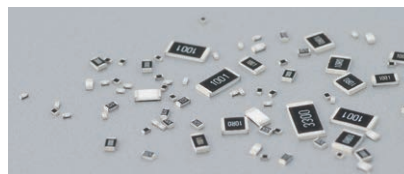


## Feature

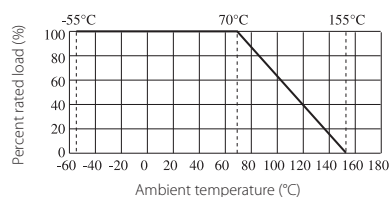
- Tolerance:  $\pm 0.5\% \sim \pm 5\%$
- Application automobile industry, comply with the relevant provisions of AEC-Q200.
- Anti-sulfurized performance: H<sub>2</sub>S 3~5ppm, 50°C $\pm 2^\circ\text{C}$ , 91%~93%RH, 1000H
- Resistance range: 1 $\Omega$ ~10M $\Omega$ , 0 $\Omega$
- Operating temperature range: -55°C ~ +155°C
- Stable electrical capability, high reliability
- Suit for reflow & wave soldering
- RoHS complaint



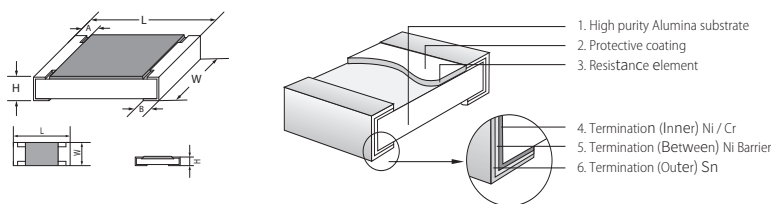
## Application

- Intelligent home appliances
- High-end computer
- Medical equipment
- Industrial equipment
- Outdoor electronic application

