

## ***Data Sheet***

Customer: \_\_\_\_\_

Product: Multilayer Chip Varistor. A series High Surge Absorption \_\_\_\_\_

Size : 1206/1210/1812/2220 \_\_\_\_\_

Issued Date: 1-Sep.-2017 \_\_\_\_\_

Edition: Ver. 1 \_\_\_\_\_

### **Record of change**

| Date        | Ver. | Description | Page |
|-------------|------|-------------|------|
| 1-Sep.-2017 | 1    |             |      |
|             |      |             |      |
|             |      |             |      |
|             |      |             |      |

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|-------------|-------------|-------------|------------------------|
| 1-Sep.-2017 | 1-Sep.-2017 | 1-Sep.-2017 |                        |
| Andy Hsu    | Hwa Wu      | Hwa Wu      |                        |

## ● A Series High Surge Absorption

| Hitano<br>Part no. | Working Voltage<br>(MAX)  |           | Breakdown<br>Voltage | Peak<br>Current     | Clamping Voltage<br>(MAX) |     |
|--------------------|---------------------------|-----------|----------------------|---------------------|---------------------------|-----|
| Condition<br>Unit  | AC<br>(V <sub>RMS</sub> ) | DC<br>(V) | 1mA<br>(V)           | 8/20 $\mu$ s<br>(A) | (A)                       | (V) |
| 1206ML050A         | 2.4                       | 3.3       | 5(4.0~6.0)           | 200                 | 1                         | 12  |
| 1206ML080A         | 4                         | 5.5       | 8(6.6~9.9)           | 200                 | 1                         | 18  |
| 1206ML120A         | 7                         | 9         | 12(10.2~13.8)        | 200                 | 1                         | 24  |
| 1206ML150A         | 8                         | 11        | 15(12.75~17.25)      | 200                 | 1                         | 25  |
| 1206ML180A         | 11                        | 14        | 18(15.3~20.7)        | 200                 | 1                         | 30  |
| 1206ML220A         | 12                        | 16        | 22(19.8~24.2)        | 200                 | 1                         | 36  |
| 1206ML240A         | 14                        | 18        | 24(21.6~26.4)        | 200                 | 1                         | 38  |
| 1206ML270A         | 17                        | 22        | 27(24.3~29.7)        | 200                 | 1                         | 44  |
| 1206ML300A         | 18                        | 24        | 30(27.0~33.0)        | 200                 | 1                         | 48  |
| 1206ML330A         | 20                        | 26        | 33(29.7~36.3)        | 200                 | 1                         | 54  |
| 1206ML360A         | 22                        | 28        | 36(32.7~39.6)        | 200                 | 1                         | 59  |
| 1206ML390A         | 25                        | 30        | 39(35.1~42.9)        | 200                 | 1                         | 65  |
| 1206ML420A         | 26                        | 33        | 42(38.1~46.2)        | 200                 | 1                         | 72  |
| 1206ML470A         | 30                        | 38        | 47(42.3~51.7)        | 200                 | 1                         | 77  |
| 1206ML560A         | 35                        | 45        | 56(50.4~61.6)        | 200                 | 1                         | 90  |
| 1206ML680A         | 40                        | 56        | 68(61.2~74.8)        | 200                 | 1                         | 110 |
| 1206ML760A         | 45                        | 60        | 76(69.1~83.6)        | 200                 | 1                         | 126 |
| 1206ML820A         | 50                        | 65        | 82(73.8~90.2)        | 200                 | 1                         | 135 |
| 1206ML101A         | 60                        | 85        | 100(90~100)          | 200                 | 1                         | 165 |

