



**UNI-ROYAL**  
厚聲集團

# DATA SHEET

**Product Name Automotive Thick Film Chip Resistors**

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**Part Name CQ Series**

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## 1. Scope

- 1.1 This specification for approve relates to the Automotive Thick Film Chip Resistors manufactured by UNI-ROYAL Application automobile.
- 1.2 The test items follow the test standard of AEC-Q200.
- 1.3 Anti-Sulfidation
- 1.4 Application car、IPAD、LED Lamps、 Intelligent home appliances , Medical equipment, Kinds of industrial control devices & industrial supplies

## 2. Part No. System

Part No. includes 14 codes shown as below:

2.1 1<sup>st</sup>~4<sup>th</sup> codes: Part name. E.g.: CQ01,CQ02,CQ03,CQ05,CQ06,CQ07,CQ10,CQ12

2.2 5<sup>th</sup>~6<sup>th</sup> codes: Power rating.

E.g.: W=Normal Size		“1~G” = “1~16”								
Wattage	1/32	3/4	1/2	1/3	1/4	1/8	1/10	1/16	1/20	1
Normal Size	WH	07	W2	W3	W4	W8	WA	WG	WM	1W

If power rating is lower or equal than 1 watt, 5<sup>th</sup> code would be “W” and 6<sup>th</sup> code would be a number or letter.

E.g.: WA=1/10W                      W4=1/4W

2.3 7<sup>th</sup> code: Tolerance. E.g.: D=±0.5% F=±1%                      G=±2%                      J=±5%                      K= ±10%

2.4 8<sup>th</sup>~11<sup>th</sup> codes: Resistance Value.

2.4.1 If value belongs to standard value of ≥5% series, 8<sup>th</sup> code would be zero, 9<sup>th</sup>~10<sup>th</sup> codes are significant figures of the resistance and 11<sup>th</sup> code is the power of ten.

2.4.2 If value belongs to standard value of ≤2% series, 8<sup>th</sup>~10<sup>th</sup> codes are significant figures of the resistance, and 11<sup>th</sup> code is the power of ten.

2.4.3 11<sup>th</sup> codes listed as following:

0=10<sup>0</sup>                      1=10<sup>1</sup>                      2=10<sup>2</sup>                      3=10<sup>3</sup>                      4=10<sup>4</sup>                      5=10<sup>5</sup>                      6=10<sup>6</sup>                      J=10<sup>-1</sup>                      K=10<sup>-2</sup>                      L=10<sup>-3</sup>                      M=10<sup>-4</sup>

2.5 12<sup>th</sup>~14<sup>th</sup> codes.

2.5.1 12<sup>th</sup> code: Packaging Type. E.g.: C=Bulk                      T=Tape/Reel

2.5.2 13<sup>th</sup> code: Standard Packing Quantity.

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

Chip Product: BD=B/B-20000pcs                      TC=T/R-10000pcs

2.5.3 14<sup>th</sup> code: Special features.

E = Environmental Protection, Lead Free, or Standard type.

## 3. Ordering Procedure

(Example: CQ05 1/8W ±5% 10K Ω T/R-5000 )



## 4. Marking

(1) Normally, the making of CQ01,CQ02 resistors as following



(2) Normally, the making of 0Ω CQ03, 0Ω CQ05, 0Ω CQ06, 0Ω CQ07, 0Ω CQ10, 0Ω CQ12, resistors as following



0 → 0Ω

(3) ±5%Tolerance:The first two digits are significant figures of resistance and the third denotes number of zeros following



333 → 33KΩ

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



2701 → 2.7KΩ

## 5. Dimension



Type	Dimension(mm)				
	L	W	H	A	B
CQ01(0201)	0.60±0.03	0.30±0.03	0.23±0.03	0.12±0.05	0.15±0.05
CQ02(0402)	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10
CQ03(0603)	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20
CQ05(0805)	2.00±0.15	1.25 +0.15/-0.10	0.55±0.10	0.40±0.20	0.40±0.20
CQ06(1206)	3.10±0.15	1.55+0.15/-0.10	0.55±0.10	0.45±0.20	0.45±0.20
CQ07(1210)	3.10±0.10	2.60±0.20	0.55±0.10	0.50±0.25	0.50±0.20
CQ10(2010)	5.00±0.10	2.50±0.20	0.55±0.10	0.60±0.25	0.50±0.20
CQ12(2512)	6.35±0.10	3.20±0.20	0.55±0.10	0.60±0.25	0.50±0.20

