

# INTERNATIONAL RECTIFIER

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This supplementary sheet will keep you informed of the very latest in IR semiconductors. Periodically new supplementary sheets will be introduced. To receive this new product data, write to "New Developments", International Rectifier Corporation, El Segundo, California.

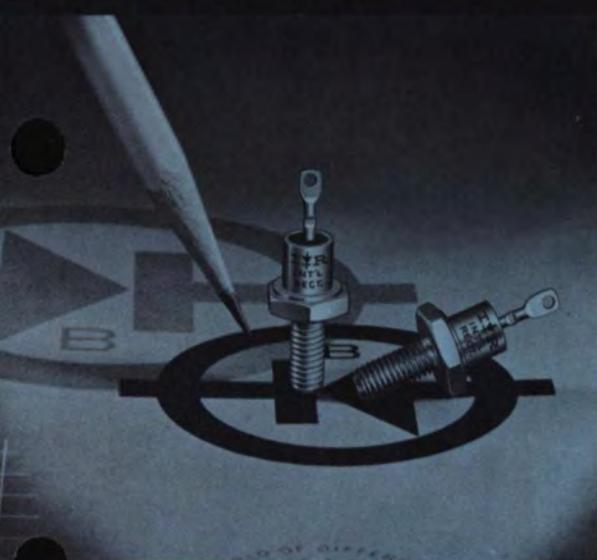
Short Form Catalog Supplementary Data Sheet No. 1—1st Quarter, 1962

# NEW DEVELOPMENTS

from International Rectifier Corporation...



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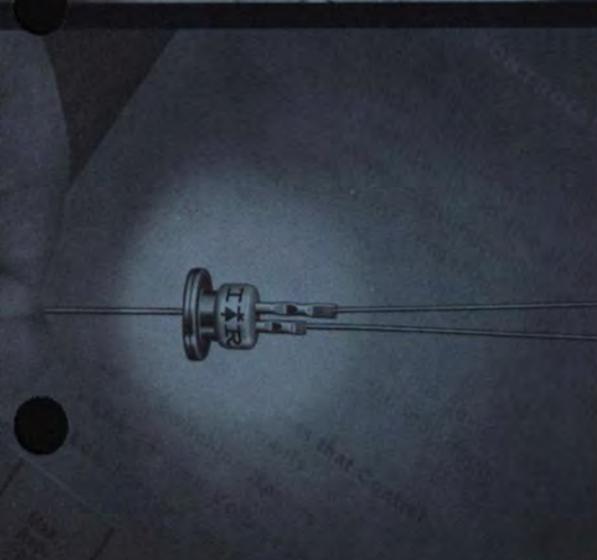


## 46 10 WATT JEDEC ZENER VOLTAGE REGULATOR TYPES COVER 6.8 TO 200 VOLT RANGE, DESIGNED TO MEET MIL-S-19500/124 (SIG C)

Forty-six stud mounted 10 watt silicon zener types span the zener voltage range from 6.8 to 200 volts, and represent industry-preferred 10 watt voltage regulators specifically designed to meet MIL-S-19500/124 (SIG C). The new devices will provide extremely high stability over a wide temperature range (—65 to +175°C) on such applications as dc voltage regulating, clipping and clamping circuits, and limiting and surge protection.

Available in 5, 10 and 20% voltage tolerances, these units are characterized by very low zener impedance (1.2 to 300 ohms @ test current) and a max. zener current range (@ 75°C) from 1.3 to 0.04 amps. The devices are packaged in the industry-preferred DO-4 case, bright tin-plated and all-welded hermetically sealed for high stability in MIL spec applications and environments.

Request Bulletin SR-266-X.



## 1.1 AMP RMS PIGTAIL CONTROLLED RECTIFIERS, 25 TO 400 PRV RATED, FOR USE IN INVERTERS, SERVOS, MOTOR CONTROL

A new series of pigtail mounted silicon controlled rectifiers rated at 0.7 amperes average (@ 38°C case temp.) and 1.1 amps RMS max. cover a peak reverse voltage range from 25 to 400 volts, and are capable of low power switching with no need for an external heat sink. Designed for a broad range of switching applications, including use in inverters, servos, circuit breakers, motor control and pulse modulation, these new devices assure ease of mounting in any position (as compared with other stud mounted SCRs) due to their pigtail lead construction. 25 thru 300 volt units are designated JEDEC types 2N1929-2N1935. The 400 volt device, not JEDEC registered, is designated PRC40. All units possess an operating temperature range from —65°C to +125°C.

Maximum ratings at 125°C base temperature include gate firing current of 8 ma, gate firing voltage of 2 volts, and a forward voltage drop of 1.1 volts (@ 1.1 amps dc). All units are hermetically sealed, and measure approx. 0.7 x 0.390" (dia.) not counting leads.

Request SR-353-B.

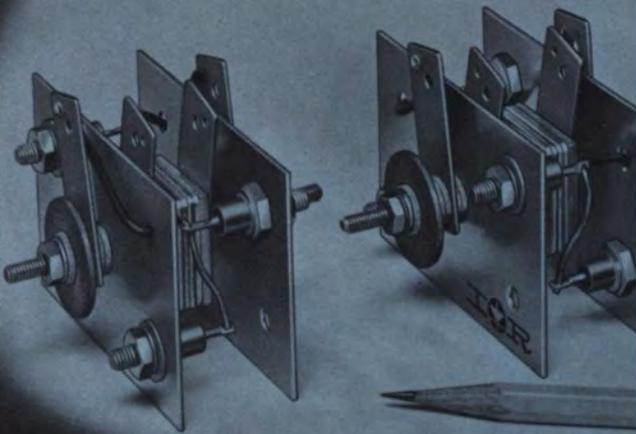
STYLES AND TYPES	6 AMP. SERIES				
	1N1341	1N1342	1N1343	1N1344	1N1345
Peak Reverse Voltage, Volts	50	100	150	200	300
Peak Input Voltage, Volts	35	70	105	140	210
Continuous DC Voltage, Volts	50	100	150	200	300
Rated DC Output Current, Ma					
Peak Surge Current (1 Cycle), Ma	50				
Operating Temperature Range					
Storage Temperature Range					
Forward Resistance					
Reverse Junction C. wa					
Electrical Character					
Forward Voltage Drop					
Full Cycle Average @ 100°C					
Base Temperature					
Leakage Current, Ma					
Full Cycle Average @ 100°C					
Base Temperature at Rated Voltage					

## 16 AMP SILICON RECTIFIERS FEATURE 300 AMPERE SURGE CURRENT CAPABILITY, RATED FROM 50 TO 1000 PRV

Very high surge current capabilities (to 300 amperes) and a peak reverse voltage range from 50 to 1000 volts are provided by a complete series of 16 ampere rated silicon power rectifiers. IR production techniques utilizing precision-controlled diffusion processes assure extremely low forward voltage drop (0.55 volts) low leakage (as low as 0.65 ma @ 175°C) and high uniformity of characteristics over the operating temperature range from —65°C to +200°C.

Designated types 16F5 through 16F100, these devices feature ruggedized, all-welded hermetically-sealed construction insuring high resistance to vibration, shock and temperature extremes. Each unit is tin-plated to provide minimum contact resistance and prevent corrosion. The addition of 16 amp devices to the IR line extends this silicon rectifier range to one of the widest in the industry . . . offering single junction rectifiers with a working range from 300 ma in low current series up to high power rectifiers rated to 250 amperes.

Request Bulletin SR-314.

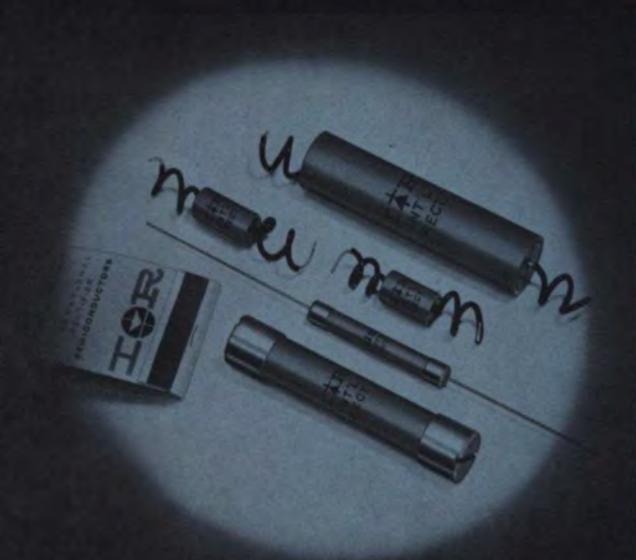


### TRANSIENT PROTECTED SILICON RECTIFIER STACKS RATED FROM 40 TO 240 VOLTS RMS

Transient clamping action is built into a new series of compact, pre-engineered silicon rectifier stacks providing DC current outputs of up to 25 amperes. The new devices are available with nominal ac input voltages of 40, 120 and 240 volts. Each stack is equipped with "Klipsel", a unique voltage limiting device which provides a built-in shunt path for transient over-voltages appearing across the stack. Designed for a broad range of dc power applications, the stacks have an operating temperature range from  $-55^{\circ}\text{C}$  to  $+100^{\circ}\text{C}$  ambient.

Non-polarized types provide voltage suppression across the ac input to clamp transients from either the transformer or the ac system. Polarized units provide clamping action across the dc output in circuits using choke-input, capacitor-output filters, and where dc load switching must be part of the circuit operation.

Request Bulletin SR 332.

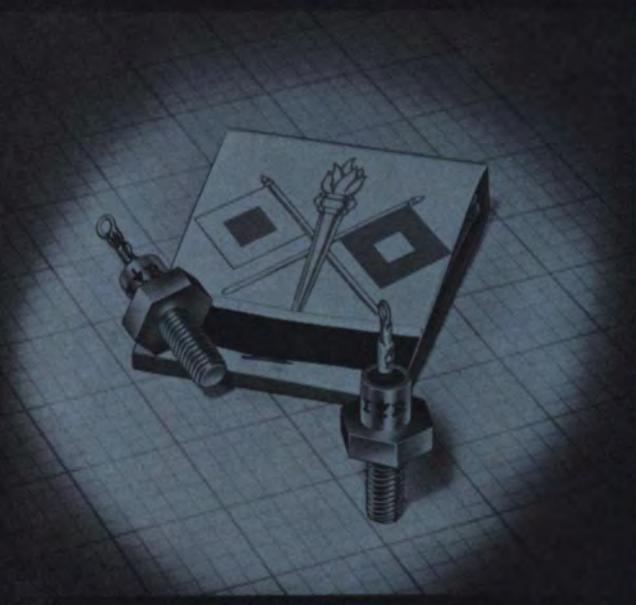


### HI VOLTAGE SELENIUM CARTRIDGES FEATURE 30% SIZE REDUCTION, PROVIDE VOLTAGE RANGE FROM 48 TO 28,200 PRV

An advanced line of selenium high voltage cartridge rectifiers pack more power to the inch (more than 30% additional voltage rating) than standard cartridge rectifiers, and are available over a peak reverse voltage range from 48 to 28,800 volts. The complete new series of 'Altose' half-wave cartridges will provide forward currents of 5 ma @  $35^{\circ}\text{C}$ , and have max. RMS input ratings ranging from 33 to 18,100 volts (res. load).

Advanced techniques in the manufacture of selenium rectifiers developed by International Rectifier account for the substantial size reduction, as well as reducing forward power losses per cell to a point where, in spite of the increased number of cells per cartridge unit length, the internal temperature rise remains essentially the same. All units feature high reliability Triple X phenolic construction.

Request Bulletin SR-172-X.



### 3 AMPERE STUDMOUNTED SILICON RECTIFIERS PROVIDE LOW LEAKAGE AND HIGH SURGE CAPABILITIES

Six studmounted diffused junction rectifier types provide up to 3 amperes dc output per cell along with very low reverse leakage characteristics ( $500 \mu\text{a}$  at rated PRV @  $150^{\circ}\text{C}$ ) and high surge current capabilities (40 amps peak @ 0.01 sec.). Designated types 3FIX thru 3F6X covering the voltage range from 100 to 600 volts, all types are recommended for magnetic amplifier applications where high reliability and low leakage are important design parameters.

The new series will provide forward currents up to 3 amps when mounted on heat sink or 1.5 amps without heat sink. Additional characteristics include low forward voltage drop (1.10 volts max. at rated current at  $25^{\circ}\text{C}$ ) and max. operating frequency of 50 kc. All types have an operating temperature range from  $-65^{\circ}\text{C}$  to  $+175^{\circ}\text{C}$ , and are encased in a rugged, hermetically sealed, welded package.

Request Bulletin SR-218X.

For further information, contact the factory, our branch offices, or representatives throughout the world.

#### BRANCH OFFICES:

NEW YORK—NEW JERSEY: 1580 LEMOINE AVE.  
FORT LEE, N.J., WINDSOR 7-3311;  
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JEDEC TYPE NO.	INT'L TYPE NO.	CLASSIFICATION and PAGE NUMBER
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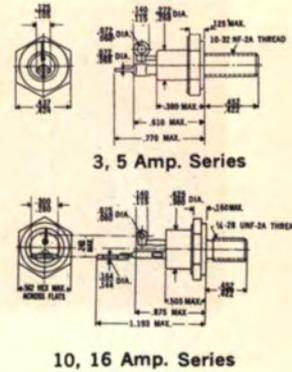
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600 to 2400 PRV; to 125 ma			
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600 to 10,000 PRV; to 300 ma			

# SILICON CONTROLLED RECTIFIERS AND SCR TRIGGER

The IR Silicon Controlled Rectifier Line . . . a complete range of miniature solid-state switching devices in JEDEC, JEDEC equivalent and IR Standard types that provide complete control of current turn-on at microsecond switching speeds. Units feature reliability that stems from 2 1/2 years of continuous refinement of SCR production techniques and test procedures. The CONTROLLED RECTIFIER TRIGGER, designed specifically for firing IR Controlled Rectifiers is a silicon transistor which displays a negative resistance characteristic when a predetermined emitter-to-base firing voltage is exceeded. This characteristic is stable over a temperature range from -65 to +140°C. For more detailed data, request pertinent data per notes below.



## IR JEDEC and JEDEC Equivalent SCR Types

Type No.	Max. Rep. PRV and Min. V <sub>co</sub> Volts	Nom. Average Forward Current, Amps	Max. Forward & Reverse Leakage, ma	Gate Current To Fire, ma @ Max. Op. Temp.		Operating Temp. Range
				Typ.	Max.*	
<b>3 Ampere 2N1600 – 2N1604 JEDEC Equivalent Types</b> (Electrically but not Mechanically Equal to JEDEC Types)						
3RC5A	50	3	0.25	2.5	6	-65 to +125°C
3RC10A	100	3	0.25	2.5	6	
3RC20A	200	3	0.25	2.5	6	
3RC30A	300	3	0.25	2.5	6	
3RC40A	400	3	0.25	2.5	6	

Type No.	Max. Rep. PRV and Min. V <sub>co</sub> Volts	Nom. Average Forward Current, Amps	Max. Forward & Reverse Leakage, ma	Gate Current To Fire, ma @ Max. Op. Temp.		Operating Temp. Range
				Typ.	Max.*	
<b>5 Ampere 2N1770 – 2N1777 JEDEC Equivalent Types</b> (Electrically but not Mechanically Equal to JEDEC Types)						
5RC2A	25	4.7	4.5	2.5	8	-65 to +125°C
5RC5A	50	4.7	4.5	2.5	8	
5RC10A	100	4.7	4.5	2.5	8	
5RC15A	150	4.7	4.0	2.5	8	
5RC20A	200	4.7	3.0	2.5	8	
5RC25A	250	4.7	2.5	2.5	8	
5RC30A	300	4.7	2.0	2.5	8	
5RC40A	400	4.7	1.0	2.5	8	

Type No.	Max. Rep. PRV and Min. V <sub>co</sub> Volts	Nom. Average Forward Current, Amps	Max. Forward & Reverse Leakage, ma	Gate Current To Fire, ma @ Max. Op. Temp.		Operating Temp. Range
				Typ.	Max.*	
<b>10 Ampere 2N1842 – 2N1849 JEDEC Types</b> (Electrically and Mechanically Equal to JEDEC Types)						
2N1842	25	10	6.5	5	25	-40 to +100°C
2N1843	50	10	6.5	5	25	
2N1844	100	10	6.5	5	25	
2N1845	150	10	6.5	5	25	
2N1846	200	10	6.0	5	25	
2N1847	250	10	5.5	5	25	
2N1848	300	10	5.0	5	25	
2N1849	400	10	4.0	5	25	

Type No.	Max. Rep. PRV and Min. V <sub>co</sub> Volts	Nom. Average Forward Current, Amps	Max. Forward & Reverse Leakage, ma	Gate Current To Fire, ma @ Max. Op. Temp.		Operating Temp. Range
				Typ.	Max.*	
<b>16 Ampere 2N681 – 2N688 JEDEC Equivalent Types</b> (Electrically but not Mechanically Equal to JEDEC Types)						
16RC2	25	16	6.5	5	25	-65 to +125°C
16RC5	50	16	6.5	5	25	
16RC10	100	16	6.5	5	25	
16RC15	150	16	6.5	5	25	
16RC20	200	16	6.0	5	25	
16RC25	250	16	5.5	5	25	
16RC30	300	16	5.0	5	25	
16RC40	400	16	4.0	5	25	

\*Gate current required to assure firing of all units.

For detailed data request SR-357, SR-358, SR-359, SR-351-B.

