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REG.-Nr.A759



CQC04001010050

## Specification for Approval

**Customer** : 深圳市嘉立創科技發展有限公司

**Product Name:** LEAD-FREE THICK FILM CHIP RESISTORS

**Part Name** : CHIP SERIES  $\pm 0.5\%$ ,  $\pm 1\%$ ,  $\pm 2\%$ ,  $\pm 5\%$  &  $0\Omega$

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### 1.0 Scope:

This specification for approve relates to the Lead-Free Thick Film Chip Resistors manufactured by UNIOHM.

### 2.0 Ratings & Dimension:

| 01005、0201、0402 | 0603、0805、1206、1210、1812、2010、2512 |
|-----------------|------------------------------------|
|                 |                                    |

### 2.1 Dimension & Resistance Range :

| Type  | 70°C Power     | Dimension(mm) |                                        |           |           |           | Resistance Range |            |           |            |
|-------|----------------|---------------|----------------------------------------|-----------|-----------|-----------|------------------|------------|-----------|------------|
|       |                | L             | W                                      | H         | A         | B         | 0.5%             | 1.0%       | 2.0%      | 5.0%       |
| 01005 | 1/32W          | 0.40±0.02     | 0.20±0.02                              | 0.13±0.02 | 0.10±0.05 | 0.10±0.03 | --               | 10Ω-10MΩ   | 10Ω-10MΩ  | 10Ω-10MΩ   |
| 0201  | 1/20W          | 0.60±0.03     | 0.30±0.03                              | 0.23±0.03 | 0.10±0.05 | 0.15±0.05 | --               | 1Ω-10MΩ    | 1Ω-10MΩ   | 1Ω-10MΩ    |
| 0402  | 1/16W          | 1.00±0.10     | 0.50±0.05                              | 0.35±0.05 | 0.20±0.10 | 0.25±0.10 | 1Ω-10MΩ          | 0.2Ω~22MΩ  | 0.2Ω~22MΩ | 0.2Ω~22MΩ  |
| 0603  | 1/10W          | 1.60±0.10     | 0.80±0.10                              | 0.45±0.10 | 0.30±0.20 | 0.30±0.20 | 1Ω-10MΩ          | 0.1Ω~33MΩ  | 0.1Ω~33MΩ | 0.1Ω~100MΩ |
| 0805  | 1/8W           | 2.00±0.15     | 1.25 <sup>+0.15</sup> <sub>-0.10</sub> | 0.55±0.10 | 0.40±0.20 | 0.40±0.20 | 1Ω-10MΩ          | 0.1Ω~33MΩ  | 0.1Ω~33MΩ | 0.1Ω~100MΩ |
| 1206  | 1/4W           | 3.10±0.15     | 1.55 <sup>+0.15</sup> <sub>-0.10</sub> | 0.55±0.10 | 0.45±0.20 | 0.45±0.20 | 1Ω-10MΩ          | 0.1Ω~33MΩ  | 0.1Ω~33MΩ | 0.1Ω~100MΩ |
| 1210  | 1/3W<br>1/2W   | 3.10±0.10     | 2.60±0.20                              | 0.55±0.10 | 0.50±0.25 | 0.50±0.20 | 1Ω-10MΩ          | 0.1Ω~10MΩ  | 0.1Ω~22MΩ | 0.1Ω~100MΩ |
| 1812  | 1/2W<br>3/4W-S | 4.50±0.20     | 3.20±0.20                              | 0.55±0.20 | 0.50±0.20 | 0.50±0.20 | 1Ω-10MΩ          | 0.11Ω-10MΩ | 0.1Ω-10MΩ | 0.1Ω-10MΩ  |
| 2010  | 1/2W<br>3/4W-S | 5.00±0.10     | 2.50±0.20                              | 0.55±0.10 | 0.60±0.25 | 0.50±0.20 | 1Ω-10MΩ          | 0.1Ω~22MΩ  | 0.1Ω~22MΩ | 0.1Ω~22MΩ  |
| 2512  | 1W             | 6.35±0.10     | 3.20±0.20                              | 0.55±0.10 | 0.60±0.25 | 0.50±0.20 | 1Ω-10MΩ          | 0.1Ω~33MΩ  | 0.1Ω~33MΩ | 0.1Ω~33MΩ  |

