



Features

- Thick film technology
- Power rating up to 2 watts at 70 °C
- High power surge withstanding
- Sulfur-resistant design, R ≥1 Ω (ASTM B-809)
- RoHS compliant* and halogen free**
- AEC-Q200 compliant

Applications

- Power supplies
- Stepper motor drives

CRM-A Series High Power Thick Film Resistor

Electrical Characteristics

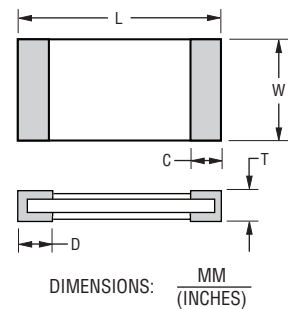
| Characteristic | Model | | | | | |
|---|--------------------|------------------|------------------|------------------|------------------|------------------|
| | CRM0603A | CRM0805A | CRM1206A | CRM1210A | CRM2010A | CRM2512A |
| Power Rating @ 70 °C | 0.125 W | 0.25 W | 0.5 W | 0.5 W | 1 W | 2 W |
| Operating Temperature Range | -55 °C to +155 °C | | | | | |
| Derated to Zero Load at | +155 °C | | | | | |
| Maximum Working Voltage 50 milliohms to 910 milliohms 1 ohm to 1 megohm | 477 mV 50 V | 551 mV 150 V | 675 mV 200 V | 675 mV 200 V | 954 mV 200 V | 1349 mV 300 V |
| Maximum Overload Voltage 50 milliohms to 910 milliohms 1 ohm to 1 megohm | 1066 mV 100 V | 1232 mV 300 V | 1508 mV 400 V | 1508 mV 400 V | 2133 mV 400 V | 3017 mV 600 V |
| Resistance Tolerance | ±0.5 %, ±1 %, ±5 % | | | | | |
| Temperature Coefficient 50 milliohms to 91 milliohms (±0.5 %, ±1 %, ±5 %, E24 Series) | ±250 ppm | ±200 ppm | ±100 ppm | ±100 ppm | ±100 ppm | ±100 ppm |
| 100 milliohms to 910 milliohms (±0.5 %, ±1 %, ±5 %, E24 Series) | ±150 ppm* | ±100 ppm | ±100 ppm | ±100 ppm | ±100 ppm | ±100 ppm |
| 1 ohm to 9.76 ohms (±0.5 %, ±1 %, E24 & E96 Series) | ±200 ppm | ±150 ppm* | ±100 ppm | ±100 ppm | ±100 ppm | ±100 ppm |
| 10 ohms to 1 megohm (±0.5 %, ±1 %, E24 & E96 Series) | ±100 ppm | ±100 ppm | ±100 ppm | ±100 ppm | ±100 ppm | ±100 ppm |
| 1 ohm to 1 megohm (±5 %, E24 Series) | ±200 ppm | ±200 ppm | ±200 ppm | ±200 ppm | ±200 ppm | ±200 ppm |

* TCR code assigned as "X"; see How to Order.

For Standard Values Used in Capacitors, Inductors and Resistors, [click here](#).

