

### Surface Mount Type

Series: **Medium-size TK** Type: **V**  
**TK High temperature Lead-Free reflow(suffix:A\*)**



#### ■ Features

- Endurance: 2000 h at 125 °C
- Vibration-proof product is available upon request.
- RoHS directive compliant

#### ■ Specifications

|                                    |  |   |    |    |    |    |    |    |     |                             |
|------------------------------------|--|---|----|----|----|----|----|----|-----|-----------------------------|
| Category Temp. Range               | -40 °C to +125 °C  |   |    |    |    |    |    |    |     |                             |
| Rated W.V. Range                   | 10 V.DC to 100 V.DC  |   |    |    |    |    |    |    |     |                             |
| Nominal Cap. Range                 | 47 μF to 4700 μF   |   |    |    |    |    |    |    |     |                             |
| Capacitance Tolerance              | ±20 % (120 Hz/+20 °C)  |   |    |    |    |    |    |    |     |                             |
| DC Leakage Current                 | I ≤ 0.01 CV After 2 minutes  |   |    |    |    |    |    |    |     |                             |
| tan δ                              | Please see the attached High temperature lead-free reflow products list.   |   |    |    |    |    |    |    |     |                             |
| Characteristics at Low Temperature | W.V. (V)   | 10  | 16 | 25 | 35 | 50 | 63 | 80 | 100 | (Impedance ratio at 120 Hz) |
|                                    | Z(-25 °C)/Z(+20 °C)  | 3   | 2  | 2  | 2  | 2  | 2  | 2  | 2   |                             |
|                                    | Z(-40 °C)/Z(+20 °C)  | 6   | 4  | 4  | 3  | 3  | 3  | 3  | 3   |                             |
| Endurance                          | After applying rated working voltage for 2000 hours at +125 °C±2 °C and then being stabilized at +20 °C, Capacitors shall meet the following limits.                                       |   |    |    |    |    |    |    |     |                             |
|                                    | Capacitance change   | ±30 % of initial measured value (Miniaturization product : Within ±35 %)    |    |    |    |    |    |    |     |                             |
|                                    | tan δ  | ≤ 300 % of initial specified value (Miniaturization product : Within 350 %) |    |    |    |    |    |    |     |                             |
|                                    | DC leakage current   | ≤ initial specified value   |    |    |    |    |    |    |     |                             |
| Shelf Life                         | After storage for 1000 hours at +125 °C±2 °C with no voltage applied and then being stabilized at +20 °C, capacitors shall meet the limits specified in Endurance.(With voltage treatment) |   |    |    |    |    |    |    |     |                             |
| Resistance to Soldering Heat       | After reflow soldering and then being stabilized at +20 °C, capacitors shall meet the following limits.  |   |    |    |    |    |    |    |     |                             |
|                                    | Capacitance change   | ±10 % of initial measured value   |    |    |    |    |    |    |     |                             |
|                                    | tan δ  | ≤ initial specified value   |    |    |    |    |    |    |     |                             |
|                                    | DC leakage current   | ≤ initial specified value   |    |    |    |    |    |    |     |                             |

#### ■ Frequency correction factor for ripple current

| Correction factor | Frequency (Hz) |      |      |          |
|-------------------|----------------|------|------|----------|
|                   | 120            | 1 k  | 10 k | 100 k to |
|                   | 0.75           | 0.90 | 0.95 | 1.00     |

#### ■ Marking

Example: 10 V 1000 μF  
 Marking color: BLACK

Negative polarity marking (-)  
 Capacitance (μF)  
 Series identification  
 Mark for Lead-Free Products Black Dot (Square)  
 Rated voltage Mark  
 Lot number

|   |      |    |       |
|---|------|----|-------|
| A | 10 V | H  | 50 V  |
| C | 16 V | J  | 63 V  |
| E | 25 V | K  | 80 V  |
| V | 35 V | 2A | 100 V |

#### ■ Dimensions in mm (not to scale)

(Unit : mm)

| Size code | D    | L        | A, B | H         | I   | W        | P   | K        |
|-----------|------|----------|------|-----------|-----|----------|-----|----------|
| H13       | 12.5 | 13.5±0.5 | 13.5 | 15.0 max. | 4.7 | 0.90±0.3 | 4.4 | 0.70±0.3 |
| J16       | 16.0 | 16.5±0.5 | 17.0 | 19.0 max. | 5.5 | 1.20±0.3 | 6.7 | 0.70±0.3 |
| K16       | 18.0 | 16.5±0.5 | 19.0 | 21.0 max. | 6.7 | 1.20±0.3 | 6.7 | 0.70±0.3 |

( ) Reference size

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Should a safety concern arise regarding this product, please be sure to contact us immediately.

