KMY

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Specification

(Reference)

Title: FIXED THICK FILM CHIP RESISTORS;
RECTANGULAR TYPE & HIGH POWER

Style: HRMW10,16,20,32,50,63

RoHS COMPLIANCE ITEM

Product specification contained in this specification
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1. Scope

1.1 This specification covers the detail requirements for fixed thick film chip resistors; rectangular type & high power, style of HRMW10,16,20,32,50,63.

1.2 Applicable documents

JIS C 5201–1: 1998

2. Classification

Type designation shall be the following form.

(Example) 1) HRMW (1) 16 (2) — Style; 123 (3); J (4); TP (5)

2) HRMW (1) 16 (2) — Style; JP (3); TP (5)

1 Fixed thick film chip resistors; rectangular type
2 Rated dissipation and / or dimension
(1 and 2 together: Style)
3 Rated resistance Example; 123 → 12kΩ, Chip jumper: JP
4 Tolerance on rated resistance
5 Packaging form

3. Rating

3.1 The ratings shall be in accordance with Table–1.

Table–1(1)

Style	Rated dissipation (W)	Temperature coefficient of resistance (10^{-6} / °C)	Rated resistance range (Ω)	Preferred number series for resistors	Tolerance on rated resistance
HRMW10	0.125	±100	10.2~976k	E24, 96	F(±1%)
		±200	1M		
		+400~–200	1.0~10		
		±200	1.02~1M	E24	J(±5%)
		+400~–200	1.0~10		
HRMW16	0.125	±100	10.2~1M	E24, 96	F(±1%), J(±5%)
		±150	1.0~10		
HRMW20	0.25	±100	10.2~1M	E24, 96	F(±1%), J(±5%)
		±150	1.0~10		
HRMW32	0.5	±100	1.0~1M	E24, 96	F(±1%), J(±5%)
HRMW50	1.0	±100	1.0~1M	E24, 96	F(±1%), J(±5%)
HRMW63	2.0	±100	1.0~1M	E24, 96	F(±1%), J(±5%)

Style	Limiting element voltage (V)	Max. Overload voltage(V)	Category temperature range (°C)
HRMW10	50	100	–55~+155
HRMW16	50	100	
HRMW20	150	300	
HRMW32	200	400	
HRMW50	200	400	
HRMW63	300	500	

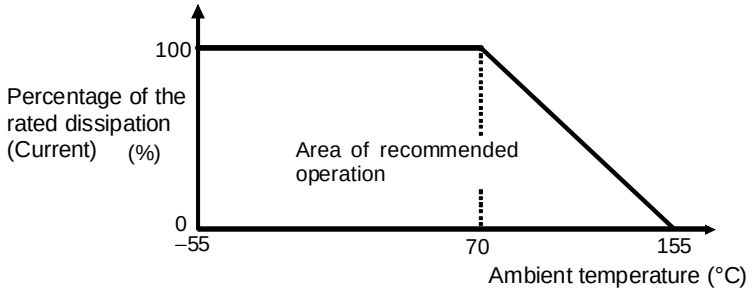
* 2W loading with total solder-pad and trace size of 300 mm^2

Table–1(2)

Style	Resistance value of chip jumper	Rated current of chip jumper (A)	Peak current of chip jumper (A)
HRMW10	50mΩ max.	-	-
HRMW16	15mΩ max.	2	-
HRMW20		4	-
HRMW32	20mΩ max.	5	12.5
HRMW50		7	17.5
HRMW63		10	25

3.2 Derating

The derated values of dissipation (or current rating in case of chip jumper) at temperature in excess of 70 °C shall be as indicated by the following curve.



Figure–1 Derating curve

3.3 Rated voltage

d. c. or a. c. r. m. s. voltage calculated from the square root of the product of the rated resistance and the rated dissipation.

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

E : Rated voltage (V)
P : Rated dissipation (W)
R : Rated resistance (Ω)

Limiting element voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.

At high value of resistance, the rated voltage may not be applicable.