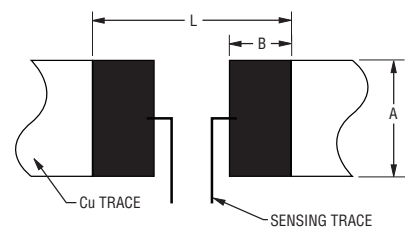
Product Dimensions

| Model | L | W | C | D | T |
|----------|---|---|---|---|---|
| CRM0603A | $\frac{1.60 \pm 0.10}{(0.063 \pm 0.004)}$ | $\frac{0.80 \pm 0.10}{(0.031 \pm 0.004)}$ | $\frac{0.30 \pm 0.20}{(0.012 \pm 0.008)}$ | $\frac{0.30 \pm 0.20}{(0.012 \pm 0.008)}$ | $\frac{0.45 \pm 0.10}{(0.018 \pm 0.004)}$ |
| CRM0805A | $\frac{2.00 \pm 0.10}{(0.079 \pm 0.004)}$ | $\frac{1.25 \pm 0.10}{(0.049 \pm 0.004)}$ | $\frac{0.40 \pm 0.20}{(0.016 \pm 0.008)}$ | $\frac{0.40 \pm 0.20}{(0.016 \pm 0.008)}$ | $\frac{0.50 \pm 0.10}{(0.020 \pm 0.004)}$ |
| CRM1206A | $\frac{3.10 \pm 0.10}{(0.122 \pm 0.004)}$ | $\frac{1.60 \pm 0.10}{(0.063 \pm 0.004)}$ | $\frac{0.50 \pm 0.25}{(0.020 \pm 0.010)}$ | $\frac{0.50 \pm 0.25}{(0.020 \pm 0.010)}$ | $\frac{0.55 \pm 0.10}{(0.022 \pm 0.004)}$ |
| CRM1210A | $\frac{3.10 \pm 0.10}{(0.122 \pm 0.004)}$ | $\frac{2.60 \pm 0.10}{(0.102 \pm 0.004)}$ | $\frac{0.50 \pm 0.25}{(0.020 \pm 0.010)}$ | $\frac{0.50 \pm 0.25}{(0.020 \pm 0.010)}$ | $\frac{0.55 \pm 0.10}{(0.022 \pm 0.004)}$ |
| CRM2010A | $\frac{5.00 \pm 0.20}{(0.197 \pm 0.008)}$ | $\frac{2.50 \pm 0.20}{(0.098 \pm 0.008)}$ | $\frac{0.65 \pm 0.25}{(0.026 \pm 0.010)}$ | $\frac{0.60 \pm 0.25}{(0.024 \pm 0.010)}$ | $\frac{0.60 \pm 0.10}{(0.024 \pm 0.004)}$ |
| CRM2512A | $\frac{6.40 \pm 0.20}{(0.252 \pm 0.008)}$ | $\frac{3.10 \pm 0.20}{(0.122 \pm 0.008)}$ | $\frac{0.60 \pm 0.25}{(0.024 \pm 0.010)}$ | $\frac{1.80 \pm 0.25}{(0.071 \pm 0.010)}$ | $\frac{0.60 \pm 0.15}{(0.024 \pm 0.006)}$ |



Recommended Solder Pad Layout

| Model | A | B | L | Model | A | B | L |
|----------|------------------------|------------------------|------------------------|----------|------------------------|------------------------|------------------------|
| CRM0603A | $\frac{0.90}{(0.035)}$ | $\frac{1.00}{(0.039)}$ | $\frac{3.00}{(0.118)}$ | CRM1210A | $\frac{3.00}{(0.118)}$ | $\frac{1.30}{(0.051)}$ | $\frac{4.70}{(0.185)}$ |
| CRM0805A | $\frac{1.30}{(0.051)}$ | $\frac{1.15}{(0.045)}$ | $\frac{3.50}{(0.138)}$ | CRM2010A | $\frac{3.00}{(0.118)}$ | $\frac{1.50}{(0.059)}$ | $\frac{6.80}{(0.268)}$ |
| CRM1206A | $\frac{1.80}{(0.071)}$ | $\frac{1.30}{(0.051)}$ | $\frac{4.70}{(0.185)}$ | CRM2512A | $\frac{3.70}{(0.032)}$ | $\frac{2.45}{(0.096)}$ | $\frac{7.60}{(0.299)}$ |



* 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.

