

MICROSEMICONDUCTOR CORP./U.S.A.

SILIZIUM MIKRO GLEICHRICHTER

Die neuen Mikrogleichrichter wurden zum Einsatz in Geräten der Industrie-, Flug- und Raumfahrt-elektronik mit geringem Platzbedarf entwickelt. Das hermetisch dichte Mikro-Gehäuse in Verbindung mit der direkten, whiskerlosen Kontaktierung des passivierten Siliziumkristalls garantiert eine besonders hohe Zuverlässigkeit. Die Mikroioden erfüllen bzw. überschreiten die Forderungen von MIL-S-19500 und MIL-STD-750. Spezialtypen mit garantierten Rekombinationszeiten $< 20 \text{ nsek}$ bzw. $< 200 \text{ nsek}$. und einer Belastbarkeit mit Strömen bis 2 A finden Sie auf Datenblatt TD HL 22.

ELEKTRISCHE DATEN (wenn nicht anders angegeben $T_u = 25^\circ\text{C}$)

Typ	Spitzen-Sperr-Spannung V	Maximaler Richtstrom (Anm. 1)		Maximaler Sperrstrom (bei Spitzen-Sperrspannung)		Durchlass-Strom bei + 1V A	Stoss-Strom 1 Periode Scheitelwert A
		bei 25°C A	bei 100°C A	bei 25°C μA	bei 100°C μA		
1N 4245	200	3,0	2,0	1	20	1	25
1N 4246	400	3,0	2,0	1	20	1	25
1N 4247	600	3,0	2,0	1	20	1	25
1N 4248	800	3,0	2,0	1	20	1	25
1N 4249	1000	3,0	2,0	1	20	1	25
1N 3611	200	2,0	1,0	1	75	1	20
1N 3612	400	2,0	1,0	1	75	1	20
1N 3613	600	2,0	1,0	1	75	1	20
1N 3614	800	2,0	1,0	1	75	1	20
1N 3957	1000	2,0	1,0	1	75	1	20
1N 3981	200	2,0	1,0	10	100	0,9	30
1N 3982	400	2,0	1,0	10	100	0,9	30
1N 3983	600	2,0	1,0	10	100	0,9	30
MB 228	100	2,0	1,0	0,025	5	1	25
MB 229	200	2,0	1,0	0,025	5	1	25
MB 230	300	2,0	1,0	0,025	5	1	25
MB 231	400	2,0	1,0	0,025	5	1	25
MB 232	500	2,0	1,0	0,025	5	1	25
MB 233	600	2,0	1,0	0,025	5	1	25
MB 234	800	2,0	1,0	0,025	5	1	25
MB 235	1000	2,0	1,0	0,025	5	1	25
MB 236	100	1,5	0,75	0,2	15	0,8	25
MB 237	200	1,5	0,75	0,2	15	0,8	25
MB 238	300	1,5	0,75	0,2	15	0,8	25
MB 239	400	1,5	0,75	0,2	15	0,8	25
MB 240	500	1,5	0,75	0,2	15	0,8	25
MB 241	600	1,5	0,75	0,2	15	0,8	25
MB 242	800	1,5	0,75	0,2	15	0,8	25
MB 243	1000	1,5	0,75	0,5	50	0,8	25
MB 244	100	1,0	0,5	1,0	75	0,6	20
MB 245	200	1,0	0,5	1,0	75	0,6	20
MB 246	300	1,0	0,5	1,0	75	0,6	20
MB 247	400	1,0	0,5	1,0	75	0,6	20
MB 248	500	1,0	0,5	1,0	75	0,6	20
MB 249	600	1,0	0,5	1,0	75	0,6	20
MB 250	800	1,0	0,5	1,0	75	0,6	20
MB 251	1000	1,0	0,5	1,0	75	0,6	20

Anmerkung 1: Dieser Wert gilt bei Montage an Lötstützpunkten ($1,5 \text{ mm } \varnothing \times 9 \text{ mm}$ Höhe, 12 mm Abstand) in freier Luft. Bei den Typen "MB" kann die Belastbarkeit bei Gebläsekühlung mit mindestens $1,5 \text{ m/sek}$. Luftgeschwindigkeit um 50% erhöht werden.

