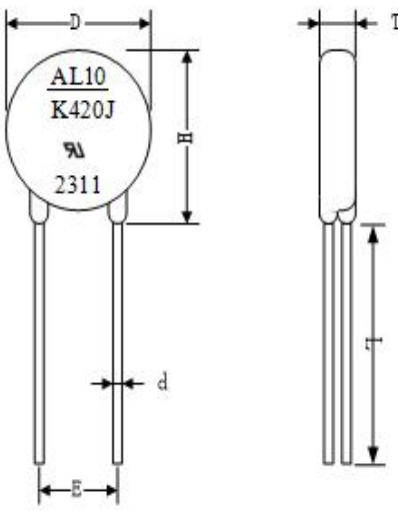
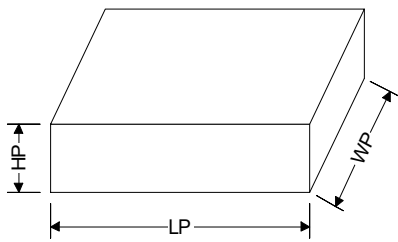
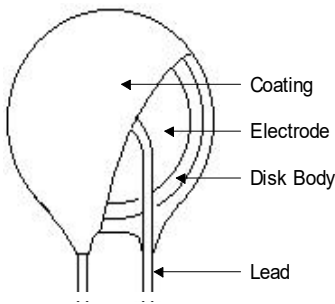


|                 |                        |                                                                                     |             |         |           |
|-----------------|------------------------|-------------------------------------------------------------------------------------|-------------|---------|-----------|
| Classification  |                        | Specification                                                                       |             | Page    | 1 / 4     |
| Subject         |                        | Aillen Surge Absorber                                                               |             | Date    | 2024/2/17 |
| Part Number     |                        | AL10K420RR-J                                                                        |             | Version | A         |
| 1 Dimension     |                        |                                                                                     |             |         |           |
| 1.1             | Appearance             | No visible scarp. Clear marking.                                                    |             |         |           |
| 1.2             | Disk Dimension         |    |             | D       | 12.5 max. |
|                 |                        |                                                                                     |             | H       | 15.5 max. |
|                 |                        |                                                                                     |             | T       | 6.4 max.  |
|                 |                        |                                                                                     |             | d       | 0.8 ± 0.1 |
|                 |                        |                                                                                     |             | E       | 7.5 ± 0.8 |
|                 |                        |                                                                                     |             | L       | 20.0min   |
|                 |                        | unit : mm                                                                           |             |         |           |
| 1.3             | Marking                | UL recognized                                                                       |             |         |           |
| 2 Packing       |                        |                                                                                     |             |         |           |
| 2.1             | Quantity               | 1000 pcs                                                                            |             |         |           |
| 2.2             | Packing Dimension      |  |             | LP      | 250 max.  |
|                 |                        |                                                                                     |             | HP      | 60 max.   |
|                 |                        |                                                                                     |             | WP      | 170 max.  |
|                 |                        | unit : mm                                                                           |             |         |           |
| 3 Material List |                        |                                                                                     |             |         |           |
| 3.1             | Drawing                |  |             |         |           |
| 3.2             | Material Chart<br>RoHs | Item                                                                                | Composition |         |           |
|                 |                        | Coating                                                                             | Epoxy Resin |         |           |
|                 |                        | Lead                                                                                | Cp/Cu. Wire |         |           |
|                 |                        | Electrode                                                                           | Silver      |         |           |
|                 |                        | Disk                                                                                | Zinc Oxide  |         |           |
|                 |                        | Solder                                                                              | Sn:100%     |         |           |

