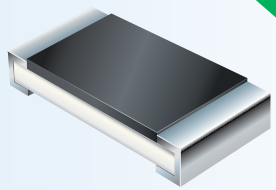
BOURNS®

CRT-G Series

General-Purpose Precision Thin Film Chip Resistors



*RoHS COMPLIANT & **HALOGEN FREE

Features

- Ultra-tight tolerance of ±0.01 %
- Wide resistance range
- Available in multiple package sizes
- RoHS compliant* and halogen free**

Applications

- Current sense
- Precision circuits
- Medical equipment***
- Printers
- Automation equipment
- Navigation equipment

Sustainability

- Small size reduces material use
- High pallet density for lower CO_2
- Energy-saving low-power design
- High efficiency, low power loss
- ISO 14001, low impact energy

Product Overview

The Bourns® CRT-G Series consists of high precision thin film chip resistors designed for applications requiring excellent accuracy, low temperature drift, and stable long-term performance. The series is available in compact package sizes from 01005 through 2512, with resistance tolerances as tight as ±0.01 % and TCR options as low as ±2 ppm/°C, depending on package size and resistance value. These features make the resistor ideal for precision measurement, medical***, industrial, communication, data acquisition, power supply, and high accuracy analog applications.

The Bourns® CRT-G Series is RoHS compliant, halogen free, and lead free, supporting high density and environmentally responsible electronic designs.

Electrical Characteristics (@ T_A = 25 °C Unless Otherwise Noted)

Characteristic	CRT01005G	CRT0201G	CRT0402G	CRT0603G	CRT0805G	CRT1206G	CRT1210G	CRT2010G	CRT2512G
Power Rating @ 70 °C	0.031 W	0.05 W	0.063 W	0.1 W	0.125 W	0.25 W	0.25 W	0.5 W	0.75 W
Operating Temperature Range	-55 to +155 °C								
Derated to Zero Load at	+155 °C								
Maximum Working Voltage	15 V	25 V	50 V	75 V	150 V	200 V			
Maximum Overload Voltage	30 V	50 V	100 V	150 V	300 V	400 V			
Resistance Range (E-96 + E-24 Values)	(See Standard Values Table)								
Temperature Coefficient of Resistance (TCR)	(See Value - TCR Table on Page 3)								

Notes:
- Rated voltage (V) is calculated as √(P × R), and must not exceed the maximum working voltage.
- (H) = High power rating.

Environmental Characteristics

Operating Temperature .....-55 °C to +155 °C
Storage Conditions
Temperature..... +5 °C to +40 °C
Humidity.....20 % to 70 %
Moisture Sensitivity Level..... 1

Contact Information

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*RoHS Directive 2015/863, Mar 31, 2015 and Annex.

**Bourns considers a product to be "halogen free" if (a) the Bromine (Br) content is 900 ppm or less; (b) the Chlorine (Cl) content is 900 ppm or less; and (c) the total Bromine (Br) and Chlorine (Cl) content is 1500 ppm or less.

***Bourns® products have not been specifically designed and tested for FDA Class III applications and their use in such applications is neither recommended nor supported.

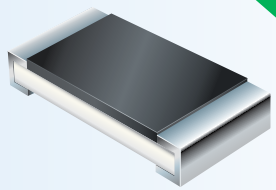
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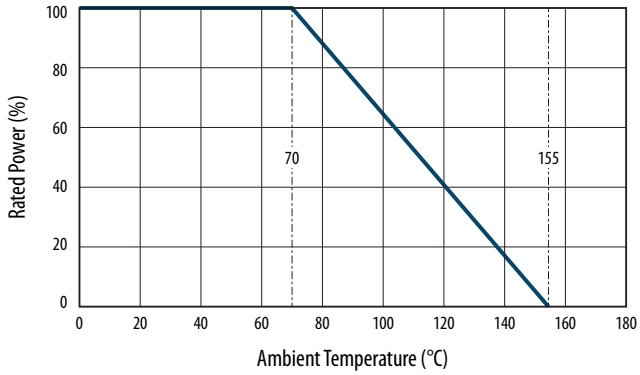
CRT-G Series

