| PART NO.: ****WG*****T*E | FILE NO.: CLW-01-002 |
|---|---|

## 1. *INSTRUCTION:*

THIS SHEET IS THE STATEMENT OF THE LEAD-FREE CHIP RESISTOR ARRAY SPECIFICATION THAT UNIOHMS' PRODUCTIONS CAN MEET.

## 2. *TYPE DESIGNATION:*

THE TYPE DESIGNATION SHALL BE IN THE FOLLOWING FROM:

**(EX)**

| TYPE | POWER RATING | RESISTANCE TOLERANCE | NOMINAL RESISTANCE |
|---|---|---|---|
| 2D02 | 1/16W | J | 12KΩ |

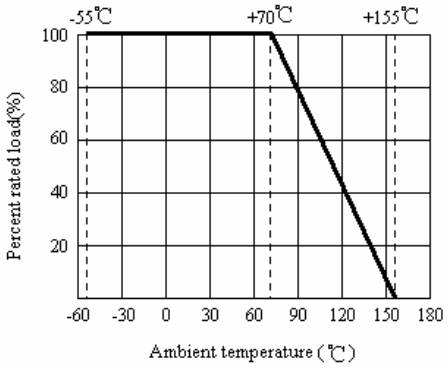
## 3. *RATING:*

| TYPE | | 2D02 | 4D02 | 4D03 | 16P8 |
|---|---|---|---|---|---|
| POWER RATING | | 1/16W | 1/16W | 1/16W | 1/16W |
| MAX. WORKING VOLTAGE | | 25V | 25V | 50V | 50V |
| MAX. OVERLOAD VOLTAGE | | 50V | 50V | 100V | 100V |
| DIELECTRIC WITHSTANDING VOLTAGE | | 100V | 100V | 300V | 300V |
| RATED AMBIENT TEMP. | | 70℃ | 70℃ | 70℃ | 70℃ |
| TOLERANCE | | ±5%,±1% | | | |
| RESISTANCE RANGE | ±5% | 10Ω --- 1MΩ | 10Ω --- 1MΩ | 1Ω --- 1MΩ | 1Ω --- 1MΩ |
| | ±1% | 10Ω --- 1MΩ | 10Ω --- 1MΩ | 1Ω --- 1MΩ | 1Ω --- 1MΩ |
| TEMP. RANGE | | -55℃ --- +155℃ | | | |

### 3.1 *POWER RATING:*

RESISTORS SHALL HAVE A POWER RATING BASED ON CONTINUOUS LOAD OPERATION AT AN AMBIENT TEMPERATURE OF $70^0$C. FOR TEMPERATURE IN EXCESS OF $70^0$C, THE LOAD SHALL BE DERATE AS SHOWN IN FIGURE 1.

**FIGURE 1**



### 3.2 *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 = RATED DC OR RMS AC CONTINUOUS WORKING VOLTAGE AT COMMERCIAL-LINE FREQUENCY AND WAVEFORM (VOLT.)

P = POWER RATING (WATT.)

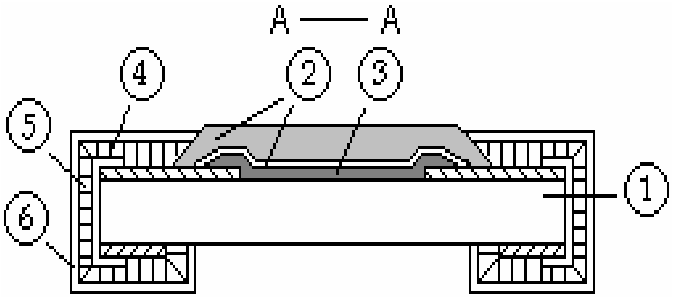
R = NOMINAL RESISTANCE (OHM)

IN NO CASE SHALL THE RATED DC OR RMS AC CONTINUOUS WORKING VOLTAGE BE GREATER THAN THE APPLICABLE MAXIMUM VALUE.

