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Thin Film Ultra Precision Resistors

Type RU73 Series

Key Features

High precision - TCR 2ppm/°C and 3ppm/°C

Tolerance down to 0.01%

Thin film (nichrome)

Available in standard and high power versions

Terminal finish – electroplated 100% matte Sn



Applications

Communications

Industrial Controls

Instrumentation

Medical

TE Connectivity are proud to introduce this ultra-high precision thin film chip resistor, sister to our successful RN73 series. With tolerances from 0.01% to 0.1% and TCRs of ±2PPM and ±3PPM this takes the chip resistor into new areas of stability and precision. Available on tape and reel for automatic insertion processes, the RU73 is available in 7 case sizes, with a higher power version available for 0603 to 2010 sizes

Electrical Characteristics – Standard Power RU73

		0402						0603					
Rated Power @ 70°C		0.063W						0.063W					
Resistance Range Ω	Min	49R9		49R9		49R9		24R9		24R9		24R9	
	Max	4K99		4K99		4K99		15K		15K		15K	
Tolerance (%)		0.01		0.05		0.1		0.01		0.05		0.1	
Code Letter		L		A		B		L		A		B	
T.C.R. (PPM°C)		2	3	2	3	2	3	2	3	2	3	2	3
Code Letter		X	O	X	O	X	O	X	O	X	O	X	O
Selection Series		E24 & E96						E24 & E96					
Max operating Voltage		25V						50V					
Max. Overload voltage		50V						100V					
Operating Temp. range		-55 ~ +155°C						-55 ~ +155°C					
Insulation Resistance (dry min.)		1000MΩ						1000MΩ					
Stability		0.5%						0.5%					

Dimensions in millimetres unless otherwise specified

Dimensions Shown for reference purposes only. Specifications subject to change

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		0805						1206					
Rated Power @ 70°C		0.1W						0.125W					
Resistance Range Ω	Min	24R9		24R9		24R9		24R9		24R9		24R9	
	Max	30K		30K		30K		49K9		49K9		49K9	
Tolerance (%)		0.01		0.05		0.1		0.01		0.05		0.1	
Code Letter		L		A		B		L		A		B	
T.C.R. (PPM°C)		2	3	2	3	2	3	2	3	2	3	2	3
Code Letter		X	O	X	O	X	O	X	O	X	O	X	O
Selection Series		E24 & E96						E24 & E96					
Max operating Voltage		100V						150V					
Max. Overload voltage		200V						300V					
Operating Temp. range		-55 ~ +155°C						-55 ~ +155°C					
Insulation Resistance (dry min.)		1000MΩ						1000MΩ					
Stability		0.5%						0.5%					

		1210						2010					
Rated Power @ 70°C		0.25W						0.25W					
Resistance Range Ω	Min	24R9		24R9		24R9		24R9		24R9		24R9	
	Max	49K9		49K9		49K9		100K		100K		100K	
Tolerance (%)		0.01		0.05		0.1		0.01		0.05		0.1	
Code Letter		L		A		B		L		A		B	
T.C.R. (PPM°C)		2	3	2	3	2	3	2	3	2	3	2	3
Code Letter		X	O	X	O	X	O	X	O	X	O	X	O
Selection Series		E24 & E96						E24 & E96					
Max operating Voltage		150V						150V					
Max. Overload voltage		300V						300V					
Operating Temp. range		-55 ~ +155°C						-55 ~ +155°C					
Insulation Resistance (dry min.)		1000MΩ						1000MΩ					
Stability		0.5%						0.5%					

		2512					
Rated Power @ 70°C		0.5W					
Resistance Range Ω	Min	24R9		24R9		24R9	
	Max	100K		100K		100K	
Tolerance (%)		0.01		0.05		0.1	
Code Letter		L		A		B	
T.C.R. (PPM°C)		2	3	2	3	2	3
Code Letter		X	O	X	O	X	O
Selection Series		E24 & E96					
Max operating Voltage		150V					
Max. Overload voltage		300V					
Operating Temp. range		-55 ~ +155°C					
Insulation Resistance (dry min.)		1000MΩ					
Stability		0.5%					

Operating Voltage=√(P*R) or Max. operating voltage listed above, whichever is lower.

