

# Thick Film Chip Resistors



## Features:

- Small size and light weight.
- Suitable for both flow and reflow soldering.
- Reduction of assembly costs and matching with placement machines.

## Performance Specifications:

Temperature coefficient	: $\pm 5\%$ : $1\Omega \sim 10\Omega \leq \pm 200\text{PPM}/^\circ\text{C}$ $\pm 1\%$ : $10\Omega \sim 100\Omega \leq \pm 200\text{PPM}/^\circ\text{C}$ ; $101\Omega \sim 1\text{M}\Omega \leq \pm 100\text{PPM}/^\circ\text{C}$ .
Short-time overload	: $\pm 5\%$ : $\pm(2.0\% + 0.1\Omega)$ Maximum $\pm 1\%$ : $\pm(1.0\% + 0.1\Omega)$ Maximum.
Minimum Insulation resistance	: 1000 Megaohm.
Dielectric withstanding voltage	: No evidence of flashover, mechanical damage, arcing or insulation breakdown.
Terminal bending	: $\pm(1.0\% + 0.05\Omega)$ Maximum .
Soldering heat	: $\pm(1.0\% + 0.05\Omega)$ Maximum.
Minimum solderability	: 95% coverage.
Temperature cycling	: $\pm 5\%$ : $\pm(1.0\% + 0.05\Omega)$ Maximum $\pm 1\%$ : $\pm(0.5\% + 0.05\Omega)$ Maximum.
Humidity (Steady state)	: $\pm 5\%$ : $\pm(3.0\% + 0.1\Omega)$ Maximum $\pm 1\%$ : $\pm(0.5\% + 0.1\Omega)$ Maximum.
Load life in humidity	: $\pm 5\%$ : $\pm(3.0\% + 0.1\Omega)$ Maximum $\pm 1\%$ : $\pm(1.0\% + 0.1\Omega)$ Maximum.
Load life	: $\pm 5\%$ : $\pm(3.0\% + 0.1\Omega)$ Maximum $\pm 1\%$ : $\pm(1.0\% + 0.1\Omega)$ Maximum.

\*The values which are not of standard E-24 series (2% & 5%) and not of E-96 series (1%) could be offered on a case to case basis.

## Specification Table

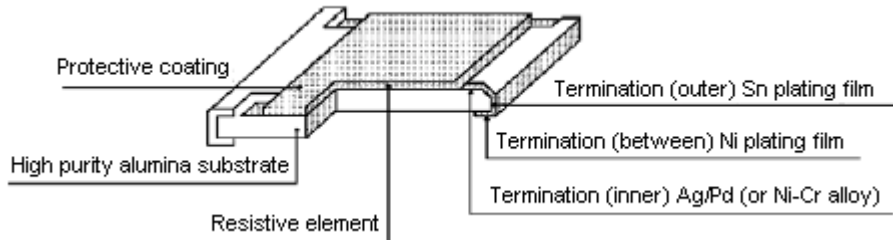
Type	Power Rating at 70°C (W)	Maximum Working Voltage (V)	Maximum Overload Voltage (V)	Operating Temperature (°C)	Tolerance (%)	Resistance Range	Standard Series
0402	1/16	1A	2A	-55 to +155	Jumper	<50mΩ	E96 E24 E24
		50	100		$\pm 1$ $\pm 2$ $\pm 5$	10Ω - 1MΩ 1Ω - 10MΩ 1Ω - 10MΩ	



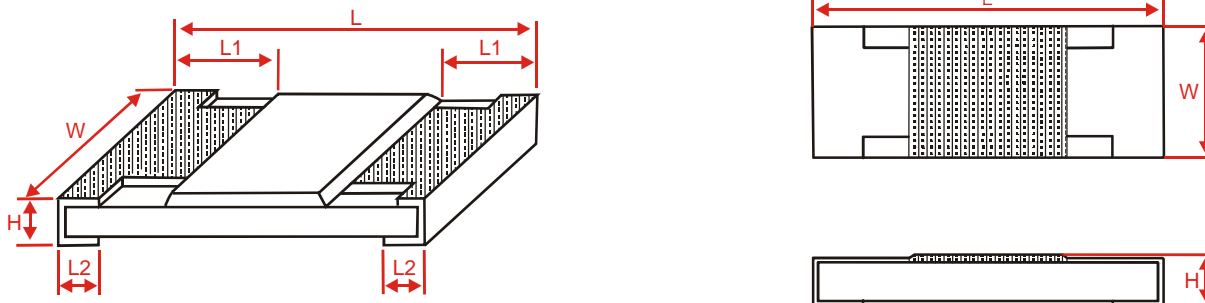
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## Construction:



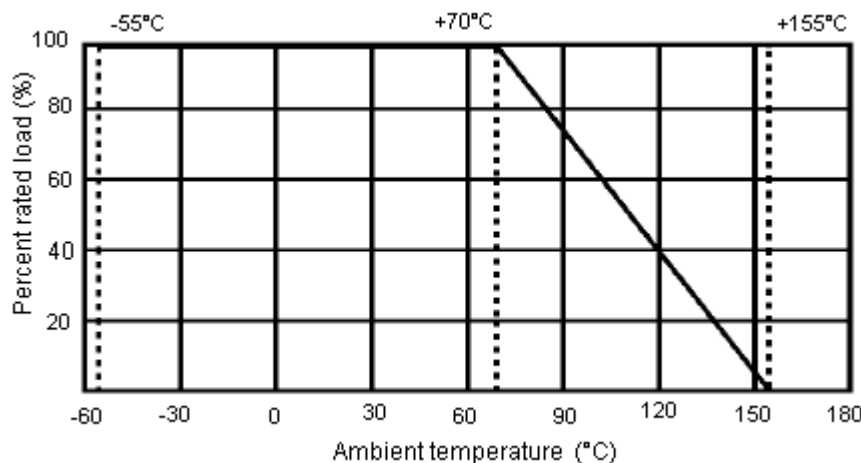
## Power Rating and Dimension:



Series	Dimension				
	Length (L) $\pm 0.10$	Width (W) $\pm 0.05$	Height (H) $\pm 0.05$	Length (L1) $\pm 0.10$	Length (L2) $\pm 0.10$
0402	1.00	0.50	0.35	0.20	0.25

Dimensions : Millimetres

## Derating Curve



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## Marking on the Resistors Body

- For 0402 size, no marking on the body due to the small size of resistor.
- $\pm 5\%$  tolerance product. (Including resistance values less than  $1\Omega$ ; both 1% and 5%) The marking is 3 digits, the first 2 digits are the significant figures of the resistance and the 3rd digit denotes number of zeros.

153 =  $15000\Omega = 15K\Omega$ ; 120 =  $12\Omega$

Below  $10\Omega$  shown as this: 6R8 =  $6.8\Omega$

	153	
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	6R8	
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## Resistance Preferred Value Range

E6	E12	E24	E96	E6	E12	E24	E96	E6	E12	E24	E96
10	10	10	10.0				21.5				46.4
			10.2	22	22	22	22.1	47	47	47	47.5
			10.5				22.6				48.7
			10.7				23.2				49.9
		11	11.0				23.7			51	51.1
			11.3			24	24.3				52.3
			11.5				24.9				53.6
			11.8				25.5				54.9
	12	12	12.1				26.1		56	56	56.2
			12.4				27.7				57.6
			12.7			27	27.4				59.0
		13	13.0				28.0				60.4
			13.3				28.7			62	61.9
			13.7				29.4				63.4
			14.0			30	30.1				64.9
			14.3				30.9				66.5
			14.7				31.6	68	68	68	68.1
15	15	15	15.0				32.4				69.8
			15.4	33	33	33	33.2				71.5
			15.8				34.0				73.2
		16	16.2				34.8			75	75.0
			16.5				35.7				76.8
			16.9			36	36.5				78.7
			17.4				37.4				80.6
			17.8				38.3		82	82	82.5
	18	18	18.2		39	39	39.2				84.5
			18.7				40.2				86.6
			19.1				41.2				88.7
			19.6				42.2			91	90.9
		20	20.0			43	43.2				93.1
			20.5				44.2				95.3
			21.0				45.3				97.6

Above values in accordance with IEC Publication 63 (1963) and BS2488



# Thick Film Chip Resistors



## Part Number Table

Resistance Value	Part Number
0R	0402WGF0000TCE
1R5	0402WGF150KTCE
2R2	0402WGF220KTCE
3R3	0402WGF330KTCE
4R7	0402WGF470KTCE
6R8	0402WGF680KTCE
10R	0402WGF100JTCE
11R	0402WGF110JTCE
12R	0402WGF120JTCE
13R	0402WGF130JTCE
15R	0402WGF150JTCE
16R	0402WGF160JTCE
18R	0402WGF180JTCE
20R	0402WGF200JTCE
22R	0402WGF220JTCE
24R	0402WGF240JTCE
27R	0402WGF270JTCE
30R	0402WGF300JTCE
33R	0402WGF330JTCE
36R	0402WGF360JTCE
39R	0402WGF390JTCE
43R	0402WGF430JTCE
47R	0402WGF470JTCE
51R	0402WGF510JTCE
56R	0402WGF560JTCE
62R	0402WGF620JTCE
68R	0402WGF680JTCE
75R	0402WGF750JTCE
82R	0402WGF820JTCE
91R	0402WGF910JTCE
100R	0402WGF1000TCE



