Data Sheet

Customer:	
Product:	Automotive Grade Chip Resistor – CRS..A Series
Size:	0201/0402/0603/0805/1206/1210/2010/2512
Issued Date:	19-May-25
Edition:	REV.A2

RoHS Compliant

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19-May-25	19-May-25	19-May-25	19-May-25	
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Automotive Grade Chip Resistor-CRS..A Series



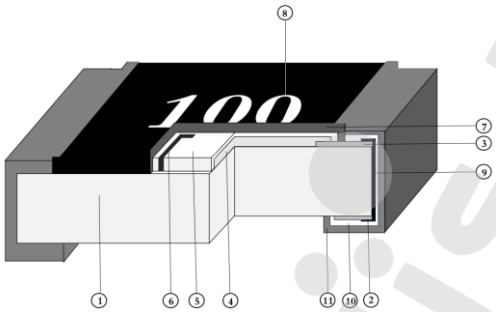
■Features

- AEC-Q200 Compliance
- Compliant with RoHS directive
- Halogen free requirement

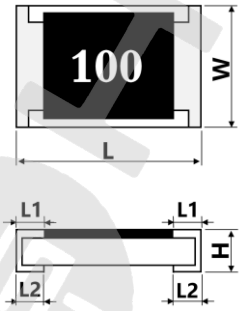
■Applications

- Automotive
- Audio-visual
- Integrated systems

■Construction



1	Ceramic substrate	5	1st Protective coating	9	Terminal inner electrode
2	Bottom inner electrode	6	Laser Trimmed	10	Ni plating
3	Top inner electrode	7	2nd Protective coating	11	Sn plating
4	Resistive layer	8	Marking		



■Dimensions

Type	Size (Inch)	L (mm)	W (mm)	H (mm)	L1 (mm)	L2 (mm)
CRS01	0201	0.60±0.03	0.30±0.03	0.23±0.03	0.10±0.05	0.15±0.05
CRS02	0402	1.00±0.10	0.50±0.05	0.30±0.05	0.20±0.10	0.25±0.10
CRS03	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.15	0.25±0.15
CRS05	0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.35±0.20
CRS06	1206	3.05±0.10	1.55±0.10	0.50±0.10	0.45±0.20	0.40±0.20
CRS13	1210	3.05±0.10	2.60±0.15	0.55±0.10	0.45±0.20	0.50±0.20
CRS10	2010	5.00±0.10	2.50±0.15	0.55±0.10	0.45±0.20	0.50±0.20
CRS12	2512	6.35±0.10	3.10±0.15	0.55±0.10	0.60±0.20	0.50±0.20

■Part Numbering

CRS	03	J	T	E		1001	A
Product Type	Dimensions (L×W)	Resistance Tolerance	Packaging Code	TCR (PPM/°C)	Power Rating	Resistance	Function Code
	01: 0201 02: 0402 03: 0603 05: 0805 06: 1206 13: 1210 10: 2010 12: 2512	D: ±0.5% F: ±1% J: ±5%	T: Taping Reel	E: ±100 F: ±200 H: ±400	: Standard	0100: 10Ω 1000:100Ω 1001: 1KΩ 1004: 1MΩ	A: Automotive Grade

