

## **Type CRG Series**

### **Key Features**

Thick Film
Resistors with
high power to
size ratio,
ideally suited
to industrial
and general
purpose use

Value range from  $1\Omega$  to  $10M\Omega$ 

Eight package sizes

Terminal finish matte Sn over Ni



The resistive element is screen printed and fired, and a passivation layer added. Each resistor is trimmed to tolerance by laser. The pre-scribed tile is then broke into strips, the end plating fired on, and the strips broken into individual components. Final termination finish is electroplated matte Sn over a Ni barrier layer.

#### **Electrical Characteristics**

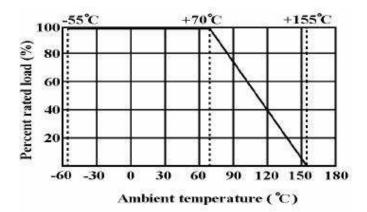
Туре	Туре			0603	0805	1206	1210	2010	2512		
Power rating	(W)	0.05	0.0625	0.1	0.125	0.25	0.5	0.75W	1W		
Resistance	Min	1R0	1R0	1R0	1R0	1R0	1R0	1R0	1R0		
range (Ω)	Max	10M	10M	10M	10M	10M	10M	10M	10M		
Tolerance (%	Tolerance (%)			1	1	1	1	1	1		
Code Letter	Code Letter			F	F	F	F	F	F		
Max Working	y Voltage	25V	50V	75V	150V	200V	200V	200V	200V		
Max Overloa	d Voltage	50V	100V	150V	300V	400V	500V	500V	500V		
Dielectric Str	ength (V)	-	100V	300V	500V	500V	500V	500V	500V		
Rated curren	0.5A	1A	1A	2A	2A	2A	2A	2A			
Max Overload Current (A (Jumper)		1A	2A	2A	5A	10A	10A	10A	10A		
Temperature	Temperature Range		-55°C ~ 155°C								

#### **Power rating:**

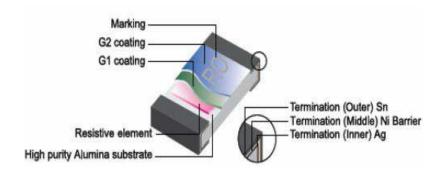
Resistors shall have a power rating based on continuous load operation at an ambient temperature of 70  $^{\circ}\text{C}$  . For temperature in excess of 70  $^{\circ}\text{C}$  , The load shall be derate as shown below



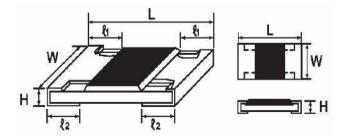
# **Derating Chart**



### Constuction



### **Dimensions:**



Tuno		[	Dimensions (mm	)	
Туре	L	W	Н	<i>l</i> 1	ℓ2
0201	0.60±0.03	0.30±0.03	0.23±0.03	0.10±0.05	0.15±0.05
0402	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10
0603	1.60±0.10	0.80+0.15	0.45±0.10	0.30±0.20	0.30±0.20
		-0.10			
0805	2.00±0.15	1.25+0.15	0.55±0.10	0.40±0.20	0.40±0.20
		-0.10			
1206	3.10±0.15	1.55+0.15	0.55±0.10	0.45±0.20	0.45±0.20
		-0.10			
1210	3.10±0.10	2.60±0.15	0.55±0.10	0.50±0.25	0.50±0.20
2010	5.00±0.10	2.50±0.15	0.55±0.10	0.60±0.25	0.50±0.20
2512	6.35±0.10	3.20±0.15	0.55±0.10	0.60±0.25	0.50±0.20