Overload Voltage=2.5*√(P*R) or Max. overload voltage listed above, whichever is lower.

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Electrical Characteristics – High Power RU73P

		0603						0805					
Rated Power @ 70°C		0.1W						0.125W					
Resistance Range Ω	Min	24R9		24R9		24R9		24R9		24R9		24R9	
	Max	15K		15K		15K		30K		30K		30K	
Tolerance (%)		0.01		0.05		0.1		0.01		0.05		0.1	
Code Letter		L		A		B		L		A		B	
T.C.R. (PPM°C)		2	3	2	3	2	3	2	3	2	3	2	3
Code Letter		X	O	X	O	X	O	X	O	X	O	X	O
Selection Series		E24 & E96						E24 & E96					
Max operating Voltage		75V						150V					
Max. Overload voltage		150V						300V					
Operating Temp. range		-55 ~ +155°C						-55 ~ +155°C					
Insulation Resistance (dry min.)		1000MΩ						1000MΩ					
Stability		0.5%						0.5%					

		1206						1210					
Rated Power @ 70°C		0.25W						0.33W					
Resistance Range Ω	Min	24R9		24R9		24R9		24R9		24R9		24R9	
	Max	49K9		49K9		30K		49K9		49K9		49K9	
Tolerance (%)		0.01		0.05		0.1		0.01		0.05		0.1	
Code Letter		L		A		B		L		A		B	
T.C.R. (PPM°C)		2	3	2	3	2	3	2	3	2	3	2	3
Code Letter		X	O	X	O	X	O	X	O	X	O	X	O
Selection Series		E24 & E96						E24 & E96					
Max operating Voltage		200V						200V					
Max. Overload voltage		400V						400V					
Operating Temp. range		-55 ~ +155°C						-55 ~ +155°C					
Insulation Resistance (dry min.)		1000MΩ						1000MΩ					
Stability		0.5%						0.5%					

		2010					
Rated Power @ 70°C		0.75W					
Resistance Range Ω	Min	24R9		24R9		24R9	
	Max	49K9		49K9		49K9	
Tolerance (%)		0.01		0.05		0.1	
Code Letter		L		A		B	
T.C.R. (PPM°C)		2	3	2	3	2	3
Code Letter		X	O	X	O	X	O
Selection Series		E24 & E96					
Max operating Voltage		200V					
Max. Overload voltage		400V					
Operating Temp. range		-55 ~ +155°C					
Insulation Resistance (dry min.)		1000MΩ					
Stability		0.5%					

Operating Voltage=√(P*R) or Max. operating voltage listed above, whichever is lower.

Overload Voltage=2.5*√(P*R) or Max. overload voltage listed above, whichever is lower.

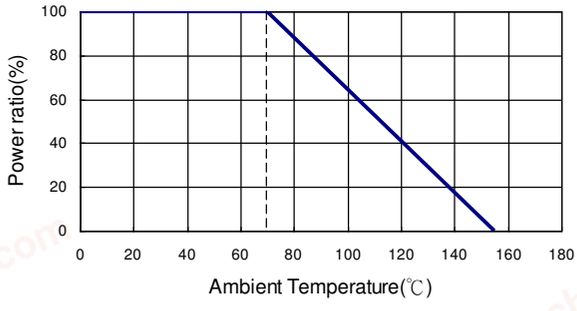
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Environmental Characteristics