Anmerkung 2: Bei einer Durchlassspannung von 1,2 V

TD HL 23
Mai 1968

1N 3611

bis

1N 3614

1N 3656

bis

1N 3658

1N 3957

1N 3981

bis

1N 3983

1N 4245

bis

1N 4249

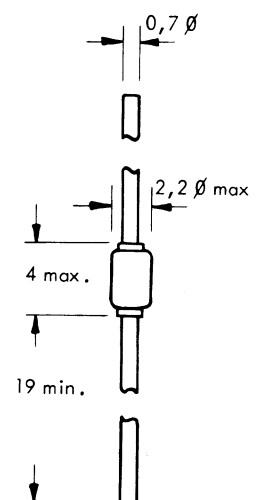
MB 228

bis

MB 277

SILIZIUM
MIKRO
LEISTUNGS
GLEICHRICHTER

ABMESSUNGEN



BITTE WENDEN

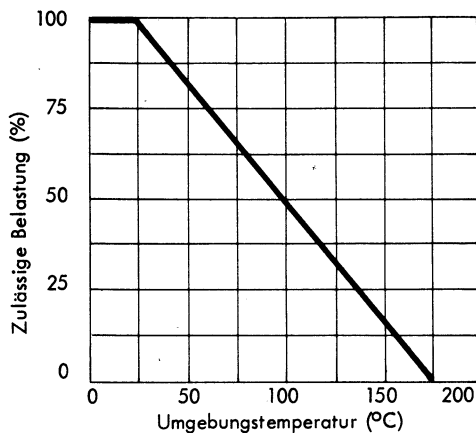
ELEKTRISCHE DATEN (wenn nicht anders angegeben $T_u = 25^\circ\text{C}$)

Typ	Spitzen- Sperr- Spannung V	Maximaler Richtstrom (Anm. 1)		Maximaler Sperrstrom (bei Spitzen- Sperrspannung)		Durchlass- Strom bei + 1V mA	Stoss-Strom 1 Periode Scheitelwert A	Elektrisch gleicher Standard Typ
		bei 25°C mA	bei 100°C mA	bei 25°C μA	bei 100°C μA			
MB252	225	750	375	0.2	15	400	15	1N645
MB253	300	750	375	0.2	15	400	15	1N646
MB254	400	750	375	0.2	15	400	15	1N647
MB255	500	750	375	0.2	15	400	15	1N648
MB256	600	750	375	0.2	15	400	15	1N649
MB257	100	500	250	1.0	60	200	10	1N676
MB258	100	750	375	1.0	60	400	15	1N677
MB259	200	500	250	1.0	60	200	10	1N678
MB260	200	750	375	1.0	60	400	15	1N679
MB261	300	500	250	1.0	60	200	10	1N681
MB262	300	750	375	1.0	60	400	15	1N682
MB263	400	500	250	1.0	60	200	10	1N683
MB264	400	750	375	1.0	60	400	15	1N684
MB265	500	500	250	1.0	60	200	10	1N685
MB266	500	750	375	1.0	60	400	15	1N686
MB267	600	500	250	1.0	60	200	10	1N687
MB268	600	750	375	1.0	60	400	15	1N689
1N3656	200	750	375	2.0	75	500	15	-
1N3657	400	750	375	2.0	75	500	15	-
1N3658	600	750	375	2.0	75	500	15	-
MB269	50	750	375	2.0	75	500	15	1N536
MB270	100	750	375	2.0	75	500	15	1N537
MB271	200	750	375	2.0	75	500	15	1N538
MB272	300	750	375	2.0	75	500	15	1N539
MB273	400	750	375	2.0	75	500	15	1N540
MB274	500	750	375	2.0	75	500	15	1N1095
MB275	600	750	375	2.0	75	500	15	1N1096
MB276	800	750	375	2.0	75	500	15	-
MB277	1000	750	375	2.0	75	500	15	-

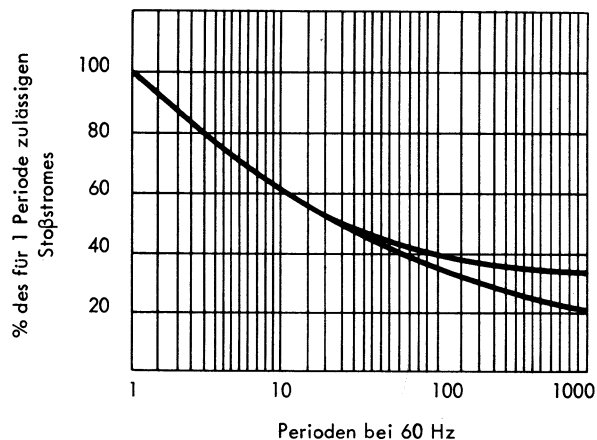
Anmerkung 1: Dieser Wert gilt bei Montage an Lötstützpunkten ($1,5 \text{ mm } \varnothing \times 9 \text{ mm}$ Höhe, 12 mm Abstand) in freier Luft. Bei den Typen "MB" kann die Belastbarkeit bei Gebläsekühlung mit mindestens $1,5 \text{ m/sec.}$ Luftgeschwindigkeit um 50% erhöht werden.

