

### Surface Mount Type

Series: **TG** Type: **V**

#### ■ Features

- Endurance: 125 °C 1000 h to 2000 h
- Miniaturization (40 % less than TA Series)
- Low ESR (Low temp)
- Vibration-proof product is available upon request. ( $\phi 8 \leq$ )
- RoHS directive compliant (Parts No  $\phi 8$  to  $\phi 10$  : **EEE\***,  $\phi 12.5$  to  $\phi 18$  : **EEV\***)



#### ■ Specifications

|                                    |                                                                                                                                                                                            |                                                      |    |    |    |    |    |    |     |                             |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|----|----|----|----|----|----|-----|-----------------------------|
| Category Temp. Range               | -40 °C to +125 °C                                                                                                                                                                          |                                                      |    |    |    |    |    |    |     |                             |
| Rated W.V. Range                   | 10 V.DC to 100 V.DC                                                                                                                                                                        |                                                      |    |    |    |    |    |    |     |                             |
| Nominal Cap. Range                 | 10 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 standard 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 1000 hours (ø8×6.2), 2000 hours (ø8×10.2≤) 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 (code U : ±35 %)     |    |    |    |    |    |    |     |                             |
|                                    | tan δ                                                                                                                                                                                      | ≤ 300 % of initial specified value (code U : ±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                            |    |    |    |    |    |    |     |                             |

#### ■ Marking

Example : 10 V 100 µF, 10 V 1000 µF  
Marking coloe : BLACK  
Lead-Free products ( $\leq \phi 10$ )

Rated Voltage Mark

Negative polarity marking (-)

Capacitance (µF)

Series identification

Mark for Lead-Free Products Black Dot (Square)

Lot number

Lead-Free products ( $\geq \phi 12.5$ )

Rated Voltage Mark

Negative polarity marking (-)

Capacitance (µF)

Series identification

Lot number

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

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

( ) reference size

0.3 max.

$\phi D \pm 0.5$

L

A

H

I

W

P

K

X

(mm)

| Size code | D    | L        | A, B | H         | I   | W        | P   | K                                      |
|-----------|------|----------|------|-----------|-----|----------|-----|----------------------------------------|
| E         | 8.0  | 6.2±0.3  | 8.3  | 9.5 max.  | 3.4 | 0.65±0.1 | 2.2 | 0.35 <sup>+0.15</sup> <sub>-0.20</sub> |
| F         | 8.0  | 10.2±0.3 | 8.3  | 10.0 max. | 3.4 | 0.90±0.2 | 3.1 | 0.70±0.20                              |
| G         | 10.0 | 10.2±0.3 | 10.3 | 12.0 max. | 3.5 | 0.90±0.2 | 4.6 | 0.70±0.20                              |
| H13       | 12.5 | 13.5±0.5 | 13.5 | 15.0 max. | 4.7 | 0.90±0.3 | 4.4 | 0.70±0.30                              |
| J16       | 16.0 | 16.5±0.5 | 17.0 | 19.0 max. | 5.5 | 1.20±0.3 | 6.7 | 0.70±0.30                              |
| K16       | 18.0 | 16.5±0.5 | 19.0 | 21.0 max. | 6.7 | 1.20±0.3 | 6.7 | 0.70±0.30                              |

## ■ Standard Products

Endurance : 125 °C 1000 h ( $\phi 8 \times 10.2 \leq$  : 2000 h)

