

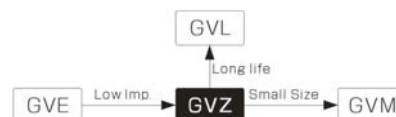
Surface Mount Aluminum Electrolytic Capacitors

**GVZ** 105°C, Lower Impedance.  
Series



**Features**

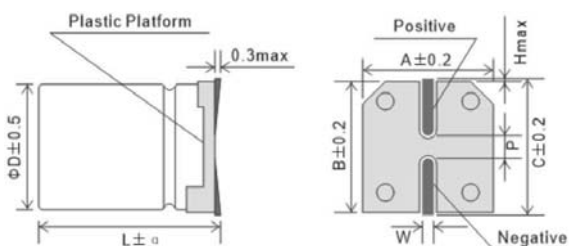
105°C, 2000~3000 hours assured, Extra low Impedance.  
Impedance 50~70% less than GVE series.  
Available for high density surface mounting.



**Specifications**

| Item                            | Condition  | Specifications                         |   |      |      |      |      |      |      |      |  |
|---------------------------------|--|--|---|------|------|------|------|------|------|------|--|
| Category Temperature Range(°C)  | —  | -55°C ~ +105°C                         |   |      |      |      |      |      |      |      |  |
| Capacitance Tolerance (%)       | 120Hz, 20°C  | ±20%                                   |   |      |      |      |      |      |      |      |  |
| Rated Voltage (V)               | —  | 6.3                                    | 10  | 16   | 25   | 35   | 50   | 63   | 100  |      |  |
| Dissipation Factor (tanδ)       | 120Hz, 20°C (Max.)   | tanδ                                   | 0.26  | 0.18 | 0.16 | 0.14 | 0.12 | 0.10 | 0.10 | 0.07 |  |
|                                 |  | Notes                                  | Exceeding 1,000uF, +0.02 every 1,000uF      |      |      |      |      |      |      |      |  |
| Leakage Current (LC)            | After 2 minutes, 20°C (uA, Max.)                             | 0.01CV or 3uA, whichever is greater.   |   |      |      |      |      |      |      |      |  |
| Low Temperature Characteristics | Impedance Ratio (Max.)                                       | Z <sub>-25°C</sub> /Z <sub>+20°C</sub> | 4   | 3    | 2    | 2    | 2    | 2    | 2    | 2    |  |
|                                 |  | Z <sub>-55°C</sub> /Z <sub>+20°C</sub> | 8   | 5    | 4    | 3    | 3    | 3    | 3    | 3    |  |
| Endurance                       | 105°C, Rated Voltage Applied (With the rated ripple current) | Hours                                  | 3,000 (2,000hrs. for Ø4~Ø6.3)               |      |      |      |      |      |      |      |  |
|                                 |  | ΔC/C                                   | Within ±30% of initial value                |      |      |      |      |      |      |      |  |
|                                 |  | tanδ                                   | 300% or less of the initial specified value |      |      |      |      |      |      |      |  |
|                                 |  | LC                                     | The initial specified value or less         |      |      |      |      |      |      |      |  |
| Shelf life                      | 105°C  | Hours                                  | 1,000                                       |      |      |      |      |      |      |      |  |
|                                 |  | Other Items                            | same as those for the endurance.            |      |      |      |      |      |      |      |  |

**Dimensions**



| D   | L    | A    | B    | C    | P   | α    | W       |
|-----|------|------|------|------|-----|------|---------|
| 4   | 5.7  | 4.3  | 4.3  | 5.0  | 1.0 | ±0.3 | 0.5-0.8 |
| 5   | 5.7  | 5.3  | 5.3  | 6.0  | 1.5 | ±0.3 | 0.5-0.8 |
| 6.3 | 5.7  | 6.6  | 6.6  | 7.3  | 2.0 | ±0.3 | 0.5-0.8 |
| 6.3 | 7.7  | 6.6  | 6.6  | 7.3  | 2.0 | ±0.3 | 0.5-0.8 |
| 8   | 10.5 | 8.3  | 8.3  | 9.0  | 3.1 | ±0.5 | 0.7-1.2 |
| 10  | 10.5 | 10.3 | 10.3 | 11.0 | 4.7 | ±0.5 | 0.7-1.2 |

