq 200\%$ of the initial specified value |
| ESR                             | $\leq 200\%$ of the initial specified value |
| Leakage current                 | $\leq$ the initial specified value          |

+ 125 °C, 4000 hours, apply the rated ripple current without exceeding the rated voltage

**Packaging information (mm)**

Drawing not to scale

Supplied in tape and reel packaging, 1200 parts for 0606 per 15" (381 mm.) diameter reel



| Size Code        | 0606  |
|------------------|-------|
| Dimension        | Value |
| $W \pm 0.30$     | 16.00 |
| $F \pm 0.15$     | 7.50  |
| $E1 \pm 0.15$    | 1.75  |
| E2 Min.          | 14.25 |
| $P0 \pm 0.05$    | 4.00  |
| $P1 \pm 0.10$    | 12.00 |
| $P2 \pm 0.05$    | 2.00  |
| $D0 \pm 0.10/-0$ | 1.50  |
| $D \pm 0.10$     | 1.60  |
| $A0 \pm 0.10$    | 7.00  |
| $B0 \pm 0.10$    | 7.00  |
| $K0 \pm 0.10$    | 6.50  |
| $K1 \pm 0.05$    | 6.25  |
| $T \pm 0.05$     | 0.40  |
| T2 Max.          | 7.07  |
| $e \pm 0.10$     | 0.60  |
| $S1 \pm 0.10$    | 4.30  |
| $S2 \pm 0.10$    | 5.20  |
| $A1 \pm 0.10$    | 2.50  |
| $A2 \pm 0.10$    | 0.80  |
| $A3 \pm 0.10$    | 3.50  |

## Packaging information (mm)

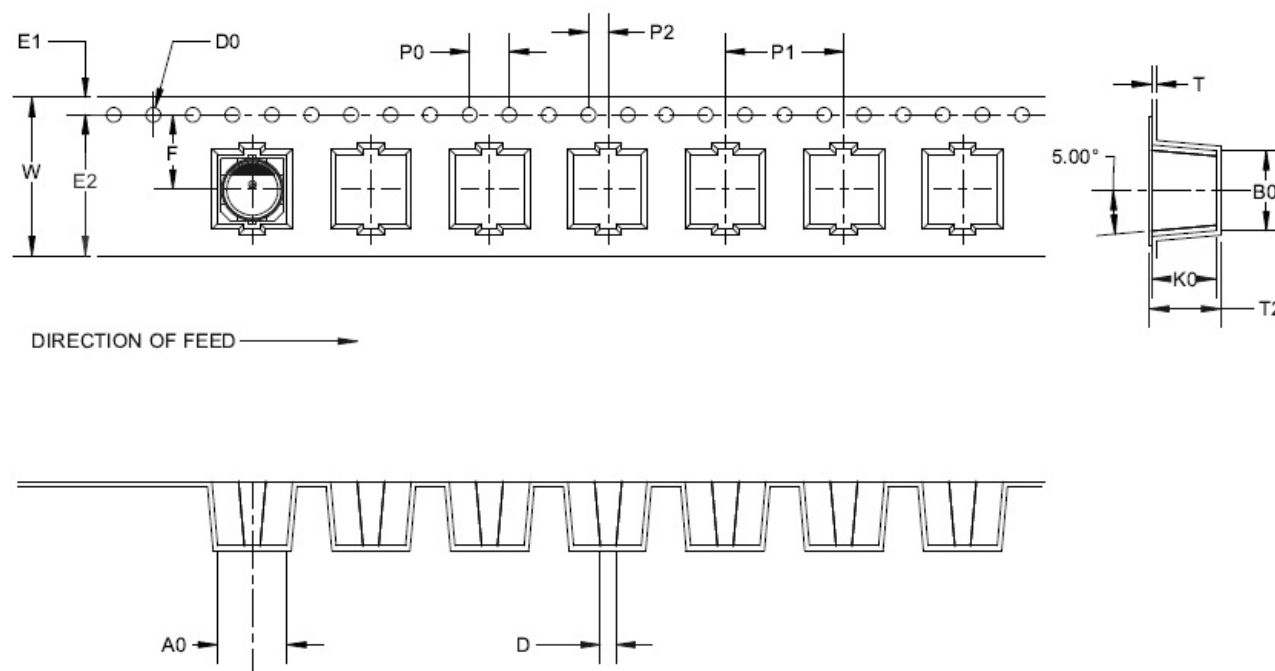
Drawing not to scale

Supplied in tape and reel packaging, 900 parts for 0608 per 15" (381 mm.) diameter reel

Supplied in tape and reel packaging, 500 parts for 0810 per 15" (381 mm.) diameter reel

Supplied in tape and reel packaging, 500 parts for 1010 per 15" (381 mm.) diameter reel