## 6. Resistance Range

Type	Power Rating at 70°C	Resistance Range	
		1.0%	5.0%
CQ01	1/20W	1Ω-10MΩ	1Ω-10MΩ
CQ02	1/16W	1Ω-10MΩ	1Ω-10MΩ
CQ03	1/10W	1Ω-10MΩ	1Ω-10MΩ
CQ05	1/8W	1Ω-10MΩ	1Ω-10MΩ
CQ06	1/4W	1Ω-10MΩ	1Ω-10MΩ
CQ07	1/2W	1Ω-10MΩ	1Ω-10MΩ
CQ10	3/4W	1Ω-10MΩ	1Ω-10MΩ
CQ12	1W	1Ω-10MΩ	1Ω-10MΩ

## 7. Ratings

Type	Max. Working Voltage	Max. Overload Voltage	Dielectric withstanding Voltage	Resistance Value of Jumper	Rated Current of Jumper	Max. Overload Current of Jumper	Operating Temperature
CQ01	25V	50V	/	<50mΩ	0.5A	1A	-55°C~155°C
CQ02	50V	100V	100V	<50mΩ	1A	2A	-55°C~155°C
CQ03	75V	150V	300V	<50mΩ	1A	2A	-55°C~155°C
CQ05	150V	300V	500V	<50mΩ	2A	5A	-55°C~155°C
CQ06	200V	400V	500V	<50mΩ	2A	10A	-55°C~155°C
CQ07	200V	500V	500V	<50mΩ	2A	10A	-55°C~155°C
CQ10	200V	500V	500V	<50mΩ	2A	10A	-55°C~155°C
CQ12	200V	500V	500V	<50mΩ	2A	10A	-55°C~155°C

## 8. Recommend the size of welding plate



Type	Dimension(mm)			
	A	B	C	D
CQ01	0.3±0.05	0.35±0.05	0.4±0.05	1.0±0.05
CQ02	0.50±0.05	0.45±0.05	0.5±0.05	1.4±0.05
CQ03	0.8±0.05	0.65±0.05	0.8±0.05	2.1±0.05
CQ05	1.0±0.1	1.0±0.1	1.3±0.1	3.0±0.1
CQ06	2.0±0.1	1.1±0.1	1.6±0.1	4.2±0.1
CQ07	2.0±0.1	1.1±0.1	2.6±0.1	4.2±0.1
CQ10	3.6±0.1	1.3±0.1	2.6±0.1	6.2±0.1
CQ12	4.9±0.1	1.6±0.1	3.3±0.1	8.1±0.1

## 9. Derating Curve

Resistors shall 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 derated as shown in figure 1

Figure 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

## 10. Structure





Flame Retardance	No flame	AEC-Q200-001	Only requested, when voltage/power will increase the surface temp to 350°C. Apply voltage from 9V to 32V. No flame; No explosion.
Resistance to Soldering Heat	$\pm(1.0\%+0.05\Omega)$	MIL-STD-202 Method 210	Condition B No per-heat of samples. Note: Single Wave Solder-Procedure 2 for SMD and Procedure 1 for Leaded with solder within 1.5mm of device body.
	<50m $\Omega$		
Sulfuration test	$\pm 5\%:(5.0\%+0.05\Omega)$ $\pm 1\%:(1.0\%+0.05\Omega)$	ASTM B-809-95	sulfur(saturated vapor) , Temperature: 50 $\pm 2^\circ\text{C}$ Humidity: 86 ~ 90%RH, 1000H .

 Sulfuration test: H<sub>2</sub>S 3~5PPM 50°C $\pm 2^\circ\text{C}$  91%~93%RH 1000H

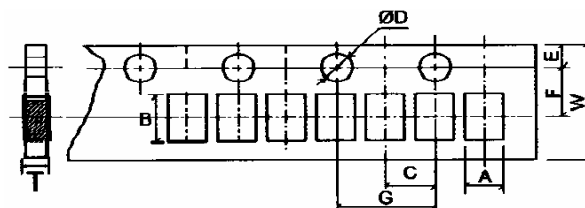
 $\pm 5\%:(5.0\%+0.05\Omega)$  ;  $\pm 1\%:(1.0\%+0.05\Omega)$ 

