

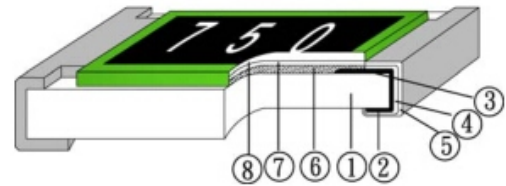
## ● Features

- I The accurate fusibility is applicable to safety circuits in the wide range of electronic sets.
- II Small in size, Light in weight.
- III Low temperature coefficient. (Under  $\pm 400\text{ppm}/^\circ\text{C}$ ).
- IV Noncombustible insula coat.
- V May treat as the general resistance use.
- VI Size: 0402/0603/0805/1206/1210/2010/2512.

## ● Applications

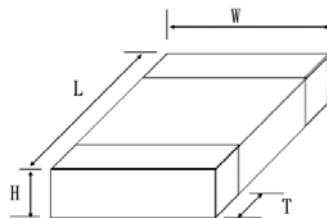
- I Medical Equipment
- II Testing / Measurement Equipment
- III Consumer Product
- IV Printer Equipment
- V Automatic Equipment Controller
- VI Converters
- VII Communication Device, Cell phone, GPS, PDA
- VIII Measurement instruments

## ● Constructions



1 Alumina Substrate	5 External Electrode (Sn)
2 Bottom Electrode (Ag)	6 Resistor Layer (RuO <sub>2</sub> )
3 Top Electrode (Ag/Pd)	7 Primary Overcoat (Glass)
4 Barrier Layer (Ni)	8 Secondary Overcoat (Epoxy)

## ● Dimensions



Power	Size	Type	L	W	H	T1	T2
1/16W	0402	FCB02	1.00 ± 0.10	0.50 ± 0.05	0.30 ± 0.05	0.20 ± 0.10	0.20 ± 0.10
1/10W	0603	FCB03	1.60 ± 0.20	0.80 ± 0.15	0.40 ± 0.10	0.30 ± 0.20	0.30 ± 0.15
1/8W	0805	FCB05	2.00 ± 0.20	1.25 ± 0.15	0.50 ± 0.15	0.35 ± 0.15	0.35 ± 0.15
1/4W	1206	FCB06	3.20 ± 0.20	1.60 ± 0.20	0.55 ± 0.15	0.45 ± 0.20	0.45 ± 0.20
1/3W	1210	FCB12	3.20 ± 0.20	2.50 ± 0.20	0.55 ± 0.15	0.50 ± 0.20	0.50 ± 0.20
1/2W	2010	FCB20	5.00 ± 0.20	2.50 ± 0.20	0.55 ± 0.10	0.60 ± 0.20	0.60 ± 0.20
1W	2512	FCB25	6.30 ± 0.20	3.20 ± 0.20	0.55 ± 0.10	0.60 ± 0.20	0.60 ± 0.20

## ● Ordering Information

Example:

FCB	1/8	J	H	10R0
(1)	(2)	(3)	(4)	(5)
Series Name	Power Rating	Resistance Tolerance	TCR	Resistance

(1) Type: FCB SERIES

(2) Power Rating: 1/16=1/16W、1/10=1/10W、1/8=1/8W、1/4=1/4W、  
1/3=1/3W、1/2=1/2W、1=1W

(3) Tolerance: J=  $\pm 5\%$

(4) TCR: H=  $\pm 400\text{ppm}/^\circ\text{C}$ ;

(5) Resistance Value: 10R0=10R、R10=0.1 $\Omega$ 、47R0=47 $\Omega$

## Reference Standards

MIL-STD-202

## Applications And Ratings

Type	Size	Rated Power (W)	MaxWorking Voltage(V)	Fusing Time & Min. Fusing Power	Resistance Range( $\Omega$ )	(+25~85°C) TCR(PPM/°C)	Tolerance Range
FCB02	0402	0.1W	50V	<30 sec at 2.5W	1 $\Omega$ ~1K	1 $\Omega$ ~47 $\Omega$ ( $\pm$ 600) 48 $\Omega$ ~470 $\Omega$ ( $\pm$ 400) 471 $\Omega$ ~10k $\Omega$ ( $\pm$ 200)	± 1% ± 2% ± 5%
FCB03	0603	0.125W	100V	<30 sec at 3W	1 $\Omega$ ~1K8		
FCB05	0805	0.15W	150V	<30 sec at 3.25W	1 $\Omega$ ~3K		
FCB06	1206	0.25W	200V	<30 sec at 5W	1 $\Omega$ ~5K1		
FCB12	1210	0.5W	250V	<30 sec at 37.5W	1 $\Omega$ ~6K2		
FCB20	2010	0.75W	300V	<30 sec at 11.25W	1 $\Omega$ ~7K5		
FCB25	2512	1W	400V	<30 sec at 15W	1 $\Omega$ ~10K		