### 3.3 *NOMINAL RESISTANCE:*

EFFECTIVE FIGURES OF NOMINAL RESISTANCE SHALL BE IN ACCORDANCE WITH E-96 SERIES FOR 1% AND E-24 SERIES FOR 5%

### 4. *STRUCTURE:*




1: HIGH PURITY ALUMINA SUBSTRATE
($96\%AL_2O_3$、$0.3\pm0.1\%CaO$、$1.0\pm0.3\%MgO$、$2.1\pm0.05\%SiO_2$)

2: PROTECTIVE COVERING

3: RESISTIVE COVERING

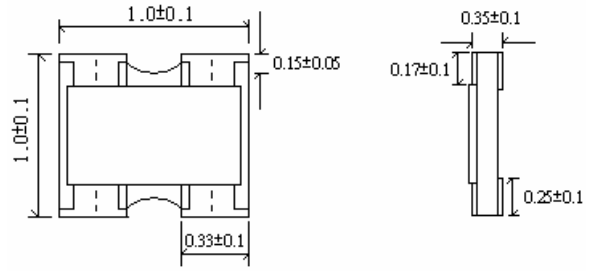
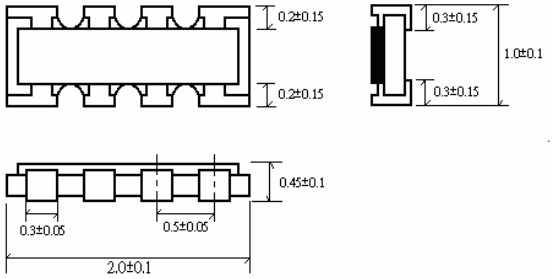
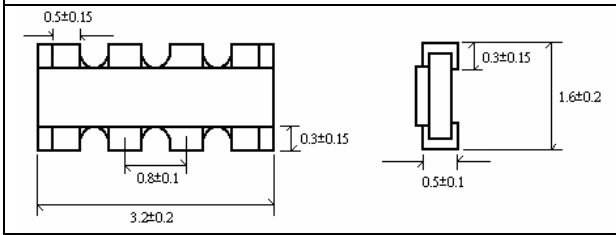
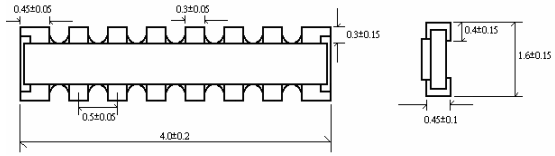
4: TERMINATION ( INNER ) Ag/Pd

5: TERMINATION ( BETWEEN ) Ni PLATING

6: TERMINATION ( OUTER ) Sn PLATING

## 5. *POWER RATING AND DIMENSIONS:*

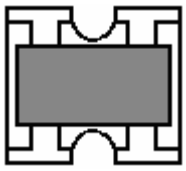
**DIMENSION: mm**

| 2D02 | 4D02 |
|---|---|
|  |  |
| **4D03** | **16P8** |
|  |  |

## 6. *MARKING:*

(1) NORMAL FOR 2D02 SIZE, NO MARKING ON THE BODY.

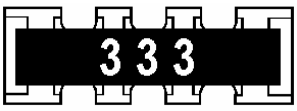
**EXAMPLE:**



(2)±5% TOLERANCE OF 4D02,4D03,16P8 SIZE: THE FIRST TWO DIGITS ARE SIGNIFICANT FIGURES OF RESISTANCE AND THE THIRD DENOTES NUMBER OF ZEROS FOLLOWING

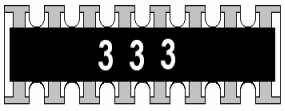
**EXAMPLE:**

**4D02,4D03**




33000 → 33KΩ

**16P8**

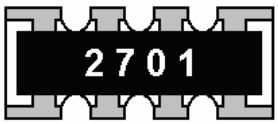



33000 → 33KΩ

(3) ±1% TOLERANCE OF 4D02,4D03,16P8 SIZE: FIRST THREE DIGITS ARE SIGNIFICANT FIGURES OF RESISTANCE AND THE FOURTH DENOTES NUMBER OF ZEROS FOLLOWING