## 12. Packing of Surface Mount Resistors

### 12.1 Dimension of Paper Taping :(Unit: mm)

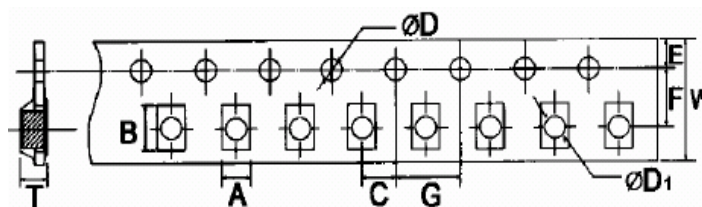


Type	A	B	C $\pm 0.05$	$\begin{matrix} +0.1 \\ \phi D \\ -0 \end{matrix}$	E $\pm 0.1$	F $\pm 0.05$	G $\pm 0.1$	W $\pm 0.2$	T
CQ01	0.40 $\pm 0.05$	0.70 $\pm 0.05$	2.00	1.50	1.75	3.50	4.00	8.00	0.42 $\pm 0.1$
CQ02	0.65 $\pm 0.1$	1.20 $\pm 0.1$	2.00	1.50	1.75	3.50	4.00	8.00	0.42 $\pm 0.05$



Type	A $\pm 0.2$	B $\pm 0.2$	C $\pm 0.05$	$\begin{matrix} +0.1 \\ \phi D \\ -0 \end{matrix}$	E $\pm 0.1$	F $\pm 0.05$	G $\pm 0.1$	W $\pm 0.2$	T $\pm 0.1$
CQ03	1.10	1.90	2.00	1.50	1.75	3.50	4.00	8.00	0.67
CQ05	1.65	2.40	2.00	1.50	1.75	3.50	4.00	8.00	0.81
CQ06	2.00	3.60	2.00	1.50	1.75	3.50	4.00	8.00	0.81
CQ07	2.80	3.50	2.00	1.50	1.75	3.50	4.00	8.00	0.75

### 12.2 Dimension of Embossed Taping: (Unit: mm)



Type	A $\pm 0.2$	B $\pm 0.2$	C $\pm 0.05$	$\begin{matrix} +0.1 \\ \phi D \\ -0 \end{matrix}$	$\begin{matrix} +0.25 \\ \phi D1 \\ -0 \end{matrix}$	E $\pm 0.1$	F $\pm 0.05$	G $\pm 0.1$	W $\pm 0.2$	T $\pm 0.1$
CQ10	2.90	5.60	2.00	1.50	1.50	1.75	5.50	4.00	12.00	1.00
CQ12	3.50	6.70	2.00	1.50	1.50	1.75	5.50	4.00	12.00	1.00

### 12.3 Dimension of Reel : (Unit: mm)



Type	Taping	Qty/Reel	A±0.5	B±0.5	C±0.5	D±1	M±2	W±1
CQ01	Paper	10,000pcs	2.0	13.0	21.0	60.0	178.0	10.0
CQ02	Paper	10,000pcs	2.0	13.0	21.0	60.0	178.0	10.0
CQ03	Paper	5,000pcs	2.0	13.0	21.0	60.0	178.0	10.0
CQ05	Paper	5,000pcs	2.0	13.0	21.0	60.0	178.0	10.0
CQ06	Paper	5,000pcs	2.0	13.0	21.0	60.0	178.0	10.0
CQ07	Paper	5,000pcs	2.0	13.0	21.0	60.0	178.0	10.0
CQ10	Embossed	4,000pcs	2.0	13.0	21.0	60.0	178.0	13.8
CQ12	Embossed	4,000pcs	2.0	13.0	21.0	60.0	178.0	13.8

### 13. Note

13.1. UNI-ROYAL recommend the storage condition temperature: 15°C~35°C, humidity :25%~75%.

(Put condition for individual product).Even under UNI-ROYAL recommended storage condition, solderability of products over 1 year old. (Put condition for each product) may be degraded.

13.2. 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.

13.3. 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.

### 14. Record

Version	Description of amendment	Page	Date	Amended by	Checked by
1	First issue of this specification	1~7	Mar.20, 2018	Chen Haiyan	Chen Nana
2	Modify the product name	1~7	Nov.22, 2018	Chen Haiyan	Chen Nana
3	Modify the Performance Specification	5~6	Feb.16, 2019	Chen Haiyan	Xu Yuhua
4	Experimental method and standard for adding vulcanization	6	Mar.05, 2019	Chen Haiyan	Xu Yuhua

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