## Voltage Rating or Current Rating

Resistance Range:  $\geq 1R$  ohm

Rated Voltage: The resistor shall have a DC continuous working voltage or a RMS AC continuous working voltage at commercial-line frequency and wave form corresponding to the power rating, as determined formula as following

REMARK:

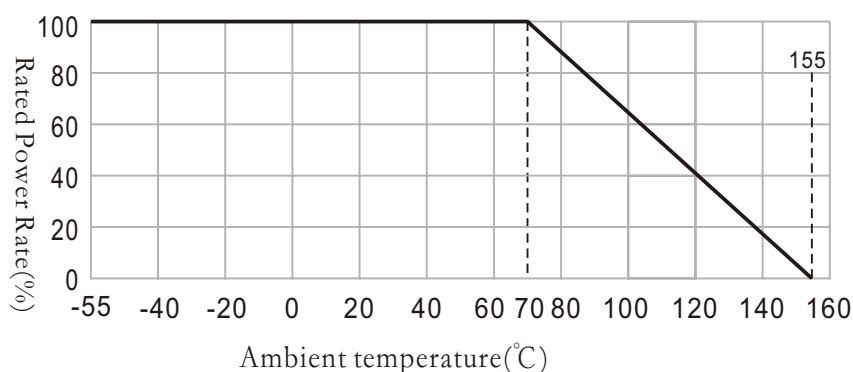
$$E = \sqrt{R \times P}$$

E= Rated voltage (V)

R=Nominal resistance ( $\Omega$ )

P=Power rating (W)

## Derating Curve

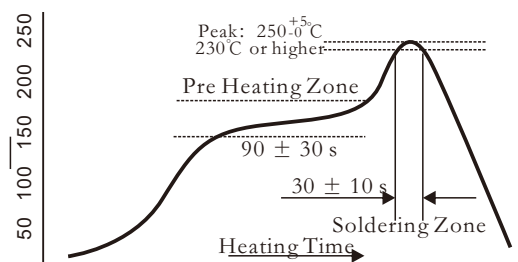


Power rating or current rating is in the case based on continuous full-load at ambient temperature of 70°C for operating at ambient temperature in excess of 70°C, the load should be derated in accordance with figure of derating curve.

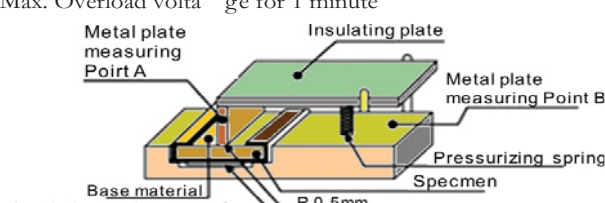
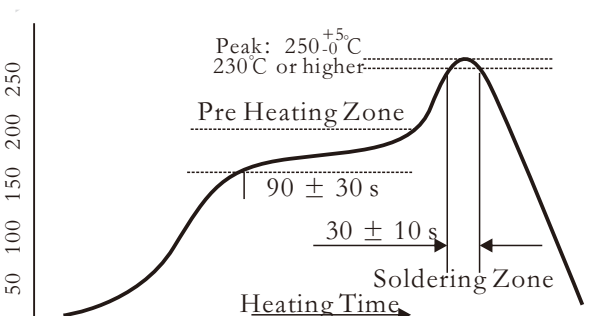
### Operation and Storage Temperature

	Min.	Max.
Operation temperature	-55 °C	70 °C
Storage temperature	20 °C	30 °C
Storage Humidity	30%	70%