4. Packaging form

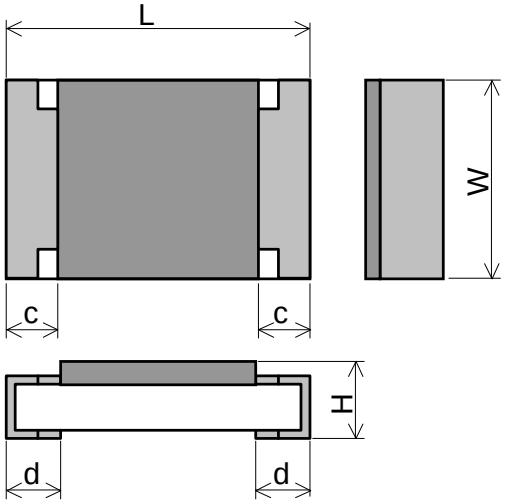
The standard packaging form shall be in accordance with Table–2.

Table–2

Symbol	Packaging form		Standard packaging quantity / units	Application
B	Bulk (loose package)		10,000 pcs.	HRMW10
			5,000 pcs.	HRMW16,20,32
			4,000 pcs.	HRMW 50, 63
TH	Paper taping	8mm width, 2mm pitches	10,000 pcs.	HRMW10
TP	Paper taping	8mm width, 4mm pitches	5,000 pcs.	HRMW16,20,32
TE	Embossed taping	12mm width, 4mm pitches	4,000 pcs.	HRMW 50, 63

5. Dimensions

5.1 The resistor shall be of the design and physical dimensions in accordance with Figure−2 and Table−3.

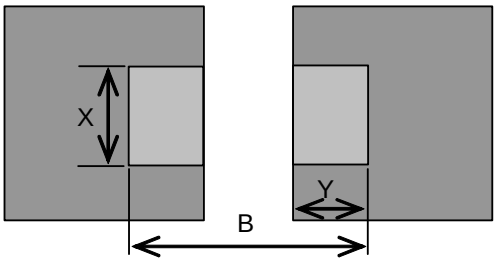


Figure−2

Table−3 Unit : mm

Style	L	W	H	c	d
HRMW10	1.0±0.05	0.5±0.05	0.35±0.05	0.2±0.1	0.25±0.10
HRMW16	1.6±0.1	0.8±0.1	0.45±0.15	0.3±0.1	0.3±0.15
HRMW20	2.0±0.1	1.25±0.1	0.5±0.15	0.4±0.2	0.4±0.2
HRMW32	3.1±0.15	1.6±0.15	0.55±0.10	0.5±0.25	0.5±0.25
HRMW50	5.0±0.2	2.5±0.2	0.6±0.1	0.6±0.25	0.6±0.25
HRMW63	6.3±0.2	3.1±0.2	0.6±0.15	0.6±0.25	1.8±0.25

* Recommended Solder Pad Dimensions



Unit : mm

Style	X	Y	B
HRMW63	3.7	2.45	7.6

6. Marking

The Rated resistance of HRMW10 should not be marked.

6.1 HRMW20,32,50,63

The nominal resistance shall be marked in 3 digits or 4 digits and marked on over coat side.

• J(±5%): 3 digits, F(±1%): 4 digits

Marking example	Contents	Application
123	12×10^{3} [Ω] → 12 [kΩ]	E24
2R2	2. 2 [Ω]	E24, Less than 10Ω
5623	562×10^{3} [Ω] → 562[kΩ]	E24, E96
12R7	12.7 [Ω]	E24, E96

6.2 HRMW16

The nominal resistance shall be marked in 3 digits (E24 and/or E96) and marked on over coat side.
In case of the resistance value that E96 overlaps with E24, there is a case to mark in E96.