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## 2.2 Ratings

| Type  | 70°C Power     | Max. Working Voltage | Max. Overload Voltage | Dielectric withstanding Voltage | Resistance Value of Jumper | Rated Current of Jumper | Max. Rated Current of Jumper | Operating Temperature |
|-------|----------------|----------------------|-----------------------|---------------------------------|----------------------------|-------------------------|------------------------------|-----------------------|
| 01005 | 1/32W          | 15V                  | 30V                   | --                              | <50mΩ                      | --                      | --                           | -55°C~155°C           |
| 0201  | 1/20W          | 25V                  | 50V                   | --                              | <50mΩ                      | 0.5A                    | 1A                           | -55°C~155°C           |
| 0402  | 1/16W          | 50V                  | 100V                  | 100V                            | <50mΩ                      | 1A                      | 2A                           | -55°C~155°C           |
| 0603  | 1/10W          | 50V                  | 100V                  | 300V                            | <50mΩ                      | 1A                      | 2A                           | -55°C~155°C           |
| 0805  | 1/8W           | 150V                 | 300V                  | 500V                            | <50mΩ                      | 2A                      | 5A                           | -55°C~155°C           |
| 1206  | 1/4W           | 200V                 | 400V                  | 500V                            | <50mΩ                      | 2A                      | 10A                          | -55°C~155°C           |
| 1210  | 1/3W<br>1/2W   | 200V                 | 500V                  | 500V                            | <50mΩ                      | 2A                      | 10A                          | -55°C~155°C           |
| 1812  | 1/2W<br>3/4W-S | 200V                 | 500V                  | 500V                            | <50mΩ                      | 2A                      | 10A                          | -55°C~155°C           |
| 2010  | 1/2W<br>3/4W-S | 200V                 | 500V                  | 500V                            | <50mΩ                      | 2A                      | 10A                          | -55°C~155°C           |
| 2512  | 1W             | 200V                 | 500V                  | 500V                            | <50mΩ                      | 2A                      | 10A                          | -55°C~155°C           |

## 3.0 Structure:



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#### 4.0 Marking:

(1) For 01005、0201 and 0402 size. Due to the very small size of the resistor's body, there is no marking on the body.

Example:



01005、0201、0402

(2)  $\pm 2\%$ ,  $\pm 5\%$  Tolerance: The first two digits are significant figures of resistance and the third denotes number of zeros following

Example:



33000  $\rightarrow$  33K $\Omega$

(3)  $\pm 2\%$ 、 $\pm 5\%$  Tolerance: Below 10 $\Omega$  show as following, read alphabet "R" as decimal point.

Example:



2R2  $\rightarrow$  2.2 $\Omega$

(4)  $\pm 0.5\%$ 、 $\pm 1\%$  Tolerance: 4 digits, first three digits are significant; fourth digit is number of zeros. Letter r is decimal point.



2701  $\rightarrow$  2.7K $\Omega$



10R0  $\rightarrow$  10 $\Omega$

(5) standard E-24 and not belong to E-96 series values (in  $\pm 0.5\%$ 、 $\pm 1\%$  tolerance) of 0603 size the marking is the same as 5% tolerance but marking as underline



333 = 33000  $\rightarrow$  33K $\Omega$



680  $\rightarrow$  68 $\Omega$

(6) Product below 1 $\Omega$ , show as following, the first digit is "R" which as decimal point.



R30  $\rightarrow$  0.3 $\Omega$

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(7) Standard E-96 series values ( $\pm 0.5\%$ 、 $\pm 1\%$  tolerance) of 0603 size. Due the small size of the resistor's body, 3 digits marking will be used to indicate the accurate resistance value by using the following multiplier & resistance code.

