

# Ordering MIL-spec resistors—

Prior to ordering any MIL equivalent parts please check whether MIL qualification is required. RCD warrants much of its product line to meet applicable MIL specifications but this does not imply qualification.

## MIL-R-11 RC07GF252K (RCD series CF meets MIL-R-11 performance requirements)

<b>RC07</b> FIXED COMPOSITION RESISTOR	<b>GF</b> "G" = 70°C Max ambient temp for full load operation. "F" = temp. coefficient which varies with resistance from ± 625ppm to ± 3100	<b>252</b> Resistance, first two digits are significant, 3rd digit is number of zeros. 252 = 2500ohms	<b>K</b> Tolerance J = ± 5% K = ± 10%
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## MIL-R-22684 RL07S103J (RCD GP series)

<b>RL07</b> FIXED FILM RESISTOR ± 200ppm	<b>S</b> Terminal (Lead) S = Solderable	<b>103</b> Resistance, first two digits are significant, 3rd digit is number of zeros. 103 = 10,000 ohms	<b>J</b> Tolerance G = ± 2% J = ± 5%
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## MIL-R-10509 RN55D1002F (RCD MF series, RCD GP series are equivalent to RN's except parts are color coded)

<b>RN55</b> FIXED FILM RESISTOR, HIGH STABILITY	<b>D</b> Temperature Coefficient B = 500ppm C = 50 ppm D = -500 to +200 ppm E = 25ppm	<b>1002</b> Resistance, first three digits are significant, 4th digit is number of zeros. 1002 = 10,000 ohms	<b>F</b> Tolerance B = ± 0.1% C = ± 0.25% D = ± 0.5% F = ± 1%
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## MIL-R-26 RW74U49R9F (RCD 100 series)

<b>RW74</b> FIXED WIREWOUND RESISTOR POWER TYPE	<b>U</b> Max "hot spot" derating temp, U = 275°C V = 350°C N = 350°C (Non-Inductive)	<b>49R9</b> Resistance, 3 or 4 digits Last digit is number of zeros, unless an R precedes it. Letter R is decimal point.	<b>F</b> Tolerance B = 0.1%, D = 0.5%, F = 1% (Tolerance code is only used on Char U resistors. Tolerance on Char V is ± 5% on values 1Ω or above, ± 10% below 1Ω)
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## MIL-R-18546 RE60G1650F (RCD 600 series)

<b>RE60</b> FIXED WIREWOUND RESISTOR CHASSIS MOUNT	<b>G</b> Inductance characteristics G = inductive N = non-inductive	<b>1650</b> Resistance, first 3 digits are significant, 4th digit is number of zeros. 1650 = 165 ohms	<b>F</b> Tolerance (Always 1%)
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## MIL-R-93 RB52CE12701D (RCD SA, PC series)

<b>RB52</b> FIXED WIREWOUND RESISTOR PRECISION	<b>C</b> Terminal C = solderable W = weldable	<b>E</b> Temp. Coef. 90ppm, below 1Ω 50ppm, 1 to 9.9Ω 20ppm, 10Ω & up	<b>12701</b> Resistance, first 4 digits are significant, last digit is number of zeros. Below 1000 ohms use letter R as decimal point. 200R0 = 200 ohms	<b>D</b> Tolerance A = ± .05% B = ± 0.1% D = ± 0.5% F = ± 1.0%
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## Useful formulas and information

### Ohm's Law

$E = IR$   
 $R = E/I$   
 $I = E/R$   
 $P = EI$   
 $P = E^2/R$   
 $P = I^2R$

**E** = Voltage (Volts)  
**R** = Resistance (ohms)  
**I** = Current (Amperes)  
**P** = Power (Watts)

### Resistors in Series

$$R_s = R_1 + R_2 + R_3 \dots + R_n$$

### Resistors in Parallel

$$R_p = \frac{1}{1/R_1 + 1/R_2 + 1/R_3 + \dots + 1/R_n}$$

### Temperature Conversion

$T_c = 5/9 (T_f - 32^\circ)$   
 $T_f = 9/5 (T_c) + 32^\circ$

### Energy Conversion

$J = Pt$      $J = \text{Energy} = \text{watt-seconds} = \text{joules}$   
 $J^* = \frac{CE^2}{2}$      $C = \text{Capacitance (farads)}$      $t = \text{Time (seconds)}$   
 $E = \text{Voltage (volts)}$      $P = \text{Power (watts)}$

\*Capacitor discharge circuit

### PPM Conversion

1ppm	10ppm	25ppm	50ppm	100ppm	1000ppm
.0001%	.001%	.0025%	.005%	.01%	0.1%

**MIL-R-39008 RCR07G153JS**

<b>RCR07</b>	<b>G</b>	<b>153</b>	<b>J</b>	<b>S</b>
FIXED COMPOSITION RESISTOR ESTABLISHED RELIABILITY	"G" = 70°C Max ambient temp. for full load operation and TC of ± 625ppm to ± 1900ppm/°C	Resistance. First 2 digits are significant, 3rd digit is number of zeros. 153 = 15,000 ohms	Tolerance J = 5% K = 10%	Failure Rate M = 1.0% P = 0.1% R = .01% S = .001%

