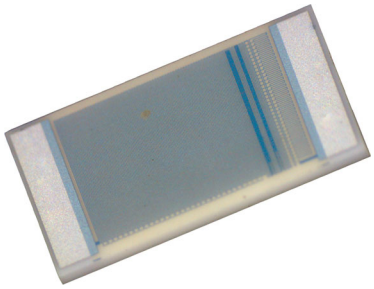
High Temperature (230 °C) Wirebondable Thin Film Chip Resistors and Resistor Networks



FEATURES

- Operating temperature range: -55 °C; +215 °C
- Storage temperature: -55 °C; +230 °C
- Wirebondable (aluminum pads)
- Aluminum pads
- Large selection of sizes available
- Custom networks available on request (CNHT)
- Temperature coefficient down to ± 15 ppm/°C (-55 °C; +215 °C)
- Tolerance down to ± 0.05 %
- Temperature coefficient remains at ± 15 ppm/°C after long term storage at 230 °C
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

RoHS COMPLIANT

HALOGEN FREE GREEN (5-2008)

LINKS TO ADDITIONAL RESOURCES

3D Models

INTRODUCTION

For applications such as down hole applications, the need for parts able to withstand very severe conditions (temperature as high as 215 °C powered or up to 230 °C un-powered) has leaded Vishay Sfernice to push out the limit of the thin film technology.

Designers might read the application note “Power Dissipation Considerations in High Precision Vishay Sfernice Thin Film Chip Resistors and Arrays (P, PRA, etc…) (High Temperature Application)” www.vishay.com/doc?53047 in conjunction with this datasheet to help them to properly design their PCBs and get the best performances of the RMKHT.

Vishay Sfernice research and development engineers will be willing to support any customer design considerations.

TYPICAL PERFORMANCE

	ABS	TRACKING (1)
TCR	± 25 ppm/°C	2 ppm/°C
	ABS	RATIO (1)
TOL.	± 0.05 %	0.02 %

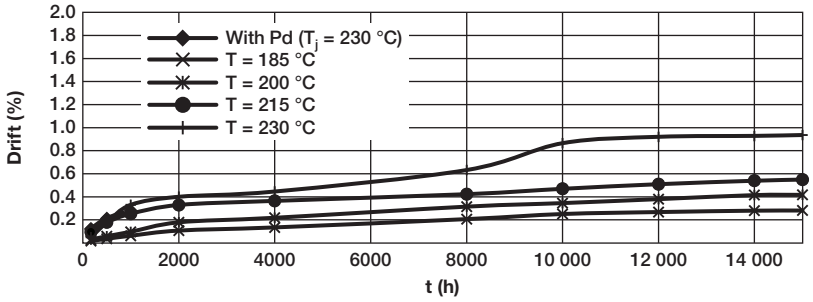
Note

(1) When applicable (networks only)

MECHANICAL SPECIFICATIONS	
Resistive element	Nichrome (NiCr)
Substrate material	Silicon (size 22, 33, 55, 515) - alumina (other sizes)
Bonding pads	Aluminum (Al)
Passivation	Silicon nitride (Si_3N_4)
Back metallization (1)	Gold (thickness = 0.5 µm typical) on nickel barrier (1 µm typical)

Note

(1) When applicable (only on alumina substrate)