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WARNING Cancer and Reproductive Harm - www.P65Warnings.ca.gov

CRM-A Series High Power Thick Film Resistor

BOURNS®

How to Order

CRM 0603 A F W - 1002 E LF

Model _____
(CRM = High Power Thick Film Resistor)

Size _____
0603 = 0603 Size
0805 = 0805 Size
1206 = 1206 Size
1210 = 1210 Size
2010 = 2010 Size
2512 = 2512 Size

Feature _____
A = AEC-Q200 Compliant

Resistance Tolerance _____
D = $\pm 0.5\%$
F = $\pm 1\%$
J = $\pm 5\%$

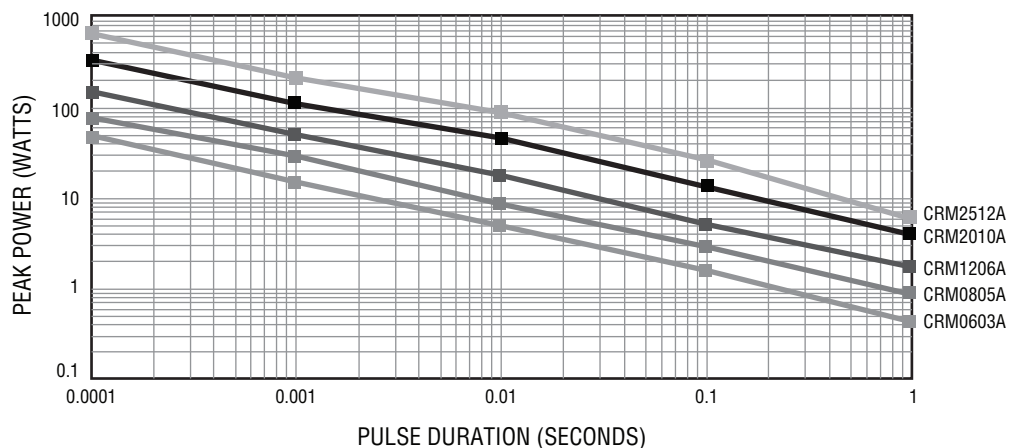
TCR (See Electrical Characteristics chart) _____
• V = ± 250 PPM/ $^{\circ}$ C
• W = ± 200 PPM/ $^{\circ}$ C
• X = ± 100 PPM/ $^{\circ}$ C NOTE: CRM0805A 0.5%, 1%, 1 ohm to 9.76 ohms: 150 PPM/ $^{\circ}$ C
CRM0603A 0.5%, 1%, 5%, 100 milliohms to 910 milliohms: 150 PPM/ $^{\circ}$ C

Resistance Value _____
• 0.5% or 1% Tolerance:
<100 ohms....."R" represents decimal point (example: 24R3 = 24.3 ohms)
 ≥ 100 ohms.....First three digits are significant, fourth digit represents number of zeros to follow (example: 8252 = 82.5K ohms)
• 5% Tolerance:
<10 ohms....."R" represents decimal point (example: 4R7 = 4.7 ohms)
 ≥ 10 ohms.....First two digits are significant, third digit represents number of zeros to follow (example: 474 = 470K ohms)

Packaging _____
• E = 5,000 pieces on 180 mm (7 inch) reel, paper tape - CRM0603A, CRM0805A, CRM1206A, CRM1210A
4,000 pieces on 180 mm (7 inch) reel, plastic tape - CRM2010A, CRM2512A

Termination _____
• LF = Tin-plated (RoHS Compliant)

Surge Performance



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CRM-A Series High Power Thick Film Resistor

BOURNS®

Typical Part Marking

**CRM0603A, CRM0805A,
CRM1206A, CRM1210A,
CRM2010A, CRM2512A**

E96 ±5 %

3 digits identify the
resistance value



$301 = 30 \times 10^1 = 300 \text{ ohms}$

**CRM0805A, CRM1206A,
CRM1210A, CRM2010A,
CRM2512A**

E24 / E96 ±1 %

4 digits identify the
resistance value



$1542 = 154 \times 10^2 = 15.4K \text{ ohms}$

CRM0603A

E24 ±1 %

3 digits identify the
resistance value



$222 = 22 \times 10^2 = 2.2K \text{ ohms}$

CRM0603A

E96 ±1 %

3 digits identify the
resistance value



$01B = 1K \text{ ohms}$
(Refer to Marking Table below)

