



● **Application**

Microcomputer, VTR, Toys, TV Game, Telecommunications...etc

● **Specification**

|                             |  |
|-----------------------------|--|
| Frequency Range             | 1.5 ~ 160.0 MHz                            |
| Vibration Mode              | AT Cut: Fundamental, Third, Fifth          |
| Frequency Tolerance at 25°C | +/-10, +/-15, +/-20, +/-30, +/-50 ppm      |
| Shunt Capacitance           | 7.0pF max. or specified                    |
| Load Capacitance            | 16, 20, 30pF, Series Resonant or specified |
| Drive Level                 | 10, 100, 300, 1000uW or specified          |
| Insulation Resistance       | 500M Ohm min. at DC 100V                   |
| Aging                       | +/- 3, 5 ppm per year or specified         |

● **Operating Temperature Range & Frequency Stability**

| Temp. ppm   | +/-3 | +/-5 | +/-7.5 | +/-10 | +/-15 | +/-20 | +/-30 | +/-50 |
|-------------|------|------|--------|-------|-------|-------|-------|-------|
| 0 ~ +50°C   | ■ O  | ■ O  | ■ O    | ■ O*  | ■ O*  | ■ O*  | ■ O*  | ■ O*  |
| -10 ~ +60°C | ■ O  | ■ O  | ■ O    | ■ O*  | ■ O*  | ■ O*  | ■ O*  | ■ O*  |
| -20 ~ +70°C |      | ■ O  | ■ O    | ■ O   | ■ O   | ■ O*  | ■ O*  | ■ O*  |
| -30 ~ +80°C |      |      |        | ■ O   | ■ O   | ■ O   | ■ O*  | ■ O*  |
| -40 ~ +90°C |      |      |        | ■ O   | ■ O   | ■ O   | ■ O   | ■ O*  |

HC49U & 50U Series : O  
HC49S Series : \*  
UM Series : ■

● **Frequency Range & Equivalent Series Resistance ( Unit: Ohm )**

| Frequency ( MHz ) | Vibration Mode | HC-49/U<br>HC-50/U | HC-49/U1<br>HC-50/U1 | HC-49/U2<br>HC-50/U2 | HC-49/U3<br>HC-50/U3 |
|-------------------|----------------|--------------------|----------------------|----------------------|----------------------|
| 1.5 ~ 1.99        | Fundamental    | 700                |                      |                      |                      |
| 2.0 ~ 2.99        | Fundamental    | 500                |                      |                      | 600                  |
| 3.0 ~ 3.19        | Fundamental    | 300                |                      |                      | 400                  |
| 3.2 ~ 3.99        | Fundamental    | 150                |                      |                      | 200                  |
| 4.0 ~ 4.49        | Fundamental    | 90                 |                      |                      | 150                  |
| 4.5 ~ 4.99        | Fundamental    | 70                 |                      | 100                  | 80                   |
| 5.0 ~ 6.99        | Fundamental    | 50                 |                      | 60                   | 60                   |
| 7.0 ~ 9.99        | Fundamental    | 35                 |                      | 40                   | 40                   |
| 10.0 ~ 30.0       | Fundamental    | 25                 | 35                   | 25                   | 25                   |
| 20.0 ~ 24.99      | Third Overtone | 45                 |                      | 50                   | 50                   |
| 25.0 ~ 90.0       | Third Overtone | 40                 | 50                   | 40                   | 40                   |
| 70.0 ~ 160.0      | Fifth Overtone | 70                 | 70                   | 70                   | 70                   |