| W.V. | Cap.<br>(±20 %) | Case size |        |               | Specification                                              |                                     |                                       | Part No.<br>(RoHS:compliant) | Reflow       | Min.<br>Packaging Q'ty |      |
|------|-----------------|-----------|--------|---------------|------------------------------------------------------------|-------------------------------------|---------------------------------------|------------------------------|--------------|------------------------|------|
|      |                 | Dia.      | Length | *Size<br>Code | Ripple<br>Current<br>(100 kHz)<br>(+125 °C)<br>(mA r.m.s.) | ESR<br>(100 kHz)<br>(+20 °C)<br>(Ω) | $\tan \delta$<br>(120 Hz)<br>(+20 °C) |                              |              | Taping                 |      |
| (V)  | (μF)            | (mm)      | (mm)   |               |                                                            |                                     |                                       |                              |              | (pcs)                  |      |
| 10   | 100             | 8         | 6.2    | E             | 100                                                        | 1.00                                | 0.30                                  | EEETG1A101P                  | (2)          | 1000                   |      |
|      | 220             | 8         | 6.2    | (E)           | 100                                                        | 1.00                                | 0.30                                  | EEETG1A221UP                 | (2)          | 1000                   |      |
|      |                 | 8         | 10.2   | F             | 197                                                        | 0.50                                | 0.30                                  | EEETG1A221P                  | (2)          | 500                    |      |
|      | 330             | 8         | 10.2   | (F)           | 197                                                        | 0.50                                | 0.30                                  | EEETG1A331UP                 | (2)          | 500                    |      |
|      |                 | 10        | 10.2   | G             | 270                                                        | 0.30                                | 0.30                                  | EEETG1A331P                  | (2)          | 500                    |      |
|      | 470             | 10        | 10.2   | (G)           | 270                                                        | 0.30                                | 0.30                                  | EEETG1A471UP                 | (2)          | 500                    |      |
|      | 1000            | 12.5      | 13.5   | H13           | 800                                                        | 0.12                                | 0.30                                  | EEVTG1A102Q                  | (3)          | 200                    |      |
|      | 1500            | 12.5      | 13.5   | (H13)         | 800                                                        | 0.12                                | 0.30                                  | EEVTG1A152UQ                 | (3)          | 200                    |      |
|      | 2200            | 16        | 16.5   | J16           | 1100                                                       | 0.08                                | 0.32                                  | EEVTG1A222M                  | (3)          | 125                    |      |
|      | 3300            | 16        | 16.5   | (J16)         | 1100                                                       | 0.08                                | 0.34                                  | EEVTG1A332UM                 | (3)          | 125                    |      |
| 18   |                 | 16.5      | K16    | 1300          | 0.075                                                      | 0.34                                | EEVTG1A332M                           | (3)                          | 125          |                        |      |
|      | 4700            | 18        | 16.5   | K16           | 1300                                                       | 0.075                               | 0.36                                  | EEVTG1A472M                  | (3)          | 125                    |      |
| 16   | 100             | 8         | 10.2   | F             | 197                                                        | 0.50                                | 0.23                                  | EEETG1C101P                  | (2)          | 500                    |      |
|      | 220             | 8         | 10.2   | (F)           | 197                                                        | 0.50                                | 0.23                                  | EEETG1C221UP                 | (2)          | 500                    |      |
|      |                 | 10        | 10.2   | G             | 270                                                        | 0.30                                | 0.23                                  | EEETG1C221P                  | (2)          | 500                    |      |
|      | 330             | 10        | 10.2   | (G)           | 270                                                        | 0.30                                | 0.23                                  | EEETG1C331UP                 | (2)          | 500                    |      |
|      |                 | 12.5      | 13.5   | H13           | 800                                                        | 0.12                                | 0.23                                  | EEVTG1C331Q                  | (3)          | 200                    |      |
|      | 470             | 12.5      | 13.5   | H13           | 800                                                        | 0.12                                | 0.23                                  | EEVTG1C471Q                  | (3)          | 200                    |      |
|      | 680             | 12.5      | 13.5   | H13           | 800                                                        | 0.12                                | 0.23                                  | EEVTG1C681Q                  | (3)          | 200                    |      |
|      | 1000            | 12.5      | 13.5   | (H13)         | 800                                                        | 0.12                                | 0.23                                  | EEVTG1C102UQ                 | (3)          | 200                    |      |
|      |                 | 16        | 16.5   | J16           | 1100                                                       | 0.08                                | 0.23                                  | EEVTG1C102M                  | (3)          | 125                    |      |
|      | 2200            | 16        | 16.5   | (J16)         | 1100                                                       | 0.08                                | 0.25                                  | EEVTG1C222UM                 | (3)          | 125                    |      |
|      |                 | 18        | 16.5   | K16           | 1300                                                       | 0.075                               | 0.25                                  | EEVTG1C222M                  | (3)          | 125                    |      |