## International Rectifier Standard SCR Types

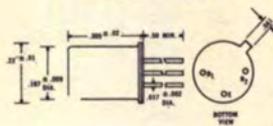
Type No.	Max. Rep. PRV and Min. V <sub>co</sub> Volts	Nom. Average Forward Current, Amps	Max. Forward & Reverse Leakage, ma	Gate Current To Fire, ma @ Max. Op. Temp.		Operating Temp. Range
				Typ.	Max.*	
<b>IR Standard 3 Ampere Series</b>						
3RC2	25	3	4.5	2.5	10	-30 to +105°C
3RC5	50	3	4.5	2.5	10	
3RC10	100	3	4.5	2.5	10	
3RC15	150	3	4.0	2.5	10	
3RC20	200	3	3.0	2.5	10	
3RC25	250	3	2.5	2.5	10	
3RC30	300	3	2.0	2.5	10	
3RC40	400	3	1.0	2.5	10	

Type No.	Max. Rep. PRV and Min. V <sub>co</sub> Volts	Nom. Average Forward Current, Amps	Max. Forward & Reverse Leakage, ma	Gate Current To Fire, ma @ Max. Op. Temp.		Operating Temp. Range
				Typ.	Max.*	
<b>IR Standard 5 Ampere Series</b>						
5RC2	25	4.7	4.5	2.5	10	-30 to +105°C
5RC5	50	4.7	4.5	2.5	10	
5RC10	100	4.7	4.5	2.5	10	
5RC15	150	4.7	4.0	2.5	10	
5RC20	200	4.7	3.0	2.5	10	
5RC25	250	4.7	2.5	2.5	10	
5RC30	300	4.7	2.0	2.5	10	
5RC40	400	4.7	1.0	2.5	10	

\*Gate current required to assure firing of all units.

For more detailed data request SR-352, SR-355.

## SCR Trigger



MODIFIED TO-18 PACKAGE



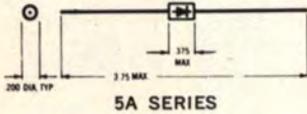
Parameters	Electrical Characteristics (25°C)	Units	Symbol	Min.	Max.
Intrinsic Standoff Ratio (V <sub>BB</sub> = 10V.)		-	η	0.45	0.70
Interbase Resistance (V <sub>BB</sub> = 3V, I <sub>E</sub> = 0)		KΩ	R <sub>BB0</sub>	4.0	9.1
Emitter Saturation Voltage (V <sub>BB</sub> = 10V, I <sub>E</sub> = 50ma)		V	V <sub>E(SAT)</sub>	-	5.0
Emitter Reverse Current (V <sub>BB</sub> = 10V, I <sub>B1</sub> = 0)		μA	I <sub>EO</sub>	-	10
Base One Peak Pulse Voltage*		V	V <sub>OB1</sub>	3.0	-

For detailed data, request SR-365.



**MINIATURE AND ECONOMY "TRI-SEALED" SILICON RECTIFIERS**

**MINIATURE TYPES**  
to 625 MA — 200 to 600 PRV



5A SERIES

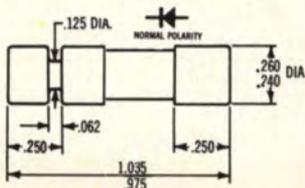


5A SERIES

Int'l Type No.	Peak Reverse Voltage, Volts	RMS Input, Volts	DC Output Current @ 100°C, Ma.	Max. Surge Current, Amps.	Max. Reverse Current @ 100°C, $\mu$ a	Forward Volt Drop, Volts
5A4	Cap. 400 Res. 400	140 280	500 625	50	200	0.92
5A5	Cap. 500 Res. 500	175 350	500 625	50	200	0.92
5A6	Cap. 600 Res. 600	210 420	500 625	50	200	0.92

For more detailed data request SR-212.

**"PLUG-IN" RECTIFIERS**  
500 MA — 200 to 600 PRV

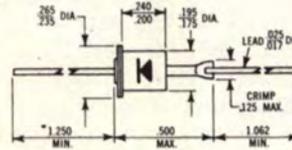


Ruggedized silicon diffused junction "plug-in" rectifiers may be rapidly snapped into radio-TV, motor control, audio-amplifier, industrial power supply and other circuits utilizing clip-type rectifier holders.

Int'l Type No.	Peak Reverse Voltage, Volts	RMS Input, Volts	DC Output Current @ 100°C, Ma.	Max. Surge Current, Amps.	Max. Reverse Current @ 100°C, $\mu$ a	Forward Volt Drop, Volts
5MA4	Cap. 400 Res. 400	140 280	500 625	50	200	0.92
5MA5	Cap. 500 Res. 500	175 350	500 625	50	200	0.92
5MA6	Cap. 600 Res. 600	210 420	500 625	50	200	0.92

For more detailed data request SR-216.

**MINIATURE "TOP HAT" SERIES**  
to 500 MA — 50 to 500 PRV



All dimensions in inches



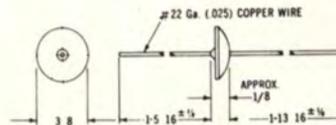
Hermetically sealed

JEDEC Type	Int'l Type	Peak Reverse Voltage Volts	RMS Input Voltage Volts	Cont. DC Voltage Volts	Rectified DC Output Current (MA.)			Max. Surge Current (1 cycle) Amps.	Max. Voltage Drop Volts	Max. Leakage Current (MA.) Full Cycle Average	
					@ 50°C	@ 100°C	@ 150°C			100°C	150°C
					1N1701	3MS5	50			35	50
1N1702	3MS10	100	70	100	300	150	—	8	1.7	0.4	—
1N1703	3MS20	200	140	200	300	150	—	8	1.7	0.3	—
1N1704	3MS30	300	210	300	300	150	—	8	1.7	0.3	—
1N1705	3MS40	400	280	400	300	150	—	8	1.7	0.3	—
1N1706	3MS50	500	350	500	300	150	—	8	1.7	0.3	—
1N1707	5MS5	50	35	50	500	340	175	10	1.3	—	0.4
1N1708	5MS10	100	70	100	500	340	175	10	1.3	—	0.4
1N1709	5MS20	200	140	200	500	340	175	10	1.3	—	0.3
1N1710	5MS30	300	210	300	500	340	175	10	1.3	—	0.3
1N1711	5MS40	400	280	400	500	340	175	10	1.3	—	0.3
1N1712	5MS50	500	350	500	500	310	175	10	1.3	—	0.3

For more detailed data request SR-203.

**ECONOMY "TRI-SEALED" SERIES**

to 500 MA — 400 to 600 PRV



"Tri-Sealed" silicon junction cells especially recommended for television and other commercial equipment applications where low cost, miniaturization and high temperature operation (to +100°C) are required.

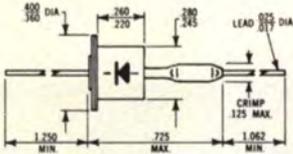


Int'l Type	PRV	RMS Input Voltage Volts	Cont. DC Voltage Volts	Rectified DC Output Current (MA.)			Max. Surge Current (1 cycle) Amps.	Max. Voltage Drop Volts	Max. Leakage Current (MA.) Full Cycle Average	
				@ 50°C	@ 100°C	@ 150°C			100°C	150°C
				2E4	Cap. 400 Res. 400	140 280			— —	270 400
5E4	Cap. 400 Res. 400	140 280	— —	480 680	150 225	— —	5 5	1.3 1.3	0.5 0.5	
5E5	Cap. 500 Res. 500	175 350	— —	480 680	150 225	— —	5 5	1.3 1.3	0.5 0.5	
5E6	Cap. 600 Res. 600	210 420	— —	480 680	150 225	— —	5 5	1.3 1.3	0.5 0.5	

For more detailed data request SR-208.

**STANDARD HERMETICALLY SEALED SILICON RECTIFIERS**

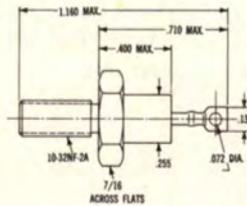
**STANDARD "TOP HAT" SERIES**  
to 1800 MA — 50 to 600 PRV



All dimensions in inches



**STUD MOUNTED SERIES**  
to 1 Ampere — 50 to 600 PRV



All dimensions in inches



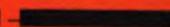
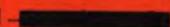
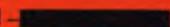
JEDEC Type	Int'l Type	Peak Reverse Voltage Volts	RMS Input Voltage Volts	Cont. DC Voltage Volts	Rectified DC Output Current (MA.)			Max. Surge Current (1 cycle) Amps.	Max. Voltage Drop Volts	Max. Leakage Current (MA.) Full Cycle Average
					@ 50°C	@ 100°C	@ 150°C			
1N440	-	100	70	100	300	300	-	15	1.5	0.30
1N441	-	200	140	200	300	300	-	15	1.5	0.75
1N442	-	300	210	300	300	300	-	15	1.5	1.00
1N443	-	400	280	400	300	300	-	15	1.5	1.50
1N444	-	500	350	500	300	300	-	15	1.5	1.75
1N440B	-	100	70	100	750	500	250	15	1.5	0.30
1N441B	-	200	140	200	750	500	250	15	1.5	0.75
1N442B	-	300	210	300	750	500	250	15	1.5	1.00
1N443B	-	400	280	400	750	500	250	15	1.5	1.50
1N444B	-	500	350	500	650	425	-	15	1.5	1.75
1N1692	-	100	70	100	600	250	-	-	0.6	0.5
1N1693	-	200	140	200	600	250	-	-	0.6	0.5
1N1694	-	300	210	300	600	250	-	-	0.6	0.5
1N1695	-	400	280	400	600	250	-	-	0.6	0.5
1N536	-	50	35	50	750	500	250	15	0.5	0.4
1N537	-	100	70	100	750	500	250	15	0.5	0.4
1N538	-	200	140	200	750	500	250	15	0.5	0.3
1N539	-	300	210	300	750	500	250	15	0.5	0.3
1N540	-	400	280	400	750	500	250	15	0.5	0.3
1N547	-	600	420	600	750	450	250	15	0.5	0.3
1N1095	-	500	350	500	675	440	-	15	0.5	0.3
1N1096	-	600	420	600	630	400	-	15	0.5	0.3
-	10B1	100	70	100	1800	-	-	40	1.10	0.05
-	10B2	200	140	200	1800	-	-	40	1.10	0.05
-	10B3	300	210	300	1800	-	-	40	1.10	0.05
-	10B4	400	280	400	1800	-	-	40	1.10	0.05
-	10B5	500	350	500	1800	-	-	40	1.10	0.05
-	10B6	600	420	600	1800	-	-	40	1.10	0.05
-	SD-91	100	70	100	550	300	-	10	1.5	1.0
-	SD-92	200	140	200	550	300	-	10	1.5	1.0
-	SD-93	300	210	300	550	300	-	10	1.5	1.0
-	SD-94	400	280	400	550	300	-	10	1.5	0.80
-	SD-95	500	350	500	550	300	-	10	1.5	0.65
-	SD-91A	100	70	100	750	500	-	15	1.3	0.5
-	SD-92A	200	140	200	750	500	-	15	1.3	0.5
-	SD-93A	300	210	300	750	500	-	15	1.3	0.5
-	SD-94A	400	280	400	750	500	-	15	1.3	0.4
-	SD-95A	500	350	500	750	400	-	15	1.3	0.3

\*1N1487-1N1492 current ratings at 25°C. †1N1487-1N1492 current ratings at 125°C.  
For more detailed data request SR-201, SR-202, SR-211, SR-213, SR-214, SR-217.

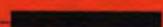
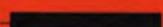
JEDEC Type	Int'l Type	Peak Reverse Voltage Volts	RMS Input Voltage (Volts)	Rectified DC Output Current, MA.	Max. Surge (0.1 sec.) Amps.	Max. Volt. Drop at 200 MA. DC Volts	Max. Leakage Current @ Rated PRV, MA.
1N607	3AT1	50	35	800	2	1.5	.025
1N608	3BT1	100	70	800	2	1.5	.025
1N609	3CT1	150	105	800	2	1.5	.025
1N610	3DT1	200	140	800	2	1.5	.025
1N611	3ET1	300	210	800	2	1.5	.025
1N612	3FT1	400	280	800	2	1.5	.025
1N613	3GT1	500	350	800	2	1.5	.025
1N614	3HT1	600	420	800	2	1.5	.025
1N 607A	3AT2	50	35	800	2	1.5	.001
1N 608A	3BT2	100	70	800	2	1.5	.001
1N 609A	3CT2	150	105	800	2	1.5	.001
1N 610A	3DT2	200	140	800	2	1.5	.001
1N 611A	3ET2	300	210	800	2	1.5	.001
1N 612A	3FT2	400	280	800	2	1.5	.0015
1N 613A	3GT2	500	350	800	2	1.5	.002
1N 614A	3HT2	600	420	800	2	1.5	.0025

For more detailed data request SR-135-C.

**JAN MILITARY TYPES**

- JAN 1N538 Axial Lead — 
- JAN 1N540 Axial Lead — 
- JAN 1N547 Axial Lead — 



- JAN 1N253 Stud Mounted — 
- JAN 1N254 Stud Mounted — 
- JAN 1N255 Stud Mounted — 
- JAN 1N256 Stud Mounted — 



## SUBMINIATURE GLASS SILICON ZENER VOLTAGE REGULATORS

279 subminiature, hermetically sealed types providing true premium performance in silicon voltage regulators. Closely controlled IR zener production techniques assure units with predetermined "High Spec" characteristics and excellent uniformity from junction to junction. The 1N962B-1N973B series listed at right possess reverse leakage and test voltage values conforming to MIL-S-19500/177(Navy). Glass fusion sealing and conservative ratings in both JEDEC types and IR "High Spec" types assure optimum reliability over the entire voltage range.

### VERY CLOSE TOLERANCE TYPES

In addition to the IR "High Spec" QZ and FZ Series listed at far right of this page, special zener types are available in discrete voltage steps and within very close voltage tolerances. The voltage steps and the degree of tolerance obtainable depends upon the broad voltage category in which the required voltage value falls as shown in the tabulation below. All special non-standard diodes are supplied only from the factory, and carry a price additive for selection. For quotations and delivery schedules required, contact the factory or your nearest IR Industrial Representative.

### INTERMEDIATE VOLTAGE TYPES

Types with intermediate, non-standard voltage values may be obtained in each of the two basic diode series listed in the tables: 250 milliwatt (Code QZ), and 400 milliwatt (Code FZ).

### VERY CLOSE VOLTAGE TOLERANCE TYPES

All standard types listed in the tables as well as intermediate voltage types can be supplied with voltage tolerances closer than 5% at a nominal price increase. The righthand column of the tabulation below gives the tolerances available.

Zener Voltage Range	Voltage Steps Available	Standard Tolerance and Code	Very Close Tolerance and Code
3.0 through 6.1 v	0.1 volt steps	± 5% (T5) ± 10% (T10) ± 20% (T20)	± 0.1 volt (V01)
6.26 through 15.75 v	0.25 volt steps	± 5% (T5) ± 10% (T10) ± 20% (T20)	± 0.25 volt (V25)
16 through 33 v	0.5 volt steps	± 5% (T5) ± 10% (T10) ± 20% (T20)	± 0.5 volt (V05)

### ORDERING INFORMATION

#### STANDARD TYPES

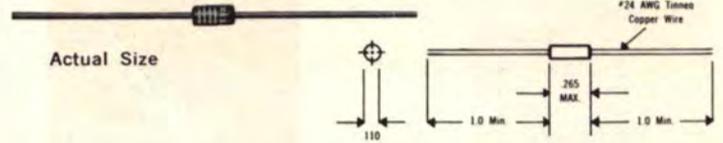
To order standard types from the tables, select the voltage required at the desired tolerance (5%, 10%, 20%) and specify the International Rectifier or JEDEC part number from the column at right. All listed are guaranteed to have a nominal voltage within the tolerance shown. All standard types listed are also normally available from International Rectifier Authorized Industrial Distributors at standard factory prices.

#### NON-STANDARD VOLTAGE TYPES

To order intermediate voltage types, formulate the part number by selecting values in accordance with the chart shown above. First specify the nominal wattage by series code (QZ or FZ); then the zener voltage required, and finally the degree of tolerance desired.

**FOR EXAMPLE:** If you need a 250-milliwatt diode with a zener voltage of 18.5 volts and a 5% voltage tolerance, your part number would be: QZ 18.5T5. (A closer tolerance number would be: QZ 18.5V05).

### Dimensional Diagram



Type No.	E <sub>z</sub> Zener Voltage			@ I <sub>zT</sub> Test Current ma	Z <sub>z</sub> Max. Dynamic Impedance ohm	I <sub>T</sub> @ Test Current ma	Typical Temperature Coefficient % / °C
	Min. Volts	Nom. Volts	Max. Volts				

### 250 mw IR types—Electrical equivalents to JEDEC types 1N465 - 1N470.

KZ2.6	2.0	2.6	3.2	5	60	10	—
KZ3.4	3.0	3.4	3.9	5	55	10	—
KZ4.1	3.7	4.1	4.5	5	45	10	—
KZ4.8	4.3	4.8	5.4	5	35	10	—
KZ5.8	5.2	5.8	6.4	5	20	10	—
KZ7.1	6.2	7.1	8.0	5	10	10	—

To order ±5% tolerance types, add suffix "T5" to type number — e.g. — "KZ2.6T5".

### 250 mw JEDEC types

1N702	2.0	2.6	3.2	5	60	10	—
1N703	3.0	3.4	3.9	5	55	10	—
1N704	3.7	4.1	4.5	5	45	10	—
1N705	4.3	4.8	5.4	5	35	10	—
1N706	5.2	5.8	6.4	5	20	10	—
1N707	6.2	7.1	8.0	5	10	10	—
1N708		5.6		25	3.6	25	—
1N709		6.2		25	4.1	25	—
1N710		6.8		25	4.7	25	—
1N711		7.5		25	5.3	25	—
1N712		8.2		25	6	25	—
1N713		9.1		25	7	25	—
1N714		10.0		25	8	25	—
1N715		10.5		25	9	25	—
1N716		12.0		25	10	25	—

JEDEC types above are ±10% tolerance types. To order ±5% tolerance types add 'A' to end of JEDEC part number — e.g. — '1N702A'.