● **Frequency Range & ESR ( Unit: Ohm )**

| Frequency ( MHz ) | Vibration Mode | LP Series |
|-------------------|----------------|-----------|
| 3.2 ~ 3.79        | Fundamental    | 180       |
| 3.8 ~ 4.49        | Fundamental    | 150       |
| 4.5 ~ 5.99        | Fundamental    | 120       |
| 6.0 ~ 7.99        | Fundamental    | 100       |
| 8.0 ~ 9.99        | Fundamental    | 80        |
| 10.0 ~ 11.9       | Fundamental    | 70        |
| 12.0 ~ 15.9       | Fundamental    | 60        |
| 16.0 ~ 19.9       | Fundamental    | 50        |
| 20.0 ~ 25.9       | Fundamental    | 40        |
| 26.0 ~ 39.9       | Third Overtone | 100       |
| 40.0 ~ 79.9       | Third Overtone | 80        |
| 80.0 ~ 100.0      | Third Overtone | 100       |

● **Frequency Range & ESR ( Unit: Ohm )**

| Frequency ( MHz ) | Vibration Mode | UM-1<br>UM-1 Slim | UM-5<br>UM-4 |
|-------------------|----------------|-------------------|--------------|
| 3.5 ~ 3.9         | Fundamental    | 200               |              |
| 4.0 ~ 4.99        | Fundamental    | 150               |              |
| 5.0 ~ 9.9         | Fundamental    | 60                |              |
| 10.0 ~ 14.9       | Fundamental    | 40                | 60           |
| 15.0 ~ 50.0       | Fundamental    | 30                | 35           |
| 30.0 ~ 49.9       | Third Overtone | 45                | 50           |
| 50.0 ~ 100.0      | Third Overtone | 60                | 60           |
| 75.0 ~ 160.0      | Fifth Overtone | 80                | 90           |

● **Dimension ( unit: mm )**

**HC49U**

| HOLDER | H    |
|--------|------|
| HC49U  | 13.0 |
| HC49U1 | 9.5  |
| HC49U2 | 11.0 |
| HC49U3 | 11.4 |

**HC50U**

| HOLDER | H    |
|--------|------|
| HC50U  | 13.1 |
| HC50U1 | 9.5  |
| HC50U2 | 11.0 |
| HC50U3 | 11.4 |

**HC49S-2.0,2.5,3.5**

| HOLDER    | H   |
|-----------|-----|
| HC49S-2.2 | 2.2 |
| HC49S-2.5 | 2.5 |
| HC49S-3.5 | 3.5 |

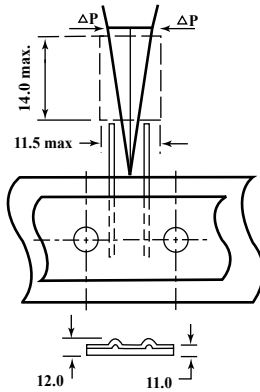
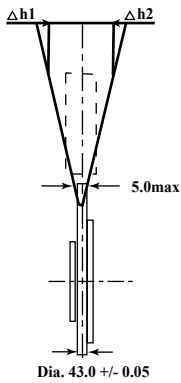
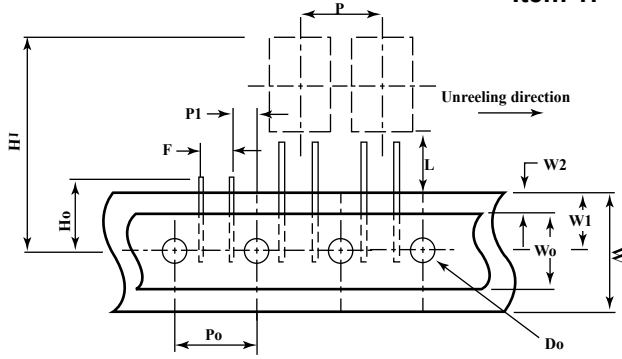
**UM-1 Slim**

