

# Chip Resistors

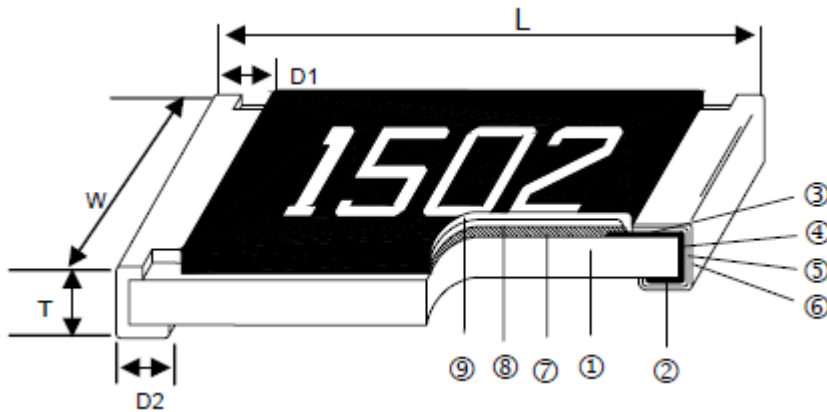
## Pulse Withstanding



### Features:

- Tolerance from  $\pm 0.5\%$  to 5%
- High power rating
- Excellent pulse withstanding performance
- Improved working voltage ratings
- Standard package sizes of 0805 to 2512

### Construction



1	Alumina Substrate
2	Bottom Electrode (Ag)
3	Top Electrode (Ag-Pd)
4	Edge Electrode (NiCr)
5	Barrier Layer (Ni)
6	External Electrode (Sn)
7	Resistor Layer ( $\text{RuO}_2 / \text{Ag}$ )
8	Primary Overcoat (Glass)
9	Secondary Overcoat (Epoxy)

### Applications:

Metering (testing / measurement)  
 Diagnostic equipment  
 Medical devices  
 Industrial controls  
 Plasma  
 LCD video monitors

### Dimensions

Type	Size (Inch)	L	W	T	D1	D2	Weight (g) (1,000 pieces)
MCPWR05	0805	$2 \pm 0.1$	$1.25 \pm 0.1$	$0.5 \pm 0.1$	$0.35 \pm 0.2$	$0.4 \pm 0.2$	4.368
MCPWR06	1206	$3.1 \pm 0.1$	$1.55 \pm 0.1$	$0.55 \pm 0.1$	$0.5 \pm 0.25$	$0.5 \pm 0.2$	8.947
MCPWR10	2010	$5 \pm 0.1$	$2.5 \pm 0.15$		$0.6 \pm 0.25$		24.241
MCPWR12	2512	$6.35 \pm 0.1$	$3.1 \pm 0.15$				39.448

