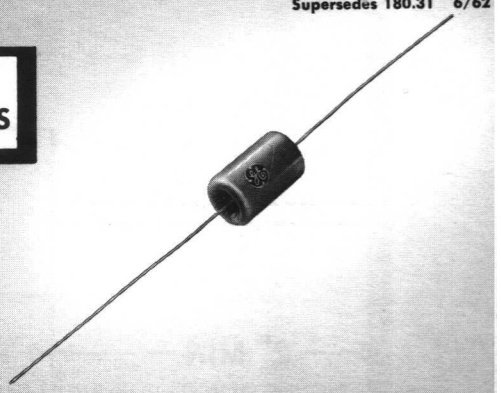
180.31 6/64
Supersedes 180.31 6/62

THYRECTOR DIODES: TRANSIENT VOLTAGE SUPPRESSORS



SERIES 6RS20SP, 6RS5SP

The new THYRECTOR DIODE transient voltage suppressor is a specially manufactured selenium rectifier. It is a result of General Electric's Vac-U-Sel® process.

The reverse characteristics have been altered to provide a very sharp I vs. E trace. (Fig. 1) Because of the defined knee and the steep slope of this curve, the cell performs in a manner similar to a Zener diode. This characteristic makes the THYRECTOR DIODE a very effective transient voltage suppressor, to be connected across the AC input of silicon and germanium rectifiers, and silicon controlled rectifiers.

By limiting transients to a known value, the designer obtains increased circuit reliability and life. Cost reductions can be made in many applications by installing THYRECTOR DIODES in the circuits, since the PRV requirement of the silicon or germanium devices can be reduced. (Fig. 2)

The miniature Thyrectors come in two series of twenty voltage ratings each, from 30 to 600 volts RMS. The housing is manufactured from an attractive blue colored fiber tube. The device is normally lead mounted. See dimensions in Table I.

Miniature Thyrectors may be purchased on special order in housings made of phenolic tubing employing fuse-clip type caps and caps with wire leads.

FEATURES

- Zener Type Breakdown (Fig. 1)
- Non-Linear Resistance (Fig. 3)
- Temperature Stability
- Instant Transient Voltage Response
- High Energy Dissipation
- Long Life
- Low Price

RATINGS (Maximum Allowable Values)

Series 6RS20SP (15/32" cell)
Series 6RS5SP (9/32" cell)

STEADY STATE

Cell Voltage	-	30 volts rms
	-	42.4 volts peak
Stack Voltage	-	30 to 600 volts rms
Max. Leakage Current @ Normal Rated Voltage	-	15/32" cell—1.2 milliamperes
	-	9/32" cell—.8 milliampere
Max. Operating Ambient Temperature	-	100°C

TRANSIENT RATING

Max. current: Single Pulse	-	See Figure 2
Max. current: Recurrent Pulse .001 second @ 60 cps.	-	15/32" cell—.75 Ampere
	-	9/32" cell—.25 Ampere
Max. Operating Cell Temperature	-	130°C

BENEFITS

- Controlled Voltage Transients
- Insured Circuit Reliability
- Lower Component Costs