E96 Marking for CRM0603A, 1 %

| Code | R Value | Code | R Value | Code | R Value | Code | R Value | Code | R Value | Code | R Value | Code | R Value | Code | R Value |
|------|---------|------|---------|------|---------|------|---------|------|---------|------|---------|------|---------|------|---------|
| 01 | 100 | 13 | 133 | 25 | 178 | 37 | 237 | 49 | 316 | 61 | 422 | 73 | 562 | 85 | 750 |
| 02 | 102 | 14 | 137 | 26 | 182 | 38 | 243 | 50 | 324 | 62 | 432 | 74 | 576 | 86 | 768 |
| 03 | 105 | 15 | 140 | 27 | 187 | 39 | 249 | 51 | 332 | 63 | 442 | 75 | 590 | 87 | 787 |
| 04 | 107 | 16 | 143 | 28 | 191 | 40 | 255 | 52 | 340 | 64 | 453 | 76 | 604 | 88 | 806 |
| 05 | 110 | 17 | 147 | 29 | 196 | 41 | 261 | 53 | 348 | 65 | 464 | 77 | 619 | 89 | 825 |
| 06 | 113 | 18 | 150 | 30 | 200 | 42 | 267 | 54 | 357 | 66 | 475 | 78 | 634 | 90 | 845 |
| 07 | 115 | 19 | 154 | 31 | 205 | 43 | 274 | 55 | 365 | 67 | 487 | 79 | 649 | 91 | 866 |
| 08 | 118 | 20 | 158 | 32 | 210 | 44 | 280 | 56 | 374 | 68 | 499 | 80 | 665 | 92 | 887 |
| 09 | 121 | 21 | 162 | 33 | 215 | 45 | 287 | 57 | 383 | 69 | 511 | 81 | 681 | 93 | 909 |
| 10 | 124 | 22 | 165 | 34 | 221 | 46 | 294 | 58 | 392 | 70 | 523 | 82 | 698 | 94 | 931 |
| 11 | 127 | 23 | 169 | 35 | 226 | 47 | 301 | 59 | 402 | 71 | 536 | 83 | 715 | 95 | 953 |
| 12 | 130 | 24 | 174 | 36 | 232 | 48 | 309 | 60 | 412 | 72 | 549 | 84 | 732 | 96 | 976 |

This table shows the first two digits for the three-digit E96 part marking scheme. The third character is a letter multiplier:
A=10⁰ B=10¹ C=10² D=10³ E=10⁴ F=10⁵ G=10⁶ H=10⁷ X=10⁻¹ Y=10⁻² Z=10⁻³

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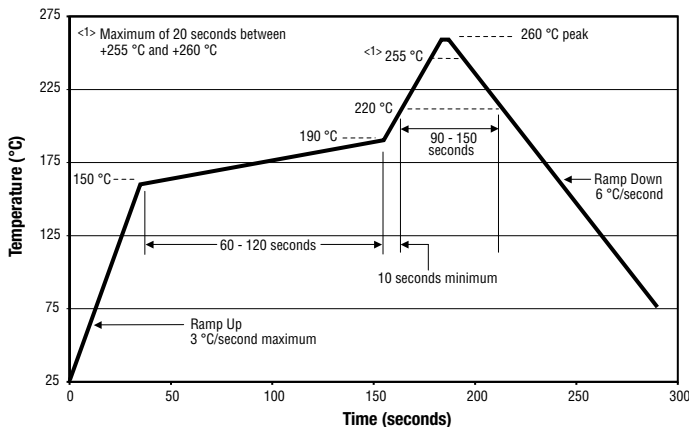
CRM-A Series High Power Thick Film Resistor