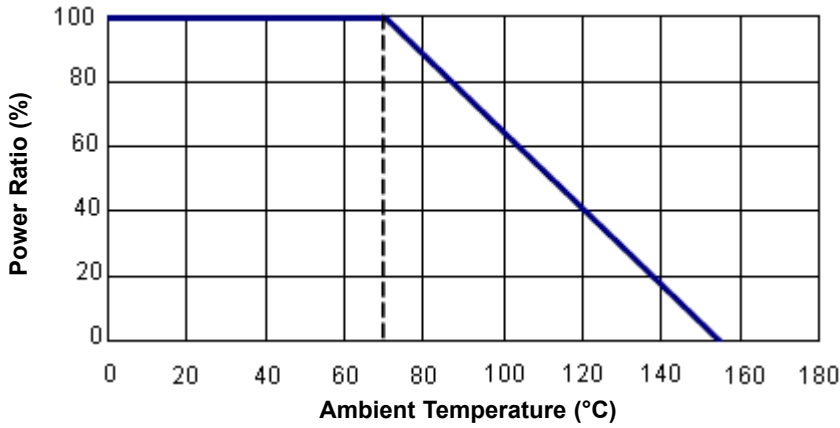
Dimensions : Millimetres

# Chip Resistors

## Pulse Withstanding



Derating Curve



### Standard Electrical Specifications

Item Type	Power Rating at 70°C	Operating Temperature Range	Maximum Operating Voltage	Resistance Range					TCR (PPM/°C)
				±0.5%	±1%	±2%	±3%	±5%	
MCPWR05 (0805)	1/8 W	-55 to +155°C	150 V	10 Ω - 299 Ω	1 Ω - 299 Ω				±200
				300 Ω - 20 MΩ					±100
MCPWR06 (1206)	1/3 W		200 V	10 Ω - 20 Ω	1 Ω - 20 Ω				±200
				20.1 Ω - 20 MΩ					±100
MCPWR10 (2010)	3/4 W		400 V	10 Ω - 20 Ω	1 Ω - 20 Ω				±200
				20.1 Ω - 20 MΩ					±100
MCPWR12 (2512)	1.5 W		500 V	10 Ω - 20 Ω	1 Ω - 20 Ω				±200
				20.1 Ω - 20 MΩ					±100

### High Power Rating Electrical Specifications

Item Type	Power Rating at 70°C	Operating Temperature Range	Maximum Operating Voltage	Resistance Range		TCR (PPM/°C)
				±1%	±5%	
MCPWR05 (0805)	1/4 W	-55 to +155°C	150 V	1 Ω - 299 Ω		±200
				300 Ω - 20 MΩ		±100
MCPWR06 (1206)	1/2 W		200 V	1 Ω - 20 Ω		±200
				20.1 Ω - 20 MΩ		±100
MCPWR10 (2010)	1 W		400 V	1 Ω - 20 Ω		±200
				20.1 Ω - 20 MΩ		±100

Operating voltage =  $\sqrt{P \cdot R}$  or maximum operating voltage listed above, whichever is lower  
 Overload voltage =  $2.5 \cdot \sqrt{P \cdot R}$  or maximum overload voltage listed above, whichever is lower

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## Pulse Withstanding

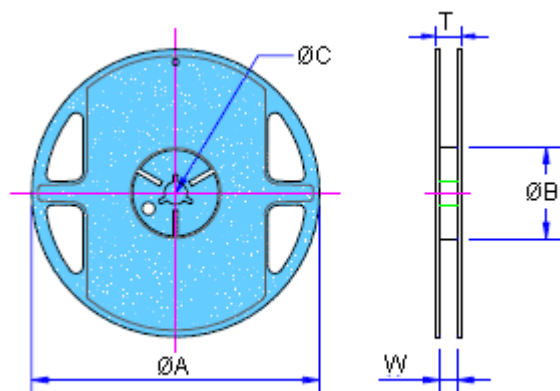
### Environmental Characteristics

Item	Requirement	Test Method
Temperature coefficient of resistance (TCR)	As specification	+25 / -55 / +25 / +125 / +25°C
Short time overload	±1%	RCWV*2.5 or maximum overload voltage for 5 s
Insulation resistance	> 1,000 MΩ	Apply 100 V <sub>DC</sub> for 1 min
Endurance	±1%	70 ±2°C, maximum working voltage for 1,000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Damp heat with load	±0.5%	40 ±2°C, 90 to 95% R H maximum working voltage for 1,000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Dry heat	±0.5%	at +155°C for 1,000 hrs
Bending strength	±1%	Bending amplitude 3 mm for 10 s
Solderability	95% minimum coverage	245 ±5°C for 3 s
Resistance to soldering heat	±0.5%	260 ±5°C for 10 s
Thermal shock	±0.5%	-55°C to 150°C, 100 cycles
Low temperature operation	±0.5%	1 hr, -65°C followed by 45 mins of RCWV