# Performance Specification:

*Insulation Resistance  *Dielectric Withstanding Voltage  *Dielectric Withstanding Voltage  *Dielectric Withstanding or insulation break down  Temperature Coefficient of Resistance  (TCR)  *In Ω-10Ω: ± 400 PPM/°C  Temperature  Coefficient of Resistance  (TCR)  *In Ω-10Ω: ± 200 PPM/°C  Tor 0201: >100 PPM/°C  For 0201: >100 PPM/°C  Short Term Overload  *Solderability  *Solderability  *Solderability  *Solderability  Soldering  Temperature  (95 % coverage Min.)  *Soldering  Temperature  (95 % coverage Min.)  Soldering  Temperature  (95 % coverage Min.)  Soldering  Resistance change rate is: application of a potential of 2.5 times (Sub-clause 4.17)  Temperature of solder: 2-3 seconds (Sub-clause 4.13)  Test temperature of solder: 2-3 seconds (Sub-clause 4.13)  Test temperature of solder: 2-3 seconds (Sub-clause 4.13)  Test emperature of solder: 2-3 seconds (Sub-clause 4.17)  Temperature of solder: 2-3 seconds (Sub-clause 4.13)  Temperature of solder: 2-3 seconds (Sub-clause 4.17)  Temperature of solder: 2-3 s	Characteristic	Specification	Test Methods (JIS C 5201-1)
*Dielectric *Dielectric Withstanding Voltage  No evidence of flashover mechanical damage, arcing or insulation break down  Temperature Coefficient of Resistance (TCR)  10.10 - 100Ω : ± 400 PPM/°C  10.10 - 100Ω : ± 200 PPM/°C  For 0201: >100Ω - ± 200 PPM/°C  Resistance value at room temperature (t1) R2: Resistance value at room temperature (t2) Sub-clause 4.8)  Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds (Sub-clause 4.13)  Test temperature of solder : 245 ±3°C Dipping time solder: 2-3 seconds (Sub-clause 4.17)  Wave soldering condition: (2 cycles Max.) Pre-heat : 100 ~ 120 °C, 30 ± 5 sec. Suggestion solder temp.: 235 ~ 255 °C, 10 sec. (Max.) Pre-heat : 150 ~ 180 °C, 90 ~ 120 sec. Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec. Peak temp.: 260 °C Reflow soldering condition: (2 cycles Max.) Pre-heat : 150 ~ 180 °C, 90 ~ 120 sec. Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec. Peak temp.: 260 °C Reflow soldering condition: (2 cycles Max.) Pre-heat : 150 ~ 180 °C, 90 ~ 120 sec. Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec. Peak temp.: 260 °C  Reflow soldering condition: (2 cycles Max.) Pre-heat : 150 ~ 180 °C, 90 ~ 120 sec. Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec. Peak temp.: 260 °C  Reflow soldering condition: (2 cycles Max.) Pre-heat : 150 ~ 180 °C, 90 ~ 120 sec. Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec. Peak temp.: 260 °C  Resistance change rate is: Dip the r	*Insulation	1.000MΩ Min.	· · · · · · · · · · · · · · · · · · ·
*Solderability Solderability PS % coverage Min.  *Solderability Reference  Soldering Temp.  Soldering Temp.  Soldering Temp.  Soldering Temp.  Soldering Temp.  Soldering Temp.  Soldering Resistance (195 % coverage Min.)  Soldering Temp.  Soldering Temp.  Soldering Temp.  Soldering Resistance change change Min.  Soldering Temp.  Soldering Temp.  Soldering Resistance change Min.  Soldering Temp.  Soldering Resistance change Min.  Soldering Resistance change min.  Soldering Temp.  Soldering Resistance change min.  Soldering Resistance change min.  Soldering Temp.  Soldering Resistance change min.  Soldering Condition:  The soldering condition:  The soldering iron tip temperature should be less than 300°Cand maximum contract time should be 5 sec.  Dip the resistor into a solder bath having a temperature of 260°C±3°C and hold it for 10±1 seconds.		_,	
*Dielectric Withstanding Voltage or insulation break down per denderical damage, arcing or insulation break down protective coating and termination for 1 minute (Sub-clause 4.7)  Temperature (Coefficient of Resistance (TCR)  10.10 · 1000 · ± 200 PPM/°C  For 0201: >1000 · ± 200 PPM/°C  For 0201: >1000 · ± 200 PPM/°C  For 0201: >1000 · ± 200 PPM/°C  R2.R1  x 10 <sup>6</sup> (PPM/°C)  R1: Resistance value at room temperature (tt) R2: Resistance value at room temperature of value value at room temperature (tt) R2: Resistance value at room temperature of value val			
Withstanding Voltage         mechanical damage, arcing or insulation break down         (0805,1206,1210,2010,2512) AC between protective coating and termination for 1 minute (Sub-clause 4.7)           Temperature Coefficient of Resistance (TCR)         10.10-100Ω: ± 200 PPM/°C         Natural resistance change per temp. degree centigrade.           Resistance (TCR)         101Ω~10MΩ: ± 100 PPM/°C         R1. Resistance value at room temperature (t1) R2: Resistance value at room temperature (t1) R2: Resistance value at room temperature (t1) R2: Resistance change after the application of a potential of 2.5 times RCWV for 5 seconds (Sub-clause 4.13)           *Soldering Temp.         Electrical characteristics shall be satisfied without distinct deformation in appearance. (95 % coverage Min.)         Test temperature of solder: 245 ±3°C Dipping time solder: 2-3 seconds (Sub-clause 4.17)           Wave soldering condition: (2 cycles Max.)         Pre-heat: 100 ~ 120 °C, 30 ± 5 sec. Suggestion solder temp.: 235 ~ 255 °C, 10 sec. (Max.)           Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec. Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec.         Peak temp.: 260 °C           Reflow soldering condition: (2 cycles Max.)         Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec. Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec.           Peak temp.: 260 °C         Peak temp.: 260 °C           Soldering endition: (2 cycles Max.)         Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec. Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec.           Peak temp.: 260 °C         Peak temp.: 260 °C           Soldering endition: (2 cycles Max.)	*Dielectric	No evidence of flashover	1 '
Voltage         or insulation break down         protective coating and termination for 1 minute (Sub-clause 4.7)           Temperature Coefficient of Resistance (TCR)         10.10Ω-100Ω: ± 200 PPM/°C         Natural resistance change per temp. degree centigrade.           101Ω~10MΩ: ± 100 PPM/°C         R1. Resistance value at room temperature (t1)         R1. Resistance value at room temperature (t1)           R2-R1         R1. Resistance value at room temperature (t1)         R2. Resistance value at room temperature (t1)           R2-R1         R1. Resistance value at room temperature (t1)         R2. Resistance value at room temperature (t1)           R2-R1         R2. R1         R1. Resistance value at room temperature (t1)           R2-R1         R2. R1         R2. R1           R2-R1         R1. Resistance value at room temperature (t1)           R2. Resistance value at room temperature (t1)         R2. Resistance value at room temperature of value at room temperature (t1)           R2. R2. R1         R2.			
