

JIS

JAPANESE INDUSTRIAL STANDARD

**Fixed carbon film chip resistors
cylindrical type
for use in electronic equipment
(Form 27, characteristic D and
G, grade C)**

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Fixed carbon film chip resistors
cylindrical type for use in electronic equipment
(Form 27, characteristic D and G, grade C)

C 5212-1995

1. Scope This Japanese Industrial Standard specifies fixed carbon film chip resistors cylindrical type mainly for use in electronic equipment, form 27, characteristic D and G, grade C (hereafter, referred to as "resistors") based on JIS C 5201.

Remarks 1. This resistor is formed in such a manner that carbon film closely fixed on the surface of cylindrical ceramic body is employed as the resistance element, no lead wire is provided, electrodes for surface mounting made of metal or conductive film are equipped on both ends of the element and insulating enclosure (insulating coating) is applied.

2. The following standards are cited in this Standard:

JIS C 0802	Colour code for fixed resistors for electronic equipment
JIS C 5201	General rules of fixed resistors for use in electronic equipment
JIS C 5202	Test methods of fixed resistors for electronic equipment
JIS C 5602	Glossary of passive components for electronic equipment
JIS C 5603	Terms and definitions for printed circuits
JIS C 6484	Copper-clad laminates for printed wiring boards - Glass fabric base, epoxy resin
JIS K 1501	Methanol
JIS K 5902	Colophonium
JIS Z 3282	Soft solder
JIS Z 8102	Names of non-luminous object colours
JIS Z 8721	Colour specification - Specification according to their three attributes
JIS Z 9015	Sampling inspection procedures and tables by attributes with severity adjustment (receiving inspection where a consumer can select suppliers)

2. Definitions For the purpose of this Standard the definitions specified in JIS C 5201, JIS C 5602 and JIS C 5603 apply.

3. Type designation

3.1 Structure of type designation The type designation shall be structured by arranging the symbols as given below.

Symbol denoting kind of resistor	Symbol denoting style	Symbol denoting character- istic	Symbol denoting rated dissipa- tion	Symbol denoting nominal resistance	Symbol denoting tolerance on resist- ance
3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6

Example: RD 27 D 2B 102 J

Symbol denoting electrode construc- tion	Symbol denoting grade	Symbol denoting failure rate level	Symbol denoting taping
3.2.7	3.2.8	3.2.9	3.2.10
A	C	X	T

3.2 Symbols

3.2.1 Kind of resistor The symbol denoting the kind of resistor shall be RD, based on 4.2.1 of JIS C 5201.

3.2.2 Style The symbol denoting the style shall be 27, based on 4.2.2 of JIS C 5201.

3.2.3 Characteristic The symbol denoting the characteristic shall consist of one English capital letter based on 4.2.3 of JIS C 5201, and D and G are employed as shown in Table 1.

Table 1. Characteristic

Characteristic			Characteristic symbol		
			D		G
Electrode construction symbol (see 3.2.7)			A	B	A
Rated dissipation (see Table 4)		Symbol	2B		2E
		Dissipation (W)	0.125		0.25
Maximum working voltage (V) (see Table 4)			150	200	250
Rated ambient temperature (°C) (see 4.1)			70		
Category temperature range (°C) (see 4.3)			−55 to +155		
Temperature characteristic of resistance (¹) (ppm/°C) (see No. 2 of Table 6)			−150 to −1500		
Allowable maximum variation of resistance	Short time overload (see No. 3 of Table 6)		±(1% + 0.05 Ω)		
	Voltage proof (see No. 5 of Table 6)				
	Intermittent overload (²) (see No. 6 of Table 6)				
	Robustness of electrode (see No. 1 of Table 7)				
	Resistance to soldering heat (see No. 2 of Table 7)				
	Change of temperature (see No. 1 of Table 8)				
	Endurance (loading under damp) (see No. 2 of Table 8)		±(5% + 0.1 Ω)		
	Endurance (rated load) (see No. 3 of Table 8)		±(3% + 0.1 Ω)		
Nominal resistance range (³) (see Table 4)			10 Ω to 1 MΩ		10 Ω to 2.2 MΩ
Tolerance on resistance (%) (see 4.5)			±5		

Notes ⁽¹⁾ This value increases or decreases within the range shown in Table according to the characteristic and nominal resistance range.

