

## CHIP TYPE SERIES

# TS13CW

### FEATURES

- Case diameter  $\phi 4\text{mm} \sim \phi 18\text{mm}$ .
- Life time 105°C 10000hrs standard product.
- High stability and reliability.
- Available for high density surface mounting.
- Reflow soldering is available.



### Specifications

| ITEMS  |  | PERFORMANCE CHARACTERISTICS               |      |      |  |   |      |         |         |
|--|--|---|------|------|--|---|------|---------|---------|
| Operating Temperature Range                              | -40°C ~ +105°C   |   |      |      |  |   |      |         |         |
| Rated Voltage Range                                      | 6.3 ~ 450V.DC  |   |      |      |  |   |      |         |         |
| Capacitance Range  | 1~1000 $\mu\text{F}$   |   |      |      |  |   |      |         |         |
| Capacitance Tolerance                                    | $\pm 20\%$ at 120Hz, 20°C  |   |      |      |  |   |      |         |         |
| Leakage Current (Max)                                    | 6.3V ~ 50V.DC  |   |      |      | 160V ~ 450V.DC   |   |      |         | 20°C    |
|  | $I \leq 0.03CV$ ( $\mu\text{A}$ ) or 4 ( $\mu\text{A}$ )<br>whichever is greater (after 2 minutes)   |   |      |      | $I \leq 0.04CV + 100$ ( $\mu\text{A}$ )<br>(after 2 minutes)       |   |      |         |         |
|  | I = Leakage Current ( $\mu\text{A}$ )  |   |      |      | C = Nominal Capacitance ( $\mu\text{F}$ )<br>V = Rated Voltage (V) |   |      |         |         |
| Dissipation Factor (Max)<br>Tan $\delta$ (20°C, 120Hz)   | Rated Voltage (V)  | 6.3                                       | 10   | 16   | 25   | 35  | 50   | 160~250 | 400~450 |
|  | Tan $\delta$   | 0.32                                      | 0.28 | 0.26 | 0.16   | 0.14                                      | 0.14 | 0.20    | 0.24    |
| Load Life  | In 105°C degrees Celsius environment, continuous application of rated voltage for 10000 hours, after 16 hours was measured at room temperature, the capacitors shall meet the following requirements : |   |      |      |  |   |      |         |         |
|  | Rated Voltage (V)  | 6.3V ~ 50V                                |      |      |  | 160V ~ 450V                               |      |         |         |
|  | Capacitance Change   | Within $\pm 30\%$ of the initial value    |      |      |  | Within $\pm 20\%$ of the initial value    |      |         |         |
|  | Dissipation Factor   | Not more than 300% of the specified value |      |      |  | Not more than 200% of the specified value |      |         |         |
|  | Leakage Current  | Not more than the specified value         |      |      |  | Not more than the specified value         |      |         |         |
| Shelf Life   | In 105°C degrees Celsius environment, without load for 1000 hours, after 16 hours was measured at room temperature, the capacitors shall meet the following requirements :                             |   |      |      |  |   |      |         |         |
|  | Rated Voltage (V)  | 6.3V ~ 50V                                |      |      |  | 160V ~ 450V                               |      |         |         |
|  | Capacitance Change   | Within $\pm 30\%$ of the initial value    |      |      |  | Within $\pm 20\%$ of the initial value    |      |         |         |
|  | Dissipation Factor   | Not more than 300% of the specified value |      |      |  | Not more than 200% of the specified value |      |         |         |
|  | Leakage Current  | Within 300% of initial specified value    |      |      |  | Within 200% of initial specified value    |      |         |         |
| Resistance to Soldering Heat                             | The capacitors shall be kept on then hot plate maintained at 250°C for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the following requirement:            |   |      |      |  |   |      |         |         |
|  | Capacitance Change   | Within $\pm 10\%$ of initial value        |      |      |  |   |      |         |         |
|  | Dissipation Factor   | Not more than the initial specified value |      |      |  |   |      |         |         |
|  | Leakage Current  | Not more than the initial specified value |      |      |  |   |      |         |         |
| Low Temperature Stability<br>Impedance Ratio (MAX) 120Hz | Rated Voltage (V)  | 6.3                                       | 10   | 16   | 25   | 35  | 50   | 160~250 | 400~450 |
|  | Z-25°C / Z+20°C  | 4   | 3    | 2    | 2  | 2   | 2    | 6       | 6       |
|  | Z-40°C / Z+20°C  | 10  | 8    | 6    | 4  | 3   | 3    | 10      | 18      |