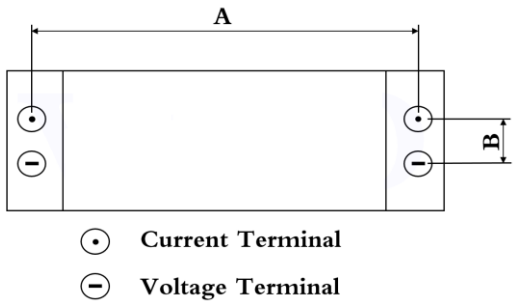
■Standard Electrical Specifications

Item / Type	Power Rating at 70℃	Operating Temp. Range	Max. rated voltage	Max. Overload Voltage	Resistance Range		TCR (PPM/℃)
					±0.5%、±1% (E24、E96)	±5% (E24)	
CRS01 (0201)	1/20W	-55 ~ +125°C	25V	50V	1Ω≤ R<10Ω	1Ω≤R<10Ω	±400
					10Ω≤R≤10MΩ	10Ω≤R≤10MΩ	±200
CRS02 (0402)	1/16W	-55 ~ +155°C	50V	100V	1Ω≤R<10Ω	1Ω≤R<10Ω	±400
					10Ω≤R<1MΩ	-	±100
					1MΩ≤R≤22MΩ	10Ω≤R≤22MΩ	±200
CRS03 (0603)	1/10W	-55 ~ +155°C	75V	150V	1Ω≤R10Ω	1Ω≤R<10Ω	±400
					10Ω≤R<1MΩ	-	±100
					1MΩ≤R≤22MΩ	10Ω≤R≤22MΩ	±200
CRS05 (0805)	1/8W	-55 ~ +155°C	150V	300V	1Ω≤R<10Ω	1Ω≤R10Ω	±400
					10Ω≤R<1MΩ	-	±100
					1MΩ≤R≤22MΩ	10Ω≤R≤22MΩ	±200
CRS06 (1206)	1/4W	-55 ~ +155°C	200V	400V	1Ω≤R<10Ω	1Ω≤R<10Ω	±400
					10Ω≤R<1MΩ	-	±100
					1MΩ≤R≤22MΩ	10Ω≤R≤22MΩ	±200
CRS13 (1210)	1/2W	-55 ~ +155°C	200V	400V	1Ω≤R<10Ω	1Ω≤R<10Ω	±400
					10Ω≤R<1MΩ	-	±100
					1MΩ≤R≤22MΩ	10Ω≤R≤22MΩ	±200
CRS10 (2010)	3/4W	-55 ~ +155°C	200V	400V	1Ω≤R<10Ω	1Ω≤R<10Ω	±400
					10Ω≤R<1MΩ	-	±100
					1MΩ≤R≤22MΩ	10Ω≤R≤22MΩ	±200
CRS12 (2512)	1W	-55 ~ +155°C	200V	400V	1Ω≤R<10Ω	1Ω≤R<10Ω	±400
					10Ω≤R<1MΩ	-	±100
					1MΩ≤R≤22MΩ	10Ω≤R≤22MΩ	±200

■Jumper(0Ω)

Item / Type	Rated Current	Max. Overload Current	Resistance Range	
			±1%	±5%
CRS01 (0201)	0.5A	1A	0Ω (≤40mΩ)	0Ω (≤50mΩ)
CRS02 (0402)	1A	2A	0Ω (≤30mΩ)	
CRS03 (0603)		3A		
CRS05 (0805)	2A	5A		
CRS06 (1206)				
CRS13 (1210)				
CRS10 (2010)				
CRS12 (2512)				

■Resistance Test Package Standard Measurement Location



Type	A (mm)	B (mm)
CRS01	0.44±0.05	0.22±0.05
CRS02	0.80±0.05	0.24±0.05
CRS03	1.35±0.05	0.35±0.05
CRS05	1.80±0.05	0.35±0.05
CRS06	2.90±0.05	0.35±0.05
CRS13	2.90±0.05	0.35±0.05
CRS10	4.50±0.05	1.15±0.05
CRS12	5.90±0.05	1.60±0.05

