



# THE DATASHEET OF SCRN220R-F



# Type SCR, Commutating Capacitors

## Type SCRN Film-Paper/Extended Foil Commutating Capacitor



Type SCRN capacitors are for SCR (silicon controlled rectifier) commutating applications that require high peak and rms current capability. These capacitors are ideal for other high frequency and pulsed applications. The SCRN is supplied in oval or rectangular metal cases with 1/4 x 20 threaded stud and insulated terminals to withstand high current and high peak voltages.

### Highlights

- Conforms to EIA RS401 for power semiconductor applications
- Non ferrous covers available for high frequency applications
- 40,000 hours life at full rated voltage and temperature
- High voltage, high current and high frequency
- Custom designs available

### Specifications

Capacitance Range	0.25 $\mu$ F to 50.0 $\mu$ F
Capacitance Tolerance	$\pm$ 10%
Rated Voltage	200 Vpk to 2000 Vpk
Operating Temperature Range	-40 °C to +80 °C
Maximum rms Current	Case codes: A, B, C, D = 60 Irms max. E and F = 100 Irms max.
Maximum rms Voltage	see application guide
Test Voltage between Terminal @ 25°C	DC voltage 2 x rated peak for 60 s
Test Voltage between Terminals & Case @ 25°C	2 x reference AC voltage +1000 Vac for 60 s
Life Test	EIA RS401
Life Expectancy	40,000 h life at full rated voltage, current, case temperature and VA
Reliability	Minimum of 95% survival
Standards	EIA RS401

### Regulatory Information

### Dimensions

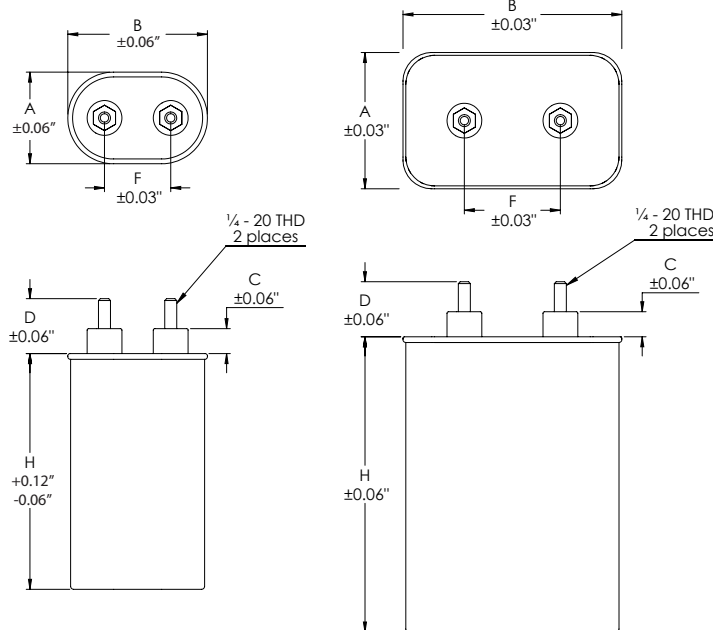


Figure 1

Figure 2

### Construction Details

Case Material	Tin Plated Steel or Aluminum
Encapsulation	Biodegradable, Environmentally Compatible Fluid
Terminal Material	Electro-tin plated copper stud and molded pillar insulator

Case Code	Dimensions Inches						Figure
	A	B	C	D	F	H	
A	1.31	2.16	0.56	1.19	0.81	see table	Fig. 1
B	1.56	2.69	0.50	1.13	1.25	see table	Fig. 1
C	1.91	2.91	0.50	1.13	1.38	see table	Fig. 1
D	1.97	3.66	0.50	1.13	1.38	see table	Fig. 1
E	2.84	4.56	0.50	1.13	2.00	see table	Fig. 2
F	3.75	4.56	0.56	1.19	2.00	see table	Fig. 2