## Derating Curve



## Figures



## Dimension (mm)

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

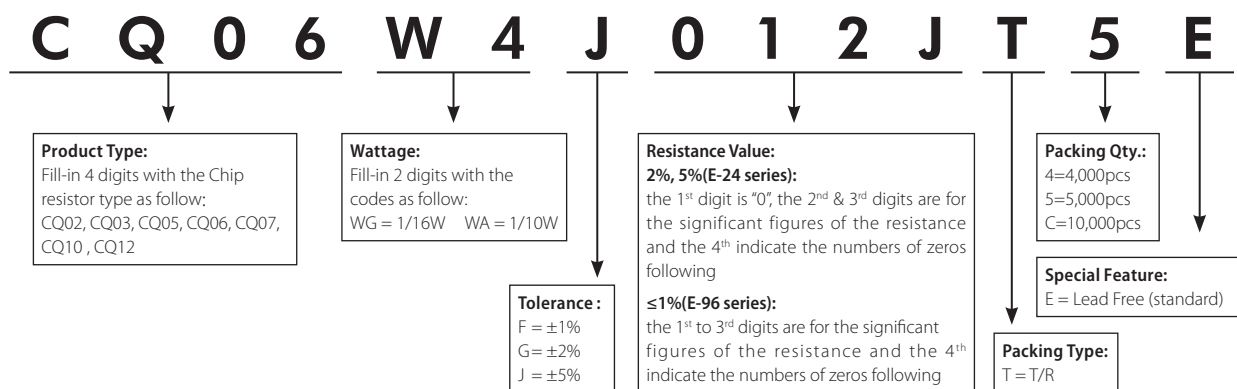
## Specification

Type	Power (70°C)	Tolerance	Resistance Range	Max Working Voltage	Max Overload Voltage	Dielectric With-standing Voltage	Resistance Value of Jumper	Rated Current of Jumper	Max. Current of Jumper	Operating Temperature Range
CQ01(0201)	1/20W	$\pm 0.5\%$ $\pm 1\%$ $\pm 2\%$ $\pm 5\%$	0 $\Omega$ 1 $\Omega$ ~10M $\Omega$	25V	50V	/	<50m $\Omega$	0.5A	1A	-55~+155°C
CQ02(0402)	1/16W			50V	100V	100V	<50m $\Omega$	1A	2A	
CQ03(0603)	1/10W			75V	150V	300V	<50m $\Omega$	1A	2A	
CQ05(0805)	1/8W			150V	300V	500V	<50m $\Omega$	2A	5A	
CQ06(1206)	1/4W			200V	400V	500V	<50m $\Omega$	2A	10A	
CQ07(1210)	1/2W			200V	500V	500V	<50m $\Omega$	2A	10A	
CQ10(2010)	3/4W			200V	500V	500V	<50m $\Omega$	2A	10A	
CQ12(2512)	1W			200V	500V	500V	<50m $\Omega$	2A	10A	

## Performance Specification

Test Item	Reference standard	Test Methods	Evaluation Criteria
Temperature Coefficient of Resistance	MIL-STD-202 Method 304	Measure between: -55°C ~+155°C	CQ01: $1\Omega \leq R \leq 10\Omega$ : -100~+350ppm/°C >10Ω: ±200ppm/°C CQ02-CQ12: $1\Omega \leq R \leq 10\Omega$ : ±200ppm/°C >10Ω: ±100ppm/°C
Pre- and Post-Stress Electrical Test (Short time Overload)	AEC-Q200 TEST 1 IEC60115 4.13	2.5x Rated voltage or Max. Overload Voltage whichever is lower for 5 seconds, then check the resistance.	±1%: ±(1.0%+0.05Ω) ±5%: ±(2.0%+0.05Ω)
Biased Humidity	AEC-Q200 TEST 7 MIL-STD-202 Method 103	1000 hours 85°C/85%RH. Note: Specified conditions:10% of operating power. Measurement at 24±4 hours after test conclusion.	±1%: ±(1.0%+0.05Ω) ±5%: ±(3.0%+0.05Ω)
Operational Life	AEC-Q200 TEST 8 MIL-STD-202 Method 108	1,000 hours at 125°C, applied de-rated (36%) power of continuous working voltage, 1.5 hours on, 0.5 hour off.	±1%: ±(1.0%+0.1Ω) ±5%: ±(3.0%+0.1Ω)
Resistance to Soldering Heat	AEC-Q200 TEST 15 MIL-STD-202 Method 210	Condition B No pre-heat of samples. Note: Single Wave Solder - Procedure 2 for SMD and Procedure 1 for Leaded with solder within 1.5mm of device body.	±(1.0%+0.05Ω)
Solderability	AEC-Q200 TEST 18 J-STD-002	SMD. Electrical test not required. Magnification 50 X. <b>Conditions:</b> 1. Baking 4 hours@155°C dry heat, dipping @ 245±3°C for 5±0.5 second. 2. Steam aging 8 hours, dipping @ 260±3°C for 30±0.5 second.	Coverage must be over 95%.
Board Flex	AEC-Q200 TEST 21 AEC-Q200-005	Bending 3mm(CQ01-CQ05)/2mm(CQ06-CQ12)for 60±5sec	±(1.0%+0.05Ω)
Sulfuration test		H <sub>2</sub> S 3~5PPM 50°C±2°C 91%~93% RH 1000H	±5%: ±(5.0%+0.05 Ω) ±1%: ±(1.0%+0.05 Ω)

## Ordering Procedure (Example: CQ06 1/4W 5% 1.2 Ω T/R-5000)



1	2	3	4	5	6	7	8	9	10	11	12	13	14
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The standard Part No. includes 14 digits with the following explanation:

1. 1<sup>st</sup>~4<sup>th</sup> digits:
  - a) This is to indicate the SMD Resistor size. Example: 1206, TC05 or HV03;
  - b) For Resistor Network & Coated type, the 1<sup>st</sup>~3<sup>rd</sup> digits are to indicate the product type and the 4<sup>th</sup> digit is the special feature. Example: RNLA = Resistor Network Circuit A type; CFRF = Carbon Film Fixed Resistors Non-Flame type; MORI = Metal Oxide Film Fixed Resistor Non-Inductive type.
  - c) For Cement Fixed Resistors, these 4 digits are to indicate the product type but if the product type has only 3 digits, the 4<sup>th</sup> digit will be "0". Example: PRW0=PRW type; PRWC=PRWC type.
2. 5<sup>th</sup>~6<sup>th</sup> digits:
  - a) This is to indicate the wattage or power rating. To distinguish the sizes and the numbers, the following codes are used, and please refer to the following chart for details: W = Normal Size; S = Small Size; U = Ultra Small Size; "1"~"G" to denotes "1"~"16" as Hexadecimal:

#### 1/16W ~ 1/2W (<1W)

Wattage	1/2	1/3	1/4	1/5	1/6	1/7	1/8	1/9	1/10	1/11	1/12	1/13	1/14	1/15	1/16
Normal Size	W2	W3	W4	W5	W6	W7	W8	W9	WA	WB	WC	WD	WE	WF	WG
Small Size	S2	S3	S4	S5	S6	S7	S8	S9	SA	SB	SC	SD	SE	SF	SG
Ultra Small Size	U2	U3	U4	U5	U6	U7	U8	U9	UA	UB	UC	UD	UE	UF	UG

#### 1W ~ 16W (≥1W)

Wattage	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Normal Size	1W	2W	3W	4W	5W	6W	7W	8W	9W	AW	BW	CW	DW	EW	FW	GW
Small Size	1S	2S	3S	4S	5S	6S	7S	8S	9S	AS	BS	CS	DS	ES	FS	GS
Ultra Small Size	1U	2U	3U	4U	5U	6U	7U	8U	9U	AU	BU	CU	DU	EU	FU	GU

- b) For power rating less than 1W, the 5<sup>th</sup> digit will be the letters W, S or U to represent the size required & the 6<sup>th</sup> digit will be a number or a letter code. Example: WA = 1/10W; U2 = 1/2W-SS
- c) For power rating of 1W to 16W, the 5<sup>th</sup> digit will be a number or a letter code and the 6<sup>th</sup> digit will be the letters of W, S or U. Example: AW = 10W; 3S = 3W-S.
- d) For power rating between 20W to 99W, the 5<sup>th</sup> & 6<sup>th</sup> digits will show the whole numbers of the power rating itself. Example: 20 = 20W; 75 = 75W.
- e) For power rating of 100W & over, the 5<sup>th</sup> & 6<sup>th</sup> digits will be indicated with "00" and the actual wattage being indicated at the last 3 digits (12<sup>th</sup>~14<sup>th</sup>) of the Part No.
- f) For special power ratings, the following codes are to be used:
 

1). WH = 1/32W (10P8 Chip Network)	2). 07 = 3/4WS (Chip 2010 size)
3). 04 = 0.4W-SS (0.4 watt Ultra Small size)	4). 06 = 0.6W-S (0.6 watt Small size)
5). 2A = 2.5W    6). 6A = 6.5W    7). WK = 2/3W	8). 1A = 1.5W    9). 1.25W = 1Q
- g) For Resistor Network, since the power rating is fixed as 1/8W for A circuit & 1/5W for B circuit, the 5<sup>th</sup> & 6<sup>th</sup> digit is to be used to denote the number of pins required. Example: 09 = 9pins; 12 = 12pins.
- h) For Jumper Wires the 5<sup>th</sup> & 6<sup>th</sup> digits will be indicated with "00".
- i) For Thin Film Chip Resistors, these 2 digits will be used to indicated the requested Temperature coefficient:
 

1). 05 = 5PPM	2). 10 = 10PPM	3). 15 = 15PPM	4). 25 = 25PPM	5). 50 = 50PPM
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3. The 7<sup>th</sup> digit is to denote the Resistance Tolerance. The following letter code is to be used for indicating the standard Resistance Tolerance. As for Metal Film Fixed Resistor products, it is also to denote the standard PPM as follows:

<b>B</b> = ±0.1% (15PPM)	<b>G</b> = ±2% (100PPM)	<b>W</b> = ±0.05%
<b>C</b> = ±0.25% (25PPM)	<b>J</b> = ±5% (200PPM)	<b>L</b> = ±0.01%
<b>D</b> = ±0.5% (50PPM)	<b>K</b> = ±10%	
<b>F</b> = ±1% (50PPM)		