|                          |                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |              |                 |           |                          |             |                |                 |                |                 |                |                 |
|--------------------------|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------------|-----------|--------------------------|-------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|
| Classification           |                                    | Specification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              | Page            | 2/ 4      |                          |             |                |                 |                |                 |                |                 |
| Subject                  |                                    | Aillen Surge Absorber                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              | Date            | 2024/2/17 |                          |             |                |                 |                |                 |                |                 |
| Part Number              |                                    | AL10K420RR-J                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |              | Version         | A         |                          |             |                |                 |                |                 |                |                 |
| 4 Electrical Test Method |                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |              |                 |           |                          |             |                |                 |                |                 |                |                 |
| 4.1                      | Varistor Voltage                   | The voltage between two terminals with the specified measuring current 1 mA DC applied is call Vb.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              |                 |           |                          |             |                |                 |                |                 |                |                 |
| 4.2                      | Maximum Allowable                  | The recommended maximum sine wave voltage (rms) or the maximum DC voltage can be applied continuously.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |              |                 |           |                          |             |                |                 |                |                 |                |                 |
| 4.3                      | Clamping Voltage                   | The maximum voltage between two terminal with the specification standard impulse current (8/20 μsec).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |                 |           |                          |             |                |                 |                |                 |                |                 |
| 4.4                      | Rated Wattage                      | The maximum power that can be applied within the specified ambient temperature.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |              |                 |           |                          |             |                |                 |                |                 |                |                 |
| 4.5                      | Energy                             | The maximum energy within the varistor voltage change of ±10% when one impulse of 2msec. is applied.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |              |                 |           |                          |             |                |                 |                |                 |                |                 |
| 4.6                      | Withstanding Surge Current         | The maximum current within the varistor voltage change of ±10% with the standard impulse current (8/20 μsec) applied one time.                                                                                                                                                                                                                                                                                                                                                                                                                                                         |              |                 |           |                          |             |                |                 |                |                 |                |                 |
| 4.7                      | Varistor Voltage Temp. Coefficient | $\frac{V_b \text{ at } 20^{\circ}\text{C}(68^{\circ}\text{F}) - V_b \text{ at } 70^{\circ}\text{C}(158^{\circ}\text{F})}{V_b \text{ at } 20^{\circ}\text{C}(68^{\circ}\text{F})} \times \frac{1}{50} \times 100 (\%/^{\circ}\text{C})$                                                                                                                                                                                                                                                                                                                                                 |              |                 |           |                          |             |                |                 |                |                 |                |                 |
| 4.8                      | Surge Life                         | The change of Vb shall be measured after the impulse listed below is applied 10,000 times continuously with the interval of ten seconds at room temperature.                                                                                                                                                                                                                                                                                                                                                                                                                           |              |                 |           |                          |             |                |                 |                |                 |                |                 |
|                          |                                    | 5 series                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | K11A to K40A | 0.5A ( 2 msec ) |           |                          |             |                |                 |                |                 |                |                 |
|                          |                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | K50A to K300 | 20A(8/20μsec)   |           |                          |             |                |                 |                |                 |                |                 |
|                          |                                    | 7 series                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | K11A to K40A | 1.5A ( 2 msec ) |           |                          |             |                |                 |                |                 |                |                 |
|                          |                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | K50A to K300 | 50A(8/20μsec)   |           |                          |             |                |                 |                |                 |                |                 |
|                          |                                    | 10 series                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | K11A to K40A | 50A(8/20μsec)   |           |                          |             |                |                 |                |                 |                |                 |
|                          |                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | K50A to K510 | 100A(8/20μsec)  |           |                          |             |                |                 |                |                 |                |                 |
|                          |                                    | 14 series                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | K11A to K40A | 75A(8/20μsec)   |           |                          |             |                |                 |                |                 |                |                 |
|                          |                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | K50A to K510 | 150A(8/20μsec)  |           |                          |             |                |                 |                |                 |                |                 |
|                          |                                    | 20 series                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | K11A to K40A | 100A(8/20μsec)  |           |                          |             |                |                 |                |                 |                |                 |
| K50A to K510             | 200A(8/20μsec)                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |              |                 |           |                          |             |                |                 |                |                 |                |                 |
| 5 Mechanical Test Method |                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |              |                 |           |                          |             |                |                 |                |                 |                |                 |
| 5.1                      | Terminal Pull Strength             | After gradually applying the load specified below and keeping the unit fixed for ten seconds , the terminal shall be visually examined for any damage.<br><table><tr><td><u>Terminal diameter</u></td><td><u>Load</u></td></tr><tr><td>0.6mm ( .024")</td><td>0.5kg (1.1 lbs)</td></tr><tr><td>0.8mm ( .031")</td><td>1.0kg (2.2 lbs)</td></tr><tr><td>1.0mm ( .039")</td><td>2.0kg (4.4 lbs)</td></tr></table>                                                                                                                                                                        |              |                 |           | <u>Terminal diameter</u> | <u>Load</u> | 0.6mm ( .024") | 0.5kg (1.1 lbs) | 0.8mm ( .031") | 1.0kg (2.2 lbs) | 1.0mm ( .039") | 2.0kg (4.4 lbs) |
| <u>Terminal diameter</u> | <u>Load</u>                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |              |                 |           |                          |             |                |                 |                |                 |                |                 |
| 0.6mm ( .024")           | 0.5kg (1.1 lbs)                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |              |                 |           |                          |             |                |                 |                |                 |                |                 |
| 0.8mm ( .031")           | 1.0kg (2.2 lbs)                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |              |                 |           |                          |             |                |                 |                |                 |                |                 |
| 1.0mm ( .039")           | 2.0kg (4.4 lbs)                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |              |                 |           |                          |             |                |                 |                |                 |                |                 |
| 5.2                      | Terminal Bending Strength          | The unit shall be secured with its terminal kept vertical and the weight specified below be applied in the axial direction. The terminal shall gradually be bent by 90°in one direction , then 90°in the opposite direction , and again back to the original position. The damage of the terminal shall be visually examined.<br><table><tr><td><u>Terminal diameter</u></td><td><u>Load</u></td></tr><tr><td>0.6mm ( .024")</td><td>0.5kg (1.1 lbs)</td></tr><tr><td>0.8mm ( .031")</td><td>1.0kg (2.2 lbs)</td></tr><tr><td>1.0mm ( .039")</td><td>2.0kg (4.4 lbs)</td></tr></table> |              |                 |           | <u>Terminal diameter</u> | <u>Load</u> | 0.6mm ( .024") | 0.5kg (1.1 lbs) | 0.8mm ( .031") | 1.0kg (2.2 lbs) | 1.0mm ( .039") | 2.0kg (4.4 lbs) |
| <u>Terminal diameter</u> | <u>Load</u>                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |              |                 |           |                          |             |                |                 |                |                 |                |                 |
| 0.6mm ( .024")           | 0.5kg (1.1 lbs)                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |              |                 |           |                          |             |                |                 |                |                 |                |                 |
| 0.8mm ( .031")           | 1.0kg (2.2 lbs)                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |              |                 |           |                          |             |                |                 |                |                 |                |                 |
| 1.0mm ( .039")           | 2.0kg (4.4 lbs)                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |              |                 |           |                          |             |                |                 |                |                 |                |                 |