Marking example	Contents	Application
123	12×10^{3} [Ω] → 12 [kΩ]	E24
2R2	2. 2 [Ω]	E24
02C	102×10^{2} [Ω] → 10.2 [kΩ]	E96
51X	332×10^{-1} [Ω] → 33.2 [Ω]	E96

6.2.1 Symbol for E96 series of resistance value

E96	Symbol	E96	Symbol	E96	Symbol	E96	Symbol	E96	Symbol
100	01	162	21	261	41	422	61	681	81
102	02	165	22	267	42	432	62	698	82
105	03	169	23	274	43	442	63	715	83
107	04	174	24	280	44	453	64	732	84
110	05	178	25	287	45	464	65	750	85
113	06	182	26	294	46	475	66	768	86
115	07	187	27	301	47	487	67	787	87
118	08	191	28	309	48	499	68	806	88
121	09	196	29	316	49	511	69	825	89
124	10	200	30	324	50	523	70	845	90
127	11	205	31	332	51	536	71	866	91
130	12	210	32	340	52	549	72	887	92
133	13	215	33	348	53	562	73	909	93
137	14	221	34	357	54	576	74	931	94
140	15	226	35	365	55	590	75	953	95
143	16	232	36	374	56	604	76	976	96
147	17	237	37	388	57	619	77		
150	18	243	38	392	58	634	78		
154	19	249	39	402	59	649	79		
158	20	255	40	412	60	665	80		

6.2.2 Symbol of multipliers

Symbol	Y	X	A	B	C	D	E	F
Multipliers	10^{-2}	10^{-1}	10^{0}	10^{1}	10^{2}	10^{3}	10^{4}	10^{5}

7. Performance

7.1 The standard condition for tests shall be in accordance with Sub–clause 4.2, JIS C 5201–1: 1998.

7.2 The performance shall be satisfied in Table–4.

Table–4(1)

No.	Test items	Condition of test (JIS C 5201–1)	Performance requirements
1	Resistance	Sub–clause 4.5	As in 4.5.2 The resistance value shall correspond with the rated resistance taking into account the specified tolerance. Chip jumper; HRMW10:50mΩ max. HRMW16,20,32:15mΩ max. HRMW50,63:20mΩ max.
2	Temperature characteristic of resistance	4.8 Natural resistance change per change in degree centigrade. $TCR(10^{-6}/\Omega)= \frac{R2-R1}{R1(t2-t1)} \times 10^{6}$ t1 : 20°C $^{+5}_{-1}$ °C, t2: 155°C $^{+5}_{-1}$ °C R1 : Resistance at t1 temperature R2 : Resistance at t2 temperature	See Table–1.
3	Short time overload	HRMW10 4.13 Permanent resistance change after a 5second application of a voltage 2.5 times RCWV or the maximum overload voltage specified in the above list, whichever is less.	Resistor: ΔR/R: Within ±(2%+0.1Ω) Chip jumper: 50mΩ max. No visible damage
		HRMW16,20,32,50,63 4.13 5.0× Rated power or Max. Overload Voltage for 5 sec. Measure resistance after 30 minutes.	Resistor: ±5%: ΔR/R: Within ±(2%+0.1Ω) ±1%: ΔR/R: Within ±(1%+0.1Ω) Chip jumper: HRMW16,20,32:15mΩ max. HRMW50,63:20mΩ max. No visible damage
4	Resistance to soldering heat	HRMW10 4.18 Un-mounted chips completely immersed for 10±1second in a SAC solder bath at 255°C±5°C	Resistor: ΔR/R: Within ±(1%+0.05Ω) Chip jumper: 50mΩ max. No visible damage
		HRMW16,20,32,50,63 4.18 Un-mounted chips completely immersed for 10±1second in a SAC solder bath at 260°C±5°C	Resistor: ±5%: ΔR/R: Within ±(1%+0.05Ω) ±1%: ΔR/R: Within ±(0.5%+0.05Ω) Chip jumper: HRMW16,20,32:15mΩ max. HRMW50,63:20mΩ max. No visible damage

Table−4(2)