Multiplier code:

| Code       | A      | B      | C      | D      | E      | F      | G      | H      | X         | Y         | Z         |
|------------|--------|--------|--------|--------|--------|--------|--------|--------|-----------|-----------|-----------|
| Multiplier | $10^0$ | $10^1$ | $10^2$ | $10^3$ | $10^4$ | $10^5$ | $10^6$ | $10^7$ | $10^{-1}$ | $10^{-2}$ | $10^{-3}$ |

Coding formula

First two digits-----Resistance code      Third digit-----Multiplier code

EXAMPLE:  $1.96K\Omega = 196 \times 10^1 \Omega$ -----29B

$12.4\Omega = 124 \times 10^{-1} \Omega$ -----10X



STANDARD E-96 VALUES AND 0603 RESISTANCE CODE

| $\Omega$ VALUE | CODE | $\Omega$ VALUE | CODE | $\Omega$ VALUE | CODE | $\Omega$ VALUE | CODE |
|----------------|------|----------------|------|----------------|------|----------------|------|
| 100            | 01   | 178            | 25   | 316            | 49   | 562            | 73   |
| 102            | 02   | 182            | 26   | 324            | 50   | 576            | 74   |
| 105            | 03   | 187            | 27   | 332            | 51   | 590            | 75   |
| 107            | 04   | 191            | 28   | 340            | 52   | 604            | 76   |
| 110            | 05   | 196            | 29   | 348            | 53   | 619            | 77   |
| 113            | 06   | 200            | 30   | 357            | 54   | 634            | 78   |
| 115            | 07   | 205            | 31   | 365            | 55   | 649            | 79   |
| 118            | 08   | 210            | 32   | 374            | 56   | 665            | 80   |
| 121            | 09   | 215            | 33   | 383            | 57   | 681            | 81   |
| 124            | 10   | 221            | 34   | 392            | 58   | 698            | 82   |
| 127            | 11   | 226            | 35   | 402            | 59   | 715            | 83   |
| 130            | 12   | 232            | 36   | 412            | 60   | 732            | 84   |
| 133            | 13   | 237            | 37   | 422            | 61   | 750            | 85   |
| 137            | 14   | 243            | 38   | 432            | 62   | 768            | 86   |
| 140            | 15   | 249            | 39   | 442            | 63   | 787            | 87   |
| 143            | 16   | 255            | 40   | 453            | 64   | 806            | 88   |
| 147            | 17   | 261            | 41   | 464            | 65   | 825            | 89   |
| 150            | 18   | 267            | 42   | 475            | 66   | 845            | 90   |
| 154            | 19   | 274            | 43   | 487            | 67   | 866            | 91   |
| 158            | 20   | 280            | 44   | 499            | 68   | 887            | 92   |
| 162            | 21   | 287            | 45   | 511            | 69   | 909            | 93   |
| 165            | 22   | 294            | 46   | 523            | 70   | 931            | 94   |
| 169            | 23   | 301            | 47   | 536            | 71   | 953            | 95   |
| 174            | 24   | 309            | 48   | 549            | 72   | 976            | 96   |

|              |           |               |           |         |           |      |
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(8) 0Ω Marking:

Normally for 01005、0201 and 0402 size, no marking on the body:



Normally, the marking of 0Ω 0603, 0Ω 0805, 0Ω 1206, 0Ω 1210, 0Ω 1812, 0Ω 2010, 0Ω 2512 resistors as following



**5.0 Derating Curve:**

Resistors shall have a power rating based on continuous load operation at an ambient temperature from -55℃ to 70℃. For temperature in excess of 70℃, the load shall be derate as shown in figure 1



5.1 Voltage rating:

Resistors shall have a rated direct-current (DC) continuous working

Voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial-line frequency and waveform corresponding to the power rating, as determined from the following formula:

$$RCWV = \sqrt{P \times R}$$

Where: RCWV commercial-line frequency and waveform (Volt.)

P = power rating (WATT.) R = nominal resistance (OHM)

In no case shall the rated DC or RMS AC continuous working voltage be greater than the applicable maximum value.

