HIGH VOLTAGE THICK FILM CHIP RESISTOR
- RHV SERIES -

SCOPE

- This specification applies to all sizes of rectangular-type fixed chip resistors with Ruthenium-base as material.

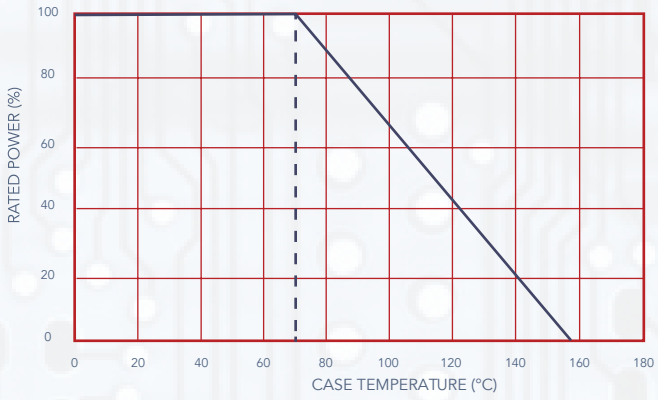
FEATURES

- AEC-Q200 Compliance
- Highly reliable multilayer electrode construction
- Higher component and equipment reliability
- Excellent performance at high voltage
- Reduced size of final equipment

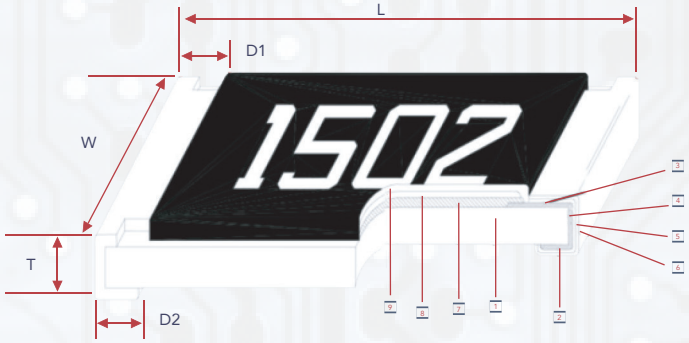
APPLICATIONS

- Inverter
- Outdoor Equipments
- Converter
- Automotive Industry
- High Pulse Equipment

DERATING CURVE



CONSTRUCTION & DIMENSIONS



1 Alumina Substrate	4 Edge Electrode (NiCr)	7 Resistor Layer (Ag/Pd)
2 Bottom Electrode (Ag)	5 Barrier Layer (Ni)	8 Primary Overcoat (Glass)
3 Top Elctrode (Ag-pd)	6 External Electrode (Sn)	9 Secondary Overcoat (Epoxy)

TYPE	SIZE (INCH)	L (MM)	W (MM)	T (MM)	D1 (MM)	D2 (MM)	WEIGHT (G) (1000PCS)
RHV04	0402	1.00±0.05	0.50±0.05	0.35±0.05	0.20±0.10	0.20±0.10	0.620
RHV06	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	2.042
RHV10	0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.40±0.20	4.368
RHV12	1206	3.10±0.10	1.55±0.10	0.55±0.10	0.50±0.25	0.50±0.20	8.947
RHV20	2010	5.00±0.10	2.50±0.15		0.60±0.25		24.241
RHV25	2512	6.35±0.10	3.10±0.15				39.448

PART NUMBERING

RHV	04	F	1003	CT	10
TYPE	DIMENSIONS	RESISTANCE TOLERANCE	RESISTANCE	PACKAGING TYPE	REEL SIZE
RHV SERIES	04: 0402 06: 0603 10: 0805 12: 1206 20: 2010 25: 2512	5% = 3 Digit 1st 2 Significant, 3rd is multiplier by (10X) 1% = 4 Digit 1st 3 Signifiacnt 4th is multiplier by (10X)	1003: 100KΩ 1004: 1MΩ 1005: 10MΩ	CT: Tape and Reel	4: 4K 8: 8K 10: 10K 20: 20K 40: 40K