Temperature Coefficient of Resistance (TCR)  10.10-100Ω: ± 200 PPM/°C  101Ω~10MΩ: ± 100 PPM/°C  For 0201:>100Ω: ± 200 PPM/°C  For 0201:>100Ω: ± 200 PPM/°C  R1(t2-t1)  R2: Resistance value at room temperature (t1) R2: Resistance value at room temperature (t1) R2: Resistance value at room temp. plus 100 °C (t2) (Sub-clause 4.8)  Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds (Sub-clause 4.13)  *Solderability  *Solderability  Soldering  Temp.  Soldering  Temp.  Reference  Soldering  Ferne.  Reference  Soldering  Ferne.  Reference  Soldering  Ferne.  Resistance change rate is:  Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds (Sub-clause 4.17)  Wave soldering condition: (2 cycles Max.)  Pre-heat: 100 ~ 120 °C, 30 ± 5 sec.  Suggestion solder temp.: 235 ~ 255 °C, 10 sec. (Max.)  Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec.  Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec.  Peak temp.: 260 °C  Reflow soldering condition: (2 cycles Max.)  Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec.  Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec.  Peak temp.: 260 °C  Reflow soldering condition: (2 cycles Max.)  Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec.  Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec.  Peak temp.: 260 °C  Reflow soldering condition: (2 cycles Max.)  Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec.  Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec.  Peak temp.: 260 °C  Reflow soldering condition: (2 cycles Max.)  Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec.  Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec.  Peak temp.: 260 °C  Reflow soldering condition: (2 cycles Max.)  Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec.  Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec.  Peak temp.: 260 °C  Reflow soldering condition: (2 cycles Max.)  Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec.  Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec.  Peak temp: 260 °C  Reflow soldering condition: (2 cycles Max.)  Reflow soldering condition: (2 cycles Max.)  Soldering temp.			
Temperature Coefficient of Resistance (TCR)   10.1Ω-100Ω:±200 PPM/°C   10.1Ω-100Ω:±200 PPM/°C   R1(t2-t1)   x 10 <sup>6</sup> (PPM/°C)   R1: Resistance value at room temperature (t1)   R2: Resistance value at room temperature (t1)   R2: Resistance value at room temp. plus 100 °C (t2) (Sub-clause 4.8)   Permanent resistance change after the application of a potential of 2.5 times (Sub-clause 4.13)   Permanent resistance change after the application of a potential of 2.5 times (Sub-clause 4.13)   Pertangent resistance of solder: 2.45 ±3°C Dipping time solder: 2	Voltage	or modiation break down	I *
Coefficient of Resistance (TCR)	Temperature	10-100 · + 400 PPM/°C	· · · · · · · · · · · · · · · · · · ·
Resistance (TCR)		112 1012 . 1 400 11 W// C	= : : :
TCR    TO10Ω~10MΩ: ± 100 PPM/°C   R1(t2-t1)   R1: Resistance value at room temperature (t1)   R2: Resistance value at room temperature (t1)   R2: Resistance value at room temperature (t1)   R2: Resistance value at room temp. plus 100 °C (t2)   (Sub-clause 4.8)   Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds (Sub-clause 4.13)   Test temperature of solder: 245 ±3°C   Dipping time solder: 2-43 seconds (Sub-clause 4.17)   Wave soldering condition: (2 cycles Max.)   Pre-heat: 100 ~ 120 °C, 30 ± 5 sec.   Suggestion solder temp.: 235 ~ 255 °C, 10 sec. (Max.)   Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec.   Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec.   Peak temp.: 260 °C   Peak temp.: 260		10 10-1000 · + 200 PPM/°C	
For 0201: >100Ω : ± 200 PPM/°C  R1(t2-t1)  R1: Resistance value at room temperature (t1) R2: Resistance value at room temp. plus 100 °C (t2) (Sub-clause 4.8)  Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds (Sub-clause 4.13)  *Solderability  95 % coverage Min.  Soldering Temp. Reference  Electrical characteristics shall be satisfied without distinct deformation in appearance. (95 % coverage Min.)  For heat: 100 ~ 120 °C, 30 ± 5 sec.  Suggestion solder temp.: 235 ~ 255 °C, 10 sec. (Max.)  Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec.  Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec.  Peak temp.: 260 °C  Reflow soldering condition: (2 cycles Max.)  Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec.  Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec.  Peak temp.: 260 °C  Reflow soldering condition: (2 cycles Max.)  The soldering condition: (2 cycles Max.)  The solder ground from the prevaluation of the sec.  Peak temp: 260 °C  Reflow solder temp.: 235 ~ 255 °C, 20 ~ 40 sec.  Peak temp: 260 °C  Reflow solder ground from: (2 cycles Max.)  The solder ground from: (2 cycles Max.)  The solder ground from: (2 cycles Max.)  The solder ground from: (2 cycles Max.)  Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec.  Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec.  Peak temp: 260 °C  Reflow solder ground from: (2 cycles Max.)  The soldering from tip temperature should be less than 300°C and maximum contract time should be 5 sec.  Dip the resistor into a solder bath having a temperature of 260°C±3°C and hold it for 10±1 seconds.		10:111 10011 : _ 200 : : !!!, ' d	SECOND SE