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Derating Curve



Typical Part Marking



CRT01005G, CRT0201G, CRT0402G

No marking



CRT0603G

Due to small resistor size, the marking cannot be made by 4 digits. Instead, it is made by 2 digits combined with one English Capital. Below 10 Ω, "R" represent decimal

Example: **01C** = 100 x 102 = 10 KΩ
5R6 = 5.6 Ω



CRT0805G ~ CRT2512G

4 digits; first three digits are significant, fourth digit is number of zeros to follow. Letter R is decimal point.

Example: **1002** = 100 x 10^2 = 10000 = 10 KΩ

How to Order

CRT 1206 G F X - 1000 E P

Model
CRT = Thin Film Chip Resistor

Size

01005	1206
0201	1210
0402	2010
0603	2512
0805	

Category
G = General grade

Resistance Tolerance

P = ±0.01 %	C = ±0.25 %
A = ±0.05 %	D = ±0.5 %
B = ±0.1 %	F = ±1 %

TCR (ppm/°C)

T = ±2	X = ±15
U = ±3	Y = ±25
V = ±5	Z = ±50
W = ±10	

Resistance Value Code
<100 ohms: "R" represents decimal point (example: 24R3 = 24.3 ohms)
≥100 ohms: First three digits are significant. Fourth digit represents number of zeroes to follow (example: 8252 = 82.5K ohms)

Packaging
G = Paper tape on 7-inch plastic reel
01005: 20,000 pcs. per reel
0201, 0402: 10,000 pcs. per reel
0603, 0805, 1206, 1210: 5,000 pcs. per reel
E = Embossed tape on 7-inch plastic reel
2010, 2512: 4,000 pcs. per reel

Termination
P = Tin-plated (RoHS compliant without exemption)

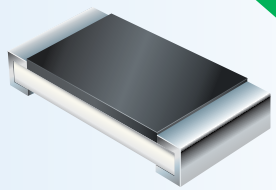
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Value - TCR Table

Model	TCR		Resistance Tolerance (Code)					
	(ppm/°C)	(Code)	±0.01 % (P)	±0.05 % (A)	±0.1 % (B)	±0.25 % (C)	±0.5 % (D)	±1 % (F)
CRT01005G	±25	(Y)	N/A		49.9 Ω to 11.8 KΩ			
	±50	(Z)						
CRT0201G	±10	(W)	N/A	1 KΩ to 14.3 KΩ	203 Ω to 14.3 KΩ			
	±15	(X)						
	±25	(Y)		49.9 Ω to 56 KΩ	10 Ω to 82 KΩ			
CRT0402G	±2	(T)	49.9 Ω to 4.99 KΩ			N/A		
	±3	(U)						
	±5	(V)	49.9 Ω to 12 KΩ		20 Ω to 12 KΩ			
	±10	(W)	49.9 Ω to 56 KΩ		4.7 Ω to 68 KΩ			
	±15	(X)						
	±25	(Y)			4.7 Ω to 332 KΩ	2.49 Ω to 332 KΩ		
	±50	(Z)						
CRT0603G	±2	(T)	49.9 Ω to 15 KΩ			N/A		
	±3	(U)						
	±5	(V)	49.9 Ω to 33 KΩ		20 Ω to 33 KΩ			
	±10	(W)	49.9 Ω to 220 KΩ		4.7 Ω to 332 KΩ			
	±15	(X)						
	±25	(Y)			4.7 Ω to 1 MΩ		2.49 Ω to 1 MΩ	
	±50	(Z)						
CRT0805G	±2	(T)	49.9 Ω to 30 KΩ			N/A		
	±3	(U)						
	±5	(V)	49.9 Ω to 68 KΩ		20 Ω to 68 KΩ			
	±10	(W)	49.9 Ω to 332 KΩ		4.7 Ω to 680 KΩ			
	±15	(X)						
	±25	(Y)			4.7 Ω to 2 MΩ		2.49 Ω to 2 MΩ	
	±50	(Z)						