STANDARD ELECTRICAL SPECIFICATIONS

TYPE	ITEM	POWER RATING AT 70°C	OPERATING TEMP RANGE	MAX OPERATING VOLTAGE	MAX OVERLOAD VOLTAGE	RESISTANCE RANGE (mΩ)		T.C.R. (PPM / °C)
						±1%	±5%	
RHV04	0402	1/16W	-55~+155°C	100V	200V	39KΩ - 1MΩ		±100
						1.02Ω - 10MΩ	1.1MΩ - 20MΩ	±200
						-	22MΩ - 100MΩ	±400
RHV06	0603	1/10W		200V	400V	56KΩ - 1MΩ		±100
						1.02Ω - 10MΩ	1.1MΩ - 20MΩ	±200
						-	22MΩ - 100MΩ	±400
RHV10	0805	1/8W		400V	800V	100KΩ - 1MΩ		±100
						1.02Ω - 10MΩ	1.1MΩ - 20MΩ	±200
						-	22MΩ - 100MΩ	±400
RHV12	1206	1/4W		500V	1000V	100KΩ - 1MΩ		±100
						1.02Ω - 10MΩ	1.1MΩ - 20MΩ	±200
						-	22MΩ - 100MΩ	±400
RHV20	2010	1/2W		2000V	3000V	51KΩ - 1MΩ		±100
						1.02Ω - 10MΩ	1.1MΩ - 20MΩ	±200
						-	22MΩ - 100MΩ	±400
RHV25	2512	1W		3000V	4000V	30KΩ - 1MΩ		±100
						1.02Ω - 10MΩ	1.1MΩ - 20MΩ	±200
						-	22MΩ - 100MΩ	±400

Operating Voltage - $\sqrt{(P*R)}$; Overload Voltage - 2.5*$\sqrt{(P*R)}$; Operating Current - $\sqrt{(P*R)}$ whichever is lower.
Cal-Chip is capable of manufacturing the optional spec based on customer's requirement.

ENVIRONMENTAL CHARACTERISTICS

ITEMS	REQUIREMENT		TEST METHOD
	±1%	±5%	
Temperature Coefficient of Resistance (T.C.R.)	As Spec.		JIS-C-5201-1 4.8 I IEC-60115-1 4.8 -55°C ~ +125°C, 25°C is the reference temperature
Short Time Overload	±(1.0% + 0.05Ω)	±(2.0% + 0.05Ω)	JIS-C-5201-1 4.13 I IEC-60115-1 4.13 RCWV*2.5 or Max. Overload Voltage whichever is lower for 5 seconds
Insulation Resistance	≥10G		JIS-C-5201-1 4.6 I IEC-60115-1 4.6 Max Overload voltage for 1 minute
Endurance	±(2.0% + 0.10Ω)	±(3.0% + 0.10Ω)	JIS-C-5201-1 4.25 I IEC-60115-1 4.25.1 70±2°C, RCVW for 1000hrs with 1.5hrs "ON" and 0.5 hrs "OFF"
Damp Heat with Load	±(2.0% + 0.10Ω)	±(3.0% + 0.10Ω)	JIS-C-5201-1 4.24 I IEC-60115-1 4.24 40±2°C, 90~95% R.H., RCVW for 1000hrs with 1.5hrs "ON" and 0.5 hrs "OFF"
Dry Heat	±(1.0% + 0.05Ω)	±(1.5% + 0.10Ω)	JIS-C-5201-1 4.23 I IEC-60115-1 4.23.2 at + 155°C for 1000hrs
Bending Strength	±(1.0% + 0.05Ω)	±(1.0% + 0.05Ω)	JIS-C-5201-1 4.33 I IEC-60115-1 4.33 Bending once for 5 seconds 2010, 2512 sizes: 2mm Other sizes: 3mm
Solderability	95% coverage Min.		JIS-C-5201-1 4.17 I IEC-60115-1 4.17 245±5°C for 3 seconds
Resistance to Soldering Heat	±(0.5% + 0.05Ω)	±(1.0% + 0.05Ω)	JIS-C-5201-1 4.18 I IEC-60115-1 4.18 260±5°C for 10 seconds
Voltage Proof	No breakdown or flashover		JIS-C-5201-1 4.7 I IEC-60115-1 4.7 HVR02: 150V for 1 minute I HVR03: 300V for 1 minute HVR05/HVR06/HVR0A/HVR12: 500V FOR 1 minute
Leaching	Individual leaching area ≤5% Total leaching area ≤10%		JIS-C-5201-1 4.18 I IEC-60115-1 8.2.1 260±5°C for 30 seconds
Rapid Change of Temperature	±(0.5% + 0.05Ω)	±(1.0% + 0.05Ω)	JIS-C-5201-1 4.19 I IEC-60115-1 4.19 -55°C to +155°C, 5 cycles