## Soldering Profile



## Performance

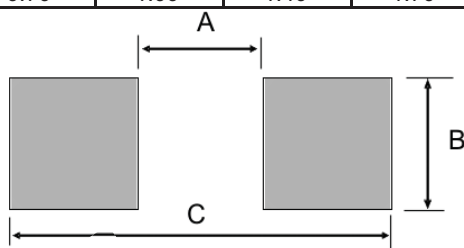
Test Item	Test Methods	Description
Temperature	-55 ~ +155 K , 20°C is the reference temperature	JIS C 5201 ...Clause 4.8 Refer to Ratings
Short Time Overload	General: 2.5 times RCWV or Max. Overload voltage for 5 seconds. High Power: 2.5 times RCWV or Max. Overload voltage for 2 seconds.	JIS C 5201-2 Clause 4.13 $\pm 1 \pm (1.0\% + 0.05 \Omega)$ Max. $\pm 5 \pm (2.0\% + 0.1 \Omega)$ Max.
Insulation Resistance	Max. Overload voltage for 1 minute 	JIS C 5201-1 .Clause 4.6 $\geq 10^9 \Omega$
IR Reflow		Sony SS-00254 Resistance Range: $\pm 1(1.0\% + 0.05\Omega)$ $\pm 5(1.0\% + 0.05\Omega)$
Leaching	$260 \pm 5^\circ\text{C}$ for 30 Seconds	Sony SS-00254-9 >95% Coverage
Soldering Heat	$260 \pm 5s^\circ\text{C}$ for 10 Seconds	Sony C 5201-1 Clause 4.18 $\pm 1(1.0\%R + 0.05\Omega)$ $\pm 5(1.0\%R + 0.05\Omega)$
Temperature Cycling	$-55^\circ\text{C}$ to $+155^\circ\text{C}$ . 5 cycles	Sony C 5201-1 Clause 4.19 0.1%, 0.5%, 1% $\pm (1.0\%R + 0.05\Omega)$ 2%, 5% $\pm (1.0\%R + 0.1\Omega)$
Electric Iron	Preheating temperature: $350 \pm 5^\circ\text{C}$ Electric iron preheating time: 3+1/-0 seconds	Sony SS-00254-5 $\pm 1(1.0\%R + 0.05\Omega)$ $\pm 5(1.0\%R + 0.05\Omega)$
Resistance to Solvent	The tested resistor be immersed into isopropyl alcohol of 20 ~ 25 K for 60 secs. Then the resistor is left in the room 48 hours.	Sony C 5201-1 Clause 4.29 $\pm 1(1.0\%R + 0.05\Omega)$ $\pm 5(1.0\%R + 0.05\Omega)$
Load Life in Humidity	$40 \pm 2^\circ\text{C}$ , 90~95% RH or Max. working voltage for 1000 hours with 1.5 hours [ON] and 0.5 hours [OFF]	Sony C 5201-1 Clause 4.24 0.1%, 0.5%, 1% $\pm (0.5\%R + 0.05\Omega)$ 2%, 5% $\pm (2.0\%R + 0.05\Omega)$
Load Life (Endurance)	$70 \pm 2^\circ\text{C}$ , or Max. Working voltage for 1000 hours with 1.5 hours [ON] and 0.5 hours [OFF]	Sony C 5201-1 Clause 4.25 0.1%, 0.5%, 1% $\pm (0.1\%R + 0.05\Omega)$ 2%, 5% $\pm (3.0\%R + 0.1\Omega)$
Terminal Bending Strength	Bending once for 5 seconds D: FCR series 0402; 0603; 0805 = 5mm FCR series 1206; 1210 = 3mm FCR series 2010; 2512 = 2mm	Sony C 5201-1 Clause 4.33 $\pm 1(1.0\%R + 0.05\Omega)$ $\pm 5(1.0\%R + 0.05\Omega)$

## ● Recommend Land Land Pattern Desidn(For Reflow Soldering)

Special Passivated NiCr Film for Anti-Acid and Anti-Damp

Unit: mm

Type	FCB02	FCB03	FCB05	FCB06	FCB10	FCB20	FCB25
Dim.	0402	0603	0805	1206	1210	2010	2512
A	0.60	0.80	1.30	2.20	2.00	3.80	4.90
B	1.60	2.40	2.90	4.20	4.40	4.24	8.10
C	0.70	1.00	1.40	1.70	2.70	4.50	3.40



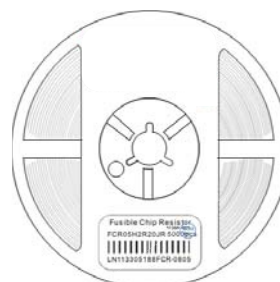
### PACKAGE SPECIFICATION

Power	Type	Size	Quantity(ea)		
			Paper Reel Tape	In Box	Carton
1/16W	FCB02	0402	10,000 Pcs 7" Reel	100K pcs	600K pcs
1/10W	FCB03	0603	5,000 Pcs 7" Reel	50K pcs	300K pcs
1/8W	FCB05	0805	5,000 Pcs 7" Reel	50K pcs	300K pcs
1/4W	FCB06	1206	5,000 Pcs 7" Reel	50K pcs	300K pcs
1/3W	FCB12	1210	5,000 Pcs 7" Reel	40K pcs	300K pcs
1/2W	FCB20	2010	4,000 Pcs 7" Reel	40K pcs	240K pcs
1W	FCB25	2512	4,000 Pcs 7" Reel	40K pcs	240K pcs

