

JIS

JAPANESE INDUSTRIAL STANDARD

Fixed metal film resistors for
use in electronic equipment
— form 14, grade C

JIS C 5724—1991

Translated and Published

by

Japanese Standards Association

Printed in Japan

In the event of any doubt arising,
the original Standard in Japanese is to be final authority.

JAPANESE INDUSTRIAL STANDARD

J I S

Fixed metal film resistors for use in
electronic equipment — form 14, grade C

C 5724-1991

1. Scope

This Japanese Industrial Standard specifies fixed metal film resistors - form 14, grade C mainly used in electronic equipment (hereafter referred to as the "resistors"), based on JIS C 5720.

- Remarks 1. This resistor is a resistor produced in such a way that the metal film closely fixed on a ceramic bar is employed as the resistor element, terminations are attached thereto, and an insulating enclosure (insulating coating) is applied to this assembly.
2. The cited Standards are given below.
- JIS C 0802-Color code for fixed resistors for electronic equipment
- JIS C 3102-Annealed copper wires for electrical purposes
- JIS C 5202-Test methods of fixed resistors for electronic equipment
- JIS C 5720-General rules of fixed metal film resistors for use in electronic equipment
- 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 5720 shall apply.

3. Type Designation

3.1 Structure of Type Designation The type designation shall be arranged as follows:

Symbol denoting kind of resistor 3.2.1	Symbol denoting style 3.2.2	Symbol denoting character- istics 3.2.3	Symbol denoting rated dissipation 3.2.4	Symbol denoting nominal resistance 3.2.5
Example: RN	14	F	3 A	103
Symbol denoting tolerances on re- sistance 3.2.6	Symbol denoting grade 3.2.7	Symbol denoting failure rate level 3.2.8	Symbol denoting classifi- cation by processing 3.2.9	
Example: D	C	X	T	

2
C 5724-1991

3.2 Symbols

3.2.1 Kind of Resistor The symbol denoting kind of resistor shall be RN based on 4.2.1 (kind of resistor) of JIS C 5720.

3.2.2 Form The symbol denoting form shall be as given in Table 1, based on 4.2.2 (form) of JIS C 5720.

Table 1. Form

Symbol	Form
14	Cylindrical, non-metallic enclosure, lead wire termination, opposite direction
14 S	Cylindrical, non-metallic enclosure, lead wire termination, opposite direction, small-sized resistor

3.2.3 Characteristics The symbol denoting characteristics shall consist of one English capital letter based on 4.2.3 (characteristics) of JIS C 5720, and shall be as given in Table 2.

Table 2. Characteristics

Characteristic symbol				F	G	H
Rated dissipation and maximum working voltage (see 4.1 and 4.6)	Form symbol	Rated dissipation		Maximum working voltage V		
		symbol	Power W			
	14	2 B	0.125	150		
		2 E	0.25	250		
		2 H	0.5	350		
		3 A	1	500		
	14 S	2 E	0.25	200		
Rated ambient temperature (see 4.1)				70°C		
Category temperature range (see 4.3)				- 55 to + 155°C		
Temperature coefficient of resistance ppm/°C (see No. 2 of Table 9)				± 25	± 50	± 100
Maximum allowable change in resistance	Short-time overload (see No. 3 of Table 9)			± (0.5 % + 0.05 Ω)		
	Voltage proof (see No. 5 of Table 9)					
	Intermittent overload ⁽¹⁾ (see No. 6 of Table 9)					
	Robustness of termination (see No. 1 of Table 10)					
	Resistance to vibration (see No. 2 of Table 10)					
	Resistance to soldering heat (see No. 3 of Table 10)					
	Cold storage (see No. 1 of Table 11)					

Table 2 (Cont'd)

Characteristic symbol		F	G	H
Maximum allowable change in resistance (cont'd)	Change of temperature (cyclic) (see No. 2 of Table 11)	$\pm (1.0 \% + 0.05 \Omega)$		
	Endurance (under damp and load) (see No. 3 of Table 11)	$\pm (1.5 \% + 0.1 \Omega)$		
	Endurance (rated load) see No. 4 of Table 11)	$\pm (2.0 \% + 0.1 \Omega)$		
Tolerance on resistance % (see 3.2.6)		± 0.5	± 1	± 2
Nominal resistance range ⁽²⁾ (see 4.4)		10 Ω to 2.2 M Ω		

Notes ⁽¹⁾ Applicable for resistors of nominal resistance of 100 Ω or more.

⁽²⁾ This range varies according to combination of rated dissipation and temperature coefficient within the range given in this Table (see Table 6).

