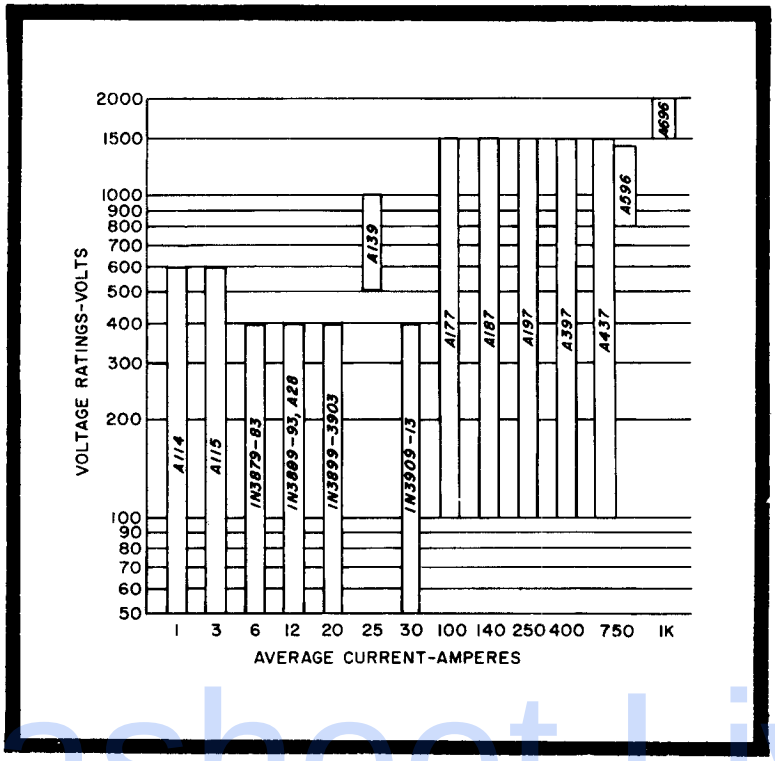
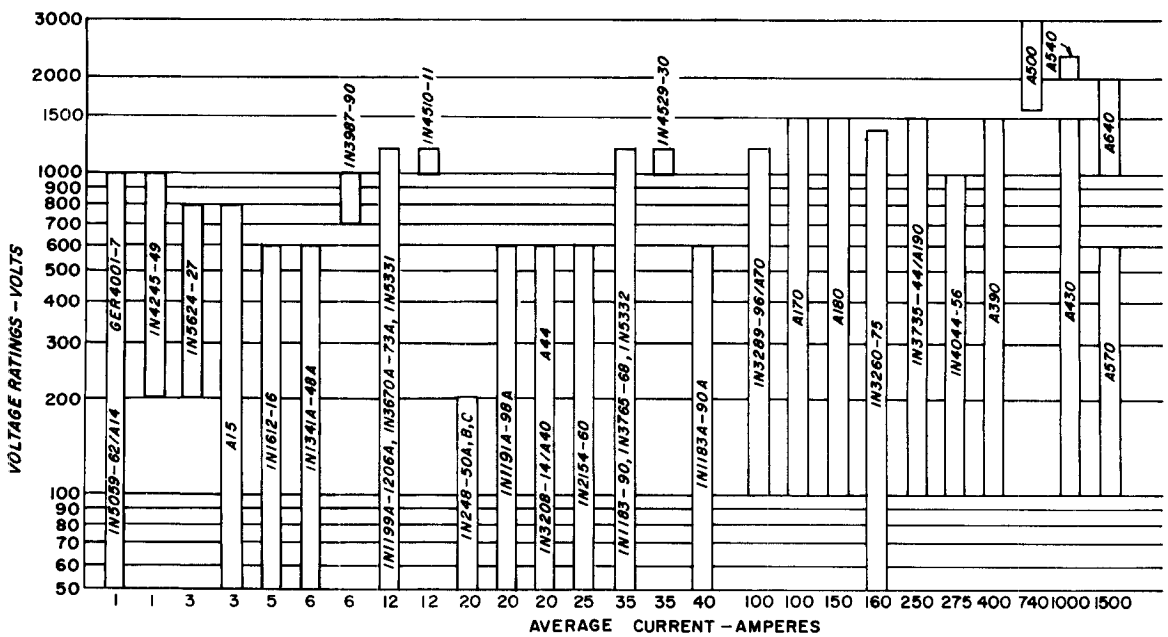
FAST RECOVERY RECTIFIERS SELECTOR GUIDE



