

FrelTec GmbH

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Thin Film Chip Resistor SMD Aluminum Nitride

SMD

SPECIFICATION

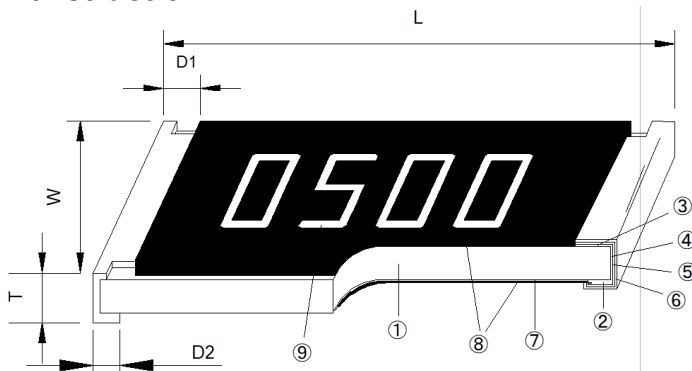
Part
Number

03A	05*	1001*	J*	T05**	D	C
Type	Size	Value	Tolerance	Packing	TCR	Power Rating
03A : SMD Thin Film Chip Resistor	03 : 0603	The last digit is the multiplier which denotes the number of zero following	F : $\pm 1\%$	T05: Tape and Reel for 5k pc (7"reel) for 0603 to 1206	D : $\pm 25\text{ppm}/^{\circ}\text{C}$	H: 1/2W
	05 : 0805					J: 1W
Aluminum Nitride	06 : 1206		D : $\pm 0,5\%$	T04: Tape and Reel for 4k pc (7"reel) for 2512	E : $\pm 50\text{ppm}/^{\circ}\text{C}$	L: 2W
	25 : 2512					6: 6W
		Example: 97R6= 97,6Ohm 9760 = 976Ohm 1001 = 1kOhm	C : $\pm 0,25\%$			
			B : $\pm 0,1\%$			
					* not all combination is possible	

All products according to RoHS (2015/863/EU)

THIN FILM CHIP RESISTORS

Construction

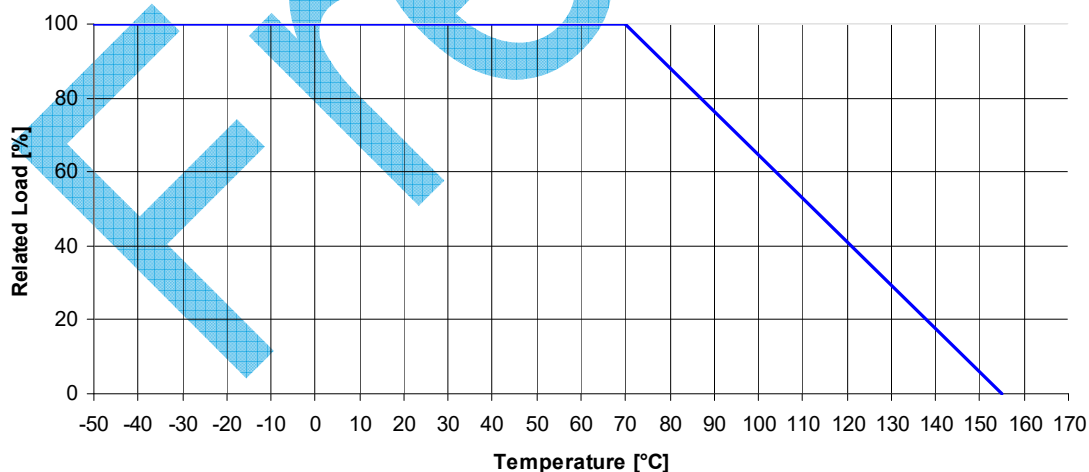


① Alumina Nitride Substrate	③ Edge Electrode	⑤ Resistor Layer
② Bottom Electrode	④ Barrier Layer	⑥ Overcoat
③ Top Electrode	⑥ External Electrode	⑨ Marking