For 0201:>100Ω:±200 PPM/°C  R1: Resistance value at room temperature (t1) R2: Resistance value at room temperature (t1) R2: Resistance value at room temp. plus 100 °C (t2) (Sub-clause 4.8)  Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds (Sub-clause 4.17)  *Solderability  *Soldering Electrical characteristics shall be satisfied without distinct deformation in appearance. (95 % coverage Min.)  *Soldering Condition: (2 cycles Max.) Pre-heat: 100 ~ 120 °C, 30 ± 5 sec. Suggestion solder temp.: 235 ~ 255 °C, 10 sec. (Max.) Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec. Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec. Peak temp.: 260 °C  **Peak temp.: 260 °C  **Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec. Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec. Peak temp.: 260 °C  **Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec. Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec. Peak temp.: 260 °C  **Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec. Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec. Peak temp.: 260 °C  **Temperature profile for evaluation.**  **Hand soldering condition: The soldering into it by temperature should be less than 300 °C and maximum contract time should be 5 sec.  Dip the resistor into a solder bath having a temperature of 260 °C±3 °C and hold it for 10±1 seconds.	(1011)	1010~10MO · + 100 PPM/°C	x 10° (PPM/°C)
Resistance change rate is:   25% (2.0% + 0.1Ω) Max.		10112 101112 . 1 100 1 1 111/1 G	R1(t2-t1)
Soldering Reference  PPM/°C  Resistance change rate is:  ± 5% (2.0% + 0.1Ω) Max.  ± 1% (1.0% + 0.1Ω) Max.  Solderability  *Solderability  *Soldering  Electrical characteristics shall be satisfied without distinct deformation in appearance.  (95 % coverage Min.)  Fre-heat: 100 ~ 120 °C, 30 ± 5 sec.  Suggestion solder temp.: 235 ~ 255 °C, 10 sec. (Max.)  Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec.  Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec.  Peak temp.: 260 °C  Reflow soldering condition:  Hand soldering condition:  The soldering iron tip temperature should be less than 300°Cand maximum contract time should be 5 sec.  Dip the resistor into a solder bath having a temperature of 260°C±3°C and hold it for 10±1 seconds.		For 0201: >1000 : + 200	R1: Resistance value at room temperature
R2: Resistance value at room temp. plus 100 °C (t2) (Sub-clause 4.8)  Short Term Overload ± 5% (2.0% + 0.1Ω) Max. ± 1% (1.0% + 0.1Ω) Max. application of a potential of 2.5 times RCWV for 5 seconds (Sub-clause 4.13)  *Solderability 95 % coverage Min.  Test temperature of solder: 245 ±3°C Dipping time solder: 2-3 seconds (Sub-clause 4.13)  Wave soldering condition: (2 cycles Max.) Pre-heat: 100 ~ 120 °C, 30 ± 5 sec. (Max.) Pre-heat: 200 °C Reflow soldering condition: (2 cycles Max.) Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec. Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec. Peak temp.: 260 °C  Reflow soldering condition: The soldering iron tip temperature should be less than 300°C and maximum contract time should be 5 sec.  Soldering Heat £(1%+0.05Ω) Max.  Dip the resistor into a solder bath having a temperature of 260°C±3°C and hold it for 10±1 seconds.			(t1)
Short Term Overload  *Solderability  *Soldering Temp. Reference  Soldering Temp. Reference  Soldering Temp. Reference  *A Coverage Min.  *Soldering Temp. Reference  Soldering Temp. Reference  *A Coverage Min.  Soldering Temp. Reference  *A Coverage Min.  *Soldering Temp. Reference  *A Coverage Min.  *Soldering Temp. Reference  *A Coverage Min.  *A Cov			R2: Resistance value at room temp. plus
Short Term Overload   ± 5% (2.0% + 0.1Ω) Max. ± 1% (1.0% + 0.1Ω) Max. ± 1% (1.0% + 0.1Ω) Max.   ± 1% (1.0% + 0.1Ω) Max.   ± 1% (1.0% + 0.1Ω) Max.   Electrical characteristics shall be satisfied without distinct deformation in appearance. (95 % coverage Min.)   Peak temp.: 235 ° 255 °C, 10 sec. (Max.)   Pre-heat: 150 ° 180 °C, 90 ° 120 sec.   Suggestion solder temp.: 235 ° 255 °C, 20 ° 40 sec.   Peak temp.: 260 °C   Peak te			100 °C (t2)
Soldering Temp. Reference   Soldering Conversage Min.   Soldering Temp. (95 % coverage Min.)   Soldering Condition: (2 cycles Max.)   Pre-heat: 100 ~ 120 °C, 30 ± 5 sec.   Suggestion solder temp.: 235 ~ 255 °C, 10 sec. (Max.)   Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec.   Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec.   Peak temp.: 260 °C   Peak temp.: 26			(Sub-clause 4.8)
*Solderability   95 % coverage Min.   Test temperature of solder: 245 ±3°C Dipping time solder: 2-3 seconds (Sub-clause 4.17)    Soldering Temp.   Electrical characteristics shall be satisfied without distinct deformation in appearance. (95 % coverage Min.)   Pre-heat: 100 ~ 120 °C, 30 ± 5 sec.    Suggestion solder temp.: 235 ~ 255 °C, 10 sec. (Max.)   Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec.   Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec.   Peak temp.: 260 °C   Peak temp.: 260 °C   Peak temp.: 250 °C   Peak temp.: 235 °C 255 °C   Peak temp.: 250 °C   Peak temp.: 25	Short Term	Resistance change rate is:	Permanent resistance change after the
*Solderability 95 % coverage Min.  *Soldering Temp.  Reference Shall be satisfied without distinct deformation in appearance.  (95 % coverage Min.)  *Soldering Temp.  Reference Shall be satisfied without distinct deformation in appearance.  (95 % coverage Min.)  *Soldering Temp.  Reference Shall be satisfied without distinct deformation in appearance.  (95 % coverage Min.)  *Soldering Condition: (2 cycles Max.)  *Pre-heat : 100 ~ 120 °C, 30 ± 5 sec.  *Suggestion solder temp.: 235 ~ 255 °C, 10 sec. (Max.)  *Pre-heat : 150 ~ 180 °C, 90 ~ 120 sec.  *Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec.  *Peak temp.: 260 °C  **Peak temp.: 260 °C  **Peak temp.: 260 °C  **Peak temp.: 260 °C  **Temperature profile for evaluation  **Hand soldering condition:  The soldering iron tip temperature should be less than 300 °C and maximum contract time should be 5 sec.  **Soldering Heat Limit All Solder Bath having a temperature of 260 °C±3 °C and hold it for 10±1 seconds.	Overload	± 5% (2.0% + 0.1Ω) Max.	application of a potential of 2.5 times
*Solderability 95 % coverage Min.  Test temperature of solder : 245 ±3°C Dipping time solder : 2-3 seconds (Sub-clause 4.17)  Soldering Temp. Reference Shall be satisfied without distinct deformation in appearance. (95 % coverage Min.)  Pre-heat : 100 ~ 120 °C, 30 ± 5 sec. Suggestion solder temp.: 235 ~ 255 °C, 10 sec. (Max.) Peak temp.: 260 °C Reflow soldering condition: (2 cycles Max.) Pre-heat : 150 ~ 180 °C, 90 ~ 120 sec. Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec. Peak temp.: 260 °C  Peak temp:: 260 °C  **Temperature profile for evaluation**  Hand soldering condition: The soldering iron tip temperature should be less than 300°C and maximum contract time should be 5 sec.  Soldering Resistance change rate is: ±(1%+0.05Ω) Max.  Test temperature of solder : 245 ±3°C Dipping time solder : 2-3 seconds (Sub-clause 4.17)  **Wave soldering condition: (2 cycles Max.) Pre-heat : 100 ~ 120 °C, 30 ± 5 sec. Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec. Peak temp:: 260 °C  **Temperature profile for evaluation**  Hand soldering condition: The soldering iron tip temperature should be less than 300°C and maximum contract time should be 5 sec.  Dip the resistor into a solder bath having a temperature of 260°C±3°C and hold it for 10±1 seconds.		$\pm$ 1% (1.0% + 0.1Ω) Max.	RCWV for 5 seconds