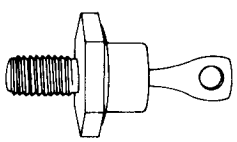
STANDARD RECTIFIERS SELECTOR GUIDE



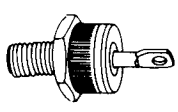
RECTIFIERS
20 TO 25 AMPERES

JEDEC		1N248B-50B	1N1195A-98A	1N2154-60	1N1183-90 1N3765-68 1N5332	1N4529-30	1N1183A-90A	1N3899-3903	1N3909-13	1N3208-14		
GE TYPE		–	–	–	–	–	–	–	–	A40F	A44F	A139
SPECIFICATIONS												
$I_{FM(AV)}$	Max. average forward current (1 phase operation) (A)	20	20	25	35	35	40	20	30	20	20	25
	@ T_C = (°C)	150	150	145	140	115	150	100	100	110	110	75
$V_{RM(rep)}$	Max. repetitive peak reverse voltage (V)											
	50	1N248B	1N1191A	1N2154	1N1183	–	1N1183A	1N3899*	1N3909*	1N3208 A40F	A44F	–
	100	1N2498	1N1192A	1N2155	1N1184*	–	1N1184A	1N3900*	1N3910*	1N3209 A40A	A44A	–
	150	–	1N1193A	–	1N1185	–	1N1185A	–	–	–	–	–
	200	1N2508	1N1194A	1N2156	1N1186*	–	1N1186A	1N3901*	1N3911*	1N2110 A40B	A44B	–
	300	–	1N1195A	1N2157	1N1187	–	1N1187A	1N3902*	1N3912*	1N3211 A40C	A44C	–
	400	–	1N1196A	1N2158	1N1188*	–	1N1188A	1N3903*	1N3913*	1N3212 A40D	A44D	–
	500	–	1N1197A	1N2159	1N1189	–	1N1189A	–	–	1N3213 A40E	A44E	A139E
	600	–	1N1198A	1N2160	1N1190*	–	1N1190A	–	–	1N3214 A40M	A44M	A139M
	700	–	–	–	1N3765	–	–	–	–	–	–	–
	800	–	–	–	1N3766	–	–	–	–	–	–	A139N
	900	–	–	–	1N3767	–	–	–	–	–	–	–
	1000	–	–	–	1N3768	1N4529	–	–	–	–	–	A139P
	1200	–	–	–	1N5332	1N4530	–	–	–	–	–	–
$I_{FM(surge)}$	Max. peak one cycle, non-recurrent surge current (60 Hz sine wave, 1 phase operation) @ max. rated load conditions (A)	350	350	400	500	500	800	225	300	300	300	400
I^2t	Max. I^2t rating (non-repetitive for 8.3 msec) A^2 sec	–	–	250	500	500	–	–	–	100	100	500
T_J	Operating junction temperature range (°C)	–65 to +175	–65 to +175	–65 to +200	–65 to +200	–65 to +175	–65 to +200	–65 to +150	–65 to +150	–65 to +175	–65 to +175	–40 to +125
T_{stg}	Storage temperature range (°C)	–65 to +175	–65 to +175	–65 to +200	–65 to +200	–65 to +200	–65 to +200	–65 to +175	–65 to +175	–65 to +175	–65 to +175	–40 to +200
$R\theta_{JC}$	Max. thermal resistance, junction-to-case (°C/W)	1.2	1.2	1.4	1.0	1.0	1.0	1.5	1.0	1.5 Typical	1.5 Typical	1.0
V_{FM}	Max. peak forward voltage drop @ rated $I_{F(AV)}$ (1 phase operation) (V)	1.5	1.2	1.2	1.8	1.4	1.3	1.4	1.4	1.00 Typical	1.00 Typical	1.85
	@ T_C = (°C)	25	25	145	140	115	25	25	25	25	25	75
T_{rr}	Max. reverse recovery time (nsec)	–	–	–	–	–	–	200	200	–	–	500
PACKAGE OUTLINE NO.		123	123	123	123	123	123	123	123	125	126	123