RCVW (Rated continuous working voltage) - $\sqrt{(P*R)}$ or Max. Operating coltage whichever is lower
STORAGE TEMPERATURE: 25±3°C; HUMIDITY <80% RH

MS LEVEL 1

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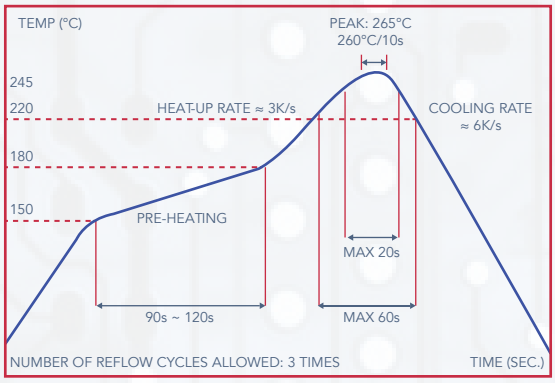
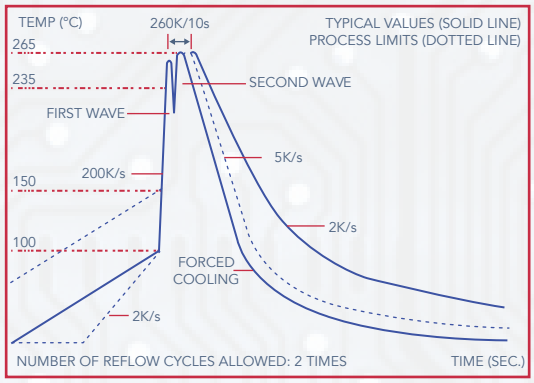
SOLDERING CONDITION



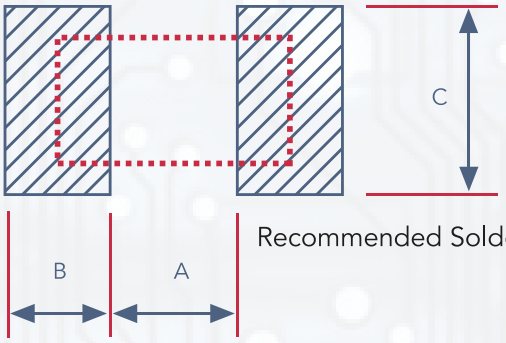
IR REFLOW SOLDERING



WAVE SOLDERING (FLOW SOLDERING)

- Time of IR reflow soldering at maximum temperature point 260°C : 10s
- Time of wave soldering at maximum temperature point 260°C : 10s
- Time of soldering iron at maximum temperature point 410°C : 5s

RECOMMEND LAND PATTERN



Recommended Solder Pad

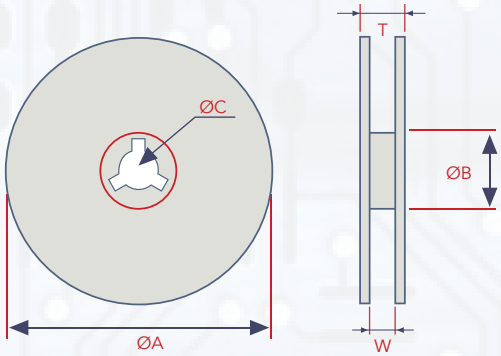
TYPE	A (MM)	B (MM)	C (MM)
RHV04	0.50	0.45	0.60
RHV06	0.90	0.60	0.90
RHV10	1.20	0.70	1.30
RHV12	2.00	0.90	1.60
RHV20	3.80		2.80
RHV25		1.60	3.50