Supplied in tape and reel packaging, 450 parts for 1012 per 15" (381 mm.) diameter reel

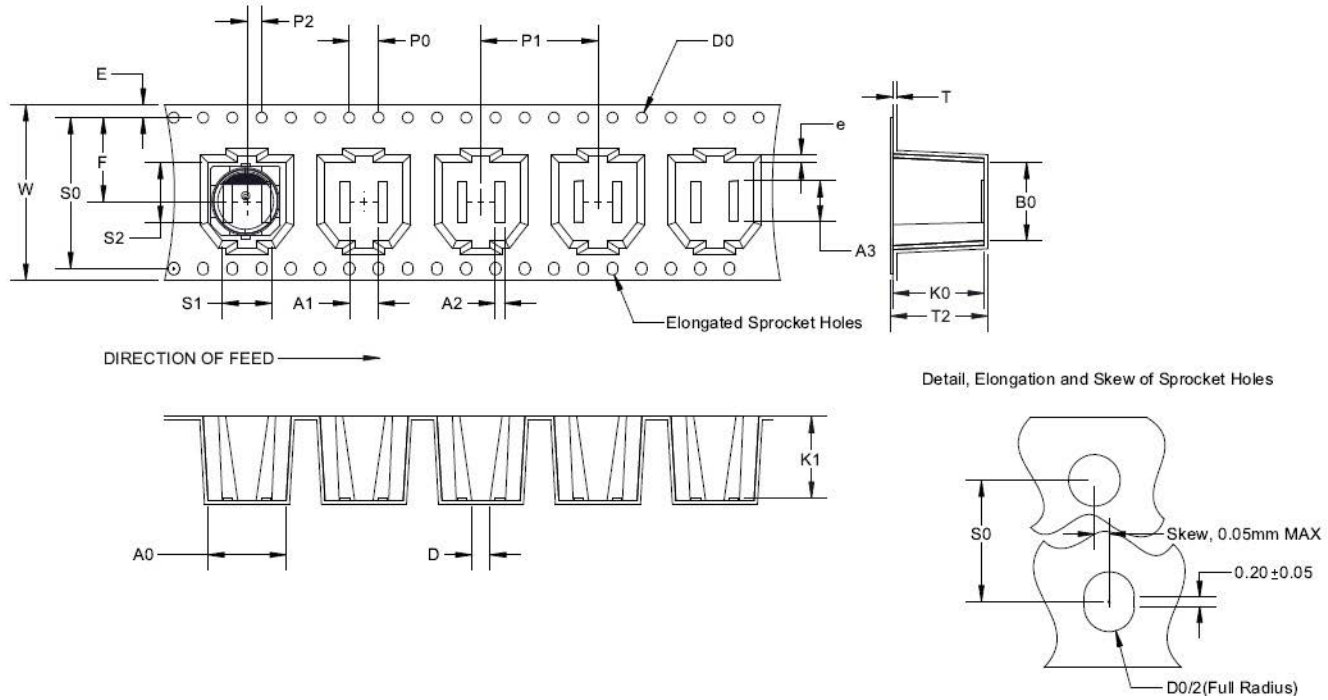


| Size Code  | 0608      | 0810          | 1010       | 1012       |
|------------|-----------|---------------|------------|------------|
| Dimension  | Value     | Value         | Value      | Value      |
| W±0.30     | 16.00     | 24.00         | 24.00      | 24.00      |
| F±0.10     | 7.50      | 11.50         | 11.50      | 11.50      |
| E1±0.10    | 1.75      | 1.75          | 1.75       | 1.75       |
| E2 Min.    | 14.25     | 22.25         | 22.25      | 22.25      |
| P0±0.10    | 4.00      | 4.00          | 4.00       | 4.00       |
| P1±0.10    | 12.00     | 16.00         | 16.00      | 16.00      |
| P2±0.10    | 2.00      | 2.00          | 2.00       | 2.00       |
| D0±0.10/-0 | 1.50      | 1.50          | 1.50       | 1.50       |
| D±0.10     | 1.60      | 1.60          | 1.60       | 1.60       |
| A0±0.10    | 7.00      | 8.70          | 10.70      | 10.70      |
| B0±0.10    | 7.00      | 8.70          | 10.70      | 10.70      |
| K0         | 8.20±0.10 | 10.00±0.10/-0 | 11.00±0.10 | 13.00±0.10 |
| T±0.05     | 0.50      | 0.50          | 0.50       | 0.50       |
| T2 Max.    | 8.87      | 10.67         | 11.67      | 13.67      |