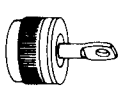
* JAN & JANTX types available.



123



125



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CONTROLLED AVALANCHE

Silicon Rectifier

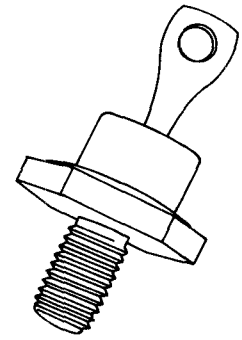
35A Avg. Up to 1200V

1N4529-30

1N4531	SEE PAGE 205
1N4532-34	SEE PAGE 262
1N4536	SEE PAGE 205

CONTROLLED AVALANCHE RECTIFIERS FROM GENERAL ELECTRIC

Feature These Advances in Silicon Rectifier Diode Applications:



Self-protection against normal voltage transients. Dissipates up to 12,000 watts peak power in the reverse direction. Permits decreased PRV safety factors in equipment due to greatly reduced transient voltage vulnerability.

- Unmatched standards of reliability at PRV's up to 1200 volts, as well as at lower voltages.
- Protection of other circuit components against overvoltage through rigidly specified maximum/minimum avalanche characteristics.
- Make ideal voltage equalizing elements for series connected SCR's and conventional rectifier diodes. Also for anode triggering SCR's to prevent damage from voltage transients in the forward direction.
- Simplified series operation of rectifiers in high-voltage applications . . . no shunting resistors necessary for Controlled Avalanche Rectifiers. Makes possible compact high-voltage assemblies.
- Can operate in the avalanche breakdown region at high voltages . . . unharmed by hi-pot and megger tests.

To be designated *"Controlled Avalanche"* a GE silicon rectifier diode must:

1. Have rigidly specified maximum and minimum avalanche voltage characteristics;
2. Be able to operate in its avalanche region without damage at any junction temperature up to a maximum of 175°C; and
3. Be able to absorb momentary power surges in the avalanche region, and have ratings defining this capability at starting junction temperatures of 25°C and 175°C.

For information on the application of Controlled Avalanche Rectifiers, see Publication No. 200.27, "An Introduction To The Controlled Avalanche Silicon Rectifier". Copies may be obtained from: General Electric Company, Distribution Services, Bldg. 6, Room 208, 1 River Road, Schenectady, New York 12305.

