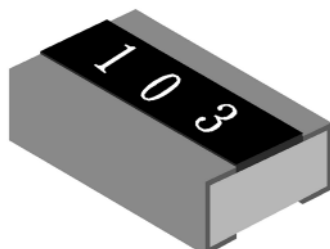




# QRW Series Automotive Wide Terminal Chip Resistor Product Specifications

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## ■ Automotive Wide Terminal Chip Resistor— QRW Series



### ■ Application

- Automotive electronics
- Navigation equipment, TPMS
- Heating, Ventilating and Air conditioning
- Indoor lighting, Central door locking, Wiper module

### ■ Features

- Small size and light weight
- Reliability, high quality
- CCD visual quality inspection
- AEC-Q200 Compliant

## ■ Parts Number Explanation

### ■ Example:

QRW	0612	J	10R0	P	05	Z
Product Type	Size (Inch)	Resistor Tolerance	Resistor Value	Package	Quantity	Optional
QRW	0612 1020 1218 1225	F : ±1% J : ±5%	10mR=R010 100mR=R100 1R=1R00 10R=10R0 100R=100R 1K=1K00 1M=1M00	P : Paper Taping (0612) E : Embossed Taping (1020~1225)	01 : 1000PCS 04 : 4000PCS 05 : 5000PCS	Z : Default H: High Power



# QRW Series Automotive Wide Terminal Chip Resistor Product Specifications

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## Standard Electrical Specifications

Type \ Item	Rated Power at 70°C	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/°C)	Resistance Range	
					F(±1%)	J(±5%)
QRW0612	0.75 W	200V	400V	±200	1Ω ≤ R < 10Ω	
				±100	10Ω ≤ R ≤ 10MΩ	
QRW1020	1 W			±200	1Ω ≤ R < 10Ω	
				±100	10Ω ≤ R ≤ 10MΩ	
QRW1218	1 W			±200	1Ω ≤ R < 10Ω	
				±100	10Ω ≤ R ≤ 10MΩ	
QRW1225	2W			±200	1Ω ≤ R < 10Ω	
				±100	10Ω ≤ R ≤ 10MΩ	

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55°C ~ +155°C

## High Power Electrical Specifications

Type \ Item	Rated Power at 70°C	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/°C)	Resistance Range	
					F(±1%)	J(±5%)
QRW0612	1.5 W	200V	400V	±100	1Ω ≤ R < 10Ω	
				±100	10Ω ≤ R ≤ 10MΩ	
QRW1020	2 W			±100	1Ω ≤ R < 10Ω	
				±100	10Ω ≤ R ≤ 10MΩ	
QRW1218	2 W			±100	1Ω ≤ R < 10Ω	
				±100	10Ω ≤ R ≤ 10MΩ	
QRW1225	3W			±100	1Ω ≤ R < 10Ω	
				±100	10Ω ≤ R ≤ 10MΩ	

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55°C ~ +155°C



# QRW Series Automotive Wide Terminal Chip Resistor Product Specifications

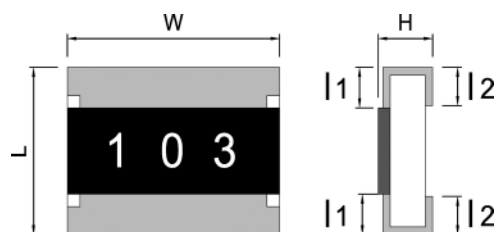
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## Low Ohm Chip Resistor Electrical Specifications

Item Type	Rated Power at 70℃	Rated Voltage Range	Max Overload Voltage	T.C.R. (PPM/℃)	Resistance Range (mΩ)
					F(±1%) · J(±5%)
QRW0612	0.75W	0.087~0.86V	2.154V	±1800	10 ≤ R < 50
				±800	50 ≤ R < 100
				±600	100 ≤ R < 1000
QRW1020	1W	0.10~0.99V	2.475V	±1800	10 ≤ R < 50
				±800	50 ≤ R < 100
				±600	100 ≤ R < 1000
QRW1218	1W	0.10~0.99V	2.475V	±1800	10 ≤ R < 50
				±800	50 ≤ R < 100
				±600	100 ≤ R < 1000
QRW1225	2W	0.14~1.41V	3.518 V	±1800	10 ≤ R < 50
				±800	50 ≤ R < 100
				±600	100 ≤ R < 1000