| HOLDER | H   |
|--------|-----|
| UM-1   | 8.2 |
| UM-4   | 4.6 |
| UM-5   | 6.0 |

**UM-1, UM-4, UM-5**

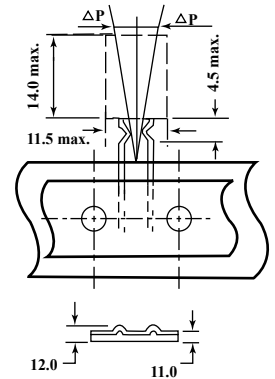
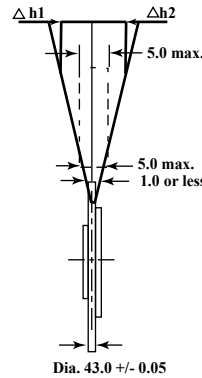
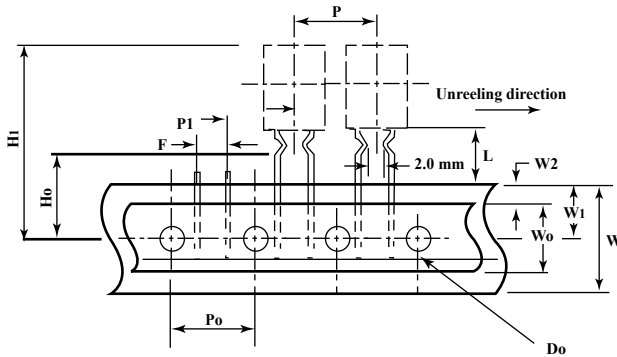
## ● Tape Specification

Item 1:

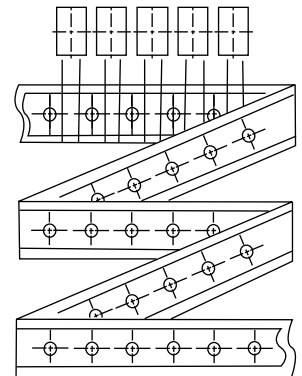
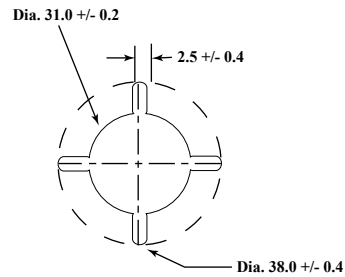
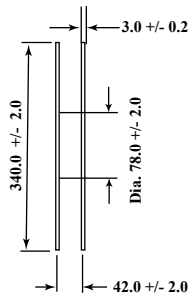
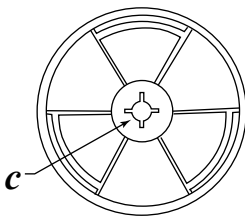


| Symbol | Dimension Tolerance ( mm ) |            |
|--------|----------------------------|------------|
| P      | 12.7+/-1.0                 |            |
| Po     | 12.7+/-0.3                 |            |
| P1     | 3.85+/-0.7                 |            |
| F      | 5.0+/-0.8                  |            |
| W      | 18.0+1.0/-0.5              |            |
| Wo     | 12.5 or more               |            |
| W1     | 9.0+0.75/-0.5              |            |
| W2     | 3.0 or less                |            |
| Do     | 4.0+/-0.2                  |            |
| L      | 9.5 or more                |            |
| t1     | 0.6+/-0.3                  |            |
| t2     | 1.5 or less                |            |
| Δ h1   | 2.0 or less                |            |
| Δ h2   | 2.0 or less                |            |
| Δ P    | 2.0 or less                |            |
| Ho     |                            | 4.0+/- 0.2 |
| H1     | 34.46 or less              | xs;24.86   |

Item 2:



## ● Reel Specification



● C Enlarge

● Tape Arrange



## ● Application

Radio Communication, AV Equipment, Office Automation Equipment, Consumer Products...etc