| Classification              |                              | Specification                                                                                                                                                                                                                                                                                                 | Page         | 3/ 4      |
|-----------------------------|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------|
| Subject                     |                              | Aillen Surge Absorber                                                                                                                                                                                                                                                                                         | Date         | 2024/2/17 |
| Part Number                 |                              | AL10K420RR-J                                                                                                                                                                                                                                                                                                  | Version      | A         |
| 5.3                         | Vibration                    | Subjected to simple harmonic motion of 0.75 mm ( 0.029" ) amplitude 1.5mm ( 0.058" ) maximum total excursion-between limits of 10 ~ 55 Hz. frequency scan shall then be applied for period of two hours in each of three mutually perpendicular direction , Thereafter , the unit shall be visually examined. |              |           |
| 5.4                         | Solderability                | After dipping the terminal to a depth of approximately 3 mm ( 0.118" ) from the body in a soldering bath of 260°C ( 500°F ) for two seconds , the terminal shall be visually examined.                                                                                                                        |              |           |
| 5.5                         | Resistance to Soldering Heat | The terminal shall be dipped into a soldering bath having a temperature of 350°C ( 660 °F ) to a point 3 mm ( 0.118" ) from the body of the unit and then be held there for three seconds. The change of Vb and mechanical damage shall be examined.                                                          |              |           |
| 6 Environmental Test Method |                              |                                                                                                                                                                                                                                                                                                               |              |           |
| 6.1                         | High Temperature Storage     | The specimen shall be subjected to 125°C ( 257°F ) for 1000 hours in a thermostatic bath without load and then stored at room temperature and humidity for one to two hours. Thereafter , The change of Vb Shall be measured.                                                                                 |              |           |
| 6.2                         | Humidity                     | The specimen shall be subjected to 40°C ( 104°F ) , 90 to 95 % R.H. for 1000 hours without load and then stored at room temperature and humidity for one to two hours. Thereafter , the change of Vb shall be measured.                                                                                       |              |           |
| 6.3                         | Thermal Shock                | The temperature cycle shown below shall be repeated five times and then stored at room temperature and humidity for one to two hours. The change of Vb as well as mechanical damage shall be examined.                                                                                                        |              |           |
|                             |                              | Step                                                                                                                                                                                                                                                                                                          | Temperature  | Period    |
|                             |                              | 1                                                                                                                                                                                                                                                                                                             | -40°C(-40°F) | 30 min.   |
|                             |                              | 2                                                                                                                                                                                                                                                                                                             | 85°C(185°F)  | 30 min.   |
| 6.4                         | High Temperature Operation   | After being continuously applied the Maximum Allowable Voltage at 85°C (185°F ) for 1000 hours , the specimen shall be stored at room temperature and humidity for one to two hours. Thereafter , the change of Vb shall be measured.                                                                         |              |           |
| 6.5                         | Humidity Operation           | The specimen shall be subjected to 40°C ( 104°F ),90 to 95%RH and the Maximum Allowable Voltage for 1000 hours and then stored at room temperature and humidity for one to two hours.Thereafter,the change of Vb shall be measured.                                                                           |              |           |
| 6.6                         | Low Temperature Storage      | The specimen shall be subjected to -40°C ( -40°F ) without load for 1000 hours and then stored at room temperature for one to two hours.Thereafter,the change of Vb shall be measured.                                                                                                                        |              |           |

|                |                       |         |           |
|----------------|-----------------------|---------|-----------|
| Classification | Specification         | Page    | 4/ 4      |
| Subject        | Aillen Surge Absorber | Date    | 2024/2/17 |
| Part Number    | <b>AL10K420RR-J</b>   | Version | A         |

