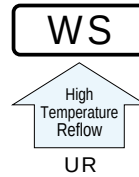


**WS** Chip Type, High CV  
High Temperature (260°C) Reflow  
series



- Corresponding with 260°C peak reflow soldering  
Recommended reflow condition : 260°C peak 5 sec. 230°C over 60 sec. 2 times  
( $\phi 8 \times 6.2$ ,  $\phi 10 \times 10$  : 1 time)
- Chip type higher capacitance in large case size.
- Applicable to automatic mounting machine fed with carrier tape.
- Compliant to the RoHS directive (2011/65/EU).

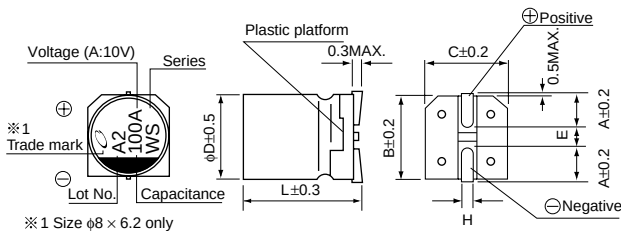


## Specifications

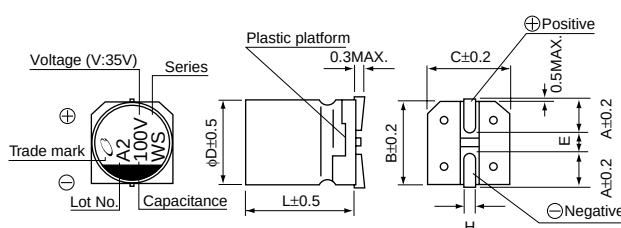
|                               |                                                                                                                                                                                                                                        |                 |      |      |                    |      |                                                   |    |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------|------|--------------------|------|---------------------------------------------------|----|
| Item                          | Performance Characteristics                                                                                                                                                                                                            |                 |      |      |                    |      |                                                   |    |
| Category Temperature Range    | -40 to +85°C                                                                                                                                                                                                                           |                 |      |      |                    |      |                                                   |    |
| Rated Voltage Range           | 6.3 to 50V                                                                                                                                                                                                                             |                 |      |      |                    |      |                                                   |    |
| Rated Capacitance Range       | 22 to 1500μF                                                                                                                                                                                                                           |                 |      |      |                    |      |                                                   |    |
| Capacitance Tolerance         | ± 20% at 120Hz, 20°C                                                                                                                                                                                                                   |                 |      |      |                    |      |                                                   |    |
| Leakage Current               | After 1 minute's application of rated voltage, leakage current is not more than 0.03CV (μA) .                                                                                                                                          |                 |      |      |                    |      |                                                   |    |
| Tangent of loss angle (tan δ) | Measurement frequency : 120Hz at 20°C                                                                                                                                                                                                  |                 |      |      |                    |      |                                                   |    |
|                               | Rated voltage (V)                                                                                                                                                                                                                      | 6.3             | 10   | 16   | 25                 | 35   | 50                                                |    |
|                               | tan δ (MAX.)                                                                                                                                                                                                                           | 0.28            | 0.24 | 0.20 | 0.16               | 0.14 | 0.12                                              |    |
| Stability at Low Temperature  | Measurement frequency: 120Hz                                                                                                                                                                                                           |                 |      |      |                    |      |                                                   |    |
|                               | Rated voltage (V)                                                                                                                                                                                                                      |                 | 6.3  | 10   | 16                 | 25   | 35                                                | 50 |
|                               | Impedance ratio<br>ZT / Z20 (MAX.)                                                                                                                                                                                                     | Z-25°C / Z+20°C | 5    | 4    | 3                  | 2    | 2                                                 | 2  |
|                               |                                                                                                                                                                                                                                        | Z-40°C / Z+20°C | 10   | 8    | 6                  | 4    | 3                                                 | 3  |
| Endurance                     | The specifications listed at right shall be met when the capacitors are restored to 20°C after the rated voltage is applied for 2000 hours at 85°C.                                                                                    |                 |      |      | Capacitance change |      | Within ±20% of the initial capacitance value      |    |
|                               |                                                                                                                                                                                                                                        |                 |      |      | tan δ              |      | 200% or less than the initial specified value     |    |
|                               |                                                                                                                                                                                                                                        |                 |      |      | Leakage current    |      | Less than or equal to the initial specified value |    |
| Shelf Life                    | After storing the capacitors under no load at 85°C for 1000 hours and then performing voltage treatment based on JIS C 5101-4 clause 4.1 at 20°C, they shall meet the specified values for the endurance characteristics listed above. |                 |      |      |                    |      |                                                   |    |
| Resistance to soldering heat  | The capacitors are kept on a hot plate for 30 seconds, which is maintained at 250°C. The capacitors shall meet the characteristic requirements listed at right when they are removed from the plate and restored to 20°C.              |                 |      |      | Capacitance change |      | Within ±10% of the initial capacitance value      |    |
|                               |                                                                                                                                                                                                                                        |                 |      |      | tan δ              |      | Less than or equal to the initial specified value |    |
|                               |                                                                                                                                                                                                                                        |                 |      |      | Leakage current    |      | Less than or equal to the initial specified value |    |
| Marking                       | Black print on the case top.                                                                                                                                                                                                           |                 |      |      |                    |      |                                                   |    |