## ● Specification

|                             |  |
|-----------------------------|--|
| Frequency Range             | 1.5 ~ 160.0 MHz                            |
| Vibration Mode              | AT Cut: Fundamental, Third, Fifth          |
| Frequency Tolerance at 25°C | +/-10, +/-15, +/-20, +/-30, +/-50 ppm      |
| Shunt Capacitance           | 7.0pF max. or specified                    |
| Load Capacitance            | 16, 20, 30pF, Series Resonant or specified |
| Drive Level                 | 10, 100, 300, 1000uW or specified          |
| Insulation Resistance       | 500M Ohm min. at DC 100V                   |
| Aging                       | +/- 3, 5 ppm per year or specified         |

## ● Operating Temperature Range & Frequency Stability

| Temp.\ppm   | +/-3 | +/-5 | +/-7.5 | +/-10 | +/-15 | +/-20 | +/-30 | +/-50 |
|-------------|------|------|--------|-------|-------|-------|-------|-------|
| 0 ~ +50°C   | ■ ○  | ■ ○  | ■ ○    | ■ ○*  | ■ ○*  | ■ ○*  | ■ ○*  | ■ ○*  |
| -10 ~ +60°C | ■ ○  | ■ ○  | ■ ○    | ■ ○*  | ■ ○*  | ■ ○*  | ■ ○*  | ■ ○*  |
| -20 ~ +70°C |      | ■ ○  | ■ ○    | ■ ○   | ■ ○*  | ■ ○*  | ■ ○*  | ■ ○*  |
| -30 ~ +80°C |      |      |        | ■ ○   | ■ ○   | ■ ○   | ■ ○*  | ■ ○*  |
| -40 ~ +90°C |      |      |        |       | ■ ○   | ■ ○   | ■ ○   | ■ ○*  |

HC49U & 50U Series : ○  
 HC49S Series : \*  
 UM Series : ■

## ● Frequency Range & Equivalent Series Resistance ( Unit: Ohm )

| Frequency ( MHz ) | Vibration Mode | HC-49/U<br>HC-50/U | HC-49/U1<br>HC-50/U1 | HC-49/U2<br>HC-50/U2 | HC-49/U3<br>HC-50/U3 |
|-------------------|----------------|--------------------|----------------------|----------------------|----------------------|
| 1.5 ~ 1.99        | Fundamental    | 700                |                      |                      |                      |
| 2.0 ~ 2.99        | Fundamental    | 500                |                      |                      | 600                  |
| 3.0 ~ 3.19        | Fundamental    | 300                |                      |                      | 400                  |
| 3.2 ~ 3.99        | Fundamental    | 150                |                      |                      | 200                  |
| 4.0 ~ 4.49        | Fundamental    | 90                 |                      |                      | 150                  |
| 4.5 ~ 4.99        | Fundamental    | 70                 |                      | 100                  | 80                   |
| 5.0 ~ 6.99        | Fundamental    | 50                 |                      | 60                   | 60                   |
| 7.0 ~ 9.99        | Fundamental    | 35                 |                      | 40                   | 40                   |
| 10.0 ~ 30.0       | Fundamental    | 25                 | 35                   | 25                   | 25                   |
| 20.0 ~ 24.99      | Third Overtone | 45                 |                      | 50                   | 50                   |
| 25.0 ~ 90.0       | Third Overtone | 40                 | 50                   | 40                   | 40                   |

