



ISO14001



ISO/TS16949



244546



245468



REG.-Nr.A759



CQC04001010058



Specification for Approval

Customer : 深圳市碧綠天科技有限公司

Product Name : LEAD-FREE CHIP RESISTOR ARRAY-CONVEX TERMINAL

Part Name : CHIP ARRAY SERIES ±1%、±5%

Part No. : ****WG*****T*E

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厚 聲 電 子 工 業 有 限 公 司
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File Name: CHIP ARRAY SERIES ±1%, ±5%		Date 2016/02/24	Edition No. 1		
Amendment Record				Signature	
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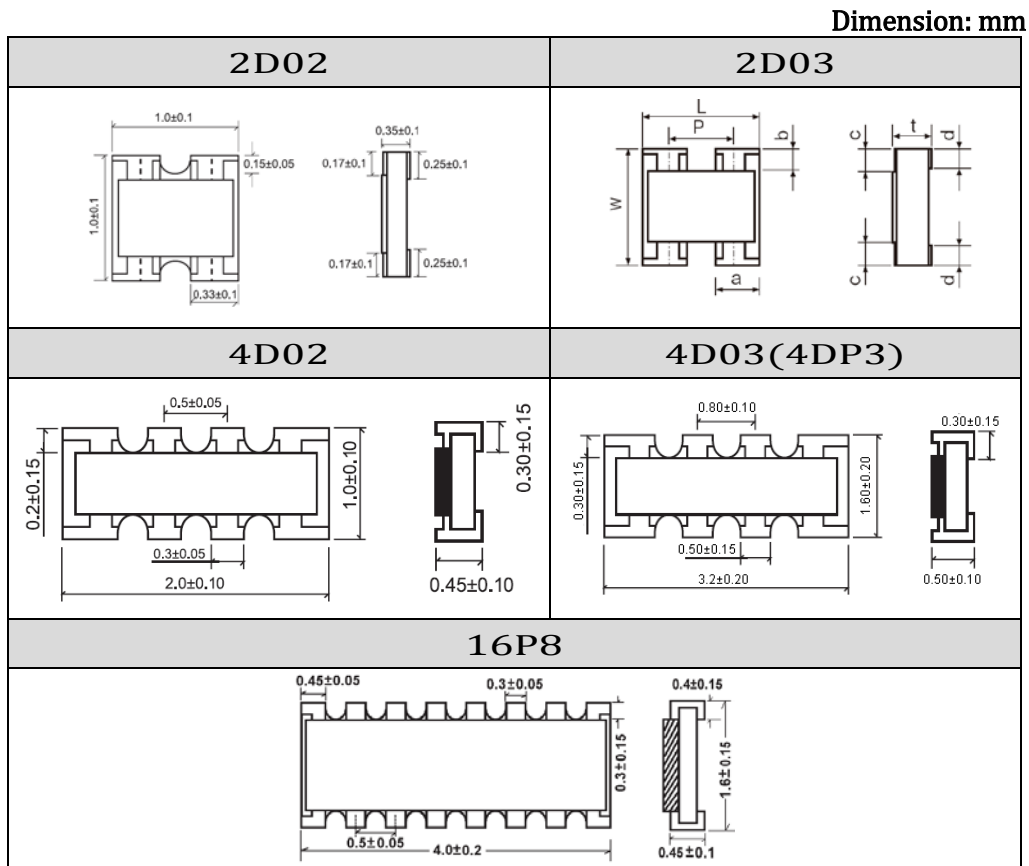
1.0 Scope

This file is approval specification of Lead-Free Chip Resistor Array-convex Terminal made by UNIOHM.

2.0 Production Type

Type	Power rating	Resistance tolerance	Nominal resistance
4D03	1/16W	F	22KΩ

3.0 Ratings & Dimension:

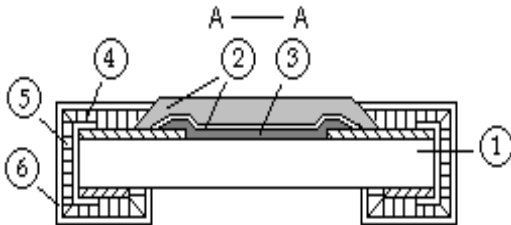


Type	2D02	4D02	2D03	4D03	4DP3	16P8
Power Rating at 70°C	1/16W	1/16W	1/16W	1/16W	1/10W	1/16W
Max Working Voltage	50V	50V	50V	50V	50V	50V
Max Overload Voltage	100V	100V	100V	100V	100V	100V
Dielectric Withstanding Voltage	100V	100V	100V	300V	300V	300V
±1%	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ	1Ω-1MΩ	1Ω-1MΩ	1Ω-1MΩ
±5%	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ	1Ω-1MΩ	1Ω-1MΩ	1Ω-1MΩ
Operating Temperature	-55 ~ +155°C					