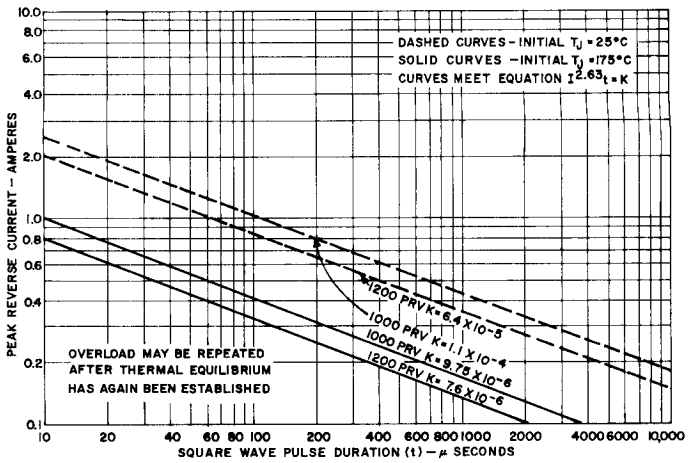
MAXIMUM ALLOWABLE RATINGS

Type	Repetitive & Working Peak Reverse Voltage* $V_{RM(rep)}$, $V_{RM(wkg)}$ $T_J = -65°C$ to $+175°C$ (Note: 1)	MINIMUM Avalanche Breakdown Voltage, BV_R, (5 mA test current at $T_J = 25°C$)	MAXIMUM Avalanche Breakdown Voltage, BV_R, (5 mA test current at $T_J = 25°C$)	Full-Load Reverse Current (full-cycle avg., 115°C T_C, 1 ϕ), $I_{R(AV)}$
	Volts**	Volts	Volts	Milliamperes**
1N4529,R	1000	1250	1550	2.5
1N4530,R	1200	1500	1930	2.0

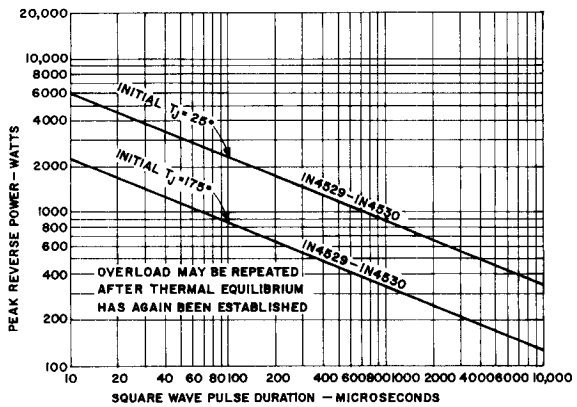
Average Forward Current, I_O ($T_C = +115°C$, single phase) ..... 35 Amperes**
Peak One-Cycle Surge Current (non-repetitive), I_{FM} (surge) ..... 500 Amperes**
Minimum I^2t Rating (see Curve 6) ..... 500 Ampere² seconds
Reverse Power Surge (non-repetitive, 10 μsec., square wave)
$T_J = +25°C$ ..... 12 Kilowatts
$T_J = +175°C$ ..... 4.5 Kilowatts
(For other conditions, see Curve 2)
Average DC Reverse Power in Breakdown Region ($-65°C \leq T_C \leq +115°C$) (Note: 2) ..... 20 Watts**
Peak Reverse Power in Breakdown Region (repetitive) (Note: 2) ..... 100 Watts
Forward Peak Voltage Drop, V_{FM} ($T_C = +115°C$, $I_O = 12$ ampere avg.) ..... 1.4 Volts**
Thermal Resistance, θ_{J-C} ..... 1.0°C/Watt
Operating Junction Temperature, T_J ..... −65°C to +175°C**
Storage Temperature, T_{stg} ..... −65°C to +200°C**
Stud Torque ..... 30 Lb-in
35 Kg-cm

*Maximum voltages apply with a heatsink thermal resistance of 8°C/watt, or less, at maximum rated junction temperature.
**Indicates values included in JEDEC Type Number Registration.

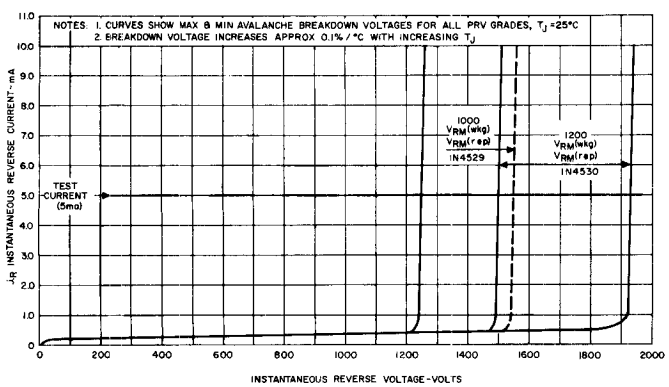
NOTES:
(1) V_{RM}(rep) applies for a conventional AC to DC conversion application. V_{RM}(rep) and V_{RM}(wkg) can be considered unlimited providing that the additional reverse power generation is taken into account by allowing for its influence on the forward current rating. Considerations similar to voltage regulator diode applications would apply.
(2) These ratings assume no forward power dissipation. In applications requiring both forward and reverse average power dissipation, reduce case temperature as determined from the maximum case temperature versus average forward current curve by 2.0°C for every watt of average reverse power dissipation.
(3) Case temperature, Tc, is measured at the center of any one of the hex flats.