**Remark:** if it is not one of the above standard "tolerance-TCR", the requirement should be clearly stated when placing order.  
Example: ±1% (25PPM), the 7<sup>th</sup> digit still shows "F" but separately note the requirement of "25PPM"

4. The 8<sup>th</sup> to 11<sup>th</sup> digits is to denote the Resistance Value:

- For the standard resistance values of E-24 series in 5% & 10% tolerance, the 8<sup>th</sup> digit is "0", the 9<sup>th</sup> & 10<sup>th</sup> digits are to denote the significant figures of the resistance and the 11<sup>th</sup> digit is the number of zeros following
- For the standard resistance values of E-96 series in  $\leq 2\%$  tolerance, the 8<sup>th</sup> digit to the 10<sup>th</sup> digits are to denote the significant figures of the resistance and the 11<sup>th</sup> digit is the number of zeros following.
- For the code to the significant figures to E-24 & E-96 series, please refer to page 170 & 171 of the standards Resistance Value list.
- The following numbers and the letter codes is to be used to indicate the number of zeros in the 11<sup>th</sup> digit:

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

- For Cement Resistors the 8<sup>th</sup> digit will be coded with "W" or "P" to denote Wire-wound type or Power Film type respectively of the Cement Fixed Resistor product. The 9<sup>th</sup> to 11<sup>th</sup> please refer to point 4.a

Example:

<u>E-24 series</u>	<u>E-96 series</u>	<u>Cement Resistors</u>
0120 = 12 ohm	1210 = 121 ohm	W120 = 12 ohm Wire-wound type
0123 = 12K ohm	1302 = 13K ohm	W12J = 1.2 ohm Wire-wound type
012J = 1.2 ohm	196J = 19.6 ohm	P273 = 27 kohm Power Film type

5. The 12<sup>th</sup>, 13<sup>th</sup> & 14<sup>th</sup> digits:

- The 12<sup>th</sup> digit is to denote the Packaging type with the following codes:  
 A = Tape / Box (Ammono Pack)      C = Bulk in Cassette (for Chip product)  
 B = Bulk / Box      T = Tape / Reel      P = Tape / Box of PT-26 product
- The 13<sup>th</sup> digit is normally to indicate the Packing Quantity of Tape/Box or Tape/Reel packaging types. Except for Chip products Bulk packing, this digit should be filled "0" or other products with "Bulk/Box packaging requirement. The following letter codes is to be used for some packaging quantities.

A = 500pcs	B = 2,500pcs	C = 10,000pcs	N = 12,500pcs	E = 15,000pcs
D = 20,000pcs	G = 25,000pcs	L = 45,000pcs	H = 50,000pcs	J = 60,000pcs

Example:

<u>CHIP product</u>	<u>Other products</u>
TD = T/R-20,000	A5 = T/B-5,000
TE = T/R-15,000	TB = T/R-2,500
T4 = T/R-4,000	B0 = B/B

- For the Forming type products, the 13<sup>th</sup> & 14<sup>th</sup> digits are used to denote the forming types of the product with the following letter codes:

MF = M type with Flattened lead wire	F0 = F type
MK = M type with Kinked lead wire	F1 = F1 type
ML = M type with normal lead wire	F2 = F2 type
MC = M type with kinked lead wire	F3 = F3 type

- For power rating over 100watt, the 12<sup>th</sup> to the 14<sup>th</sup> digits are to denote the actual wattage of the products:

Example: 100 = 100watt    150 = 150watt    225 = 225watt

- For some products, the 14<sup>th</sup> digit alone can use to denote special features or additional information with the following codes:

P = Panasert type	1 = Avisert 1 type	2 = Avisert 2 type
3 = Avisert 3 type	A = CO 1/4W - A type	B = CO 1/4W - B type

E = used to denote the "Environment Protection, lead Free type" of SMD category resistors (now, this became the Standard type of SMD)

- For some products, the 14<sup>th</sup> digit alone can use to denote special features or additional information with the following codes:

B=1/32W	C=1/16W	F=1/10W	G=1/8W	H=1/6W	J=1/4W	K=1/3W	M=1/2W
N=3/4W	P=1W	S=Special					