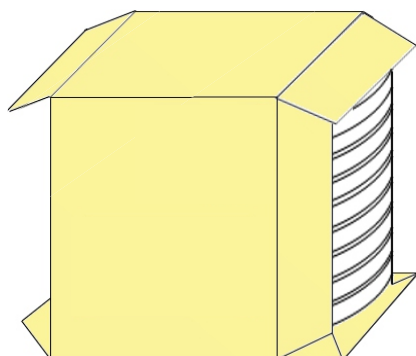
Paper Reel Tape



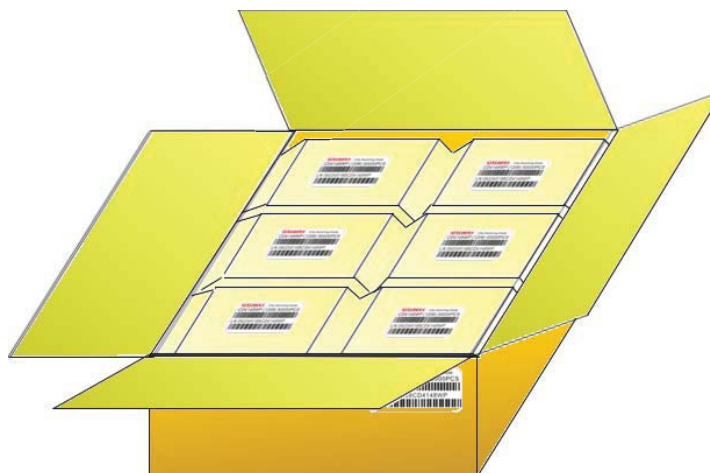
Reel Tape Leble



Inner Box



Carton Pack



## Standard Resistance Value in Decad

Tolerance	E96	E24	Power	Codes	T.C.R/°C
A= ±0.01%	m5=R0005	m5=R0005 Ω	1/32W	Z	S=± 5 ppm
B= ±0.1%	5m=R005	5m=R005 Ω	1/16W	Y	B=± 10ppm
C= ±0.25%	50m=R05	50m=R05 Ω	1/10W	X	N=± 15ppm
D= ±0.5%	100m=R1	100m=R1 Ω	1/8W	W	C=± 25ppm
F= ±1%	1000m=1	1000m=1 Ω	1/4W	V	D=+ 50ppm
G= ±2%	1R = 1R00	1R = 1R0	1/2W	U	E= + 100ppm
H= ±3%	10R=10R0	10R=100	3/4W	T	K= ±150ppm
J= ±5%	100R=100R	100R=101	1.0W	S	F= + 200ppm
K= ±10%	1K = 1001	100R=102	1.5W	R	G= + 300ppm
M= +20%	10K = 1002	10K = 10	2.0W	Q	H= + 400ppm
N= +50%	100K=1003	100K=104	2.5W	P	I= + 500 ppm
Z=+80-20%	1M=1-004	1M=105	3.0W	N	J= ± 600 ppm
	10M=1005	10M=106	4.0W	M	Z= + 1500ppm
	100M=1006	100M=10	5.0W	L	

## Resistor Series Ordering Information :

± 1%	Marking Code please refer to E96 data form as below :
Ex.	121K the marking code is 1213 in E96 10R ohm the marking code is 1009 E96 1R ohm the marking code is 1008 E96 0.1R ohm the marking code is 0R10 E96
± 5%	Marking Code please refer to E24 data form as below :
Ex.	100K the marking code is 104 in E24 10R ohm the marking code is 100 E24 1R ohm the marking code is 1R0 E24 0.1R ohm the marking code is 0R1 E24

## For Resistance According to IEC Publication 63

E24	E96			
10	100	178	316	562
11	102	182	324	576
12	105	187	332	590
13	107	191	340	604
15	110	196	348	619
16	113	200	357	634
18	115	205	365	649
20	118	210	374	665
22	121	215	383	681
24	124	221	392	698
27	127	226	402	715
30	130	232	412	732
33	133	237	422	750
36	137	243	432	768
39	140	249	442	787
43	143	255	453	806
47	147	261	464	825
51	150	267	475	845
56	154	274	487	866
62	158	280	499	887
68	162	287	511	909
75	165	294	523	931
82	169	301	536	953
91	174	309	549	976