⁽²⁾ Applicable for resistors of nominal resistance 100 Ω or more.

⁽³⁾ This range increases or decreases within the range shown in Table according to the characteristic.

3.2.4 Rated dissipation The symbols denoting rated dissipation shall be as given in Table 2, based on 4.2.4 of JIS C 5201.

Table 2. Rated dissipation

Symbol	Dissipation (W)
2B	0.125
2E	0.25

3.2.5 Nominal resistance The symbol denoting nominal resistance shall consist of three numerals based on 4.2.5 of JIS C 5201. The first and second numerals mean the significant figures of resistance in the unit of ohm (Ω), and the third numeral means the number of zeros following to the significant figures.

Example: 100 10 Ω

102 1 k Ω

3.2.6 Tolerance on resistance The symbol denoting tolerance on resistance shall be J($\pm 5\%$) based on 4.2.6 of JIS C 5201.

3.2.7 Electrode construction The symbol denoting the electrode construction shall consist of one English capital letter as given in Table 3.

Table 3. Electrode construction

Symbol	Electrode construction
A	Metal system
B	Conductive film system

3.2.8 Grade The symbol denoting grade shall consist of one English capital letter based on 4.2.7 of JIS C 5201, and the letter shall be C.

3.2.9 Failure rate level The symbol denoting failure rate level shall consist of one English capital letter based on 4.2.8 of JIS C 5201, and the letter shall be X (no failure rate level is specified).

3.2.10 Taping If taping is carried out, the symbol shall consist of one English capital letter based on 4.2.9 of JIS C 5201, and the letter shall be T.

4. Ratings

4.1 Rated dissipation The rated dissipation shall be as given in Table 4. However, for resistors with a resistance exceeding the critical resistance, it means the dissipation corresponding to the maximum working voltage.

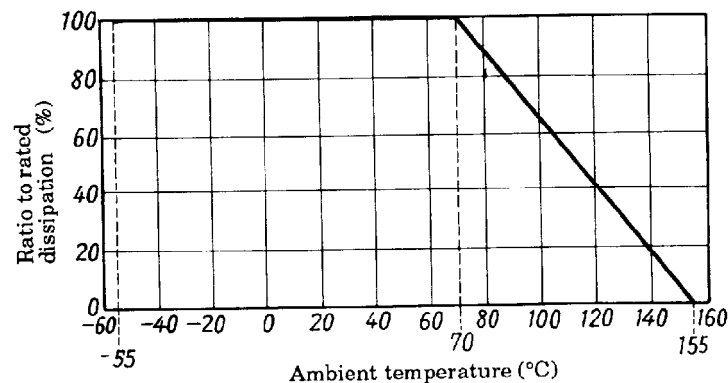
The rated ambient temperature is 70°C.

Table 4. Rating

Rated dissipation		Characteristic symbol	Electrode construction symbol	Maximum working voltage (V)	Maximum overload voltage (V)	Maximum intermittent overload voltage (V)	Voltage proof (V)	Nominal resistance range
Symbol	Dissipation (W)							
2B	0.125	D	A	150	300	300	300	10 Ω to 1 M Ω
			B					
2E	0.25	G	A	200	400	400	400	10 Ω to 2.2 M Ω
				250	500	500	500	

4.2 Maximum dissipation The maximum dissipation at a temperature not exceeding the rated ambient temperature shall be equal to the rated dissipation. The maximum dissipation at a temperature exceeding the rated ambient temperature shall have a derated value of rated dissipation by means of the derating curve shown in Fig. 1.

Fig. 1. Derating curve



4.3 Category temperature range The category temperature range shall be -55°C to $+155^{\circ}\text{C}$.

4.4 Nominal resistance value The resistance shall be expressed in the unit of ohm (Ω), and the values shall be 10^n (n is an integer) times the numerical values given in Table 5 (E24 series).

The correlation between the characteristic and the nominal resistance range shall be as given in Table 4.

Table 5. Standard values of nominal resistance (E24 series)

1.0	1.5	2.2	3.3	4.7	6.8
1.1	1.6	2.4	3.6	5.1	7.5
1.2	1.8	2.7	3.9	5.6	8.2
1.3	2.0	3.0	4.3	6.2	9.1

4.5 Tolerance on resistance The tolerance on resistance shall be expressed in percent (%), and only one kind of $\pm 5\%$ (J) is assigned.

