PART SPECIFICATION

Description: CRGV - High Voltage Thick Film Chip Resistors

Tyco Electronics Family

CRGV 0603	1/16W	+/- 1% & 5%	100KΩ ~ 10MΩ T/R
CRGVP 0603	1/10W-S	+/- 1% & 5%	100KΩ ~ 10MΩ T/R
CRGV 0805	1/10W	+/- 1% & 5%	100KΩ ~ 10MΩ T/R
CRGVP 0805	1/8W-S	+/- 1% & 5%	100KΩ ~ 10MΩ T/R
CRGV 1206	1/8W	+/- 1% & 5%	100KΩ ~ 10MΩ T/R
CRGVP 1206	1/4W-S	+/- 1% & 5%	100KΩ ~ 10MΩ T/R
CRGV 2010	1/2W	+/- 1% & 5%	50KΩ ~ 10MΩ T/R
CRGV 2512	1W	+/- 1% & 5%	50KΩ ~ 10MΩ T/R

Approved by

Parts corresponding to RoHS Compliant: 2005-Apr.-1

Approved	Checked	Prepared
T Northcott	A. Pile	Subhash M

Rev 2 2013/02/14

CRGV - High Voltage Thick Film Chip Resistors

1. Scope:

This specification for approval relates to High Voltage Thick Film Chip Resistors manufactured by Tyco Electronics specifications.

2. Type designation:

The type designation shall be in the following form:

Ex.

Type	Power Rating	Resistance tolerance	Nominal Resistanc
CRGV 0603	1/16W	F - 1% J - 5%	1K0
CRGVP 0603	1/10W-S		
CRGV 0805	1/10W		
CRGVP 0805	1/8W-S		
CRGV 1206	1/8W		
CRGVP 1206	1/4W-S		
CRGV 2010	1/2W		
CRGV 2512	1W		

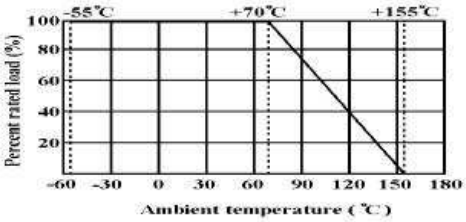
3. Ratings:

Type		CRGV0603	CRGV0805	CRGV1206	CRGV2010	CRGV2512
Power Rating	CRGV	0.0625W	0.10W	0.125W	0.50W	1W
	CRGVP	0.10W	0.125W	0.25W	-	-
Maximum Working Voltage		200 V	400 V	500 V	2000 V	3000 V
Maximum Overload Voltage		400 V	800 V	1000 V	3000 V	4000 V
Dielectric Withstanding Voltag		300 V	500 V	500 V	500 V	500 V
Temperature Range		-55°C +155°C				
Ambient Temperature		70°C				

3.1 Power rating:

Resistors shall have a power rating based on continuous load operation at an ambient temperature of 70°C For temperature in excess of 70°C, the load shall be derated as shown in figure 1.

Figure 1



3.2 Voltage Rating:

Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial-line frequen and waveform corresponding to the power rating , as determined from the following formula :

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

Where: RCWV = Rated DC or RMS AC continuous working voltage at commercial-line frequency and waveform (volt)

P = Power Rating (watt)

R = Nominal Resistance (ohm)

In no case shall the rated DC or RMS AC continuous working voltage be greater than the applicable maximum value.

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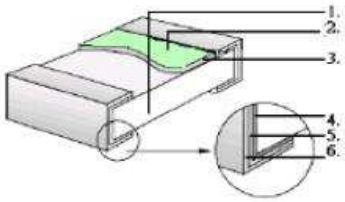
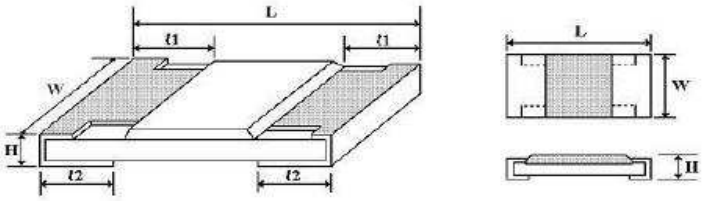
4. Construction :