Performance Characteristics (AEC-Q200)

| Test | Method | Procedure | Test Limits ΔR |
|--|---------------------|---|---|
| High Temperature Exposure Storage | AEC-Q200 Table 7.3 | 1,000 hours @ +125 °C; no power loading | 0.5 %, 1 % tolerance: $\leq \pm 1$ % 5 % tolerance: $\leq \pm 3$ % |
| Temperature Cycling | AEC-Q200 Table 7.4 | -55 °C to +125 °C, 1,000 cycles | 0.5 %, 1 % tolerance: $\leq \pm 1$ % 5 % tolerance: $\leq \pm 3$ % |
| Moisture Resistance | AEC-Q200 Table 7.6 | +65 °C / 80~100 % RH / 10 cycles | 0.5 %, 1 % tolerance: $\leq \pm 0.5$ % 5 % tolerance: $\leq \pm 1$ % |
| Biased Humidity | AEC-Q200 Table 7.7 | 1,000 hours @ +85 °C / 85 % RH, 10 % operating power | 0.5 %, 1 % tolerance: $\leq \pm 1$ % 5 % tolerance: $\leq \pm 3$ % |
| Operational Life | AEC-Q200 Table 7.8 | 1,000 hours @ +125 °C, at specified rated power | 0.5 %, 1 % tolerance: $\leq \pm 1$ % 5 % tolerance: $\leq \pm 3$ % |
| Mechanical Shock | AEC-Q200 Table 7.13 | 100 g, half-sine, 6 ms, velocity: 12.3 ft./sec. | Within product specification tolerance; no visible damage |
| Vibration | AEC-Q200 Table 7.14 | 5 g for 20 minutes, 12 cycles each of 3 durations; 10~200 Hz | 0.5 %, 1 % tolerance: $\leq \pm 0.5$ % 5 % tolerance: $\leq \pm 1$ % |
| Resistance to Solder Heat | AEC-Q200 Table 7.15 | +270 °C ± 5 °C, 10 ± 1 seconds | 0.5 %, 1 % tolerance: $\leq \pm 0.5$ % 5 % tolerance: $\leq \pm 1$ % |
| Thermal Shock | AEC-Q200 Table 7.16 | -55 °C to +155 °C, dwell time 15 minutes, max. transfer time 20 seconds/300 cycles | 0.5 %, 1 % tolerance: $\leq \pm 0.5$ % 5 % tolerance: $\leq \pm 1$ % |
| ESD | AEC-Q200-002 | 1 kV min. | $\leq \pm 1$ % |
| Solderability | AEC-Q200 Table 7.18 | a) Backing +155 °C, 4 hours, dipping +235 °C, 5 seconds b) Steam 8 hours, dipping +215 °C, 5 seconds c) Steam 8 hours, dipping +260 °C, 7 seconds | Over 95 % of the termination must be covered with solder |
| Flammability | AEC-Q200 Table 7.20 | UL 94 V-0 or V-1 are acceptable | Refer to UL 94 |
| Board Flex | AEC-Q200 Table 7.21 | Bending 2 mm (CRM1206A, 1210A, 2010A, 2512A) Bending 3 mm (CRM0603A, 0805A) | 0.5 %, 1 % tolerance: $\leq \pm 0.5$ % 5 % tolerance: $\leq \pm 1$ % |
| Terminal Strength | AEC-Q200 Table 7.22 | Force 1.8 Kg for 60 seconds | No mechanical damage |
| Sulfur-resistant (Applies only when R ≥ 1 ohm) | ASTM B-809 | +50 °C ± 2 °C, 1,000 hours | $\leq \pm 1$ % |