The overload voltage is 2.5 times RCWV or Max. Overload voltage whichever is less.

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### 6.0 Performance Specification:

| Characteristic                                            | Limits                                                                                                                                                                                                                                                                                                                                                                                   | Test Method<br>(JIS-C-5201& JIS-C-5202)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                         |             |      |   |                                         |         |   |            |                |   |                                          |         |   |            |                |
|-----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-------------|------|---|-----------------------------------------|---------|---|------------|----------------|---|------------------------------------------|---------|---|------------|----------------|
| ◎Temperature Coefficient                                  | <b>01005:</b><br>$10\Omega \leq R \leq 100\Omega: \pm 400\text{PPM}/^\circ\text{C}$<br>$>100\Omega: \pm 250\text{PPM}/^\circ\text{C}$                                                                                                                                                                                                                                                    | 4.8 Natural resistance changes per temp. Degree centigrade<br>$R_2 - R_1$<br>$\frac{R_2 - R_1}{R_1(T_2 - T_1)} \times 10^6 \text{ (PPM}/^\circ\text{C)}$<br>$R_1$ : resistance value at room temp. ( $T_1$ )<br>$R_2$ : resistance value at room temp. $+100^\circ\text{C}$ ( $T_2$ )<br>Test pattern: room temp. ( $T_1$ ), room temp. $+100^\circ\text{C}$ ( $T_2$ )                                                                                                                                                                                                                     |                                         |             |      |   |                                         |         |   |            |                |   |                                          |         |   |            |                |
|                                                           | <b>0201:</b><br>$1\Omega \leq R \leq 10\Omega: \pm 400\text{PPM}/^\circ\text{C}$<br>$>10\Omega: \pm 200\text{PPM}/^\circ\text{C}$                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                         |             |      |   |                                         |         |   |            |                |   |                                          |         |   |            |                |
|                                                           | <b>0402~2512 :</b><br>$<1\Omega \leq \pm 800\text{PPM}/^\circ\text{C}$<br>$1\Omega \leq R \leq 10\Omega \leq \pm 400\text{PPM}/^\circ\text{C}$<br>$10\Omega < R \leq 100\Omega \leq \pm 200\text{PPM}/^\circ\text{C}$<br>$100\Omega < R < 10\text{M}\Omega \leq \pm 100\text{PPM}/^\circ\text{C}$<br>$10\text{M}\Omega \leq R < 100\text{M}\Omega \leq \pm 200\text{PPM}/^\circ\text{C}$ |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                         |             |      |   |                                         |         |   |            |                |   |                                          |         |   |            |                |
| ◎ *Short-time overload                                    | $\pm 0.5\%, \pm 1\%$ $\pm (1\% + 0.1\Omega) \text{ Max.}$                                                                                                                                                                                                                                                                                                                                | 4.13 Permanent resistance change after the application of a potential of 2.5 times RCWV or Max. Overload Voltage whichever less for 5 seconds..<br><br>Apply max Overload current for 0Ω                                                                                                                                                                                                                                                                                                                                                                                                   |                                         |             |      |   |                                         |         |   |            |                |   |                                          |         |   |            |                |
|                                                           | $\pm 2\%, \pm 5\%$ $\pm (2\% + 0.1\Omega) \text{ Max.}$                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                         |             |      |   |                                         |         |   |            |                |   |                                          |         |   |            |                |
|                                                           | 01005 $\pm (2\% + 0.1\Omega) \text{ Max}$                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                         |             |      |   |                                         |         |   |            |                |   |                                          |         |   |            |                |
|                                                           | * $< 50\text{m}\Omega$                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                         |             |      |   |                                         |         |   |            |                |   |                                          |         |   |            |                |
| * Dielectric withstanding voltage                         | No evidence of flashover mechanical damage, arcing or insulation breaks down.                                                                                                                                                                                                                                                                                                            | 4.7 Resistors shall be clamped in the trough of a $90^\circ\text{C}$ metallic v-block and shall be tested at ac potential respectively specified in the given list of each product type for 60-70 seconds.                                                                                                                                                                                                                                                                                                                                                                                 |                                         |             |      |   |                                         |         |   |            |                |   |                                          |         |   |            |                |
| ◎ *Solderability                                          | 95% coverage Min.                                                                                                                                                                                                                                                                                                                                                                        | Wave solder:<br>Test temperature of solder: $245^\circ\text{C} \pm 3^\circ\text{C}$ dipping time in solder: 2-3 seconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                         |             |      |   |                                         |         |   |            |                |   |                                          |         |   |            |                |
|                                                           | Go up tin rate bigger than half of end pole                                                                                                                                                                                                                                                                                                                                              | Reflow:<br>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                         |             |      |   |                                         |         |   |            |                |   |                                          |         |   |            |                |
| ◎ Temperature cycling                                     | $\pm 0.5\%, \pm 1\%$ $\pm (0.5\% + 0.05\Omega) \text{ Max}$                                                                                                                                                                                                                                                                                                                              | 4.19 Resistance change after continuous five cycles for duty cycle specified below:<br><table border="1" data-bbox="790 1635 1380 1803"> <thead> <tr> <th>Step</th> <th>Temperature</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1</td> <td><math>-55^\circ\text{C} \pm 3^\circ\text{C}</math></td> <td>30 mins</td> </tr> <tr> <td>2</td> <td>Room temp.</td> <td>10 --- 15 mins</td> </tr> <tr> <td>3</td> <td><math>+155^\circ\text{C} \pm 2^\circ\text{C}</math></td> <td>30 mins</td> </tr> <tr> <td>4</td> <td>Room temp.</td> <td>10 --- 15 mins</td> </tr> </tbody> </table> | Step                                    | Temperature | Time | 1 | $-55^\circ\text{C} \pm 3^\circ\text{C}$ | 30 mins | 2 | Room temp. | 10 --- 15 mins | 3 | $+155^\circ\text{C} \pm 2^\circ\text{C}$ | 30 mins | 4 | Room temp. | 10 --- 15 mins |
|                                                           | Step                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Temperature                             | Time        |      |   |                                         |         |   |            |                |   |                                          |         |   |            |                |
|                                                           | 1                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | $-55^\circ\text{C} \pm 3^\circ\text{C}$ | 30 mins     |      |   |                                         |         |   |            |                |   |                                          |         |   |            |                |
| 2                                                         | Room temp.                                                                                                                                                                                                                                                                                                                                                                               | 10 --- 15 mins                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                         |             |      |   |                                         |         |   |            |                |   |                                          |         |   |            |                |
| 3                                                         | $+155^\circ\text{C} \pm 2^\circ\text{C}$                                                                                                                                                                                                                                                                                                                                                 | 30 mins                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                         |             |      |   |                                         |         |   |            |                |   |                                          |         |   |            |                |
| 4                                                         | Room temp.                                                                                                                                                                                                                                                                                                                                                                               | 10 --- 15 mins                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                         |             |      |   |                                         |         |   |            |                |   |                                          |         |   |            |                |
| $\pm 2\%, \pm 5\%$ $\pm (1.0\% + 0.05\Omega) \text{ Max}$ |                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                         |             |      |   |                                         |         |   |            |                |   |                                          |         |   |            |                |
| 01005 $\pm (1\% + 0.05\Omega) \text{ Max}$                |                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                         |             |      |   |                                         |         |   |            |                |   |                                          |         |   |            |                |
| ◎ Soldering heat                                          | Resistance change rate is:<br>$\pm (1\% + 0.05\Omega) \text{ Max}$                                                                                                                                                                                                                                                                                                                       | 4.18 Dip the resistor into a solder bath having a temperature of $260^\circ\text{C} \pm 5^\circ\text{C}$ and hold it for $10 \pm 1$ seconds.                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                         |             |      |   |                                         |         |   |            |                |   |                                          |         |   |            |                |