Dimensions

Power Derating Curve

Size	L	W	T	D1	D2
0603	1,55±0,10	0,80±0,10	0,43±0,15	0,30±0,15	0,50±0,20
0805	2,00±0,15	1,25±0,15	0,43±0,15	0,35±0,15	0,60±0,20
1206	3,05±0,20	1,55±0,20	0,43±0,15	0,50±0,15	1,20±0,20
2512	6,30±0,20	3,10±0,20	0,43±0,15	0,70±0,25	1,60±0,25



Type	Size	Power Rating at 70°C	Max. Operating Voltage	Max. Overload Voltage	Operating Temp. Range	Temperature Coefficient [TCR; ppm/°C]	Resistance Range [Ω]			
							B(±0,1%) E24, E96*	C(±0,25%) E24, E96*	D(±0,5%) E24, E96*	F(±1%) E24, E96*
03A 03	0603	1/2W*	75V	75V	+55°C~155°C	±25	50Ω~30,1kΩ			
						±50				
03A 05	0805	1,0W*	100V	200V		±25	50Ω~30,1kΩ			
						±50				
03A 06	1206	2,0W*	100V	200V		±25	50Ω~30,1kΩ			
						±50				
03A 25	2512	6,0W*	100V	200V		±50	50Ω~30,1kΩ			

* Dependant on component mounting by user.

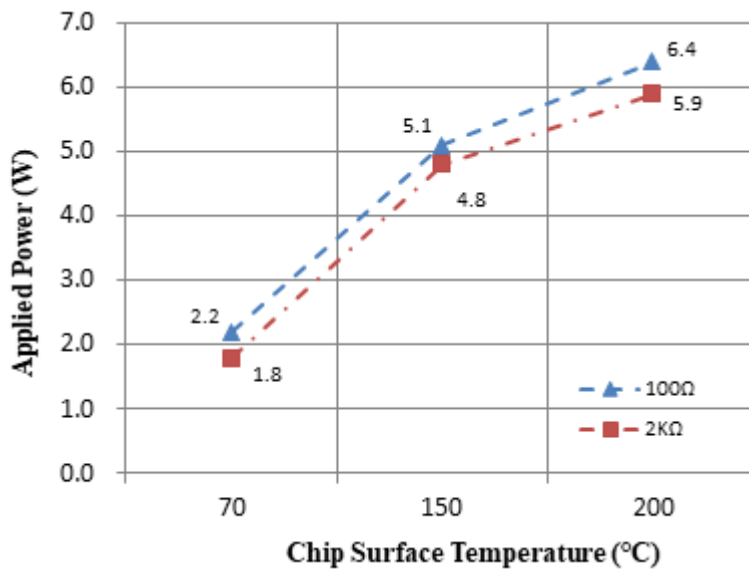
Specific ohm value possible, availability need checking with sales. Chip no marking!

Operating Voltage= $\sqrt{P \cdot R}$ or Max. operating voltage listed above, whichever is lower.

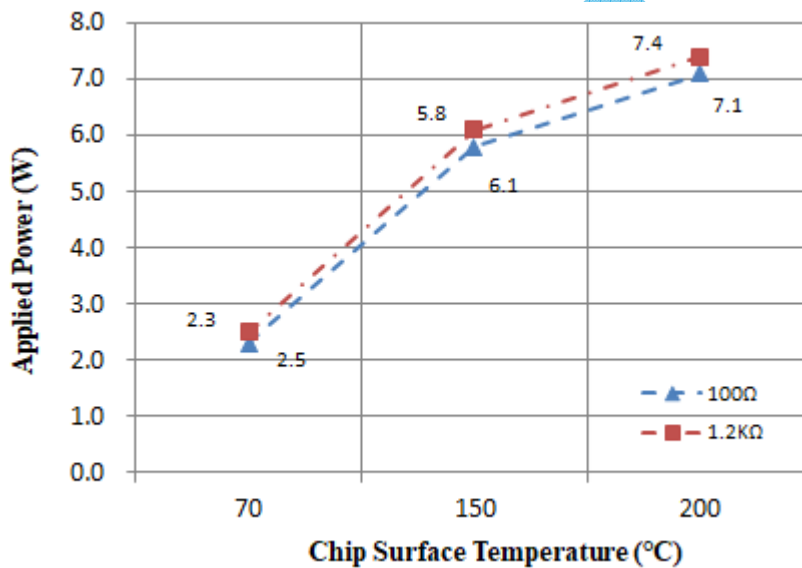
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Chip Temp Vs. Applied Power