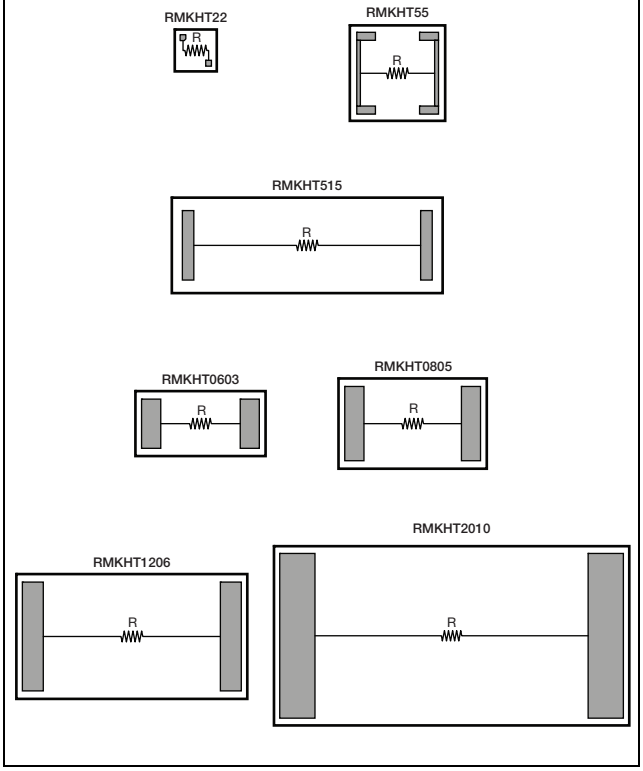


Note

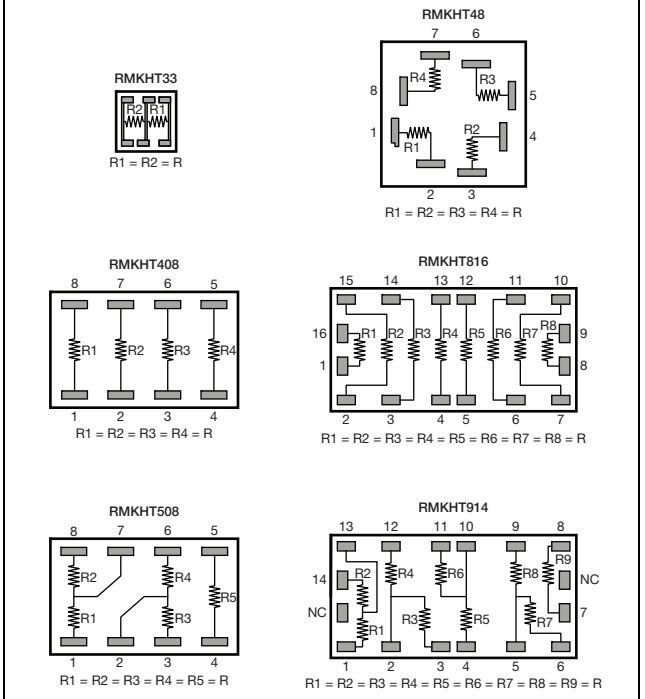
- TCR (-55 °C; +215 °C) remains unchanged after 15 000 h storage

