Type CCR Series

The CCR series of resistors is constructed utilising solid ceramic composition, which is the traditional medium for absorbing high energy pulses, in cases of high inrush current. These resistors have evolved over many years to have excellent pulse withstand capabilities, whilst remaining very stable. These improved characteristics have been achieved by prudent selection of materials of optimum physical properties and by advances in the manufacturing process. The CCR series are ideal for circuitry associated performance in high voltage power supplies, R-C snubber circuits, and inrush limiters.

Key Features

- Designed for Pulse Withstand
- Range of Resistance Tolerances
- Solid Ceramic Composition
- Low Cost, High Performance
- Two Sizes Available
- Wide Range of Resistance Values
- Available on Tape

Characteristics - Electrical

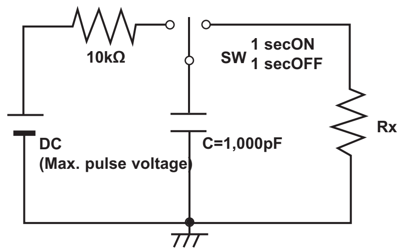
Power at 70°C Ambient:	0.5 Watt.	1.0 Watt.	2.0 Watt.
Derating:	Derating to 0 at 200°C	Derating to 0 at 200°C	Derating to 0 at 200°C
Resistance Range:	10R – 100K	3R3 – 390K	3R3 – 390K
Resistance Tolerance:	10% E12 series	10% E12 series	10% E12 series
Temp. Coefficient (ppm/°C):	<100R: -900 to ±300		>100R: -1300 to ±300
Max. Working Voltage:	200V	300V	400V
Max. Overload Voltage:	400V	600V	800V
Dielectric Withstand Voltage:	500 volts	500 volts	700 volts
Impulse Withstanding Voltage*:	10 Kv	14 Kv	20 Kv

NB *: Please refer to Resistance to Pulse Circuit

Characteristics - Environmental

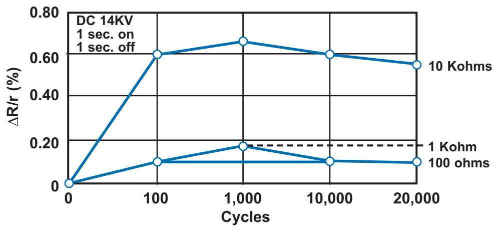
Operating Temperature Range:	-40°C to +200°C
Temperature Cycles (-40°C to 85°C, 5 cycles):	ΔR/R ± 2%
Load Life (1000 hours at 70°C):	ΔR/R ± 5%
Resistance to Solder Heat (360°C for 3 seconds):	ΔR/R ± 3%
Short Time Overload (2x rated voltage for 5 seconds):	ΔR/R ± 2%
Humidity (40°C, 95%RH 240 hrs.):	ΔR/R ± 5%

Resistance to Pulse Circuit

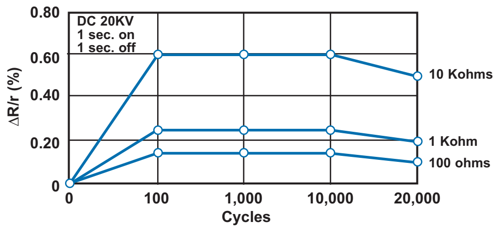


Resistance to Pulse Graphs

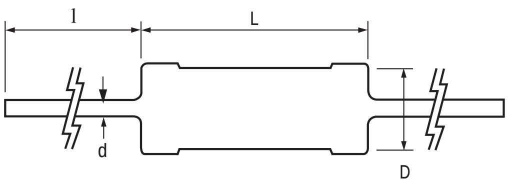
CCR1



CCR2



Dimensions



BULK	L	D	d (nom)	l
CCR1/2	9.0 ± 1.0	3.5 ± 0.5	0.7	30 ± 3
CCR1	16.5 ± 1.0	5.5 ± 1.0	0.8	38 ± 3
CCR2	19.0 ± 1.0	7.0 ± 1.0	0.8	38 ± 3

Application Notes

Limitations of Potential Pulsing on Fixed Ceramic Composition Resistors

Ceramic Composition resistors are susceptible to failure under some high voltage conditions. In circuitry where there is a possibility of transient potentials, considerable high voltage may be applied to a resistor for a short period of time. These notes are intended to aid the determining of "safe" potential level for the CCR Series when used in pulse application.

For Pulse Power limitations please refer to the graph (fig.1). Power below that specified on the graph will, generally not cause any significant degradation to the resistor, but please note that the resistance value may vary slightly due to repeated pulsing over a long period of time. The circuit designer should also be aware of the fact that the pulse voltage is limited even under the conditions on which the graph is based. The maximum peak pulse voltage for these resistors is the lesser of (A) or (B) below.

(A)

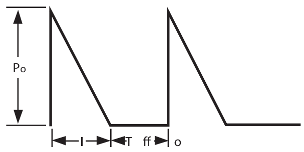
V peak = $\sqrt{Po \times R}$

Where:
"Po" is the pulse limit power taken from the graph.
"R" is the resistance value in ohms.

