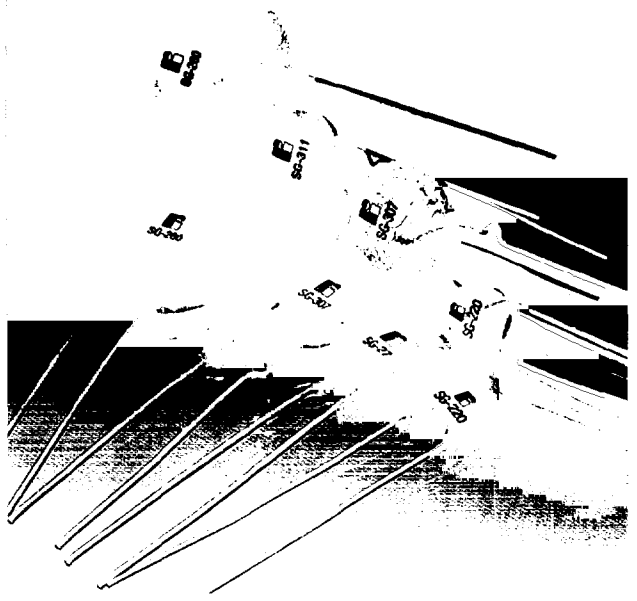


SURGE-GARD™

Inrush Current Limiting Devices

Description

Ketema Rodan Surge-Gard™ devices are manufactured of a specially formulated metal oxide ceramic material which is capable of suppressing high inrush current surges. They are especially useful in power supplies (See Fig. A) where, because of the extremely low impedance of the capacitor being charged, the bridge is subjected to an exceedingly high current surge at turn-on. The Surge-Gard, being of relatively high resistance, limits the current for 1 to 2 seconds during which time the device decreases in resistance substantially to a point where its voltage drop is negligible.

Applications

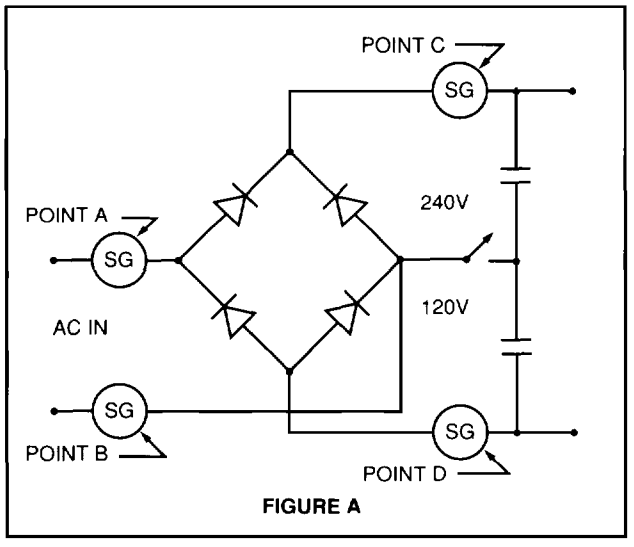


FIGURE A

If the resistance of one Surge-Gard does not provide sufficient inrush current limiting for your application, two or more may be used in series or in separate legs of the supply circuit. Surge-Gards cannot be used in parallel since one unit will tend to conduct nearly all the current available. Surge-Gards may be used in the AC (Point A or B) or the DC (Point C or D) locations in the circuit.

SURGE-GARD™ Resistance Curve

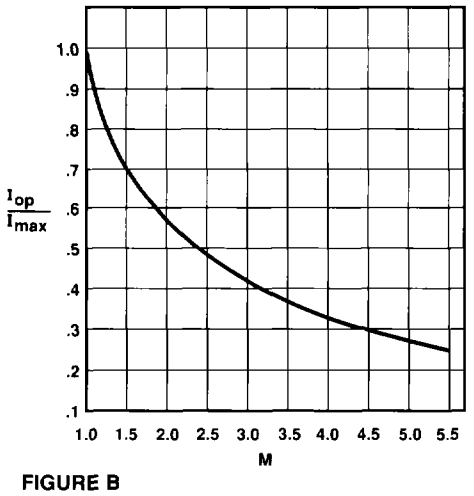


FIGURE B

To determine the approximate resistance of a Ketema Rodan Surge-Gard operating at less than Imax, first determine the operating current ratio by dividing the actual operating current (I_{op}) by the respective Imax for the device being used.

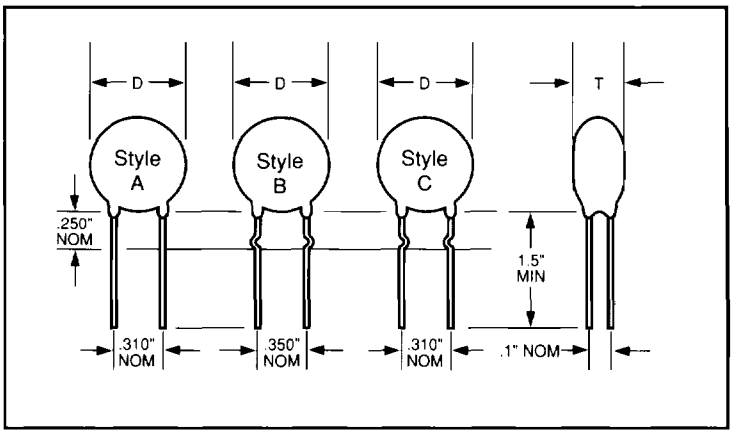
Next, refer to the curve in Figure B and multiply the corresponding "M" value by the R_{Imax} for the device being used. The nominal Imax and R_{Imax} ratings for Ketema Rodan Surge-Gards can be found in the specification table.