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|                                                                         |                           |                              |                                                                                                                                                                                            |
|-------------------------------------------------------------------------|---------------------------|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Terminal bending                                                        | $\pm(1\%+0.05\Omega)$ Max |                              | 4.33 Twist of test board:<br>Y/x = 3/90 mm for 60Seconds                                                                                                                                   |
| * Insulation resistance                                                 | 1,000 M $\Omega$ or more  |                              | 4.6 the measuring voltage shall be ,measured with a direct voltage of (100 $\pm$ 15)V or a voltage equal to the dielectric withstanding voltage., and apply for 1min                       |
| ◎ Humidity ( steady state )                                             | $\pm 0.5\%, \pm 1\%$      | $\pm(0.5\%+0.1\Omega)$ Max.  | 4.24 Temporary resistance change after 240 hours exposure in a humidity test chamber controlled at 40 $\pm$ 2 $^{\circ}$ C and 90-95% relative humidity,                                   |
|                                                                         | $\pm 2\%, \pm 5\%$        | $\pm(3.0\%+0.1\Omega)$ Max.  |                                                                                                                                                                                            |
|                                                                         | 01005                     | $\pm(3.0\%+0.05\Omega)$ Max. |                                                                                                                                                                                            |
| ◎ *Load life in humidity                                                | $\pm 0.5\%, \pm 1\%$      | $\pm(1\%+0.1\Omega)$ max.    | 7.9 Resistance change after 1,000 hours (1.5 hours "ON", 0.5 hour "OFF") at RCWV in a humidity chamber controlled at 40 $^{\circ}$ C $\pm$ 2 $^{\circ}$ C and 90 to 95% relative humidity. |
|                                                                         | $\pm 2\%, \pm 5\%$        | $\pm(3\%+0.1\Omega)$ Max.    |                                                                                                                                                                                            |
|                                                                         | 01005                     | $\pm(3.0\%+0.05\Omega)$ Max. |                                                                                                                                                                                            |
|                                                                         | * <50m $\Omega$           |                              |                                                                                                                                                                                            |
| ◎ *Load life                                                            | $\pm 0.5\%, \pm 1\%$      | $\pm(1\%+0.1\Omega)$ Max.    | 4.25.1 Permanent resistance change after 1,000 hours operating at RCWV with duty cycle 1.5 hours "ON", 0.5 hour "OFF" at 70 $^{\circ}$ C $\pm$ 2 $^{\circ}$ C ambient.                     |
|                                                                         | $\pm 2\%, \pm 5\%$        | $\pm(3\%+0.1\Omega)$ Max     |                                                                                                                                                                                            |
|                                                                         | 01005                     | $\pm(3.0\%+0.05\Omega)$ Max. |                                                                                                                                                                                            |
|                                                                         | * <50m $\Omega$           |                              |                                                                                                                                                                                            |
| The resistors of 0 $\Omega$ only can do the characteristic noted of *   |                           |                              |                                                                                                                                                                                            |
| The resistors of 01005 & 0201 only can do the characteristic noted of ◎ |                           |                              |                                                                                                                                                                                            |