■ High temperature Lead-Free reflow Products

Endurance : 125 °C 2000 h

| W.V.<br>(V) | Cap.<br>(±20 %)<br>(μF) | Case size    |                |               | Specification  |                         |        |                               | Part No.<br>(RoHS:compliant) | Reflow | Min.<br>Packaging Q'ty |
|-------------|-------------------------|--------------|----------------|---------------|--|-------------------------|--------|-------------------------------|------------------------------|--------|------------------------|
|             |                         | Dia.<br>(mm) | Length<br>(mm) | *Size<br>Code | Ripple<br>Current<br>(100 kHz)<br>(+125 °C)<br>(mA r.m.s.) | ESR<br>(100 kHz)<br>(Ω) |        | tan δ<br>(120 Hz)<br>(+20 °C) |                              |        | Taping<br>(pcs)        |
|             |                         |              |                |               |  | +20 °C                  | -40 °C |                               |                              |        |                        |
| 10          | 1000                    | 12.5         | 13.5           | H13           | 800  | 0.120                   | 1.80   | 0.30                          | EEETK1A102AQ                 | (9)    | 200                    |
|             | 1500                    | 12.5         | 13.5           | (H13)         | 800  | 0.120                   | 1.80   | 0.30                          | EEETKA152UAQ                 | (9)    | 200                    |
|             | 2200                    | 16           | 16.5           | J16           | 1100   | 0.080                   | 1.20   | 0.32                          | EEETK1A222AM                 | (9)    | 125                    |
|             |                         | 16           | 16.5           | (J16)         | 1100   | 0.080                   | 1.20   | 0.34                          | EEETKA332UAM                 | (9)    | 125                    |
|             | 3300                    | 18           | 16.5           | K16           | 1300   | 0.075                   | 1.10   | 0.36                          | EEETK1A332AM                 | (9)    | 125                    |
|             |                         | 18           | 16.5           | (K16)         | 1300   | 0.075                   | 1.10   | 0.38                          | EEETK1A472AM                 | (9)    | 125                    |
| 16          | 330                     | 12.5         | 13.5           | H13           | 800  | 0.120                   | 1.80   | 0.23                          | EEETK1C331AQ                 | (9)    | 200                    |
|             | 470                     | 12.5         | 13.5           | H13           | 800  | 0.120                   | 1.80   | 0.23                          | EEETK1C471AQ                 | (9)    | 200                    |
|             | 680                     | 12.5         | 13.5           | H13           | 800  | 0.120                   | 1.80   | 0.23                          | EEETK1C681AQ                 | (9)    | 200                    |
|             | 1000                    | 12.5         | 13.5           | (H13)         | 800  | 0.120                   | 1.80   | 0.23                          | EEETKC102UAQ                 | (9)    | 200                    |
|             |                         | 16           | 16.5           | J16           | 1100   | 0.080                   | 1.20   | 0.25                          | EEETK1C102AM                 | (9)    | 125                    |
|             | 2200                    | 16           | 16.5           | (J16)         | 1100   | 0.080                   | 1.20   | 0.27                          | EEETKC222UAM                 | (9)    | 125                    |
|             |                         | 18           | 16.5           | K16           | 1300   | 0.075                   | 1.10   | 0.27                          | EEETK1C222AM                 | (9)    | 125                    |
|             | 3300                    | 18           | 16.5           | K16           | 1300   | 0.075                   | 1.10   | 0.29                          | EEETK1C332AM                 | (9)    | 125                    |
| 25          | 330                     | 12.5         | 13.5           | H13           | 800  | 0.120                   | 1.80   | 0.18                          | EEETK1E331AQ                 | (9)    | 200                    |
|             | 470                     | 12.5         | 13.5           | H13           | 800  | 0.120                   | 1.80   | 0.18                          | EEETK1E471AQ                 | (9)    | 200                    |
|             | 680                     | 12.5         | 13.5           | (H13)         | 800  | 0.120                   | 1.80   | 0.18                          | EEETKE681UAQ                 | (9)    | 200                    |
|             |                         | 16           | 16.5           | J16           | 1100   | 0.080                   | 1.20   | 0.18                          | EEETK1E681AM                 | (9)    | 125                    |
|             | 1000                    | 16           | 16.5           | (J16)         | 1100   | 0.080                   | 1.20   | 0.18                          | EEETKE102UAM                 | (9)    | 125                    |
|             |                         | 18           | 16.5           | K16           | 1300   | 0.075                   | 1.10   | 0.18                          | EEETK1E102AM                 | (9)    | 125                    |
|             | 2200                    | 18           | 16.5           | K16           | 1300   | 0.075                   | 1.10   | 0.20                          | EEETK1E222AM                 | (9)    | 125                    |
| 35          | 330                     | 12.5         | 13.5           | H13           | 800  | 0.120                   | 1.80   | 0.16                          | EEETK1V331AQ                 | (9)    | 200                    |
|             | 470                     | 12.5         | 13.5           | (H13)         | 800  | 0.120                   | 1.80   | 0.16                          | EEETKV471UAQ                 | (9)    | 200                    |