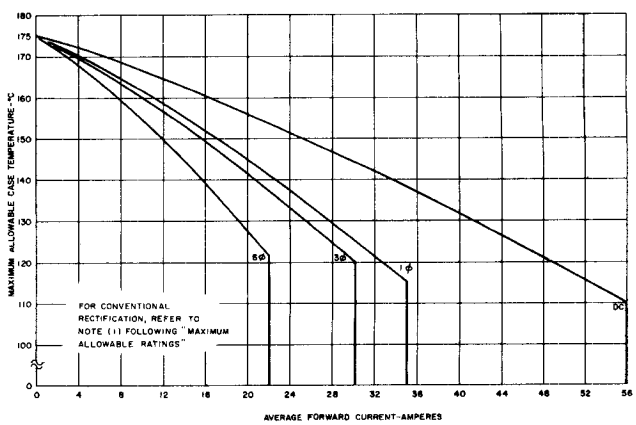
1. NON-RECURRENT REVERSE SURGE CURRENT RATINGS



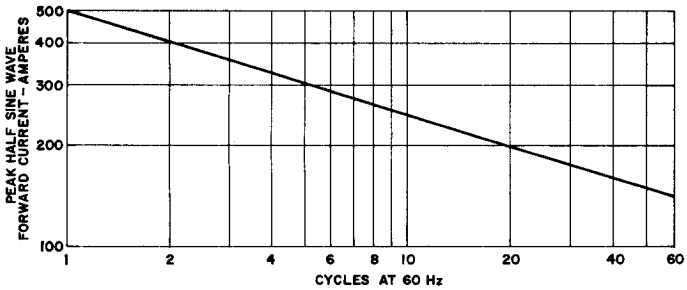
2. NON-RECURRENT REVERSE POWER SURGE



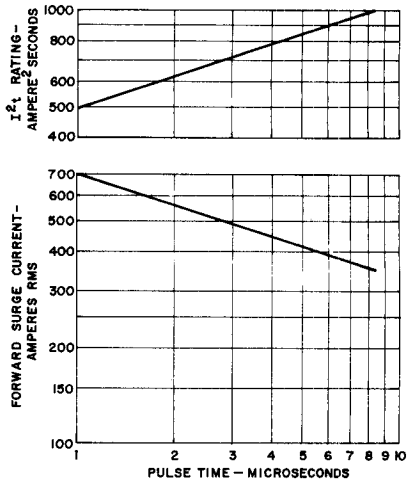
3. REVERSE CHARACTERISTICS



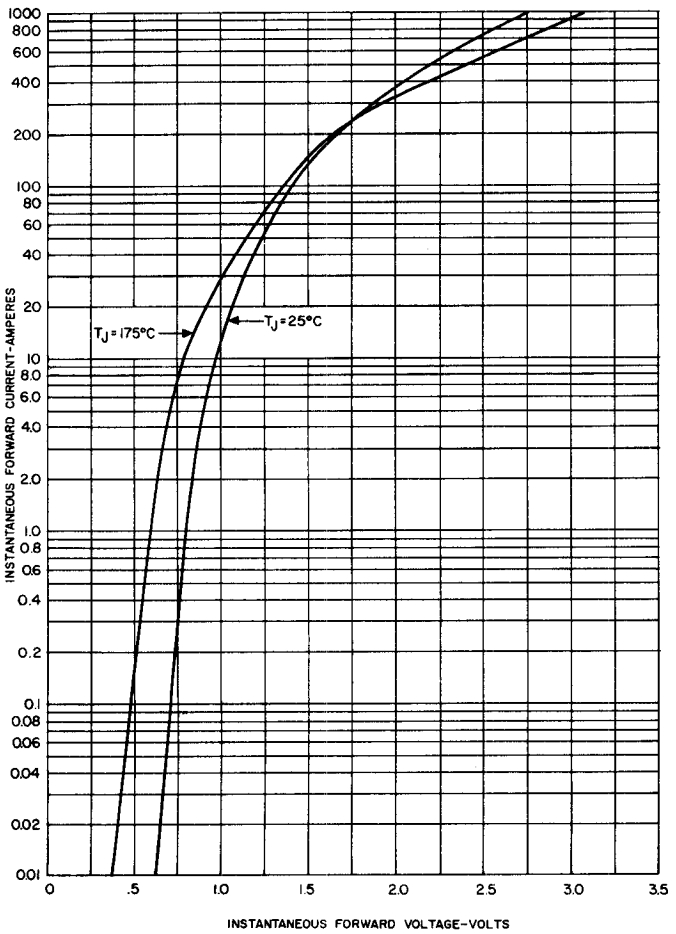
4. MAXIMUM CASE TEMPERATURE VS. AVERAGE FORWARD CURRENT



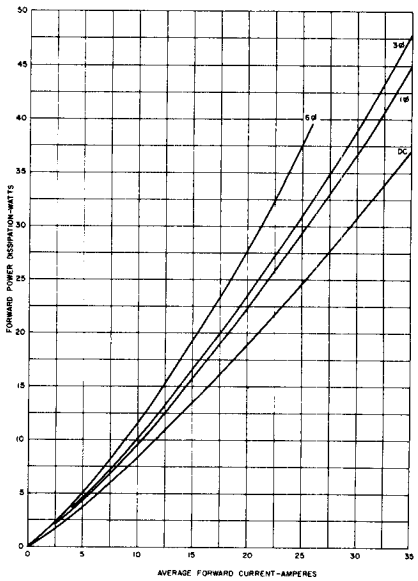