### 7.0 Explanation of Part No. System:

The standard Part No. includes 14 digits with the following explanation:

7.1 1<sup>st</sup>~4<sup>th</sup> digits

This is to indicate the Chip Resistor.

Example: 01005, 0201, 0402, 0603, 0805, 1206, 1210, 2010, 1812, 2512

7.2 5<sup>th</sup>~6<sup>th</sup> digits:

7.2.1 This is to indicate the wattage or power rating. To dieting the size and the numbers,

The following codes are used; and please refer to the following chart for detail:

W=Normal Size; S=Small Size; U= Ultra Small Size; "1" ~ "G" to denotes "1" ~ "16" as Hexadecimal:

1/16W~1W:

|                  |      |      |     |     |     |     |      |      |       |    |
|------------------|------|------|-----|-----|-----|-----|------|------|-------|----|
| Wattage          | 1/32 | 3/4W | 1/2 | 1/3 | 1/4 | 1/8 | 1/10 | 1/16 | 1/20W | 1  |
| Normal Size      | WH   | 07   | W2  | W3  | W4  | W8  | WA   | WG   | WM    | 1W |
| Small Size       | /    | 07   | S2  | S3  | S4  | S8  | SA   | SG   | /     | 1S |
| Ultra Small Size | /    | /    | U2  | U3  | U4  | U8  | UA   | UG   | /     | 1U |

7.2.2 For power rating less or equal to 1 watt, the 5th digit will be the letters W or S to represent the size required & the 6th digit will be a number or a letter code.