4.6 Rated voltage The rated voltage means the d.c. or a.c. (r.m.s. value at power frequency) voltage which corresponds to the rated dissipation, and shall be calculated from the equation below. If the voltage so obtained exceeds the maximum working voltage in Table 4, this maximum working voltage shall be employed as the rated voltage.

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

where, E : rated voltage (V)

P : rated dissipation (W)

R : nominal resistance (Ω)

5. Performance

5.1 Electrical performance The electrical performances shall satisfy each item in Table 6.

The test method shall be as specified in JIS C 5202.

Table 6. Electrical performance

No.	Item	Performance	Test method (JIS C 5202)																								
1	Resistance	Within specified tolerance on resistance	As specified in 5.1. Use classification A for voltage application.																								
			Nominal resistance range (<i>r</i>)	Maximum applied voltage (V)																							
			$10\ \Omega \leq r < 100\ \Omega$	0.3																							
			$100\ \Omega \leq r < 1\ \text{k}\Omega$	1																							
			$1\ \text{k}\Omega \leq r < 10\ \text{k}\Omega$	3																							
			$10\ \text{k}\Omega \leq r < 100\text{k}\Omega$	10																							
			$100\ \text{k}\Omega \leq r < 1\ \text{M}\Omega$	25																							
			$1\ \text{M}\Omega \leq r$	50																							
2	Temperature characteristic of resistance	The temperature coefficient of resistance shall have the following values. <table><tr><td>Characteristic symbol</td><td>D</td><td>G</td><td rowspan="2">Temperature coefficient of resistance (ppm/°C)</td></tr><tr><td>Rated dissipation (W)</td><td>0.125</td><td>0.25</td></tr><tr><td rowspan="5">Resistance range</td><td>1 kΩ max.</td><td>10 kΩ max</td><td>−150 to −350</td></tr><tr><td>1.1 kΩ to 47 kΩ</td><td>11 kΩ to 150 kΩ</td><td>−150 to −600</td></tr><tr><td>51 kΩ to 470 kΩ</td><td>160 kΩ to 2.2 MΩ</td><td>−150 to −1 000</td></tr><tr><td>510 kΩ to 1 MΩ</td><td>510 kΩ to 2.2 MΩ</td><td>150 to −1 500</td></tr><tr><td></td><td></td><td></td></tr></table>	Characteristic symbol	D	G	Temperature coefficient of resistance (ppm/°C)	Rated dissipation (W)	0.125	0.25	Resistance range	1 kΩ max.	10 kΩ max	−150 to −350	1.1 kΩ to 47 kΩ	11 kΩ to 150 kΩ	−150 to −600	51 kΩ to 470 kΩ	160 kΩ to 2.2 MΩ	−150 to −1 000	510 kΩ to 1 MΩ	510 kΩ to 2.2 MΩ	150 to −1 500				As specified in 5.2. (1) Mount the resistor to be tested (specimen) to test substrate B in accordance with Annex 1 of this Standard (JIS C 5212) and then subject it to the test. (2) Carry out the measurement at two points i.e. at room temperature and a temperature about 100°C higher than room temperature. (3) Calculate the temperature coefficient of resistance as specified in 5.2.2 (2) (a).	
			Characteristic symbol	D	G		Temperature coefficient of resistance (ppm/°C)																				
			Rated dissipation (W)	0.125	0.25																						
			Resistance range	1 kΩ max.	10 kΩ max	−150 to −350																					
				1.1 kΩ to 47 kΩ	11 kΩ to 150 kΩ	−150 to −600																					
				51 kΩ to 470 kΩ	160 kΩ to 2.2 MΩ	−150 to −1 000																					
				510 kΩ to 1 MΩ	510 kΩ to 2.2 MΩ	150 to −1 500																					
3	Short-time overload	There shall be no remarkable abnormality on appearance, and the marking shall be legible. Change of resistance Within ±(1% + 0.05 Ω)	As specified in 5.5. (1) Mount the specimen to test substrate B in accordance with Annex 1 of this Standard (JIS C 5212), and then subject it to the test. (2) The test condition shall be condition A. (3) The maximum overload voltage shall be as given in Table 4 of this Standard (JIS C 5212).																								