|      | 3300            | 18        | 16.5   | K16           | 1300                                                       | 0.075                               | 0.27                                  | EEVTG1C332M                  | (3)          | 125                    |      |
|      | 25              | 47        | 8      | 6.2           | E                                                          | 100                                 | 1.00                                  | 0.18                         | EEETG1E470P  | (2)                    | 1000 |
|      |                 | 100       | 8      | 6.2           | (E)                                                        | 100                                 | 1.00                                  | 0.18                         | EEETG1E101UP | (2)                    | 1000 |
| 8    |                 |           | 10.2   | F             | 197                                                        | 0.50                                | 0.18                                  | EEETG1E101P                  | (2)          | 500                    |      |
| 220  |                 | 8         | 10.2   | (F)           | 197                                                        | 0.50                                | 0.18                                  | EEETG1E221UP                 | (2)          | 500                    |      |
|      |                 | 10        | 10.2   | G             | 270                                                        | 0.30                                | 0.18                                  | EEETG1E221P                  | (2)          | 500                    |      |
| 330  |                 | 10        | 10.2   | (G)           | 270                                                        | 0.30                                | 0.18                                  | EEETG1E331UP                 | (2)          | 500                    |      |
|      |                 | 12.5      | 13.5   | H13           | 800                                                        | 0.12                                | 0.18                                  | EEVTG1E331Q                  | (3)          | 200                    |      |
| 470  |                 | 12.5      | 13.5   | H13           | 800                                                        | 0.12                                | 0.18                                  | EEVTG1E471Q                  | (3)          | 200                    |      |
| 680  |                 | 12.5      | 13.5   | (H13)         | 800                                                        | 0.12                                | 0.18                                  | EEVTG1E681UQ                 | (3)          | 200                    |      |
|      |                 | 16        | 16.5   | J16           | 1100                                                       | 0.08                                | 0.18                                  | EEVTG1E681M                  | (3)          | 125                    |      |
| 1000 |                 | 16        | 16.5   | (J16)         | 1100                                                       | 0.08                                | 0.18                                  | EEVTG1E102UM                 | (3)          | 125                    |      |
|      |                 | 18        | 16.5   | K16           | 1300                                                       | 0.075                               | 0.18                                  | EEVTG1E102M                  | (3)          | 125                    |      |
| 2200 |                 | 18        | 16.5   | K16           | 1300                                                       | 0.075                               | 0.20                                  | EEVTG1E222M                  | (3)          | 125                    |      |
| 35   |                 | 33        | 8      | 6.2           | E                                                          | 100                                 | 1.00                                  | 0.16                         | EEETG1V330P  | (2)                    | 1000 |
|      | 47              | 8         | 6.2    | (E)           | 100                                                        | 1.00                                | 0.16                                  | EEETG1V470UP                 | (2)          | 1000                   |      |
|      |                 | 8         | 10.2   | F             | 197                                                        | 0.50                                | 0.16                                  | EEETG1V470P                  | (2)          | 500                    |      |
|      | 100             | 8         | 10.2   | (F)           | 197                                                        | 0.50                                | 0.16                                  | EEETG1V101UP                 | (2)          | 500                    |      |
|      |                 | 10        | 10.2   | G             | 270                                                        | 0.30                                | 0.16                                  | EEETG1V101P                  | (2)          | 500                    |      |
|      | 220             | 10        | 10.2   | (G)           | 270                                                        | 0.30                                | 0.16                                  | EEETG1V221UP                 | (2)          | 500                    |      |
|      | 330             | 12.5      | 13.5   | H13           | 800                                                        | 0.12                                | 0.16                                  | EEVTG1V331Q                  | (3)          | 200                    |      |
| 35   | 470             | 12.5      | 13.5   | (H13)         | 800                                                        | 0.12                                | 0.16                                  | EEVTG1V471UQ                 | (3)          | 200                    |      |
|      |                 | 16        | 16.5   | J16           | 1100                                                       | 0.08                                | 0.16                                  | EEVTG1V471M                  | (3)          | 125                    |      |
|      | 680             | 16        | 16.5   | (J16)         | 1100                                                       | 0.08                                | 0.16                                  | EEVTG1V681UM                 | (3)          | 125                    |      |
|      |                 | 18        | 16.5   | K16           | 1300                                                       | 0.075                               | 0.16                                  | EEVTG1V681M                  | (3)          | 125                    |      |
|      | 1000            | 18        | 16.5   | K16           | 1300                                                       | 0.075                               | 0.16                                  | EEVTG1V102M                  | (3)          | 125                    |      |