### Packaging information (mm)

Drawing not to scale

Supplied in tape and reel packaging, 200 parts for 1016 per 15" (381 mm.) diameter reel



| Size Code  | 1016  |
|------------|-------|
| Dimension  | Value |
| W±0.30     | 32.00 |
| F±0.10     | 14.25 |
| E±0.10     | 1.75  |
| P0±0.10    | 4.00  |
| P1±0.10    | 24.00 |
| P2±0.10    | 2.00  |
| D0±0.10/-0 | 1.50  |
| D±0.10     | 1.60  |
| A0±0.10    | 10.50 |
| B0±0.10    | 10.50 |
| K0±0.10    | 16.95 |
| K1±0.05    | 16.85 |
| T±0.05     | 0.50  |
| T2 Max.    | 17.62 |
| e±0.10     | 0.60  |
| S0±0.10    | 28.40 |
| S1±0.10    | 7.30  |
| S2±0.10    | 8.70  |
| A1±0.10    | 4.00  |
| A2±0.10    | 1.00  |
| A3±0.10    | 5.40  |

## Storage condition and shelf life

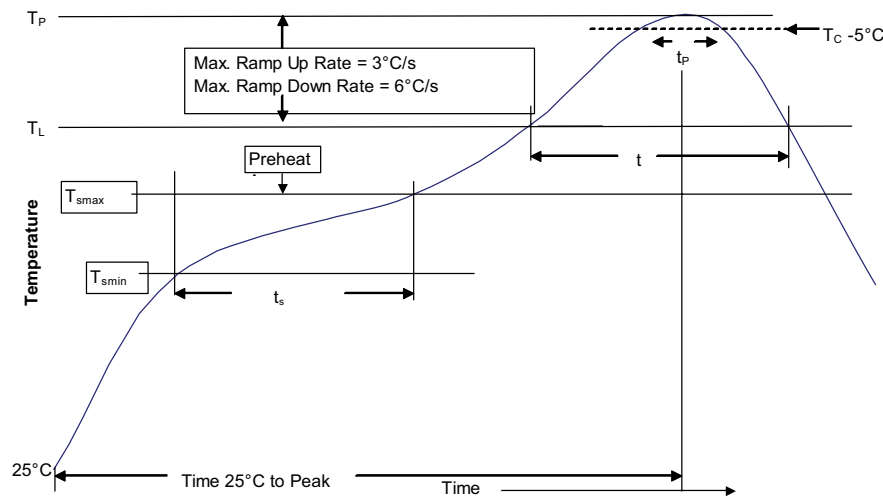
The minimum shelf life is two (2) years from date code manufactured provided product is maintained in its original packaging and stored in a controlled environment under the conditions of +15 to +35 °C / < 75% relative humidity.

A capacitor left for a long period is prone to have a greater flow of leak current. This happens because the oxide film deteriorates under a no-load condition. Voltage application to the capacitor reduces the leak current.

However, at the start of voltage application, a large flow of film recovery current increases the leak current, which may cause a circuit failure, etc.

Avoid the following storage environmental conditions:

- Environments resulting in water adhesion, high temperatures, high humidity, and condensation.
- Environments resulting in oil adhesion or environments filled with oil components in a gaseous state.
- Environments resulting in saltwater adhesion or environments filled with salt.
- Environments filled with acidic toxic gases (hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, bromine, methyl bromide, etc.).
- Environments filled with ammonia or other alkaline toxic gases.
- Environments exposed to acids or alkaline solvents.
- Environments exposed to direct sunlight, ozone, UV light, or radiation.
- Conditions related to vibration and shock.



| Profile feature                                                                                   |                                                                    |                      |
|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|----------------------|
| Preheat and soak                                                                                  | • Temperature minimum (T <sub>smin</sub> )                         | 150 °C               |
|                                                                                                   | • Temperature maximum (T <sub>smax</sub> )                         | 200 °C               |
|                                                                                                   | • Time (T <sub>smin</sub> to T <sub>smax</sub> ) (t <sub>s</sub> ) | 60 to 120 seconds    |
| Ramp up rate T <sub>L</sub> to T <sub>P</sub>                                                     |                                                                    | 3 °C/ second maximum |
| Liquidous temperature (T <sub>L</sub> )                                                           |                                                                    | 217 °C               |
| Time (t <sub>L</sub> ) maintained above T <sub>L</sub>                                            |                                                                    | 60 to 150 seconds    |
| Peak package body temperature (T <sub>P</sub> )                                                   |                                                                    | 260 °C               |
| Time (t <sub>p</sub> )* within 5 °C of the specified classification temperature (T <sub>C</sub> ) |                                                                    | 10 seconds           |
| Ramp-down rate (T <sub>P</sub> to T <sub>L</sub> )                                                |                                                                    | 6 °C/ second maximum |

\* Tolerance for peak profile temperature (T<sub>P</sub>) is defined as a supplier minimum and a user maximum.

Manual solder

+350 °C, 20 Watt soldering iron, 4 to 5 seconds maximum with tip diameter of 1.0 mm maximum, generally manual, hand soldering is not recommended

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