## ● Frequency Range & ESR ( Unit: Ohm )

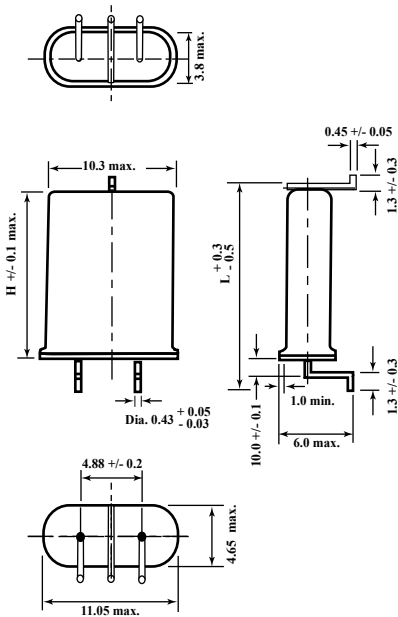
| Frequency ( MHz ) | Vibration Mode | LP Series |
|-------------------|----------------|-----------|
| 3.2 ~ 3.79        | Fundamental    | 180       |
| 3.8 ~ 4.49        | Fundamental    | 150       |
| 4.5 ~ 5.99        | Fundamental    | 120       |
| 6.0 ~ 7.99        | Fundamental    | 100       |
| 8.0 ~ 9.99        | Fundamental    | 80        |
| 10.0 ~ 11.9       | Fundamental    | 70        |
| 12.0 ~ 15.9       | Fundamental    | 60        |
| 16.0 ~ 19.9       | Fundamental    | 50        |
| 20.0 ~ 25.9       | Fundamental    | 40        |
| 26.0 ~ 39.9       | Third Overtone | 100       |
| 40.0 ~ 59.9       | Third Overtone | 80        |
| 60.0 ~ 79.9       | Third Overtone | 60        |
| 80.0 ~ 100.0      | Third Overtone | 60        |

## ● Frequency Range & ESR ( Unit: Ohm )

| Frequency ( MHz ) | Vibration Mode | UM-1<br>UM-1 Slim | UM-5<br>UM-4 |
|-------------------|----------------|-------------------|--------------|
| 3.5 ~ 3.9         | Fundamental    | 200               |              |
| 4.0 ~ 4.99        | Fundamental    | 150               |              |
| 5.0 ~ 9.9         | Fundamental    | 60                |              |
| 10.0 ~ 14.9       | Fundamental    | 40                | 60           |
| 15.0 ~ 50.0       | Fundamental    | 30                | 35           |
| 30.0 ~ 49.9       | Third Overtone | 45                | 50           |
| 50.0 ~ 100.0      | Third Overtone | 60                | 60           |
| 75.0 ~ 160.0      | Third Overtone | 80                | 90           |

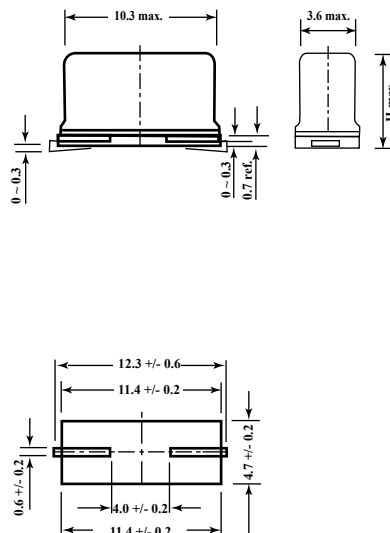
## ● Dimension ( unit: mm )

HC49U (SMD)



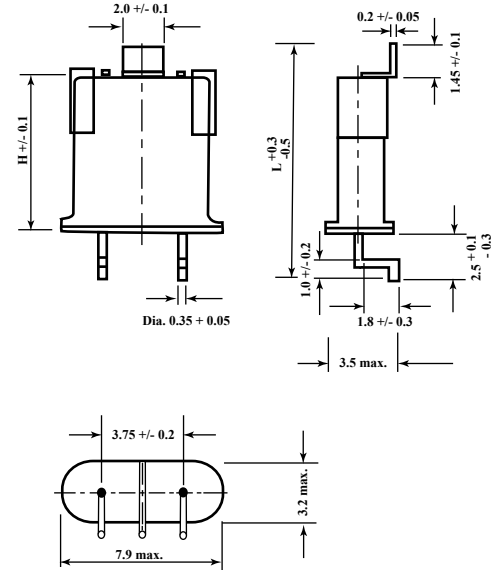
| HOLDER | H    | L     |
|--------|------|-------|
| HC49U  | 13.1 | 17.06 |
| HC49U1 | 9.5  | 13.46 |
| HC49U2 | 11.0 | 14.96 |
| HC49U3 | 11.4 | 15.36 |