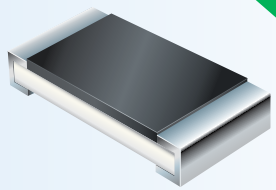
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CRT-G Series

General-Purpose Precision Thin Film Chip Resistors



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Value - TCR Table – Continued

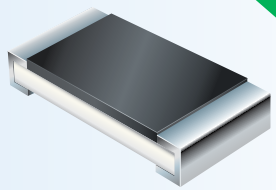
Model	TCR		Resistance Tolerance (Code)					
	(ppm/°C)	(Code)	±0.01 % (P)	±0.05 % (A)	±0.1 % (B)	±0.25 % (C)	±0.5 % (D)	±1 % (F)
CRT1206G	±2	(T)	49.9 Ω to 49.9 KΩ			N/A		
	±3	(U)						
	±5	(V)	49.9 Ω to 100 KΩ		20 Ω to 100 KΩ			
	±10	(W)	49.9 Ω to 499 KΩ		4.7 Ω to 1 MΩ			
	±15	(X)						
	±25	(Y)			4.7 Ω to 3.3 MΩ		2.49 Ω to 3.3 MΩ	
	±50	(Z)						
CRT1210G	±2	(T)	49.9 Ω to 49.9 KΩ			N/A		
	±3	(U)						
	±5	(V)	49.9 Ω to 100 KΩ		20 Ω to 100 KΩ			
	±10	(W)	49.9 Ω to 499 KΩ		10 Ω to 1 MΩ			
	±15	(X)						
	±25	(Y)			4.7 Ω to 3 MΩ			
	±50	(Z)						
CRT2010G	±2	(T)	49.9 Ω to 49.9 KΩ			N/A		
	±3	(U)						
	±5	(V)	49.9 Ω to 100 KΩ		20 Ω to 100 KΩ			
	±10	(W)	49.9 Ω to 499 KΩ		10 Ω to 1 MΩ			
	±15	(X)						
	±25	(Y)			4.7 Ω to 3 MΩ			
	±50	(Z)						
CRT2512G	±2	(T)	49.9 Ω to 49.9 KΩ			N/A		
	±3	(U)						
	±5	(V)	49.9 Ω to 100 KΩ		20 Ω to 100 KΩ			
	±10	(W)	49.9 Ω to 499 KΩ		10 Ω to 1 MΩ			
	±15	(X)						
	±25	(Y)			4.7 Ω to 3 MΩ			
	±50	(Z)						