### 400 mw JEDEC types

1N746	2.97	3.3	3.63	20	28	20	-0.062
1N747	3.24	3.6	3.96	20	24	20	-0.055
1N748	3.51	3.9	4.29	20	23	20	-0.049
1N749	3.87	4.3	4.73	20	22	20	-0.036
1N750	4.23	4.7	5.17	20	19	20	-0.018
1N751	4.6	5.1	5.61	20	17	20	-0.008
1N752	5.05	5.6	6.16	20	11	20	+0.006
1N753	5.58	6.2	6.82	20	7	20	+0.022
1N754	6.12	6.8	7.48	20	5	20	+0.035
1N755	6.75	7.5	8.25	20	6	20	+0.043
1N756	7.39	8.2	9.03	20	8	20	+0.052
1N757	8.2	9.1	10.0	20	10	20	+0.056
1N758	9.0	10.0	11.0	20	17	20	+0.060
1N759	10.8	12.0	13.2	20	30	20	+0.060

Types listed are ±10% tolerance. For ±5% tolerance types, add 'A' to end of JEDEC number — e.g. — '1N746A'.



**JEDEC AND IR "HIGH SPEC" TYPES IN 5%, 10%, AND 20% TOLERANCES**

Type No.	E <sub>Z</sub> Zener Voltage @ I <sub>ZT</sub> Test			Z <sub>Z</sub> Max. Dynamic Impedance @ I <sub>T</sub> Test	I <sub>T</sub> Test Current ma	Typical Temperature Coefficient %/°C
	Min. Volts	Nom. Volts	Max. Volts			

**250 mw JEDEC types**

1N751	4.3	4.8	5.4	10	55	10	— .010
1N762	5.2	5.8	6.4	10	20	10	+ .015
1N763	6.2	7.1	8.0	10	10	10	+ .044
1N764	7.5	8.7	10	10	15	5	+ .055
1N765	9.0	10.5	12	5	50	5	+ .065
1N766	11.0	12.7	14.5	5	70	5	+ .070

Types listed are ±10% tolerance types.

**400 mw JEDEC types**

1N957	6.8	20	5	20	+0.035
1N958	7.5	20	6	20	+0.045
1N959	8.2	20	8	20	+0.052
1N960	9.1	20	10	20	+0.056
1N961	10	20	17	20	+0.060
1N962	11	11.5	9.5	11.5	+0.060
1N963	12	10.5	11.5	10.5	+0.065
1N964	13	9.5	13	9.5	+0.065
1N965	15	8.5	16	8.5	+0.070
1N966	16	7.8	17	7.8	+0.070
1N967	18	7.0	21	7.0	+0.075
1N968	20	6.2	25	6.2	+0.075
1N969	22	5.6	29	5.6	+0.080
1N970	24	5.2	33	5.2	+0.080
1N971	27	4.6	41	4.6	+0.080
1N972	30	4.2	49	4.2	+0.080
1N973	33	3.8	58	3.8	+0.080

Types listed are ±20% voltage tolerance. To order ±10% tolerance, add 'A' to end of JEDEC Part No. — e.g. — '1N957A'. For ±5% tolerance add 'B' to end of JEDEC number.

**250 mw IR types—Electrical equivalents to JEDEC types 1N1313 - 1N1320.**

JZ 8.7T10	7.5	8.7	10	0.20	—	—	—
JZ10.5T10	9	10.5	12	0.20	—	—	—
JZ12.7T10	11	12.7	14.5	0.20	—	—	—
JZ15.7T10	13.5	15.7	18	0.20	—	—	—
JZ19.0T10	17	19	21	0.20	—	—	—
JZ23.5T10	20	23.5	27	0.20	—	—	—
JZ28.5T10	25	28.5	32	0.20	—	—	—
JZ34.5T10	30	34.5	39	0.20	—	—	—

Types listed are ±10% voltage tolerance. To order ±5% tolerance types, add 'T5' to end of type number — e.g. — "JZ8.7T5."

**250 mw JEDEC types**

1N1929	5.1	5.6	6.2	5	8	10	—
1N1930	6.2	6.8	7.5	5	7	10	—
1N1931	7.5	8.3	9.1	5	15	10	—
1N1932	9.1	10.0	11	5	22	10	—
1N1933	11	12.0	13	1	30	5	—
1N1934	13	14.5	16	1	50	5	—
1N1935	16	18.0	20	1	70	5	—
1N1936	20	22.0	24	1	100	5	—
1N1937	24	27.0	30	1	200	3	—

Types listed are ±10% voltage tolerance. To order ±5% tolerance types, add 'A' to end of JEDEC part number — e.g. — '1N1927A'.

IR Type No.	E <sub>Z</sub> Zener Voltage @ I <sub>ZT</sub> Test			Z <sub>Z</sub> Max. Dynamic Impedance @ I <sub>T</sub> Test	I <sub>T</sub> Test Current ma	I <sub>R</sub> Max. Reverse Current @ 25°C	I <sub>R</sub> Max. Reverse Current @ 150°C	V <sub>T</sub> Test Voltage Volts
	Min. Volts	Nom. Volts	Max. Volts					

**IR 250 mw "High Spec" Types**

QZ3.3T5	3.14	3.3	3.46	20	22	20	10	15	—1.0
QZ3.6T5	3.42	3.6	3.78	20	19	20	10	15	—1.0
QZ3.9T5	3.71	3.9	4.07	20	18	20	10	15	—1.0
QZ4.3T5	4.09	4.3	4.51	20	16	20	10	15	—1.0
QZ4.7T5	4.47	4.7	4.93	20	14	20	1	5	—1.5
QZ5.1T5	4.85	5.1	5.35	20	10	20	0.1	1.0	—1.5
QZ5.6T5	5.32	5.6	5.88	20	7	20	0.1	1.0	—1.5
QZ6.2T5	5.89	6.2	6.51	20	4	20	0.1	1.0	—1.5
QZ6.8T5	6.46	6.8	7.14	20	4	20	0.1	1.0	—3.5
QZ7.5T5	7.13	7.5	7.87	20	5	20	0.1	1.0	—3.5
QZ8.2T5	7.79	8.2	8.61	20	6	20	0.1	1.0	—3.5
QZ9.1T5	8.65	9.1	9.55	20	7	20	0.1	1.0	—3.5
QZ10T5	9.50	10	10.5	20	8	20	0.1	1.0	—8.0
QZ11T5	10.4	11	11.6	5	10	5	0.1	1.0	—8.8
QZ12T5	11.40	12	12.6	5	11	5	0.1	1.0	—9.7
QZ13T5	12.35	13	13.6	5	13	5	0.05	1.0	—10.4
QZ14T5	13.29	14	14.7	5	15	5	0.05	1.0	—11.2
QZ15T5	14.20	15	15.7	5	17	5	0.05	1.0	—12.0
QZ16T5	15.2	16	16.8	5	19	5	0.05	1.0	—12.8
QZ17T5	16.1	17	17.8	5	21	5	0.05	1.0	—13.6
QZ18T5	17.1	18	18.9	5	25	5	0.05	1.0	—14.4
QZ19T5	18.0	19	19.9	5	28	5	0.05	1.0	—15.2
QZ20T5	19.0	20	21.0	5	32	5	0.05	1.0	—16.0
QZ22T5	20.9	22	23.1	5	35	5	0.05	1.0	—17.6
QZ24T5	22.8	24	25.2	5	37	5	0.05	1.0	—19.2
QZ25T5	23.8	25	26.2	5	39	5	0.05	1.0	—20.0
QZ27T5	25.6	27	28.4	5	40	5	0.05	1.0	—21.6
QZ30T5	28.5	30	31.5	5	45	5	0.05	1.0	—24.0

Types listed are ±5% voltage tolerance. For ±10% tolerance types, substitute 'T10' in place of 'T5' in part number — e.g. — "QZ3.3T10".

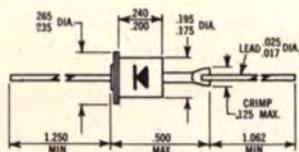
**IR 400 mw "High Spec" Types**

FZ3.3T5	3.14	3.3	3.46	20	22	20	10	15	—1.0
FZ3.6T5	3.42	3.6	3.78	20	19	20	10	15	—1.0
FZ3.9T5	3.71	3.9	4.07	20	18	20	10	15	—1.0
FZ4.3T5	4.09	4.3	4.51	20	16	20	10	15	—1.0
FZ4.7T5	4.47	4.7	4.93	20	14	20	1	5	—1.5
FZ5.1T5	4.85	5.1	5.35	20	10	20	0.1	1.0	—1.5
FZ5.6T5	5.32	5.6	5.88	20	7	20	0.1	1.0	—1.5
FZ6.2T5	5.89	6.2	6.51	20	4	20	0.1	1.0	—1.5
FZ6.8T5	6.46	6.8	7.14	20	4	20	0.1	1.0	—3.5
FZ7.5T5	7.13	7.5	7.87	20	5	20	0.1	1.0	—3.5
FZ8.2T5	7.79	8.2	8.61	20	6	20	0.1	1.0	—3.5
FZ9.1T5	8.66	9.1	9.55	20	7	20	0.1	1.0	—3.5
FZ10T5	9.50	10	10.5	20	8	20	0.1	1.0	—8.0
FZ11T5	10.4	11	11.6	5	10	5	0.1	1.0	—8.8
FZ12T5	11.4	12	12.6	5	11	5	0.1	1.0	—9.7
FZ13T5	12.35	13	13.6	5	13	5	0.05	1.0	—10.4
FZ14T5	13.29	14	14.7	5	15	5	0.05	1.0	—11.2
FZ15T5	14.2	15	15.7	5	17	5	0.05	1.0	—12.0
FZ16T5	15.2	16	16.8	5	19	5	0.05	1.0	—12.8
FZ17T5	16.1	17	17.8	5	21	5	0.05	1.0	—13.6
FZ18T5	17.1	18	18.9	5	25	5	0.05	1.0	—14.4
FZ19T5	18.0	19	19.9	5	28	5	0.05	1.0	—15.2
FZ20T5	19.0	20	21.0	5	32	5	0.05	1.0	—16.0
FZ22T5	20.9	22	23.1	5	35	5	0.05	1.0	—17.6
FZ24T5	22.8	24	25.2	5	37	5	0.05	1.0	—19.2
FZ25T5	23.8	25	26.2	5	39	5	0.05	1.0	—20.0
FZ27T5	25.6	27	28.4	5	40	5	0.05	1.0	—21.6
FZ30T5	28.5	30	31.5	5	45	5	0.05	1.0	—24.0

Types listed are ±5% voltage tolerance. For ±10% tolerance types, substitute 'T10' in place of 'T5' in part number — e.g. — "FZ3.3T10".

## SILICON ZENER AXIAL LEAD VOLTAGE REGULATORS

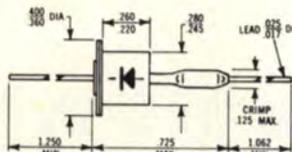
### 750 MILLIWATT TYPES Hermetically sealed



All dimensions in inches



### 1 WATT RATED TYPES Hermetically sealed



All dimensions in inches



Ratings and Characteristics at 25°C

JEDEC Type See Note 3	New Int'l Type No.	Standard Types			Typical Impedance		Max. DC Zener Current @ 25°C	Typical Zener Voltage Temp. Coeff. %/°C.	Former Int'l Part No.
		Nominal Zener Voltage @ I <sub>Z</sub> MA -- (Note 1)			Test Current I <sub>Z</sub> MA (Note 2)	Test Impedance Z <sub>Z</sub> Ohms (Note 2)			
		20%	10%	5%					
1N1507 1N1507A	MZ3.9T10 MZ3.9T5	3.9			35	14	180	-.04	MZ3.9
			3.9		35	14	180	-.04	MZ3.9A
	MZ4.3T5 MZ4.7T20 MZ4.7T10 MZ4.7T5	4.7			30	12	150	0	MZ4.3A
1N1508 1N1508A			4.7		30	12	150	0	MZ4.7
				4.7	30	12	150	0	MZ4.7A
	MZ5.1T5 MZ5.6T10 MZ5.6T5	5.6			30	12	150	0	MZ5.1A
1N1509 1N1509A			5.6		26	5.2	130	+.03	MZ5.6
				5.6	26	5.2	130	+.03	MZ5.6A
	MZ6.2T5 MZ6.8T20 MZ6.8T10 MZ6.8T5 MZ7.5T5	6.8			22	1.5	110	+.05	MZ6.2A
1N1510 1N1510A			6.8		22	1.5	110	+.05	MZ6.8
				6.8	22	1.5	110	+.05	MZ6.8A
				7.5	22	1.5	110	+.05	MZ7.5A
	MZ8.2T10 MZ8.2T5 MZ9.1T5	8.2			18	1.5	90	+.06	MZ8.2
1N1511 1N1511A			8.2		18	1.5	90	+.06	MZ8.2A
				9.1	18	1.5	90	+.06	MZ9.1A
	MZ10T20 MZ10T10 MZ10T5	10			15	1.8	75	+.07	MZ10
1N1512 1N1512A			10		15	1.8	75	+.07	MZ10A
				10	15	1.8	75	+.07	MZ10A
	MZ11T5 MZ12T10 MZ12T5	12			12	2.8	60	+.075	MZ11A
1N1513 1N1513A			12		12	2.8	60	+.075	MZ12
				12	12	2.8	60	+.075	MZ12A
	MZ13T5 MZ15T20 MZ15T10 MZ15T5	15			10	5	50	+.08	MZ13A
1N1514 1N1514A			15		10	5	50	+.08	MZ15
				15	10	5	50	+.08	MZ15A
	MZ16T5 MZ18T10 MZ18T5	18			8	9	40	+.085	MZ16A
1N1515 1N1515A			18		8	9	40	+.085	MZ18
				18	8	9	40	+.085	MZ18A
	MZ20T5 MZ22T20 MZ22T10 MZ22T5	22			6	19	33	+.09	MZ20A
1N1516 1N1516A			22		6	19	33	+.09	MZ22
				22	6	19	33	+.09	MZ22A
	MZ24T5 MZ27T10 MZ27T5 MZ30T5	27			5	50	26	+.095	MZ24A
1N1517 1N1517A			27		5	50	26	+.095	MZ27
				27	5	50	26	+.095	MZ27A
				30	5	50	26	+.095	MZ30A

Ratings and Characteristics at 25°C

JEDEC Type See Note 3	New Int'l Type No.	Standard Types			Typical Impedance		Max. DC Zener Current @ 25°C	Typical Zener Voltage Temp. Coeff. %/°C.	Former Int'l Part No.
		Nominal Zener Voltage @ I <sub>Z</sub> MA -- (Note 1)			Test Current I <sub>Z</sub> MA (Note 2)	Test Impedance Z <sub>Z</sub> Ohms (Note 2)			
		20%	10%	5%					
1N1518 1N1518A	1Z3.9T10 1Z3.9T5	3.9			50	9	250	-.04	1Z3.9
			3.9		50	9	250	-.04	1Z3.9A
	1Z4.3T5 1Z4.7T20 1Z4.7T10 1Z4.7T5	4.7			40	8.5	200	0	1Z4.3A
1N1519 1N1519A			4.7		40	8.5	200	0	1Z4.7
				4.7	40	8.5	200	0	1Z4.7A
	1Z5.1T5 1Z5.6T10 1Z5.6T5	5.6			40	8.5	200	0	1Z5.1A
1N1520 1N1520A			5.6		35	5.5	175	+.03	1Z5.6
				5.6	35	5.5	175	+.03	1Z5.6A
	1Z6.2T5 1Z6.8T20 1Z6.8T10 1Z6.8T5 1Z7.5T5	6.8			30	1.6	150	+.05	1Z6.2A
1N1521 1N1521A			6.8		30	1.6	150	+.05	1Z6.8
				6.8	30	1.6	150	+.05	1Z6.8A
				7.5	30	1.6	150	+.05	1Z7.5A
	1Z8.2T10 1Z8.2T5 1Z9.1T5	8.2			25	1.1	120	+.06	1Z8.2
1N1522 1N1522A			8.2		25	1.1	120	+.06	1Z8.2A
				9.1	25	1.1	120	+.06	1Z9.1A
	1Z10T20 1Z10T10 1Z10T5	10			20	1.5	100	+.07	1Z10
1N1523 1N1523A			10		20	1.5	100	+.07	1Z10
				10	20	1.5	100	+.07	1Z10A
	1Z11T5 1Z12T10 1Z12T5	12			15	2.4	80	+.075	1Z11A
1N1524 1N1524A			12		15	2.4	80	+.075	1Z12
				12	15	2.4	80	+.075	1Z12A
	1Z13T5 1Z15T20 1Z15T10 1Z15T5	15			13	5.4	65	+.08	1Z13A
1N1525 1N1525A			15		13	5.4	65	+.08	1Z15
				15	13	5.4	65	+.08	1Z15A
	1Z16T5 1Z18T10 1Z18T5	18			10	11	55	+.085	1Z16A
1N1526 1N1526A			18		10	11	55	+.085	1Z18
				18	10	11	55	+.085	1Z18A
	1Z20T5 1Z22T20 1Z22T10 1Z22T5	22			9	18	45	+.09	1Z20A
1N1527 1N1527A			22		9	18	45	+.09	1Z22
				22	9	18	45	+.09	1Z22A
	1Z24T5 1Z27T10 1Z27T5 1Z30T5	27			7	28	35	+.095	1Z24A
1N1528 1N1528A			27		7	28	35	+.095	1Z27
				27	7	28	35	+.095	1Z27A
				30	7	28	35	+.095	1Z30A

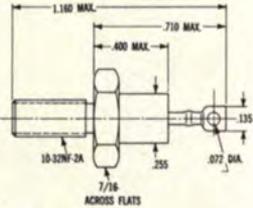
NOTES: Note 1. Nominal zener voltage at standard test current (I<sub>Z</sub>) and impedance (Z<sub>Z</sub>) as listed in "Typical Impedance" column. Note 2. Z<sub>Z</sub> is measured at standard test current of I<sub>Z</sub>.