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4.0 Structure:

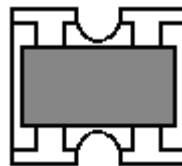


- 1: High purity alumina substrate 高纯度氧化铝基板
- 2: Protective covering 保护层
- 3: Resistive covering (Ag for 0Ω) 電阻層(0Ω 爲 Ag 层)
- 4: Termination (inner) Ni/Cr 端面(內)鎳/鉻
- 5: Termination (between) Ni plating
- 6: Termination (outer) Sn plating

5.0 Marking:

5.1 For 2D02: There is no marking on the body including 0Ω resistor.

Example:

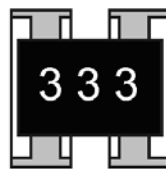


5.2 For 4D02, 2D03, 4D03, 4DP3 and 16P8 size ±5% Tolerance resistors:

Two codes ahead: Significant figures of resistance;

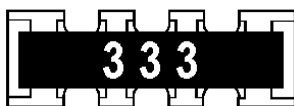
Third code: power of ten.

Example: 2D03



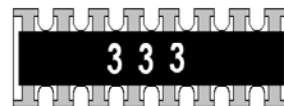
33000 → 33KΩ

4D02, 4D03, 4DP3



33000 → 33KΩ

16P8



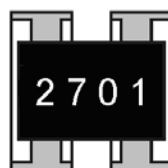
33000 → 33KΩ

5.3 For 4D02, 2D03, 4D03, 4DP3 and 16P8 size ±1% Tolerance resistors:

3 codes ahead: significant figures of resistance.

4th code: power of ten.

Example: 2D03

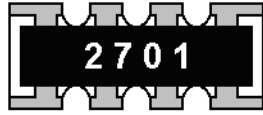


2701 → 2.7KΩ

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4D02, 4D03

16P8



2701 → 2.7KΩ



2701 → 2.7KΩ

6.0 Power rating:

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

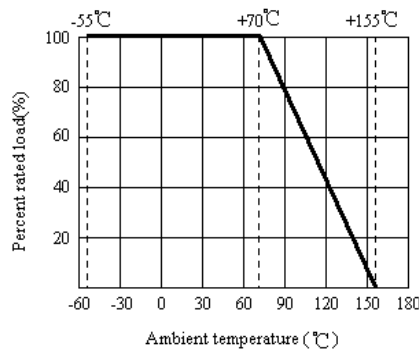


Figure 1

7.0 Voltage rating:

Resistors should have a direct-current (DC) continuous voltage rating and an alternating-current (AC) continuous voltage rating relates to Power Rating, formula shown as:

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

RCWV: Rated dc or RMS ac continuous working voltage at commercial-line frequency and waveform (Volt.)

P: Power Rating (Watt.)

R: Nominal Resistance (Ohm)

Resistors will be burned out if it overload, such as higher than the maximum value of series' RCWV.

And we named 2.5 times RCWV is OVERLOAD Voltage.

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8.0 Performance specification:

Characteristic	Limits		Test Method (JIS-C-5201&5202)
Temperature Coefficient	2D02 4D02 2D03	±200PPM/°C	4.8 Natural resistance changes per temp. Degree centigrade $\frac{R_2 - R_1}{R_1(T_2 - T_1)} * 10^6 (PPM/°C)$ R ₁ : resistance value at room temp. (T ₁) R ₂ : resistance value at room temp. +100°C (T ₂) Test pattern: room temp. (T ₁), room temp. +100°C(T ₂)
	4D03 4DP3 16P8	≥10Ω:±200PPM/°C <10Ω:±400PPM/°C	
Short-time overload	±(2%+0.1Ω)		4.13 Permanent resistance change after the application of a potential of 2.5 times RCWV of Max. Overload Voltage whichever less for 5 seconds.
Insulation resistance	1,000 MΩ or more		4.6 the measuring voltage shall be ,measured with a direct voltage of (100±15)v or a voltage equal to the dielectric withstanding voltage., and apply for 1min
Terminal bending	±(1%+0.05Ω)		4.33 Twist of test board: Y/x = 3/90 mm for 60Seconds
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°metallic v-block and shall be tested at ac potential respectively specified in the given list of each product type for 60-70 seconds.
Soldering heat	Resistance change rate must be in ±(1%+0.05Ω)		4.18 Dip the resistor into a solder bath having a temperature of 260°C±5°C and hold it for 10±1 seconds.
Solderability	95% coverage Min.		Wave solder: Test temperature of solder: 245°C±3°C dipping time in solder: 2-3 seconds.
	Go up tin rate bigger than half of end pole		Reflow:

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Characteristic	Limits	Test Method (JIS-C-5201&5202)															
Temperature cycling	$\pm(1.0\%+0.05\ \Omega)$	4.19 Resistance change after continuous five cycles for duty cycle specified below: <table border="1"> <thead> <tr> <th>STEP</th> <th>TEMPERATURE</th> <th>TIME</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>$-55^{\circ}\text{C}\pm 3^{\circ}\text{C}$</td> <td>30 MIN</td> </tr> <tr> <td>2</td> <td>ROOM TEMP.</td> <td>10 --- 15 MIN</td> </tr> <tr> <td>3</td> <td>$+155^{\circ}\text{C}\pm 2^{\circ}\text{C}$</td> <td>30 MIN</td> </tr> <tr> <td>4</td> <td>ROOM TEMP.</td> <td>10 --- 15 MIN</td> </tr> </tbody> </table>	STEP	TEMPERATURE	TIME	1	$-55^{\circ}\text{C}\pm 3^{\circ}\text{C}$	30 MIN	2	ROOM TEMP.	10 --- 15 MIN	3	$+155^{\circ}\text{C}\pm 2^{\circ}\text{C}$	30 MIN	4	ROOM TEMP.	10 --- 15 MIN
STEP	TEMPERATURE	TIME															
1	$-55^{\circ}\text{C}\pm 3^{\circ}\text{C}$	30 MIN															
2	ROOM TEMP.	10 --- 15 MIN															
3	$+155^{\circ}\text{C}\pm 2^{\circ}\text{C}$	30 MIN															
4	ROOM TEMP.	10 --- 15 MIN															
Load life in humidity	$\pm(3\%+0.1\ \Omega)$	7.9 Resistance change after 1,000 hours (1.5 hours "ON", 0.5 hour "OFF") at RCWV in a humidity chamber controlled at $40^{\circ}\text{C}\pm 2^{\circ}\text{C}$ and 90 to 95% relative humidity.															
Load life	$\pm(3\%+0.1\ \Omega)$	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 $70^{\circ}\text{C}\pm 2^{\circ}\text{C}$ ambient.															

9.0 Part No. System

The standard Part No. System includes 14 codes:

9.1 1st ~4th codes: Product series name

Example: 2D02, 4D02, 2D03, 4D03, 4DP3, 16P8

9.2 5th~6th codes: Power rating.

W=Normal Size; "1"~"G": "1"~"16" as Hexadecimal:

Wattage	1/2	1/3	1/4	1/5	1/6	1/8	1/10	1/16	1
Normal Size	W2	W3	W4	W5	W6	W8	WA	WG	1W

If power rating is lower than 1 watt, 5th code will be letter W or S, 6th code will be a number or a letter.

Example: WG=1/16W WA=1/10W

9.3 7th code: Tolerance.

F=±1% G=±2% J=±5% K= ±10%

9.4 8th ~ 11th codes: Resistance Value.

9.4.1 For 5%&10% tolerance: Standard resistance values of E-24 series:

8th code: "0"

9th ~ 10th codes: Significant figures of the resistance.

11th code: power of ten.

9.4.2 For ≤2% tolerance: Standard resistance values of E-96 series:

8th ~ 10th codes: Significant figures of the resistance

11th code: Power of ten.

9.4.3 The following codes are used to represent power of ten:

0=10⁰ 1=10¹ 2=10² 3=10³ 4=10⁴ 5=10⁵ 6=10⁶ J=10⁻¹ K=10⁻² L=10⁻³ M=10⁻⁴

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9.5 12th~14th codes.