## 7 Electrical Test Requirements

|     |                                    |                                       |        |                                                                |
|-----|------------------------------------|---------------------------------------|--------|----------------------------------------------------------------|
| 7.1 | Varistor voltage                   | Vb : 612V~ 748 V                      |        | Measuring current : 1 mA DC                                    |
| 7.2 | Maximum Allowable                  | AC : 420V rms<br>DC : 560 V           |        |                                                                |
| 7.3 | Clamping Voltage                   | 1120 V max.                           |        | Measuring current : 25 A<br>Impulse waveform : 8/20 μsec       |
| 7.4 | Rated Wattage                      | 0.4 W                                 |        |                                                                |
| 7.5 | Energy                             | 98J                                   |        | Impulse waveform : 8/20μsec                                    |
| 7.6 | Withstanding Surge Current         | 1 Pulse                               | 3500 A | Impulse waveform : 8/20 μsec<br>8/20 μsec , interval 5 min.    |
|     |                                    | 2 Pulse                               | 2500A  |                                                                |
| 7.7 | Varistor Voltage Temp. Coefficient | 0 to 0.05% / °C                       |        | Temp. range : +25°C ~ +85°C                                    |
| 7.8 | Surge Life                         | $\Delta V_b / V_b \leq 10\%$ at 100 A |        | Impulse waveform : 8/20 μsec<br>10000 times by interval 10 sec |
| 7.9 | Capacitance                        | 150 pF ( reference )                  |        | Measure frequency : 1 KHz                                      |

## 8 Mechanical Test Requirement

|     |                              |                                                                |                                                     |
|-----|------------------------------|----------------------------------------------------------------|-----------------------------------------------------|
| 8.1 | Terminal Pull Strength       | No outstanding damage                                          | Load : 1.0 kg(2.2 lbs)                              |
| 8.2 | Terminal Bending Strength    | No outstanding damage                                          | Load : 1.0 kg(2.2 lbs)                              |
| 8.3 | Vibration                    | No outstanding damage                                          | Frequency : 10 ~55 Hz<br>Amplitude : 0.75 mm        |
| 8.4 | Solderability                | Almost all the surface should be covered with solder uniformly | Solder Temp. : 260°C ± 2°C<br>Immersed time : 3 sec |
| 8.5 | Resistance to soldering heat | $\Delta V_b / V_b \leq \pm 5\%$<br>No outstanding damage       | Solder Temp. : 350°C ± 2°C<br>Immersed time : 3 sec |

## 9 Environmental Test Requirements

|     |                            |                                  |                                                                               |        |         |
|-----|----------------------------|----------------------------------|-------------------------------------------------------------------------------|--------|---------|
| 9.1 | High Temperature Storage   | $\Delta V_b / V_b \leq \pm 5\%$  | Ambient temp. : 125°C ± 2°C<br>Time : 1000 hours                              |        |         |
| 9.2 | Humidity                   | $\Delta V_b / V_b \leq \pm 5\%$  | Ambient temp. : 40°C ± 2°C<br>Humidity : 90 to 95 % R.H.<br>Time : 1000 hours |        |         |
| 9.3 | Thermal Shock              | $\Delta V_b / V_b \leq \pm 5\%$  | Step                                                                          | Temp.  | Period  |
|     |                            |                                  | 1                                                                             | -40 °C | 30 min. |
|     |                            |                                  | 2                                                                             | 85 °C  | 30 min. |
|     |                            |                                  | 5 Cycles                                                                      |        |         |
| 9.4 | High Temperature Operation | $\Delta V_b / V_b \leq \pm 10\%$ | Ambient temp. : 85°C ± 2°C<br>Time : 1000 hours                               |        |         |
| 9.5 | Humidity Operation         | $\Delta V_b / V_b \leq \pm 10\%$ | Ambient temp. : 40°C ± 2°C<br>Humidity : 90 to 95 % R.H.<br>Time : 1000 hours |        |         |
| 9.6 | Low Temperature Storage    | $\Delta V_b / V_b \leq \pm 5\%$  | Ambient temp. : -40°C ± 2°C<br>Time : 1000 hours                              |        |         |