

## Surface Mount Type

Series : **TP** Type : **V**

**High temperature**

**Lead-Free reflow (suffix : A\*)**



### Features

- Lower ESR at Low temperature after endurance
- Endurance : 125 °C 3000 h (D8 size : 2000 h)
- Automotive
- Vibration-proof product is available upon request. ( $\phi 8$  mm and larger)
- RoHS compliant

### Specifications

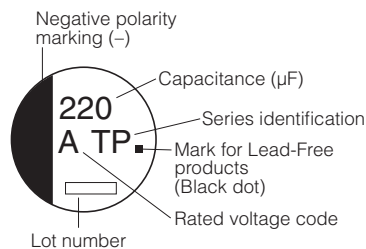
| Category temperature range           | -40 °C to +125 °C  |  |  |  |  |           |  |  |    |   |   |                  |      |     |      |                       |    |     |
|--------------------------------------|--|--|--|--|--|-----------|--|--|----|---|---|------------------|------|-----|------|-----------------------|----|-----|
| Rated voltage range                  | 10 V.DC to 35 V.DC   |  |  |  |  |           |  |  |    |   |   |                  |      |     |      |                       |    |     |
| Capacitance range                    | 47 $\mu$ F to 470 $\mu$ F  |  |  |  |  |           |  |  |    |   |   |                  |      |     |      |                       |    |     |
| Capacitance tolerance                | $\pm 20$ % (120 Hz/+20 °C)   |  |  |  |  |           |  |  |    |   |   |                  |      |     |      |                       |    |     |
| Leakage current                      | $I \leq 0.01 CV$ ( $\mu$ A) After 2 minutes  |  |  |  |  |           |  |  |    |   |   |                  |      |     |      |                       |    |     |
| Dissipation factor ( $\tan \delta$ ) | Please see the attached characteristics list   |  |  |  |  |           |  |  |    |   |   |                  |      |     |      |                       |    |     |
| Endurance                            | After the life test with DC rated working voltage at +125 °C $\pm 2$ °C for 3000 hours (D8 size : 2000 h), the capacitors shall meet the limits specified below.                                 |  |  |  |  |           |  |  |    |   |   |                  |      |     |      |                       |    |     |
|                                      | Capacitance change   | Within $\pm 30$ % of the initial value |  |  |  |           |  |  |    |   |   |                  |      |     |      |                       |    |     |
|                                      | $\tan \delta$  | $\leq 300$ % of the initial limit      |  |  |  |           |  |  |    |   |   |                  |      |     |      |                       |    |     |
|                                      | DC leakage current   | Within the initial limit               |  |  |  |           |  |  |    |   |   |                  |      |     |      |                       |    |     |
|                                      | ESR after endurance ( $\Omega/100kHz$ )  |  | <table border="1"> <thead> <tr> <th rowspan="2"></th> <th colspan="3">Size Code</th> </tr> <tr> <th>D8</th> <th>F</th> <th>G</th> </tr> </thead> <tbody> <tr> <td>Initial (+20 °C)</td> <td>0.45</td> <td>0.2</td> <td>0.15</td> </tr> <tr> <td>After 2000 h (-40 °C)</td> <td>40</td> <td>4.5</td> <td>3.5</td> </tr> </tbody> </table> |  |  | Size Code |  |  | D8 | F | G | Initial (+20 °C) | 0.45 | 0.2 | 0.15 | After 2000 h (-40 °C) | 40 | 4.5 |
|                                      | Size Code  |  |  |  |  |           |  |  |    |   |   |                  |      |     |      |                       |    |     |
|                                      | D8   | F                                      | G  |  |  |           |  |  |    |   |   |                  |      |     |      |                       |    |     |
| Initial (+20 °C)                     | 0.45   | 0.2                                    | 0.15   |  |  |           |  |  |    |   |   |                  |      |     |      |                       |    |     |
| After 2000 h (-40 °C)                | 40   | 4.5                                    | 3.5  |  |  |           |  |  |    |   |   |                  |      |     |      |                       |    |     |
| 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) |  |  |  |  |           |  |  |    |   |   |                  |      |     |      |                       |    |     |
| Resistance to soldering heat         | After reflow soldering and then being stabilized at +20 °C, capacitors shall meet the following limits.  |  |  |  |  |           |  |  |    |   |   |                  |      |     |      |                       |    |     |
|                                      | Capacitance change   | Within $\pm 10$ % of the initial value |  |  |  |           |  |  |    |   |   |                  |      |     |      |                       |    |     |
|                                      | $\tan \delta$  | Within the initial limit               |  |  |  |           |  |  |    |   |   |                  |      |     |      |                       |    |     |
|                                      | DC leakage current   | Within the initial limit               |  |  |  |           |  |  |    |   |   |                  |      |     |      |                       |    |     |
| AEC-Q200                             | AEC-Q200 compliant   |  |  |  |  |           |  |  |    |   |   |                  |      |     |      |                       |    |     |