If You Didn't Get This From My Site,  
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# SILICON ZENER STUD MOUNTED VOLTAGE REGULATORS

## 3.5 WATT RATED TYPES

Hermetically sealed



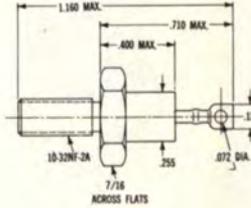
All dimensions in inches

Ratings and Characteristics @ 25°C

JEDEC Type See Note 3	New Int'l Type No.	Standard Types			Typical Impedance		Max. DC Zener Current @ 25°C	Typical Zener Voltage Temp. Coeff. %/°C.	Former Int'l Part No.
		Nominal Zener Voltage @ 1/2 MA -- (Note 1)			Test Current 1/2 MA (Note 2)	Test Impedance Z <sub>Z</sub> Ohms (Note 2)			
		20%	10%	5%					
1N1588	3Z3.9T10		3.9		150	2.6	850	-.04	3Z3.9
1N1588A	3Z3.9T5			3.9	150	2.6	850	-.04	3Z3.9A
1N1589 1N1589A	3Z4.3T5	4.7	4.7	4.3	150	2.6	850	-.04	3Z4.3A
	3Z4.7T20				125	2.3	700	0	
	3Z4.7T10				125	2.3	700	0	3Z4.7
	3Z4.7T5				125	2.3	700	0	3Z4.7A
1N1590 1N1590A	3Z5.1T5	5.6	5.6	125	2.3	700	0	3Z5.1A	
	3Z5.6T10			110	1.4	625	+.03	3Z5.6	
1N1590A	3Z5.6T5			110	1.4	625	+.03	3Z5.6A	
	3Z6.2T5	6.8	6.8	110	1.4	625	+.03	3Z6.2A	
3Z6.8T20	100			.58	525	+.05			
3Z6.8T10	100			.58	525	+.05	3Z6.8		
3Z6.8T5	100			.58	525	+.05	3Z6.8A		
3Z7.5T5	100			.58	525	+.05	3Z7.5A		
3Z7.5T5	100			.58	525	+.05	3Z7.5A		
1N1592 1N1592A	3Z8.2T10	8.2	8.2	80	.5	425	+.06	3Z8.2	
	3Z8.2T5			80	.5	425	+.06	3Z8.2A	
	3Z9.1T5			80	.5	425	+.06	3Z9.1A	
1N1593 1N1593A	3Z10T20	10	10	70	.7	350	+.07	3Z10	
	3Z10T10			70	.7	350	+.07	3Z10A	
	3Z10T5			70	.7	350	+.07	3Z10A	
1N1594 1N1594A	3Z11T5	12	12	70	.7	350	+.07	3Z11A	
	3Z12T10			50	1.4	275	+.075	3Z12	
	3Z12T5			50	1.4	275	+.075	3Z12A	
1N1595 1N1595A	3Z13T5	15	15	50	1.4	275	+.075	3Z13A	
	3Z15T20			40	3.4	225	+.08		
	3Z15T10			40	3.4	225	+.08	3Z15	
	3Z15T5			40	3.4	225	+.08	3Z15A	
1N1596 1N1596A	3Z16T5	18	18	40	3.4	225	+.08	3Z16A	
	3Z18T10			35	6	200	+.085	3Z18	
	3Z18T5			35	6	200	+.085	3Z18A	
1N1597 1N1597A	3Z20T5	22	22	30	9	160	+.085	3Z20A	
	3Z22T20			30	9	160	+.09		
	3Z22T10			30	9	160	+.09	3Z22	
	3Z22T5			30	9	160	+.09	3Z22A	
1N1598 1N1598A	3Z24T5	27	27	30	9	160	+.09	3Z24A	
	3Z27T10			25	13	125	+.095	3Z27	
	3Z27T5			25	13	125	+.095	3Z27A	
	3Z30T5			25	13	125	+.095	3Z30A	

## 10 WATT RATED TYPES

Hermetically sealed



All dimensions in inches

Ratings and Characteristics @ 25°C

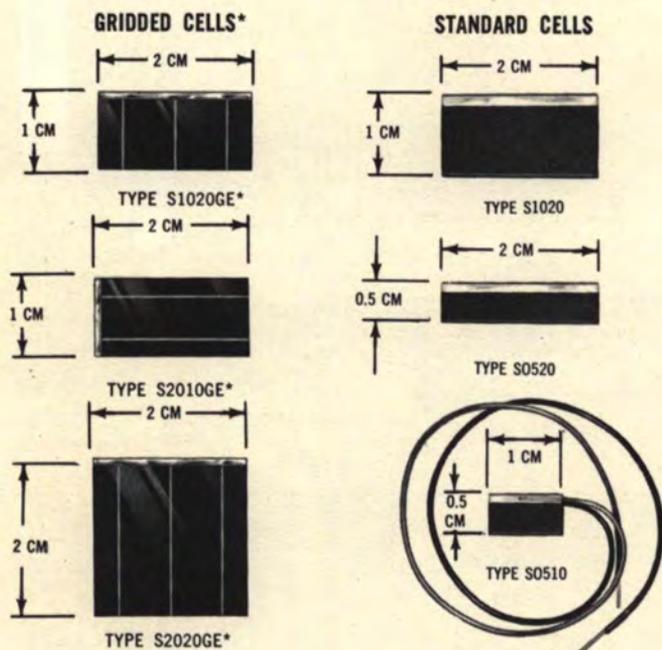
JEDEC Type See Note 3	New Int'l Type No.	Standard Types			Typical Impedance		Max. DC Zener Current @ 25°C	Typical Zener Voltage Temp. Coeff. %/°C.	Former Int'l Part No.
		Nominal Zener Voltage @ 1/2 MA -- (Note 1)			Test Current 1/2 MA (Note 2)	Test Impedance Z <sub>Z</sub> Ohms (Note 2)			
		20%	10%	5%					
1N1599	10Z3.9T10		3.9		500	.84	2500	-.04	10Z3.9
1N1599A	10Z3.9T5			3.9	500	.84	2500	-.04	10Z3.9A
1N1600 1N1600A	10Z4.3T5	4.7	4.7	4.3	500	.84	2500	-.04	10Z4.3A
	10Z4.7T20			400	.68	2000	0		
	10Z4.7T10			400	.68	2000	0	10Z4.7	
	10Z4.7T5			400	.68	2000	0	10Z4.7A	
1N1601 1N1601A	10Z5.1T5	5.6	5.6	400	.68	2000	0	10Z5.1A	
	10Z5.6T10			350	.3	1750	+.03	10Z5.6	
1N1601A	10Z5.6T5			350	.3	1750	+.03	10Z5.6A	
1N1602 1N1602A	10Z6.2T5	6.8	6.8	350	.3	1750	+.03	10Z6.2A	
	10Z6.8T20			300	.2	1500	+.05		
	10Z6.8T10			300	.2	1500	+.05	10Z6.8	
	10Z6.8T5			300	.2	1500	+.05	10Z6.8A	
	10Z7.5T5			300	.2	1500	+.05	10Z7.5A	
	10Z7.5T5			300	.2	1500	+.05	10Z7.5A	
1N1603 1N1603A	10Z8.2T10	8.2	8.2	250	.25	1200	+.06	10Z8.2	
	10Z8.2T5			250	.25	1200	+.06	10Z8.2A	
	10Z9.1T5			250	.25	1200	+.06	10Z9.1A	
1N1604 1N1604A	10Z10T20	10	10	200	.55	1000	+.07	10Z10	
	10Z10T10			200	.55	1000	+.07	10Z10A	
	10Z10T5			200	.55	1000	+.07	10Z10A	
1N1605 1N1605A	10Z11T5	12	12	200	.55	1000	+.07	10Z11A	
	10Z12T10			170	.95	850	+.075	10Z12	
	10Z12T5			170	.95	850	+.075	10Z12A	
1N1606 1N1606A	10Z13T5	15	15	170	.95	850	+.075	10Z13A	
	10Z15T20			140	1.5	650	+.08		
	10Z15T10			140	1.5	650	+.08	10Z15	
	10Z15T5			140	1.5	650	+.08	10Z15A	
1N1607 1N1607A	10Z16T5	18	18	140	1.5	650	+.08	10Z16A	
	10Z18T10			110	2	550	+.085	10Z18	
	10Z18T5			110	2	550	+.085	10Z18A	
1N1608 1N1608A	10Z20T5	22	22	110	2	550	+.085	10Z20A	
	10Z22T20			90	3	450	+.09		
	10Z22T10			90	3	450	+.09	10Z22	
	10Z22T5			90	3	450	+.09	10Z22A	
1N1609 1N1609A	10Z24T5	27	27	90	3	450	+.09	10Z24A	
	10Z27T10			70	4.5	350	+.095	10Z27	
	10Z27T5			70	4.5	350	+.095	10Z27A	
	10Z30T5			70	4.5	350	+.095	10Z30A	

Note 3. Types will be marked with JEDEC type numbers where assigned (see JEDEC type number column). JEDEC numbers have not been assigned for types where none is shown.



# SILICON SOLAR CELLS AND SELENIUM PHOTOVOLTAIC CELLS

This series of silicon solar cells features conversion efficiency of up to 11%. Higher efficiency cells are also available on request. Modular assemblies of series-connected standard cells designed for interconnection to supply from milliwatts to hundreds of watts of power are also available. For detailed data, request SR-280.



\*To order high efficiency gridded cells, add efficiency rating desired to end of part number — e.g., S1020GE10 (10% cell), etc.

Polarity: positive contact on cell active surface; negative contact on opposite (inactive) side. Positive contact strip is 0.1 cm wide.

### STANDARD UNMOUNTED CELL TYPES

Typical Characteristics for Optimum Power Transfer at 28°C Cell Temperature and 100 mw/cm<sup>2</sup> Solar Irradiation

Cell Type No.	Dimensions (1) (Cm x Cm)	Active Area (Cm <sup>2</sup> )	Minimum Conversion Efficiency	Minimum Output Power (MW) <sup>(2)</sup>	Approximate Current at 0.4 Volts (MA)
S1020E4	1 x 2	1.8	4	7.2	18
S1020E5	1 x 2	1.8	5	9.0	22
S1020E6	1 x 2	1.8	6	10.8	27
S1020E7	1 x 2	1.8	7	12.6	31
S1020E8	1 x 2	1.8	8	14.4	36
S1020E9	1 x 2	1.8	9	16.2	40
S1020E10	1 x 2	1.8	10	18.0	45
S1020E11	1 x 2	1.8	11	19.8	49
S0520E4	0.5 x 2	0.8	4	3.2	8
S0520E5	0.5 x 2	0.8	5	4.0	10
S0520E6	0.5 x 2	0.8	6	4.8	12
S0520E7	0.5 x 2	0.8	7	5.6	14
S0520E8	0.5 x 2	0.8	8	6.4	16
S0520E9	0.5 x 2	0.8	9	7.2	18
S0520E10	0.5 x 2	0.8	10	8.0	20
S0520E11	0.5 x 2	0.8	11	8.8	22
S0510E4	0.5 x 1	0.4	4	1.6	4
S0510E5	0.5 x 1	0.4	5	2.0	5
S0510E6	0.5 x 1	0.4	6	2.4	6
S0510E7	0.5 x 1	0.4	7	2.8	7
S0510E8	0.5 x 1	0.4	8	3.2	8
S0510E9	0.5 x 1	0.4	9	3.6	9
S0510E10	0.5 x 1	0.4	10	4.0	10
S0510E11	0.5 x 1	0.4	11	4.4	11

For more detailed data request SR-280

### Selenium Photocells

Self-generating photocells in standard or custom sizes, mounted or unmounted. Optimum load resistance range: 10 to 10,000 ohms. Output from .2 MA to 60 MA in average sunlight. Ambient temperature range: -65°C to + 85°C. For detailed data, request Bulletin PC 649-A.

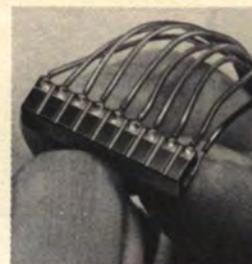
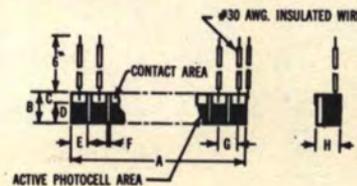


ROUND TYPES					
Scale Drawings	Cell Type	Overall Dimensions		Photosensitive Area inches <sup>2</sup>	Output Current 100fc 100 ohms microamperes
		diameter inches	thickness inches		
	A2	0.25	0.047	0.045	12
	A3	0.38	0.047	0.06	20
	A5	1.13	0.047	0.78	250
	A7	1.50	0.058	1.40	440
	A10	1.75	0.058	2.04	600
	A15	2.0	0.058	2.58	770
	A30	2.75	0.058	5.10	1400
	PC103	0.0, 2.0 I.D. 0.69	0.058	2.20	600

RECTANGULAR TYPES						
Scale Drawings	Cell Type	Overall Dimensions			Typical Photosensitive Area inches <sup>2</sup>	Output Current 100fc 100 ohms microamperes
		length inches	width inches	thickness inches		
	B1	0.59	0.24	0.047	0.12	32
	B2	0.72	0.44	0.021	0.26	77
	B4	0.88	0.54	0.047	0.39	120
	B5	1.44	0.64	0.047	0.78	250
	B10	1.69	0.88	0.058	1.26	380
	B15	1.69	1.69	0.058	2.25	640
	B17	6.0	0.50	0.021	2.6	710
	B20	2.0	2.0	0.021	3.3	900
	B30	3.25	3.25	0.021	9.41	2200

### Silicon Readout Photocells

Fast Response Time • Stable Characteristics



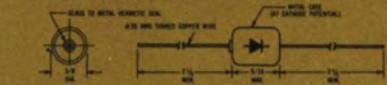
In'tl Part No.*	Number of Readout Positions	Overall Length (Inches)	Overall Width (Inches)	Contact Width (Inches)	Active Cell Area (Inches)	Segment Spacing (Inches)	Center to Center Spacing (Inches)	Thickness (Inches)
SPR-5-08BPL	5	0.415	0.200	0.040	0.160 x 0.067	0.020	0.087	0.150
SPR-6-08BPL	6	0.502	0.200	0.040	0.160 x 0.067	0.020	0.087	0.150
SPR-8-08BPL	8	0.676	0.200	0.040	0.160 x 0.067	0.020	0.087	0.150
SPR-9-08BPL	9	0.763	0.200	0.040	0.160 x 0.067	0.020	0.087	0.150
SPR-10-08BPL	10	0.850	0.200	0.040	0.160 x 0.067	0.020	0.087	0.150
SPR-5-10BPL	5	0.480	0.200	0.040	0.160 x 0.080	0.020	0.100	0.150
SPR-6-10BPL	6	0.580	0.200	0.040	0.160 x 0.080	0.020	0.100	0.150
SPR-8-10BPL	8	0.780	0.200	0.040	0.160 x 0.080	0.020	0.100	0.150
SPR-9-10BPL	9	0.880	0.200	0.040	0.160 x 0.080	0.020	0.100	0.150

\*NOTE 1. When matrices without leads are desired, omit suffix "PL" from part number.  
2. When matrices without metal base plate are desired, omit suffix "B" from part number.

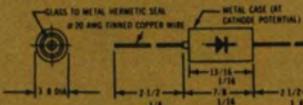
For more detailed data request SR-280

**SILICON HIGH VOLTAGE CARTRIDGE RECTIFIERS**

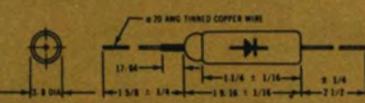
**600 TO 2500 PRV-TO 125 MA**



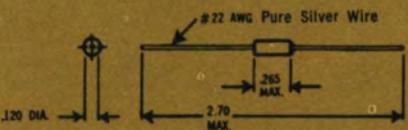
Case Type A



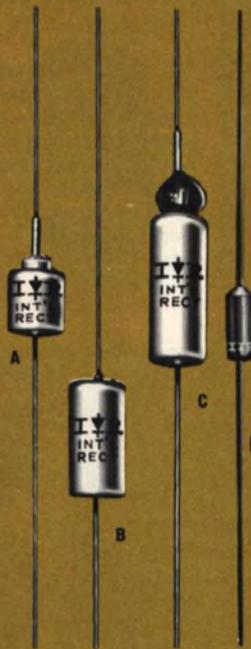
Case Type B



Case Type C



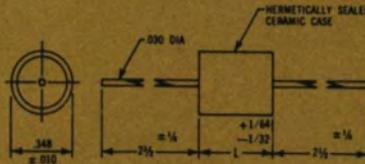
Case Type D



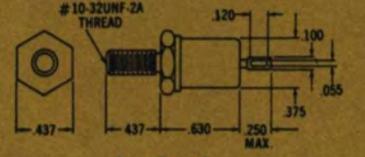
JEDEC Type	Int'l Type	Peak Reverse Voltage, Volts	Average Rect. Forward Current (MA.)		Maximum Voltage Drop—Volts	Max. Reverse Current @ 25°C, MA.	Case Type
			25°C	75°C			
1N596	EM1J2	600	145	125	3.0	0.025	A
1N597	FM1J2	800	145	125	3.0	0.025	A
1N598	GM1J2	1000	145	125	3.0	0.025	A
1N1406	66-0706	600	115	100	5.0	0.001	B
1N1407	66-0708	800	115	100	5.0	0.001	B
1N1408	66-0710	1000	115	100	5.0	0.001	B
1N1409	EM1L4	1200	115	100	5.0	0.001	C
1N1410	EM1L5	1500	115	100	6.25	0.001	C
1N1411	EM1L6	1800	115	100	7.5	0.001	C
1N1412	FM1L5	2000	115	100	6.25	0.001	C
1N1413	FM1L6	2400	115	100	7.5	0.001	C
---	Q10X	1000	100	55	4	2.0	D
---	Q15X	1500	95	50	4	2.0	D
---	Q20X	2000	90	45	4	2.0	D
---	Q25X	2500	85	35	4	2.0	D

For more detailed data, request SR-138E, SR-157.