9.5.1 12th code: Packaging Type:

C=Bulk in (Chip Product) T=Tape/Reel

9.5.2 13th code: Packing Quantity

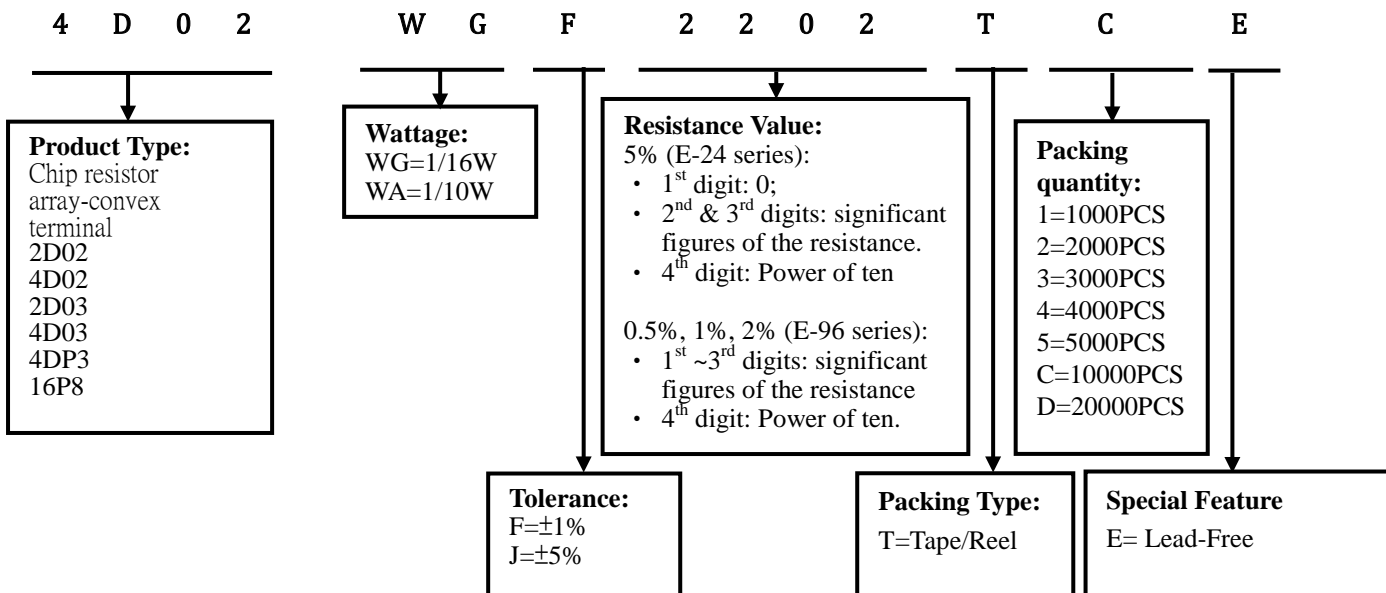
4=4000pcs 5=5000pcs C=10000pcs D=20000pcs E=15000pcs

9.5.3 14th code: Special features

E: Environmental Protection, Lead Free type.

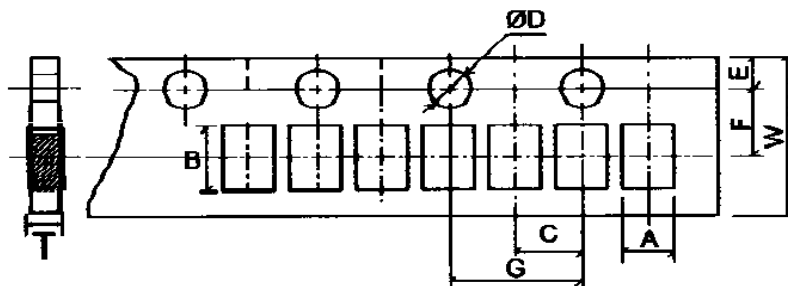
S: Special features, such as: Embossed tape, different marking requirement, etc.