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CRT-G Series

General-Purpose Precision Thin Film Chip Resistors



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Performance Characteristics

Test Item	Condition of Test	Reference Standard	Requirements		
			CRT0402G ~ CRT2512G	CRT0201G	CRT01005G
Temperature Coefficient of Resistance (TCR)	At +25 °C / -55 °C and +25 °C / +125 °C, +25 °C is the reference temperature	JIS-C-5201-1 4.8 IEC 60115-1 4.8	Refer to Standard Electrical Specifications		
Physical Dimension	Verify physical dimensions to the applicable device specification	JESD22 Method JB-100	Refer to Dimensions		
Short Time Overload	2.5X RCWV or max. overload voltage, whichever is less for 5 seconds	JIS C-5201-1 4.13 IEC 60115-1 4.13	±(0.1 % + 0.05 Ω) No visual damage	±(0.3 % + 0.05 Ω) No visual damage	±(0.5 % + 0.05 Ω) No visual damage
Load Life	70 ±2 °C, RCWV or max. working voltage, whichever is less, for 1000 hrs. with 1.5 hrs "ON" and 0.5 hrs. "OFF"	JIS-C-5201-1 4.25 IEC 60115-1 4.25.1	±(0.1 % + 0.05 Ω) No visual damage	±(0.3 % + 0.05 Ω) No visual damage	±(0.5 % + 0.05 Ω) No visual damage
Damp Heat with Load	40 ±2 °C, 90~95 % R.H. RCWV or max. working voltage, whichever is less, for 1000 hrs. with 1.5 hrs. "ON" and 0.5 hrs. "OFF"	JIS C-5201-1 4.24 IEC 60115-1 4.24	±(0.1 % + 0.05 Ω) No visual damage	±(0.3 % + 0.05 Ω) No visual damage	±(0.5 % + 0.05 Ω) No visual damage
Temperature Cycling	300 cycles (-55 °C to +155 °C) measurement at 24 ±4 hours after test conclusion.	JESD22 Method JA-104	±(0.3 % + 0.05 Ω) No visual damage		
Resistance to Soldering Heat	One reflow cycle according to JEDEC J-STD-020, cool down, then parts are immersed into a molten solder bath with a temperature of 260 °C for a period of 10 ±1 seconds	IPC/JEDEC J-STD-020	±(0.1 % + 0.05 Ω) No visual damage	±(0.3 % + 0.05 Ω) No visual damage	±(0.5 % + 0.05 Ω) No visual damage
Leaching	260 ±5 °C for 30 seconds	JIS C-5201-1 4.18 IEC 60068-2-58 8.2.1	>95 % coverage No Visual damage		

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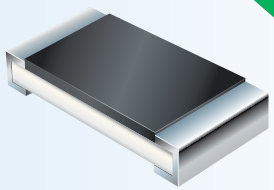
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CRT-G Series

General-Purpose Precision Thin Film Chip Resistors



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Performance Characteristics

Test Item	Condition of Test	Reference Standard	Requirements		
			CRT0402G ~ CRT2512G	CRT0201G	CRT01005G
High Temperature Exposure	At 155 ±5 °C for 1000 hours	JIS C5201-1 4.25 IEC 60068-2-2	±(0.2 % + 0.05 Ω)	±(0.3 % + 0.05 Ω)	±(0.5 % + 0.05 Ω)
Insulation Resistance	Apply 100 VDC for 1 minute	JIS C-5201-1 4.6 IEC 60115-1 4.6	≥10 GΩ		
Solderability	245 ±5 °C for 3 seconds	JIS C-5201-1 4.17 IEC 60115-1 4.17	>95 % coverage No visual damage		
Resistance to Solvent	The tested resistor be immersed into isopropyl alcohol at 20~25 °C for 60 secs. Then the resistor is left in the room for 48 hrs	JIS C-5201-1 4.29	±(0.1 % + 0.05 Ω) No visual damage	±(0.3 % + 0.05 Ω) No visual damage	±(0.5 % + 0.05 Ω) No visual damage
Biased Humidity	1,000 hours; 85 °C / 85 % RH, 10 % of operating power. Measurement at 24 ±4 hours after test conclusion	MIL-STD-202 Method 103	±(0.1 % + 0.05 Ω) No visual damage	±(0.3 % + 0.05 Ω) No visual damage	±(0.5 % + 0.05 Ω) No visual damage
Bending Strength	Bending once for 5 seconds CRT0201G, CRT0402G, CRT0603G, CRT0805G, CRT01005G = 5 mm CRT1206G, CRT1210G = 3 mm CRT2010G, CRT2512G = 2 mm	JIS C-5201-1 4.33 IEC 60115-1 4.33	±(0.1 % + 0.05 Ω) No visual damage	±(0.3 % + 0.05 Ω) No visual damage	±(0.5 % + 0.05 Ω) No visual damage