3.2.4 Rated Dissipation The symbol denoting rated dissipation shall be as given in Table 3 based on 4.2.4 (rated dissipation) of JIS C 5720.

Table 3. Rated Dissipation

Symbol	Rated dissipation W
2B	0.125
2E	0.25
2H	0.5
3A	1

3.2.5 Nominal Resistance The symbol denoting nominal resistance shall consist of three numerals (E 24 series) or four numerals (E 96 series), based on 4.2.5 (nominal resistance) of JIS C 5720.

In the case of three numerals, the first and second numerals shall represent the significant figures in the unit of ohm (Ω) and the third numeral shall represent the number of zeros following the significant figures.

In the case of four numerals, the first, second and third numerals shall represent the significant figures in the unit of ohm (Ω) and the fourth numeral shall represent the number of zeros following to the significant figures. However, if there is a decimal point, the decimal point shall be represented by English capital letter R, and all the numerals are significant figures in this expression.

Example	For the case of three numerals				For the case of four numerals			
100.....	10 Ω	150.....	15 Ω		10R0.....	10 Ω	15R0.....	15 Ω
101.....	100 Ω	151.....	150 Ω		1000.....	100 Ω	1500.....	150 Ω
102.....	1 k Ω	152.....	1.5 k Ω		1001.....	1 k Ω	1501.....	1.5 k Ω
103.....	10 k Ω	153.....	15 k Ω		1002.....	10 k Ω	1502.....	15 k Ω
104.....	100 k Ω	154.....	150 k Ω		1003.....	100 k Ω	1503.....	150 k Ω
105.....	1 M Ω	155.....	1.5 M Ω		1004.....	1 M Ω	1504.....	1.5 M Ω

3.2.6 Tolerance on Resistance The symbol denoting tolerance on resistance shall consist of one English capital letter based on 4.2.6 (tolerance on resistance) of JIS C 5720, and shall be as given in Table 4.

Table 4. Tolerance on Resistance

Symbol	D	F	G
Tolerance on resistance %	± 0.5	± 1	± 2

3.2.7 Grade The symbol denoting grade shall consist of one English capital letter based on 4.2.7 (grade) of JIS C 5720, and the letter shall be C (simple level).

3.2.8 Failure Rate Level The symbol denoting failure rate level shall consist of one English capital letter based on 4.2.8 (failure rate level) of JIS C 5720, and the letter shall be X (no failure rate is specified).

3.2.9 Classification by Processing The symbol denoting classification by processing shall consist of one English capital letter based on 4.2.9 (other necessary particular) of JIS C 5720, and shall be as given in Table 5. However, this symbol is omitted for resistors without special processing.

Table 5. Classification by Processing

Symbol	Classification by processing
F	The shape of lead wire termination is processed.
T	Resistors are processed by taping.

4. Ratings

4.1 Rated Dissipation The rated dissipation shall be as given in Table 6. However, for a resistor with a resistance exceeding its critical resistance, this means the dissipation corresponding to its maximum working voltage.

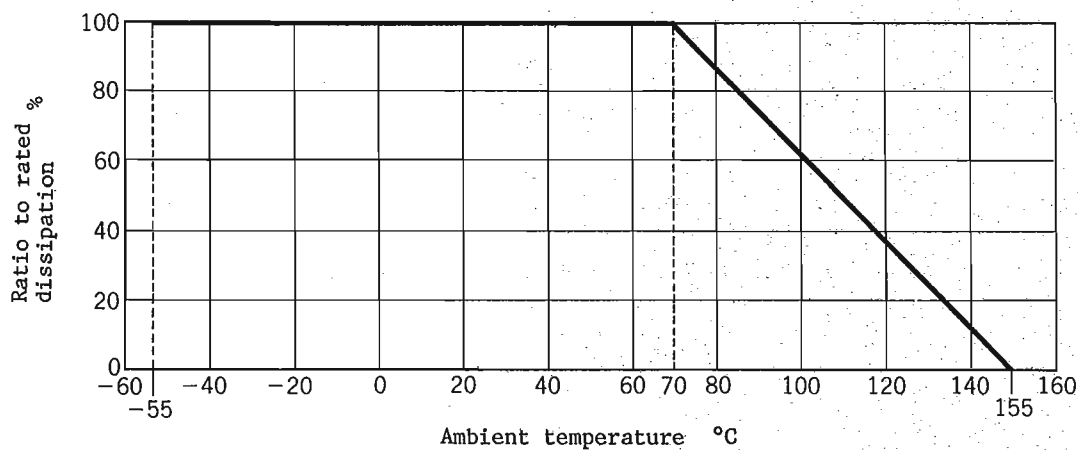
The rated ambient temperature shall be 70°C.