|             |                         | 16           | 16.5           | J16           | 1100   | 0.080                   | 1.20   | 0.16                          | EEETK1V471AM                 | (9)    | 125                    |
|             | 680                     | 16           | 16.5           | (J16)         | 1100   | 0.080                   | 1.20   | 0.16                          | EEETKV681UAM                 | (9)    | 125                    |
|             |                         | 18           | 16.5           | K16           | 1300   | 0.075                   | 1.10   | 0.16                          | EEETK1V681AM                 | (9)    | 125                    |
|             | 1000                    | 18           | 16.5           | K16           | 1300   | 0.075                   | 1.10   | 0.16                          | EEETK1V102AM                 | (9)    | 125                    |
| 50          | 220                     | 12.5         | 13.5           | H13           | 600  | 0.230                   | 3.40   | 0.14                          | EEETK1H221AQ                 | (10)   | 200                    |
|             | 330                     | 12.5         | 13.5           | H13           | 600  | 0.230                   | 3.40   | 0.14                          | EEETK1H331AQ                 | (10)   | 200                    |
|             | 470                     | 16           | 16.5           | J16           | 900  | 0.150                   | 2.20   | 0.14                          | EEETK1H471AM                 | (10)   | 125                    |
|             |                         | 16           | 16.5           | (J16)         | 900  | 0.150                   | 2.20   | 0.14                          | EEETKH681UAM                 | (10)   | 125                    |
|             | 680                     | 18           | 16.5           | K16           | 950  | 0.140                   | 2.10   | 0.14                          | EEETK1H681AM                 | (10)   | 125                    |
|             |                         | 18           | 16.5           | (K16)         | 950  | 0.140                   | 2.10   | 0.14                          | EEETK1H102AM                 | (10)   | 125                    |
| 63          | 100                     | 12.5         | 13.5           | H13           | 350  | 0.260                   | 5.20   | 0.12                          | EEETK1J101AQ                 | (11)   | 200                    |
|             | 220                     | 12.5         | 13.5           | H13           | 350  | 0.260                   | 5.20   | 0.12                          | EEETK1J221AQ                 | (11)   | 200                    |
|             | 330                     | 16           | 16.5           | J16           | 500  | 0.180                   | 3.60   | 0.12                          | EEETK1J331AM                 | (11)   | 125                    |
|             | 470                     | 16           | 16.5           | J16           | 500  | 0.180                   | 3.60   | 0.12                          | EEETK1J471AM                 | (11)   | 125                    |
| 80          | 47                      | 12.5         | 13.5           | H13           | 250  | 0.420                   | 8.40   | 0.12                          | EEETK1K470AQ                 | (11)   | 200                    |
|             | 100                     | 12.5         | 13.5           | (H13)         | 250  | 0.420                   | 8.40   | 0.12                          | EEETKK101UAQ                 | (11)   | 200                    |
|             |                         | 16           | 16.5           | J16           | 350  | 0.300                   | 6.00   | 0.12                          | EEETK1K101AM                 | (11)   | 125                    |
|             | 220                     | 16           | 16.5           | (J16)         | 350  | 0.300                   | 6.00   | 0.12                          | EEETKK221UAM                 | (11)   | 125                    |
|             |                         | 18           | 16.5           | K16           | 400  | 0.280                   | 5.60   | 0.12                          | EEETK1K221AM                 | (11)   | 125                    |
|             | 330                     | 16           | 16.5           | (J16)         | 350  | 0.300                   | 6.00   | 0.12                          | EEETKK331UAM                 | (11)   | 125                    |
|             |                         | 18           | 16.5           | K16           | 400  | 0.280                   | 5.60   | 0.12                          | EEETK1K331AM                 | (11)   | 125                    |
| 470         | 18                      | 16.5         | K16            | 400           | 0.280  | 5.60                    | 0.12   | EEETK1K471AM                  | (11)                         | 125    |                        |
| 100         | 47                      | 12.5         | 13.5           | H13           | 250  | 0.420                   | 8.40   | 0.10                          | EEETK2A470AQ                 | (11)   | 200                    |
|             | 100                     | 16           | 16.5           | J16           | 350  | 0.300                   | 6.00   | 0.10                          | EEETK2A101AM                 | (11)   | 125                    |
|             | 220                     | 18           | 16.5           | K16           | 400  | 0.280                   | 5.60   | 0.10                          | EEETK2A221AM                 | (11)   | 125                    |
|             | 330                     | 18           | 16.5           | K16           | 400  | 0.280                   | 5.60   | 0.10                          | EEETK2A331AM                 | (11)   | 125                    |

\* Size code( ):Miniaturization product

· Please refer to the page of "Reflow Profile" and "The Taping Dimensions".

· When requesting vibration-proof product, please put the last "V" instead to "Q or M"



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