\*Size code( ):Miniaturization product

The taping dimensions are explained on EE188 of our Catalog. Please use it as a reference guide.

Reflow Profile(Fig-1 to Fig-11) listed on EE186 of our Catalog.

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.

00 Sep. 2010

### Standard Products

Endurance : 125 °C 1000 h ( $\phi 8 \times 10.2 \leq$  : 2000 h)

| W.V. | Cap.<br>(±20 %) | Case size |        |               | Specification                                              |                                     |                                       | Part No.<br>(RoHS:compliant) | Reflow | Min.<br>Packaging Q'ty |
|------|-----------------|-----------|--------|---------------|------------------------------------------------------------|-------------------------------------|---------------------------------------|------------------------------|--------|------------------------|
|      |                 | Dia.      | Length | *Size<br>Code | Ripple<br>Current<br>(100 kHz)<br>(+125 °C)<br>(mA r.m.s.) | ESR<br>(100 kHz)<br>(+20 °C)<br>(Ω) | $\tan \delta$<br>(120 Hz)<br>(+20 °C) |                              |        | Taping                 |
| (V)  | (μF)            | (mm)      | (mm)   |               |                                                            |                                     |                                       |                              |        | (pcs)                  |
| 50   | 10              | 8         | 6.2    | E             | 80                                                         | 1.60                                | 0.14                                  | EEETG1H100P                  | (2)    | 1000                   |
|      | 22              | 8         | 6.2    | E             | 80                                                         | 1.60                                | 0.14                                  | EEETG1H220P                  | (2)    | 1000                   |
|      | 33              | 8         | 6.2    | (E)           | 80                                                         | 1.60                                | 0.14                                  | EEETG1H330UP                 | (2)    | 1000                   |
|      |                 | 8         | 10.2   | F             | 133                                                        | 0.75                                | 0.14                                  | EEETG1H330P                  | (2)    | 500                    |
|      | 47              | 8         | 10.2   | (F)           | 133                                                        | 0.75                                | 0.14                                  | EEETG1H470UP                 | (2)    | 500                    |
|      |                 | 10        | 10.2   | G             | 221                                                        | 0.50                                | 0.14                                  | EEETG1H470P                  | (2)    | 500                    |
|      | 100             | 10        | 10.2   | (G)           | 221                                                        | 0.50                                | 0.14                                  | EEETG1H101UP                 | (2)    | 500                    |
|      | 220             | 12.5      | 13.5   | H13           | 600                                                        | 0.23                                | 0.14                                  | EEVTG1H221Q                  | (3)    | 200                    |
|      | 330             | 12.5      | 13.5   | H13           | 600                                                        | 0.23                                | 0.14                                  | EEVTG1H331Q                  | (3)    | 200                    |
|      | 470             | 16        | 16.5   | J16           | 900                                                        | 0.15                                | 0.14                                  | EEVTG1H471M                  | (3)    | 125                    |
|      | 680             | 16        | 16.5   | (J16)         | 900                                                        | 0.15                                | 0.14                                  | EEVTG1H681UM                 | (3)    | 125                    |
|      |                 | 18        | 16.5   | K16           | 950                                                        | 0.14                                | 0.14                                  | EEVTG1H681M                  | (3)    | 125                    |
| 1000 | 18              | 16.5      | K16    | 950           | 0.14                                                       | 0.14                                | EEVTG1H102M                           | (3)                          | 125    |                        |
| 63   | 10              | 8         | 6.2    | E             | 55                                                         | 2.20                                | 0.12                                  | EEETG1J100P                  | (2)    | 1000                   |
|      | 22              | 8         | 10.2   | F             | 100                                                        | 1.00                                | 0.12                                  | EEETG1J220P                  | (2)    | 500                    |
|      | 33              | 8         | 10.2   | (F)           | 100                                                        | 1.00                                | 0.12                                  | EEETG1J330UP                 | (2)    | 500                    |
|      |                 | 10        | 10.2   | G             | 150                                                        | 0.80                                | 0.12                                  | EEETG1J330P                  | (2)    | 500                    |
|      | 47              | 8         | 10.2   | (F)           | 100                                                        | 1.00                                | 0.12                                  | EEETG1J470UP                 | (2)    | 500                    |
|      |                 | 10        | 10.2   | G             | 150                                                        | 0.80                                | 0.12                                  | EEETG1J470P                  | (2)    | 500                    |
|      | 100             | 10        | 10.2   | (G)           | 150                                                        | 0.80                                | 0.12                                  | EEETG1J101UP                 | (2)    | 500                    |
|      |                 | 12.5      | 13.5   | H13           | 350                                                        | 0.26                                | 0.12                                  | EEVTG1J101Q                  | (3)    | 200                    |
