Series RC1313
Resistor-Capacitor Networks

Suggested applications include: noise suppression and contact protection.

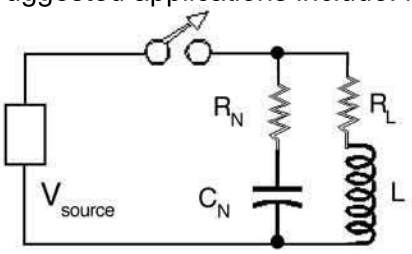

Fig. 1 (across the load)

OR

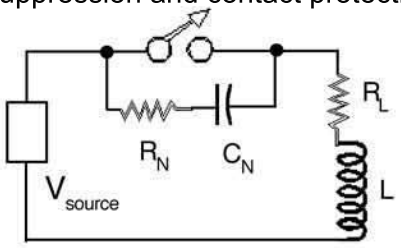

Fig. 2 (across the contacts)

The circuit to be used is dependent upon particular situations. Either circuit may be enough protection for your needs. For extreme situations, both "Load" and "Contact" protection may be required.

Recommendations

There are two types of discharges that can damage switching contacts and generate noise:
(1) "Glow Discharges" caused by the ignition of gases between contacts. These develop at about 320 volts at about a 0.0003 inch gap range and can be sustained at a much wider gap range.
(2) "Arc Discharges" occur at much lower voltages, about 0.5 MV/cm. Minimum voltages and currents are necessary for "Arc Discharges to be sustained. Contact material also plays a role in sustained "Arc Discharges." (See Table 1).

MATERIAL	MIN. (VA) Arcing Voltage	MIN. (IA) Arcing Current mA
Silver	12	400
Gold	15	400
Gold Alloy	9	400
Palladium	16	800
Platinum	17.5	700

TABLE 1

The function of the RC network is to:
(1) Keep the voltage across the contacts below 300 volts. $C \geq (I_L/300)^2 L$
(2) Keep the rate of voltage change below 1V/µs. $C \geq I_L \times 10^{-6}$
(3) Keep the current below that described in Table 1.

Inductors do not instantly "let go" of a current. At the instant a contact opens, the current through the contact does not want to change. Using Ohms Law (E=IR), we can see that when the contact is closed, the resistance is essentially zero, making the voltage zero, as well. As the contact opens the resistance begins to increase. This leads to the generation of a high voltage which is generally destructive to contact life.

Capacitors will restrict an instantaneous change in voltage. A capacitor, therefore is useful to counter the destructive voltages generated at the switch contacts. When the contacts are closed, the capacitor is out of the circuit. As the contacts are opened any change in voltage is restricted by the capacitor if its value is large enough to restrict the voltage change to less than 1 V/µs.

A capacitor alone is not an ideal solution. When the contacts are open, the capacitor charges up to the supply voltage. As the contact is "made," an inrush of current results limited only by a residual resistance and damage may still result. For this reason, a resistor is configured in series with the capacitor. The higher the resistance value the smaller the inrush current and the less effective is the capacitor. The voltage across the contacts when opened is equal to the load current x resistance. (V=IR) It is recommended to keep V=< supply voltage. In this case, the maximum resistance of the network (R_N) will be equal to the load resistance (R_L).

The above formulas are recommended for determining the RC network parameters. They do not identify all of the subtleties but should serve as a guideline for effective results.