■Environmental Characteristics

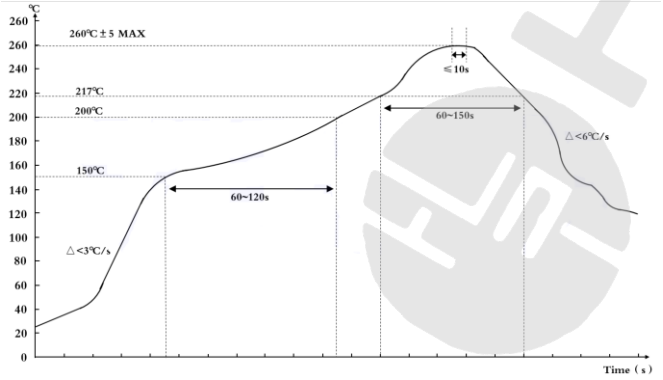
Item	Requirement		Test Method
	Resistors	Jumper	
TCR	As Spec	-	MIL-STD-202 Method 304 $TCR\ (ppm/^{\circ}C) = \frac{(R2-R1)}{R1\ (T2-T1)} \times 10^{6}$ R1: Measured resistance at room temperature (Ω) R2: Measured resistance at -55℃ or +125℃. (Ω) T1: room temperature (℃) T2: Temperatures of -55°C or +125°C (℃)。 According to MIL-STD-202 Method 304
Short Time Overload	F:△R≤±(1%R+0.05Ω) J:△R≤±(2%R+0.05Ω) No damage to appearance, no short circuits or burnouts.	F: 0201:R≤40mΩ 0402 and above R≤30mΩ; J: R≤50mΩ; No visible damage	IEC60115-1 8.1 Apply 2.5 times the rated voltage (2.5 times the rated voltage or the maximum overload voltage, whichever is less) for 5 seconds, release the load for about 30 minutes, and then measure the resistance variance. (For rated voltage, refer to Specification)

Item	Requirement		Test Method
	Resistors	Jumper	
Solderability	The tin area of the conductor should be greater than 95%. No damage to appearance.		AEC -Q200 Test 18 The resistance is immersed in a furnace of 235±5℃ for 2 seconds and then placed in a microscope Observe the solder area under the microscope.
Resist soldering heat	Test item 1: (1).Rate of change of resistance Range of resistance:≧1Ω △R%≤±(1.0%+0.05Ω) (2).The appearance of the electrode is normal, and the side guide does not fall off. Test item 2 : (1).The tin area of the conductor should be greater than 95%. (2).No lower layer material (e.g., white substrate) should be seen at the edge of the electrode. Test item 3 : (1).Rate of change of resistance Range of resistance:≧1Ω △R%≤±(1.0%+0.05Ω) (2).The appearance of the electrode is normal, and the side guide is not detached.	Test item 1: (1).Rate of change of resistance F: 0201:R≤40mΩ 0402 and above R≤30mΩ； J: R≤50mΩ; (2).The appearance of the electrode is normal, and the side guide is not detached. Test item 2: (1).The tin area of the conductor should be greater than 95%. (2).No lower layer material (e.g., white substrate) should be seen at the edge of the electrode. Test item 3: (1).Rate of change of resistance F: 0201:R≤40mΩ 0402 and above R≤30mΩ； J: R≤50mΩ; (2).The appearance of the electrode is normal, and the side guide does not fall off.	AEC-Q200 Test 15 Test item 1 (soldering furnace test): Immerse in a tin furnace of 260+5/-0℃ for 10 +1/-0 seconds, take out and leave for more than 60 minutes, and then measure the change rate of resistance value. Test item 2 (welding furnace test): Soak in a tin furnace of 260+5/-0℃ for 30+1/-0 seconds, then wash it out. Observe the solder area under a microscope. Test item 3 (test of soldering iron): heating temperature :350±10℃ Heating time of the soldering iron:3+1/-0 sec. The chromium iron was taken from the electrode and heated at both ends, then removed and left for more than 60 minutes, and the rate of change of resistance was measured.
Hot and cold shocks	△R%≤±(2.0%+0.05Ω)	F: 0201:R≤80mΩ 0402 and above R≤60mΩ； J: R≤100mΩ; No visible damage	MIL-STD-202 Method 107 The samples were placed in a high and low temperature laboratory with a temperature change from-55℃ to 125℃ for 30 minutes, a total of 1000 times. Then they were taken out and stabilized at room temperature for 24 hours ±4 hours or more, and their resistance variance rate was measured.
Bending test	△R%≤±(1.0%+0.05Ω) There is no damage to the appearance, no side guide detachment and no body fracture.	F: 0201:R≤40mΩ 0402 and above R≤30mΩ； J: R≤50mΩ; No visible damage	AEC-Q200 Test 21 Test samples on the PCB by welding and place the PCB on a bending tester. Add force to the center part of the PCB for a duration of 60 (±5) seconds. Measure the resistance variance rate in the load. Bend depth (D) 0402、0603、0805=5 mm 0201、1206、1210=3 mm 2010、2512=2 mm
End electrode tensile test	Item 1: No damage to the appearance, no side guide detachment and no body fracture occurred. Item 2: Tension is greater than or equal to 5N		AEC-Q200 Test 22 Test item 1: Solder the resistor to the circuit board, apply a force of 5N to the back of the resistor for 10 sec, and check the appearance of the side conductor. Test item 2: Solder the resistor to the circuit board, gradually apply force to the back of the resistor, and test the maximum peel strength of the end electrode.