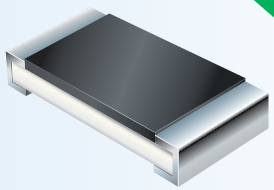
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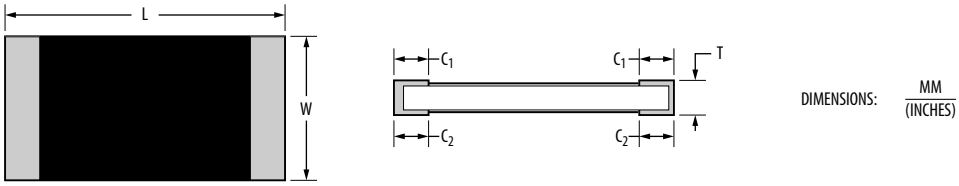
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Product Dimensions



DIMENSIONS: MM / (INCHES)

Model	Dimensions				
	L	W	C_1	C_2	T
CRT01005G	0.40 ± 0.02 (.016 ± .001)	0.20 ± 0.02 (.008 ± .001)	0.10 ± 0.03 (.004 ± .001)	0.10 ± 0.03 (.004 ± .001)	0.13 ± 0.02 (.005 ± .001)
CRT0201G	0.60 ± 0.05 (.024 ± .002)	0.30 ± 0.05 (.012 ± .002)	0.12 ± 0.05 (.005 ± .002)	0.15 ± 0.05 (.006 ± .002)	0.23 ± 0.05 (.009 ± .002)
CRT0402G	1.00 ± 0.10 (.039 ± .004)	0.50 ± 0.05 (.020 ± .002)	0.20 ± 0.10 (.008 ± .004)	0.20 ± 0.10 (.008 ± .004)	0.30 ± 0.05 (.012 ± .002)
CRT0603G	1.60 ± 0.15 (.063 ± .006)	0.80 ± 0.10 (.031 ± .004)	0.30 ± 0.20 (.012 ± .008)	0.30 ± 0.20 (.012 ± .008)	0.45 ± 0.10 (.018 ± .004)
CRT0805G	2.00 ± 0.15 (.079 ± .006)	1.25 ± 0.15 (.049 ± .006)	0.35 ± 0.20 (.014 ± .008)	0.40 ± 0.20 (.016 ± .008)	0.55 ± 0.10 (.022 ± .004)
CRT1206G	3.10 ± 0.15 (.122 ± .006)	1.60 ± 0.15 (.063 ± .006)	0.45 ± 0.20 (.018 ± .008)	0.50 ± 0.20 (.020 ± .008)	0.55 ± 0.10 (.022 ± .004)
CRT1210G	3.10 ± 0.15 (.122 ± .006)	2.50 ± 0.15 (.098 ± .006)	0.45 ± 0.20 (.018 ± .008)	0.50 ± 0.20 (.020 ± .008)	0.55 ± 0.10 (.022 ± .004)
CRT2010G	5.00 ± 0.15 (.197 ± .006)	2.50 ± 0.15 (.098 ± .006)	0.60 ± 0.20 (.024 ± .008)	0.60 ± 0.20 (.024 ± .008)	0.55 ± 0.10 (.022 ± .004)
CRT2512G	6.30 ± 0.15 (.248 ± .006)	3.20 ± 0.15 (.126 ± .006)	0.60 ± 0.20 (.024 ± .008)	0.60 ± 0.20 (.024 ± .008)	0.55 ± 0.10 (.022 ± .004)