SMD49S-3.0S,3.5S,5.0S ( HC49S SMD Type )



| HOLDER      | H   |
|-------------|-----|
| SMD49S-3.0S | 3.0 |
| SMD49S-3.5S | 3.5 |
| SMD49S-5.0S | 5.0 |

UM-1S, UM-4S, UM-5S (SMD)

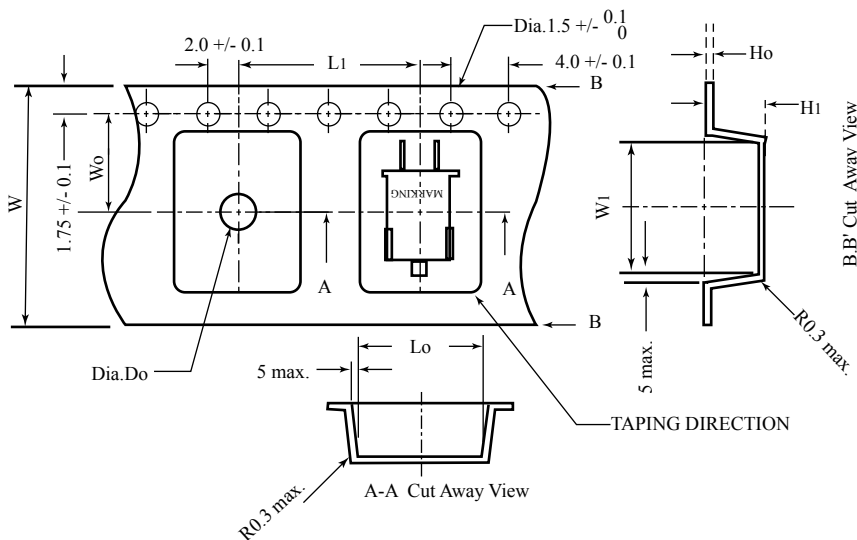


| HOLDER | H   | L    |
|--------|-----|------|
| UM-1S  | 7.7 | 11.7 |
| UM-4S  | 4.6 | 8.6  |
| UM-5S  | 5.9 | 9.9  |

# CRYSTAL UNITS ( DIP TYPE )

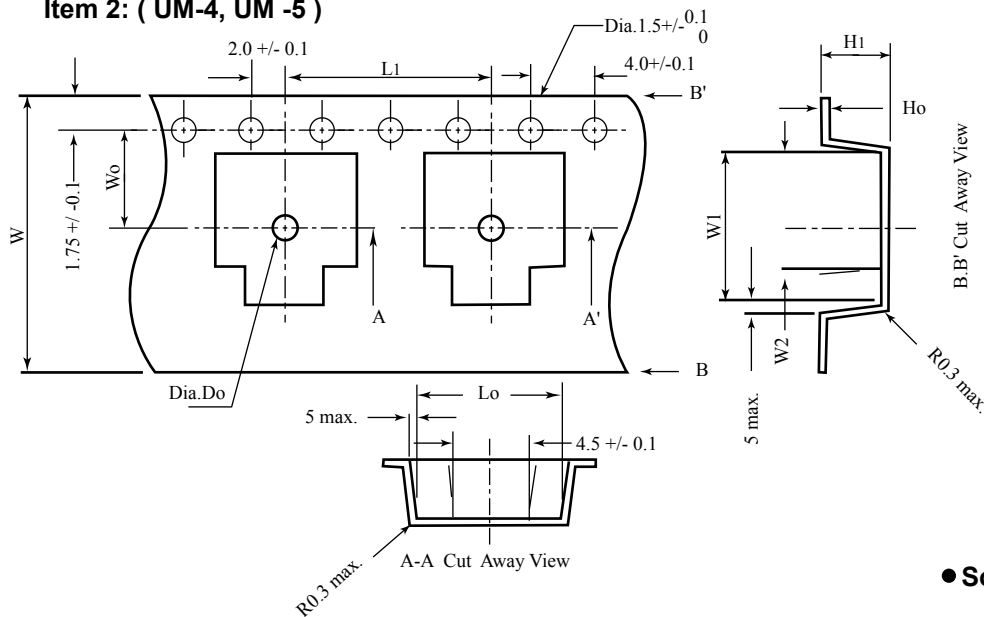


## ● Tape Specification Item 1 : ( 49U, SMD49S, UM-1 )



| Symbol         | Dimension Tolerance (mm) |            |            |
|----------------|--------------------------|------------|------------|
|                | 49U                      | SMD49S     | UM-1       |
| W              | 32.0+/-0.3               | 24.0+/-0.3 | 24.0+/-0.3 |
| W <sub>0</sub> | 14.2+/-0.1               | 11.5+/-0.1 | 11.5+/-0.1 |
| W <sub>1</sub> | 18.0+/-0.2               | 13.0+/-0.1 | 13.9+/-0.1 |
| Lo             | 11.2+/-0.1               | 5.1+/-0.1  | 8.7+/-0.1  |
| L1             | 16.0+/-0.1               | 12.0+/-0.1 | 12.0+/-0.1 |
| Ho             | 0.4+/-0.05               | 0.4+/-0.05 | 0.3+/-0.05 |