0603:

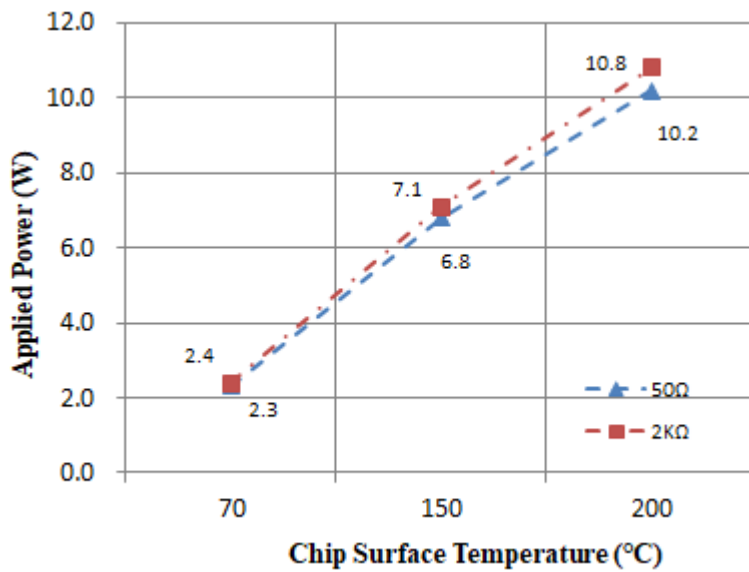


0805:

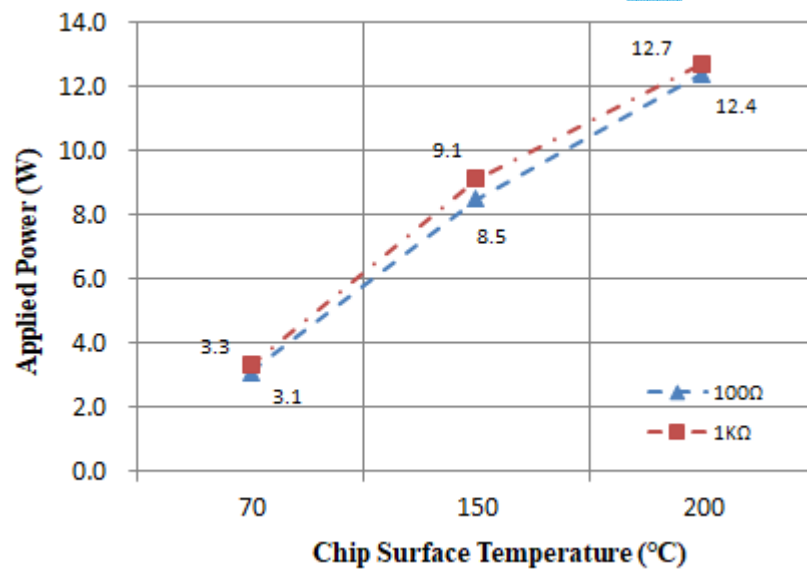


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1206:



2512:



SPECIFICATION

0805 to 2512

1542

4 digit marking, first three digits marking are significant figures;
forth digit is multiplier (10^x),

examples: 1542 = $154 \times 10^2 = 15,400 \text{ Ohm} = 15,4 \text{ kOhm}$

12C

0603 E-96: 3-digit marking

examples: 12C (Table below) = $130 \times 10^2 = 13 \text{ kOhm}$

512

0603 E-24 series

3 digit marking, first two digits marking are significant figures; third
digit is multiplier (10^x),

examples: 222 = $22 \times 10^2 = 2,2 \text{ kOhm}$

3 digit Marking Table E96

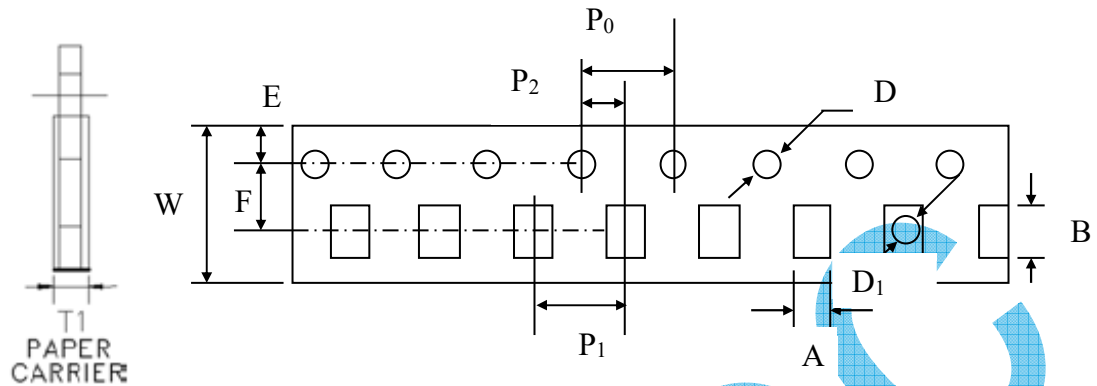
Code	E96	Code	E96	Code	E96	Code	E96
01	100	25	178	49	316	73	562
02	102	26	182	50	324	74	576
03	105	27	187	51	332	75	590
04	107	28	191	52	340	76	604
05	110	29	196	53	348	77	619
06	113	30	200	54	357	78	634
07	115	31	205	55	365	79	649
08	118	32	210	56	374	80	665
09	121	33	215	57	383	81	681
10	124	34	221	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	G	H	X	Y	Z
Multiplier	10^0	10^1	10^2	10^3	10^4	10^5	10^6	10^7	10^{-1}	10^{-2}	10^{-3}

3 digit Marking Table E24

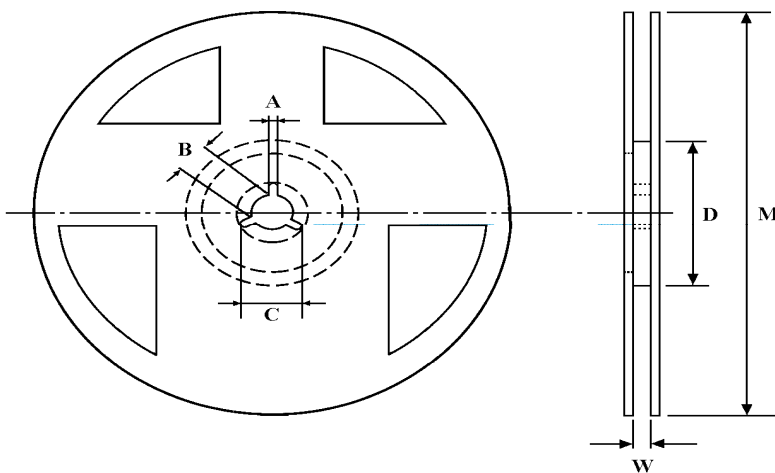
E24	10	11	12	13	15	16	18	20	22	24	27	30	33	36	39	43	47	51	56	62	68	75	82	91
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SPECIFICATION