**600 TO 10,000 PRV-TO 300 MA**



Case Type D



Case Type E



JEDEC Type	Int'l Type	Peak Reverse Voltage, Volts	Average Rect. Forward Current (MA.)		Maximum Voltage Drop—@ 25°C	Max. Reverse Current @ Rated PRV @ 25°C, MA.	"L" Length Inches Case D
			25°C	75°C			
1N2373	EF1S2	600	250	150	3.0	0.001	0.5
1N2374	GF1S2	1000	250	150	3.0	0.001	0.5
1N2375	GF1S3	1500	200	135	4.5	0.001	0.5
1N2376	FF1F5	2000	200	135	7.5	0.001	0.9
1N2377	FF1F6	2400	150	100	9.0	0.001	0.9
1N2378	GF1G6	3000	150	100	9.0	0.001	1.0
1N2379	FF1H10	4000	100	65	15.0	0.001	1.25
1N2380	FF1T15	6000	100	65	22.5	0.001	2.5
1N2381	FF1T25	10000	75	40	37.5	0.001	2.5
1N1730	---	1000	200	100	5	0.01	0.5
1N1731	---	1500	200	100	5	0.01	0.5
USA1N1731	---	1500	200	100	5	0.01	0.5
1N1732	---	2000	200	100	9	0.01	1.0
1N1733	---	3000	150	75	12	0.01	1.0
USA1N1733	---	3000	150	75	12	0.01	1.0
USA1N1734	---	5000	100	50	18	0.01	1.75
1N1130	---	1500	300	275	4.5	0.005	Case E
1N1131	---	1500	300	275	4.5	0.005	Case E

For more detailed data, request SR-226, SR-227, SR-228.

**SILICON RECTIFIER EQUIVALENTS TO STANDARD TUBE TYPES**



These high voltage rectifiers are specifically designed to supplant vacuum tube and mercury vapor tube rectifiers where the superior characteristics of silicon (no warm-up time, long life, high temperature operation, minimum heat generation, rugged, compact package) are desired. All devices are equipped with tube bases to allow direct replacement of their tube counterparts.



FIG. 1

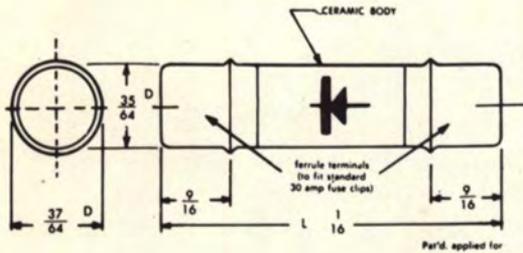
FIG. 2

Int'l Type No.	Jedec No.	PRV (Per Section) Volts	Max. RMS Input, Volts	Max. DC Output Ma @ 75°C	Average Volt. Drop, Volts	Max. Dimensions (Inches)		Replaces Tube Types:
						L	D	
ST-1	IN2630	1500	1050	85	2.25	1.75	0.87	6X4, 12X4
ST-1A	IN570	1500	1050	75	4.0			MIL 6X4, MIL 12X4
ST-2	IN2631	1600	1130	600	3.0	2.65	1.25	5A4W, 5A4X4, 5A24, 5AU4, 5W4
ST-2A	IN2632	2800	1950	250	6.0	2.65	1.25	5Y3, 5U4, 5T4, 6004, 5Z4
ST-3	IN2633	1600	1130	600	3.0	2.65	1.25	5R4, 5R4W
ST-4	IN2634	1600	1130	600	3.0	2.65	1.25	6AX5, 6W5, 6X5, 6Z5Y, 0Z4, 5839, 5852, 5X4
ST-5	IN2635	1500	1050	85	2.25	1.75	0.87	5Z3, 80, 82, 83, 83V
ST-6	IN2636	1500	1050	85	2.25	2.45	1.19	6X4, 12X4 (High Altitude Types)
ST-7A	---	10,500	7500	250	28.0	5.05	1.38	84/624
ST-8	---	1250	880	80	3.9	1.10	1.40	866, 866A
ST-9	---	10,000	7000	1250	32	8.03	2.13	024, 6X5
ST-10	---	10,000	7000	1250	32	8.18	2.31	8008
ST-13	---	1275	900	130	3.0	2.0	0.75	872A, 872B
								6BW4, 12BW4

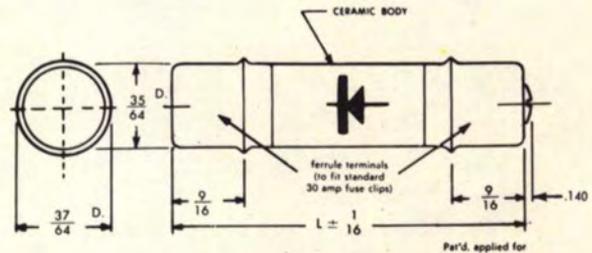
For more detailed data, request SR-209.

# SILICON HIGH VOLTAGE CARTRIDGE RECTIFIERS

**STANDARD TYPES—TO 16000 PRV-100 ma**  
Designed for Normal Convection Cooling



**HIGH CURRENT TYPES—TO 16000 PRV-440 ma**  
Designed for Forced Convection or Oil Cooling



All dimensions in inches

**ABSOLUTE MAXIMUM RATINGS AT 75°C AMBIENT**  
(Normal Convection Cooling — Horizontal Mounting)  
Half-Wave Resistive Load — 60 CPS

JETEC Type	Int'l Type	Peak Reverse Voltage Volts	Max. Rectified DC Output Current MA.	Forward DC Volt Drop at Rated DC Current Volts	"L" Length Inches
1N1134	EF1A5	1500	100	7.5	1¾
1N1135	CF1B12	1800	65	18.0	2½
1N1136	EF1A6	1800	85	9.0	1¾
1N1137	CF1B16	2400	50	24.0	2½
1N1138	EF1A8	2400	60	12.0	1¾
1N1139	DF1C18	3600	65	27.0	4½
1N1140	EF1B12	3600	65	18.0	2½
1N1141	DF1C24	4800	60	36.0	4½
1N1142	EF1B16	4800	50	24.0	2½
1N1143	DF1C30	6000	50	45.0	4½
1N1143A	EF1C20	6000	65	30.0	4½
1N1144	DF1D36	7200	50	54.0	6½
1N1145	EF1C24	7200	60	36.0	4½
1N1146	DF1D40	8000	45	60.0	6½
1N1147	EF1D40	12000	45	60.0	6½
1N1148	FF1D35	14000	50	52.0	6½
1N1149	FF1D40	16000	45	60.0	6½

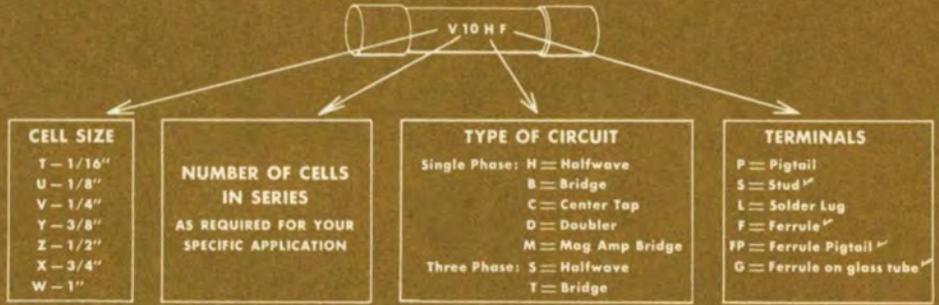
**ABSOLUTE MAXIMUM RATINGS AT 75°C AMBIENT**  
Half-Wave Resistive Load — 60 CPS

JETEC Type	Int'l Type	Peak Reverse Voltage Volts	Max. Rectified DC Output Current (MA.)		Forward DC Volt Drop at Rated DC Current Volts	"L" Length Inches
			Oil Immersed Oil Temp. @ 75°C	Forced Convection 2000 LFM @ 75°C		
1N1745	CF1B10M	1500	380	300	15.0	2½
1N1746	EF1A5M	1500	440	360	7.5	1¾
1N1747	CF1B12M	1800	360	270	18.0	2½
1N1748	EF1A6M	1800	420	330	9.0	1¾
1N1749	CF1B16M	2400	320	220	24.0	2½
1N1750	EF1A8M	2400	380	270	12.0	1¾
1N1751	DF1C18M	3600	370	290	27.0	4½
1N1752	EF1B12M	3600	360	280	18.0	2½
1N1753	DF1C24M	4800	330	230	36.0	4½
1N1754	EF1B16M	4800	320	220	24.0	2½
1N1755	DF1C30M	6000	290	210	45.0	4½
1N1756	EF1C20M	6000	360	280	30.0	4½
1N1757	DF1D36M	7200	290	240	54.0	6½
1N1758	EF1C24M	7200	330	230	36.0	4½
1N1759	DF1D40M	8000	250	220	60.0	6½
1N1760	EF1D40M	12000	250	220	60.0	6½
1N1761	FF1D35M	14000	300	240	52.0	6½
1N1762	FF1D40M	16000	250	220	60.0	6½

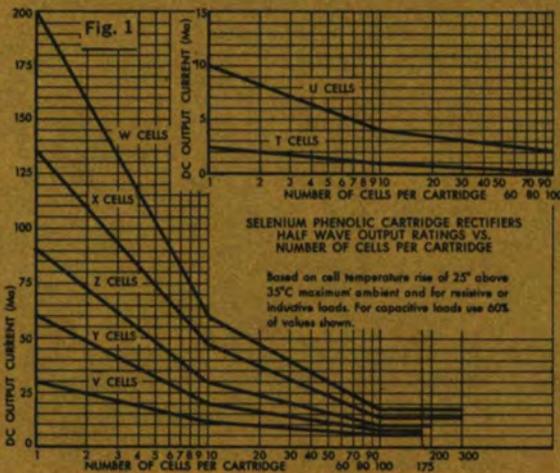
For more detailed data, request SR 225.

# SELENIUM HIGH VOLTAGE CARTRIDGE RECTIFIERS

These selenium cartridge rectifiers have been designed to meet the exacting requirements of military specifications. They will deliver efficient rectification over a temperature range from -65°C to 100°C. Cartridge rectifiers listed in this bulletin illustrate only a partial listing of the rectifier designs available. Since there is no limit to the number of cartridges which can be connected in series, there is, therefore, no theoretical limit to the DC voltages which are obtainable.



**FIG. 1 - Current ratings for International selenium cartridge rectifiers in phenolic tubing. Curves indicate half-wave DC output current ratings vs. number of cells per cartridge for resistive or inductive load. (For half-wave capacitive loads, use 60% of values shown).**



## TERMINALS AND MOUNTINGS

Type of Terminal	RECTIFIER CELL DIAMETERS AND TERMINAL CONSTRUCTION AVAILABLE						
	T 1/16"	U 1/8"	V 1/4"	Y 3/8"	Z 1/2"	X 3/4"	W 1"
AXIAL PIGTAIL (P) (Half Wave Only) AWG *Lead Length	P #22 3"	P #20 2 1/2"	P #20 2 1/2"	P #20 2 1/2"	P #20 2 1/2"	P #20 2 1/2"	P #20 2 1/2"
RADIAL PIGTAIL (P) (Multiple circuits) AWG *Lead Length	P #22 5 1/4"	P #20 3 1/2"	P #20 3 1/2"	P #20 3 1/2"	P #20 3 1/2"	P #20 2 1/2"	P #20 2 1/4"
STUD (S) Size Length	S** 10-32 NF2 3/8"	S 6-32 NC2 3/8"	S 6-32 NC2 7/16"	S 8-32 NC2 7/16"	S 8-32 NC2 7/16"	S 8-32 NC2 7/16"	S 10-32 NF2 7/16"
SOLDER LUG (L) Lug Extension ±1/16"			L 3/8"	L 1 1/16"	L 3/8"	L 3/8"	L 1 1/16"
FERRULE (F) Ferrule D x L Specify Ferrule Mounting Clip	F 1/4" x 1/4" FU	F 3/8" x 1/2" FV	F 1/2" x 1/2" FV	F 3/4" x 5/8" FZ	F 1" x 3/4" FX	F 1 1/4" x 1" FX	F 1 1/2" x 1" FW
**FERRULE ON GLASS TUBE (G) Ferrule D x L Specify Ferrule Mounting Clip	G** 3/16" x 1/16"	G** 3/16" x 1/16"					
FERRULE PIGTAIL AWG *Lead Length Ferrule D x L	P #22 3" 3/16" x 1/4"	FP #20 2 1/4" 1/4" x 1/4"					

\*Tolerance ±1/4".  
\*\*Available under special conditions only—consult manufacturer.  
\*\*\*Not recommended for less than 20 plates per cartridge.  
†DxL indicates Diameter & Length of ferrule.  
††FW denotes body mounting clip only. Not for electrical connection.

## HALF-WAVE CARTRIDGE RECTIFIERS



Half wave cartridge rectifiers are available in Triple X phenolic tubing and the cell sizes listed. Current ratings for these units are given in Fig. 1.

Cells Per Cartridge in Series	Max. AC Input Volts RMS		Nominal DC Output Voltage		Peak Inverse Voltage	T-HP U-HF U-MHF U-NP V-MP V-HF V-MG Y-MP Y-HF Z-MP Z-HF X-MP W-MP													
	Resistive Load	Capacitive Load	Resis. Load	Capac. Load		O.D. 1/4"	O.D. 1/4"	O.D. 1/4"	O.D. 1/4"	O.D. 1/4"	O.D. 1/4"	O.D. 1/4"	O.D. 1/4"	O.D. 1/4"	O.D. 1/4"	O.D. 1/4"	O.D. 1/4"	O.D. 1/4"	
1	33	20	13	20	48	3/8"	3/8"	3/8"	3/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	
2	66	40	26	40	96	3/8"	3/8"	3/8"	3/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	
3	99	60	39	60	144	3/8"	3/8"	3/8"	3/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	
4	132	80	52	80	192	3/8"	3/8"	3/8"	3/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	
5	165	100	65	100	240	3/8"	3/8"	3/8"	3/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	
10	330	200	130	200	480	3/8"	3/8"	3/8"	3/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	
15	495	300	195	300	720	3/8"	3/8"	3/8"	1	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	
20	660	400	260	400	960	3/8"	3/8"	3/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	
25	825	500	325	500	1,200	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	
30	990	600	390	600	1,440	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	
40	1320	800	520	800	1,920	1 1/8"	1 1/8"	1 1/8"	1 1/8"	2	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	
45	1485	900	585	900	2,160	1 1/8"	1 1/8"	1 1/8"	2	2 1/8"	2 1/8"	1 1/8"	2 1/8"	2 1/8"	2 1/8"	2 1/8"	2 1/8"	2 1/8"	
50	1650	1000	650	1000	2,400	2	1 1/8"	1 1/8"	2 1/8"	2 1/8"	2 1/8"	2 1/8"	2 1/8"	2 1/8"	2 1/8"	2 1/8"	2 1/8"	2 1/8"	
60	1980	1200	780	1200	2,880	2 1/8"	2 1/8"	2 1/8"	2 1/8"	2 1/8"	2 1/8"	2 1/8"	2 1/8"	2 1/8"	2 1/8"	2 1/8"	2 1/8"	2 1/8"	
75	2475	1500	975	1500	3,600	2 1/8"	2 1/8"	2 1/8"	3	3 1/8"	3	3 1/8"	3	3 1/8"	3	3 1/8"	3 1/8"	3 1/8"	
100	3300	2000	1300	2000	4,800	3 1/8"	3 1/8"	3 1/8"	3 1/8"	4 1/8"	4	3 1/8"	4 1/8"	4	4 1/8"	4	4 1/8"	4 1/8"	
125	4125	2500	1625	2500	6,000					4 1/8"	4 1/8"	4 1/8"	5	4 1/8"	5	4 1/8"	5 1/8"	5 1/8"	
150	4950	3000	1950	3000	7,200					5 1/8"	5 1/8"	5 1/8"	5 1/8"	5 1/8"	5 1/8"	5 1/8"	6 1/8"	6 1/8"	
175	5775	3500	2275	3500	8,400					6 1/8"	6	7 1/8"	6 1/8"	6	6 1/8"	6 1/8"	7 1/8"	7 1/8"	
200	6600	4000	2600	4000	9,600												8	8 1/8"	
250	8250	5000	3250	5000	12,000												10	10	
300	9900	6000	3900	6000	14,400												11 1/8"	11 1/8"	

\*Number of cells in series — refer to first column of table.

If You Didn't Get This From My Site,  
Then It Was Stolen From...

**FULL-WAVE CENTER TAP CARTRIDGE RECTIFIERS**



For cell current information, refer to ratings for single phase bridge cartridge rectifiers.

Cells In Series (per leg)	Cells Per Cartridge	Max. AC Input Volts RMS**		Nominal DC Output Voltage		Peak Inverse Voltage	U-CP	V-CP	Y-CP	Z-CP	X-CP	W-CP
		Resistive OR Capacitive Loads	Resistive Load	Capacitive Load	O.D. = 1/4"		O.D. = 3/8"	O.D. = 1/2"	O.D. = 1 1/16"	O.D. = 1"	O.D. = 1 1/4"	
					Length"		Length"	Length"	Length"	Length"	Length"	
1	2	33	13	16	48	3/4	3/4	3/4	3/4	1 1/4	1 1/4	1 1/4
2	4	66	26	32	96	3/4	3/4	3/4	1	1 1/4	1 1/4	1 1/4
3	6	99	39	48	144	3/4	3/4	3/4	1	1 1/4	1 1/4	1 1/4
4	8	132	52	64	192	3/4	1	1	1 1/4	1 1/4	1 1/4	1 1/4
5	10	165	65	80	240	3/4	1	1	1 1/4	1 1/4	1 1/4	1 1/4
6	12	198	78	96	288	3/4	1	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4
7	14	231	91	112	336	3/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4
8	16	264	104	128	384	1	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	2
10	20	330	136	160	480	1 1/4	1 1/4	1 1/4	1 1/4	2	2	2
15	30	495	204	240	720	1 1/4	1 1/4	1 1/4	2	2 1/4	2 1/4	2 1/4
20	40	660	271	320	960	2	2	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4
25	50	825	340	400	1200	2 1/4	2 1/4	2 1/4	2 1/4	3 1/4	3 1/4	3 1/4
30	60	990	406	480	1440	2 1/4	2 1/4	2 1/4	2 1/4	3 1/4	3 1/4	3 1/4
40	80	1320	543	640	1920	3 1/4	3 1/4	3 1/4	3 1/4	4 1/4	4 1/4	4 1/4
50	100	1650	680	800	2400	4	4 1/4	4 1/4	4 1/4	4 1/4	4 1/4	4 1/4

**VOLTAGE DOUBLER CARTRIDGE RECTIFIERS**



For cell current ratings refer to Figure 1. When these voltage doublers are used as individual sections of single or three-phase bridges, they should be rated in accordance with the applicable bridge ratings.

