

# Ceramic Composition Resistors

## Type CCR Series

### 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

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

NB \*: Please refer to Resistance to Pulse Circuit

### Characteristics - Environmental

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

### Resistance to Pulse Circuit



### Resistance to Pulse Graphs CCR1



### CCR2



### Dimensions



BULK	L	D	d (nom)	I
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

## Type CCR Series

### 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)

$$V_{\text{peak}} = \sqrt{P_o \times R}$$

Where:

"P<sub>o</sub>" is the pulse limit power taken from the graph.

"R" is the resistance value in ohms.

(B)

	CCR1/2	800V
CCR1	1200V	
CCR2	1600V	

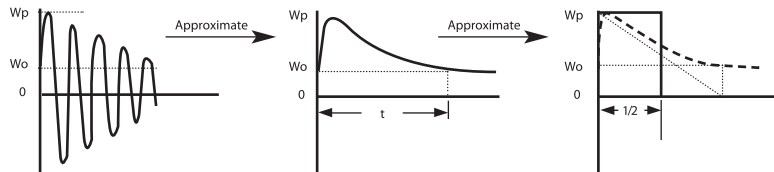
The Peak Power is defined as the maximum power dissipated at any point in time regardless of the waveform shape.



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



$W_p$  - Peak Power.  $W_o$  - Rated Power.  $t$  - Time to attenuate down to the rated power.



$W_p$  - Peak Power.  $W_o$  - 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 ( $P_o$ ) obtained from the graph is required for repetitive pulse applications.

1. If  $T_{\text{off}} < 4\mu$  seconds, or  $T_{\text{off}} < 5$  milliseconds and  $(T_{\text{off}}/t) < 1$ , then the peak power is treated as continuous power and, therefore,  $P_m =$  the resistor's rated wattage.
2. If  $T_{\text{off}}$  is  $> 4\mu$  sec, but is  $< 100\mu$  sec, and  $(T_{\text{off}}/t) < 700$ , then  $P_m = P_o \times 0.01 \times (T_{\text{off}}/t)^{0.7}$ .
3. If  $T_{\text{off}}$  is  $> 100\mu$  sec, and  $(T_{\text{off}}/t) < 200$ , then  $P_m = P_o \times 0.01 \times (T_{\text{off}}/t)^{0.85}$ .
4. If  $T_{\text{off}}$  is  $> 4\mu$  sec, but is  $< 100\mu$  sec, and  $(T_{\text{off}}/t) < 700$ , or  $T_{\text{off}}$  is  $> 100\mu$  sec, and  $(T_{\text{off}}/t) > 200$ , then  $P_m = P_o$  as obtained from the pulse power graph.

Where:

$P_m$ : Derated Pulse Power (W)  
 $P_o$ : Pulse Power from graph below (W)  
 $T_{\text{off}}$ : Off time between pulses (sec)  
 $t$ : Pulse width (sec)

## Type CCR Series

### Application Notes (continued)

**Notes**

- Graph pulse power ( $P_o$ ) is for ambient temperatures of 70°C or less. For ambient operating temperatures greater than 70°C, pulse power ( $P_o$ ) or ( $P_m$ ) 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 ( $P_m$ ) is calculated to be less than the resistor's rated continuous power, the resistor's rated wattage should be used.

### Pulse Limiting Power ( $P_o$ ) One Pulse



### How to Order

CCR	1	10R	K	B
<b>Common Part</b>	<b>Power Rating</b>	<b>Resistance Value</b>	<b>Tolerance</b>	<b>Packaging</b>
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



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.