# Thick Film Chip Resistors



## Part Number Table

Resistance Value	Part Number
110R	0402WGF1100TCE
120R	0402WGF1200TCE
130R	0402WGF1300TCE
150R	0402WGF1500TCE
160R	0402WGF1600TCE
180R	0402WGF1800TCE
200R	0402WGF2000TCE
220R	0402WGF2200TCE
240R	0402WGF2400TCE
270R	0402WGF2700TCE
300R	0402WGF3000TCE
330R	0402WGF3300TCE
360R	0402WGF3600TCE
390R	0402WGF3900TCE
430R	0402WGF4300TCE
470R	0402WGF4700TCE
510R	0402WGF5100TCE
560R	0402WGF5600TCE
620R	0402WGF6200TCE
680R	0402WGF6800TCE
750R	0402WGF7500TCE
820R	0402WGF8200TCE
910R	0402WGF9100TCE
1K	0402WGF1001TCE
1K1	0402WGF1101TCE
1K2	0402WGF1201TCE
1K3	0402WGF1301TCE
1K5	0402WGF1501TCE
1K6	0402WGF1601TCE
1K8	0402WGF1801TCE
2K	0402WGF2001TCE



# Thick Film Chip Resistors



## Part Number Table

Resistance Value	Part Number
2K2	0402WGF2201TCE
2K4	0402WGF2401TCE
2K7	0402WGF2701TCE
3K	0402WGF3001TCE
3K3	0402WGF3301TCE
3K6	0402WGF3601TCE
3K9	0402WGF3901TCE
4K3	0402WGF4301TCE
4K7	0402WGF4701TCE
5K1	0402WGF5101TCE
5K6	0402WGF5601TCE
6K2	0402WGF6201TCE
6K8	0402WGF6801TCE
7K5	0402WGF7501TCE
8K2	0402WGF8201TCE
9K1	0402WGF9101TCE
10K	0402WGF1002TCE
11K	0402WGF1102TCE
12K	0402WGF1202TCE
13K	0402WGF1302TCE
15K	0402WGF1502TCE
16K	0402WGF1602TCE
18K	0402WGF1802TCE
20K	0402WGF2002TCE
22K	0402WGF2202TCE
24K	0402WGF2402TCE
27K	0402WGF2702TCE
30K	0402WGF3002TCE
33K	0402WGF3302TCE
36K	0402WGF3602TCE
39K	0402WGF3902TCE



# Thick Film Chip Resistors



## Part Number Table

Resistance Value	Part Number
43K	0402WGF4302TCE
47K	0402WGF4702TCE
51K	0402WGF5102TCE
56K	0402WGF5602TCE
62K	0402WGF6202TCE
68K	0402WGF6802TCE
75K	0402WGF7502TCE
82K	0402WGF8202TCE
91K	0402WGF9102TCE
100K	0402WGF1003TCE
110K	0402WGF1103TCE
120K	0402WGF1203TCE
130K	0402WGF1303TCE
150K	0402WGF1503TCE
160K	0402WGF1603TCE
180K	0402WGF1803TCE
200K	0402WGF2003TCE
220K	0402WGF2203TCE
240K	0402WGF2403TCE
270K	0402WGF2703TCE
300K	0402WGF3003TCE
330K	0402WGF3303TCE
360K	0402WGF3603TCE
390K	0402WGF3903TCE
430K	0402WGF4303TCE
470K	0402WGF4703TCE
510K	0402WGF5103TCE
560K	0402WGF5603TCE
620K	0402WGF6203TCE
680K	0402WGF6803TCE
750K	0402WGF7503TCE
820K	0402WGF8203TCE
910K	0402WGF9103TCE
1M	0402WGF1004TCE



# Thick Film Chip Resistors



## Multiplier Code (for 0402 1% Marking)

Code	A	B	C	D	E	F	G	H	X	Y	Z
Multiplier	10 <sup>0</sup>	10 <sup>1</sup>	10 <sup>2</sup>	10 <sup>3</sup>	10 <sup>4</sup>	10 <sup>5</sup>	10 <sup>6</sup>	10 <sup>7</sup>	10 <sup>-1</sup>	10 <sup>-2</sup>	10 <sup>-3</sup>

## Standard E-96 Series Resistance Value Code (for 0402 1% Marking)

Value	Code	Value	Code	Value	Code	Value	Code	Value	Code
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	383	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	-	-

## Stocked Values

Tolerance	Wattage	Preferred Value Range	Range Value
1%	0.06W	E96	0R - 1M
1%	0.1W	E24	0R - 1M
1%	0.125W	E24	0R - 1M





# Thick Film Chip Resistors



## Notes:

## International Sales Offices:

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