Cells In Series (per leg)	Cells Per Cartridge	Max. AC Input Volts RMS		Nominal DC Output Voltage		Peak Inverse Voltage	U-DP	V-DP	Y-DP	Z-DP	X-DP	W-DP
		Capacitive Load	Capacitive Load	O.D. = 1/4"	O.D. = 3/8"		O.D. = 1/2"	O.D. = 1 1/16"	O.D. = 1"	O.D. = 1 1/4"		
				Length"	Length"		Length"	Length"	Length"	Length"		
1	2	20	40	48	3/4	3/4	3/4	3/4	1 1/4	1 1/4	1 1/4	
2	4	40	80	96	3/4	3/4	3/4	1	1 1/4	1 1/4	1 1/4	
3	6	60	120	144	3/4	3/4	3/4	1	1 1/4	1 1/4	1 1/4	
4	8	80	160	192	3/4	1	1	1 1/4	1 1/4	1 1/4	1 1/4	
5	10	100	200	240	3/4	1	1	1 1/4	1 1/4	1 1/4	1 1/4	
6	12	120	240	288	3/4	1	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	
7	14	140	280	336	3/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	
8	16	160	320	384	1	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	2	
10	20	200	400	480	1 1/4	1 1/4	1 1/4	1 1/4	2	2	2	
15	30	300	600	720	1 1/4	1 1/4	1 1/4	2	2 1/4	2 1/4	2 1/4	
20	40	400	800	960	2	2	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	
25	50	500	1000	1200	2 1/4	2 1/4	2 1/4	2 1/4	3 1/4	3 1/4	3 1/4	
30	60	600	1200	1440	2 1/4	2 1/4	2 1/4	2 1/4	3 1/4	3 1/4	3 1/4	
40	80	800	1600	1920	3 1/4	3 1/4	3 1/4	3 1/4	4 1/4	4 1/4	4 1/4	
50	100	1000	2000	2400	4	4 1/4	4 1/4	4 1/4	4 1/4	4 1/4	4 1/4	

**SINGLE PHASE BRIDGE CARTRIDGE RECTIFIERS**



For capacitive load, derate volt-ampere output by 20%—see Fig. 1. It is recommended that this VA derating factor be applied to the output current rather than voltage.

Cells In Series (per leg)	Cells Per Cartridge	Max. AC Input Volts RMS		Nominal DC Output Voltage		Peak Inverse Voltage	U-BP	V-BP	Y-BP	Z-BP	X-BP	W-BP
		Resistive OR Capacitive Load	Resistive Load	Capacitive Load (Nominal)	O.D. = 1/4"		O.D. = 3/8"	O.D. = 1/2"	O.D. = 1 1/16"	O.D. = 1"	O.D. = 1 1/4"	
					Length"		Length"	Length"	Length"	Length"	Length"	
1	4	33	25	33	48	3/4	3/4	1	1	1 1/4	1 1/4	1 1/4
2	8	66	50	66	96	1 1/4	1	1	1 1/4	1 1/4	1 1/4	1 1/4
3	12	99	75	99	144	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	2
4	16	132	100	132	192	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	2
5	20	165	125	165	240	1 1/4	1 1/4	1 1/4	1 1/4	2	2	2 1/4
6	24	198	150	198	288	1 1/4	1 1/4	1 1/4	1 1/4	2	2	2 1/4
7	28	231	175	231	336	1 1/4	1 1/4	1 1/4	1 1/4	2	2	2 1/4
8	32	264	200	264	384	1 1/4	1 1/4	1 1/4	2	2 1/4	2 1/4	2 1/4
10	40	330	250	330	480	2	2	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4
15	60	495	375	495	720	2 1/4	2 1/4	2 1/4	2 1/4	3 1/4	3 1/4	3 1/4
20	80	660	500	660	960	3 1/4	3 1/4	3 1/4	3 1/4	4 1/4	4 1/4	4 1/4
25	100	825	635	825	1200	4	4 1/4	4 1/4	4 1/4	5 1/4	5 1/4	5 1/4

**HERMETICALLY SEALED CARTRIDGE RECTIFIERS**



Standard half-wave hermetically sealed selenium cartridge rectifiers are available in cadmium-plated brass or steel cases in the sizes listed below. They are recommended for airborne and shipboard equipment and similar applications where extreme conditions of humidity, salt spray, moisture, etc. are encountered. Single phase bridge and voltage multipliers are also available for special applications. The units listed have the metal case common with the negative terminal lead. Insulated case types also available from regular production, consult with factory.

Cells Per Cartridge	Max. AC Input Volts RMS		Nominal DC Output Voltage		Peak Inverse Voltage	T-HM	U-HM	V-HM	Y-HM	Z-HM	X-HM	W-HM
	Resistive Load	Capacitive Load	Resistive Load	Capacitive Load		O.D. = 3/16"	O.D. = 1/8"	O.D. = 3/16"	O.D. = 1/2"	O.D. = 1/16"	O.D. = 1"	O.D. = 1 1/16"
						Length"	Length"	Length"	Length"	Length"	Length"	Length"
1	33	20	13	20	48	1/32	1/32	1/2	1/16	1/16	1 1/4	1 1/4
2	66	40	26	40	96	1/32	1/32	1/2	1/16	1/16	1 1/4	1 1/4
3	99	60	39	60	144	1/32	1/32	1/2	1/16	1/16	1 1/4	1 1/4
4	132	80	52	80	192	1/32	1/32	1/2	1/16	1/16	1 1/4	1 1/4
5	165	100	65	100	240	1/32	1/32	1/2	1/16	1/16	1 1/4	1 1/4
6	198	120	78	120	288	1/32	1/32	1/2	1/16	1/16	1 1/4	1 1/4
7	231	140	91	140	336	1/32	1/32	1/2	1/16	1/16	1 1/4	1 1/4
8	264	160	104	160	384	1/32	1/32	1/2	1/16	1/16	1 1/4	1 1/4
9	297	180	117	180	432	1/32	1/32	1/2	1/16	1/16	1 1/4	1 1/4
10	330	200	130	200	480	1/32	1/32	1/2	1/16	1/16	1 1/4	1 1/4
11	363	220	143	220	528	1/32	1/32	1/2	1/16	1/16	1 1/4	1 1/4
12	396	240	156	240	576	1/32	1/32	1/2	1/16	1/16	1 1/4	1 1/4
13	429	260	169	260	624	1/32	1/32	1/2	1/16	1/16	1 1/4	1 1/4
14	462	280	182	280	672	1/32	1/32	1/2	1/16	1/16	1 1/4	1 1/4
15	495	300	195	300	720	1/32	1/32	1/2	1/16	1/16	1 1/4	1 1/4
20	660	400	260	400	960	1/32	1/32	1/2	1/16	1/16	1 1/4	1 1/4

\*Number of cells in series — refer to first column of table.

PROTECTIVE FINISHES AVAILABLE include salt spray resistant, fungus resistant, moisture resistant, standard commercial and combinations of the above.

COLOR CODING SYSTEM — RED: Positive, BLACK: Negative, YELLOW: AC.



# SILICON SUPERPOWER HIGH VOLTAGE RECTIFIER COLUMNS

THE MOST ADVANCED ENGINEERING DESIGN OF ITS TYPE IN THE INDUSTRY

VOLTAGES UP TO 120 KV, CURRENT UP TO 50 AMPERES, POWER UP TO 1200 KW

POWER DENSITY UP TO 1 KW PER CUBIC INCH!

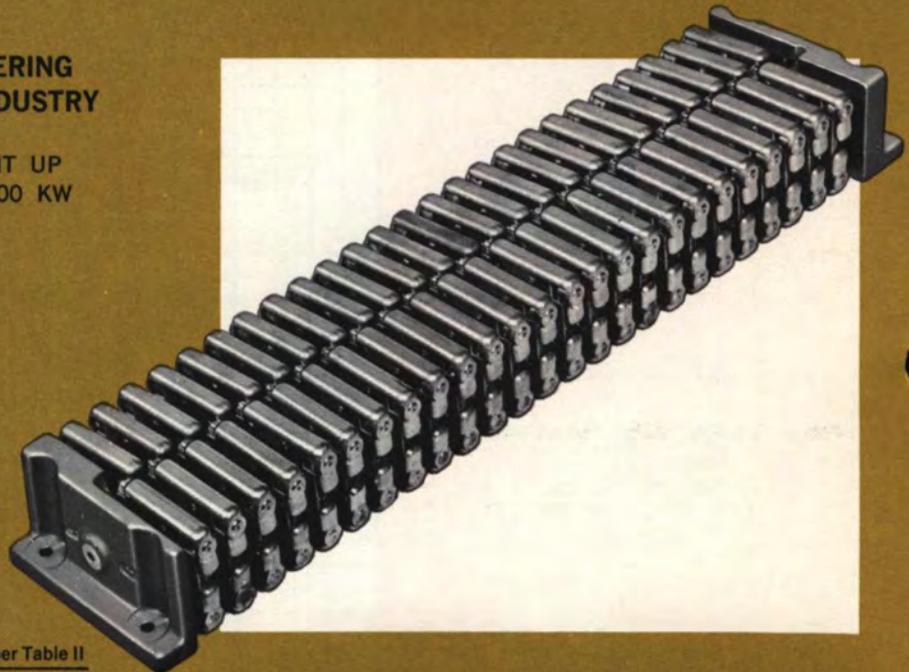


TABLE I DESIGNATION OF RECTIFIER COLUMNS

		<b>1HV6E</b>		Cell Type, per Table II	
		High Voltage Column		600 Volt PRV Cells.	
RECTIFIER COLUMN TYPE→					
		1HV		2HV	
		Volts	Code	Volts	Code
Standard Cell Voltages PRV		400	4	400	4
		500	5	500	5
		600	6	600	6
STANDARD Length Column	Number of Cells	100		76	
	Number of Modules	50		38	
	Capacitor (μF) (in Air)	.0015		.0012	
	Capacitor (μF) (in Oil)	.0033		.0027	
	Approx. Weight	5 lbs.		5.9 lbs.	
MAXIMUM Length Column	Number of Cells	200		152	
	Number of Modules	100		76	
	Capacitor (μF) (in Air)	.0056		.0039	
	Capacitor (μF) (in Oil)	.0120		.0100	
	Approx. Weight	9.4 lbs.		10.9 lbs.	
	Equivalent number of Standard Columns	2		2	
Maximum Length		33.7"		49.3"	
Incremental Length	Per Module	.3125"		.411"	
	Per Cell	.15625"		.2055"	
LENGTH OF NON-STANDARD COLUMNS		L = Length in inches		1HV: L = 2.44 + .3125M inches	
		M = Number of Modules		2HV: L = 2.44 + .411M inches	
		N = 2M = Number of Cells		3HV: L = 2.44 + .822M inches	

IR superpower rectifier columns can be built for voltages ranging from 10,000 to more than 100,000 volts. Their current capacity ranges from 1 to 50 amperes. If special circuits are used, such as multiplier, cascade or series circuits these values may be greatly increased. Standard columns are single-phase and three phase bridge. With these circuits, the maximum power capacity is above 1000 kw.

### Designations and Standards

Columns are available in three basic types, designated as 1HV, 2HV and 3HV. Table I shows standard columns with the types and rated voltages of the individual silicon rectifier cells which make up a complete column. Standard columns contain the standard number of cells and modules, as shown in the upper part of Table I. Columns can be assembled in a wide variety of cell ratings, varying in voltage, current, temperature rating or military specifications. Non-standard columns differ only in length, shown in incremental and overall values at the bottom of Table I. Table II indicates the IR rectifier cells which may be designed into standard superpower columns. For individual cell ratings, see elsewhere in this catalog.

Table III shows the rated voltages of standard columns, and gives the column type, number of cells, and peak reverse voltage per cell. With this may be obtained the PRV per column, blocking voltage and recommended RMS voltage.

For more detailed data, request SR-370.

TABLE II

CODE LETTER	RECTIFIER CELL TYPE
A	10B1 to 10B6
B	SD91A-S095A
N	SD91-S095
E	1N536-1N1096
H-JAN 1N538. JAN 1N540. JAN 1N547	
2HV COLUMN	
C	6F SERIES
J	1N1341-1N1347
D	12F SERIES
K	1N1199-1N1205
3HV COLUMN	
P	25 H SERIES (1N2128A to 1N2137A)
G	25HB SERIES (1N2123 to 1N2137)

TABLE III

STANDARD COLUMNS

Column Type	Number of Cells	PRV per Cell Volt	PRV per Column Kilovolt	D-C Block Voltage Max. Kilovolt	RMS A-C Voltage Max. Kilovolt
1HV4	100	400	40	20	14.1
1HV5	100	500	50	25	17.7
1HV6	100	600	60	30	21.2
2HV4	76	400	30.4	15.2	10.8
2HV5	76	500	38	19	13.5
2HV6	76	600	45.6	22.8	16.1
3HV4	38	400	15.2	7.6	5.4
3HV5	38	500	19	8.5	6.7
3HV6	38	600	22.8	11.4	8.1

TABLE IV

MAXIMUM LENGTH COLUMNS

Column Type	Number of Cells	PRV per Cell Volt	PRV per Column Kilovolt	D-C Block Voltage Max. Kilovolt	RMS A-C Voltage Max. Kilovolt
1HV4	200	400	80	40	28.3
1HV5	200	500	100	50	35.4
1HV6	200	600	120	60	42.4
2HV4	152	400	60.8	30.4	21.5
2HV5	152	500	76.0	38.0	26.9
2HV6	152	600	91.1	45.6	32.2
3HV4	114	400	45.6	22.8	16.1
3HV5	114	500	57.0	28.5	20.2
3HV6	114	600	68.4	34.2	24.2

**HERMETIC AND "QUAD-SEALED" SILICON POWER RECTIFIERS**

JEDEC Type	Int'l Type	Peak Reverse Voltage, Volts	RMS Input Voltage, Volts	Rectified DC Output Current, MA.	Max. Surge (0.1 sec.) Amps.	Typ. Volt. Drop at 200 MA. DC Volts	Max. Leakage Current @ Rated PRV, MA.
<b>6 AND 12 AMP. RATED JEDEC TYPES — CASE TYPE F</b>							
1N1341	—	50	35	6 Amps	50	0.5 volts at 6 amps	2.5
1N1342	—	100	70		50		2.5
1N1343	—	150	105		50		2.5
1N1344	—	200	140		50		2.5
1N1345	—	300	210		50		2.5
1N1346	—	400	280		50		2.5
1N1347	—	500	350	50	2.5		
1N1199	—	50	35	12 Amps	65	0.5 volts at 12 amps	2.5
1N1200	—	100	70		65		2.5
1N1201	—	150	105		65		2.5
1N1202	—	200	140		65		2.5
1N1203	—	300	210		65		2.5
1N1204	—	400	280		65		2.5
1N1205	—	500	350	65	2.5		

For detailed data, request SR-311.