| H1             | 4.8+/-0.1                | 2.0+/-0.01 | 2.2+/-0.1  |
| Dia.Do         | 2.0+/-0.1                | 2.0+/-0.1  | 2.2+/-0.1  |

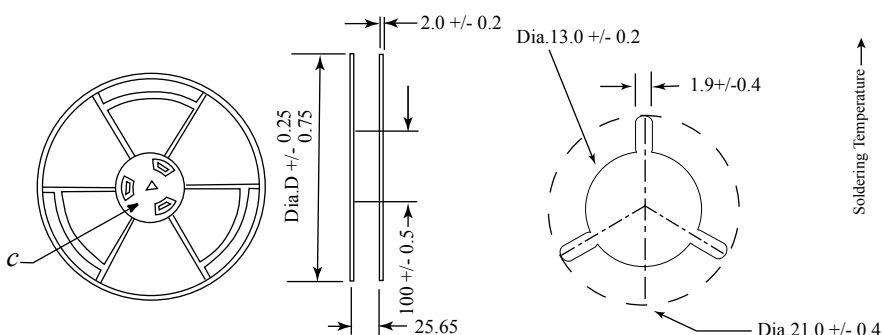
## Item 2 : ( UM-4, UM -5 )



| Symbol         | Dimension Tolerance (mm) |            |
|----------------|--------------------------|------------|
|                | UM-5                     | UM-4       |
| W              | 24.0+/-0.3               | 16.0+/-0.3 |
| W <sub>0</sub> | 11.5+/-0.1               | 7.5+/-0.1  |
| W <sub>1</sub> | 11.4+/-0.1               | 8.9+/-0.1  |
| W <sub>2</sub> | 8.7+/-0.1                | 6.7+/-0.1  |
| L <sub>0</sub> | 8.4+/-0.1                | 8.3+/-0.1  |
| L <sub>1</sub> | 12.0+/-0.1               | 12.0+/-0.1 |
| H <sub>0</sub> | 0.4+/-0.05               | 0.4+/-0.05 |
| H <sub>1</sub> | 3.7+/-0.1                | 3.9+/-0.1  |
| Dia.Do         | 2.0+/-0.1                | 1.6+/-0.1  |

## ● Reel Specification

### C ENLARGE



| Dia D | Material      |
|-------|---------------|
| 300   | Paper-Machine |
| 350   | Plastics      |

## ● Solder Reflow Diagram