TO BE CONTINUED

● **A Series High Surge Absorption**

| Hitano<br>Part no. | Working Voltage<br>(MAX)  |           | Breakdown<br>Voltage | Peak<br>Current | Clamping Voltage<br>(MAX) |     |
|--------------------|---------------------------|-----------|----------------------|-----------------|---------------------------|-----|
|                    | AC<br>(V <sub>RMS</sub> ) | DC<br>(V) |                      |                 | (A)                       | (V) |
| 1210ML050A         | 2.4                       | 3.3       | 5(4.0~6.0)           | 400             | 1                         | 12  |
| 1210ML080A         | 4                         | 5.5       | 8(6.6~9.9)           | 400             | 1                         | 18  |
| 1210ML120A         | 7                         | 9         | 12(10.2~13.8)        | 400             | 1                         | 24  |
| 1210ML150A         | 8                         | 11        | 15(12.75~17.25)      | 400             | 1                         | 25  |
| 1210ML180A         | 11                        | 14        | 18(15.3~20.7)        | 400             | 1                         | 30  |
| 1210ML220A         | 12                        | 16        | 22(19.8~24.2)        | 400             | 1                         | 36  |
| 1210ML240A         | 14                        | 18        | 24(21.6~26.4)        | 400             | 1                         | 38  |
| 1210ML270A         | 17                        | 22        | 27(24.3~29.7)        | 400             | 1                         | 44  |
| 1210ML300A         | 18                        | 24        | 30(27.0~33.0)        | 400             | 1                         | 48  |
| 1210ML330A         | 20                        | 26        | 33(29.7~36.3)        | 400             | 1                         | 54  |
| 1210ML360A         | 22                        | 28        | 36(32.7~39.6)        | 400             | 1                         | 59  |
| 1210ML390A         | 25                        | 30        | 39(35.1~42.9)        | 400             | 1                         | 65  |
| 1210ML420A         | 26                        | 33        | 42(38.1~46.2)        | 400             | 1                         | 72  |
| 1210ML470A         | 30                        | 38        | 47(42.3~51.7)        | 400             | 1                         | 77  |
| 1210ML560A         | 35                        | 45        | 56(50.4~61.6)        | 400             | 1                         | 90  |
| 1210ML680A         | 40                        | 56        | 68(61.2~74.8)        | 400             | 1                         | 110 |
| 1210ML760A         | 45                        | 60        | 76(69.1~83.6)        | 400             | 1                         | 126 |
| 1210ML820A         | 50                        | 65        | 82(73.8~90.2)        | 400             | 1                         | 135 |
| 1210ML101A         | 60                        | 85        | 100(90~100)          | 400             | 1                         | 165 |

TO BE CONTINUED

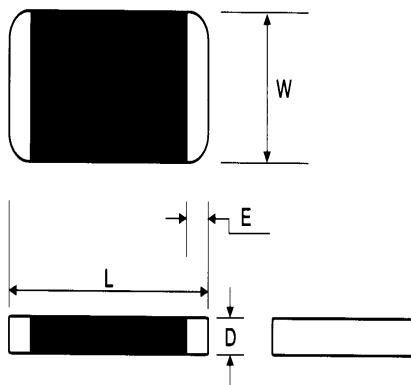
## ● A Series High Surge Absorption

| Hitano<br>Part no. | Working Voltage<br>(MAX)  |           | Breakdown<br>Voltage | Peak<br>Current | Clamping Voltage<br>(MAX) |     |
|--------------------|---------------------------|-----------|----------------------|-----------------|---------------------------|-----|
| Unit<br>Condition  | AC<br>(V <sub>RMS</sub> ) | DC<br>(V) | 1Ma<br>(V)           | 8/20μs<br>(A)   | (A)                       | (V) |
| 1812ML080A         | 4                         | 5.5       | 8(6.6~9.9)           | 800             | 1                         | 18  |
| 1812ML120A         | 7                         | 9         | 12(10.2~13.8)        | 800             | 1                         | 24  |
| 1812ML150A         | 8                         | 11        | 15(12.75~17.25)      | 800             | 1                         | 25  |
| 1812ML180A         | 11                        | 14        | 18(15.3~20.7)        | 800             | 1                         | 30  |
| 1812ML220A         | 12                        | 16        | 22(19.8~24.2)        | 800             | 1                         | 36  |
| 1812ML240A         | 14                        | 18        | 24(21.6~26.4)        | 800             | 1                         | 38  |
| 1812ML270A         | 17                        | 22        | 27(24.3~29.7)        | 800             | 1                         | 44  |
| 1812ML300A         | 18                        | 24        | 30(27.0~33.0)        | 800             | 1                         | 48  |
| 1812ML330A         | 20                        | 26        | 33(29.7~36.3)        | 800             | 1                         | 54  |
| 1812ML360A         | 22                        | 28        | 36(32.7~39.6)        | 800             | 1                         | 59  |
| 1812ML390A         | 25                        | 30        | 39(35.1~42.9)        | 800             | 1                         | 65  |
| 1812ML420A         | 26                        | 33        | 42(38.1~46.2)        | 800             | 1                         | 72  |
| 1812ML470A         | 30                        | 38        | 47(42.3~51.7)        | 800             | 1                         | 77  |
| 1812ML560A         | 35                        | 45        | 56(50.4~61.6)        | 800             | 1                         | 90  |
| 1812ML680A         | 40                        | 56        | 68(61.2~74.8)        | 800             | 1                         | 110 |
| 1812ML760A         | 45                        | 60        | 76(69.1~83.6)        | 800             | 1                         | 126 |
| 1812ML820A         | 50                        | 65        | 82(73.8~90.2)        | 800             | 1                         | 135 |
| 1812ML101A         | 60                        | 85        | 100(90~100)          | 800             | 1                         | 165 |
| 1812ML121A         | 75                        | 100       | 120(108~1032)        | 800             | 1                         | 200 |

