

**GVM** Ultra-low Impedance, Small size.  
Series



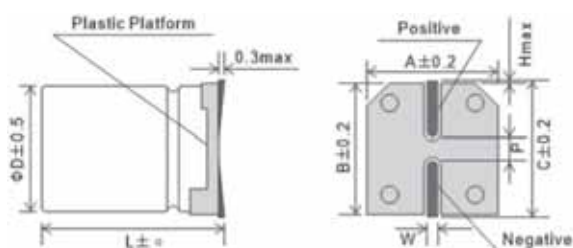
**Features**

105°C, 2000~5000 hours assured, Ultra-low Impedance.  
Impedance 20~30% less than GVZ 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   |  |
| Dissipation Factor (tanδ)       | 120Hz, 20°C (Max.)   | tanδ                                   | 0.26  | 0.18 | 0.16 | 0.14 | 0.12 | 0.10 |  |
|                                 |  | 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    |  |
|                                 |  | Z <sub>-55°C</sub> /Z <sub>+20°C</sub> | 8   | 5    | 4    | 3    | 3    | 3    |  |
| Endurance                       | 105°C, Rated Voltage Applied (With the rated ripple current) | Hours                                  | 5,000 (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)<br>Capacitance (uF) | 50   | 120  | 1k   | 10k  | 100K |
|------------------------------------|------|------|------|------|------|
| Under 100                          | 0.45 | 0.65 | 0.85 | 0.95 | 1.00 |
| 100 ~ 2200uF                       | 0.50 | 0.70 | 0.90 | 0.95 | 1.00 |