Item	Requirement		Test Method
	Tol. ≤0.05%	TOL. >0.05%	
Temperature Coefficient of Resistance (TCR)	As per TCRs specified in Electrical Characteristics tables		MIL-STD-202 Method 304 +25/-55/+25/+125/+25°C
Short Time Overload	ΔR±0.05%	ΔR±0.2%	JIS-C-5201-1 5.5 RCWV*2.5 or Max. overload voltage whichever is lower for 5 seconds
Insulation Resistance	>1000 MΩ		MIL-STD-202 Method 302 Apply 100VDC for 1 minute
Endurance	ΔR±0.05%	ΔR±0.2%	MIL-STD-202 Method 108A 70±2°C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
	>7kΩ ΔR±0.5%		
Damp Heat with Load	ΔR±0.05%	ΔR±0.3%	MIL-STD-202 Method 103B 40±2°C, 90~95% R.H. RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Bending Strength	ΔR±0.05%	ΔR±0.2%	JIS-C-5201-1 6.1.4 Bending amplitude 3 mm for 10 seconds
Solderability	95% min. coverage		MIL-STD-202 Method 208H 245±5°C for 3 seconds
Resistance to Soldering Heat	ΔR±0.05%	ΔR±0.2%	MIL-STD-202 Method 210E 260±5°C for 10 seconds
Dielectric Withstand Voltage	By Type		MIL-STD-202 Method 301 Max. overload voltage for 1 minute
Thermal Shock	ΔR±0.05%	ΔR±0.25%	MIL-STD-202 Method 107G -55°C ~150°C, 100 cycles
Low Temperature Operation	ΔR±0.05%	ΔR±0.2%	JIS-C-5201-1 7.1 1 hour, -65°C, followed by 45 minutes of RCWV

Storage Temperature: 25±3°C; Humidity < 80%RH

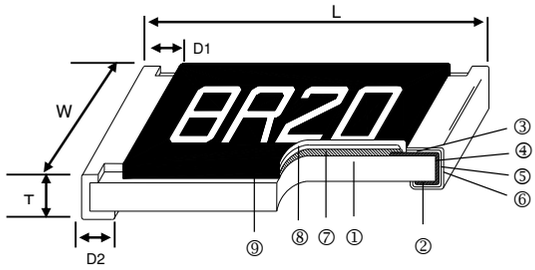
Derating Curve



For resistors operated in ambient temperatures above 70°C, power rating must be derated in accordance with this curve

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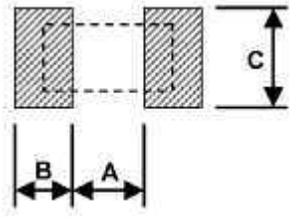
Construction and dimensions



①	Alumina Substrate	④	Edge Electrode (NiCr)	⑦	Resistor Layer (NiCr)
②	Bottom Electrode (Ag)	⑤	Barrier Layer (Ni)	⑧	Overcoat (Epoxy)
③	Top Electrode (Ag)	⑥	External Electrode (Sn)	⑨	Marking

Size	L (mm)	W (mm)	T (mm)	D1 (mm)	D2 (mm)	Weight (g) (1000 Pcs.)
0402	1.00±0.05	0.50±0.05	0.30±0.05	0.20±0.10	0.20±0.10	0.54
0603	1.55±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	1.83
0805	2.00±0.15	1.25±0.15	0.55±0.10	0.30±0.20	0.40±0.20	4.71
1206	3.05±0.15	1.55±0.15	0.55±0.10	0.42±0.20	0.35±0.25	9.02
1210	3.10±0.15	2.40±0.15	0.55±0.10	0.40±0.20	0.55±0.25	10
2010	4.90±0.15	2.40±0.15	0.55±0.10	0.60±0.30	0.50±0.25	23.61
2512	6.30±0.15	3.10±0.15	0.55±0.10	0.60±0.30	0.50±0.25	38.06

Suggested PCB Layout Plan



Recommended Land Pattern			
Size	A	B	C
0402	0.50	0.50	0.60±0.2
0603	0.80	1.00	0.90±0.2
0805	1.00	1.00	1.35±0.2
1206	2.00	1.15	1.70±0.2
1210	2.00	1.15	2.50±0.2
2010	3.60	1.40	2.50±0.2
2512	4.90	1.60	3.10±0.2

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Marking

Case sizes 0805 to 2512 IEC 4 Digit Marking:

Resistance	100R (100Ω)	2K2 (2.2kΩ)	10K (10kΩ)	499K (499kΩ)	100K (100kΩ)
Code	1000	2201	1002	4992	1003

Case Size 0603 E24 3 digit marking – Example 101 = 100R 102=1K0

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

Case size 0603 E96 3 digit marking – Examples 14C = 13K7 68B = 4K99 68X = 49R9

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}

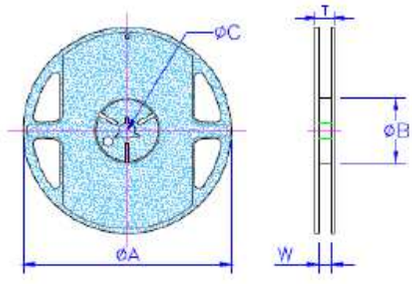
NB For case size 0603 values other than E24 and E96 resistors will be supplied unmarked.