TO BE CONTINUED

● **A Series High Surge Absorption**

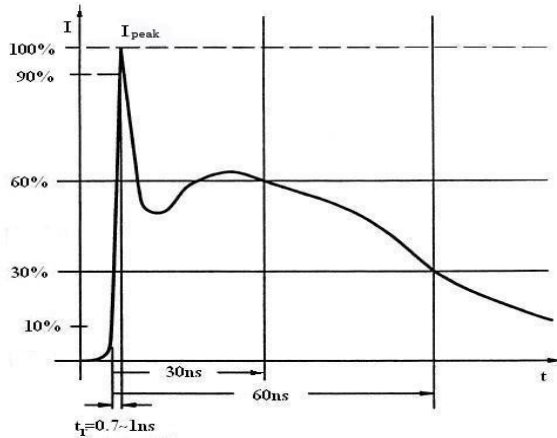
| Hitano<br>Part no. | Working Voltage<br>(MAX)  |           | Breakdown<br>Voltage | Peak<br>Current | Clamping Voltage<br>(MAX) |     |
|--------------------|---------------------------|-----------|----------------------|-----------------|---------------------------|-----|
|                    | AC<br>(V <sub>RMS</sub> ) | DC<br>(V) |                      |                 | (A)                       | (V) |
| 2220ML240A         | 14                        | 18        | 24(21.6~26.4)        | 1200            | 1                         | 38  |
| 2220ML270A         | 17                        | 22        | 27(24.3~29.7)        | 1200            | 1                         | 44  |
| 2220ML300A         | 18                        | 24        | 30(27.0~33.0)        | 1200            | 1                         | 48  |
| 2220ML330A         | 20                        | 26        | 33(29.7~36.3)        | 1200            | 1                         | 54  |
| 2220ML360A         | 22                        | 28        | 36(32.7~39.6)        | 1200            | 1                         | 59  |
| 2220ML390A         | 25                        | 30        | 39(35.1~42.9)        | 1200            | 1                         | 65  |
| 2220ML420A         | 26                        | 33        | 42(38.1~46.2)        | 1200            | 1                         | 72  |
| 2220ML470A         | 30                        | 38        | 47(42.3~51.7)        | 1200            | 1                         | 77  |
| 2220ML560A         | 35                        | 45        | 56(50.4~61.6)        | 1200            | 1                         | 90  |
| 2220ML680A         | 40                        | 56        | 68(61.2~74.8)        | 1200            | 1                         | 110 |
| 2220ML760A         | 45                        | 60        | 76(69.1~83.6)        | 1200            | 1                         | 126 |
| 2220ML820A         | 50                        | 65        | 82(73.8~90.2)        | 1200            | 1                         | 135 |
| 2220ML101A         | 60                        | 85        | 100(90~100)          | 1200            | 1                         | 165 |



| Type | L<br>(mm) | W<br>(mm) | D<br>(mm) | E<br>(mm)    |
|------|-----------|-----------|-----------|--------------|
| 1206 | 3.20±0.20 | 1.60±0.15 | 1.2max.   | 0.50±0.20    |
| 1210 | 3.20±0.20 | 2.50±0.20 | 1.5max    | 0.50±0.20    |
| 1812 | 4.50±0.20 | 3.20±0.20 | 2.0max.   | 0.5+0.3/-0.1 |
| 2220 | 5.70±0.20 | 5.00±0.20 | 3.0max.   | 0.5+0.3/-0.1 |