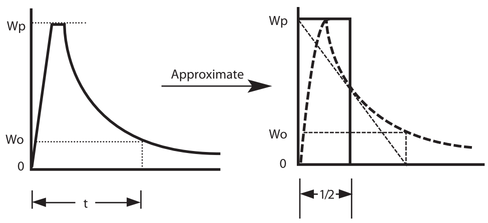
(B)

CCR1/2	800V
CCR1	1200V
CCR2	1600V

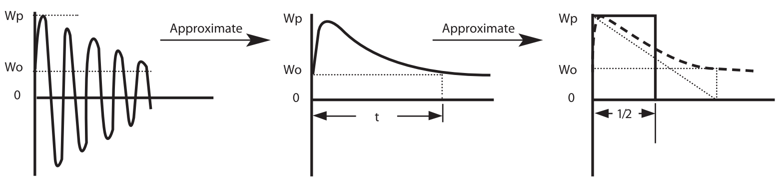
The Peak Power is defined as the maximum power dissipated at any point in time regardless of the waveform shape.



The Pulse Waveform, if other than square wave, must first be converted to an approximate square wave as shown below.



Wp - Peak Power. Wo - Rated Power. t - Time to attenuate down to the rated power.



Wp - Peak Power. Wo - Rated Power. t - Time to attenuate down to the rated power.

Application Notes

The following design rules determine if derating of the Pulse Limit Power (Po) obtained from the graph is required for repetitive pulse applications.

1. If T off < 4μ seconds, or T off < 5m seconds and (T off/t) < 1, then the peak power is treated as continuous power and, therefore, Pm = the resistor's rated wattage.

2. If T off is > 4μ sec, but is < 100μ sec, and (T off/t) < 700, then Pm = Po x 0.01 x (T off/t)0.7.

3. If T off is > 100μ sec, and (T off/t) < 200, then Pm = Po x 0.01 x (T off/t)0.85.

4. If T off is > 4μ sec, but is < 100μ sec, and (T off/t) < 700, or T off is >100μ sec, and (T off/t) > 200, then Pm = Po as obtained from the pulse power graph.

Where:

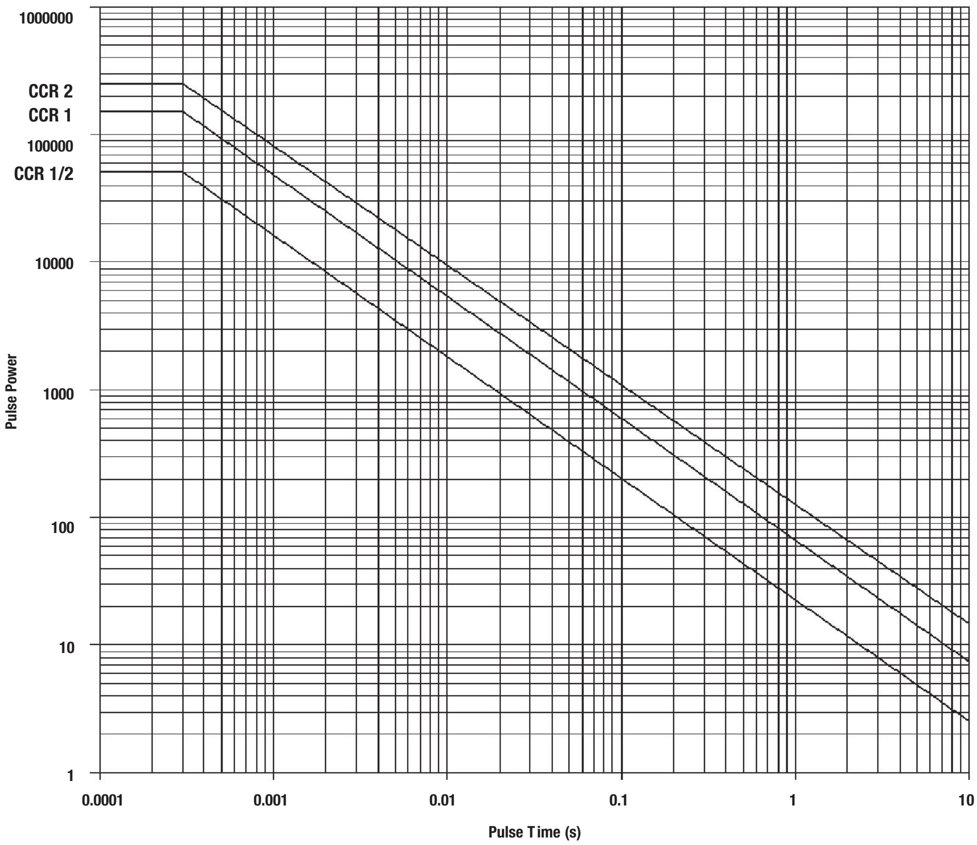
Pm: Derated Pulse Power (W)
Po: Pulse Power from graph below (W)
T off: Off time between pulses (sec)
t: Pulse width (sec)

Application Notes (continued)

Notes

- Graph pulse power (Po) is for ambient temperatures of 70°C or less. For ambient operating temperatures greater than 70°C, pulse power (Po) or (Pm) must be further derated by 1.18% per °C above 70°C in accordance with the power derating schedule of the resistor.
- If derated pulse power (Pm) is calculated to be less than the resistor's rated continuous power, the resistor's rated wattage should be used.

Pulse Limiting Power (Po) One Pulse



How to Order

CCR	1	10R	K	B
Common Part	**Power Rating**	**Resistance Value**	**Tolerance**	**Packaging**
CCR	_ - 0.5 Watt 1 – 1.0 Watt 2 – 2.0 Watt	10 ohm (10 ohms) 10R 1K ohms (1000 ohms) 1K0 100K ohms (100000 ohms) 100K	K - 10%	B - Bulk T - Taped