Storage temperature : 25 ±3°C; humidity < 80% RH

### Packaging

#### Reel Specifications and Packaging Quantity



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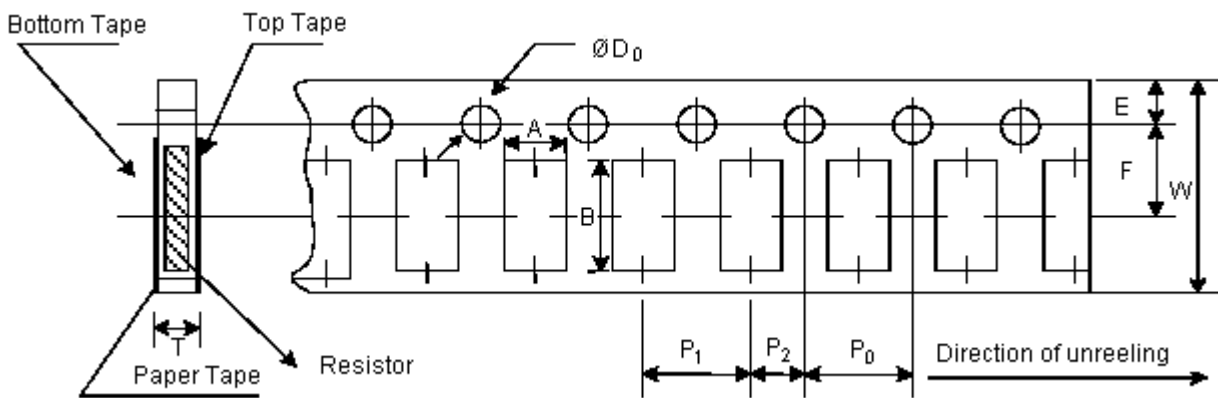
## Pulse Withstanding



Type	Packaging Quantity		Tape Width	Reel Diameter (Inches)	ØA	ØB	ØC	W	T
MCPWR05 MCPWR06	Paper	10 K	8 mm	10	254 ±1	100 ±0.5	13 ±0.2	9.5 ±0.5	13.5 ±0.5
MCPWR10	Embossed	4 K	12 mm	7	178.5 ±1.5	60 <sup>+1/-0</sup>	13.0 ±0.5	13.0 ±0.5	15.5 ±0.5
MCPWR12		8 K		10	250 ±1	62 ±0.5		12.5 ±0.5	16.5 ±0.5

Dimensions : Millimetres (Inches)

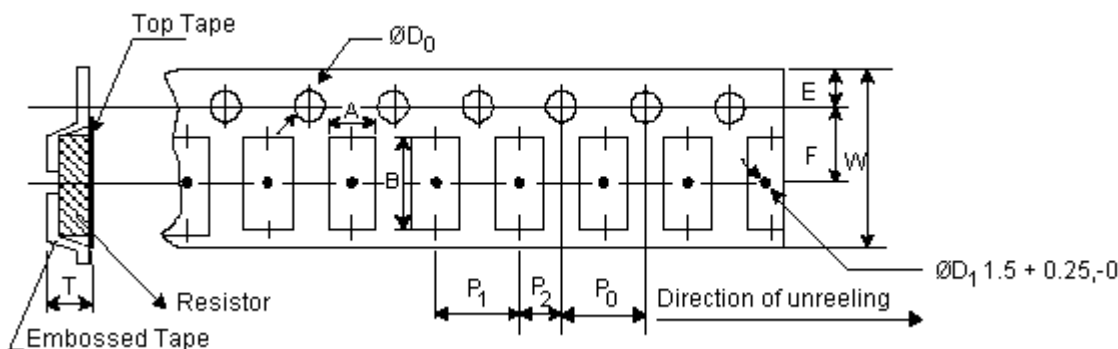
### Paper Tape Specifications



Type	A	B	W	E	F	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	ØD <sub>0</sub>	T
MCPWR05	1.6 ±0.1	2.4 ±0.2	8 ±0.2	1.75 ±0.1	3.5 ±0.05	4 ±0.1	4 ±0.05	2 ±0.05	1.5+0.1,-0	0.85 ±0.1
MCPWR06	1.9 ±0.1	3.5 ±0.2								

Dimensions : Millimetres

### Embossed Plastic Tape Specifications



Type	A	B	W	E	F	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	ØD <sub>0</sub>	T
MCPWR10	2.8 ±0.1	5.5 ±0.1	12 ±0.3	1.75 ±0.1	5.5 ±0.05	4 ±0.1	4 ±0.1	2 ±0.05	1.5+0.1,-0	1.2 <sup>+0</sup>
MCPWR12	3.5 ±0.1	6.7 ±0.1								

Dimensions : Millimetres



# Chip Resistors

## Pulse Withstanding

### Marking

#### 0805 to 2512 4 Digits Marking For Example

Resistance	100 Ω	2.2 KΩ	10 KΩ	49.9 KΩ	100 KΩ
Marking	1,000	2,201	1,002	4,992	1,003