Example: WA=1/10W; S4=1/4W-S

7.3 The 7th digit is to denote the Resistance Tolerance. The following letter code is to be used for indicating the standard Resistance Tolerance.

D= $\pm 0.5\%$     F= $\pm 1\%$     G= $\pm 2\%$     J= $\pm 5\%$     K=  $\pm 10\%$

|              |           |               |           |         |           |       |
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7.4 The 8th to 11th digits is to denote the Resistance Value.

7.4.1 For the standard resistance values of 5%&10% series, the 8th digit is "0", the 9th & 10th digits are to denote the significant figures of the resistance and the 11th digit is the number of zeros following;

For the standard resistance values of  $\leq 2\%$  series in, the 8th digit to the 10th digits is to denote the significant figures of the resistance and the 11th digit is the zeros following.

7.4.2 The following number s and the letter codes are to be used to indicate the number of zeros in the 11th digit:

$$0=10^0 \quad 1=10^1 \quad 2=10^2 \quad 3=10^3 \quad 4=10^4 \quad 5=10^5 \quad 6=10^6 \quad J=10^{-1} \quad K=10^{-2} \quad L=10^{-3} \quad M=10^{-4}$$

7.4.3 The 12th, 13th & 14th digits.

The 12th digit is to denote the Packaging Type with the following codes:

C=Bulk in (Chip Product)

T=Tape/Reel

7.4.4 The 13th digit is normally to indicate the Packing Quantity of Tape/Reel packaging types. The following letter code is to be used for some packing quantities:

$$4=4000\text{pcs} \quad 5=5000\text{pcs} \quad C=10000\text{pcs} \quad D=20000\text{pcs} \quad E=15000\text{pcs}$$

Chip Product: BD=B/B-20000pcs

TC=T/R-10000pcs

7.4.5 For some items, the 14th digit alone can use to denote special features of additional information with the following codes:

"\*" = the internal series general character (usually shown with A, B, C etc.)

## 8.0 Ordering Procedure: ( Example: 1210 1/2W $\pm 1\%$ 22 $\Omega$ T/R-5000 )



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**9.0 Packaging:**

**9.1 Tapping Dimension:**



Unit: mm

| Type  | A         | B         | C±0.05 | $\Phi D$<br>$\begin{matrix} +0.1 \\ -0 \end{matrix}$ | E±0.1 | F±0.05 | G±0.1 | W±0.2 | T±0.1 |
|-------|-----------|-----------|--------|------------------------------------------------------|-------|--------|-------|-------|-------|
| 01005 | 0.24±0.05 | 0.45±0.05 | 2.00   | 1.50                                                 | 1.75  | 3.50   | 4.00  | 8.00  | 0.40  |
| 0201  | 0.40±0.05 | 0.70±0.05 | 2.00   | 1.50                                                 | 1.75  | 3.50   | 4.00  | 8.00  | 0.42  |
| 0402  | 0.65±0.20 | 1.15±0.20 | 2.00   | 1.50                                                 | 1.75  | 3.50   | 4.00  | 8.00  | 0.45  |