SCHEMATIC

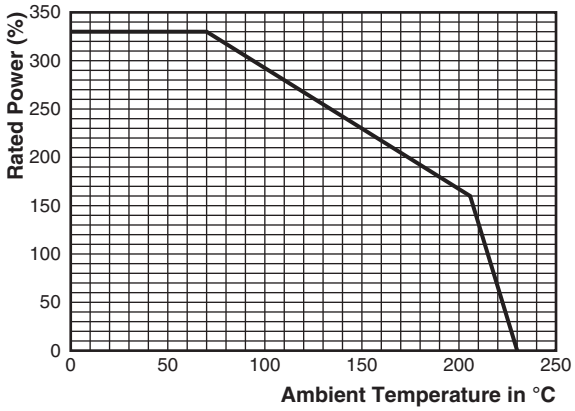
WIREBONDABLE CHIP RESISTORS



WIREBONDABLE RESISTORS NETWORKS



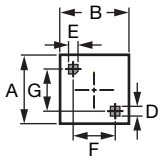
POWER DERATING CURVE



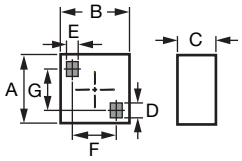
PATTERN

WIREBONDABLE CHIP RESISTORS

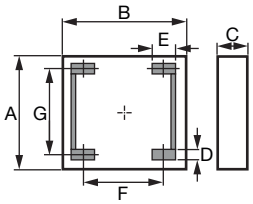
RMKHT22 Type A



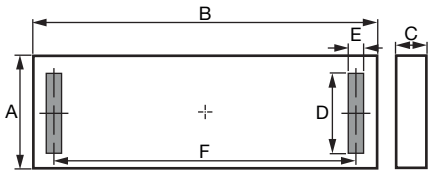
RMKHT22 Type B



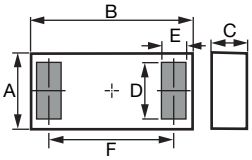
RMKHT55



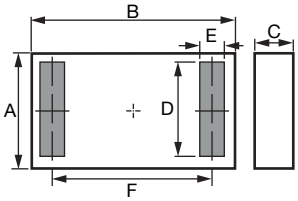
RMKHT515



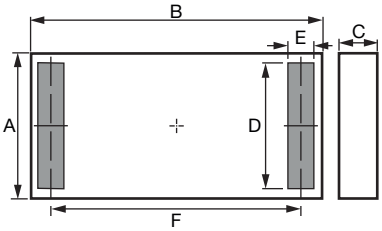
RMKHT0603



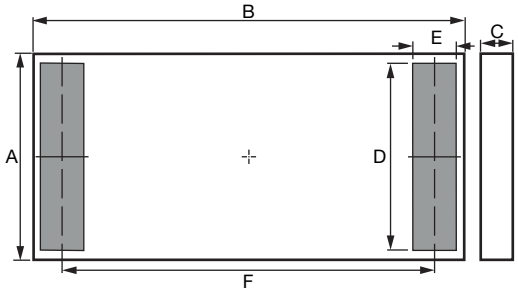
RMKHT0805



RMKHT1206

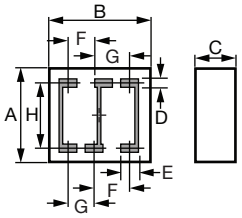


RMKHT2010

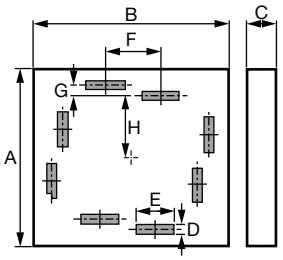


WIREBONDABLE RESISTORS NETWORKS

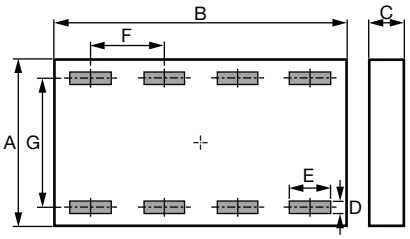
RMKHT33



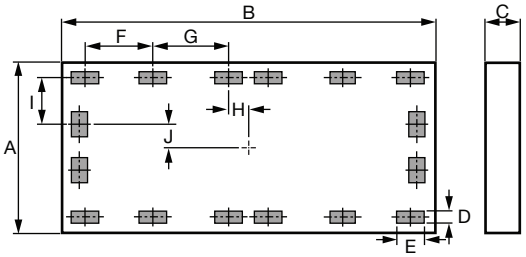
RMKHT48



RMKHT408
RMKHT508



RMKHT816
RMKHT914



DIMENSIONS in millimeters

SERIES	A ± 0.05	B ± 0.05	C max.	D	E	F	G
RMKHT22 Type A	0.58	0.58	0.4	0.08	0.08	0.354	0.354
RMKHT22 Type B	0.58	0.58	0.4	0.125	0.1	0.374	0.349
RMKHT55	1.32	1.32	0.4	0.11	0.26	0.87	1.02
RMKHT515	1.32	3.75	0.4	0.96	0.16	3.3	
RMKHT0603	0.9	1.8	0.45	0.68	0.265	1.365	
RMKHT0805	1.25	2.05	0.45	1.03	0.265	1.615	
RMKHT1206	1.725	3.2	0.45	1.505	0.29	2.74	
RMKHT2010	2.64	5.23	0.45	2.42	0.518	4.54	

DIMENSIONS in millimeters

SERIES	A ± 0.05	B ± 0.05	C max.	D	E	F	G	H	I	J
RMKHT33	0.83	0.83	0.4	0.08	0.16	0.3	0.22	0.6		
RMKHT48	2	2	0.4	0.1	0.39	0.57	0.12	0.69		
RMKHT408	1.6	2.6	0.4	0.11	0.36	0.65	1.25			
RMKHT508										
RMKHT816	1.7	3.4	0.4.	0.13	0.25	0.62	0.69	0.175	0.47	0.225
RMKHT914										

STANDARD ELECTRICAL SPECIFICATIONS - Bare Resistors Chips

MODEL	SIZE	RESISTANCE RANGE (1) Ω	TCR (2) -55 °C; +215 °C ± ppm/°C	TOLERANCE ± %	POWER RATING (3) $P_{70\,°C}$ W	POWER RATING (3) $P_{215\,°C}$ W
RMKHT22	0202	10 to 500K	15, 30	0.05, 0.1, 0.5, 1	0.05	0.005
RMKHT55	0505	150 to 2M	15, 30	0.05, 0.1, 0.5, 1	0.25	0.025
RMKHT515	0515	100 to 5M	15, 30	0.05, 0.1, 0.5, 1	0.5	0.05
RMKHT0603	0603	10 to 320K	15, 30	0.05, 0.1, 0.5, 1	0.125	0.0375
RMKHT0805	0805	10 to 720K	15, 30	0.05, 0.1, 0.5, 1	0.2	0.06
RMKHT1206	1206	10 to 2.7M	15, 30	0.05, 0.1, 0.5, 1	0.33	0.1
RMKHT2010	2010	10 to 7.5M	15, 30	0.05, 0.1, 0.5, 1	1	0.2 (5)