Tape And Reel Package

Type	A	B	W	E	F	P_0	P_1	P_2	ΦD	T1
0603	$1,10 \pm 0,05$	$1,90 \pm 0,05$	$8,00 \pm 0,10$	$1,75 \pm 0,05$	$3,5 \pm 0,05$	$4,00 \pm 0,10$	$4,00 \pm 0,10$	$2,00 \pm 0,05$	$1,55 \pm 0,05$	$0,60 \pm 0,03$
0805	$1,60 \pm 0,05$	$2,37 \pm 0,05$	$8,00 \pm 0,10$	$1,75 \pm 0,05$	$3,5 \pm 0,05$	$4,00 \pm 0,10$	$4,00 \pm 0,10$	$2,00 \pm 0,05$	$1,55 \pm 0,05$	$0,75 \pm 0,05$
1206	$2,00 \pm 0,05$	$3,55 \pm 0,05$	$8,00 \pm 0,10$	$1,75 \pm 0,05$	$3,5 \pm 0,05$	$4,00 \pm 0,10$	$4,00 \pm 0,10$	$2,00 \pm 0,05$	$1,55 \pm 0,05$	$0,75 \pm 0,05$
2512	$3,400 \pm 0,10$	$6,65 \pm 0,10$	$12,00 \pm 0,10$	$1,75 \pm 0,10$	$5,5 \pm 0,05$	$4,00 \pm 0,10$	$4,00 \pm 0,10$	$2,00 \pm 0,05$	$1,50 \pm 0,05$	$1,00 \pm 0,20$

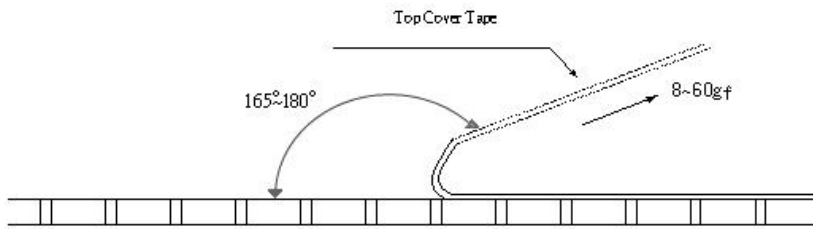
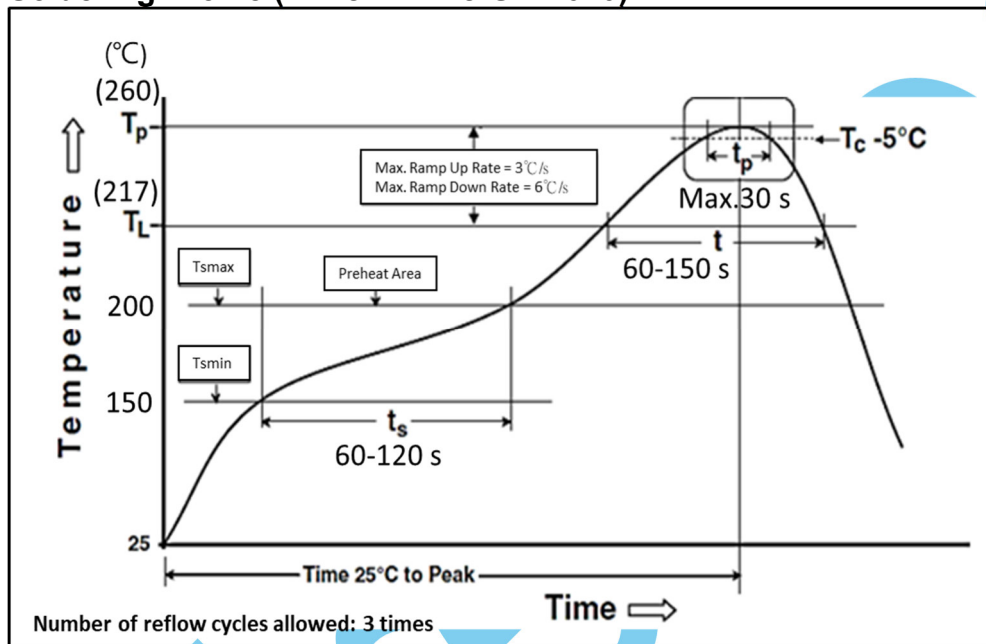
in mm