**EXAMPLE:**

**4D02,4D03**




2700 → 2.7KΩ

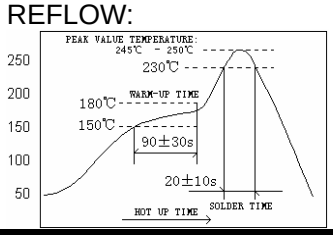
**16P8**


2700 → 2.7KΩ

## 7. *CHARACTERISTICS:*

| CHARACTERISTIC | LIMITS | TEST METHOD (JIS-C-5201) |
|---|---|---|
| TEMPERATURE COEFFICIENT | ≥ 10Ω : ±200PPM/°C<br>< 10Ω : ±400PPM/°C | 4.8 NATURAL RESISTANCE CHANGE PER TEMP. DEGREE CENTIGRADE<br>$\frac{R_2-R_1}{R_1(T_2-T_1)} \times 10^6$ (PPM/℃)<br>$R_1$: RESISTANCE VALUE AT ROOM TEMP. ($T_1$)<br>$R_2$: RESISTANCE VALUE AT ROOM TEMP. +100℃ ($T_2$)<br>TEST PATTERN: ROOM TEMP., ROOM TEMP. +100℃ |
| SHORT-TIME OVERLOAD | ±(2%+0.1Ω ) MAX | 4.13 PERMANENT RESISTANCE CHANGE AFTER THE APPLICATION OF 2.5 TIMES RCWV FOR 5 SECONDS. |
| INSULATION RESISTANCE | 1,000MΩ OR MORE | 4.6 APPLY 500V DC BETWEEN PROTECTIVE COATING AND TERMINATION FOR 1 MINUTE, THEN MEASURE. |
| TEMPERATURE CYCLING | ±(1.0%+0.05 Ω) MAX. | 4.19 RESISTANCE CHANGE AFTER CONTINUOUS FIVE CYCLES FOR DUTY CYCLE SPECIFIED BELOW: |

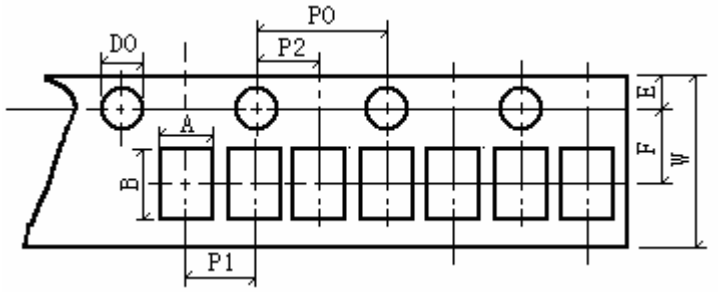
| STEP | TEMPERATURE | TIME |
|---|---|---|
| 1 | -55℃±3℃ | 30 MINS |
| 2 | ROOM TEMP. | 10 --- 15 MINS |
| 3 | +155℃±2℃ | 30 MINS |
| 4 | ROOM TEMP. | 10 --- 15 MINS |

| | | |
|---|---|---|
| DIELECTRIC WITHSTANDING VOLTAGE | NO EVIDENCE OF FLASHOVER MECHANICAL DAMAGE, ARCING OR INSULATION BREAK DOWN. | 4.7 RESISTORS SHALL BE CLAMPED IN THE TROUGH OF A 90℃METALLIC V-BLOCK AND SHALL BE TESTED AT AC POTENTIAL RESPECTIVELY SPECIFIED IN THE GIVEN LIST OF EACH PRODUCT TYPE FOR 60-70 SECONDS. |
| TERMINAL BENDING | ±(1%+0.05Ω ) MAX | 4.33 TWIST OF TEST BOARD :<br>Y/X = 3/90 mm FOR 60 SECONDS |
| SOLDERING HEAT | RESISTANCE CHANGE RATE IS: ±(1%+0.05Ω ) MAX | 4.18 DIP THE RESISTOR INTO A SOLDER BATH HAVING A TEMPERATUER OF 260°C±3°C AND HOLD IT FOR 10±1 SECONDS. |
| SOLDERABILITY | 95% COVERAGE MIN. | WAVE SOLDER:<br>TEST TEMPERATURE OF SOLDER: 245℃±3℃ DIPPING TIME IN SOLDER: 2-3 SECONDS. |
| | GO UP TIN RATE BIGGER THAN HALF OF END POLE | REFLOW:<br>  |