**Rated Ripple Current Multipliers**

| Frequency (Hz)   | 50   | 120  | 1k   | 10k  | 100K |
|------------------|------|------|------|------|------|
| Capacitance (uF) |      |      |      |      |      |
| Under 100        | 0.35 | 0.50 | 0.70 | 0.90 | 1.00 |
| 100 ~ 2200uF     | 0.40 | 0.65 | 0.85 | 0.95 | 1.00 |

# GVZ Series

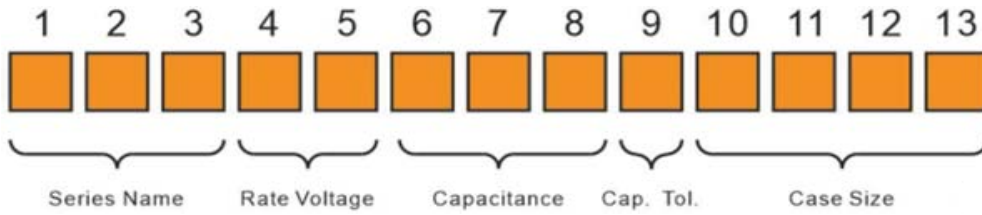
## ■ Dimensions

| uF   | WV | 6.3v(0J) |      |      | 10v(1A) |      |      | 16v(1C) |      |      | 25v(1E) |      |      | 35v(1V) |         |      | 50v(1H) |         |      |     |
|------|----|----------|------|------|---------|------|------|---------|------|------|---------|------|------|---------|---------|------|---------|---------|------|-----|
|      |    | ΦDxL     | Imp. | R.C. | ΦDxL    | Imp. | R.C. | ΦDxL    | Imp. | R.C. | ΦDxL    | Imp. | R.C. | ΦDxL    | Imp.    | R.C. | ΦDxL    | Imp.    | R.C. |     |
| 1    |    |          |      |      |         |      |      |         |      |      |         |      |      |         |         |      | 4x5.7   | 2.9     | 60   |     |
| 1.5  |    |          |      |      |         |      |      |         |      |      |         |      |      |         |         |      | 4x5.7   | 2.9     | 60   |     |
| 2.2  |    |          |      |      |         |      |      |         |      |      |         |      |      |         |         |      | 4x5.7   | 2.9     | 60   |     |
| 3.3  |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 4x5.7   | 1.8  | 80      | 4x5.7   | 2.9  | 60  |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 5x5.7   | 1.52 | 85      | 5x5.7   | 1.52 | 85  |
| 4.7  |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 4x5.7   | 1.8  | 80      | 4x5.7   | 2.9  | 60  |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 5x5.7   | 1.52 | 85      | 5x5.7   | 1.52 | 85  |
| 10   |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 4x5.7   | 1.8  | 80      | 4x5.7   | 2.9  | 60  |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 5x5.7   | 0.76 | 150     | 5x5.7   | 0.76 | 150 |
| 15   |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 4x5.7   | 1.8  | 80      | 4x5.7   | 2.9  | 60  |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 5x5.7   | 0.76 | 150     | 5x5.7   | 0.76 | 150 |
| 22   |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 4x5.7   | 1.8  | 80      | 4x5.7   | 2.9  | 60  |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 5x5.7   | 0.76 | 150     | 5x5.7   | 0.76 | 150 |
| 33   |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 4x5.7   | 1.8  | 80      | 4x5.7   | 2.9  | 60  |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 5x5.7   | 0.76 | 150     | 5x5.7   | 0.76 | 150 |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 6.3x5.7 | 0.44 | 230     | 6.3x5.7 | 0.44 | 230 |
| 47   |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 4x5.7   | 1.8  | 80      | 4x5.7   | 2.9  | 60  |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 5x5.7   | 0.76 | 150     | 5x5.7   | 0.76 | 150 |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 6.3x5.7 | 0.44 | 230     | 6.3x5.7 | 0.44 | 230 |
| 56   |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 4x5.7   | 1.8  | 80      | 4x5.7   | 2.9  | 60  |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 5x5.7   | 0.76 | 150     | 5x5.7   | 0.76 | 150 |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 6.3x5.7 | 0.44 | 230     | 6.3x5.7 | 0.44 | 230 |
| 68   |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 4x5.7   | 1.8  | 80      | 4x5.7   | 2.9  | 60  |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 5x5.7   | 0.76 | 150     | 5x5.7   | 0.76 | 150 |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 6.3x5.7 | 0.44 | 230     | 6.3x5.7 | 0.44 | 230 |