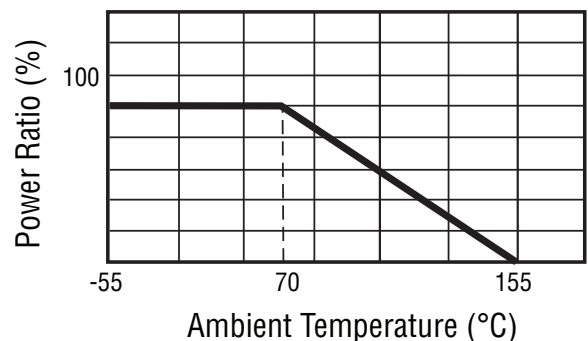
Soldering Profile



Environmental Characteristics

Moisture Sensitivity Level..... 1

Derating Curve



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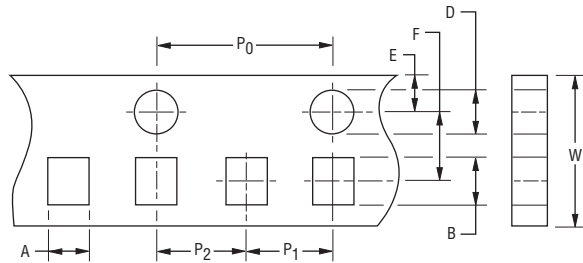
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CRM-A Series High Power Thick Film Resistor

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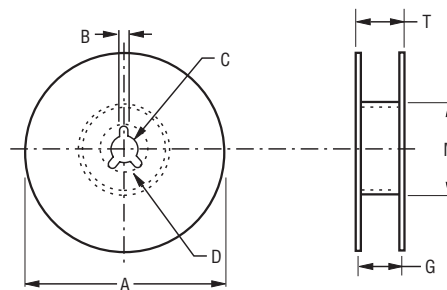
Packaging Dimensions (Conforms to EIA RS-481A)