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55℃ ~ +155℃

## Type Dimension



CRW0612/ CRW1020/ CRW1218/  
CRW1225

## Dimension

Unit: mm

TYPE	L	W	H	l <sub>1</sub>	l <sub>2</sub>
QRW0612	1.60 ± 0.20	3.20 ± 0.20	0.55 ± 0.10	0.30 ± 0.20	0.50 ± 0.20
QRW1020	2.50 ± 0.20	5.00 ± 0.20	0.55 ± 0.10	0.40 ± 0.20	0.75 ± 0.20
QRW1218	3.10 ± 0.10	4.60 ± 0.10	0.55 ± 0.05	0.40 ± 0.20	0.50 ± 0.20
QRW1225*Z	3.20 ± 0.20	6.50 ± 0.20	0.55 ± 0.20	0.40 ± 0.20	0.75 ± 0.20
QRW1225*H	3.20 ± 0.20	6.50 ± 0.20	0.65 ± 0.20	0.40 ± 0.20	0.75 ± 0.20

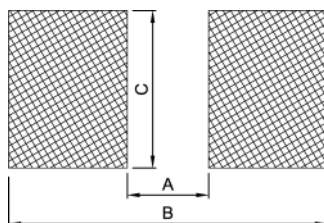


# QRW Series Automotive Wide Terminal Chip Resistor Product Specifications

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## ● General Information

### ■ Recommend Land Pattern Design



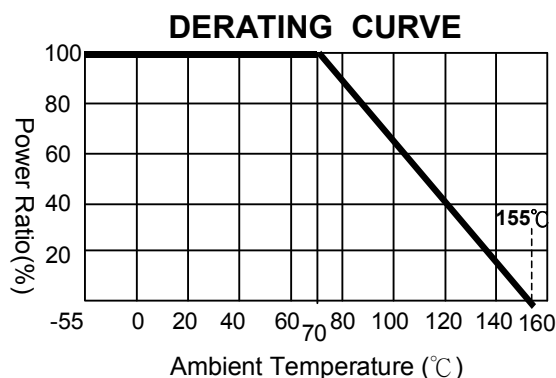
### ■ Dimension

Unit:mm

Item \ Type	0612	1020	1218	1225
A	0.60	0.75	2.04	0.85
B	2.90	3.40	4.24	3.70
C	3.20	5.00	4.80	6.40

## ■ Performance Characteristics

### ■ Power Derating Curve



Power rating or current rating is in the case based on continuous full-load at ambient temperature of 70°C. For operation at ambient temperature in excess of 70°C, the load should be derated in accordance with figure of derating Curve.

### ■ Voltage Rating or Current Rating

Resistance Range:  $\geq 1\Omega$

Rated Voltage: The resistor shall have a DC continuous working voltage or a RMS AC continuous working voltage at commercial-line frequency and wave form corresponding to the power rating, as determined formula as following:

$$E(RCWV) = \sqrt{P \times R}$$

E=Rated voltage(V)  
P=Power rating(W)  
R=Nominal resistance( $\Omega$ )



# QRW Series Automotive Wide Terminal Chip Resistor Product Specifications

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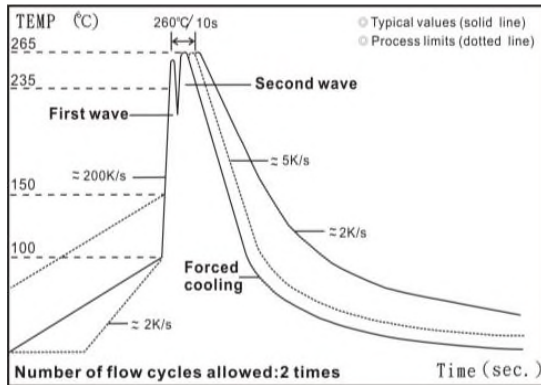
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## ● Reliability Test and Requirement