Table 6. Ratings

Form symbol	Rated dissipation		Characteristic symbol (temperature coefficient of resistance)	Maximum working voltage V	Maximum overload voltage V	Maximum intermittent overload voltage V	Voltage proof V	Nominal resistance range	Tolerance on resistance %
	Symbol	Power W							
14	2B	0.125	F (± 25) (ppm/°C)	150	300	300	300	51 Ω to 51 k Ω	± 0.5 (D)
	2E	0.25		250	500	500	500	51 Ω to 2.2 M Ω	± 1 (F)
	2H	0.5		350	700	700	700		± 2 (G)
	3A	1		500	1 000	1 000	700	51 Ω to 1.2 M Ω	
14S	2E	0.25		200	400	400	300	51 Ω to 1 M Ω	
14	2B	0.125	G (± 50) (ppm/°C)	150	300	300	300	51 Ω to 51 k Ω	± 1 (F)
	2E	0.25		250	500	500	500	10 Ω to 2.2 M Ω	± 2 (G)
	2H	0.5		350	700	700	700		
	3A	1		500	1 000	1 000	700	10 Ω to 1.2 M Ω	
14S	2E	0.25		200	400	400	300	10 Ω to 1 M Ω	
14	2B	0.125	H (± 100) (ppm/°C)	150	300	300	300	10 Ω to 100 k Ω	± 1 (F)
	2E	0.25		250	500	500	500	10 Ω to 2.2 M Ω	± 2 (G)
	2H	0.5		350	700	700	700		
	3A	1		500	1 000	1 000	700	10 Ω to 1.2 M Ω	
14S	2E	0.25		200	400	400	300	10 Ω to 1 M Ω	

4.2 Maximum Dissipation The maximum dissipation shall have the same value as that of rated dissipation at temperatures not exceeding the rated ambient temperature. The maximum dissipation at temperatures exceeding the rated ambient temperature shall have the values obtained by reducing the rated dissipation by means of the derating curve of Fig. 1.

Fig. 1. Derating Curve



4.3 Category Temperature Range The category temperature range shall be - 55 to + 155°C.

4.4 Nominal Resistance The nominal resistance shall be expressed in the unit of ohm (Ω), and the values shall be the numerical values given in Table 7 (E 24 series) multiplied by 10^n (n is an integer). If use of other numerical values is unavoidable, the values in Table 8 (E 96 series) may be used for resistors with tolerances on resistance of $\pm 0.5\%$ (D) or $\pm 1\%$ (F).

Further, the nominal resistance range in relation with the rated dissipation and characteristics shall be as given in Table 6.

Table 7. Preferred Numbers of Nominal Resistance
(E 24 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

Table 8. Preferred Numbers of Nominal Resistance
(E 96 Series)

1.00	1.33	1.78	2.37	3.16	4.22	5.62	7.50
1.02	1.37	1.82	2.43	3.24	4.32	5.76	7.68
1.05	1.40	1.87	2.49	3.32	4.42	5.90	7.87
1.07	1.43	1.91	2.55	3.40	4.53	6.04	8.06
1.10	1.47	1.96	2.61	3.48	4.64	6.19	8.25
1.13	1.50	2.00	2.67	3.57	4.75	6.34	8.45
1.15	1.54	2.05	2.74	3.65	4.87	6.49	8.66
1.18	1.58	2.10	2.80	3.74	4.99	6.65	8.87
1.21	1.62	2.15	2.87	3.83	5.11	6.81	9.09
1.24	1.65	2.21	2.94	3.92	5.23	6.98	9.31
1.27	1.69	2.26	3.01	4.02	5.36	7.15	9.53
1.30	1.74	2.32	3.09	4.12	5.49	7.32	9.76

4.5 Tolerance on Resistance The tolerance on resistance shall be expressed in percent (%) and shall be as given in Table 4.

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 formula below. However, if the rated voltage so obtained exceeds the maximum working voltage given in Table 6, this maximum working voltage shall be taken as the rated voltage.

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

where, E : rated voltage (V)

P : rated dissipation (W)

R : nominal resistance (Ω)

5. Performances and Test Methods

5.1 Test Methods The test methods for electrical, mechanical and climatic performances shall be as specified in JIS C 5202.

5.2 Electrical Performances The electrical performances shall be as given in Table 9.