

### Surface Mount Type

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



#### ■ Features

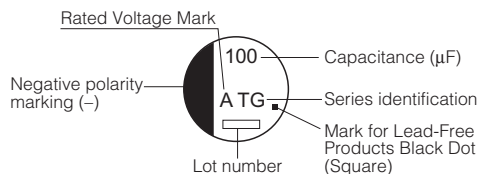
- Endurance: 125 °C 1000 h to 2000 h
- Miniaturization (40 % less than TA Series)
- Low ESR (Low temp)
- Vibration-proof product is available upon request. ( $\phi 8 \leq$ )
- RoHS directive compliant (Parts No  $\phi 8$  to  $\phi 10$  : **EEE\***,  $\phi 12.5$  to  $\phi 18$  : **EEV\***)

#### ■ Specifications

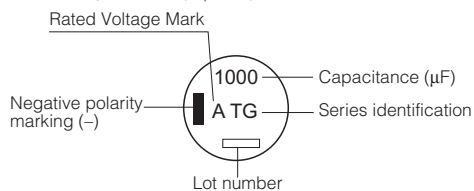
|                                    |  |  |    |    |    |    |    |    |     |                             |
|------------------------------------|--|--|----|----|----|----|----|----|-----|-----------------------------|
| Category Temp. Range               | -40 °C to +125 °C  |  |    |    |    |    |    |    |     |                             |
| Rated W.V. Range                   | 10 V.DC to 100 V.DC  |  |    |    |    |    |    |    |     |                             |
| Nominal Cap. Range                 | 10 $\mu$ F to 4700 $\mu$ F   |  |    |    |    |    |    |    |     |                             |
| Capacitance Tolerance              | $\pm 20$ % (120 Hz/+20 °C)   |  |    |    |    |    |    |    |     |                             |
| DC Leakage Current                 | $I \leq 0.01$ CV After 2 minutes   |  |    |    |    |    |    |    |     |                             |
| tan $\delta$                       | 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 ( $\phi 8 \times 6.2$ ), 2000 hours ( $\phi 8 \times 10.2 \leq$ ) at +125 °C $\pm 2$ °C and then being stabilized at +20 °C, capacitors shall meet the following limits. |  |    |    |    |    |    |    |     |                             |
|                                    | Capacitance change   | $\pm 30$ % of initial measured value (code U : $\pm 35$ %)     |    |    |    |    |    |    |     |                             |
|                                    | tan $\delta$   | $\leq 300$ % of initial specified value (code U : $\pm 350$ %) |    |    |    |    |    |    |     |                             |
|                                    | DC leakage current   | $\leq$ initial specified value                                 |    |    |    |    |    |    |     |                             |
| Shelf Life                         | After storage for 1000 hours at +125 °C $\pm 2$ °C with no voltage applied and then being stabilized at +20 °C, capacitors shall meet the limits specified in Endurance (With voltage treatment)                             |  |    |    |    |    |    |    |     |                             |
|                                    | After reflow soldering and then being stabilized at +20 °C, capacitors shall meet the following limits.  |  |    |    |    |    |    |    |     |                             |
| Resistance to Soldering Heat       | Capacitance change   | $\pm 10$ % of initial measured value                           |    |    |    |    |    |    |     |                             |
|                                    | tan $\delta$   | $\leq$ initial specified value                                 |    |    |    |    |    |    |     |                             |
|                                    | DC leakage current   | $\leq$ initial specified value                                 |    |    |    |    |    |    |     |                             |
|                                    |  |  |    |    |    |    |    |    |     |                             |

#### ■ Marking

Example : 10 V 100  $\mu$ F, 10 V 1000  $\mu$ F  
 Marking color: **BLACK**  
 Lead-Free products ( $\leq \phi 10$ )



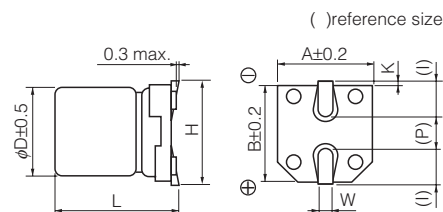
Lead-Free products ( $\ge \phi 12.5$ )



#### 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)



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

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>( $\pm 20\%$ ) | 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>( $\Omega$ ) | $\tan \delta$<br>(120 Hz)<br>(+20 °C) |                              |        | Taping<br><br>(pcs)    |
| (V)  | ( $\mu$ F)             | (mm)      | (mm)   |               |  |  |                                       |                              |        |                        |
| 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.

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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>( $\pm 20\%$ ) | 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>( $\Omega$ ) | $\tan \delta$<br>(120 Hz)<br>(+20 °C) |                              |        | Taping<br>(pcs)        |
| (V)  | ( $\mu$ F)             | (mm)      | (mm)   |               |  |  |                                       |                              |        |                        |
| 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.