No	Test items	Condition of test (JIS C 5201−1)	Performance requirements
5	Solderability	HRMW10 4.17 Un-mounted chips completely immersed for 3±0.3 second in a SAC solder bath at 245°C±5°C. HRMW16,20,32,50,63 4.17 Un-mounted chips completely immersed for 2±0.5 second in a SAC solder bath at 235°C±5°C.	95% coverage min., good tinning and no visible damage.
6	Temperature cycling	4.19 30 minutes at -55°C±3°C, 2~3 minutes at 20°C+5°C/-1°C, 30 minutes at +155°C±3°C, 2~3 minutes at 20°C+5°C/-1°C, total 5 continuous cycles	-HRMW10 Resistor: ΔR/R: Within ±(1%+0.05Ω) Chip jumper: 50mΩ max. -HRMW16,20,32,50,63 Resistor: ±5%: ΔR/R: Within ±(1%+0.05Ω) ±1%: ΔR/R: Within ±(0.5%+0.05Ω) Chip jumper: HRMW16,20,32:15mΩ max. HRMW50,63:20mΩ max. No visible damage
7	Load life in humidity	4.24 1000 +48/-0 hours, loaded with RCWV or Vmax in humidity chamber controller at 40°C±2°C and 90~95% relative humidity, 1.5hours on and 0.5 hours off.	-HRMW10 Resistor: 10 to 1MΩ: ΔR/R: Within ±(3%+0.1Ω) R<10Ω: ΔR/R: Within ±(5%+0.1Ω) Chip jumper: 50mΩ max. -HRMW16,20,32,50,63 Resistor: ±5%: ΔR/R: Within ±(3%+0.1Ω) ±1%: ΔR/R: Within ±(1%+0.1Ω) Chip jumper: HRMW16,20,32:15mΩ max. HRMW50,63:20mΩ max. No visible damage
8	Load life	4.25 1000 +48/-0 hours, loaded with RCWV or Vmax in chamber controller 70±2ºC, 1.5 hours on and 0.5 hours off.	-HRMW10 Resistor: 10 to 1MΩ: ΔR/R: Within ±(3%+0.1Ω) R<10Ω: ΔR/R: Within ±(5%+0.1Ω) Chip jumper: 50mΩ max. -HRMW16,20,32,50,63 Resistor: ±5%: ΔR/R: Within ±(3%+0.1Ω) ±1%: ΔR/R: Within ±(1%+0.1Ω) Chip jumper: HRMW16,20,32:15mΩ max. HRMW50,63:20mΩ max. No visible damage

Table–4(3)

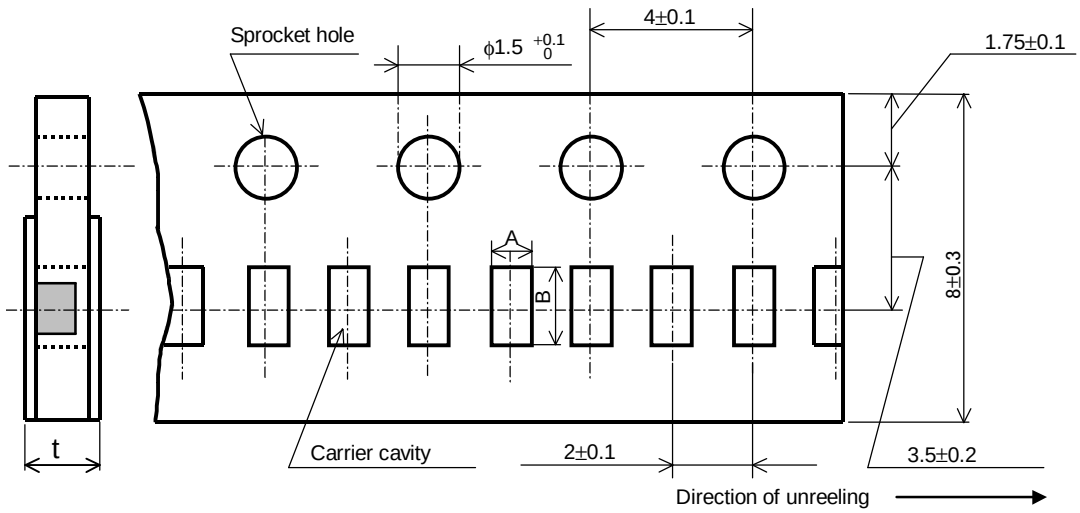
No	Test items	Condition of test (JIS C 5201–1)	Performance requirements
9	Bending strength	4.33 Resistors mounted on a 90mm glass epoxy resin PCB(FR4); bending: HRMW10,16,20,32: 3mm, HRMW50,63: 2mm, once for 10s	HRMW10 Resistor: ΔR/R: Within ±(1%+0.05Ω) Chip jumper: 50mΩ max. HRMW16,20,32,50,63 Resistor: ±5%: ΔR/R: Within ±(1%+0.05Ω) ±1%: ΔR/R: Within ±(0.5%+0.05Ω) Chip jumper: HRMW16,20,32:15mΩ max. HRMW50,63:20mΩ max. No visible damage
10	Adhesion	4.32 Pressurizing force: 5N, Test time: 10±1sec.	No remarkable damage or removal of the terminations
11	Insulation resistance	4.6 Apply the Max. overload voltage (DC) for 1minute.	R≥10GΩ
12	Dielectric withstanding voltage	4.7 Apply the Max. overload voltage (AC) for 1 minute	No flashover, fire and breakdown.