I_{max} = The maximum steady state DC or RMS AC current

RI_{max} = The approximate resistance under maximum steady state current conditions. To determine the resistance of a device at less than the maximum rated current, see Figure B above.

Max Operating Temp. = All Ketema Rodan Surge-Gard devices are rated for operation to a maximum ambient temperature of 65°C. If your application requires operation above 65°C ambient, please consult Ketema Rodan's applications engineering department.

Recovery Time = Since Ketema Rodan Surge-Gards self-heat due to current flow which in turn causes a reduction in their resistance, the devices require a cool-down time after power is removed. The cool-down time allows the resistance to increase sufficiently to provide the required inrush current limiting. This time varies with the particular device, mounting method and ambient temperature. Usually, a one minute cool-down period is adequate. Selection of capacitor bleeder resistors, which will provide a one minute or so bleed down time, can eliminate the cool-down time requirement.



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SURGE-GARD™ Specifications

Part Number			R @ 25°C	R Tolerance	I_{max}	RI_{max}	Max. "D"	Max. "T"	Lead Dia.	NTC	Surge Rating
Style A	Style B	Style C	(Ohms)	(± %)	(AMPS)	(Ohms)	(Inches)	(Inches)	(Inches)	Curve	(Joules)
SG260	SG326		.5	20	30.00	.010	1.250	.200	.040	A	31*
SG415	SG327		.7	25	12.00	.030	.740	.200	.040	A	45
SG100	SG301		1.0	15	20.00	.015	.900	.300	.040	A	48*
SG405	SG328		1.0	25	30.00	.015	1.250	.250	.040	A	157
SG416	SG329		1.3	25	8.00	.050	.525	.200	.040	A	40
SG110	SG302		2.0	15	18.00	.030	.900	.350	.040	A	80
SG 420	SG355		2.0	25	23.00	.025	1.250	.300	.040	A	250
SG120		SG303	2.5	15	3.00	.150	.600	.250	.032	A	27
SG130		SG304	2.5	15	7.00	.050	.600	.250	.032	A	27
SG140		SG305	2.5	15	9.00	.040	.600	.250	.032	A	27
SG150	SG306		2.5	15	10.00	.040	.900	.300	.040	A	87
SG160	SG307		2.5	15	15.00	.030	.900	.300	.040	A	87
SG170	SG308		4.0	15	8.00	.070	.600	.250	.040	A	27
SG32	SG330		4.0	20	14.00	.050	.900	.350	.040	A	100
SG180		SG309	5.0	15	2.00	.400	.600	.250	.032	A	36
SG413			5.0	25	2.80	.250	.530	.200	.025	A	23
SG190		SG310	5.0	15	4.00	.150	.600	.250	.032	A	36
SG57		SG331	5.0	10	6.00	.100	.600	.250	.032	A	30
SG200		SG311	5.0	15	7.00	.070	.600	.250	.032	A	40
SG44	SG332		5.0	20	8.00	.050	.600	.250	.040	A	40
SG26	SG333		5.0	15	12.00	.060	.900	.275	.040	A	134
SG418		SG334	6.0	15	5.00	.150	.600	.270	.032	A	40
SG210	SG312		7.0	15	4.00	.200	.600	.300	.040	A	50
SG85	SG335		7.0	25	5.00	.150	.600	.300	.040	A	45
SG64	SG336		7.0	15	10.00	.080	.950	.275	.040	J	100
SG13		SG337	10.0	15	2.00	.300	.500	.250	.032	A	17
SG220		SG313	10.0	15	3.00	.200	.450	.300	.032	A	17
SG42	SG338		10.0	15	5.00	.200	.600	.350	.040	A	44
SG27	SG314		10.0	15	6.00	.150	.500	.350	.040	A	40
SG40	SG72		10.0	20	8.00	.100	.900	.350	.040	J	50
SG39	SG339		12.0	10	4.00	.220	.500	.350	.040	A	40
SG23		SG340	15.0	10	2.50	.330	.550	.300	.032	A	40
SG86			16.0	25	1.70	.600	.530	.300	.025	A	45
SG414			16.0	25	2.70	.400	.530	.300	.025	A	45
SG63	SG320		16.0	25	4.00	.250	.750	.250	.040	J	50
SG230		SG315	20.0	15	1.75	.600	.500	.300	.032	A	31
SG411		SG341	25.0	25	1.70	.600	.500	.300	.032	A	30
SG412		SG342	25.0	25	2.40	.400	.500	.300	.032	A	30
SG38	SG343		30.0	15	3.00	.400	.600	.250	.040	B	25
SG240		SG316	40.0	15	2.00	.600	.625	.250	.032	B	20
SG52	SG344		47.0	25	3.00	.500	.770	.240	.040	B	55
SG16		SG345	60.0	10	1.50	1.000	.600	.250	.032	B	50
SG250	SG317		120.0	15	3.00	.900	.925	.250	.040	C	36
SG31	SG346		220.0	20	1.30	1.900	.600	.300	.040	C	25

For applications requiring ratings not shown, contact Ketema Rodan applications engineering.
Maximum operating voltage is 265V RMS.
*Maximum operating voltage is 120V RMS.