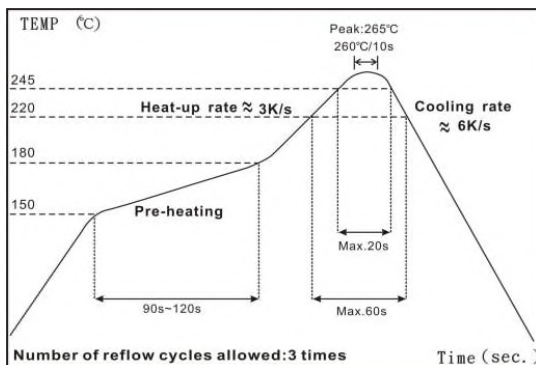
Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of Resistance (T.C.R)	JIS-C-5201-1 4.8 IEC-60115-1 4.8	At 25°C / -55°C and 25°C / +155°C, 25°C is the reference temperature	As Spec
Short Time Overload	JIS-C-5201-1 4.13 IEC-60115-1 4.13	Z:6.25*Rated power or Max Overload voltage whichever is less for 5 seconds. H:5*Rated power or Max Overload voltage whichever is less for 5 seconds.	±1% : ±(1.0%+0.05Ω) ±5% : ±(2.0%+0.1Ω) Value <1Ω : ±(2.0%+0.1Ω)
Leaching	JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1	260±5°C for 30 seconds.	Individual leaching area ≤5% Total leaching area ≤ 10%
Resistance to Soldering Heat	JIS-C-5201-1 4.18 IEC-60115-1 4.18	260±5°C for 10 seconds.	±1% : ±(0.5%+0.05Ω) ±5% : ±(1.0%+0.05Ω) Value <1Ω : ±(1.0%+0.05Ω)
Insulation Resistance	JIS-C-5201-1 4.6 IEC-60115-1 4.6	Apply 100VDC for 1 minute.	≥ 10GΩ
Temperature Cycling	JESD22 Method JA-104	1000 Cycles (-55°C to +125°C) Measurement at 24±4 hours after test conclusion. 30min maximum dwell time at each temperature extreme.	±1% : ±(0.5%+0.05Ω) ±5% : ±(1.0%+0.10Ω)
Resistance to Solvent	MIL-STD-202 Method 215	Add Aqueous wash chemical - OKEM Clean or equivalent.	±1% : ±(0.5%+0.05Ω) ±5% : ±(0.5%+0.05Ω)
Biased Humidity	MIL-STD-202 Method 103	1,000 hours; 85°C / 85% RH, 10% of operating power. Measurement at 24±4 hours after test conclusion.	±1% : ±(1.0%+0.05Ω) ±5% : ±(3.0%+0.05Ω)
High Temperature Exposure (Storage)	MIL-STD-202 Method 108	1000 hrs. @ T=155°C. Unpowered. Measurement at 24±4 hours after test conclusion.	±1% : ±(0.5%+0.05Ω) ±5% : ±(2.0%+0.05Ω)
Operational Life	MIL-STD-202 Method 108	Condition D Steady State TA=125°C at derated power. Measurement at 24±4 hours after test conclusion.	±1% : ±(1.0%+0.05Ω) ±5% : ±(3.0%+0.10Ω)
External Visual	MIL-STD-883 Method 2009	Electrical test not required. Inspect device construction, marking and workmanship.	—
Mechanical Shock	MIL-STD-202 Method 213	Wave Form : Tolerance for half sine shock pulse. Peak value is 100g's. Normal duration(D) is 6(ms)	±1% : ±(1.0%+0.05Ω) ±5% : ±(2.0%+0.1Ω)
Vibration	MIL-STD-202 Method 204	5 g's for 20 min., 12 cycles each of 3 orientations. Note: Test from 10-2000 Hz	±1% : ±(1.0%+0.05Ω) ±5% : ±(2.0%+0.1Ω)
ESD	AEC-Q200-002 or ISO/DIS 10605	Human body model 0612 : 1KV 1020 and above : 2KV	±(3%+0.05Ω)
Solderability	J-STD-002	(1) 4 hrs 155°C dry heat (2) 245±5°C 3 sec.	±1% : ±(0.5%+0.05Ω) ±5% : ±(1.0%+0.05Ω)
Terminal Strength (SMD)	AEC Q200-006	Pressurizing force for 60 seconds 0612 : 8N ; 1020 and above : 17.7N	No broken
Board Flex	AEC Q200-005	Bending once for 60 seconds 0612/1020/1218/1225 : 3mm	±1% : ±(1.0%+0.05Ω) ±5% : ±(1.0%+0.05Ω)