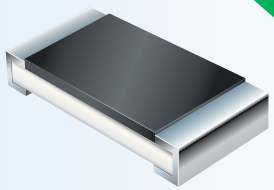
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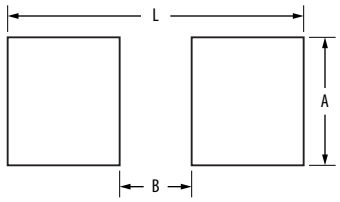
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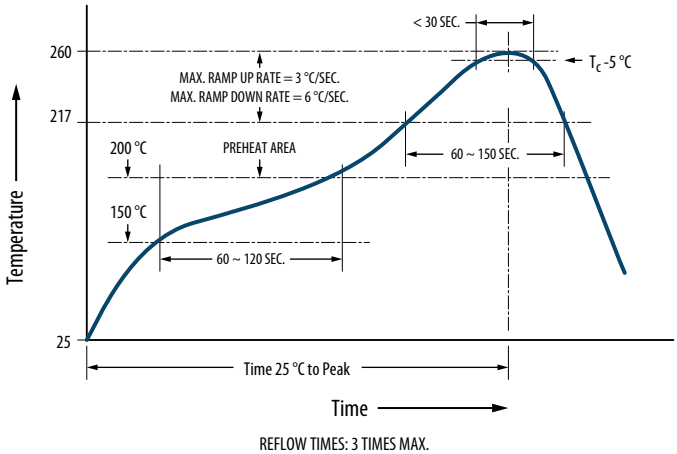
Recommended Solder Pad Layout

Model	Dimensions		
	A	B	L
CRT01005G	0.25 (.010)	0.14 (.006)	0.50 (.020)
CRT0201G	0.35 (.014)	0.25 (.010)	0.85 (.033)
CRT0402G	0.70 (.028)	0.50 (.020)	1.60 (.063)
CRT0603G	1.00 (.039)	0.80 (.031)	2.40 (.094)
CRT0805G	1.40 (.055)	1.30 (.051)	2.90 (.114)
CRT1206G	1.70 (.067)	2.20 (.087)	4.20 (.165)
CRT1210G	2.70 (.106)	2.00 (.079)	4.40 (.173)
CRT2010G	2.70 (.106)	3.80 (.150)	6.60 (.260)
CRT2512G	3.40 (.134)	4.90 (.193)	8.10 (.319)



DIMENSIONS: MM (INCHES)

Soldering Profile



REFLOW TIMES: 3 TIMES MAX.

Profile Feature	Pb Free Assembly
Preheat - Temperature Min. (T_{smin}) - Temperature Max. (T_{smax}) - Time (t_s) from T_{smin} to T_{smax}	 150 °C 200 °C 60-120 seconds
Ramp-up Rate (T_L to T_p)	3 °C/second max.
Liquidus temperature (T_L)	217 °C
Time (t_L) maintained above T_L	60-150 seconds
Peak package body temperature (T_p)	260 °C
Time within 5 °C of Actual Peak Temperature t_p	<30 seconds
Ramp-Down Rate (T_p to T_L)	6 °C/second max.
Time 25 °C to Peak Temperature	8 minutes max.

Tolerance for peak profile temperature (T_p) is defined as a supplier minimum and a user maximum.

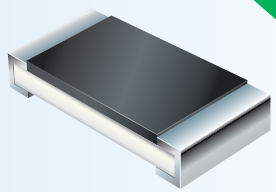
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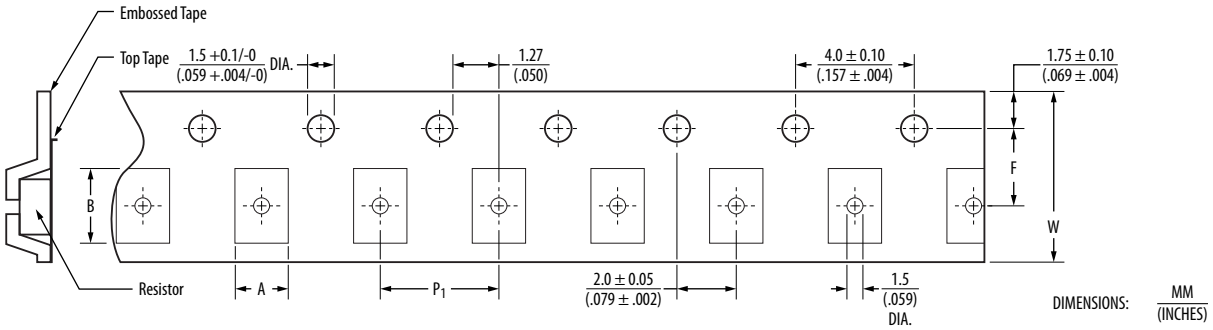
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Packaging Specifications – Tape