### Frequency correction factor for ripple current

|                   |      |      |      |          |
|-------------------|------|------|------|----------|
| Frequency (Hz)    | 120  | 1 k  | 10 k | 100 k to |
| Correction factor | 0.65 | 0.85 | 0.95 | 1.00     |

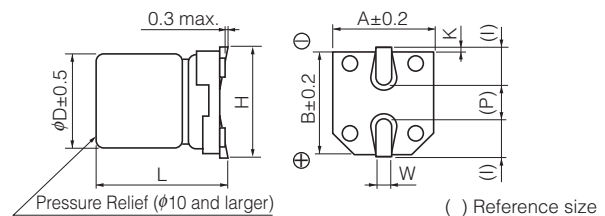
### Marking

Example : 10 V.DC 220  $\mu$ F  
Marking color : BLACK



|                   |    |    |    |    |
|-------------------|----|----|----|----|
| R. Voltage (V.DC) | 10 | 16 | 25 | 35 |
| Code              | A  | C  | E  | V  |

### Dimensions



(Unit : mm)

| Size code | $\phi D$ | L              | A, B | H         | I   | W              | P   | K                       |
|-----------|----------|----------------|------|-----------|-----|----------------|-----|-------------------------|
| D8        | 6.3      | 7.7 $\pm 0.3$  | 6.6  | 7.8 max.  | 2.6 | 0.65 $\pm 0.1$ | 1.8 | 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 $\pm 0.20$         |

## Characteristics list

Endurance : 125 °C 3000 h ( $\phi 6.3 \times 7.7$  : 2000 h)

| Rated voltage<br>(V.DC) | Cap.<br>( $\pm 20\%$ )<br>( $\mu\text{F}$ ) | Case size (mm) |      | Size*<br>code | Specification   |                                  |        | Part No. | Reflow       | Min. Packaging Qty                    |                 |
|-------------------------|---|----------------|------|---------------|---|----------------------------------|--------|----------|--------------|---------------------------------------|-----------------|
|                         |   | $\phi\text{D}$ | L    |               | Ripple current<br>(100 kHz)<br>(+125 °C)<br>(mA r.m.s.) | ESR<br>(100 kHz)<br>( $\Omega$ ) |        |          |              | $\tan \delta$<br>(120 Hz)<br>(+20 °C) | Taping<br>(pcs) |
|                         |   |                |      |               |   | +20 °C                           | -40 °C |          |              |                                       |                 |
| 10                      | 220   | 8              | 10.2 | F             | 270   | 0.20                             | 3      | 0.30     | EEETP1A221AP | (8)                                   | 500             |
|                         | 330   | 8              | 10.2 | (F)           | 270   | 0.20                             | 3      | 0.30     | EEETPA331UAP | (8)                                   | 500             |
|                         |   | 10             | 10.2 | G             | 500   | 0.15                             | 2      | 0.30     | EEETP1A331AP | (8)                                   | 500             |
|                         |   | 470            | 10   | 10.2          | G   | 500                              | 0.15   | 2        | 0.30         | EEETP1A471AP                          | (8)             |
| 16                      | 100   | 6.3            | 7.7  | D8            | 197   | 0.45                             | 5      | 0.23     | EEETPC101XAP | (8)                                   | 900             |
|                         |   | 8              | 10.2 | F             | 270   | 0.20                             | 3      | 0.23     | EEETP1C101AP | (8)                                   | 500             |
|                         | 220   | 8              | 10.2 | F             | 270   | 0.20                             | 3      | 0.23     | EEETP1C221AP | (8)                                   | 500             |
|                         | 330   | 10             | 10.2 | G             | 500   | 0.15                             | 2      | 0.23     | EEETP1C331AP | (8)                                   | 500             |
|                         | 470   | 10             | 10.2 | G             | 500   | 0.15                             | 2      | 0.23     | EEETP1C471AP | (8)                                   | 500             |
|                         | 25  | 100            | 8    | 10.2          | F   | 270                              | 0.20   | 3        | 0.18         | EEETP1E101AP                          | (8)             |
| 220                     |   | 10             | 10.2 | G             | 500   | 0.15                             | 2      | 0.18     | EEETP1E221AP | (8)                                   | 500             |
| 330                     |   | 10             | 10.2 | G             | 500   | 0.15                             | 2      | 0.18     | EEETP1E331AP | (8)                                   | 500             |
| 35                      | 47  | 6.3            | 7.7  | D8            | 197   | 0.45                             | 5      | 0.16     | EEETPV470XAP | (8)                                   | 900             |
|                         |   | 8              | 10.2 | F             | 270   | 0.20                             | 3      | 0.16     | EEETP1V470AP | (8)                                   | 500             |
|                         | 100   | 8              | 10.2 | F             | 270   | 0.20                             | 3      | 0.16     | EEETP1V101AP | (8)                                   | 500             |
|                         | 220   | 10             | 10.2 | G             | 500   | 0.15                             | 2      | 0.16     | EEETP1V221AP | (8)                                   | 500             |

\* Size code( ) : Miniaturization product

If Part number exceeds 12 digits, voltage code is abbreviated as follows; 0J → J, 1A → A, 1C → C, 1E → E, 1V → V

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

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