1. High purity alumima substrate
2. Protective coating
3. Resistive element
4. Termination (Inner) Ni / Cr
5. Termination (Between) Ni barrier
6. Termination (Outer) Sn

5. Power rating and dimensions



Dimension :

Type	Dimension (mm)				
	L	W	H	ℓ1	ℓ2
0603	1.60 ± 0.10	0.80 + 0.15 - 0.10	0.45 ± 0.10	0.30 ± 0.20	0.30 ± 0.20
0805	2.00 ± 0.15	1.25 + 0.15 - 0.10	0.55 ± 0.10	0.40 ± 0.20	0.40 ± 0.20
1206	3.10 ± 0.15	1.55 + 0.15 - 0.10	0.55 ± 0.10	0.45 ± 0.20	0.45 ± 0.20
2010	5.00 ± 0.10	2.50 + 0.15 - 0.10	0.55 ± 0.10	0.60 ± 0.25	0.50 ± 0.20
2512	6.35 ± 0.10	3.20 + 0.15 - 0.10	0.55 ± 0.10	0.60 ± 0.25	0.50 ± 0.20

Power Rating :

Type	Power Rating at 70°C	Tolerance %	Resistance Range	Standard Series
0603	0.10W-S 0.0625W	± 1	100KΩ ~ 10MΩ	E-96
		± 5	100KΩ ~ 10MΩ	E-24
0805	0.125W-S 0.1W	± 1	100KΩ ~ 10MΩ	E-96
		± 5	100KΩ ~ 10MΩ	E-24
1206	0.25W-S 0.125W	± 1	100KΩ ~ 10MΩ	E-96
		± 5	100KΩ ~ 10MΩ	E-24
2010	0.50W	± 1	50KΩ ~ 10MΩ	E-96
		± 5	50KΩ ~ 10MΩ	E-24
2512	1W	± 1	50KΩ ~ 10MΩ	E-96
		± 5	50KΩ ~ 10MΩ	E-24

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6. Marking :

6.1 Resistors

A. ± 5% Tolerance 0603, 0805, 1206, 2010, 2512: the first two digits are significant figure of resistance and the third onedenoted number of zeros.

Ex.	333	33K

B. For ohmic values below 10 Ω

Ex.	2R2	2.2 ohms

C. For E-96 series [±1% (F) tolerance] in 0603 size 3 digit system (due to space restrictions) please refer to page 8 for coding formula

Ex.	02C	10.2K

D. ±1% Tolerance 0805, 1206, 2010, 2512: 4 Digits, the first three digits are singnificant figures of resistance and the fourth digit denoted number of zeros
.Letter"R" is for decimal point.

Ex.	2701	2.7K

6.2 Labels

Label shall be marked with the following item :

Label shall be marked with the following item :

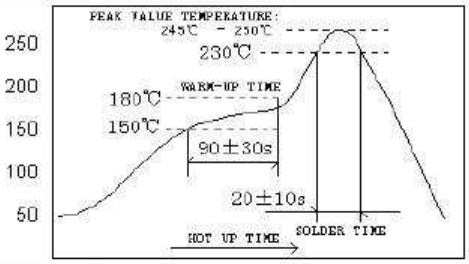
A. Nominal Resistance and Resistance Tolerance
B. Power Rating and Size
C. Quantity
D. Part No.
E. P.O.No.
F. Lot No.

tyco / Electronics
CHIP RESISTORS
NEOHM

RESISTANCE:	100K	Ω	± 5 %
WATTAGE:	1/4W-S	SIZE:	CRGV1206
QUANTITY:	5,000	PCS	Pb-Free
PART NO.:	1879535-1	RoHS	2002/95/EC
LOT NO. :	1234567	REF #	1234567389