8. Taping

8.1 Paper taping (8mm width, 2mm pitches)

Taping dimensions shall be in accordance with Figure–3 and Table–5.

Unit: mm



Figure–3

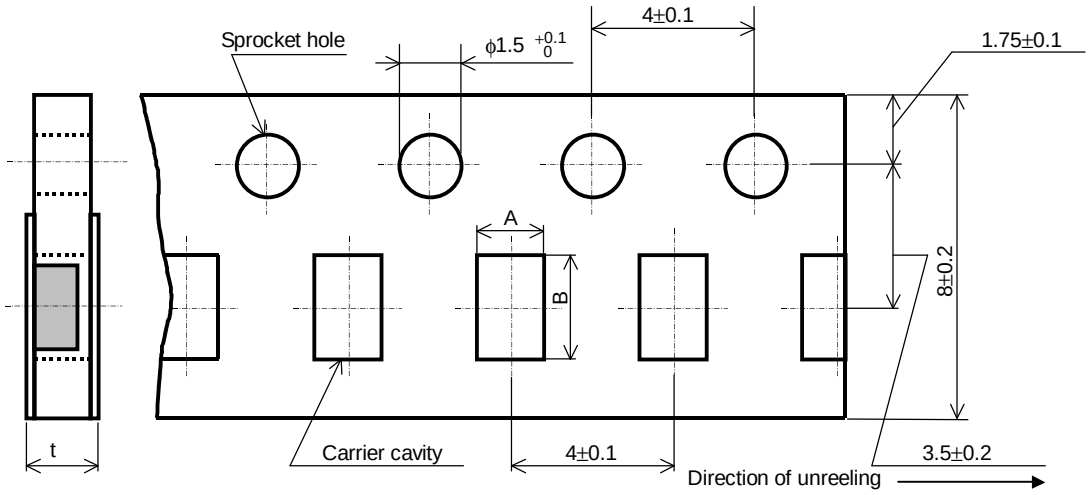
Table–5 Unit: mm

Style	A	B	t
HRMW10	0.7±0.1	1.2±0.1	0.4±0.05

8.2 Paper taping (8mm width, 4mm pitches)

Taping dimensions shall be in accordance with Figure–4 and Table–6.