| 100  |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 4x5.7   | 1.8  | 80      | 4x5.7   | 2.9  | 60  |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 5x5.7   | 0.76 | 150     | 5x5.7   | 0.76 | 150 |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 6.3x5.7 | 0.44 | 230     | 6.3x5.7 | 0.44 | 230 |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 6.3x7.7 | 0.34 | 280     | 6.3x7.7 | 0.34 | 280 |
| 150  |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 4x5.7   | 1.8  | 80      | 4x5.7   | 2.9  | 60  |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 5x5.7   | 0.76 | 150     | 5x5.7   | 0.76 | 150 |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 6.3x5.7 | 0.44 | 230     | 6.3x5.7 | 0.44 | 230 |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 6.3x7.7 | 0.34 | 280     | 6.3x7.7 | 0.34 | 280 |
| 220  |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 4x5.7   | 1.8  | 80      | 4x5.7   | 2.9  | 60  |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 5x5.7   | 0.76 | 150     | 5x5.7   | 0.76 | 150 |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 6.3x5.7 | 0.44 | 230     | 6.3x5.7 | 0.44 | 230 |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 6.3x7.7 | 0.34 | 280     | 6.3x7.7 | 0.34 | 280 |
| 330  |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 4x5.7   | 1.8  | 80      | 4x5.7   | 2.9  | 60  |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 5x5.7   | 0.76 | 150     | 5x5.7   | 0.76 | 150 |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 6.3x5.7 | 0.44 | 230     | 6.3x5.7 | 0.44 | 230 |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 6.3x7.7 | 0.34 | 280     | 6.3x7.7 | 0.34 | 280 |
| 470  |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 4x5.7   | 1.8  | 80      | 4x5.7   | 2.9  | 60  |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 5x5.7   | 0.76 | 150     | 5x5.7   | 0.76 | 150 |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 6.3x5.7 | 0.44 | 230     | 6.3x5.7 | 0.44 | 230 |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 6.3x7.7 | 0.34 | 280     | 6.3x7.7 | 0.34 | 280 |
| 680  |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 4x5.7   | 1.8  | 80      | 4x5.7   | 2.9  | 60  |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 5x5.7   | 0.76 | 150     | 5x5.7   | 0.76 | 150 |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 6.3x5.7 | 0.44 | 230     | 6.3x5.7 | 0.44 | 230 |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 6.3x7.7 | 0.34 | 280     | 6.3x7.7 | 0.34 | 280 |
| 1000 |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 4x5.7   | 1.8  | 80      | 4x5.7   | 2.9  | 60  |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 5x5.7   | 0.76 | 150     | 5x5.7   | 0.76 | 150 |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 6.3x5.7 | 0.44 | 230     | 6.3x5.7 | 0.44 | 230 |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 6.3x7.7 | 0.34 | 280     | 6.3x7.7 | 0.34 | 280 |
| 1500 |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 4x5.7   | 1.8  | 80      | 4x5.7   | 2.9  | 60  |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 5x5.7   | 0.76 | 150     | 5x5.7   | 0.76 | 150 |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 6.3x5.7 | 0.44 | 230     | 6.3x5.7 | 0.44 | 230 |
|      |    |          |      |      |         |      |      |         |      |      |         |      |      |         | 6.3x7.7 | 0.34 | 280     | 6.3x7.7 | 0.34 | 280 |

Note1: Case size ΦD x L(mm), ripple current (mA, rms) at 105°C, 100KHz.

Note2: Produce custom product too, which are not found in these tables.