Dipping time solder : 2-3 seconds (Sub-clause 4.17)  Soldering Temp.  Reference  Beference  Begestion solder temp.: 235 ~ 255 °C, 10 sec. (Max.)  Beak temp.: 260 °C  Beffow soldering condition: (2 cycles Max.)  Beak temp.: 260 °C  Beffow soldering condition: (2 cycles Max.)  Beak temp.: 260 °C  Beak temp.: 260 °			(Sub-clause 4.13)
Soldering Temp. Reference  Electrical characteristics shall be satisfied without distinct deformation in appearance. (95 % coverage Min.)  Pre-heat: 100 ~ 120 °C, 30 ± 5 sec. Suggestion solder temp.: 235 ~ 255 °C, 10 sec. (Max.) Peak temp.: 260 °C Reflow soldering condition: (2 cycles Max.) Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec. Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec. Peak temp.: 260 °C Peak temp.: 260 °C Peak temp.: 260 °C Peak temp.: 235 ~ 255 °C, 20 ~ 40 sec. Peak temp.: 260 °C  The peak temp.: 260 °C  Pre-Heating time  Temperature profile for evaluation  Hand soldering condition: The soldering iron tip temperature should be less than 300 °C and maximum contract time should be 5 sec.  Soldering Heat  Resistance change rate is: ±(1%+0.05Ω) Max.  Dip the resistor into a solder bath having a temperature of 260 °C±3 °C and hold it for 10±1 seconds.	*Solderability	95 % coverage Min.	Test temperature of solder : 245 ±3°C
Electrical characteristics shall be satisfied without distinct deformation in appearance. (95 % coverage Min.)   Pre-heat : 100 ~ 120 °C, 30 ± 5 sec.   Suggestion solder temp.: 235 ~ 255 °C, 10 sec. (Max.)   Peak temp.: 260 °C   Reflow soldering condition: (2 cycles Max.)   Pre-heat : 150 ~ 180 °C, 90 ~ 120 sec.   Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec.   Peak temp.: 260 °C			Dipping time solder : 2-3 seconds
Shall be satisfied without distinct deformation in appearance. (95 % coverage Min.)  Pre-heat: 100 ~ 120 °C, 30 ± 5 sec. Suggestion solder temp.: 235 ~ 255 °C, 10 sec. (Max.) Peak temp.: 260 °C Reflow soldering condition: (2 cycles Max.) Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec. Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec. Peak temp.: 260 °C  Suggestion solder ing condition: The soldering condition: The soldering condition: The soldering iron tip temperature should be less than 300°C and maximum contract time should be 5 sec.  Soldering Heat  Resistance change rate is: ±(1%+0.05Ω) Max.  Dip the resistor into a solder bath having a temperature of 260°C±3°C and hold it for 10±1 seconds.			(Sub-clause 4.17)
Reference  distinct deformation in appearance. (95 % coverage Min.)  Suggestion solder temp.: 235 ~ 255 °C, 10 sec. (Max.)  Peak temp.: 260 °C  Reflow soldering condition: (2 cycles Max.)  Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec.  Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec.  Peak temp.: 260 °C  Peak temp.: 260 °C  Peak temp.: 260 °C  Temperature profile for evaluation  Hand soldering condition:  The soldering iron tip temperature should be less than 300°C and maximum contract time should be 5 sec.  Soldering  Heat  Resistance change rate is: ±(1%+0.05Ω) Max.  Dip the resistor into a solder bath having a temperature of 260°C±3°C and hold it for 10±1 seconds.	Soldering	Electrical characteristics	Wave soldering condition: (2 cycles Max.)
appearance. (95 % coverage Min.)  sec. (Max.) Peak temp.: 260 °C Reflow soldering condition: (2 cycles Max.) Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec. Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec. Peak temp.: 260 °C  (**C) Peak: 260°* Library 2cne*  Temperature profile for evaluation  Hand soldering condition: The soldering iron tip temperature should be less than 300°C and maximum contract time should be 5 sec.  Soldering Heat  Resistance change rate is: ±(1%+0.05Ω) Max.  Dip the resistor into a solder bath having a temperature of 260°C±3°C and hold it for 10±1 seconds.	Temp.	shall be satisfied without	Pre-heat : 100 ~ 120 °C, 30 ± 5 sec.
Peak temp.: 260 °C Reflow soldering condition: (2 cycles Max.) Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec. Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec. Peak temp.: 260 °C  (C) Peak: 260 °C	Reference	distinct deformation in	Suggestion solder temp.: 235 ~ 255 °C, 10
Reflow soldering condition: (2 cycles Max.)  Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec. Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec.  Peak temp.: 260 °C  (C) 250 200 190 190 190 190 190 190 190 190 190 1		appearance.	sec. (Max.)
Max.) Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec. Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec. Peak temp.: 260 °C   Temperature profile for evaluation  Hand soldering condition: The soldering iron tip temperature should be less than 300°Cand maximum contract time should be 5 sec.  Soldering Heat  Resistance change rate is: ±(1%+0.05Ω) Max.   Hand solder ing iron to a solder bath having a temperature of 260°C±3°C and hold it for 10±1 seconds.		(95 % coverage Min.)	Peak temp.: 260 °C
Pre-heat: 150 ~ 180 °C, 90 ~ 120 sec. Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec. Peak temp.: 260 °C   Temperature profile for evaluation  Hand soldering condition:  The soldering iron tip temperature should be less than 300 °C and maximum contract time should be 5 sec.  Soldering Heat  Pre-heat: 250 °C, 20 ~ 40 sec. Peak temp.: 260 °C  Temperature profile for evaluation  Hand soldering condition:  The soldering iron tip temperature should be less than 300 °C and maximum contract time should be 5 sec.  Dip the resistor into a solder bath having a temperature of 260 °C±3 °C and hold it for 10±1 seconds.			Reflow soldering condition: (2 cycles
Suggestion solder temp.: 235 ~ 255 °C, 20 ~ 40 sec.  Peak temp.: 260 °C   (**C)  236 **C - 255 **C - 205			1