OUTLINE DRAWING

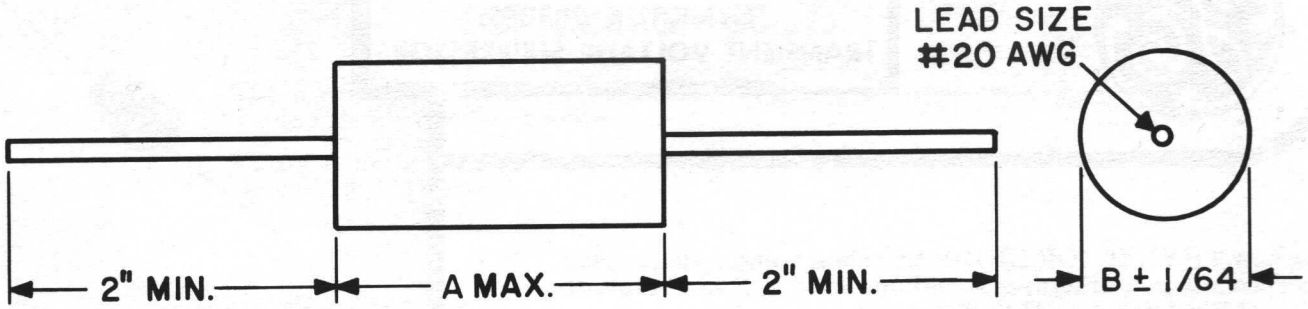
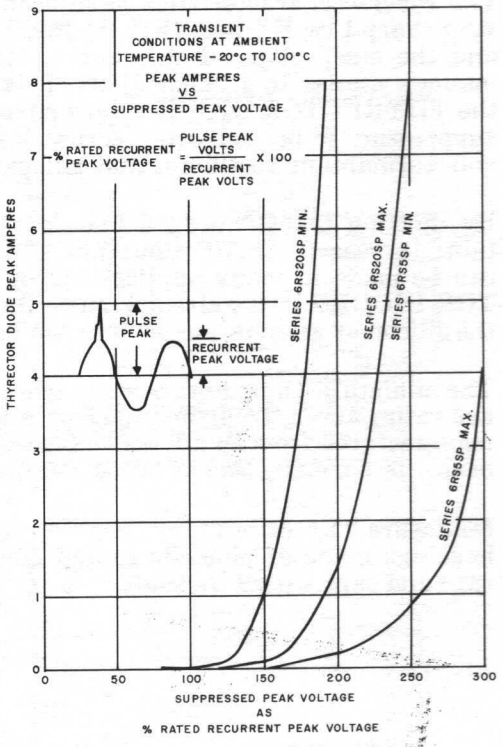