Unit: mm



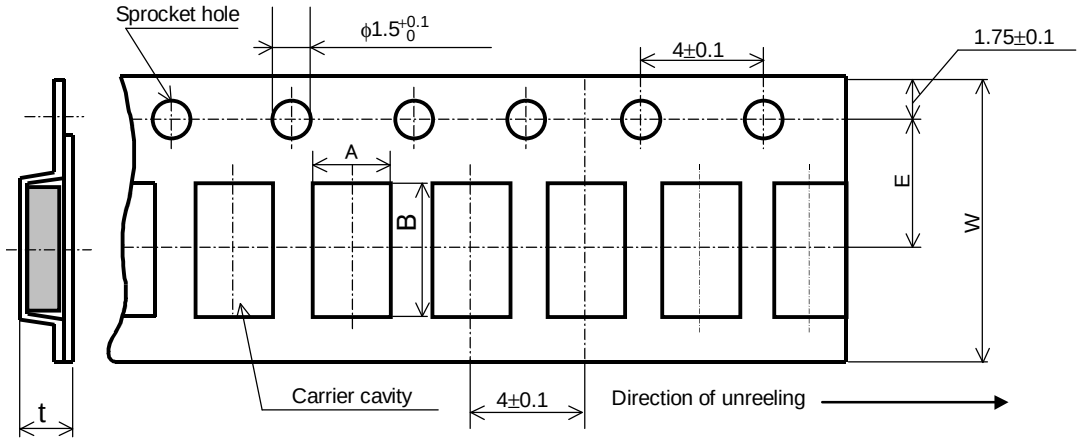
Figure–4

Table–6 Unit: mm

Style	A	B	t
HRMW16	1.1±0.2	1.9±0.2	0.65±0.05
HRMW20	1.65±0.20	2.4±0.2	1.0 Max.
HRMW32	2.0±0.2	3.6±0.2	1.0 max.

8.3 Embossed taping dimensions shall be in accordance with Figure–5 and Table–7.

Unit: mm



Figure–5

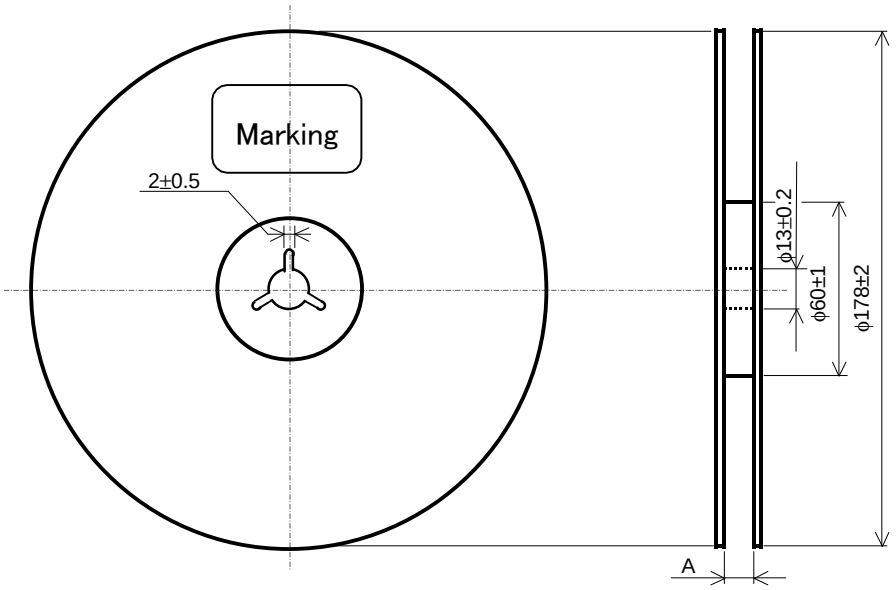
Table–7 Unit: mm

Style	A	B	W	E	t
HRMW50	2.8±0.2	5.5±0.2	12.0±0.3	5.5±0.1	Max. 1.2
HRMW63	3.6±0.2	6.9±0.2			

8.4 Reel dimension

Reel dimensions shall be in accordance with the following Figure–6 and Table–8.

Unit: mm



Figure–6

Table–8 Unit: mm

Style	A
HRMW10, 16, 20, 32, 35	9±0.5
HRMW50, 63	12.4±1.0

9. Marking on package

The label of a minimum package shall be legibly marked with follows.

(1) Classification (Style, Rated resistance, Tolerance on rated resistance, Packaging form)

(2) Quantity (3) Lot number (4) Manufacturer's name or trade mark (5) Others