#### 3 Digits Marking in E24

Example: 101 = 100 Ω    102 = 1 KΩ (1<sup>st</sup> and 2<sup>nd</sup> are E24 code and 3<sup>rd</sup> 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
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#### 1% for 0603: 3 Digits Marking in E96 (E96 Series Except E24 Series)



3 Digits Marking for Example: 13C = 13K3 Ω    68B = 4K99 Ω    68X = 49.9 Ω

### Marking Table

Code	E96	Code	E96	Code	E96	Code	E96
02	102	28	191	52	340	75	590
03	105	29	196	53	348	76	604
04	107	31	205	54	357	77	619
06	113	32	210	55	365	78	634
07	115	33	215	56	374	79	649
08	118	34	221	57	383	80	665
09	121	35	226	58	392	81	681
10	124	36	232	59	402	82	698
11	127	37	237	60	412	83	715
13	133	38	243	61	422	84	732
14	137	39	249	62	432	86	768
15	140	40	255	63	442	87	787
16	143	41	261	64	453	88	806
17	147	42	267	65	464	89	825
19	154	43	274	66	475	90	845
20	158	44	280	67	487	91	866
21	162	45	287	68	499	92	887
22	165	46	294	69	511	93	909

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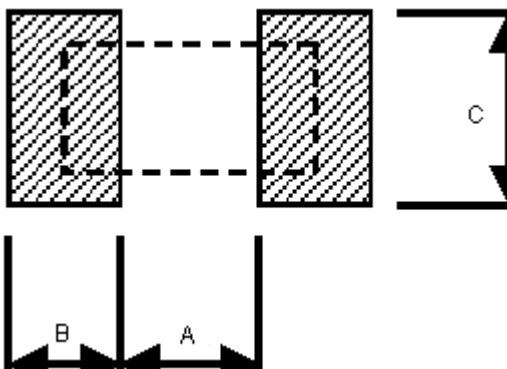
## Pulse Withstanding

### Marking Table

Code	E96	Code	E96	Code	E96	Code	E96
23	169	47	301	70	523	94	931
24	174	48	309	71	536	95	953
25	178	49	316	72	549	96	976
26	182	50	324	73	562	-	-
27	187	51	332	74	576	-	-

Code	A	B	C	D	E	F	G	X	Y
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>-1</sup>	10 <sup>-2</sup>

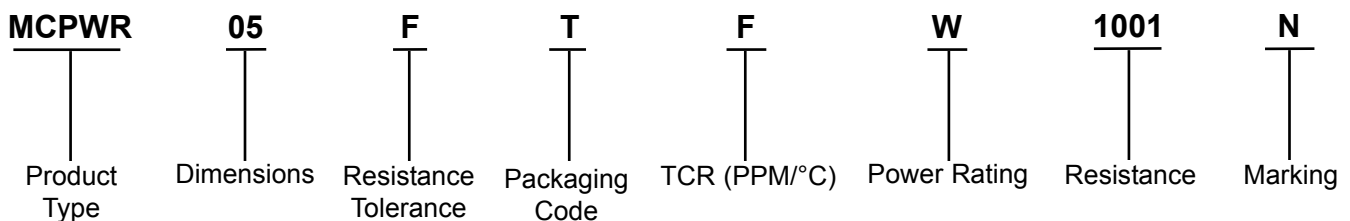
### Recommend Land Pattern



Type	A	B	C
MCPWR05	1.2	0.7	1.3
MCPWR06	2	0.9	1.6
MCPWR10	3.8		2.8
MCPWR12		1.6	3.5

Dimensions : Millimetres

### Part Number Explanation:



- Dimensions** : 05 = 0805, 06 = 1206, 10 = 2010 and 12 = 2512
- Resistance Tolerance** : F = ±1%
- Packaging Code** : T = Taping Reel
- TCR (PPM/°C)** : E = ±100, F = ±200
- Power Rating** : A = 1.5 W, O = 1/3 W, Q = 3/4 W and W = 1/8 W
- Resistance** : 1001 = 1 KΩ, 1004 = 1 MΩ and 1005 = 10 MΩ
- Marking** : Standard Marking, N = No Marking

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