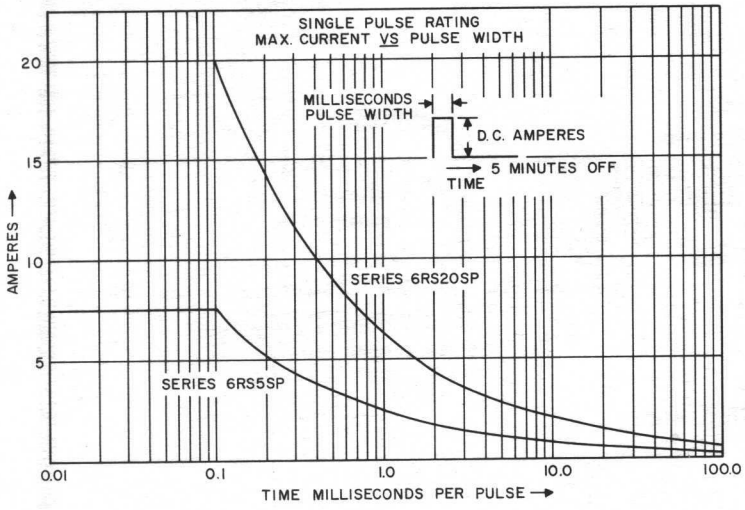
TABLE I
MINIATURE THYRECTOR DIODES TRANSIENT VOLTAGE SUPPRESSORS

Model Number	*Steady State Rating RMS Input Volts	Peak Input Volts	ACMA Leakage	Dimensions Inches A	B
6RS20SP1B1	30	42.4	1.2	1 3/8	37/64
2B2	60	84.8	1.2	"	37/64
3B3	90	127.2	1.2	"	37/64
4B4	120	169.6	1.2	"	37/64
5B5	150	212.0	1.2	"	37/64
6B6	180	254.4	1.2	1 39/64	37/64
7B7	210	296.8	1.2	"	37/64
8B8	240	339.2	1.2	"	37/64
9B9	270	381.6	1.2	"	37/64
10B10	300	424.4	1.2	"	37/64
11B11	330	466.6	1.2	1 27/32	37/64
12B12	360	509.0	1.2	"	37/64
13B13	390	551.4	1.2	"	37/64
14B14	420	593.8	1.2	"	37/64
15B15	450	636.3	1.2	"	37/64
16B16	480	678.7	1.2	2 5/64	37/64
17B17	510	721.1	1.2	"	37/64
18B18	540	763.5	1.2	"	37/64
19B19	570	805.9	1.2	"	37/64
20B20	600	848.4	1.2	"	37/64
6RS5SP1B1	30	42.4	.8	1 11/64	3/8
2B2	60	84.8	.8	"	3/8
3B3	90	127.2	.8	"	3/8
4B4	120	169.6	.8	"	3/8
5B5	150	212.0	.8	"	3/8
6B6	180	254.4	.8	1 13/32	3/8
7B7	210	296.8	.8	"	3/8
8B8	240	339.2	.8	"	3/8
9B9	270	381.6	.8	"	3/8
10B10	300	424.4	.8	"	3/8
11B11	330	466.6	.8	1 41/64	3/8
12B12	360	509.0	.8	"	3/8
13B13	390	551.4	.8	"	3/8
14B14	420	593.8	.8	"	3/8
15B15	450	636.3	.8	"	3/8
16B16	480	678.7	.8	1 7/8	3/8
17B17	510	721.1	.8	"	3/8
18B18	540	763.5	.8	"	3/8
19B19	570	805.9	.8	"	3/8
20B20	600	848.4	.8	"	3/8

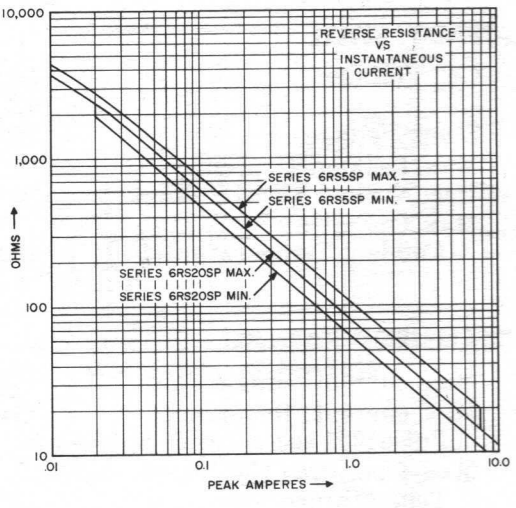
*Steady State defined as normal input conditions. If non-sinusoidal wave input is present, peak voltage input values should be used to select model. ACMA leakage is based upon sinusoidal input.