(Conforms to EIA RS-481A)



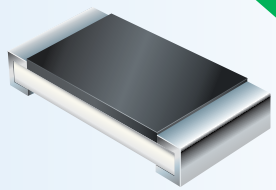
Model	A	B	W	F	P_1
CRT01005G	0.23 ± 0.02 (.009 ± .001)	0.43 ± 0.02 (.017 ± .001)	8.0 ± 0.20 (.315 ± .008)	3.5 ± 0.05 (.138 ± .002)	2.0 ± 0.10 (.079 ± .004)
CRT0201G	0.40 ± 0.05 (.016 ± .002)	0.70 ± 0.05 (.028 ± .002)			
CRT0402G	0.70 ± 0.10 (.028 ± .004)	1.20 ± 0.10 (.047 ± .004)			
CRT0603G	1.05 ± 0.20 (.041 ± .008)	1.80 ± 0.20 (.071 ± .008)			4.0 ± 0.10 (.157 ± .004)
CRT0805G	1.55 ± 0.20 (.059 ± .008)	2.30 ± 0.20 (.091 ± .008)			
CRT1206G	1.90 ± 0.20 (.075 ± .008)	3.50 ± 0.20 (.138 ± .008)			
CRT1210G	2.85 ± 0.20 (.112 ± .008)	3.50 ± 0.20 (.138 ± .008)			
CRT2010G	2.80 ± 0.20 (.110 ± .008)	5.60 ± 0.20 (.220 ± .008)	12.0 ± 0.10 (.472 ± .004)	5.5 ± 0.10 (.217 ± .004)	
CRT2512G	3.4 ± 0.20 (.134 ± .008)	6.7 ± 0.20 (.264 ± .008)			

Specifications are subject to change without notice. Users should verify actual device performance in their specific applications.

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CRT-G Series

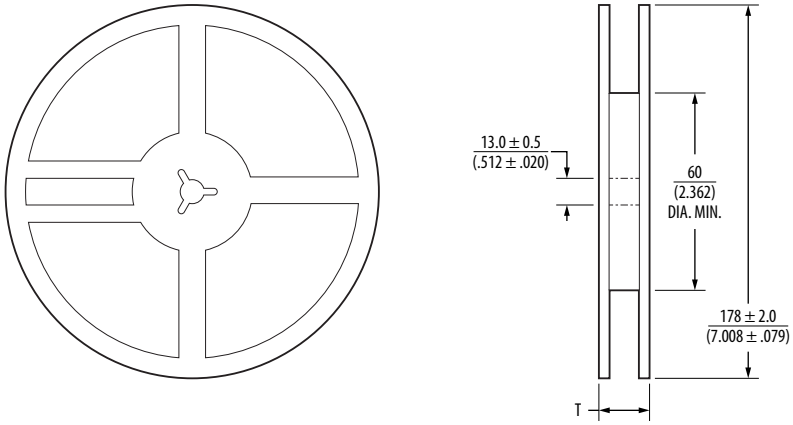
General-Purpose Precision Thin Film Chip Resistors



*RoHS COMPLIANT & **HALOGEN FREE

Packaging Specifications – Reel

(Conforms to EIA RS-481A)



Dimension	CRT01005G	CRT0201G	CRT0402G	CRT0603G	CRT0805G	CRT1206G	CRT1210G	CRT2010G	CRT2512G
T	11.5 ± 2.0 (.453 ± .079)							16.0 ± 2.0 (.630 ± .079)	

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