### Drawing (Unit: mm)

Fig. 1 ( $\Phi 4 \sim \Phi 10$ )

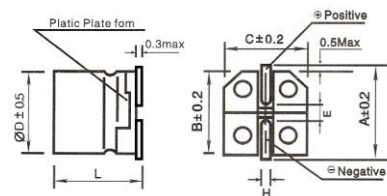
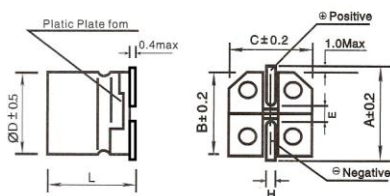


Fig. 2 ( $\geq \Phi 12.5$ )



| $\Phi D$ | L              | A    | B    | C    | E   | H       | Fig. No. |
|----------|----------------|------|------|------|-----|---------|----------|
| 6.3      | 7.7 $\pm 0.3$  | 7.2  | 6.6  | 6.6  | 2.1 | 0.5~0.9 | 1        |
| 6.3      | 10.2 $\pm 0.3$ | 7.2  | 6.6  | 6.6  | 2.1 | 0.5~0.9 | 1        |
| 8        | 10.2 $\pm 0.5$ | 9.1  | 8.3  | 8.3  | 3.1 | 0.8~1.1 | 1        |
| 8        | 12.5 $\pm 0.5$ | 9.1  | 8.3  | 8.3  | 3.1 | 0.8~1.1 | 1        |
| 10       | 10.2 $\pm 0.5$ | 11.1 | 10.3 | 10.3 | 4.5 | 0.8~1.1 | 1        |
| 10       | 12.5 $\pm 0.5$ | 11.1 | 10.3 | 10.3 | 4.5 | 0.8~1.1 | 1        |
| 12.5     | 13.5 $\pm 0.5$ | 13.7 | 13.0 | 13.0 | 4.4 | 1.0~1.4 | 2        |
| 12.5     | 16 $\pm 0.5$   | 13.7 | 13.0 | 13.0 | 4.4 | 1.0~1.4 | 2        |
| 16       | 16.5 $\pm 0.5$ | 18.0 | 17.0 | 17.0 | 6.4 | 1.0~1.4 | 2        |
| 16       | 21.5 $\pm 0.5$ | 18.0 | 17.0 | 17.0 | 6.4 | 1.0~1.4 | 2        |
| 18       | 16.5 $\pm 0.5$ | 20.0 | 19.0 | 19.0 | 6.4 | 1.0~1.4 | 2        |
| 18       | 21.5 $\pm 0.5$ | 20.0 | 19.0 | 19.0 | 6.4 | 1.0~1.4 | 2        |