5. MAXIMUM FORWARD SURGE CURRENT FOLLOWING RATED LOAD CONDITIONS



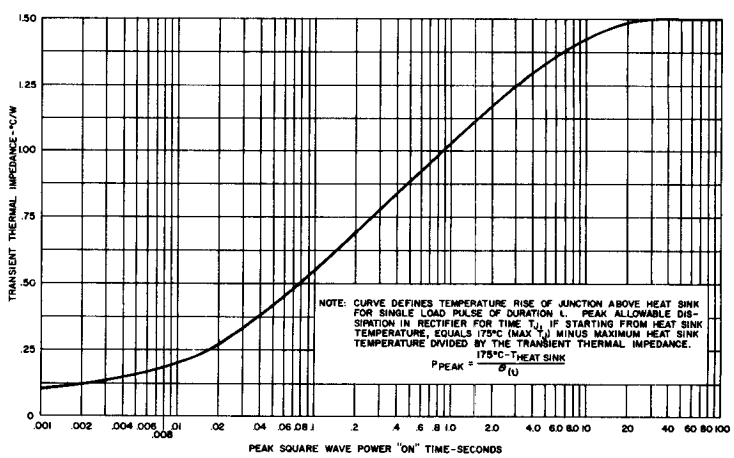
6. SUBCYCLE SURGE FORWARD CURRENT AND I^2t RATING FOLLOWING RATED LOAD CONDITIONS



7. MAXIMUM FORWARD CHARACTERISTICS



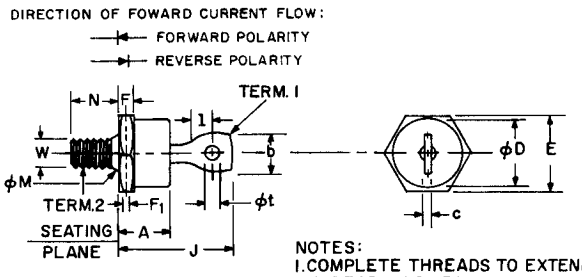
8. FORWARD POWER AS A FUNCTION OF AVERAGE FORWARD CURRENT (T_J = +175°C)