## ● A Series High Surge Absorption

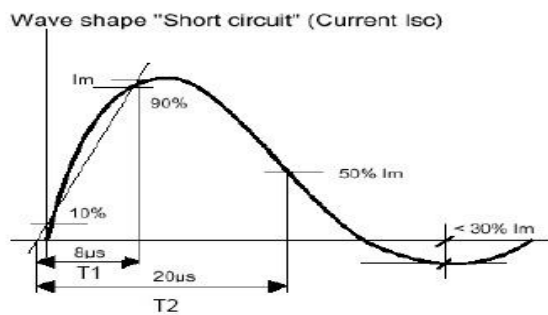
### ESD Wave Form



| SEVERITY LEVEL | AIRDIRCHARGE | DIRECT ISCHARGE |
|----------------|--------------|-----------------|
| 1              | 2 kV         | 2 kV            |
| 2              | 4 kV         | 4 kV            |
| 3              | 8 kV         | 6 kV            |
| 4              | 15 kV        | 8 kV            |

IEC61000-4-2 Compliant ESD Current Pulse Waveform

### Surge Wave Form



| SEVERITY LEVEL | T1   | T2    |
|----------------|------|-------|
| 1              | 8 μS | 20 μS |

IEC61000-4-5 Standards

## ● A Series High Surge Absorption

- **Environmental Characteristics**

| Characteristic                   | Test method and description                                                                                                                                                                                                                       |      |                  |          |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------|----------|
| High Temperature Storage         | The specimen shall be subjected to 125℃ for 1000 hours in a thermostatic bath without load and then stored at room temperature and humidity for 1 to 2 hours.<br>The change of varistor voltage shall be within 10%.                              |      |                  |          |
| Temperature Cycle                | The temperature cycle of specified temperature shall be repeated five times and then stored at room temperature and humidity for one two hours. The change of varistor voltage shall be within 10% and mechanical damage shall be examined.       | Step | Temperature      | Period   |
|                                  |                                                                                                                                                                                                                                                   | 1    | -40±3℃           | 30min±3  |
|                                  |                                                                                                                                                                                                                                                   | 2    | Room Temperature | 1~2hours |
|                                  |                                                                                                                                                                                                                                                   | 3    | 125±2℃           | 30min±3  |
| High Temperature Load            | After being continuously applied the maximum allowable voltage at 85℃ for 1000hours, the specimen shall be stored at room temperature and humidity for one or hours, the change of varistor voltage shall be within 10%.                          | 4    | Room Temperature | 1~2hours |
|                                  |                                                                                                                                                                                                                                                   |      |                  |          |
| Damp Heat Load/<br>Humidity Load | The specimen should be subjected to 40℃,90 to 95%RH environment, and the maximum allowable voltage applied for 1000 hours, then stored at room temperature and humidity for one or two hours. The change of varistor voltage shall be within 10%. |      |                  |          |
| Low Temperature Storage          | The specimen should be subjected to -40℃, without load for 1000 hours and then stored at room temperature for one two hours. The change of varistor voltage shall be within 10%.                                                                  |      |                  |          |

## ● A Series High Surge Absorption

### Soldering Recommendation

The principal techniques used for the soldering of components in surface mount technology are infrared reflow and wave soldering.

### Wave Soldering

When wave soldering, the MLCV is attached to the circuit board by means of an adhesive. The assembly is then placed on a conveyor and run through the soldering process to contact the wave. Wave soldering is the most strenuous of the processes. To avoid the possibility of generating stresses due to thermal shock, a preheat stage in the soldering process is recommended, and the peak temperature of the solder process should be rigidly controlled. The following is the typical profiles.