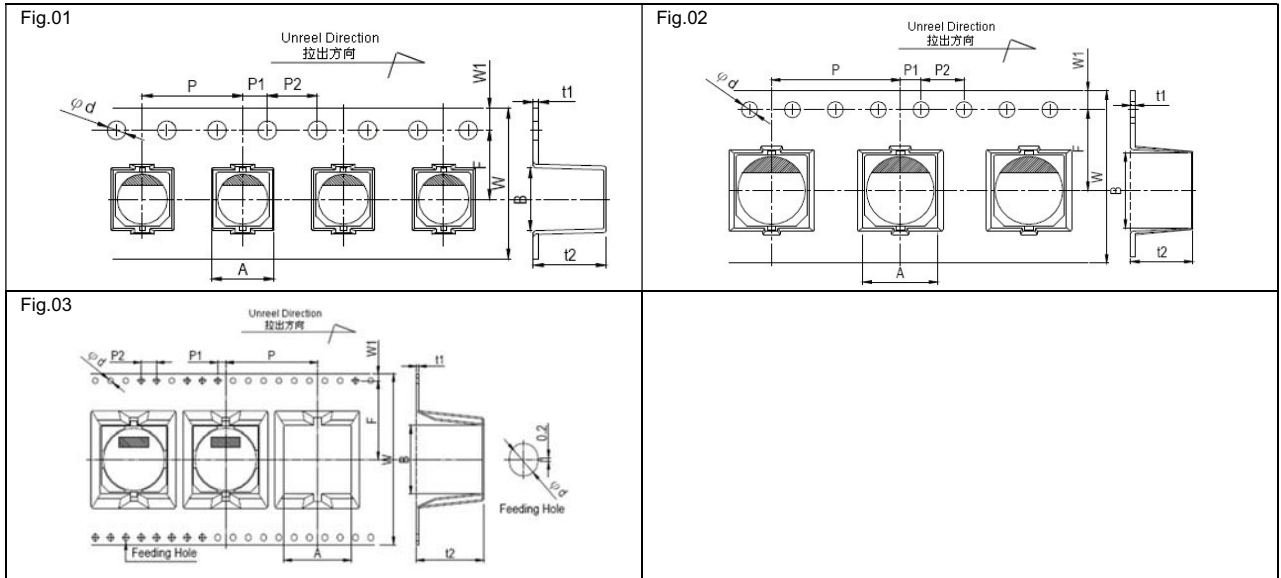
■ Explanation of Part Numbers



| (1-3)  | (4-5)         | (6-8) | (9)              | (10-13) |                    |      |                 |      |
|--------|---------------|-------|------------------|---------|--------------------|------|-----------------|------|
| Series | Voltage (W.V) | Code  | Capacitance (mF) | Code    | Cap. Tolerance (%) | Code | Size $\phi$ DxL | Code |
| GVS    | 4             | 0G    | 0.1              | 0R1     | +5                 | J    | 4x5(5.7)        | 0405 |
| GVT    | 6.3           | 0J    | 0.22             | 0R22    | -5                 |      | 4x7             | 0407 |
| GVE    | 10            | 1A    | 0.33             | 0R33    | +10                | K    | 5x5(5.7)        | 0505 |
| GVZ    | 16            | 1C    | 0.47             | 0R47    | -10                |      | 5x7             | 0507 |
| GVM    | 25            | 1E    | 1                | 1R0     | +15                | L    | 5x11            | 0511 |
| GVL    | 35            | 1V    | 2.2              | 2R2     | -15                |      | 6.3x5(5.7)      | 0605 |
| GVU    | 50            | 1H    | 3.3              | 3R3     | +20                | M    | 6.3x7(7.7)      | 0607 |
| GVY    | 63            | 1J    | 4.7              | 4R7     | -20                |      | 6.3x11          | 0611 |
| GVF    | 80            | 1K    | 10               | 100     | +30                | N    | 8x5             | 0805 |
| GVR    | 100           | 2A    | 22               | 220     | -30                |      | 8x6.5           | 0806 |
| GVG    | 125           | 2B    | 33               | 330     | +20                | V    | 8x9             | 0809 |
| GVD    | 160           | 2C    | 47               | 470     | -10                |      | 8x10(10.5)      | 0810 |
| GVP    | 180           | 2Z    | 68               | 680     | +30                | Q    | 8x11(11.5)      | 0811 |
| GVT    | 200           | 2D    | 100              | 101     | -10                |      | 8x12            | 0812 |
| GVC    | 220           | 2P    | 220              | 221     | +50                | T    | 10x10(10.5)     | 1010 |
| GVN    | 250           | 2E    | 330              | 331     | -10                |      | 10x12.5         | 1012 |
| GVK    | 315           | 2F    | 470              | 471     | +50                | S    | 10x14           | 1014 |
| GVA    | 330           | 2L    | 680              | 681     | -20                |      | 12.5x13.5       | 1213 |
|        | 350           | 2V    | 1000             | 102     | +80                | Z    | 12.5x16         | 1216 |
|        | 400           | 2G    | 2200             | 222     | -20                |      | 16x16.5         | 1616 |
|        | 420           | 2Q    | 3300             | 332     | +20                | R    | 16x25           | 1625 |
|        | 450           | 2W    | 4700             | 472     | -0                 |      | 20x25           | 2025 |
|        | 500           | 2H    | 6800             | 682     |                    |      | 35x42           | 3542 |