# GVM

 Series

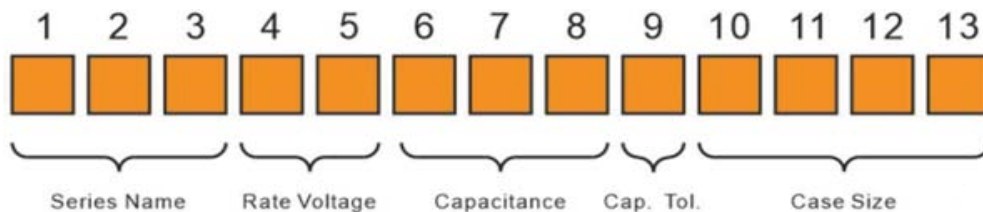
## ■ Dimensions

| uF   | WV                | 6.3v(0J)          |            |                   | 10v(1A)           |            |                   | 16v(1C)           |            |                   | 25v(1E)           |            |                   | 35v(1V)           |             |         | 50v(1H)           |      |      |
|------|-------------------|-------------------|------------|-------------------|-------------------|------------|-------------------|-------------------|------------|-------------------|-------------------|------------|-------------------|-------------------|-------------|---------|-------------------|------|------|
|      |                   | $\Phi D \times L$ | Imp.       | R.C.              | $\Phi D \times L$ | Imp.       | R.C.              | $\Phi D \times L$ | Imp.       | R.C.              | $\Phi D \times L$ | Imp.       | R.C.              | $\Phi D \times L$ | Imp.        | R.C.    | $\Phi D \times L$ | Imp. | R.C. |
| 10   |                   |                   |            |                   |                   |            |                   |                   |            |                   |                   |            |                   |                   |             | 4x5.7   | 2.30              | 85   |      |
|      |                   |                   |            |                   |                   |            |                   |                   |            |                   |                   |            |                   |                   |             | 5x5.7   | 0.88              | 165  |      |
| 22   |                   |                   |            |                   |                   |            |                   |                   |            |                   |                   |            | 4x5.7             | 1.00              | 160         | 5x5.7   | 0.88              | 165  |      |
| 33   |                   |                   |            |                   |                   |            |                   |                   |            |                   |                   |            | 5x5.7             | 0.36              | 240         | 6.3x5.7 | 0.68              | 195  |      |
| 39   |                   |                   |            |                   |                   |            |                   |                   |            | 4x5.7             | 1.00              | 160        | 5x5.7             | 0.36              | 240         | 6.3x5.7 | 0.68              | 195  |      |
| 47   |                   |                   |            |                   |                   |            |                   |                   |            | 5x5.7             | 0.36              | 240        | 5x5.7             | 0.36              | 240         | 6.3x5.7 | 0.68              | 195  |      |
| 56   |                   |                   |            |                   |                   |            | 4x5.7             | 1.00              | 160        | 5x5.7             | 0.36              | 240        | 6.3x5.7           | 0.26              | 300         | 6.3x7.7 | 0.34              | 350  |      |
| 68   |                   |                   |            | 4x5.7             | 1.00              | 160        | 5x5.7             | 0.36              | 240        | 5x5.7             | 0.36              | 240        | 6.3x5.7           | 0.26              | 300         | 6.3x7.7 | 0.34              | 350  |      |
| 100  |                   |                   |            | 5x5.7             | 0.36              | 240        | 5x5.7             | 0.36              | 240        | 6.3x5.7           | 0.26              | 300        | 6.3x5.7           | 0.26              | 300         | 6.3x7.7 | 0.34              | 350  |      |
| 120  | 4x5.7             | 1.00              | 160        | 5x5.7             | 0.36              | 240        | 6.3x5.7           | 0.26              | 300        | 6.3x5.7           | 0.26              | 300        | 6.3x7.7           | 0.16              | 600         | 8x10.5  | 0.18              | 670  |      |
| 150  | 5x5.7             | 0.36              | 240        | 5x5.7             | 0.36              | 240        | 6.3x5.7           | 0.26              | 300        | 6.3x7.7           | 0.16              | 600        | 6.3x7.7           | 0.16              | 600         | 8x10.5  | 0.18              | 670  |      |
| 220  | 5x5.7             | 0.36              | 240        | 6.3x5.7           | 0.26              | 300        | 6.3x5.7           | 0.26              | 300        | 6.3x7.7           | 0.16              | 600        | 6.3x7.7<br>8x10.5 | 0.16<br>0.08      | 600<br>850  | 8x10.5  | 0.18              | 670  |      |
| 330  | 6.3x5.7           | 0.26              | 300        | 6.3x5.7           | 0.26              | 300        | 6.3x7.7           | 0.16              | 600        | 6.3x7.7<br>8x10.5 | 0.16<br>0.08      | 600<br>850 | 8x10.5            | 0.08              | 850         | 10x10.5 | 0.12              | 900  |      |
| 390  | 6.3x5.7           | 0.26              | 300        | 6.3x7.7           | 0.16              | 600        | 6.3x7.7           | 0.16              | 600        | 8x10.5            | 0.08              | 850        | 8x10.5            | 0.08              | 850         |         |                   |      |      |
| 470  | 6.3x5.7           | 0.26              | 300        | 6.3x7.7           | 0.16              | 600        | 6.3x7.7<br>8x10.5 | 0.16<br>0.08      | 600<br>850 | 8x10.5            | 0.08              | 850        | 8x10.5<br>10x10.5 | 0.08<br>0.06      | 850<br>1190 |         |                   |      |      |
| 560  | 6.3x7.7           | 0.16              | 600        | 6.3x7.7           | 0.16              | 600        | 8x10.5            | 0.08              | 850        | 8x10.5            | 0.08              | 850        | 10x10.5           | 0.06              | 1190        |         |                   |      |      |
| 680  | 6.3x7.7           | 0.16              | 600        | 6.3x7.7<br>8x10.5 | 0.16<br>0.08      | 600<br>850 | 8x10.5            | 0.08              | 850        | 10x10.5           | 0.06              | 1190       | 10x10.5           | 0.06              | 1190        |         |                   |      |      |
| 820  | 6.3x7.7<br>8x10.5 | 0.16<br>0.08      | 600<br>850 | 8x10.5            | 0.08              | 850        | 8x10.5            | 0.08              | 850        | 10x10.5           | 0.06              | 1190       |                   |                   |             |         |                   |      |      |
| 1000 | 8x10.5            | 0.08              | 850        | 8x10.5            | 0.08              | 850        | 10x10.5           | 0.06              | 1190       | 10x10.5           | 0.06              | 1190       |                   |                   |             |         |                   |      |      |
| 1200 | 8x10.5            | 0.08              | 850        | 8x10.5            | 0.08              | 850        | 10x10.5           | 0.06              | 1190       |                   |                   |            |                   |                   |             |         |                   |      |      |
| 1500 | 8x10.5            | 0.08              | 850        | 10x10.5           | 0.06              | 1190       | 10x10.5*          | 0.06              | 1190       |                   |                   |            |                   |                   |             |         |                   |      |      |
| 1800 | 10x10.5           | 0.06              | 1190       | 10x10.5           | 0.06              | 1190       |                   |                   |            |                   |                   |            |                   |                   |             |         |                   |      |      |
| 2200 | 10x10.5           | 0.06              | 1190       |                   |                   |            |                   |                   |            |                   |                   |            |                   |                   |             |         |                   |      |      |

 Note1: Case size  $\Phi D \times L$ (mm), ripple current (mA, rms) at 105°C, 120Hz.