40 sec. Peak temp.: 260 °C  Peak: 260 °C (Max)  Peak: 260 °C (Max)  Peak: 260 °C (Max)  Pre Heating Zone  190  190  190  190  190  190  190  19			
Peak temp.: 260 °C  (C)  236 °C - 255 °C - 255 °C - 235 °C - 255			
Peak: 280°C (Max)  Peak: 280°C (Max)  Pre Heating Zone  180°C  Pre Heating Zone  190  Temperature profile for evaluation  Hand soldering condition:  The soldering iron tip temperature should be less than 300°C and maximum contract time should be 5 sec.  Soldering  Resistance change rate is:  ±(1%+0.05Ω) Max.  Dip the resistor into a solder bath having a temperature of 260°C±3°C and hold it for 10±1 seconds.			
Temperature profile for evaluation  Hand soldering condition:  The soldering iron tip temperature should be less than 300°Cand maximum contract time should be 5 sec.  Soldering  Heat  Existence change rate is:  ±(1%+0.05Ω) Max.  Dip the resistor into a solder bath having a temperature of 260°C±3°C and hold it for 10±1 seconds.			Peak temp.: 260 °C
Temperature profile for evaluation  Hand soldering condition:  The soldering iron tip temperature should be less than 300°Cand maximum contract time should be 5 sec.  Soldering  Heat  Experature of 260°C±3°C and hold it for 10±1 seconds.			Peak: 280 C (Max)
Temperature profile for evaluation  Hand soldering condition:  The soldering iron tip temperature should be less than 300°Cand maximum contract time should be 5 sec.  Soldering  Heat  ±(1%+0.05Ω) Max.  Dip the resistor into a solder bath having a temperature of 260°C±3°C and hold it for 10±1 seconds.			235 C - 255 C
Temperature profile for evaluation  Hand soldering condition:  The soldering iron tip temperature should be less than 300°Cand maximum contract time should be 5 sec.  Soldering  Heat  Experiment to the soldering iron tip temperature should be less than 300°C and maximum contract time should be 5 sec.  Dip the resistor into a solder bath having a temperature of 260°C±3°C and hold it for 10±1 seconds.			Pre Heating Zone
$\frac{100}{\text{Soldering 2ons}}$ Heating time Temperature profile for evaluation Hand soldering condition: The soldering iron tip temperature should be less than 300°Cand maximum contract time should be 5 sec.  Soldering Heat $\frac{100}{\text{Heating time}}$ The soldering iron tip temperature should be less than 300°Cand maximum contract time should be 5 sec.  Dip the resistor into a solder bath having a temperature of 260°C±3°C and hold it for 10±1 seconds.			
$\frac{\text{Heating time}}{\text{Temperature profile for evaluation}} \\ \frac{\text{Hand soldering condition:}}{\text{The soldering iron tip temperature should be less than 300°Cand maximum contract time should be 5 sec.}}\\ \text{Soldering} \\ \text{Resistance change rate is:} \\ \frac{\pm (1\% + 0.05\Omega) \text{ Max.}}{\text{Max.}} \\ \frac{10\pm 1 \text{ seconds.}}{\text{Soldering 2one}} \\ \frac{\text{Temperature profile for evaluation}}{\text{Temperature profile for evaluation}} \\ \text{The soldering condition:}} \\ \text{The soldering condition:}} \\ \text{The soldering iron tip temperature should be less than 300°Cand maximum contract time should be 5 sec.}} \\ \text{Dip the resistor into a solder bath having a temperature of 260°C±3°C and hold it for 10±1 seconds.}} \\ \text{The soldering condition:}} \\ \text{The soldering iron tip temperature should be less than 300°Cand maximum contract time should be 5 sec.} \\ \text{The soldering iron tip temperature of 260°C±3°C and hold it for 10±1 seconds.}} \\ \text{The soldering iron tip temperature should be less than 300°Cand maximum contract time should be 5 sec.} \\ \text{The soldering iron tip temperature of 260°C±3°C and hold it for 10±1 seconds.}} \\ \text{The soldering iron tip temperature of 260°C±3°C and hold it for 10±1 seconds.}} \\ \text{The soldering iron tip temperature of 260°C±3°C and hold it for 10±1 seconds.}} \\ \text{The soldering iron tip temperature of 260°C±3°C and hold it for 10±1 seconds.}} \\ \text{The soldering iron tip temperature of 260°C±3°C and hold it for 10±1 seconds.}} \\ \text{The soldering iron tip temperature of 260°C±3°C and hold it for 10±1 seconds.} \\ \text{The soldering iron tip temperature of 260°C±3°C and hold it for 10±1 seconds.} \\ \text{The soldering iron tip temperature of 260°C±3°C and hold it for 10±1 seconds.} \\ \text{The soldering iron tip temperature of 260°C±3°C and hold it for 10±1 seconds.} \\ \text{The soldering iron tip temperature of 260°C±3°C and hold it for 10±1 seconds.} \\ \text{The soldering iron tip temperature of 260°C±3°C and hold it for 10±1 seconds.} \\ \text{The soldering iron tip temperature of 260°C±3°C and hold it for 10±1 seconds.} \\ The soldering iron tip $			
$\frac{1}{\text{Temperature profile for evaluation}} \\ \text{Hand soldering condition:} \\ \text{The soldering iron tip temperature should be less than 300°Cand maximum contract time should be 5 sec.} \\ \text{Soldering} \\ \text{Resistance change rate is:} \\ \text{Example 100 Max.} \\ \text{Dip the resistor into a solder bath having a temperature of 260°C±3°C and hold it for 10±1 seconds.} \\ \text{Temperature profile for evaluation.} \\ Te$			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			
$\begin{tabular}{lll} \begin{tabular}{lll} $			
be less than 300°Cand maximum contract time should be 5 sec.  Soldering Resistance change rate is: $\pm (1\%+0.05\Omega)$ Max.  Dip the resistor into a solder bath having a temperature of 260°C $\pm$ 3°C and hold it for 10 $\pm$ 1 seconds.			
be less than 300°Cand maximum contract time should be 5 sec.  Soldering Resistance change rate is: $\pm (1\%+0.05\Omega)$ Max.  Dip the resistor into a solder bath having a temperature of 260°C $\pm$ 3°C and hold it for 10 $\pm$ 1 seconds.			_
Soldering Resistance change rate is: Dip the resistor into a solder bath having a temperature of $260^{\circ}\text{C}\pm3^{\circ}\text{C}$ and hold it for $10\pm1$ seconds.			
Heat $\pm (1\%+0.05\Omega)$ Max. temperature of 260°C±3°C and hold it for $10\pm1$ seconds.			time should be 5 sec.
Heat $\pm (1\%+0.05\Omega)$ Max. temperature of 260°C±3°C and hold it for $10\pm1$ seconds.	Soldering	Resistance change rate is:	Dip the resistor into a solder bath having a
10±1 seconds.	_	_	
(Sub-clause 4.19)		·	-
(Jub-clau56 4.10)			(Sub-clause 4.18)