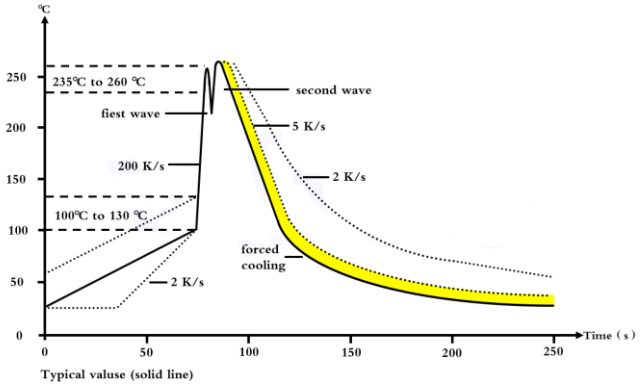
Item	Requirement		Test Method
	Resistors	Jumper	
Resistance-to-high temperature test	F:△R≤±(1%R+0.05Ω） J:△R≤±(2%R+0.05Ω）	F: 0201:R≤80mΩ 0402 and above R≤60mΩ； J: R≤100mΩ	AEC -Q200 Test 3 The specimens are placed in a chamber at a temperature of 155 ± 3°C for 1000 hours, then removed, stabilised at room temperature for 24 hours ± 4 hours or more, and their resistance variance measured.
Resistant to moisture load	F:△R≤±(2%R+0.05Ω） J:△R≤±(3%R+0.05Ω）	F: 0201:R≤80mΩ 0402 and above R≤60mΩ； J: R≤100mΩ	AEC-Q200 Test 7 Temperature 85°C、Humidity 85%、10% Rated Power Current , Placement 1000 hours.
ESD	No damage to appearance △R≤±(3.0%R+0.05Ω)	F: 0201:R≤40mΩ 0402 and above R≤30mΩ； J: R≤50mΩ; No visible damage	AEC-Q200 Test 17 Human body mode, two discharges, positive and negative polarity each time. 0603:1kV;0805:2kV；1206 and above：3Kv
Load life	F:△R≤±(2%R+0.05Ω） J:△R≤±(3%R+0.05Ω）	F: 0201:R≤80mΩ 0402 and above R≤60mΩ； J: R≤100mΩ	AEC-Q200 Test 8 125°C±2°C, 1000 hours , voltage at 36% of rated power (current) value or component limit voltage (whichever is less), 1.5 hours on/0.5 hours off.
Anti-vulcanization properties	△R≤±(4.0%+0.5Ω) No visible damage	F: 0201:R≤80mΩ 0402 and above R≤60mΩ； J: R≤100mΩ; No visible damage	ASTM-B -809-95 The resistance to be measured is placed in saturated sulfur vapor, temperature: 60℃±3℃, humidity: 91℃~93%RH, and the placement time is 750 hours.
vibrate	△R≤±(1.0%R+0.05Ω) No visible damage	F: 0201:R≤40mΩ 0402 and above R≤30mΩ； J: R≤50mΩ; No visible damage	AEC-Q200 Test 14 Frequency: 10Hz~2000Hz, acceleration: 5g's, one cycle 20min, X, Y, Z three directions each direction 12 cycles, a total of 36 cycles.

■Storage Period: It can be stored for two years under the conditions of -5~40℃ and 20~75% of storage environment.