All resistors smaller than 0603 supplied unmarked.

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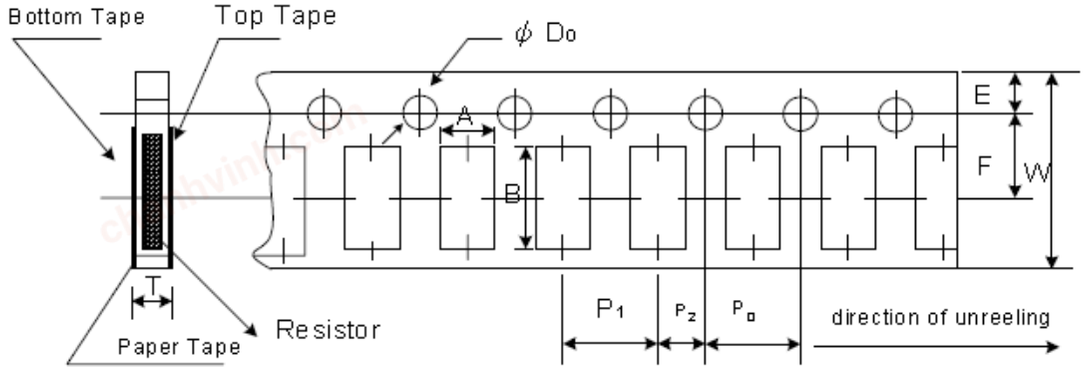
Packaging

Packing Quantity and Reel Specification



Size	ØA ±1.0	ØB ±1.0	ØC ±0.7	W ±1.0	T ±1.0	Paper Tape	Embossed Plastic Tape
0402	178.0	60.0	13.5	9.5	11.5	1000 / 5000	N/A
0603							
0805							
1206							
1210							
2010				13.5	15.5	N/A	4000
2512							

Paper tape Specification



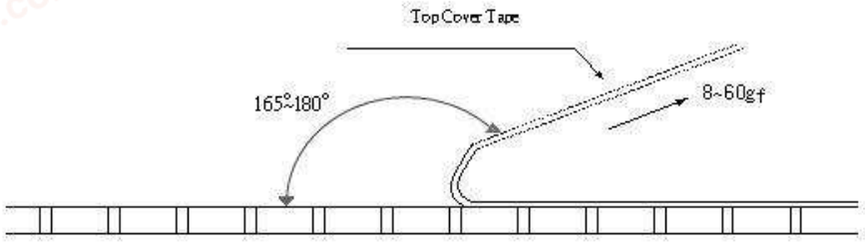
Size	A ±0.05	B ±0.05	W ±0.10	E ±0.05	F ±0.05	P_o	P_1	P_2 ±0.05	ØD$_o$	T
0402	0.70	1.16	8.00	1.75	3.5	4.00 ±0.10	2.00 ±0.05	2.00	1.55 ±0.05	0.40 ±0.03
0603	1.10	1.90					4.00 ±0.10			0.60 ±0.03
0805	1.60	2.37								0.75 ±0.05
1206	2.00	3.55								
1210	2.75	3.40				4.00 ±0.05			1.60 ±0.10	

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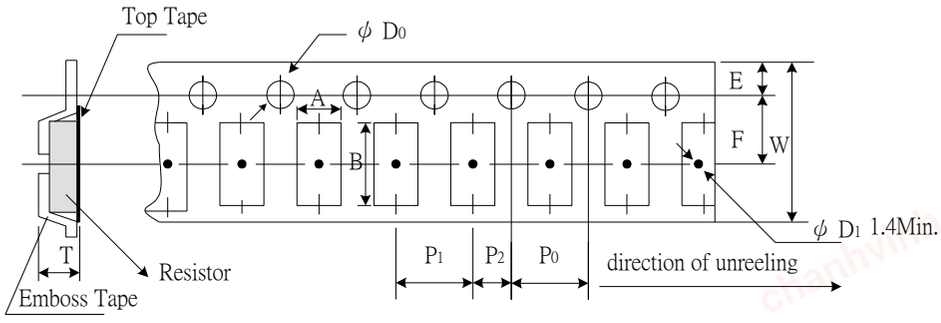
Peel force of top cover tape