PERFORMANCES - Bare Resistors Chips

TEST	SPECIFICATIONS	CONDITIONS
Limiting voltage	From 75 V to 300 V (depending on size) (4)	
Operating temperature range	-55 °C; +215 °C	
Max. temperature resistive element	220 °C	
Max. substrate temperature	230 °C	
Load life stability	± 0.35 %	2000 h / 220 °C (ambient) at Pn
Storage temperature range	-55 °C; +230 °C	
Shelf life stability	± 0.6 % typ. (± 0.8 % max.)	15 000 h / 230 °C

STANDARD ELECTRICAL SPECIFICATIONS - Bare Resistors Networks

MODEL	SIZE	RESISTANCE RANGE (1) Ω	ABSOLUTE TOLERANCE ± %	RATIO TOLERANCE ± %	ABSOLUTE TCR (2) -55 °C; +215 °C ± ppm/°C	RATIO TCR -55 °C; +215 °C ± ppm/°C	POWER RATING (3) $P_{70\,°C}$ W PER RESISTOR	POWER RATING (3) $P_{215\,°C}$ W PER RESISTOR
RMKHT33	0303	100 to 500K	0.05, 0.1, 0.5, 1	0.02, 0.05, 0.5, 0.1, no	15, 30	2, 5	0.10	0.010
RMKHT48	0808	100 to 800K	0.05, 0.1, 0.5, 1	0.02, 0.05, 0.5, 0.1	15, 30	2, 5	0.10	0.010
RMKHT408	0610	100 to 400K	0.05, 0.1, 0.5, 1	0.02, 0.05, 0.5, 0.1	15, 30	2, 5	0.10	0.010
RMKHT508	0610	500 to 400K	0.05, 0.1, 0.5, 1	0.02, 0.05, 0.5, 0.1	15, 30	2, 5	0.10	0.010
RMKHT816	0714	100 to 400K	0.05, 0.1, 0.5, 1	0.02, 0.05, 0.5, 0.1	15, 30	2, 5	0.10	0.010
RMKHT914	0714	500 to 200K	0.05, 0.1, 0.5, 1	0.02, 0.05, 0.5, 0.1	15, 30	2, 5	0.10	0.010

PERFORMANCES - Bare Resistors Networks

TEST	SPECIFICATIONS	CONDITIONS
Limiting voltage	100 V on each resistor (except RMKHT33 50 V on each resistor)	
Operating temperature range	-55 °C; +215 °C	
Max. temperature resistive element	220 °C	
Max. substrate temperature	230 °C	
Load life stability	± 0.35 %	2000 h / 220 °C (ambient) at Pn
Load life stability on ratio	± 0.35 %	2000 h / 220 °C (ambient) at Pn
Storage temperature range	-55 °C; +230 °C	
Shelf life stability	± 0.6 % typ. (± 0.8 % max.)	15 000 h/230 °C

Notes

(1) For ohmic range vs. tolerance and TCR see detailed table on next page

(2) **Temperature Coefficient of Resistance**

Bare Resistors Chips

Y	± 10 ppm/°C ± 15 ppm/°C	-55 °C; +155 °C -55 °C; +215 °C
E	± 25 ppm/°C ± 30 ppm/°C	-55 °C; +155 °C -55 °C; +215 °C

Bare Resistors Networks

Y	± 10 ppm/°C abs.	1 ppm/°C tracking	-55 °C; +155 °C
	± 15 ppm/°C abs.	2 ppm/°C tracking	-55 °C; +215 °C
E	± 25 ppm/°C abs.	2 ppm/°C tracking	-55 °C; +155 °C
	± 30 ppm/°C abs.	5 ppm/°C tracking	-55 °C; +215 °C

(3) Pn is intended with no back side metallized. For power handling improvement, please refer to application note 53047 “Power Dissipation Considerations in High Precision Vishay Sfernice Thin Film Chip Resistors and Arrays (High Temperature Applications)” www.vishay.com/doc?53047 and consult Vishay Sfernice

(4) See Limiting Voltage table on next page

(5) It is possible to dissipate up to 0.3 W, but there will be an additional drift of 0.1 % after load life