■Soldering Condition



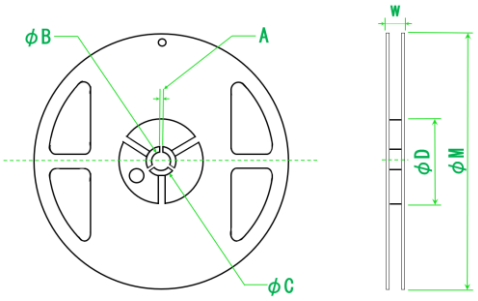
Recommended reflow soldering curve



Recommended wave soldering curve

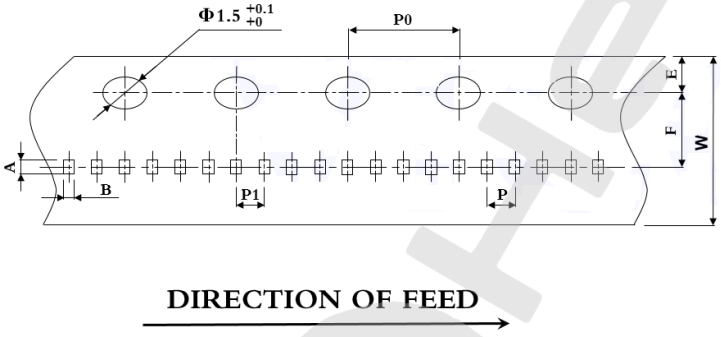
■Packaging

Reel Specifications & Packaging Quantity

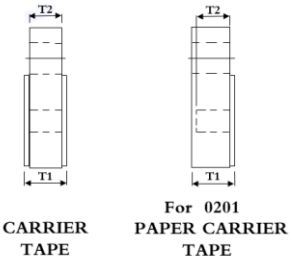


Type	Packaging Quantity		Tape Width	Reel Diameter	Wa (mm)	M (mm)	A (mm)	B (mm)	C (mm)	D (mm)
CRS01	Paper	15K	8mm	7 inch	9.0±0.5	178±0.5	2.0±0.5	13.5±0.5	21.0±0.5	60.0±1.0
CRS02	Paper	10K	8mm	7 inch	9.0±0.5	178±0.5	2.0±0.5	13.5±0.5	21.0±0.5	60.0±1.0
CRS03 CRS05 CRS06 CRS13	Paper	5K	8mm	7 inch	9.0±0.5	178±0.5	2.0±0.5	13.5±0.5	21.0±0.5	60.0±1.0
CRS10 CRS12	Embossed	4K	12mm	7 inch	13.8±0.5	178±0.5	2.0±0.5	13.5±0.5	21.0±0.5	80.0±1.0