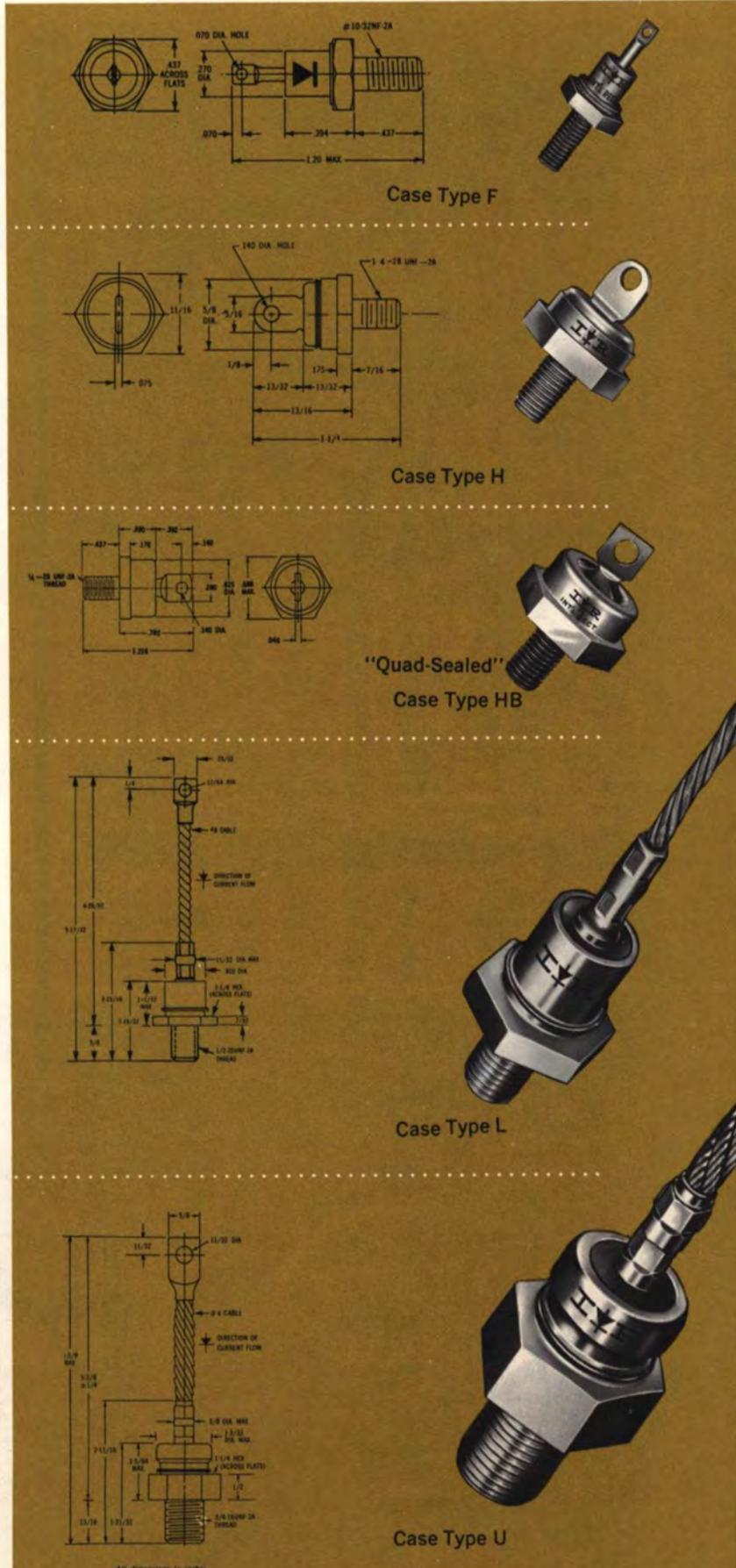
JEDEC Type	Int'l Type	Max. Peak Reverse Voltage, Volts	Max. RMS Volts	Recommended Ratings	
				Crest Working Voltage, Volts	RMS, Volts
<b>25 TO 35 AMP. RATED — CASE TYPE H</b> For detailed data, request SR-304.					
1N2128A	25H5	50	35	17.5	12.5
1N2129A	25H10	100	70	35	25
1N2130A	25H15	150	105	52	37
1N2131A	25H20	200	140	70	50
1N2132A	25H25	250	175	87	62
1N2133A	25H30	300	210	105	75
1N2134A	25H35	350	245	120	85
1N2135A	25H40	400	280	140	100
1N2136A	25H45	450	310	155	110
1N2137A	25H50	500	350	175	120
1N2138A	25H60	600	420	210	145

<b>25 TO 35 AMP. RATED — CASE TYPE HB</b> For detailed data, request SR-310.					
1N2128	25HB5	50	35	17.5	12.5
1N2129	25HB10	100	70	35	25
1N2130	25HB15	150	105	52	37
1N2131	25HB20	200	140	70	50
1N2132	25HB25	250	175	87	62
1N2133	25HB30	300	210	105	75
1N2134	25HB35	350	245	120	85
1N2135	25HB40	400	280	140	100
1N2136	25HB45	450	310	155	110
1N2137	25HB50	500	350	175	120
1N2138	25HB60	600	420	210	145

<b>45 TO 150 AMP. RATED — CASE TYPE L</b> For detailed data, request SR-300.					
1N3085	45L5	50	35	17.5	12.5
	45L10	100	70	35	25
	45L15	150	105	52	37
1N3086	45L20	200	140	70	50
	45L25	250	175	87	62
1N3087	45L30	300	210	105	75
	45L35	350	245	120	85
1N3088	45L40	400	280	140	100
	45L45	450	310	155	110
1N3089	45L50	500	350	175	120
	45L60	600	420	210	145

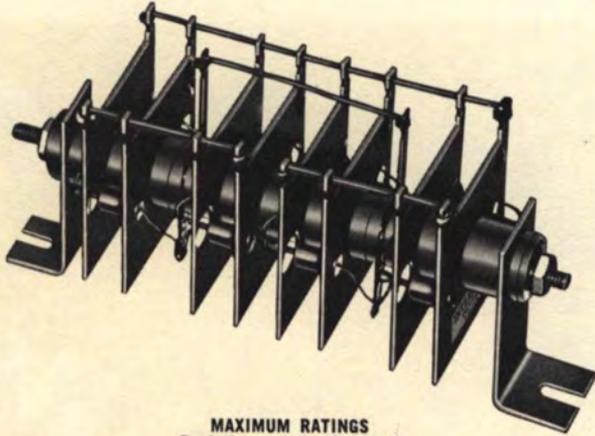
<b>70 TO 250 AMP. RATED — CASE TYPE U</b> For detailed data, request SR-305.					
1N2054	70U5	50	35	17.5	12.5
1N2055	70U10	100	70	35	25
1N2056	70U15	150	105	52	37
1N2057	70U20	200	140	70	50
1N2058	70U25	250	175	87	62
1N2059	70U30	300	210	105	75
1N2060	70U35	350	245	120	85
1N2061	70U40	400	280	140	100
1N2062	70U45	450	310	155	110
1N2063	70U50	500	350	210	120
1N2064	70U60	600	420	175	145

Stack assemblies utilizing these cells also available. Contact your IR sales representative for details.





## STANDARD SILICON MEDIUM POWER RECTIFIER STACK ASSEMBLIES PARTIAL LISTING

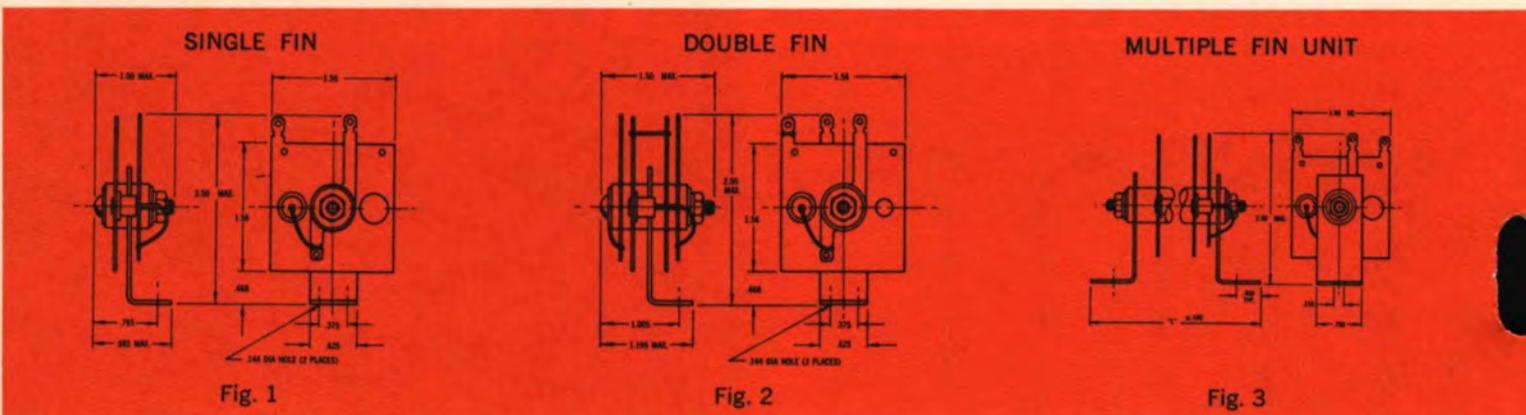


**MAXIMUM RATINGS**  
Resistive or Inductive Load

JEDEC Type	Int'l Type	RMS Input Voltage, Volts	DC Output Voltage, Volts	DC OUTPUT CURRENT		Fig. No.	Dimension "L" Inches
				at 25°C	at 150°C		
<b>Single Phase Half Wave</b>							
1N2638	66B1H1S2CS4	70	31	1.5	0.5	1	—
1N2641	66B1H1S2CU4	140	62	1.5	0.5	1	—
1N2644	66B1H1S2CV4	210	94	1.5	0.5	1	—
1N2647	66B1H1S2CW4	280	125	1.5	0.5	1	—
1N2650	66B2H1S2CV4	420	188	1.5	0.5	2	—
1N2653	66B2H1S2CW4	560	250	1.5	0.5	2	—
1N2656	66B3H1S2DW4	840	376	1.5	0.5	3	3.51
1N2659	66B4H1S2DW4	1120	500	1.5	0.5	3	3.96
1N2662	66B5H1S2DW4	1400	625	1.5	0.5	3	4.57
1N2664	66B6H1S2DW4	1680	750	1.5	0.5	3	4.56
1N2666	66B8H1S2DW4	2240	1000	1.5	0.5	3	5.50
1N2667	66B10H1S2DW4	2800	1250	1.5	0.5	3	6.51
1N2668	66B12H1S2DW4	3360	1500	1.5	0.5	3	7.02
<b>Single Phase Center Tap</b>							
1N2702	66B1C1S2CS4	70	31	3.0	1.0	2	—
1N2705	66B1C1S2CU4	140	62	3.0	1.0	2	—
1N2708	66B1C1S2CV4	210	94	3.0	1.0	2	—
1N2711	66B1C1S2CW4	280	125	3.0	1.0	2	—
1N2714	66B2C1S2DV4	420	188	3.0	1.0	3	3.51
1N2717	66B2C1S2DW4	560	250	3.0	1.0	3	3.51
1N2720	66B3C1S2DW4	840	376	3.0	1.0	3	4.49
1N2722	66B4C1S2DW4	1120	500	3.0	1.0	3	6.01
1N2723	66B5C1S2DW4	1400	625	3.0	1.0	3	6.54
1N2724	66B6C1S2DW4	1680	750	3.0	1.0	3	7.53

JEDEC Type	Int'l Type	RMS Input Voltage, Volts	DC Output Voltage, Volts	DC OUTPUT CURRENT		Fig. No.	Dimension "L" Inches
				at 25°C	at 150°C		
<b>Single Phase Bridge</b>							
1N2725	66B1B1S2DS4	70	62	3.0	1.0	3	3.51
1N2728	66B1B1S2DU4	140	125	3.0	1.0	3	3.51
1N2731	66B1B1S2DV4	210	188	3.0	1.0	3	3.51
1N2734	66B1B1S2DW4	280	250	3.0	1.0	3	3.51
1N2737	66B2B1S2DV4	420	376	3.0	1.0	3	5.00
1N2738	66B2B1S2DW4	560	376	3.0	1.0	3	5.00
1N2739	66B3B1S2DW4	840	750	3.0	1.0	3	6.48
<b>Single Phase Magnetic Amplifier Bridge</b>							
1N2750	66B1M1S2DS4	70	62	3.0	1.0	3	3.48
1N2753	66B1M1S2DU4	140	125	3.0	1.0	3	3.48
1N2756	66B1M1S2DV4	210	188	3.0	1.0	3	3.48
1N2759	66B1M1S2DW4	280	250	3.0	1.0	3	3.48
1N2762	66B2M1S2DV4	420	376	3.0	1.0	3	4.99
1N2763	66B2M1S2DW4	560	500	3.0	1.0	3	4.99
1N2764	66B3M1S2DW4	840	750	3.0	1.0	3	6.54
<b>Three Phase Bridge</b>							
1N2740	66B1T1S2DS4	70	93	3.6	1.2	3	4.48
1N2742	66B1T1S2DU4	140	188	3.6	1.2	3	4.48
1N2744	66B1T1S2DV4	210	283	3.6	1.2	3	4.48
1N2746	66B1T1S2DW4	280	376	3.6	1.2	3	4.48
1N2748	66B2T1S2DV4	420	575	3.6	1.2	3	6.54
1N2749	66B2T1S2DW4	560	750	3.6	1.2	3	6.54
<b>Three Phase Half Wave</b>							
1N2669	66B1S1S2DS4	70	46	3.6	1.2	3	3.49
1N2673	66B1S1S2DU4	140	93	3.6	1.2	3	3.49
1N2677	66B1S1S2DV4	210	140	3.6	1.2	3	3.49
1N2681	66B1S1S2DW4	280	186	3.6	1.2	3	3.49
1N2685	66B2S1S2DV4	420	280	3.6	1.2	3	4.51
1N2687	66B2S1S2DW4	560	370	3.6	1.2	3	4.51
1N2689	66B3S1S2DV4	630	420	3.6	1.2	3	5.48
1N2690	66B3S1S2DW4	840	556	3.6	1.2	3	5.48
1N2691	66B4S1S2DW4	1120	740	3.6	1.2	3	6.99
<b>Six Phase Star</b>							
1N2692	66B1U1S2DS4	70	46	7.2	2.4	3	5.50
1N2694	66B1U1S2DU4	140	93	7.2	2.4	3	5.50
1N2696	66B1U1S2DV4	210	141	7.2	2.4	3	5.50
1N2698	66B1U1S2DW4	280	188	7.2	2.4	3	5.50
1N2700	66B2U1S2DV4	420	283	7.2	2.4	3	7.51
1N2701	66B2U1S2DW4	560	376	7.2	2.4	3	7.51

For detailed data, request SR-330.



## STANDARD SELENIUM POWER RECTIFIER STACK ASSEMBLIES



Long a recognized leader in the development and production of high quality selenium rectifier stacks, International Rectifier today has the most dependable and versatile line of selenium rectifiers in the industry. In addition to Standard and High Voltage cells, IR offers Double Density Cells, with twice the current-handling capabilities of standard cells, and Triple Density Cells, providing 3 times higher current capabilities (see rating table below). Where cell size and bulk are important design parameters, Double and Triple Density Stacks offer significant savings in space and weight over standard cells. The stack coding table below is designed for rapid selection of the exact unit to fit your rectifying application. The stack code number "H2B2SDBGX" below indicates how a typical stack part number is composed, including the 9 optional mechanical and electrical features available.

### OPTIONAL MECHANICAL AND ELECTRICAL FEATURES AVAILABLE

Typical Stack Code → **H 2 B 2 S D B G X**

1	2	3	4	5	6	7	8	9
Cell Type	Number of Cells in Series per Arm	Type of Circuit (See Page 5)	Number of Cells in Parallel per Arm	Type of Spacing	Type of Finish	Type of Mounting	Reverse Voltage Rating	Type of Cell††
A B C  L D P  J F G H	Determined by RMS Voltage applied and Inverse Voltage Rating of Cells	Single Phase H—Half Wave B—Bridge C—Center Tap+ J—Center Tap— D—Doubler M—MAG Amp. Bridge  Three Phase S—Half Wave+ L—Half Wave— T—Bridge U—Center Tap Z—MAG Amp. Bridge* Y—MAG Amp. Bridge**	Determined by DC Current required and Cell Capacity	N—Narrow S—Standard W—Wide	D—Commercial Finish Standard Coating T—Military Finish Multiple Coating with Fungicide T2 } Special T3 } Military T4 } Finish#  # Available for severe environmental requirements.	A—Bolt, no Mtg. Bracket B—Stud, no Mtg. Bracket C—Bolt with One Mtg. Bracket D—Stud, Two Mtg. Brackets E—Eyelet	G— 26 Volt H— 30 Volt K— 33 Volt  L— 36 Volt M—140 Volt P—145 Volt	X—Standard and High Voltage D—Double Density T—Triple Density

\*6 AC Terminals, 2 DC Terminals. \*\*3 AC Terminals, 6 DC Terminals. †Available in Standard Density Cells only. ††High temperature cells also available for applications up to 125°C. Consult with factory.

### IR Standard, Double and Triple Density Cell Convection Cooled Rating, Amperes

Cell Type	Cell Size (Inches)	Half Wave			Full Wave Center Tap			Three Phase Triple Diametric			Three Phase Wye and Bridge			Three Phase Double Wye		
		Standard Density	Double Density	Triple Density	S.D. <sup>1</sup>	D.D. <sup>2</sup>	T.D. <sup>3</sup>	S.D. <sup>1</sup>	D.D. <sup>2</sup>	T.D. <sup>3</sup>	S.D. <sup>1</sup>	D.D. <sup>2</sup>	T.D. <sup>3</sup>	S.D. <sup>1</sup>	D.D. <sup>2</sup>	T.D. <sup>3</sup>
A	1 x 1	0.10	0.20	0.31	0.20	0.40	0.62	0.78	1.32	2.06	0.30	0.55	0.84	0.55	1.1	1.68
B	1¼ x 1¼	0.15	0.32	0.50	0.30	0.64	1.0	1.0	2.1	3.33	0.45	0.87	1.36	0.81	1.7	2.72
C	1½ x 1½	0.30	0.52	0.81	0.60	1.04	1.63	2.0	3.46	5.42	0.90	1.41	2.21	1.6	2.82	4.43
L	2 x 2	0.6	0.96	1.5	1.2	1.92	3.0	4.0	6.4	10.0	1.8	2.6	4.1	3.3	5.2	8.17
D	3 x 3	1.2	2.24	3.5	2.4	4.49	7.0	8.0	15.0	23.3	3.6	6.1	9.5	6.5	12.4	19.0
P	4 x 4	2.1	4.2	6.55	4.2	8.4	13.2	14.0	28.0	43.5	6.3	11.4	17.8	11.5	22.8	35.6
J	4¼ x 6	3.6	7.2	11.2	7.25	14.4	22.5	24.0	48.0	74.0	11.0	19.6	30.2	19.8	39.3	60.4
F	5 x 6	4.2	8.5	13.2	8.5	17.0	26.5	28.0	56.7	87.3	13.0	23.0	35.6	22.8	46.2	71.3
G	6 x 6	5.25	10.5	—	10.5	21.0	—	35.0	70.0	—	15.7	28.6	—	28.5	57.2	—
H	6¼ x 7¼	6.6	13.0	—	13.0	26.0	—	44.0	86.6	—	20.0	35.4	—	36.0	70.8	—

Note: Fan Cooled Standard Density Cell Ratings: up to 2½ times above standard cell ratings (based on 800-1000 LFM forced air cooling velocity).

1. "S.D." Standard Density. 2. "D.D." Double Density. 3. "T.D." Triple Density. For more detailed data, request SR-170.