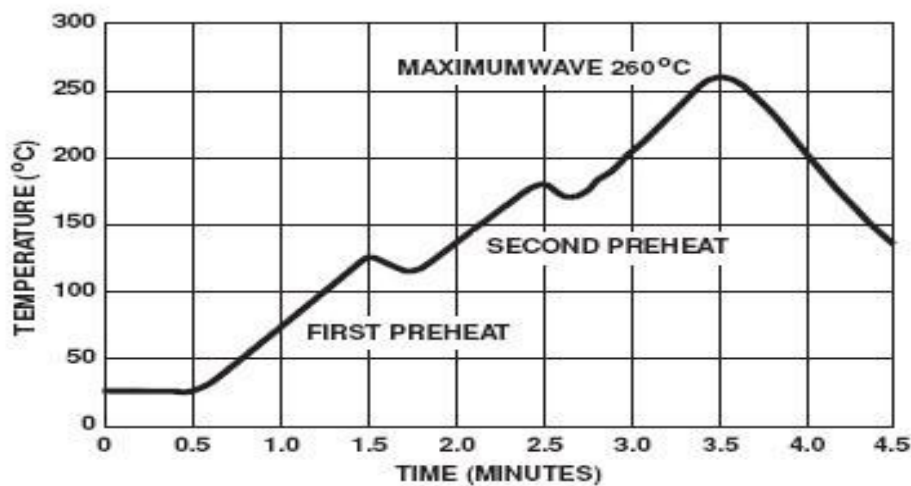


FIGURE 6. WAVE SOLDER PROFILE

## ● A Series High Surge Absorption

### Reflow Soldering

When reflow soldering, the device is placed a solder paste on the substrate ,as the solder paste is heated, it re-flows and solders the unite to board. When using a reflow process ,care should be taken to ensure that the MLCV is not subjected to an thermal gradient steeper than 4 degrees per second; the ideal gradient being 2degrees per second. During the soldering process, preheating to within 100 degrees of the soldier's peak temperature is essential to minimize thermal shock. The following is typical profile.

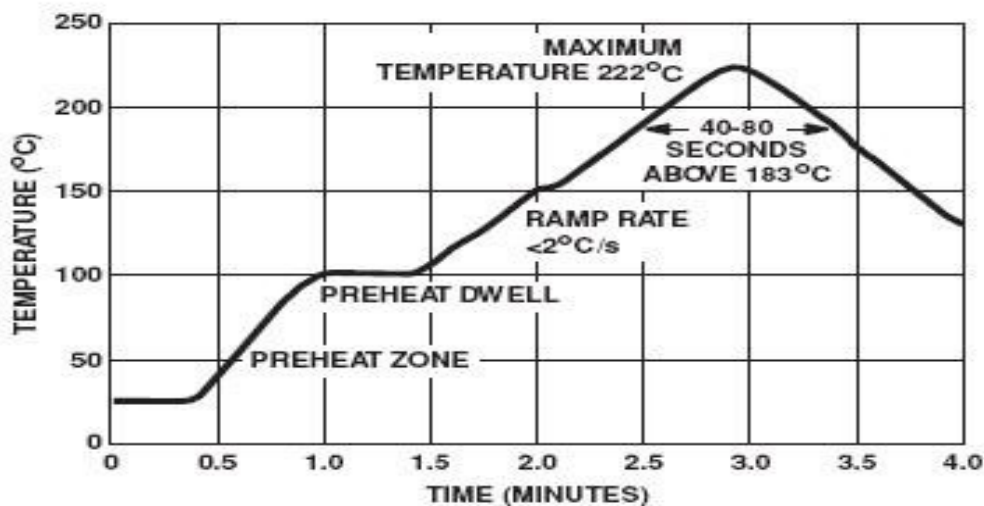
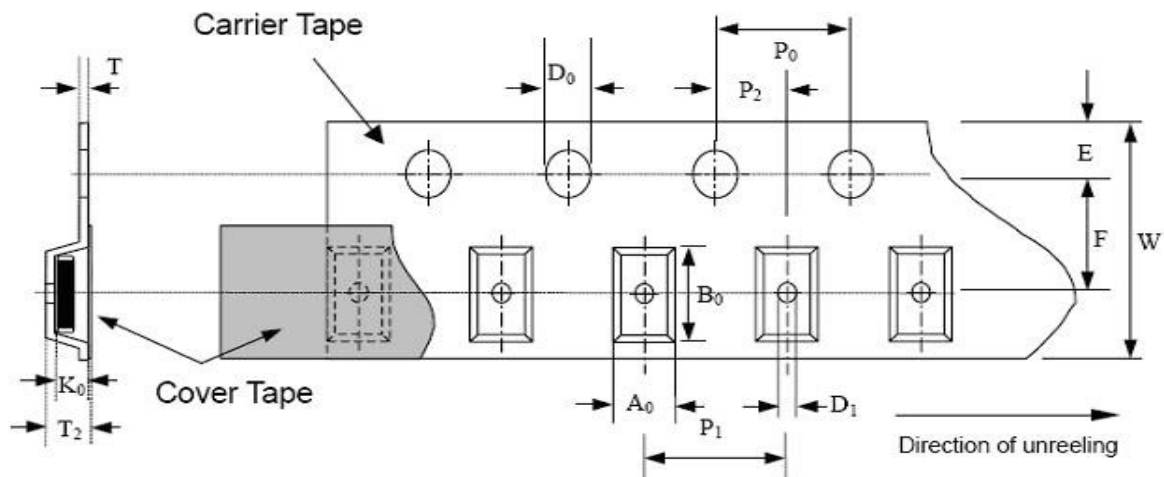


FIGURE 5. REFLOW SOLDER PROFILE

### Packaging Specification

1. Carrier tape transparent cover tape should be heat-sealed to carry the products, and the reel should be used to reel the carrier tape.
2. The adhesion of the heat-sealed cover tape shall be  $40 \pm 20$  - 15grams.
3. Both the head and the end portion of taping shall be empty for reel package and SMT auto-pickup machine. And a normal paper tape shall be connected in the head of taping for the operator handle.