TRANSIENT CONDITIONS AT AMBIENT TEMPERATURE — 20° TO 100°C
Figure 1



SINGLE PULSE RATING MAX. CURRENT VS. PULSE WIDTH
Figure 2



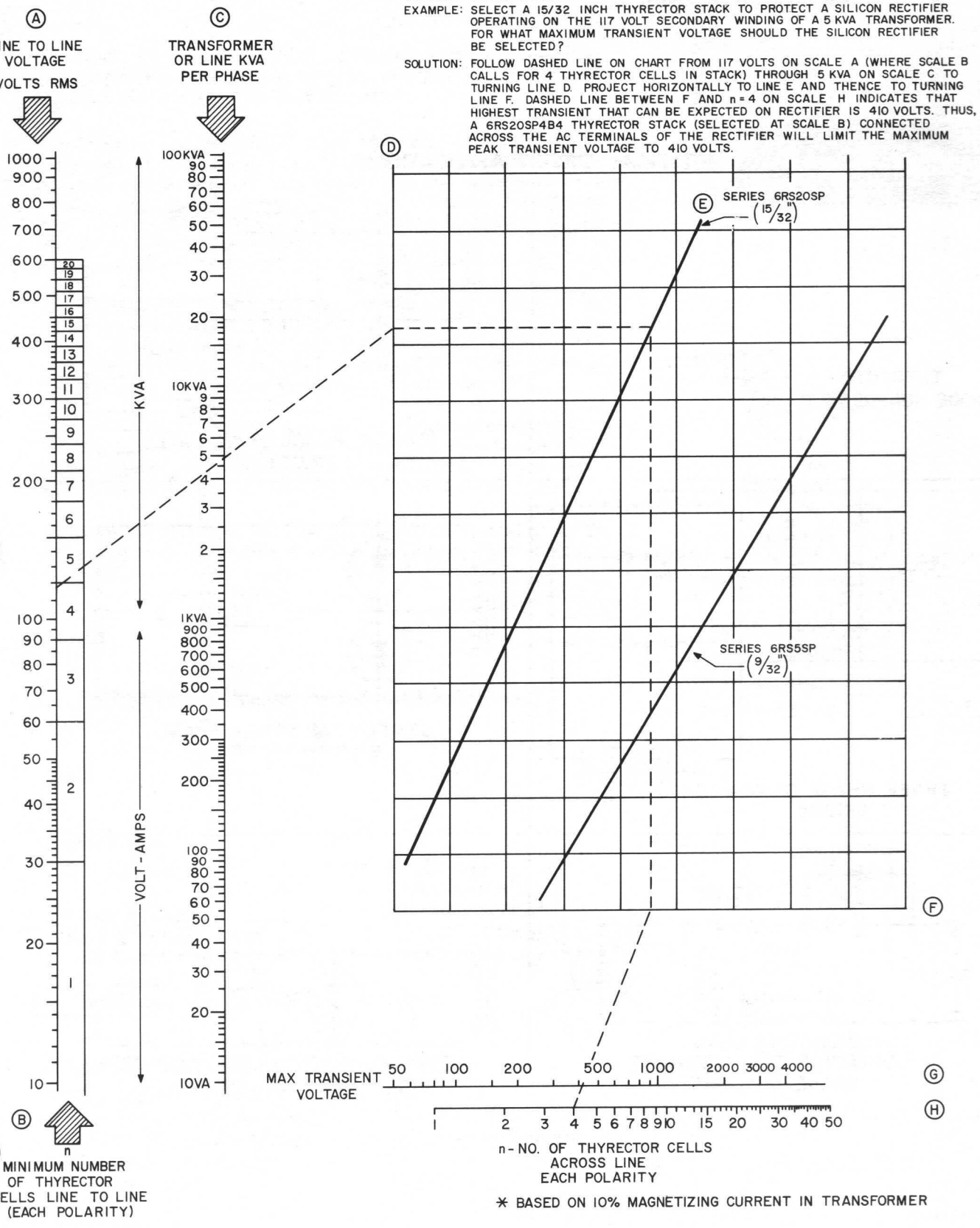
REVERSE RESISTANCE VS. INSTANTANEOUS CURRENT
Figure 3

THYRECTOR SELECTION NOMOGRAM

TO LIMIT TRANSFORMER SWITCHING TRANSIENTS TO INDICATED VOLTAGE PEAKS.*

EXAMPLE: SELECT A 15/32 INCH THYRECTOR STACK TO PROTECT A SILICON RECTIFIER OPERATING ON THE 117 VOLT SECONDARY WINDING OF A 5 KVA TRANSFORMER. FOR WHAT MAXIMUM TRANSIENT VOLTAGE SHOULD THE SILICON RECTIFIER BE SELECTED?

SOLUTION: FOLLOW DASHED LINE ON CHART FROM 117 VOLTS ON SCALE A (WHERE SCALE B CALLS FOR 4 THYRECTOR CELLS IN STACK) THROUGH 5 KVA ON SCALE C TO TURNING LINE D. PROJECT HORIZONTALLY TO LINE E AND THENCE TO TURNING LINE F. DASHED LINE BETWEEN F AND n = 4 ON SCALE H INDICATES THAT HIGHEST TRANSIENT THAT CAN BE EXPECTED ON RECTIFIER IS 410 VOLTS. THUS, A 6RS20SP4B4 THYRECTOR STACK (SELECTED AT SCALE B) CONNECTED ACROSS THE AC TERMINALS OF THE RECTIFIER WILL LIMIT THE MAXIMUM PEAK TRANSIENT VOLTAGE TO 410 VOLTS.