# TS13CW

### ◆ Standard size

| WV   | 6.3     |       |     | 10     |       |     | 16      |       |     | 25      |       |     | 35      |       |     | 50      |       |     |
|------|---------|-------|-----|--------|-------|-----|---------|-------|-----|---------|-------|-----|---------|-------|-----|---------|-------|-----|
| μF   | DxL     | Tan δ | mA  | DxL    | Tan δ | mA  | DxL     | Tan δ | mA  | DxL     | Tan δ | mA  | DxL     | Tan δ | mA  | DxL     | Tan δ | mA  |
| 10   | --      | --    | --  | --     | --    | --  | --      | --    | --  | --      | --    | --  | 6.3x7.7 | 0.14  | 31  | --      | --    | --  |
| 22   | --      | --    | --  | --     | --    | --  | --      | --    | --  | --      | --    | --  | 6.3x7.7 | 0.14  | 43  | --      | --    | --  |
| 33   | --      | --    | --  | --     | --    | --  | --      | --    | --  | 6.3x7.7 | 0.16  | 48  | --      | --    | --  | 8x10.2  | 0.14  | 79  |
| 47   | --      | --    | --  | --     | --    | --  | 6.3x7.7 | 0.26  | 50  | --      | --    | --  | 8x10.2  | 0.14  | 90  | 8x10.2  | 0.14  | 95  |
| 100  | 6.3x7.7 | 0.32  | 60  | --     | --    | --  | --      | --    | --  | 8x10.2  | 0.16  | 119 | 8x10.2  | 0.14  | 132 | 10x10.2 | 0.14  | 155 |
| 220  | --      | --    | --  | 8x10.2 | 0.28  | 145 | 8x10.2  | 0.26  | 159 | --      | --    | --  | 10x10.2 | 0.14  | 220 | --      | --    | --  |
| 330  | 8x10.2  | 0.32  | 165 | --     | --    | --  | 8x10.2  | 0.26  | 194 | --      | --    | --  | --      | --    | --  | --      | --    | --  |
| 470  | 8x10.2  | 0.32  | 196 | --     | --    | --  | 10x10.2 | 0.26  | 260 | --      | --    | --  | --      | --    | --  | --      | --    | --  |
| 1000 | 10x10.2 | 0.32  | 315 | --     | --    | --  | --      | --    | --  | --      | --    | --  | --      | --    | --  | --      | --    | --  |

| WV  | 160       |       |     | 200       |       |     | 250       |       |     | 400       |       |    | 450       |       |    |
|-----|-----------|-------|-----|-----------|-------|-----|-----------|-------|-----|-----------|-------|----|-----------|-------|----|
| μF  | DxL       | Tan δ | mA  | DxL       | Tan δ | mA  | DxL       | Tan δ | mA  | DxL       | Tan δ | mA | DxL       | Tan δ | mA |
| 1   |           |       |     |           |       |     | 6.3x10.5  | 0.20  | 20  | 6.3x10.5  | 0.24  | 17 | 8x10.2    | 0.24  | 20 |
| 2.2 |           |       |     |           |       |     | 6.3x10.5  | 0.20  | 31  | 8x10.2    | 0.24  | 30 | 10x10.2   | 0.24  | 35 |
| 3.3 |           |       |     |           |       |     | 8x10.2    | 0.20  | 43  | 10x10.2   | 0.24  | 39 | 10x10.2   | 0.24  | 38 |
| 4.7 |           |       |     | 8x10.2    | 0.20  | 53  | 8x10.2    | 0.20  | 52  | 10x10.2   | 0.24  | 56 | 10x10.2   | 0.24  | 59 |
| 5.6 |           |       |     | 8x10.2    | 0.20  | 58  | 8x12.5    | 0.20  | 62  | 10x10.2   | 0.24  | 66 | 12.5x13.5 | 0.24  | 75 |
| 6.8 | 8x10.2    | 0.20  | 68  | 8x10.2    | 0.20  | 64  | 10x10.2   | 0.20  | 72  | 12.5x13.5 | 0.24  | 72 |           |       |    |
| 8.2 | 10x10.2   | 0.20  | 85  | 8x12.5    | 0.20  | 77  | 10x12.5   | 0.20  | 85  |           |       |    |           |       |    |
| 10  | 10x10.2   | 0.20  | 95  | 12.5x13.5 | 0.20  | 110 | 12.5x13.5 | 0.20  | 110 |           |       |    |           |       |    |
| 12  | 10x10.2   | 0.20  | 104 | 12.5x13.5 | 0.20  | 125 | 12.5x13.5 | 0.20  | 120 |           |       |    |           |       |    |
| 15  | 12.5x13.5 | 0.20  | 140 | 12.5x13.5 | 0.20  | 140 |           |       |     |           |       |    |           |       |    |

Rated ripple current (mA, 105°C, 120Hz)

### ◆ Frequency coefficient

| Frequency   | 120Hz | 1kHz | 10kHz | 100kHz |
|-------------|-------|------|-------|--------|
| Coefficient | 1.00  | 1.60 | 1.80  | 2.00   |

Note: Specifications are subject to change without notice. For more detail and update, please visit our website.