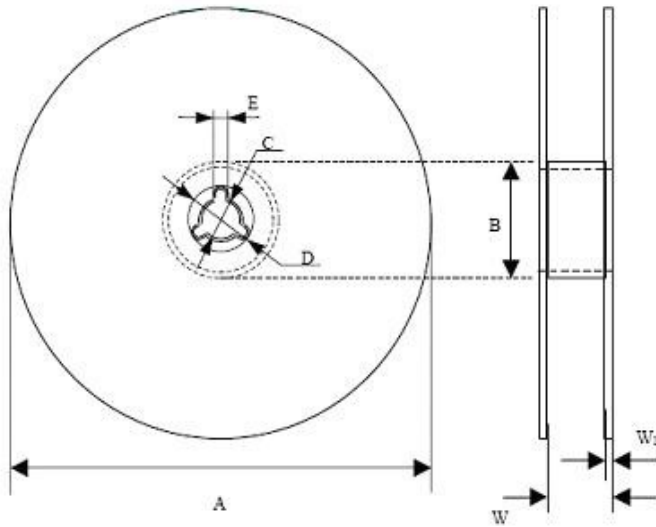
## ● A Series High Surge Absorption



| Size | A0    | B0    | K0    | T     | T2    | D0     | D1    | P1    | P2    | P0    | W     | E     | F     |
|------|-------|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|-------|
| 1206 | ±0.10 | ±0.10 | ±0.10 | ±0.05 | ±0.05 | +0.1-0 | ±0.05 | ±0.10 | ±0.05 | ±0.05 | ±0.20 | ±0.10 | ±0.05 |
| 1210 | 1.88  | 3.50  | 1.27  | 0.20  | 1.49  | 1.50   | 1.00  | 4.00  | 2.00  | 4.00  | 8.00  | 1.75  | 3.50  |
| 1812 | 2.18  | 3.46  | 1.45  | 0.22  | 1.77  | 1.50   | 1.00  | 4.00  | 2.00  | 4.00  | 8.00  | 1.75  | 3.50  |
| 2220 | 3.66  | 4.95  | 1.74  | 0.25  | 1.99  | 1.50   | 1.50  | 8.00  | 2.00  | 4.00  | 12.00 | 1.75  | 5.50  |
|      | 5.10  | 5.97  | 2.80  | 0.25  | 3.05  | 1.50   | 1.50  | 8.00  | 2.00  | 4.00  | 12.00 | 1.75  | 5.50  |

● **A Series High Surge Absorption**

**Reel Dimension**



| Size | A         | B        | C        | D        | E       | W        | W1       |
|------|-----------|----------|----------|----------|---------|----------|----------|
| 1206 | 178.0±1.0 | 60.0±0.5 | 13.0±0.2 | 21.0±0.2 | 2.0±0.5 | 9.0±0.50 | 1.5±0.15 |
| 1210 | 178.0±1.0 | 60.0±0.5 | 13.0±0.2 | 21.0±0.2 | 2.0±0.5 | 9.0±0.50 | 1.5±0.15 |
| 1812 | 178.0±1.0 | 60.0±0.5 | 13.5±0.1 | 21.0±0.2 | 2.0±0.5 | 13.6±0.2 | 1.5±0.15 |
| 2220 | 178.0±1.0 | 60.0±0.5 | 13.5±0.1 | 21.0±0.2 | 2.0±0.5 | 13.6±0.2 | 1.5±0.15 |

| Size             |         | 1206 | 1210 | 1812     | 2220     |
|------------------|---------|------|------|----------|----------|
| quantity         | paper   | -    | -    | -        | -        |
|                  | plastiA | 3000 | 3000 | 500/1000 | 500/1000 |
| Minimum ordering |         | 3000 | 3000 | 500/1000 | 500/1000 |