Unit: mm

| Type | A ±0.2 | B ±0.2 | C±0.05 | $\Phi D$<br>$\begin{matrix} +0.1 \\ -0 \end{matrix}$ | E±0.1 | F±0.05 | G±0.1 | W±0.2 | T±0.1 |
|------|--------|--------|--------|------------------------------------------------------|-------|--------|-------|-------|-------|
| 0603 | 1.10   | 1.90   | 2.00   | 1.50                                                 | 1.75  | 3.50   | 4.00  | 8.00  | 0.67  |
| 0805 | 1.65   | 2.40   | 2.00   | 1.50                                                 | 1.75  | 3.50   | 4.00  | 8.00  | 0.81  |
| 1206 | 2.00   | 3.60   | 2.00   | 1.50                                                 | 1.75  | 3.50   | 4.00  | 8.00  | 0.81  |
| 1210 | 2.80   | 3.50   | 2.00   | 1.50                                                 | 1.75  | 3.50   | 4.00  | 8.00  | 0.75  |
| 2010 | 2.80   | 5.40   | 2.00   | 1.50                                                 | 1.75  | 5.50   | 4.00  | 12.00 | 0.75  |

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Unit: mm

| Type | A±0.2 | B±0.2 | C±0.05 | +0.1<br>φD<br>-0 | +0.25<br>φD1<br>-0 | E±0.1 | F±0.05 | G±0.1 | W±0.2 | T±0.1 |
|------|-------|-------|--------|------------------|--------------------|-------|--------|-------|-------|-------|
| 1812 | 3.50  | 4.80  | 2.00   | 1.50             | 1.50               | 1.75  | 5.50   | 4.00  | 12.00 | 1.00  |
| 2512 | 3.50  | 6.70  | 2.00   | 1.50             | 1.50               | 1.75  | 5.50   | 4.00  | 12.00 | 1.00  |

9.2 Dimension:



Unit: mm

| Type  | Taping            | Qty/Reel  | A±0.5 | B±0.5 | C±0.5 | D±1  | M±2   | W±1  |
|-------|-------------------|-----------|-------|-------|-------|------|-------|------|
| 01005 | Paper             | 20,000pcs | 2.0   | 13.0  | 21.0  | 60.0 | 178.0 | 10.0 |
| 0201  | Paper             | 10,000pcs | 2.0   | 13.0  | 21.0  | 60.0 | 178.0 | 10.0 |
| 0402  | Paper             | 10,000pcs | 2.0   | 13.0  | 21.0  | 60.0 | 178.0 | 10.0 |
| 0603  | Paper             | 5,000pcs  | 2.0   | 13.0  | 21.0  | 60.0 | 178.0 | 10.0 |
| 0805  | Paper             | 5,000pcs  | 2.0   | 13.0  | 21.0  | 60.0 | 178.0 | 10.0 |
| 1206  | Paper             | 5,000pcs  | 2.0   | 13.0  | 21.0  | 60.0 | 178.0 | 10.0 |
| 1210  | Paper             | 5,000pcs  | 2.0   | 13.0  | 21.0  | 60.0 | 178.0 | 10.0 |
| 2010  | Paper or Embossed | 4,000pcs  | 2.0   | 13.0  | 21.0  | 60.0 | 178.0 | 13.8 |
| 1812  | Embossed          | 4,000pcs  | 2.0   | 13.0  | 21.0  | 60.0 | 178.0 | 13.8 |
| 2512  | Embossed          | 4,000pcs  | 2.0   | 13.0  | 21.0  | 60.0 | 178.0 | 13.8 |

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#### 10.0: Note Matter :

10.1 UNIOHM recommend the storage condition temperature: 15°C~35°C, humidity :25%~75%.

(Put condition for individual product).

Even under UNIOHM recommended storage condition, solderability of products over 1 year old.

(Put condition for each product) may be degraded.

10.2 Store / transport cartons in the correct direction, which is indicated on a carton as a symbol.

Otherwise bent leads may occur due to excessive stress applied when dropping of a carton.

10.3 Product performance and soldered connections may deteriorate if the products are stored in the following places:

a. Storage in high Electrostatic.

b. Storage in direct sunshine、rain and snow or condensation.

c. Where the products are exposed to sea winds or corrosive gases, including Cl<sub>2</sub>, H<sub>2</sub>S<sub>3</sub>, NH<sub>3</sub>, SO<sub>2</sub>, NO<sub>2</sub>.

10.4 The products are used in circuit board thickness greater than 1.6mm. If customers use less than the thickness of the circuit board that you should confirm with the company, in order to recommend a more suitable product.

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