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### Ratings

Cap ( $\mu$ F)	Catalog Part Number	Case Code	H (Inches)	Max VA (65 °C)	Max (Arms)	Cap ( $\mu$ F)	Catalog Part Number	Case Code	H (Inches)	Max VA (65 °C)	Max (Arms)
<b>200 Vpk (Paper Dielectric)</b>						<b>600 Vpk (Film Dielectric for Low-loss)</b>					
3	SCRN201R-F	A	2.13	400	60	1	SCRN262R-F	A	2.38	2200	60
5	SCRN202R-F	A	2.63	465	60	2	SCRN263R-F	A	2.38	2060	60
10	SCRN203R-F	A	3.88	625	60	3	SCRN264R-F	A	3.88	3190	60
15	SCRN205R-F	A	4.75	765	60	5	SCRN265R-F	A	4.25	4380	60
20	SCRN206R-F	B	4.25	875	60	10	SCRN266R-F	C	4.25	6060	60
30	SCRN208R-F	C	5.25	1200	60	<b>1000 Vpk (Film and Paper Dielectric)</b>					
40	SCRN209R-F	C	6.75	1500	60	1	SCRN233R-F	A	2.13	790	60
50	SCRN210R-F	D	5.75	1590	60	2	SCRN234R-F	A	3.13	1070	60
<b>400 Vpk (Film and Paper Dielectric)</b>						3	SCRN235R-F	A	3.88	1455	60
2	SCRN211R-F	A	2.63	790	60	5	SCRN236R-F	B	4.25	1785	60
3	SCRN212R-F	A	2.63	970	60	10	SCRN237R-F	C	5.75	2570	60
5	SCRN213R-F	A	3.88	1130	60	15	SCRN238R-F	D	5.75	3170	60
10	SCRN214R-F	B	4.75	1930	60	20	SCRN239R-F	E	5.13	5200	100
15	SCRN215R-F	C	4.75	2240	60	<b>1500 Vpk (Film and Paper Dielectric)</b>					
20	SCRN216R-F	C	6.25	2800	60	.5	SCRN240R-F	A	2.13	990	60
30	SCRN217R-F	D	6.75	3720	60	1	SCRN241R-F	A	2.88	1240	60
40	SCRN218R-F	D	8.00	4330	60	2	SCRN242R-F	B	3.50	1890	60
50	SCRN219R-F	E	6.25	6050	100	3	SCRN243R-F	C	4.25	2550	60
<b>600 Vpk (Film and Paper Dielectric)</b>						5	SCRN244R-F	C	5.75	3250	60
2	SCRN220R-F	A	2.63	815	60	10	SCRN245R-F	E	5.13	6500	100
3	SCRN221R-F	A	3.13	1200	60	<b>2000 Vpk (Film and Paper Dielectric)</b>					
5	SCRN222R-F	A	4.25	1420	60	.25	SCRN246R-F	A	2.13	990	60
10	SCRN224R-F	C	4.25	2040	60	.33	SCRN257R-F	A	2.13	1000	60
15	SCRN226R-F	C	5.75	2800	60	.5	SCRN247R-F	A	2.63	1180	60
20	SCRN227R-F	D	5.75	3260	60	1	SCRN248R-F	A	3.13	1300	60
25	SCRN229R-F	D	6.75	3720	60	2	SCRN249R-F	B	4.25	2230	60
30	SCRN230R-F	D	8.00	4330	60	3	SCRN251R-F	C	4.75	2800	60
40	SCRN231R-F	E	6.25	6060	100	5	SCRN253R-F	D	5.75	4020	60
50	SCRN232R-F	E	7.25	6850	100	10	SCRN256R-F	F	5.75	7600	100

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### Application Guide

#### How to Choose a Commutating Capacitor

1. From circuit analysis or measurement, determine application values for these six parameters:

- Nominal capacitance in  $\mu\text{F}$
- Current pulse width in  $\mu\text{s}$
- Current pulse period in  $\mu\text{s}$
- Maximum peak voltage
- Continuous AC voltage in  $V_{\text{rms}}$
- Maximum volt-amps (VA)

2. Choose a capacitor from the ratings table of the desired nominal capacitance with a peak voltage rating no less than your maximum peak voltage.