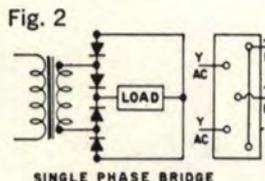
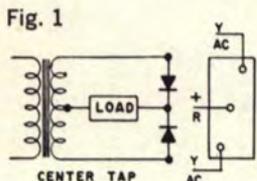
## SELENIUM RECTIFIER STACKS AND VOLTAGE SURGE PROTECTORS

### HVC\* Multiple Range Selenium Rectifier Stacks

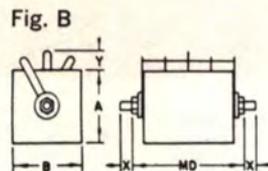
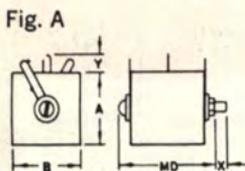
These High Voltage and Current\* rectifiers will deliver approximately twice the current output of standard selenium units. They possess high inverse voltage ratings and outstanding ability to handle temporary overloads.



Circuit and Connecting Diagrams



Diagrams of Dimensions

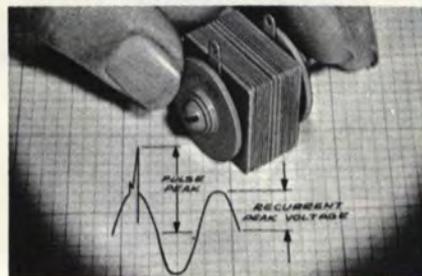


Rectifier Ratings and Dimensions\*

Type	Output		Max. Input AC Volts	Circuit & Connecting Diag. Fig.	Dimensions (Inches)						
	DC Volts	DC Amps			Fig.	A	B	MD*	X	Y	Stud
J14C04	0	0.4	36	1	A	1	1	1 1/8	3/8	1/4	8-32
J14C1	1.0	1.0	36	1	A	1 1/2	1 1/2	1 1/8	3/8	5/16	8-32
J14C5	to	4.8	36	1	A	3	3	1 1/8	3/8	3/8	3/8-16
J14C8	to	8.4	36	1	A	4	4	1 7/8	3/8	1 1/8	3/8-16
J14C17	14	17.0	36	1	A	6	5	2 1/8	3/8	1 1/4	3/8-16
J29B04	0	0.4	36	2	B	1	1	1 1/2	3/8	1/4	8-32
J29B1	1.0	1.0	36	2	B	1 1/2	1 1/2	1 1/2	3/8	5/16	8-32
J29B5	to	4.5	36	2	B	3	3	2 1/8	3/8	3/8	3/8-16
J29B8	to	8.4	36	2	B	4	4	2 1/8	3/8	1 1/8	3/8-16
J29B17	29	17.0	36	2	B	6	5	3 1/4	3/8	1 1/4	3/8-16
J58B04	0	0.4	72	2	B	1	1	2 1/4	3/8	1/4	8-32
J58B1	1.0	1.0	72	2	B	1 1/2	1 1/2	2 1/4	3/8	5/16	8-32
J58B5	to	4.5	72	2	B	3	3	4 1/8	3/8	3/8	3/8-16
J58B8	to	8.4	72	2	B	4	4	4 1/8	3/8	1 1/8	3/8-16
J58B17	58	17.0	72	2	B	6	5	5 1/8	3/8	1 1/4	3/8-16
J116B04	0	0.4	144	2	B	1	1	3 1/8	3/8	1/4	8-32
J116B1	1.0	1.0	144	2	B	1 1/2	1 1/2	3 1/8	3/8	5/16	8-32
J116B5	to	4.5	144	2	B	3	3	7 1/8	3/8	3/8	3/8-16
J116B8	to	8.4	144	2	B	4	4	7 1/8	3/8	1 1/8	3/8-16
J116B17	116	17.0	144	2	B	6	5	10 1/4	3/8	1 1/4	3/8-16
J135B04	0	0.4	180	2	B	1	1	4 1/8	3/8	1/4	8-32
J135B1	1.0	1.0	180	2	B	1 1/2	1 1/2	4 1/8	3/8	5/16	8-32
J135B5	to	4.5	180	2	B	3	3	8 1/8	3/8	3/8	3/8-16
J135B8	to	8.4	180	2	B	4	4	8 1/8	3/8	1 1/8	3/8-16
J135B17	135	17.0	180	2	B	6	5	12 1/8	3/8	1 1/4	3/8-16

\* For rectifier replacement information, request Cross Reference Guide JCR-100. For detailed data, request JB-508.

### Selenium 'Klip-Sel' Voltage Surge Protectors



Higher circuit reliability and lower circuit cost may be obtained through the use of these transient voltage suppressors in the protection of silicon power rectifier and controlled rectifier circuits. By limiting transients to a known value, they increase circuit reliability. Lower circuit cost is assured, since 'Klip-Sels' permit the use of silicon rectifiers and controlled rectifiers with lower peak reverse voltage ratings.

'Klip-Sels' are specially processed selenium cells which exhibit a change from high to very low impedance when the applied voltage exceeds a specified value. Units are available in polarized or non-polarized configurations, in stacked or cartridge assemblies. They have RMS input voltage ratings ranging from 25 up to 500 volts. (See Table I and II below) Max. Operating Temperature: 100°C.

TABLE I 'Klip-Sel' Surge Protector Coding

Polarization	No. Cells in Series (per leg)	Cell Size	Type of Mounting		Type of Finish	Clipping Voltage Symbol*
			A (bolt)	B (stud)		
K (Non-Polarized)	1 to 20 (Depending on Voltage to be Clipped)	V (1/4" D)	A (bolt)	B (stud)	D-Comm. Finish	H*
PK (Polarized)		A (1" sq.)	C (one bracket)	D (two brackets)		M*
		L (2" sq.)	P (cartridge-pigtail lead)			

NOTE: H cells to clip at 25 to 31 volt range; operate at 20 volts RMS max. per cell. M cells to clip at 37 to 45 volt range; operate at 26 volts RPM max. per cell.

TABLE II

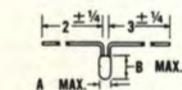
Approximate Assembly Dimensions			
Mounting dimensions may be estimated as follows:			
OPEN STACKS	Non-Polarized	Polarized	
'A' (1" Sq.) cells	No. cells x .060" ± 1"	No. cells x .060" ± .88"	
'L' (2" Sq.) cells	No. cells x .060" ± 1.25"	No. cells x .060" ± 1.13"	
CARTRIDGE ASSEMBLIES	Cells Per Stack Non-Polarized	Cells Per Stack Polarized	Case Length (in)
'V' (1/4" D) cells	2 cells (25V max.) 10 cells (125V max.) 16 cells (200V max.)	2 cells (30V max.) 10 cells (250V max.) 16 cells (400V max.)	9/16 7/8 1 1/4
'Z' (1/2" D) cells	4 cells (30V max.) 8 cells (100V max.) 20 cells (250V max.)	4 cells (100V max.) 8 cells (200V max.) 20 cells (500V max.)	5/8 7/8 1 5/8

For more detailed data, request SR-155

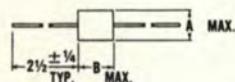
## SUBMINIATURE SELENIUM DIODES AND CONTACT PROTECTORS

### SELENIUM CONTACT PROTECTORS

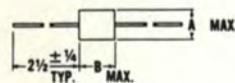
These highly reliable contact protectors are suitable for a large number of circuits. They are available in three physical configurations; encapsulated diode types, fibre tube cartridges and hermetically sealed cartridges.



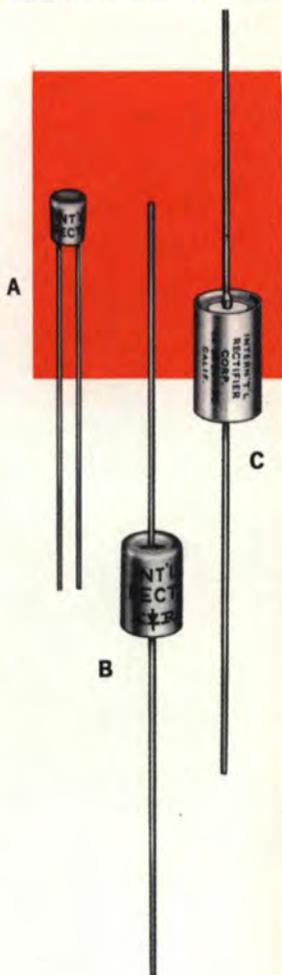
A - DIODE TYPE



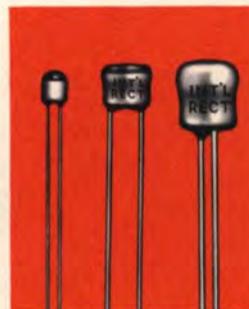
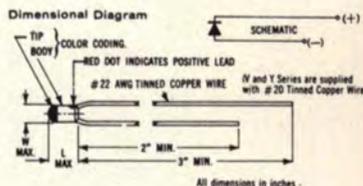
B - FIBRE CARTRIDGE TYPE



C - HERMETIC SEAL CARTRIDGE TYPE



### SUBMINIATURE SELENIUM DIODES



Typical Ratings, and Characteristics at 25°C

JETEC TYPE	INT'L TYPE	MAXIMUM RATINGS					MAXIMUM DIMENSIONS (INCHES)	
		RMS INPUT AC VOLTAGE (VOLTS)		RECTIFIED DC OUTPUT	SURGE, Ma (1 SEC.)	PRV VOLTS	W	L
		RES. LOAD	CAP. LOAD					
1N1625	1S1	33	20	250 $\mu$ a	5	48	.165	.225
1N1626	2S1	66	40	250 $\mu$ a	5	96	.165	.225
1N1625A	1T1	33	20	500 $\mu$ a	10	48	.165	.225
1N1626A	2T1	66	40	500 $\mu$ a	10	96	.165	.225
1N1627	1U1	33	20	3.75ma	80	48	.190	.265
1N1628	2U1	66	40	3.75ma	80	96	.190	.265
1N1629	3U1	99	60	3.75ma	80	144	.190	.265
1N1630	4U1	132	80	3.75ma	80	192	.265	.265
1N1631	5U1	165	100	3.75ma	80	240	.285	.265
1N1632	6U1	198	120	3.75ma	80	288	.345	.265
1N1633	7U1	231	140	3.75ma	80	336	.345	.265
1N1634	8U1	264	160	3.75ma	80	384	.345	.265
1N1635	1V1	33	20	12.5 ma	250	48	.320	.395
1N1636	2V1	66	40	12.5 ma	250	96	.320	.395
1N1637	3V1	99	60	12.5 ma	250	144	.360	.425
1N1638	4V1	132	80	12.5 ma	250	192	.395	.425
1N1639	5V1	165	100	12.5 ma	250	240	.395	.425
1N1640	1Y1	33	20	28 ma	550	48	.465	.525
1N1641	2Y1	66	40	28 ma	550	96	.465	.525
1N1642	3Y1	99	60	28 ma	550	144	.465	.525

For detailed data, request SR-163-A.

International Rectifier Part Number is stamped on body.

### AC Type Selenium Contact Protectors

WORKING VOLTS AC	MAX. COIL CURRENT (amp)	DIODE TYPE		FIBRE CARTRIDGE TYPE		HERMETIC SEAL CARTRIDGE TYPE	
		CODE NO.	DIMENSION A (MAX.) B	CODE NO.	DIMENSION A (MAX.) B	CODE NO.	DIMENSION A (MAX.) B
26	.20	S1V1D	.310 .470	S1V1P	.380 .620	S1V1H	.440 .860
52	.20	S2V2D	.360 .470	S2V2P	.380 .620	S2V2H	.440 .860
78	.20			S3V3P	.380 .620	S3V3H	.440 .860
104	.20			S4V4P	.380 .620	S4V4H	.440 .860
130	.20			S5V5P	.380 .620	S5V5H	.440 .860
156	.20			S6V6P	.380 .990	S6V6H	.440 1.190
26	.40	S1Y1D	.470 .550	S1Y1P	.500 .620	S1Y1H	.535 .860
52	.40			S2Y2P	.500 .620	S2Y2H	.535 .860
78	.40			S3Y3P	.500 .620	S3Y3H	.535 .860
104	.40			S4Y4P	.500 .620	S4Y4H	.535 .860
130	.40			S5Y5P	.500 .620	S5Y5H	.535 .860
156	.40			S6Y6P	.500 .990	S6Y6H	.535 1.190
26	.60			S1Z1P	.640 .620	S1Z1H	.700 .860
52	.60			S2Z2P	.640 .620	S2Z2H	.700 .860
78	.60			S3Z3P	.640 .620	S3Z3H	.700 .860
104	.60			S4Z4P	.640 .620	S4Z4H	.700 .860
130	.60			S5Z5P	.640 .620	S5Z5H	.700 .860
156	.60			S6Z6P	.640 .990	S6Z6H	.700 1.190
26	.90			S1X1P	1.060 .620	S1X1H	1.090 .860
52	.90			S2X2P	1.060 .620	S2X2H	1.090 .860
78	.90			S3X3P	1.060 .620	S3X3H	1.090 .860
104	.90			S4X4P	1.060 .620	S4X4H	1.090 .860
130	.90			S5X5P	1.060 .620	S5X5H	1.090 .860
156	.90			S6X6P	1.060 .990	S6X6H	1.090 1.192
26	1.2			S1W1P	1.380 .620	S1W1H	1.420 .860
52	1.2			S2W2P	1.380 .620	S2W2H	1.420 .860
78	1.2			S3W3P	1.380 .620	S3W3H	1.420 .860
104	1.2			S4W4P	1.380 .620	S4W4H	1.420 .860
130	1.2			S5W5P	1.380 .620	S5W5H	1.420 .860
156	1.2			S6W6P	1.380 .990	S6W6H	1.420 1.192

For detailed data, request SR-150.

### DC Type Selenium Contact Protectors

WORKING VOLTS DC	MAX. COIL CURRENT (amp)	DIODE TYPE		FIBRE CARTRIDGE TYPE		HERMETIC SEAL CARTRIDGE TYPE	
		CODE NO.	DIMENSION A (MAX.) B	CODE NO.	DIMENSION A (MAX.) B	CODE NO.	DIMENSION A (MAX.) B
15	.22	S1V1D	.310 .470	S1V1P	.380 .620	S1V1H	.440 .860
23	.44	S2V1D	.350 .470	S2V1P	.380 .620	S2V1H	.440 .860
45	.66	S3V1D	.400 .470	S3V1P	.380 .620	S3V1H	.440 .860
67	.88			S4V2P	.380 .620	S4V2H	.440 .860
89	1.10			S5V2P	.380 .620	S5V2H	.440 .860
111	1.32			S6V2P	.380 .620	S6V2H	.440 .860
133	1.54			S7V2P	.380 .620	S7V2H	.440 .860
15	.22	S1Y1D	.470 .550	S1Y1P	.500 .620	S1Y1H	.535 .860
23	.44	S2Y1D	.470 .550	S2Y1P	.500 .620	S2Y1H	.535 .860
45	.66			S3Y2P	.500 .620	S3Y2H	.535 .860
67	.88			S4Y2P	.500 .620	S4Y2H	.535 .860
89	1.10			S5Y2P	.500 .620	S5Y2H	.535 .860
111	1.32			S6Y2P	.500 .620	S6Y2H	.535 .860
133	1.54			S7Y2P	.500 .620	S7Y2H	.535 .860
15	.22			S1Z1P	.640 .620	S1Z1H	.700 .860
23	.44			S2Z1P	.640 .620	S2Z1H	.700 .860
45	.66			S3Z2P	.640 .620	S3Z2H	.700 .860
67	.88			S4Z2P	.640 .620	S4Z2H	.700 .860
89	1.10			S5Z2P	.640 .620	S5Z2H	.700 .860
111	1.32			S6Z2P	.640 .620	S6Z2H	.700 .860
133	1.54			S7Z2P	.640 .620	S7Z2H	.700 .860
15	.22			S1X1P	1.060 .620	S1X1H	1.090 .860
23	.44			S2X1P	1.060 .620	S2X1H	1.090 .860
45	.66			S3X2P	1.060 .620	S3X2H	1.090 .860
67	.88			S4X2P	1.060 .620	S4X2H	1.090 .860
89	1.10			S5X2P	1.060 .620	S5X2H	1.090 .860
111	1.32			S6X2P	1.060 .620	S6X2H	1.090 .860
133	1.54			S7X2P	1.060 .620	S7X2H	1.090 .860
15	.22			S1W1P	1.380 .620	S1W1H	1.420 .860
23	.44			S2W1P	1.380 .620	S2W1H	1.420 .860
45	.66			S3W2P	1.380 .620	S3W2H	1.420 .860
67	.88			S4W2P	1.380 .620	S4W2H	1.420 .860
89	1.10			S5W2P	1.380 .620	S5W2H	1.420 .860
111	1.32			S6W2P	1.380 .620	S6W2H	1.420 .860
133	1.54			S7W2P	1.380 .620	S7W2H	1.420 .860

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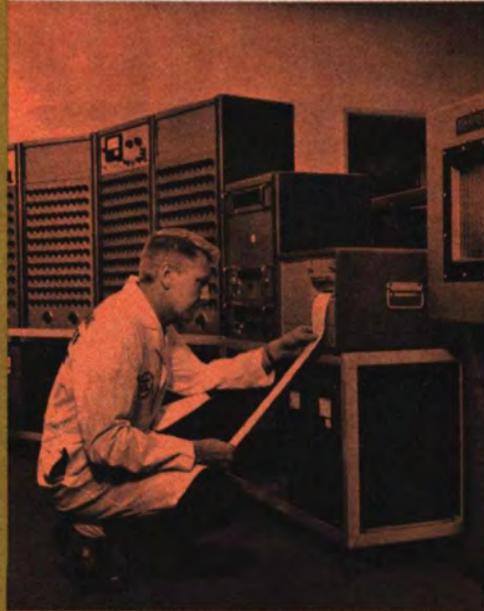
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