Paper Tape Specifications



DIRECTION OF FEED

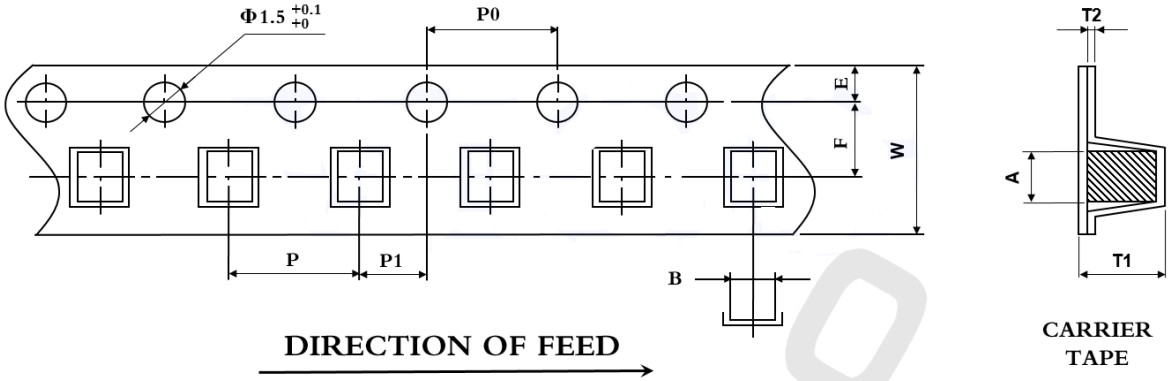


CARRIER TAPE

For 0201 PAPER CARRIER TAPE

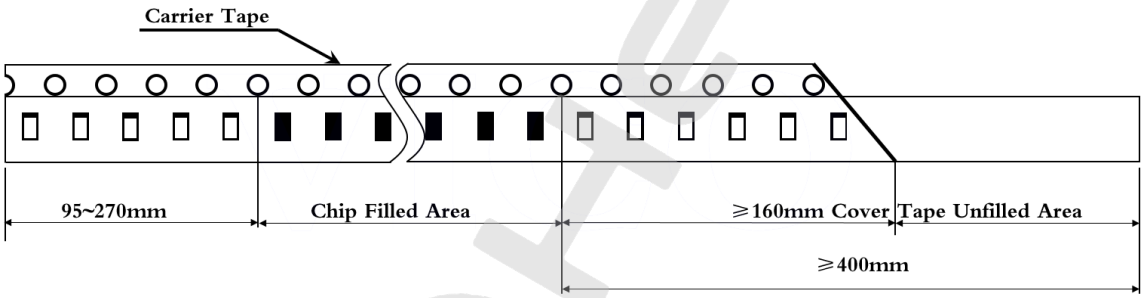
Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	T1 (mm)	T2 (mm)	P (mm)	P0 (mm)	P1 (mm)
CRS01	0.68±0.05	0.38±0.03	8.00±0.10	1.75±0.10	3.50±0.05	0.42+0.1/-0	0.28±0.02	2.00±0.05	4.00±0.05	2.00±0.05
CRS02	1.15±0.05	0.65±0.05	8.00±0.20	1.75±0.10	3.50±0.05	0.40+0.2/-0	0.40±0.05	2.00±0.10	4.00±0.05	2.00±0.05
CRS03	1.80±0.10	1.00±0.10	8.00±0.20	1.75±0.10	3.50±0.05	0.60+0.2/-0	0.60±0.10	4.00±0.10	4.00±0.05	2.00±0.05
CRS05	2.30±0.10	1.55±0.10	8.00±0.20	1.75±0.10	3.50±0.05	0.75+0.2/-0	0.75±0.10	4.00±0.10	4.00±0.05	2.00±0.05
CRS06	3.50±0.20	1.90±0.20	8.00±0.20	1.75±0.10	3.50±0.05	0.75+0.2/-0	0.75±0.10	4.00±0.10	4.00±0.05	2.00±0.05
CRS13	3.50±0.20	2.80±0.20	8.00±0.20	1.75±0.10	3.50±0.05	0.75+0.2/-0	0.75±0.10	4.00±0.10	4.00±0.05	2.00±0.05

Embossed Plastic Tape Specifications

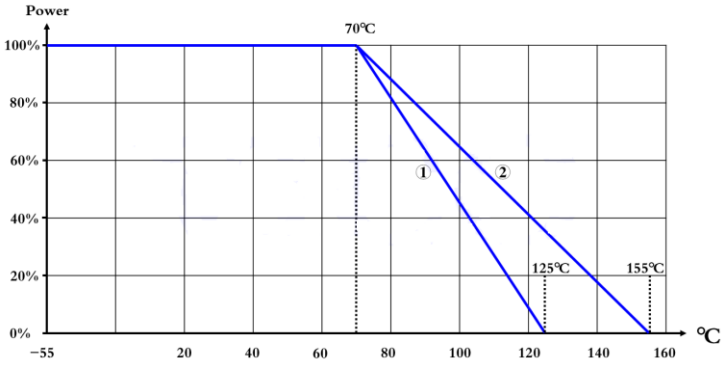


Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	T1 (mm)	T2 (mm)	P (mm)	P0 (mm)	P1 (mm)
CRS10	5.50±0.20	2.80±0.20	12.00±0.20	1.75±0.10	5.50±0.05	1.10±0.15	0.23±0.15	4.00±0.10	4.00±0.05	2.00±0.05
CRS12	6.70±0.20	3.40±0.20	12.00±0.20	1.75±0.10	5.50±0.05	1.10±0.15	0.23±0.15	4.00±0.10	4.00±0.05	2.00±0.05

Front and Rear Guide Belt Dimensions



■Derating Curve



Clarification: For resistors operating at ambient temperatures above 70°C, the power rating shall be derated in accordance with the following chart.