PACKAGING

- Packaging Quantity & Reel Specifications

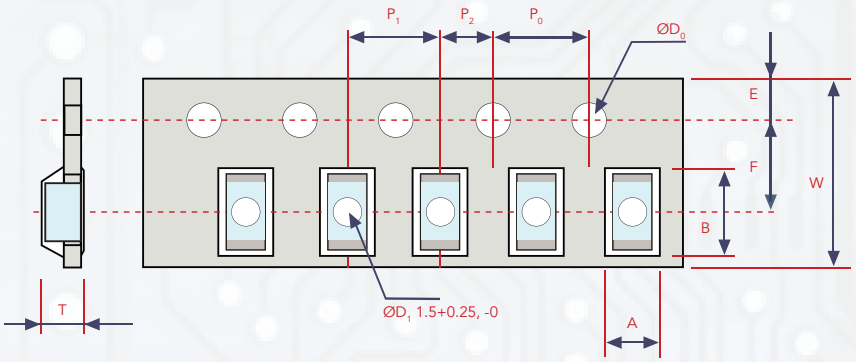
UNIT: MM

TYPE	PACKAGING QUANTITY		TAPE WIDTH	REEL DIAMETER	ØA (mm)	ØB (mm)	ØC (mm)	W (mm)	T (mm)
RHV04	Paper	10K	8mm	7 inch	178.5 ± 1.5	60 +1/-0	13.0 ± 0.20	9.5 ± 0.5	12.5 ± 0.05
		20K		10 inch	254 ± 1.0	100 ± 0.5			13.5 ± 0.05
		40K		13 inch	330 ± 1.0	100 ± 0.5			13.5 ± 0.05
RHV06 RHV10 RHV12	Paper	5K		7 inch	178.5 ± 1.5	60 +1/-0			12.5 ± 0.05
		10K		10 inch	254 ± 1.0	100 ± 0.5			13.5 ± 0.05
		20K		13 inch	330 ± 1.0	100 ± 0.5			13.5 ± 0.05
RHV20	Embossed	4K	12mm	7 inch	178.5 ± 1.5	60 +1/-0	13.0 ± 0.5	13.0 ± 0.5	15.5 ± 0.5
RHV25		8K		10 inch	250 ± 1.0	62 ± 0.5		12.5 ± 0.5	16.5 ± 0.5



PACKAGING

- Embossed Plastic Tape Specifications



TYPE	A	B	W	E	F	P_0	P_1	P_2	$ØD_0$	T
RHV20	2.8 ± 0.10	5.5 ± 0.10	12.0 ± 0.30	1.75 ± 0.10	5.5 ± 0.05	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	1.50 + 0.1, -0	1.2^{+0}
RHV25	3.5 ± 0.10	6.7 ± 0.10								

MARKING

- No Marking for 0402
- 1% for 0805 / 1206 / 2010 / 2512: 4 markings

EXAMPLE:

RESISTANCE	49.9Ω	100KΩ	1MΩ	4.99MΩ	10MΩ
MARKING	4992	1003	1004	4994	1005

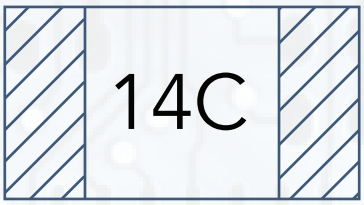
- 5% FOR 0603 / 0805 / 1206 / 2010 / 2512: 3 digits marking E24

EXAMPLE: 124 - 120Ω I 106 - 10MΩ (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: 3 digits marking E96

3 digits markikng for Example: 75C - 59KΩ 39E - 2.49MΩ



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	X	Y
MULTIPLIER	10^0	10^1	10^2	10^3	10^4	10^5	10^{-1}	10^{-2}