#### Using Volt-Ampere Ratings

The capacitor's maximum VA rating is the maximum product of the sine wave voltage and current that may be applied at 65 °C without overheating the capacitor and reducing its expected life. For other temperatures and pulsed current, use the multipliers of Figures 2 and 3 to derate the Max VA rating.

The Max Amps RMS rating is set by the capability of the capacitor terminals. Exceeding this limit can damage the terminals and cause capacitor failure.

Calculate the capacitor's actual VA load as the product of the rms voltage across the capacitor and the rms current through the capacitor. To calculate rms current for an applied sine wave or squarewave voltage, use these equations.

For a sinewave voltage the current is:

$$I_{\text{rms}} = 2\pi f C V_{\text{rms}} \times 10^{-6}$$

and for a squarewave the current is:

$$I_{\text{rms}} = C\Delta V / [0.64(tT)^{0.5}] = I_{\text{peak}}(t/T)^{0.5}$$

where (f) is repetition frequency in Hz, C is nominal capacitance in  $\mu\text{F}$ ,  $\Delta V$  the peak-to-peak squarewave amplitude in volts, (t) is the pulse width in  $\mu\text{s}$  and T is the pulse period in  $\mu\text{s}$ .

The peak current for the square wave voltage is:

$$I_{\text{peak}} = C\Delta V / 0.64t$$

3. Check that your application's rms current is no more than the capacitor's Max. Amps RMS. You can calculate the current from your  $V_{\text{rms}}$  using the equations in the following section.

4. Check that your application's volt-amperes is not more than the capacitor's VA capability. The VA capability is the max VA rating times the Volt-Ampere multiplier from Figure 2 (Current Pulse Width) and that times the Volt-Ampere Multiplier from Figure 3 (Ambient Temperature). See the following section for more on using volt-ampere multipliers.

If you need a greater VA capability, repeat these steps for a higher peak voltage capacitor or consider connecting units in parallel to divide the VA required. For up to peak voltage of 600 V, you may also consider polypropylene film dielectric units, Catalog Numbers SCR262R through SCR266R, with higher VA capability.

Pulse Wave Applications

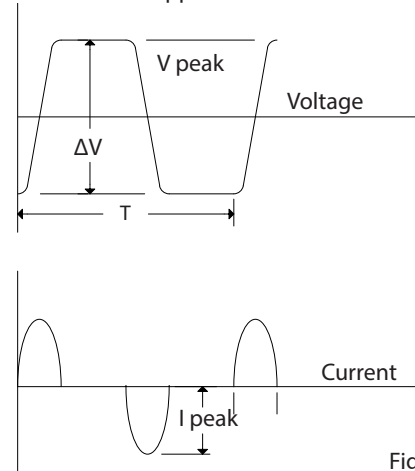


Figure 1

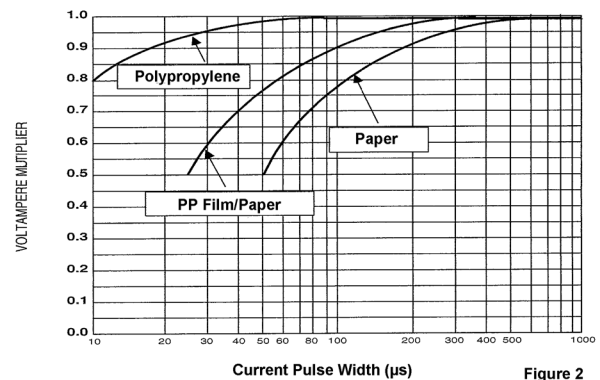


Figure 2

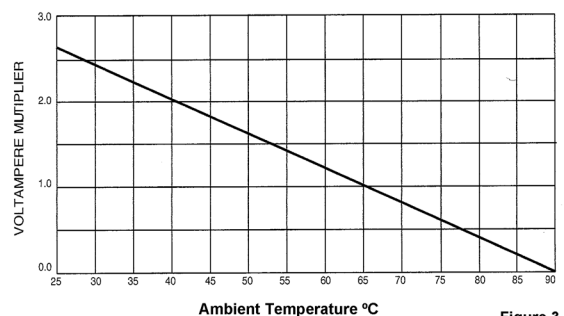




Figure 3

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