■ **Recommended Customer Soldering Parameters**

■ **Wave solder Temperature condition**



■ **Solder reflow Temperature condition**



■ **Rework temperature ( hot air equipment ) : 350°C, 3~5seconds**

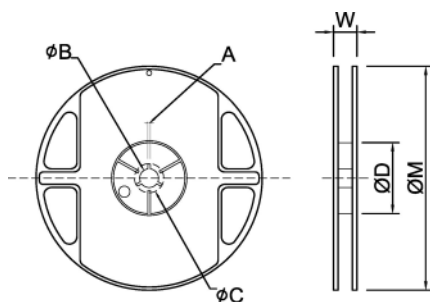
■ **Recommended reflow methods**

IR, vapor phase oven, hot air oven

If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

■ **Appendix For SMD Chip Resistor**

● **Packaging Information**

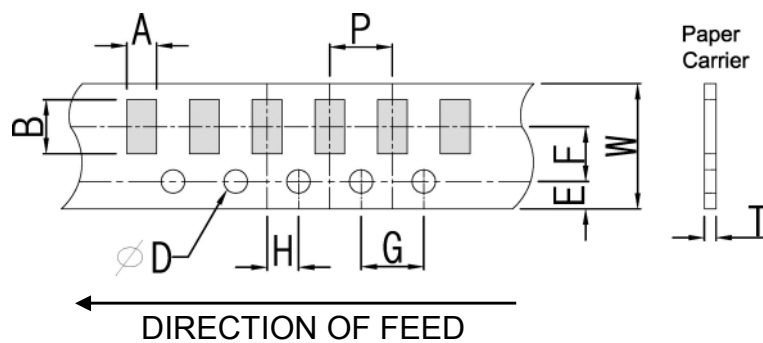


■ **Dimension**

Unit:mm

TYPE	SIZE	A	φB	φC	φD	W	φM
0612	7" 5K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	11.5±2.0	178±2.0
1020/1218/1225	7" 4K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	16.0±2.0	178±2.0

■ **Tapping Specification**



■ **Dimension**

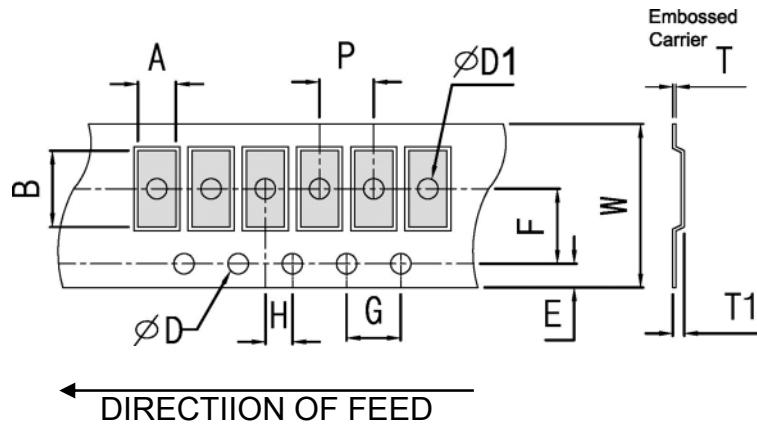
Unit:mm

Packaging	Type	A	B	W	E	F	G	H	T	φD	P
Paper Type	0612	1.90±0.2	3.50±0.2	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.05	0.75±0.1	1.50 <sup>+0.10</sup> <sub>-0</sub>	4.0±0.1