**MIL-R-39017 RLR071502GR**

<b>RLR07</b>	<b>C</b>	<b>1502</b>	<b>G</b>	<b>R</b>
FIXED FILM RESISTOR ESTABLISHED RELIABILITY	Terminal "C" = solderable/weldable	Resistance. First 3 digits are significant, 4th digit is number of zeros. 1502 = 15,000Ω	Tolerance F = 1.0% G = 2.0%	Failure Rate M = 1.0% P = 0.1% R = .01% S = .001%

**MIL-R-55182 RNR60H1003FS**

<b>RNR60</b>	<b>H</b>	<b>1003</b>	<b>F</b>	<b>S</b>
RNR = Solderable leads RNC = Solderable/weldable RNN = Weldable FIXED FILM RESISTOR ESTABLISHED RELIABILITY	C = 50ppm, hermetic sealed H = 50ppm, non-hermetic E = 25ppm, hermetic sealed J = 25ppm, non-hermetic K = 100ppm, non-hermetic	Resistance. First 3 digits are significant, 4th digit is number of zeros. 1003 = 100,000 ohms	Tolerance B = 0.1% D = 0.5% F = ± 1%	Failure Rate M = 1.0% P = 0.1% R = .01% S = .001%

**MIL-R-39007 RWR74S49R9FR**

<b>RWR74</b>	<b>S</b>	<b>49R9</b>	<b>F</b>	<b>R</b>
FIXED POWER WIREWOUND RESISTOR ESTABLISHED RELIABILITY	Terminal S = solderable W = weldable Z = weldable, non inductive N = solderable, non inductive	Resistance. First 3 digits are significant, 4th digit is number of zeros. For values below 100 ohms use R as decimal pt 49R9 = 49.9 ohms	Tolerance B = 0.1% D = 0.5% F = ± 1%	Failure Rate M = 1.0% P = 0.1% R = .01% S = .001%

**MIL-R-39009 RER60F1650R**

<b>RER60</b>	<b>F</b>	<b>1650</b>	<b>R</b>
FIXED POWER WIREWOUND CHASSIS MOUNT RESISTOR ESTABLISHED RELIABILITY	Tolerance (Always 1%)	Resistance. First 3 digits are significant, 4th digit is number of zeros. For values below 100 ohms use R as a decimal point. 49R9 = 49.9 ohms	Failure Rate M = 1.0%/1000 hours P = 0.1%/1000 hours R = 0.01%/1000 hours S = 0.001%/1000 hours

**MIL-R-39005 RBR52L12601FR**

<b>RBR52</b>	<b>L</b>	<b>12601</b>	<b>F</b>	<b>R</b>
FIXED PRECISION WIREWOUND RESISTOR ESTABLISHED RELIABILITY	Terminal L = solderable U = weldable	Resistance. First 4 digits are significant, 5th digit is number of zeros. For resistances less than 1000 ohms use letter R as decimal point	Tolerance T = .01% Q = .02% A = .05% B = 0.1% F = ± 1%	Failure Rate M = 1.0% P = 0.1% R = .01% S = .001%

**Electrical Characteristics**

Quantity	Symbol	Basic unit
Current	<i>I</i> or <i>i</i>	ampere (A)
Charge	<i>Q</i> or <i>q</i>	coulomb (C)
Power	<i>P</i>	watt (W)
Voltage	<i>V</i> or <i>v</i>	volt (V)
Resistance	<i>R</i>	ohm (Ω)
Reactance	<i>X</i>	ohm (Ω)
Impedance	<i>Z</i>	ohm (Ω)
Conductance	<i>G</i>	siemens (S)
Capacitance	<i>C</i>	farad (F)
Inductance	<i>L</i>	henry (H)
Frequency	<i>f</i>	hertz (Hz)
Period	<i>T</i>	second (s)

**Multiples and Submultiples of Units\***

Value	Prefix	Symbol	Example
1,000,000,000,000 = 10 <sup>12</sup>	tera	T	TΩ = 10 <sup>12</sup> Ω
1,000,000,000 = 10 <sup>9</sup>	giga	G	GΩ = 10 <sup>9</sup> Ω
1,000,000 = 10 <sup>6</sup>	mega	M	MΩ = 10 <sup>6</sup> Ω
1,000 = 10 <sup>3</sup>	kilo	k	kV = 10 <sup>3</sup> V
100 = 10 <sup>2</sup>	hecto	h	hm = 10 <sup>2</sup> m
10 = 10	deka	da	dam = 10 m
0.1 = 10 <sup>-1</sup>	deci	d	dm = 10 <sup>-1</sup> m
0.01 = 10 <sup>-2</sup>	centi	c	cm = 10 <sup>-2</sup> m
0.001 = 10 <sup>-3</sup>	milli	m	mA = 10 <sup>-3</sup> A
0.000 001 = 10 <sup>-6</sup>	micro	μ**	μV = 10 <sup>-6</sup> V
0.000 000 001 = 10 <sup>-9</sup>	nano	n	ns = 10 <sup>-9</sup> s
0.000 000 000 001 = 10 <sup>-12</sup>	pico	p	pF = 10 <sup>-12</sup> F

\*Additional prefixes are exa = 10<sup>18</sup>, peta = 10<sup>15</sup>, femto = 10<sup>-15</sup>, and atto = 10<sup>-18</sup>  
\*\*"M" is often used to designate "μ" (micro)