| LEAD-FREE CHIP RESISTOR ARRAY | | |
|---|---|---|
| | | |
| **CHARACTERISTIC** | **LIMITS** | **TEST METHOD (JIS-C-5201)** |
| LOAD LIFE IN HUMIDITY | RESISTANCE CHANGE RATE IS:±(3%+0.1Ω) 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℃± 2℃ AND 90 TO 95% RELATIVE HUMIDITY. |
| LOAD LIFE | RESISTANCE CHANGE RATE IS:±( 3%+0.1Ω ) 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℃±2℃ AMBIENT. |
| RESISTANCE TO DISSOLUTION OF METALLIZATION TEST | INSPECT FOR ANY DISSOLUTION OF METALLIZATION ON COMPONENT ELECTRODES WITH MAGNIFIER OF ABOUT 20-30 MAGNIFICATION | TEST CONDITION: SOLDER TEMPERATURE 260℃±3℃ IMMERSION TIME 30±1 SECOND IMMERSION DEPTH 2.0-2.5MM |
| | | |

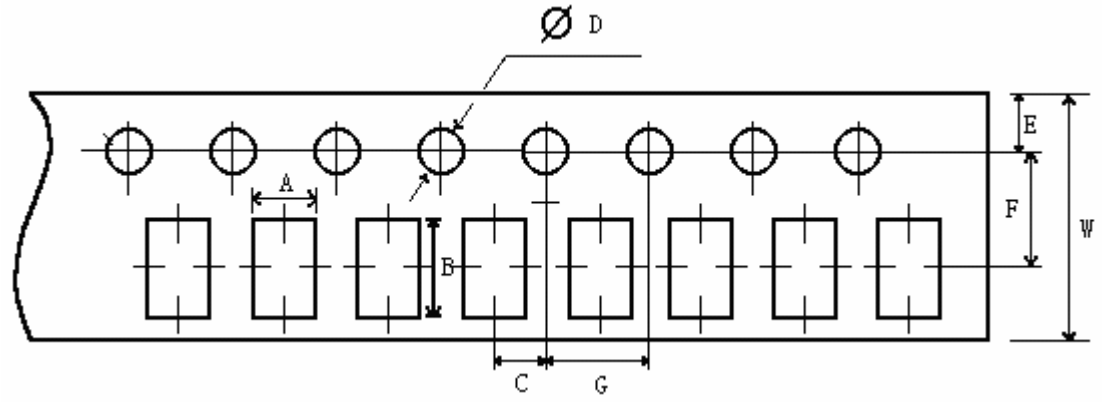
## 8. *PACKAGING:*

### 8.1 *TAPING DIMENSION:*



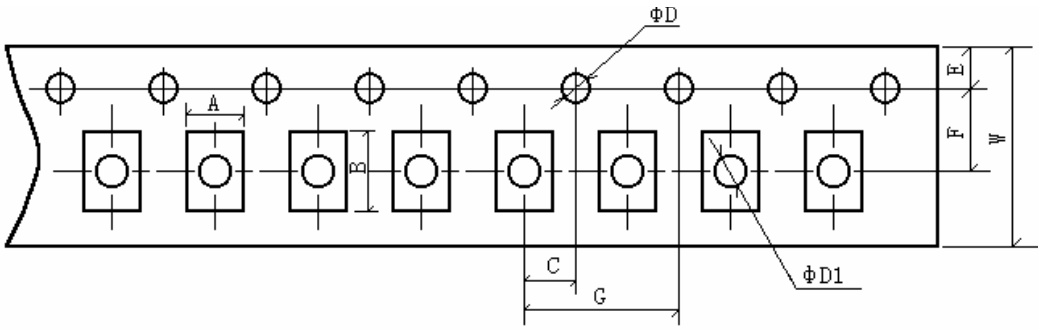

**UNIT: mm**

| TYPE | A | B | W | E | F | Po | P2 | φ Do |
|---|---|---|---|---|---|---|---|---|
| 2D02 | 1.2± 0.2 | 1.2± 0.2 | 8.0±0.2 | 1.75±0.1 | 3.5±0.05 | 4.0±0.1 | 2.0±0.05 | 1.5 +0.1 -0 |
| 4D02 | 1.2± 0.2 | 2.2± 0.2 | 8.0±0.2 | 1.75±0.1 | 3.5±0.05 | 4.0±0.1 | 2.0±0.05 | 1.5 +0.1 -0 |