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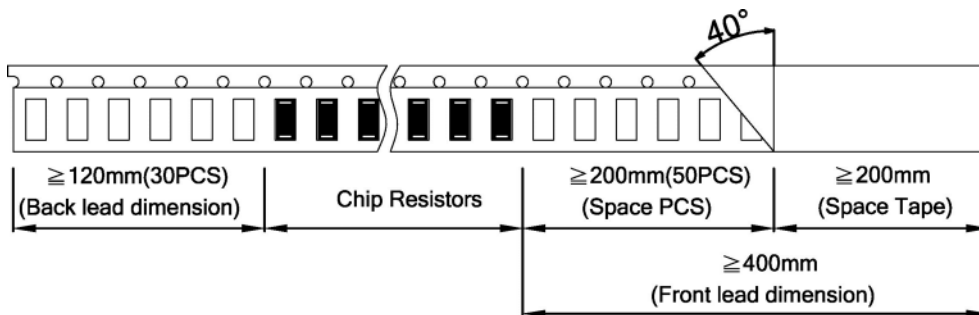
## Dimension

Unit:mm

Packaging	Type	A	B	W	E	F	G	H	T	$\phi D$	$\phi D1$	T1	P
Embossed Type	1020	2.80±0.2	5.60±0.2	12±0.1	1.75±0.1	5.5±0.05	4.0±0.1	2.0±0.05	0.23±0.1	1.50 <sup>+0.10</sup> <sub>-0</sub>	1.50±0.1	0.85±0.15	4.0±0.1
	1225*Z	3.40±0.2	6.70±0.2	12±0.1	1.75±0.1	5.5±0.05	4.0±0.1	2.0±0.05	0.23±0.1		1.50±0.1	0.85±0.15	
	1225*H	3.40±0.2	6.70±0.2	12±0.1	1.75±0.1	5.5±0.05	4.0±0.1	2.0±0.05	0.23±0.1		1.50±0.1	1.0±0.15	
	1218	3.30±0.2	4.60±0.2	12±0.1	1.75±0.1	5.5±0.05	4.0±0.1	2.0±0.05	0.23±0.1		1.50±0.1	0.85±0.15	

## Packing Material Data/Storage Data

### Front & Back Lead Dimension



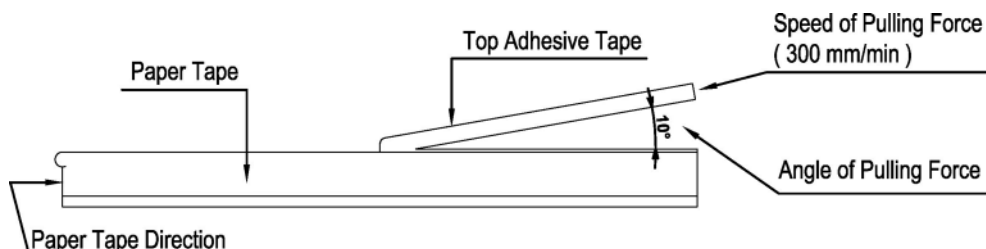




# QRW Series Automotive Wide Terminal Chip Resistor Product Specifications

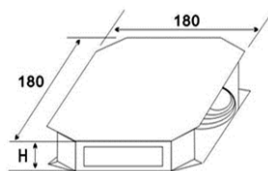
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## ■ Top Adhesive Peel Off Strength : 10~70g

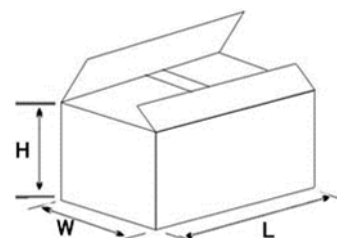


## ■ Package

Inner Box Size	
Reel	Size H(mm)
1	13
2	24
3	36
5	60
10	113



External Box Size			
Contain (Kpcs)	Length (mm)	Width (mm)	Height (mm)
25K	180	180	60
50K	180	180	110
150K	430	200	200
300K	400	400	200



## ■ Storage Data :

Storage time at the environment temp: 25±5°C & humidity: 60±20% is valid for one year from the date of delivery.