High Voltage Thick Film Chip Resistors

7. Performance specification :

Characteristics	Limits	Test Methods (JIS C 5201-1)
Temperature Coeffiicient	± 200 PPM/°C	4.8 Natural resistance change per temp. degree centigrade. $\frac{R_2-R_1}{R_1(t_2-t_1)} \times 10^6$ (PPM/°C) R1: Resistance value at room temperature (t1) R2: Resistance value at room temp. plus 100 °C (t2) Test pattern : Room Temperature(t1), Room temperature +100°C (t2)
Short time overload	Resistance change rate is ±(2.0%+0.1Ω) Maximum	4.13 Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds
Solderability	95 % coverage Minimum	Test temperature of solder : 245 ± 3℃ Dipping time in solder : 2~3 seconds
	Go up tin rate bigger than half of end pole.	Reflow: 
Temperature cycling	Resistance change rate is ± 5% (1.0% + 0.05Ω) Maximu ± 1% (0.5% + 0.05Ω) Maximu	4.19 Resistance change after continuous 5 cycles for duty cycle specified below :

Step	Temperature	Time
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

Humidity (Steady State)	Resistance change rate is ±(3.0%+0.1Ω) Maximum	4.24 Temporary resistance change after 1,000 hours exposure in a humidity test chamber controlled at 40±2°C and 90~95% relative humidity
Load life in Humidty	Resistance change rate is ±(3.0%+0.1Ω) Maxium	7.9 Resistance change after 1,000 hours (1.5 hours "on", 0.5 hour "off") at RCWV in a humidity chamber controlled at 40°C ± 3°C and 90 to 95 % relative humidity
Load Life	Resistance change rate is ±(3.0%+0.1Ω)Max.	4.25.1 Permanent resistance change after 1,000 hours at RCWV, with duty cycle 1.5 hours"on", 0.5 hour"off" at 70°C ± 2°C ambient
Terminal Bending	Resistance change rate is ±(1.0%+0.05Ω)Max.	4.33 Twist of Test Board : Y/X = 3/90 mm for 60 seconds

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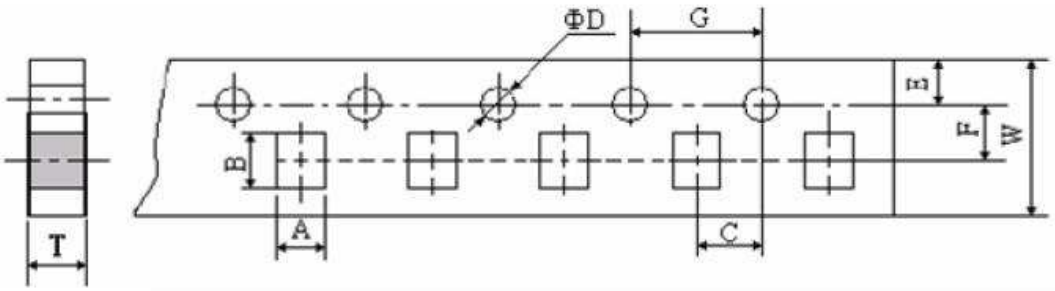
6. Packing specification :

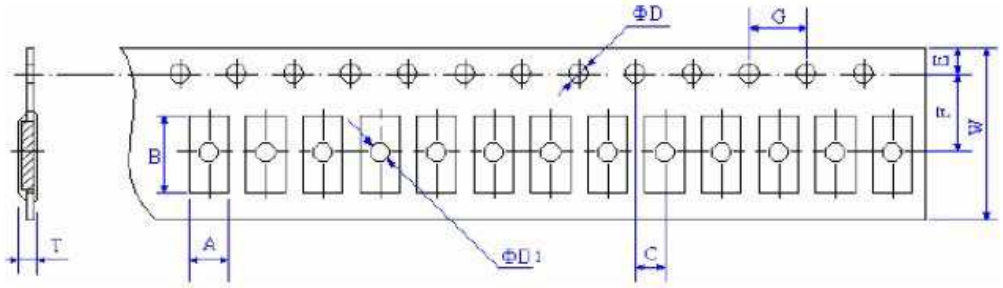
6.1 Taping Dimension (mm)