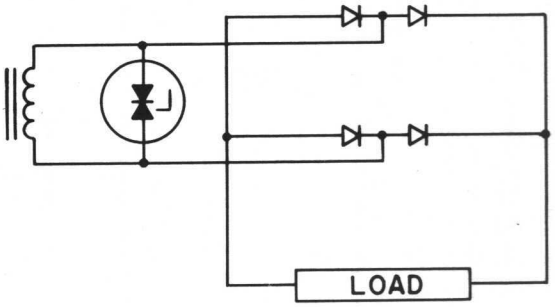
* BASED ON 10% MAGNETIZING CURRENT IN TRANSFORMER

APPLICATION GUIDES

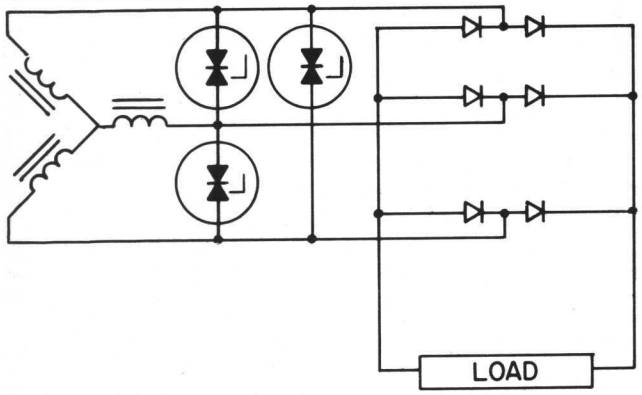
1. The RMS input voltage rating of the Thyrector Diode models listed in Table 1 should not be exceeded.
2. Under transient conditions, the single pulse rating shown in Figure 2 should not be exceeded.

TYPICAL CIRCUIT APPLICATIONS

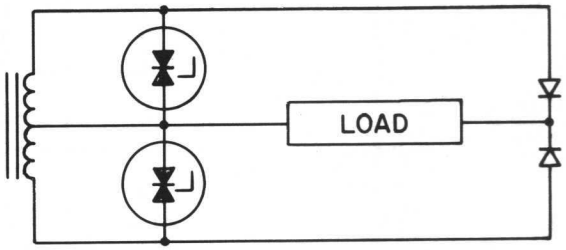
THYRECTOR =
DIODE SUPPRESSOR



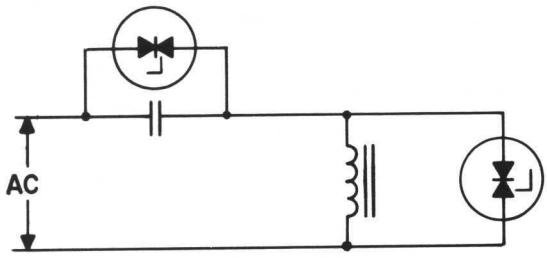
SINGLE PHASE SILICON (G.E.)
RECTIFIER



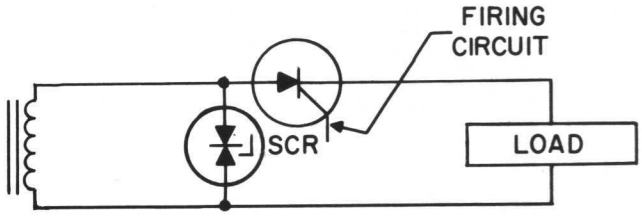
THREE PHASE SILICON
BRIDGE



CENTER TAP SINGLE PHASE
SILICON RECTIFIER



INDUCTIVE LOAD
CONTACTOR COIL, MAGNETIC
BRAKE COIL, ETC.



TYPICAL CONTROLLED RECTIFIER
HALF WAVE STATIC SWITCH

SEMICONDUCTOR PRODUCTS DEPARTMENT
ELECTRONICS PARK SYRACUSE 1, N. Y.
GENERAL ELECTRIC
(In Canada, Canadian General Electric Company, Ltd., Toronto, On
Outside the U.S.A., and Canada, by: Electronic Component Sale
I.G.E. Export Division, 159 Madison Avenue, New York, N. Y. 1001