## ■ Product Testing Method:

Our products are tested with our company's tapping & testing equipments by using four-feet probe to touch at the back of both electrodes. Supposed different testing points or methods are requested, please advise beforehand and customized-made production is available.

## ■ mΩ Resistance Codes

Resistance	Code	0603 Code	Resistance	Code	0603 Code	Resistance	Code	0603 Code	Resistance	Code	0603 Code	Resistance	Code	0603 Code
10mΩ	R010	010	65mΩ	R065	065	0.12Ω	R120	R12	0.27Ω	R270	R27	0.56Ω	R560	R56
15mΩ	R015	015	68mΩ	R068	068	0.13Ω	R130	R13	0.30Ω	R300	R30	0.60Ω	R600	R60
20mΩ	R020	020	70mΩ	R070	070	0.15Ω	R150	R15	0.33Ω	R330	R33	0.65Ω	R650	R65
30mΩ	R030	030	75mΩ	R075	075	0.16Ω	R160	R16	0.36Ω	R360	R36	0.68Ω	R680	R68
40mΩ	R040	040	80mΩ	R080	080	0.18Ω	R180	R18	0.40Ω	R400	R40	0.70Ω	R700	R70
50mΩ	R050	050	90mΩ	R090	090	0.20Ω	R200	R20	0.43Ω	R430	R43	0.75Ω	R750	R75
56mΩ	R056	056	0.10Ω	R100	R10	0.22Ω	R220	R22	0.47Ω	R470	R47	0.80Ω	R800	R80
60mΩ	R060	060	0.11Ω	R110	R11	0.25Ω	R250	R25	0.50Ω	R500	R50	0.90Ω	R900	R90



# QRW Series Automotive Wide Terminal Chip Resistor Product Specifications

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## ■ Standard Resistance Values in a Decade

Marking code:

- 1%: marking code, please refer to E96 and E24 data form as below  
 Ex: 120K, The marking code is 1203 in E24  
 121K, The marking code is 1213 in E96
- 5%: marking code, please refer to E24 data form as below  
 Ex: 120K, The marking code is 124 in E24
- Note: jumper zero ohm resistor marking code is one 「0」 (except type below 0402).

E96	E48	E96	E48	E96	E48	E96	E48	E96	E48						
100	100	169	169	287	287	487	487	825	825						
102		174		294		499		845							
105	105	178	178	301	301	511	511	866	866						
107		182		309		523		887							
110	110	187	187	316	316	536	536	909	909						
113		191		324		549		931							
115	115	196	196	332	332	562	562	953	953						
118		200		340		576		976							
121	121	205	205	348	348	590	590								
124		210		357		604		<b>E24</b>	<b>E12</b>	<b>E6</b>	<b>E3</b>				
127	127	215	215	365	365	619	619	10	10	10	10				
130		221		374		634		11	12						
133	133	226	226	383	383	649	649	12	12						
137		232		392		665		13	15	15					
140	140	237	237	402	402	681	681	15	15	15					
143		243		412		698		16	18						
147	147	249	249	422	422	715	715	18	18						
150		255		432		732		20	22	22	22	22			
154	154	261	261	442	442	750	750	22	22	22	22	22			
158		267		453		768		24	27						
162	162	274	274	464	464	787	787	27	27						
165		280		475		806		30	33	33					
								33	33	33					
								36	39						
								39	39						
								43	47	47	47	47			
								47	47	47	47	47			
								51	56						
								56	56						
								62	68	68					
								68	68	68					
								75	82						
								82	82						
								91							

According to IEC publication 63