|      | 220             | 12.5      | 13.5   | H13           | 350                                                        | 0.26                                | 0.12                                  | EEVTG1J221Q                  | (3)    | 200                    |
|      | 330             | 16        | 16.5   | J16           | 500                                                        | 0.18                                | 0.12                                  | EEVTG1J331M                  | (3)    | 125                    |
| 470  | 16              | 16.5      | J16    | 500           | 0.18                                                       | 0.12                                | EEVTG1J471M                           | (3)                          | 125    |                        |
| 80   | 10              | 8         | 10.2   | F             | 70                                                         | 1.30                                | 0.12                                  | EEETG1K100P                  | (2)    | 500                    |
|      | 22              | 8         | 10.2   | (F)           | 70                                                         | 1.30                                | 0.12                                  | EEETG1K220UP                 | (2)    | 500                    |
|      |                 | 10        | 10.2   | G             | 90                                                         | 1.00                                | 0.12                                  | EEETG1K220P                  | (2)    | 500                    |
|      | 33              | 8         | 10.2   | (F)           | 70                                                         | 1.30                                | 0.12                                  | EEETG1K330UP                 | (2)    | 500                    |
|      |                 | 10        | 10.2   | G             | 90                                                         | 1.00                                | 0.12                                  | EEETG1K330P                  | (2)    | 500                    |
|      | 47              | 10        | 10.2   | (G)           | 90                                                         | 1.00                                | 0.12                                  | EEETG1K470UP                 | (2)    | 500                    |
|      |                 | 12.5      | 13.5   | H13           | 250                                                        | 0.42                                | 0.12                                  | EEVTG1K470Q                  | (3)    | 200                    |
|      | 100             | 12.5      | 13.5   | (H13)         | 250                                                        | 0.42                                | 0.12                                  | EEVTG1K101UQ                 | (3)    | 200                    |
|      |                 | 16        | 16.5   | J16           | 350                                                        | 0.30                                | 0.12                                  | EEVTG1K101M                  | (3)    | 125                    |
|      | 220             | 16        | 16.5   | (J16)         | 350                                                        | 0.30                                | 0.12                                  | EEVTG1K221UM                 | (3)    | 125                    |
|      |                 | 18        | 16.5   | K16           | 400                                                        | 0.28                                | 0.12                                  | EEVTG1K221M                  | (3)    | 125                    |
|      | 330             | 16        | 16.5   | (J16)         | 350                                                        | 0.30                                | 0.12                                  | EEVTG1K331UM                 | (3)    | 125                    |
| 18   |                 | 16.5      | K16    | 400           | 0.28                                                       | 0.12                                | EEVTG1K331M                           | (3)                          | 125    |                        |
| 470  | 18              | 16.5      | K16    | 400           | 0.28                                                       | 0.12                                | EEVTG1K471M                           | (3)                          | 125    |                        |
| 100  | 10              | 8         | 10.2   | F             | 70                                                         | 1.30                                | 0.10                                  | EEETG2A100P                  | (2)    | 500                    |
|      | 22              | 8         | 10.2   | (F)           | 70                                                         | 1.30                                | 0.10                                  | EEETG2A220UP                 | (2)    | 500                    |
|      |                 | 10        | 10.2   | G             | 90                                                         | 1.00                                | 0.10                                  | EEETG2A220P                  | (2)    | 500                    |
|      | 33              | 10        | 10.2   | G             | 90                                                         | 1.00                                | 0.10                                  | EEETG2A330P                  | (2)    | 500                    |
|      | 47              | 12.5      | 13.5   | H13           | 250                                                        | 0.42                                | 0.10                                  | EEVTG2A470Q                  | (3)    | 200                    |
|      | 100             | 16        | 16.5   | J16           | 350                                                        | 0.30                                | 0.10                                  | EEVTG2A101M                  | (3)    | 125                    |
|      | 220             | 18        | 16.5   | K16           | 400                                                        | 0.28                                | 0.10                                  | EEVTG2A221M                  | (3)    | 125                    |
| 330  | 18              | 16.5      | K16    | 400           | 0.28                                                       | 0.10                                | EEVTG2A331M                           | (3)                          | 125    |                        |

\*Size code( ):Miniaturization product

The taping dimensions are explained on EE188 of our Catalog. Please use it as a reference guide.

Reflow Profile(Fig-1 to Fig-11) listed on EE186 of our Catalog.