### Performance Specification: (Continued)

Characteristic	Specification	Test Methods				
		(JIS C 5201-1)				
Temperature	Resistance change rate is	Resistance cha	ange after contir	nuous		
Cycling		5 cycles for duty cycle specified below:				
	$\pm$ 5% (1.0% + 0.05Ω) Max.	Step	Temperature	Time		
	$\pm$ 1% (0.5% + 0.05Ω) Max.	1	-55°C±3°C	30 mins		
		2	Room Temp	10~15 mins		
		3	155°C±2°C	30 mins		
		4	Room Temp	10~15 mins		
		(Sub-clause 4.	19)			
Load Life in	Resistance change rate is	Resistance change after 1,000 hours (1.5				
Humidity	± 5% (3.0% + 0.1Ω) Max.	hours "on", 0.5 hour "off" ) at RCWV in a				
	$\pm$ 1% (1.0% + 0.1Ω) Max.	humidity char	mber controlled	at 40°C ± 2°C		
		and 90 to 95 9	% relative humid	ity		
		(Sub-clause 4.	24.2.1)			
Load Life	Resistance change rate is	Permanent re	sistance change	after 1,000		
	$\pm$ 5% (3.0% + 0.1Ω) Max.	hours operati	ng at RCWV, wit	h duty cycle		
	$\pm$ 1% (1.0% + 0.1Ω) Max.	of (1.5 hours"	on", 0.5 hour"of	f") at 70°C ±		
		2°C ambient				
		(Sub-clause 4.25.1)				
Terminal	Resistance change rate is	Twist of Test I	Board :			
Bending	$\pm$ (1.0% + 0.05Ω) Max.	Y/X = 5/90 mr	n for 10 seconds	i		
		(Sub-clause 4.	33)			
The resistors of	$\int \Omega \Omega$ only can do the characteris	tic noted of *				

#### **Environment Related Substance**

This product complies to EU RoHS directive, EU PAHs directive, EU PFOS directive and Halogen free. Ozone layer depleting substances are not used in our manufacturing process of this product.

This product is not manufactured using Chloro fluorocarbons (CFCs), Hydrochlorofluorocarbons (HCFCs), Hydrobromofluorocarbons (HBFCs) or other ozone depleting substances in any phase of the manufacturing process.

### **Storage Condition**

The performance of these products, including the solderability, is guaranteed for a year from the date of arrival at your company, provided that they remain packed as they were when delivered and stored at a temperature of 25°C  $\pm$  10°C and a relative humidity of 60%RH  $\pm$  10%RH, chemical and dust free atmosphere

Even within the above guarantee periods, do not store these products in the following conditions otherwise, their electrical performance and/or solderability may be deteriorated, and the packaging materials (e.g. taping materials) may be deformed or deteriorated, resulting in mounting failures.