## Chip Type

( $\phi 6.3$ ,  $\phi 8 \times 6.2$ )



( $\phi 8 \times 10$ ,  $\phi 10 \times 10$ )



## Type numbering system (Example : 10V 100 $\mu$ F)

|   |   |   |   |   |   |   |   |   |    |    |    |                              |    |
|---|---|---|---|---|---|---|---|---|----|----|----|------------------------------|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13                           | 14 |
| U | W | S | 1 | A | 1 | 0 | 1 | M | C  | L  | 1  | G                            | S  |
|   |   |   |   |   |   |   |   |   |    |    |    | Package code                 |    |
|   |   |   |   |   |   |   |   |   |    |    |    | Configuration                |    |
|   |   |   |   |   |   |   |   |   |    |    |    | Capacitance tolerance (±20%) |    |
|   |   |   |   |   |   |   |   |   |    |    |    | Rated capacitance (100μF)    |    |
|   |   |   |   |   |   |   |   |   |    |    |    | Rated voltage (10V)          |    |
|   |   |   |   |   |   |   |   |   |    |    |    | Series name                  |    |
|   |   |   |   |   |   |   |   |   |    |    |    | Type                         |    |

## Voltage

|      |     |    |    |    |    |    |
|------|-----|----|----|----|----|----|
| V    | 6.3 | 10 | 16 | 25 | 35 | 50 |
| Code | j   | A  | C  | E  | V  | H  |

● Dimension table in next page.

## ■Dimensions

| V         |      | 6.3     |     | 10        |     | 16        |     | 25        |     | 35        |     | 50                       |                 |
|-----------|------|---------|-----|-----------|-----|-----------|-----|-----------|-----|-----------|-----|--------------------------|-----------------|
| Cap. (μF) | Code | 0J      |     | 1A        |     | 1C        |     | 1E        |     | 1V        |     | 1H                       |                 |
| 22        | 220  |         |     |           |     |           |     |           |     |           |     | 6.3 × 5.8                | 45              |
| 33        | 330  |         |     |           |     |           |     |           |     | 6.3 × 5.8 | 55  | 8 × 6.2                  | 95              |
| 47        | 470  |         |     |           |     |           |     | 6.3 × 5.8 | 65  | 8 × 6.2   | 105 | 8 × 10                   | 140             |
| 100       | 101  |         |     | 6.3 × 5.8 | 70  | 8 × 6.2   | 125 | 8 × 6.2   | 145 | 8 × 10    | 175 | 10 × 10                  | 195             |
| 150       | 151  |         |     | 6.3 × 5.8 | 85  | 6.3 × 7.7 | 151 | 8 × 10    | 192 | 8 × 10    | 214 | 10 × 10                  | 238             |
| 220       | 221  | 8 × 6.2 | 160 | 8 × 6.2   | 175 | 8 × 10    | 215 | 10 × 10   | 250 | 10 × 10   | 265 | 10 × 10                  | 289             |
| 330       | 331  | 8 × 6.2 | 190 | 8 × 10    | 240 | 8 × 10    | 270 | 10 × 10   | 305 | 10 × 10   | 324 |                          |                 |
| 470       | 471  | 8 × 10  | 265 | 8 × 10    | 290 | 10 × 10   | 330 | 10 × 10   | 393 |           |     |                          |                 |
| 680       | 681  | 8 × 10  | 318 | 10 × 10   | 374 | 10 × 10   | 396 |           |     |           |     |                          |                 |
| 1000      | 102  | 10 × 10 | 400 | 10 × 10   | 454 |           |     |           |     |           |     | Case size<br>φD × L (mm) | Rated<br>ripple |
| 1500      | 152  | 10 × 10 | 489 |           |     |           |     |           |     |           |     |                          |                 |

Rated ripple current (mA rms) at 85°C 120Hz

## ●Frequency coefficient of rated ripple current

| Cap. (μF)    | Frequency | 50 Hz | 120 Hz | 300 Hz | 1 kHz | 10 kHz or more |
|--------------|-----------|-------|--------|--------|-------|----------------|
| Less than 47 |           | 0.80  | 1.00   | 1.15   | 1.40  | 1.67           |
| 100 to 1500  |           | 0.85  | 1.00   | 1.08   | 1.20  | 1.30           |

- Taping specifications are given in page 23.
- Recommended land size, soldering by reflow are given in page 18, 19.
- Please refer to page 3 for the minimum order quantity.