10.0 Ordering Procedure: (Example: 4D02 1/16W ±1% 22KΩ T/R-10000)



11.0 Packaging:

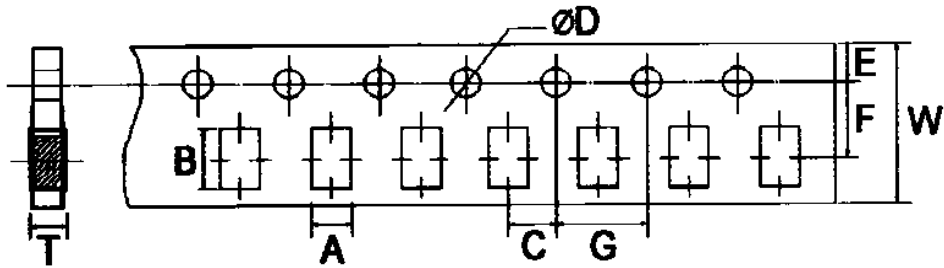
11.1 Tapping dimension:



Unit: mm

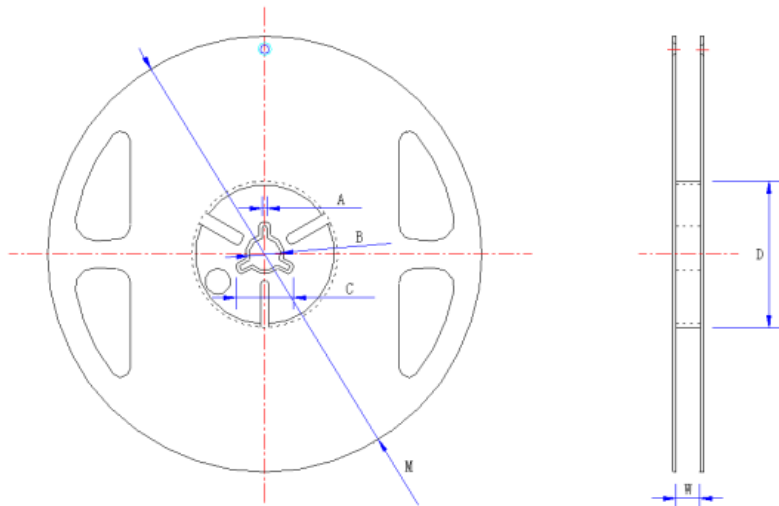
TYPE	A ±0.2	B ±0.2	C ±0.05	ØD ^{+0.1} _{-0.0}	E ±0.1	F ±0.05	G ±0.1	W ±0.2	T ±0.1
2D02	1.2	1.2	2.0	1.5	1.75	3.5	4.0	8.0	0.45
4D02	1.2	2.2	2.0	1.5	1.75	3.5	4.0	8.0	0.70

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TYPE	A ±0.2	B ±0.2	C ±0.05	ØD ^{+0.1} _{-0.0}	E ±0.1	F ±0.05	G ±0.1	W ±0.2	T ±0.1
2D03	1.9	1.9	2.0	1.5	1.75	3.5	4.0	8.0	0.83
4D03	2.0	3.60	2.0	1.5	1.75	3.5	4.0	8.0	0.83
4DP3	2.0	3.60	2.0	1.5	1.75	3.5	4.0	8.0	0.83
16P8	1.80	4.30	2.0	1.5	1.75	5.5	4.0	12.0	0.75

11.2 Reel dimension



TYPE	QUANTITY	A ± 0.5	B ± 0.5	C ± 0.5	D ± 1.0	M ± 2.0	W ± 1.0
2D02	10,000 PCS/R	2.0	13.0	21.0	60.0	178.0	10.0
4D02	10,000 PCS/R	2.0	13.0	21.0	60.0	178.0	10.0
2D03	5,000 PCS/R	2.0	13.0	21.0	60.0	178.0	10.0
4D03	5,000 PCS/R	2.0	13.0	21.0	60.0	178.0	10.0
4DP3	5,000 PCS/R	2.0	13.0	21.0	60.0	178.0	10.0
16P8	4,000 PCS/R	2.0	13.0	21.0	60.0	178.0	13.8

12.0 Note

- 12.1 UNIOHM recommends strongly that storage condition should keep in temperature: 15°C~35°C, humidity: 25%~75%. Even under storage condition above-mentioned, resistors' solderability still degrades day by day.
- 12.2 Store / delivery cartons must be put by correct direction; otherwise product will crack or bent.
- 12.3 Product performance and solderability may deteriorate if stored in the following place:
 - 12.3.1 In high electrostatic
 - 12.3.2 Direct sunshine, rain, snow or condensation.
 - 12.3.3 Exposed to sea winds or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂.

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