Type	Packaging	M	B	D	W
038 03 ... T05	Paper	$178,0 \pm 1,0$	$13,5 \pm 0,7$	$60,0 \pm 1,0$	$9,5 \pm 1,0$
038 05 ... T05					$9,5 \pm 1,0$
038 06 ... T05					$9,5 \pm 1,0$
038 25 ... T05	Embossed				$13,5 \pm 1,0$

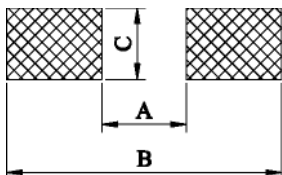
Cover Tape Peel off Strength

Specifications: peel force of top cover tape shall be between 8 to 60g
 The peel speed shall be about 300mm/min \pm 5%

**Soldering Profile (IPC/JEDEC J-STD-020)**

Stock period

The performance of these products, including the solderability, is guaranteed for 24 month, provided that they remain packed as they were when delivered and stored at a temperature of $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ and a relative humidity less than 80%RH

Recommended Land Pattern Design (mm):

Size	A	B	C
0603	0,37	2,35	0,86 \pm 0,1
0805	0,50	2,66	1,32 \pm 0,1
1206	0,60	4,40	1,80 \pm 0,1
2512	2,77	7,39	3,20 \pm 0,2

Environmental Characteristics

Item	Requirement	Test Method
Temperature Coefficient of Resistance (T.C.R.)	As spec.	MIL-STD-202 Method 304 +25/-55/+25/+125/+25 $^{\circ}\text{C}$
Short Time Overload	$\Delta R \pm 0,5\%$	Actual power handling capability is limited by the end user mounting process. As with any high power chip resistor the ability to remove the heat is critical to the overall performance of the device
Insulation Resistance	>9999 M Ω	MIL-STD-202 Method 302 Apply 100V _{DC} for 1 minute
Endurance	$\Delta R \pm 1\%$	MIL-STD-202 Method 108 70 \pm 2 $^{\circ}\text{C}$, RCWV for 1000 hrs with 1,5 hrs "ON" and 0,5 hrs "OFF"
Damp Heat with Load	$\Delta R \pm 0,4\%$	MIL-STD-202 Method 103 40 \pm 2 $^{\circ}\text{C}$, 90~95% R.H. RCWV for 1000 hrs with 1,5 hrs "ON" and 0,5 hrs "OFF"
Solderability	95% min. coverage	MIL-STD-202 Method 208 245 \pm 5 $^{\circ}\text{C}$ for 3 seconds
Resistance to Soldering Heat	$\Delta R \pm 0,2\%$	MIL-STD-202 Method 210 260 \pm 5 $^{\circ}\text{C}$ for 10 seconds
Low Temperature Operation	$\Delta R \pm 0,2\%$	JIS-C-5201-1 4.36 1 hour, -65 $^{\circ}\text{C}$, followed by 45 minutes of RCWV
High Temperature Exposure	$\Delta R \pm 0,2\%$	MIL-STD-202 Method 108 At 155 $^{\circ}\text{C}$, for 1000h
Thermal Shock	$\Delta R \pm 0,2\%$	MIL-STD-202F Method 107 -55 $^{\circ}\text{C}$ ~ 150 $^{\circ}\text{C}$, for 100 cycles

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