SURGE-GARD™ Recommended I_{max} Derating Curve

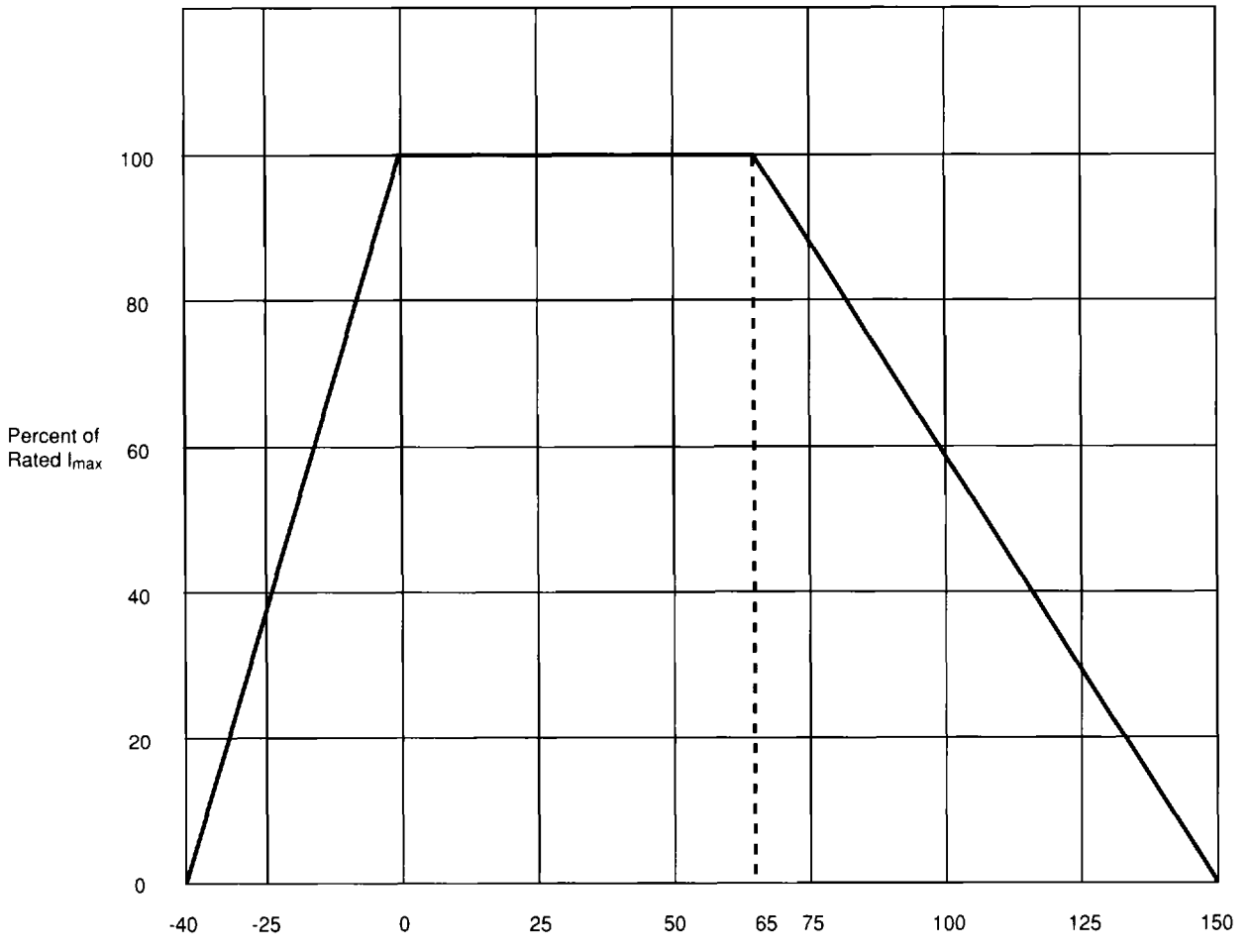

Figure C

The recommended I_{max} current versus the ambient temperature is shown in Figure C.

If the ambient temperature is between 0°C and 65°C, the percent of I_{max} is 100%.

If the ambient temperature is between 65°C and 150°C, the percent of $I_{max} = 100 \left[1 - \frac{T - 65°C}{85°C}\right]$

T = ambient temperatures between 65°C and 150°C.

If the ambient temperature is between 0°C and – 40°C, the percent of $I_{max} = 100 \left[1 - \frac{T - 0°C}{-40°C}\right]$

T = ambient temperatures between 0°C and – 40°C.

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