A. Paper taping



Type	A ± 0.2	B ± 0.2	C ± 0.05	ϕ D +0.1 - 0	E ± 0.1	F ± 0.05	G ± 0.1	W ± 0.2	T ±0.1
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
2010	2.80	5.40	2.0	1.5	1.75	5.5	4.0	12.0	0.75

B. Embossed taping



Type	A ±0.2	B ±0.2	C ±0.05	ϕ D+0.1 -0	E ±0.1	F ±0.05	G ±0.1	W ±0.2	ϕ D1+0.1 -0
2512	3.50	6.70	2.0	1.5	1.75	5.5	4.0	12.0	1.0

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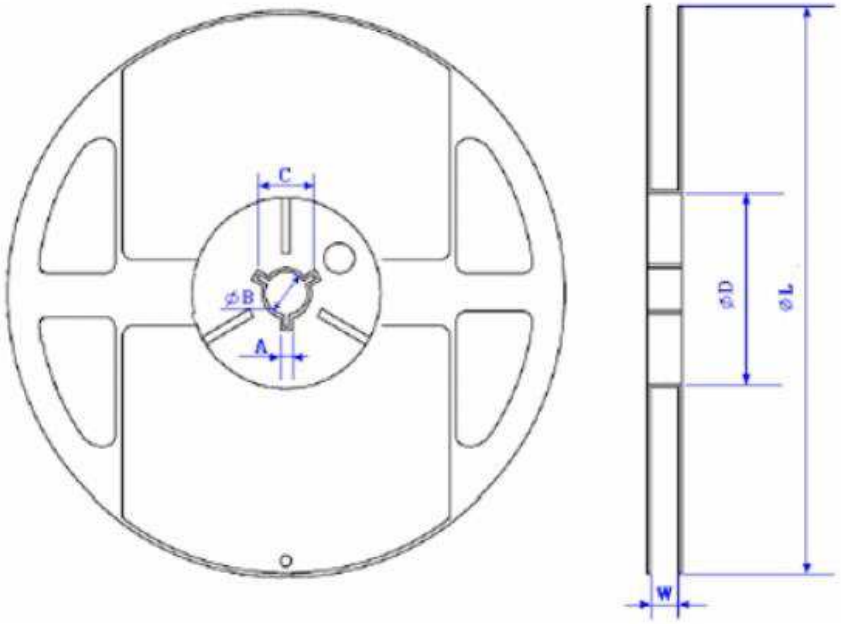
7.2 Reel Dimension (mm)



Type	Packaging	Quantity Per Reel	A ± 0.5	B ± 0.5	C ± 0.5	D ± 1	M ± 2	W ± 1
0603	Paper	5,000 pcs.	2	13	21	60	178	10
0805	Paper	5,000 pcs.	2	13	21	60	178	10
1206	Paper	5,000 pcs.	2	13	21	60	178	10
2010	Paper	4,000 pcs.	2	13	21	60	178	13.8
2512	Embossed	4,000 pcs.	2	13	21	60	178	13.8

High Voltage Thick Film Chip Resistors

Mutiplier Code :

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}

Coding

XX

Resistance Code

Formula

X

Multiplier Code

Example :

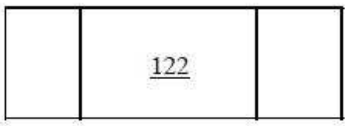
$10.2K\Omega = 102 \times 10^2\ \Omega = 02C$ (02, C)

$33.2\Omega = 332 \times 10^{-1}\ \Omega = 51X$ (51, X)

E96 Marking Code Table

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		

*Marking for 0603 E-96 series, the resistance value that no have multiplier code indicate marking follow this: The first two digits are significant figures of resistance and the third one denoted number of zeros and under line the marking letters.

Ex. 

1.2KΩ

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Explanation of Part Number System