Accumulated dimensional tolerance $\frac{40 \pm 0.2}{(1.575 \pm .008)}$

DIMENSIONS: $\frac{\text{MM}}{\text{(INCHES)}}$

| Model | Tape Type | A | B | W | F | E | P ₁ | P ₂ | P ₀ | D |
|----------|-----------|---|---|--|---|---|---|---|---|---|
| CRM0603A | Paper | $\frac{1.10 \pm 0.20}{(.043 \pm .008)}$ | $\frac{1.90 \pm 0.20}{(.075 \pm .008)}$ | $\frac{8.00 \pm 0.30}{(.315 \pm .012)}$ | $\frac{3.50 \pm 0.05}{(.138 \pm .002)}$ | $\frac{1.75 \pm 0.10}{(.069 \pm .004)}$ | $\frac{4.00 \pm 0.10}{(.158 \pm .004)}$ | $\frac{2.00 \pm 0.05}{(.079 \pm .002)}$ | $\frac{4.00 \pm 0.10}{(.158 \pm .004)}$ | $\frac{1.50 + 0.10/-0}{(.006 + .004/-0)}$ |
| CRM0805A | Paper | $\frac{1.65 \pm 0.20}{(.065 \pm .008)}$ | $\frac{2.40 \pm 0.20}{(.094 \pm .008)}$ | $\frac{8.00 \pm 0.30}{(.315 \pm .012)}$ | $\frac{3.50 \pm 0.05}{(.138 \pm .002)}$ | $\frac{1.75 \pm 0.10}{(.069 \pm .004)}$ | $\frac{4.00 \pm 0.10}{(.158 \pm .004)}$ | $\frac{2.00 \pm 0.05}{(.079 \pm .002)}$ | $\frac{4.00 \pm 0.10}{(.158 \pm .004)}$ | $\frac{1.50 + 0.10/-0}{(.006 + .004/-0)}$ |
| CRM1206A | Paper | $\frac{2.00 \pm 0.20}{(.079 \pm .008)}$ | $\frac{3.60 \pm 0.20}{(.142 \pm .008)}$ | $\frac{8.00 \pm 0.30}{(.315 \pm .012)}$ | $\frac{3.50 \pm 0.05}{(.138 \pm .002)}$ | $\frac{1.75 \pm 0.10}{(.069 \pm .004)}$ | $\frac{4.00 \pm 0.10}{(.158 \pm .004)}$ | $\frac{2.00 \pm 0.05}{(.079 \pm .002)}$ | $\frac{4.00 \pm 0.10}{(.158 \pm .004)}$ | $\frac{1.50 + 0.10/-0}{(.006 + .004/-0)}$ |
| CRM1210A | Paper | $\frac{3.00 \pm 0.20}{(.118 \pm .008)}$ | $\frac{3.60 \pm 0.20}{(.142 \pm .008)}$ | $\frac{8.00 \pm 0.30}{(.315 \pm .012)}$ | $\frac{3.50 \pm 0.05}{(.138 \pm .002)}$ | $\frac{1.75 \pm 0.10}{(.069 \pm .004)}$ | $\frac{4.00 \pm 0.10}{(.158 \pm .004)}$ | $\frac{2.00 \pm 0.05}{(.079 \pm .002)}$ | $\frac{4.00 \pm 0.10}{(.158 \pm .004)}$ | $\frac{1.50 + 0.10/-0}{(.006 + .004/-0)}$ |
| CRM2010A | Plastic | $\frac{2.80 \pm 0.20}{(.110 \pm .008)}$ | $\frac{5.50 \pm 0.20}{(.217 \pm .008)}$ | $\frac{12.00 \pm 0.30}{(.472 \pm .012)}$ | $\frac{3.50 \pm 0.05}{(.138 \pm .002)}$ | $\frac{1.75 \pm 0.10}{(.069 \pm .004)}$ | $\frac{4.00 \pm 0.10}{(.158 \pm .004)}$ | $\frac{2.00 \pm 0.05}{(.079 \pm .002)}$ | $\frac{4.00 \pm 0.10}{(.158 \pm .004)}$ | $\frac{1.50 + 0.10/-0}{(.006 + .004/-0)}$ |
| CRM2512A | Plastic | $\frac{3.50 \pm 0.20}{(.138 \pm .008)}$ | $\frac{6.70 \pm 0.20}{(.264 \pm .008)}$ | $\frac{12.00 \pm 0.30}{(.472 \pm .012)}$ | $\frac{3.50 \pm 0.05}{(.138 \pm .002)}$ | $\frac{1.75 \pm 0.10}{(.069 \pm .004)}$ | $\frac{4.00 \pm 0.10}{(.158 \pm .004)}$ | $\frac{2.00 \pm 0.05}{(.079 \pm .002)}$ | $\frac{4.00 \pm 0.10}{(.158 \pm .004)}$ | $\frac{1.50 + 0.10/-0}{(.006 + .004/-0)}$ |



DIMENSIONS: $\frac{\text{MM}}{\text{(INCHES)}}$

| Model | Packaging Quantity | A | N | C | D Min. | B | G | T Max. |
|----------|---------------------|---|--|---|------------------------|---|--|-----------------------|
| CRM0603A | 5,000 pcs. per reel | $\frac{1.78 \pm 2.00}{(.070 \pm .079)}$ | $\frac{60 \pm 0.50}{(2.362 \pm .020)}$ | $\frac{13.0 \pm 0.50}{(.512 \pm .020)}$ | $\frac{20.0}{(8.661)}$ | $\frac{2.00 \pm 0.50}{(.079 \pm .020)}$ | $\frac{10.00 \pm 1.50}{(.394 \pm .006)}$ | $\frac{14.9}{(.587)}$ |
| CRM0805A | | | | | | | | |
| CRM1206A | | | | | | | | |
| CRM1210A | | | | | | | | |
| CRM2010A | 4,000 pcs. per reel | $\frac{1.78 \pm 2.00}{(.070 \pm .079)}$ | $\frac{60 \pm 0.50}{(2.362 \pm .020)}$ | $\frac{13.0 \pm 0.50}{(.512 \pm .020)}$ | $\frac{20.0}{(8.661)}$ | $\frac{2.00 \pm 0.50}{(.079 \pm .020)}$ | $\frac{13.80 \pm 1.50}{(.543 \pm .006)}$ | $\frac{16.7}{(.657)}$ |
| CRM2512A | | | | | | | | |

REV. 05/29/20

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