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

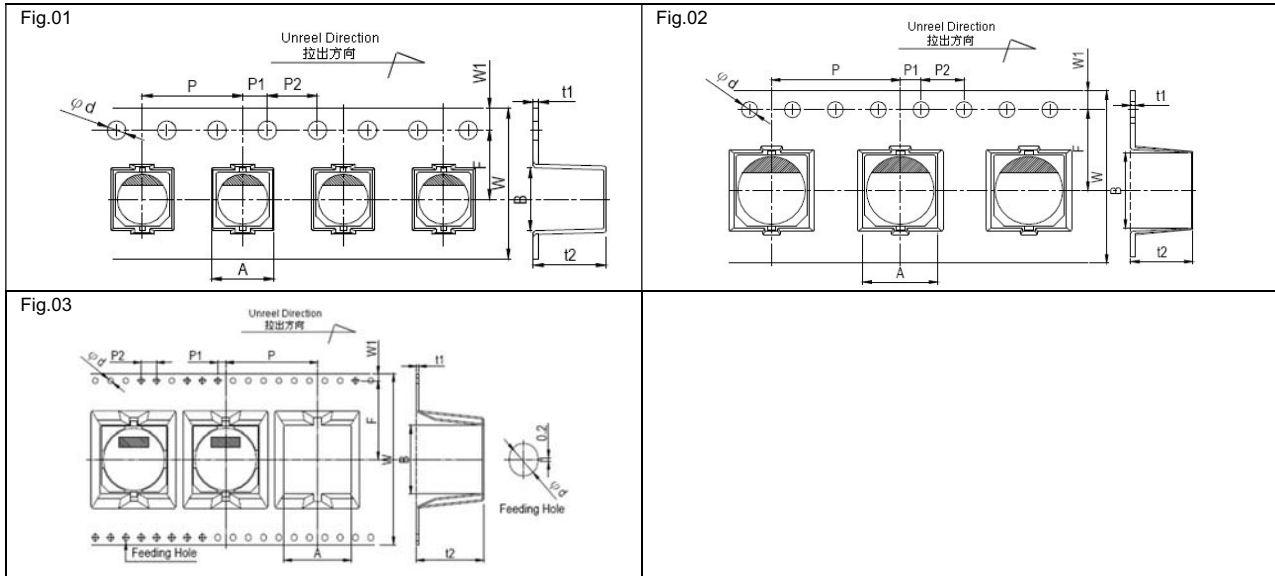
■ Explanation of Part Numbers



| (1-3)  |               |      | (4-5)            |      | (6-8)              |      |                 | (9)  | (10-13) |  |
|--------|---------------|------|------------------|------|--------------------|------|-----------------|------|---------|--|
| Series | Voltage (W.V) | Code | Capacitance (UF) | 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 |         |  |

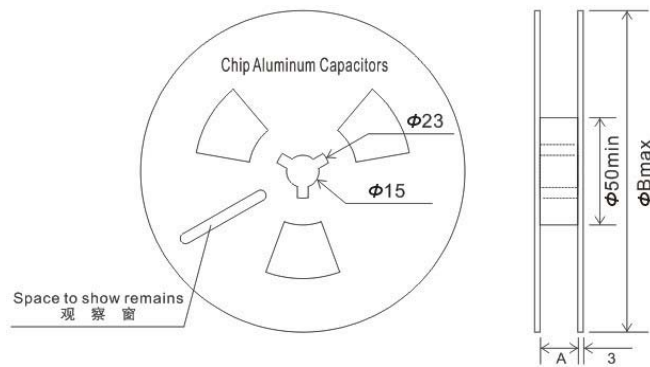
■ Taping Specifications

■ 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



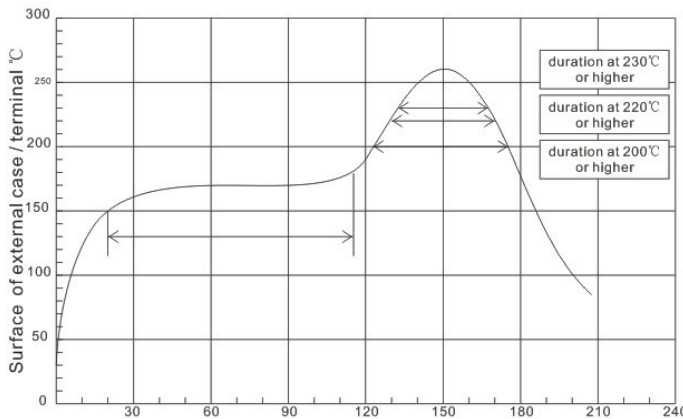
| Case Size | Reel | Carton | A±0.3 | B±2 | Case Size   | Reel | Carton | A±0.3 | B±2 |
|-----------|------|--------|-------|-----|-------------|------|--------|-------|-----|
| φ 4x5.7   | 2000 | 20000  | 14    | 382 | φ 10x13.5   | 300  | 3000   | 26    | 382 |
| φ 5x5.7   | 1000 | 10000  | 14    | 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

- 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.
- Reflow should be performed twice or less.
- Please ensure that the capacitor became cold enough to the room temperature (5 to 35°C) before the second reflow.

### Classification Reflow Profile

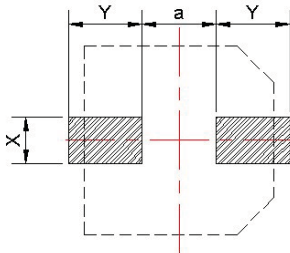


**Notice:**

- Average ramp-up rate is 5°C/second max.
- Ramp-down rate is 6°C/second max.
- 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 |

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