41 Interstate Lane, Waterbury, CT 06705 . (203) 755.5629 . (203) 755.0659 Fax
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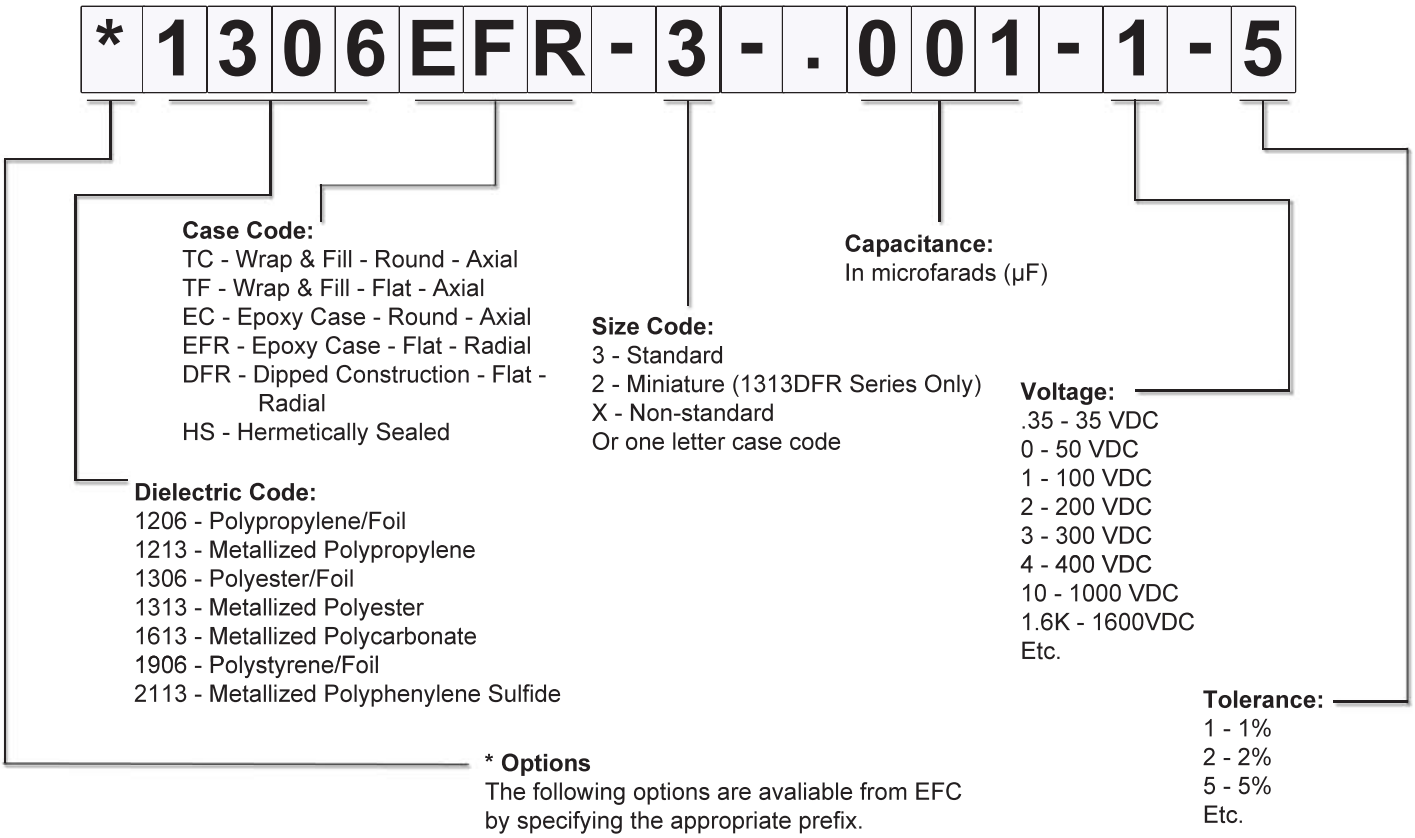
Catalog Nomenclature



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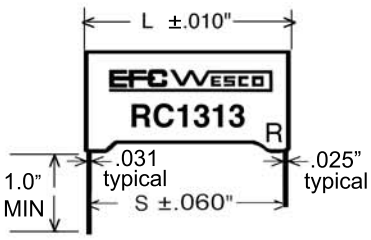
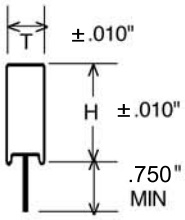
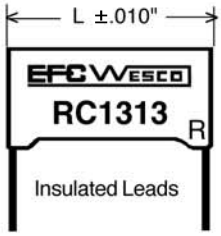
Please consult factory for special requirements, including non-standard values and sizes

RC1313EFR
Rectangular Plastic Case (Radial Leads)

Resistor-Capacitor Networks







Dimensions and Ratings

Cap.	200 VDC / 125 VAC					
µF	Part #	Res. Value (Ohms)	L inches (mm)	T inches (mm)	H inches (mm)	S inches (mm)
.10	RC1313EFR-H-.1-2-_/____	22-1000	.709 (18)	.295 (7.5)	.531 (13.5)	.562 (14.3)
.25	RC1313EFR-H-.25-2-_/____	22-1000	.709 (18)	.295 (7.5)	.531 (13.5)	.562 (14.3)
.50	RC1313EFR-L-.5-2-_/____	22-1000	1.04 (26.5)	.236 (6)	.591 (15)	.886 (22.5)
1.0	RC1313EFR-N-1.0-2-_/____	22-1000	1.04 (26.5)	.335 (8.5)	.669 (17)	.886 (22.5)

Cap.	630 VDC / 250 VAC					
µF	Part #	Res. Value (Ohms)	L inches (mm)	T inches (mm)	H inches (mm)	S inches (mm)
.10	RC1313EFR-N-.1-6.3-_/____	22-1000	1.04 (26.5)	.335 (8.5)	.669 (17)	.886 (22.5)
.25	RC1313EFR-O-.25.6.3-_/____	22-1000	1.04 (26.5)	.394 (10)	.748 (19)	.886 (22.5)
.50	RC1313EFR-Q-.5-6.3-_/____	22-1000	1.26 (32)	.512 (13)	.866 (22)	1.13 (28.7)
1.0	RC1313EFR-V-1.0-6.3-_/____	22-1000	1.26 (32)	.670 (17)	1.36 (34.5)	1.13 (28.7)

Resistor Specifications

Power (Watts)	Voltage (VAC)	Type
0.25	250	Carbon Comp.
0.50	250	Carbon Comp.
Resistor Tolerance ± 10% or better		

Res. Wattage:
2 - 1/4 Watt
5 - 1/2 Watt
6 - 1.0 Watt
7 - 2.0 Watt

Resistor Val. (OHMS):
First 2 digits are significant figures -
Last digit is number of zeros added.
(i.e. 101 = 100 OHMS)

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