BEST TOLERANCE AND TCR VS. OHMIC VALUE - Bare Resistors Chips

SERIES	OHMIC RANGE (1)			
	CT: Y		CT: E	
	MIN.	MAX.	MIN.	MAX.
22	50 Ω	300 kΩ	10 Ω	500 kΩ
55	1 kΩ	1.5 MΩ	150 Ω	2 MΩ
515	1 kΩ	2 MΩ	100 Ω	5 MΩ
0603	39 Ω	210 kΩ	10 Ω	320 kΩ
0805	39 Ω	480 kΩ	10 Ω	720 kΩ
1206	39 Ω	1.8 MΩ	10 Ω	2.7 MΩ
2010	39 Ω	5 MΩ	10 Ω	7.5 MΩ

Note

(1) Best possible tolerance:
0.5 %: 10 Ω to < 20 Ω
0.1 %: 20 Ω to < 39 Ω
0.05 %: 39 Ω to max. ohmic value

BEST TOLERANCE AND TCR VS. OHMIC VALUE - Bare Resistors Networks

SERIES	OHMIC RANGE			
	CT: Y		CT: E	
	MIN.	MAX.	MIN.	MAX.
33	1 kΩ	250 kΩ	100 Ω	500 kΩ
48	1 kΩ	200 kΩ	100 Ω	800 kΩ
408	1 kΩ	200 kΩ	100 Ω	400 kΩ
508	1 kΩ	200 kΩ	500 Ω	400 kΩ
816	1 kΩ	200 kΩ	100 Ω	400 kΩ
914	1 kΩ	100 kΩ	500 Ω	200 kΩ

SIZE	LIMITING VOLTAGE in V
22	100 V
55	100 V
515	100 V
0603	75 V
0805	150 V
1206	200 V
2010	300 V

POPULAR OPTION

Back side metalized

Option to order: 06 (not available for sizes 22, 33, 55, 515)

Please refer to Application Note 53047 “Power Considerations in High Precision Vishay Sfernice Thin Film Chip Resistors and Arrays (High Temperature Applications) www.vishay.com/doc?53047 to evaluate performances improvement depending on process (brazing or gluing). Choice of PCB will be determinant.

GLOBAL PART NUMBERING INFORMATION - Bare Resistors Chips

Bare Chip Resistors

R	M	K	H	T	0	6	0	3	Y	1	0	0	1	B	A	0	6

GLOBAL MODEL	SIZE	TCR	VALUE	TOLERANCE	PADS	OPTION
RMKHT	**22** **55** **515** **0603** **0805** **1206** **2010**	**Y** **E**	The first 3 digits are significant figures and the last digit specifies the number of zeros to follow. R designates decimal point **10R0** = 10 Ω **3901** = 3900 Ω **1004** = 1 MΩ **AA** (2)	**W** = 0.05 % **B** = 0.1 % **D** = 0.5 % **F** = 1 %	**A**: aluminum	**Blank** = no option **06** = back side metallized

GLOBAL PART NUMBERING INFORMATION - Bare Resistors Networks

Bare Resistors Networks

R	M	K	H	T	8	1	6	E	1	0	0	1	B	W	A	0	6

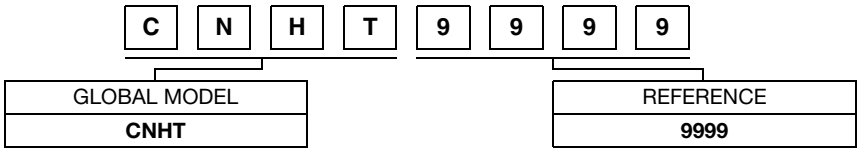
GLOBAL MODEL	SIZE	TCR	VALUE	ABS. TOLERANCE	TOLERANCE RATIO	PADS	OPTION
RMKHT	**33** **48** **408** **508** **816** **914**	**Y** **E**	The first 3 digits are significant figures and the last digit specifies the number of zeros to follow. R designates decimal point **10R0** = 10 Ω **3901** = 3900 Ω **1004** = 1 MΩ **AA** (1)	**W** = 0.05 % **B** = 0.1 % **D** = 0.5 % **F** = 1 %	**P** = 0.02 % **W** = 0.05 % **D** = 0.5 % **B** = 0.1 % **N** = no (2)	**A**: aluminum	**Blank** = no option **06** = back side metallized

Notes

(1) For more than three significant digits an alphabetical code will be used (AA to ZZ) and a cross table will be provided
(2) Available only for RMKHT 33

GLOBAL PART NUMBERING INFORMATION - Bare Custom Networks

Custom Networks



Note

- A specific reference number is assigned by Vishay Sfernice

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