- 1. In salty air or in air with a high concentration of corrosive gas, such as Cl2, H2S, NH3, SO2, or NO2
- 2. In direct sunlight



# Marking

E24 series 0603-2512 3 Digits – first two digits denote significant figures of resistance and third digit denotes number of zeros thereafter. EG

Marking for E96 Series 0805 - 2512 4 digits – First three digits denote significant figures of resistance and fourth digit denotes number of zeros thereafter. EG.

For ohmic values below 100R letter "R" denotes decimal point. EG

0201 and 0402 size chips are not marked

0603 E96 3 digit marking.

Resistance Code from table on next page, and Multiplier code from table below

Multiplier Code

Code	Α	В	С	D	E	F	G	Η	Χ	Υ	Z
Mult.	10°	10¹	10 <sup>2</sup>	10³	10 <sup>4</sup>	10 <sup>5</sup>	10 <sup>6</sup>	10 <sup>7</sup>	10 <sup>-1</sup>	10-2	10-3



#### Resistance Code

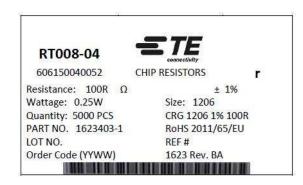
Value	Code	Value	Code	Value	Code	Value	Code	Value	Code
100	01	162	21	261	41	422	61	681	81
102	02	165	22	267	42	432	62	698	82
105	03	169	23	274	43	442	63	715	83
107	04	174	24	280	44	453	64	732	84
110	05	178	25	287	45	464	65	750	85
113	06	182	26	294	46	475	66	768	86
115	07	187	27	301	47	487	67	787	87
118	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	8	1
150	18	243	38	392	58	634	78		
154	19	249	39	402	59	649	79		
158	20	255	40	412	60	665	80	465	

### Label

Label shall be marked with the following item:

- A. Nominal Resistance and Resistance Tolerance
- B. Power Rating and Size
- C. Quantity and description
- D. Part No.
- E. Lot No.

Ex.

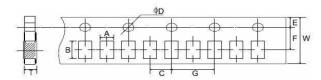




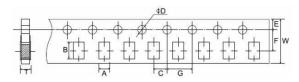
# **Packing Specification:**

Tape dimensions (mm)

# A. Paper Taping

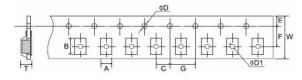


Type	A±0.2	B±0.2	C±0.05	ØD+0.1	E±0.1	F±0.05	G±0.1	W±0.2	T±0.1
				-0					
0201	0.40	0.70	2.0	1 [	1 75	2 5	4.0	0.0	0.42
	±0.05	±0.05	2.0	1.5	1.75	3.5	4.0	8.0	0.42
0402	0.65	1.15	2.0	1.5	1.75	3.5	4.0	8.0	0.45



Туре	A±0.2	B±0.2	C±0.05	ØD+0.1	E±0.1	F±0.05	G±0.1	W±0.2	T±0.1
				-0					
0603	1.10	1.90	2.0	1.5	1.75	3.5	4.0	8.0	0.67
0805	1.65	2.40	2.0	1.5	1.75	3.5	4.0	8.0	0.81
1206	2.00	3.60	2.0	1.5	1.75	3.5	4.0	8.0	0.81
1210	2.80	3.50	2.0	1.5	1.75	3.5	4.0	8.0	0.75

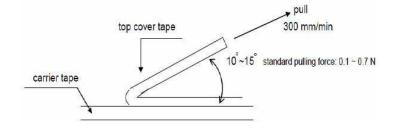
### B. Embossed Taping



Туре	Α	В	С	ØD+0.1	ØD1+0.1	E	F	G	W	Т
	±0.2	±0.2	±0.05	-0	-0	±0.1	±0.05	±0.1	±0.2	±0.1
2010	2.90	5.60	2.0	1.5	1.5	1.75	5.5	4.0	12.0	1.0
2512	3.50	6.70	2.0	1.5	1.5	1.75	5.5	4.0	12.0	1.0

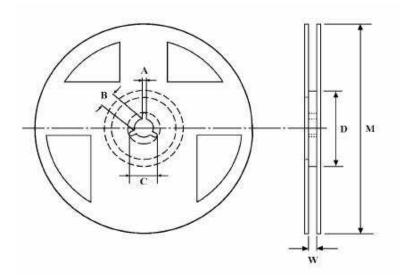
<sup>\*</sup> Peeling Strength of Top Cover Tape

Test Condition: 0.1 to 0.7 N at a peel-off speed of 300 mm / min.





# Reel Dimension (mm)



Type	Taping	Reel	A ±0.5	B ±0.5	C ±0.5	D±1	M ±1	W ±1
		Quantity						
0201	Papar	10,000	2	13	21	60	178	10
0402	Paper	10,000	2	13	21	60	178	10
0603	Paper	5,000	2	13	21	60	178	10
0805	Paper	5,000	2	13	21	60	178	10
1206	Paper	5,000	2	13	21	60	178	10
1210	Paper	5,000	2	13	21	60	178	10
2010	Embossed	4,000	2	13	21	60	178	13.8
2512	Embossed	4,000	2	13	21	60	178	13.8

### **How To Order**

CRG	0603	F	10K
Common Part	Size	Tolerance	Resistance Value
	0201		1 ohm (1Ω) 1R0
	0402		
	0603		1K ohm (1000Ω) 1K0
CRG - Thick Film	0805	F - ±1%	
Chip Resistor	1206		100K ohm (100000Ω)
	1210		100K
	2010		
	2512		1M ohm (1000000Ω) 1M0

# 单击下面可查看定价,库存,交付和生命周期等信息

# >>TE Connectivity(泰科)