**UNIT: mm**

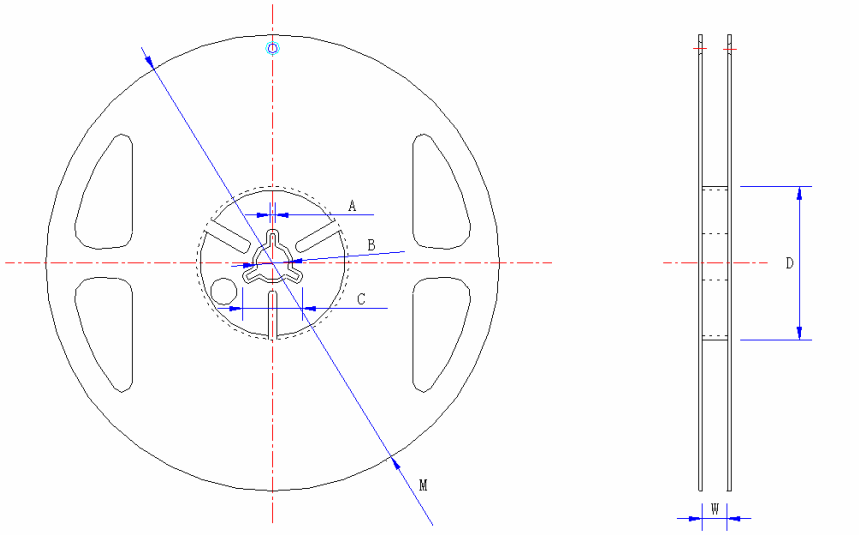
| TYPE | A ± 0.2 | B ± 0.2 | C ± 0.05 | ϕD + 0.1 - 0 | E ± 0.1 | F ± 0.05 | G ± 0.1 | W ± 0.2 |
|---|---|---|---|---|---|---|---|---|
| 4D03 | 2.0 | 3.6 | 2.0 | 1.5 | 1.75 | 3.5 | 4.0 | 8.0 |




UNIT: mm

| TYPE | A ± 0.20 | B ± 0.20 | C ± 0.05 | ϕD + 0.10 - 0.00 | ϕD1 + 0.25 - 0.00 | E ± 0.1 | F ± 0.05 | G ± 0.10 | W ± 0.20 |
|---|---|---|---|---|---|---|---|---|---|
| 16P8 | 1.80 | 4.40 | 2.00 | 1.50 | 1.50 | 1.75 | 5.50 | 4.00 | 12.0 |

## 8.2 *REEL DIMENSION:*




UNIT: mm

| TYPE | QUANTITY PER REEL | A ± 0.5 | B ± 0.5 | C ± 0.5 | D ± 1.0 | M ± 2.0 | W ± 1.0 |
|---|---|---|---|---|---|---|---|
| 2D02 | 10,000PCS | 2.0 | 13.0 | 21.0 | 60.0 | 178.0 | 10.0 |
| 4D02 | 10,000PCS | 2.0 | 13.0 | 21.0 | 60.0 | 178.0 | 10.0 |
| 4D03 | 5,000PCS | 2.0 | 13.0 | 21.0 | 60.0 | 178.0 | 10.0 |
| 16P8 | 4,000PCS | 2.0 | 13.0 | 21.0 | 60.0 | 178.0 | 13.8 |

## PART NUMBER SYSTEM

EXPLANATION OF PART NUMBER SYSTEM

**(LEAD-FREE CHIP RESISTOR ARRAY)**

ORDERING PROCEDURE (EXAMPLE: 2D02 1/16W 5% 12KΩ T/R-10,000 LEAD-FREE):