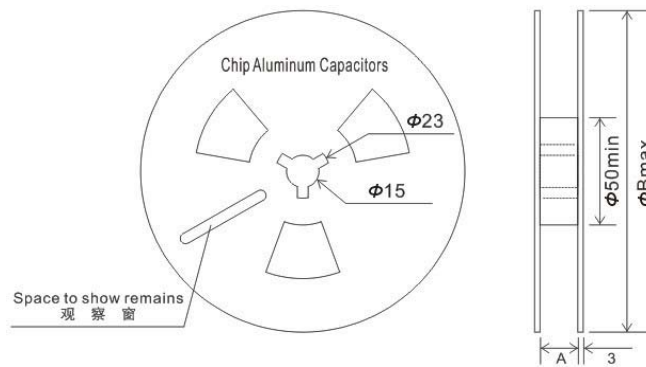
## ■ Taping Specifications

### ■ Carrier Tape



| Case Size   | W (mm) | W1 (mm) | F (mm) | P (mm) | P1 (mm) | P2 (mm) | A (mm) | B (mm) | t1 (mm) | t2 (mm) |
|-------------|--------|---------|--------|--------|---------|---------|--------|--------|---------|---------|
| φ 4x5.7     | 12     | 1.75    | 5.5    | 8      | 2       | 4       | 4.7    | 4.7    | 0.4     | 6.3     |
| φ 5x5.7     | 12     |         | 5.5    | 12     |         |         | 6      | 6      |         | 6.3     |
| φ 6.3x5.7   | 16     |         | 7.5    | 12     |         |         | 7      | 7      |         | 6.3     |
| φ 6.3x7.7   | 16     |         | 7.5    | 12     |         |         | 7      | 7      |         | 8.3     |
| φ 8x6.5     | 16     |         | 7.5    | 12     |         |         | 8.7    | 8.7    |         | 7       |
| φ 8x10.5    | 24     |         | 11.5   | 16     |         |         | 8.7    | 8.7    |         | 11      |
| φ 10x10.5   | 24     |         | 11.5   | 16     |         |         | 10.7   | 10.7   |         | 11      |
| φ 10x13.5   | 24     |         | 11.5   | 16     |         |         | 10.7   | 10.7   |         | 14.1    |
| φ 12.5x13.5 | 32     |         | 14.2   | 24     |         |         | 14     | 14     |         | 14.1    |
| φ 12.5x16   | 32     |         | 14.2   | 24     |         |         | 14     | 14     |         | 16.4    |
| φ 16x16.5   | 44     | 20.2    | 28     | 17.5   | 17.5    | 16.9    |        |        |         |         |
| φ 16x21.5   | 44     | 20.2    | 28     | 17.5   | 17.5    | 21.9    |        |        |         |         |
| φ 18x16.5   | 44     | 20.2    | 32     | 19.5   | 19.5    | 16.9    |        |        |         |         |
| φ 18x21.5   | 44     | 20.2    | 32     | 19.5   | 19.5    | 21.9    |        |        |         |         |
| Tolerance   | ±0.3   | ±0.15   | ±0.1   | ±0.1   | ±0.1    | ±0.1    | ±0.2   | ±0.2   | ±0.1    | ±0.2    |