The peel speed shall be about 300mm/min±5%

The peel force of top cover tape shall be between 8gf to 60gf



Embossed Plastic Tape Specifications

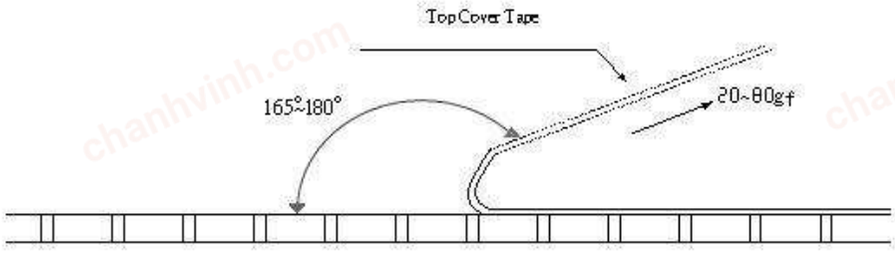


Type	A	B	W	E	F	P_0	P_1	P_2	ØD0	T
2010	2.85±0.10	5.45±0.10	12.0±0.10	1.75±0.10	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50+0.10	1.00±0.20
2512	3.40±0.10	6.65±0.10	12.0±0.10	1.75±0.10	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50+0.10	1.00±0.20

Peel force of top cover tape

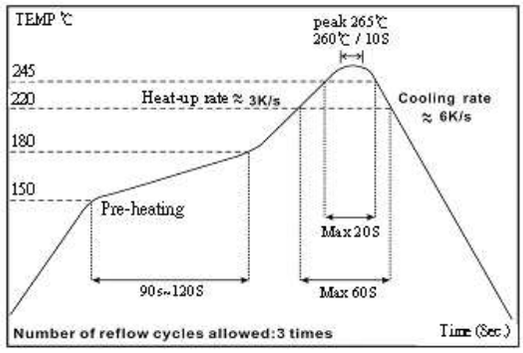
The peel speed shall be about 300mm/min±5%

The peel force of top cover tape shall be between 20gf to 80g



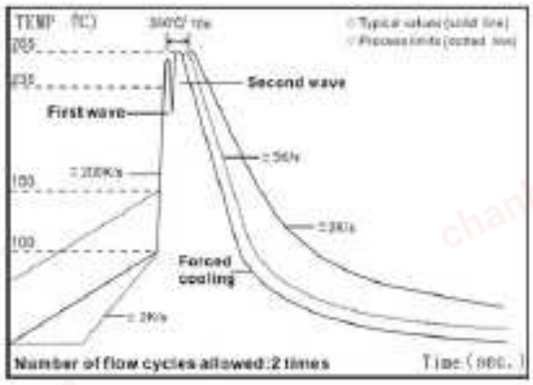
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Reflow Solder Profile



Time of Reflow soldering at maximum temperature point 260°C = 10s

Wave Solder Profile



Time of Wave soldering at maximum temperature point 260°C = 10s

Time of Soldering Iron at maximum temperature point 410°C = 5s

How To Order

RU73	X	2A	100R	B	TD
Common Part	**TCR**	**Package Size**	**Value**	**Tolerance**	**Packaging**
RU73 – Standard power RU73P – High power	X - ±2ppm/°C O - ±3ppm/°C	1E - 0402 1J – 0603 2A – 0805 2B – 1206 2E – 1210 2H – 2010 3A - 2512	100R (100Ω) 1K0 (1000Ω) 10K (10,000Ω)	L – ±0.01% A - ±0.05% B - ±0.1%	TDF – 1000 reel (1E, 1J, 2A, 2B) TD – 5000 reel (1E, 1J, 2A, 2B, 2E) TE – 4000 reel (2H, 3A only