9. MAXIMUM TRANSIENT THERMAL IMPEDANCE— JUNCTION TO HEATSINK

OUTLINE DRAWING

SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN.	MAX.	MIN.	MAX.	
A		.450		11.43	
b		.375		9.53	2
c		.080		2.03	
ϕD		.667		16.94	
E	.667	.687	16.94	17.45	
F	.115	.200	2.92	5.08	
F_1	.060		1.52		
J		1.000		25.40	
1	.156		3.96		4
ϕM	.220	.249	5.59	6.32	1
N	.422	.453	10.72	11.51	
ϕt	.140	.175	3.56	4.45	
W					1,3



NOTES:
1. COMPLETE THREADS TO EXTEND TO WITHIN 2-1/2 THREADS OF SEATING PLANE.
2. ANGULAR ORIENTATION OF TERMINAL IS UNDEFINED.
3. 1/4-28 UNF-2A. MAXIMUM PITCH DIAMETER OF PLATED THREADS SHALL BE BASIC PITCH DIAMETER (.2268", 5.74 MM) REF. (SCREW THREAD STANDARDS FOR FEDERAL SERVICES 1957) HANDBOOK H28 1957 P1.
4. MINIMUM FLAT.

EIA-NEMA STANDARD OUTLINE, NEMA SK-51-EIA RS-241.
INSULATING HARDWARE IS AVAILABLE UPON REQUEST.

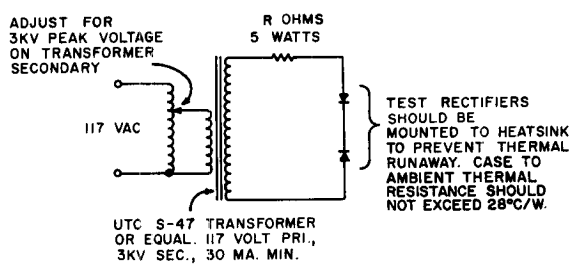
COMPLIES WITH EIA REGISTERED OUTLINE DO-5

TRY THESE SIMPLE TESTS TO PROVE HOW SUPERIOR *CONTROLLED AVALANCHE RECTIFIERS* ARE COMPARED TO OTHER RECTIFIERS:

True Controlled Avalanche Rectifiers Will Not Be Damaged In Any Way By These Tests.

STEADY-STATE

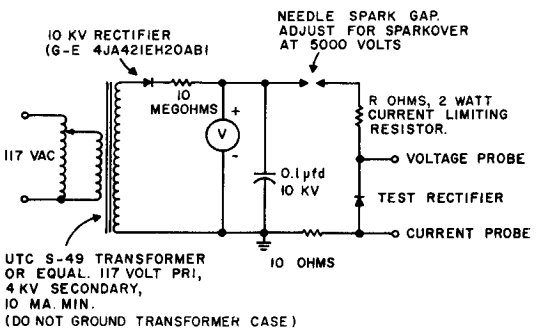
This test operates the rectifier in its high voltage avalanche region at a continuous power dissipation level of approximately 10 watts, at avalanche voltages over 800 volts. This is a test for surface stability at high voltage.



Test Rectifier	R Ohms
1N4529	50K
1N4530	50K

REVERSE IMPULSE

This tests the ability of the rectifier to withstand high transient voltages and to dissipate high levels of peak power in the reverse direction. Peak reverse power for rectifiers with avalanche voltages above 800 volts is over 500 watts in this circuit.



Test Rectifier	R Ohms
1N4529	6K
1N4530	6K

The impulse voltage and current in the test rectifier can be viewed by connecting a scope between the indicated voltage and current taps and ground.

FACTORY CONTROL TESTS

General Electric Controlled Avalanche Rectifiers are subjected to rigorous tests to assure capability to the above conditions. In addition, production units undergo tests to control:

- Minimum/maximum avalanche voltage
- Elevated temperature reverse current
- Package leaks (helium leak test)
- Internal thermal resistance
- 5 temperature cycles (−65° to +175°C)
- 500 ampere forward surge current capability
- Forward voltage drop
- Reverse power surge