### ■ Carrier Tape



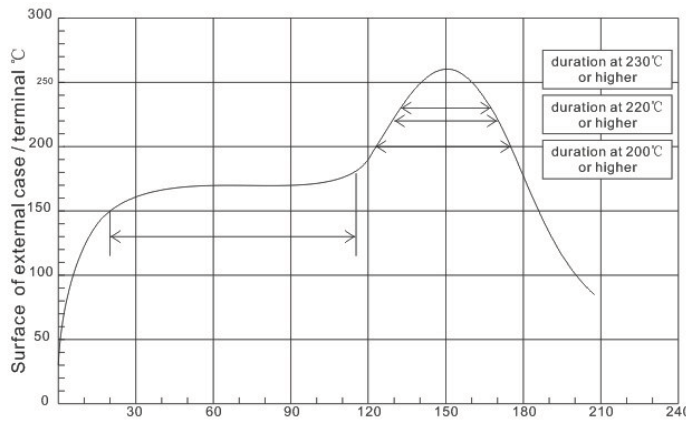
| Case Size | Reel | Carton | A±0.3 | B±2 | Case Size   | Reel | Carton | A±0.3 | B±2 |
|-----------|------|--------|-------|-----|-------------|------|--------|-------|-----|
| φ 4x5.7   | 2000 | 20000  | 14    | 382 | φ 10x13.5   | 300  | 3000   | 26    | 382 |
| φ 5x5.7   | 1000 | 10000  | 14    | 382 | φ 12.5x13.5 | 200  | 600    | 34    | 332 |
| φ 6.3x5.7 | 1000 | 10000  | 18    | 382 | φ 12.5x16   | 150  | 450    | 34    | 332 |
| φ 6.3x7.7 | 1000 | 10000  | 18    | 382 | φ 16x16.5   | 125  | 250    | 46    | 332 |
| φ 8x6.5   | 1000 | 10000  | 18    | 382 | φ 16x21.5   | 75   | 150    | 46    | 332 |
| φ 8x10.2  | 500  | 5000   | 26    | 382 | φ 18x16.5   | 125  | 250    | 46    | 332 |
| φ 10x10.2 | 500  | 5000   | 26    | 382 | φ 18x21.5   | 75   | 150    | 46    | 332 |

## Reflow Soldering Conditions

### Recommended soldering heat conditions

1. The following conditions are recommended for air convection and infrared reflow soldering on the SMD products onto a glass epoxy circuit boards by cream solder. The temperatures shown are the surface temperature values on the top of the can and on the capacitor terminals.
2. Reflow should be performed twice or less.
3. Please ensure that the capacitor became cold enough to the room temperature (5 to 35°C) before the second reflow.

### Classification Reflow Profile

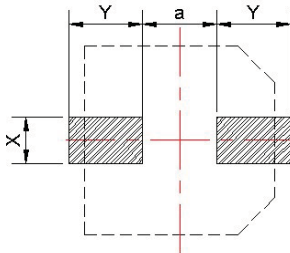


Notice:

1. Average ramp-up rate is 5°C/second max.
2. Ramp-down rate is 6°C/second max.
3. Time from 25°C to peak temperature is 6 minutes max.

|                      | Preheat                            | Time maintained above 200°C | Time maintained above 220°C | Time maintained above 230°C | Peak temp. | Reflow number   |
|----------------------|------------------------------------|-----------------------------|-----------------------------|-----------------------------|------------|-----------------|
| Dia. 4~10mm general  | 120°C to 180°C<br>120 sec.<br>Max. | 60 sec.                     | 50 sec.                     | 30 sec.                     | 250°C Max. | 2 times or less |
| φ8x6.5               |                                    | 50 sec.                     | 40 sec.                     | 25 sec.                     | 245°C Max. | 2 times or less |
| WV 160v-450v         |                                    | 60 sec.                     | 50 sec.                     | 30 sec.                     | 240°C Max. | 2 times or less |
| Dia. 12.5~20mm Cap.  |                                    | 60 sec.                     | 40 sec.                     | 30 sec.                     | 240°C Max. | 2 times or less |
| 125°C Category Temp. |                                    | 60 sec.                     | 40 sec.                     | 30 sec.                     | 250°C Max. | 2 times or less |

### Recommended Solder Land Size on PC Board



| Size    | X   | Y   | a   |
|---------|-----|-----|-----|
| φ4      | 1.6 | 2.6 | 1.0 |
| φ5      | 1.6 | 3.0 | 1.4 |
| φ6.3    | 1.6 | 3.5 | 2.1 |
| φ8x6.5  | 1.6 | 4.5 | 2.1 |
| φ8x10.5 | 2.5 | 3.5 | 3.0 |
| φ10     | 2.5 | 4.0 | 4.0 |
| φ12.5   | 3.0 | 5.7 | 4.0 |
| φ16     | 3.5 | 6.5 | 6.0 |