Rated voltage or rated current:

Rated voltage: the rated power DC or AC (commercial weekly RMS.) voltage.

The following formula can be used to obtain the value, but if the obtained value exceeds the maximum voltage in the specification table, the maximum rated voltage shall be used as its rated voltage.

$$E=\sqrt{P\times R}$$

E=Rated voltage (V)
P=Rated power (W)
R=Nominal resistance (Ω)

■Marking

No Marking for 0201 and 0402

Jumper for all: Letter “0”

Example: 

1% for 0805/1206/1210/2010/2512: 4 digits marking

Example:

Resistance	100Ω	2.2KΩ	10KΩ	49.9KΩ	100KΩ
Marking	1000	2201	1002	4992	1003

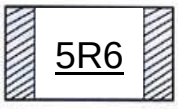
5% for 0603/0805/1206/1210/2010/2512: 3 digits marking in E24

Example: 101=100Ω 102=1KΩ (1st and 2nd are E24 code and 3rd code is multiplier)

E24 code	10	11	12	13	15	16	18	20	22	24	27	30	33	36	39	43	47	51	56	62	68	75	82	91

1% for 0603(E24): 3 digits marking in E24

Example: one short bar under marking letter



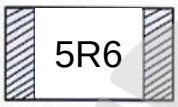
1% for 0603(E96): 3 digits marking in E96



3 digits marking for Example: 14C=13K7Ω 13C=13K3Ω

68B=4K99Ω 68X=49.9Ω

The decimal point should be expressed by “R”

Example: 

Marking Table

Code	E96	Code	E96	Code	E96	Code	E96
01	100	**25**	178	**49**	316	**73**	562
02	102	**26**	182	**50**	324	**74**	576
03	105	**27**	187	**51**	332	**75**	590
04	107	**28**	191	**52**	340	**76**	604
05	110	**29**	196	**53**	348	**77**	619
06	113	**30**	200	**54**	357	**78**	634
07	115	**31**	205	**55**	365	**79**	649
08	118	**32**	210	**56**	374	**80**	665
09	121	**33**	215	**57**	383	**81**	681
10	124	**34**	221	**58**	392	**82**	698
11	127	**35**	226	**59**	402	**83**	715
12	130	**36**	232	**60**	412	**84**	732
13	133	**37**	237	**61**	422	**85**	750
14	137	**38**	243	**62**	432	**86**	768
15	140	**39**	249	**63**	442	**87**	787
16	143	**40**	255	**64**	453	**88**	806
17	147	**41**	261	**65**	464	**89**	825
18	150	**42**	267	**66**	475	**90**	845
19	154	**43**	274	**67**	487	**91**	866
20	158	**44**	280	**68**	499	**92**	887
21	162	**45**	287	**69**	511	**93**	909
22	165	**46**	294	**70**	523	**94**	931
23	169	**47**	301	**71**	536	**95**	953
24	174	**48**	309	**72**	549	**96**	976

Code	A	B	C	D	E	F	G	X	Y		
Multiplier	10^0	10^1	10^2	10^3	10^4	10^5	10^6	10^{-1}	10^{-2}		

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version A1	Apr 02,2025		-Modify the description of Features and Applications -Modify the content of Construction -Modify all size specifications of Dimensions -Add Resistance Tolerance D ±0.5% -Modify the specifications of Standard Electrical Specifications -Remove the High Power Rating Electrical Specifications and Recommend land pattern -Add Resistance Test Package Standard Measurement Location -Modify the Environmental Characteristics -Modify the Soldering Condition -Modify the packaging specifications -Modify the Derating Curve
Version A2	May 19,2025		-Modify TCR for full-size 10Ω ≤ R < 1MΩ from ±200 to ±100. -Add specifications for full-size jumper resistor. -Add Environmental Characteristics items for jumper resistors.