Anmerkung 2: Bei einer Durchlassspannung von 1,2 V

REDUKTIONSKURVE



MAX. ZULÄSSIGER STOSSSTROM





MICROSEMICONDUCTOR CORPORATION

11250 PLAYA COURT • CULVER CITY, CALIFORNIA
TELEPHONE EX 1-8271 • UP 0-2974 Area Code 213
TWX 510 343 6470

BULLETIN 605

MICRO SIZE

MACRO RELIABILITY

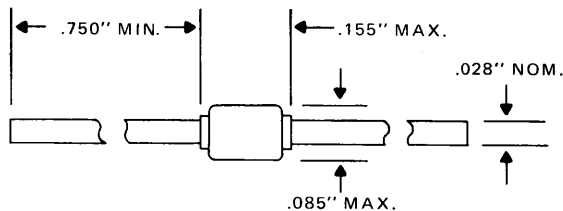
1.5 WATT MICROMINIATURE ZENER GLASS DIODES

MicroSemiconductor's family of 1.5 Watt microminiature zener diodes was developed specifically for microcircuitry and other applications where space limitations and/or high performance requirements are of prime concern. The combination of outstanding performance characteristics with a micro package provides a perfect match with the stringent demands of Space Age circuitry.

NEW FEATURES

Reverse Current, Small Signal Breakdown Impedance and Breakdown Voltage Regulation are high performance characteristics which are conventionally specified. Reverse current limits can be specified at levels less than $.025 \mu\text{Adc}$ at 80% of zener voltage at 25°C .

MECHANICAL OUTLINE



Package: Double hermetically sealed glass

Leads: Gold plated copper

Marking: Alpha-numerical with JEDEC number, using high temperature tape affixed to the body of the diode/color bands.

Polarity: Indicated by diode symbol/cathode stripe.

NOTE: The diode may be mounted in any position.

The Micro package enables direct replacement of most lower rated regulators. This package is smaller than most .25 Watt packages. Circuit package redesign is unnecessary to gain the safety advantage associated with the high power rating. With proper design of heatsink mounting, power dissipation greater than 4 Watts is allowable.

The weaknesses associated with the typical thin oxide passivation are eliminated by the thick, true mixed glass passivation developed by MicroSemiconductor and applied to this family of devices. Totally stable operation at temperatures above 200°C is now attainable since the device surface is removed as a performance limiting factor.

DESIGN AND CONSTRUCTION

Double device protection is provided by the thick hard glass surface passivation and the hard glass-to-metal hermetic seal of the Micro package. An inert atmosphere in the extremely small space between the two glass walls precludes the trapping of potentially dangerous contaminants.

The bond between the silicon die and the two heat sinking terminal studs results in very low thermal impedance. In 25°C free air with normal mounting, this package has demonstrated capability of dissipating 3 Watts.

Without the usual "whisker" and with a reduced number of component parts reliability is enhanced. Extremely high levels of mechanical shock, vibration and acceleration are withstood easily by this construction.

Assembly in present and future microcircuit applications is made easy by the axial leaded Micro package. Many different lead materials are available upon request.

ING. ERICH SOMMER
Elektronik-Ges. m. b. H.
6 Frankfurt/Main
Tel. 43-74 (0511) 550288
21. 3. 73

MAXIMUM RATINGS

Storage Temperature -65° C to 200° C
Operating Temperature -65° C to 175° C

Power Dissipation: -1.5 Watts @ 30° C Air
Ambient - see Power Nomograph for maximum allowable power dissipation versus heat sinking conditions.

ELECTRICAL SPECIFICATIONS

Type	Nominal Zener Voltage ± 5% Tol. Note (1)	Test Current	Maximum Dynamic Resistance Note (2)		Maximum Reverse Current @ 25° C * Note (3)			Voltage Regulation Note (4)	Maximum Zener Current Note (5)	Maximum Reverse Surge Current Note (6)
	$V_z @ I_{zt}$	I_{zt}	$Z_{zt} @ I_{zt}$	$Z_{zk} @ I_{zk}$	I_{zk}	$I_R @ V_R$	V_R	V_z	I_{zm}	I_R
	volts	mA	ohms	ohms	mA	μA	volts	volts	mA	mA
1N4460	6.2	40.0	4	200	1.0	20.0	3.72	.35	230	1540
1N4461	6.8	37.0	2.5	200	1.0	5.0	4.08	.30	210	1480
1N4462	7.5	34.0	2.5	400	.5	1.0	4.50	.35	191	1360
1N4463	8.2	31.0	3	400	.5	.5	4.92	.40	174	1200
1N4464	9.1	28.0	4	500	.5	.3	5.46	.45	157	1080
1N4465	10.0	25.0	5	500	.25	.5	8.00	.50	143	960
1N4466	11.0	23.0	6	550	.25	.3	8.80	.55	130	840
1N4467	12.0	21.0	7	550	.25	.2	9.60	.60	119	800
1N4468	13.0	19.0	8	550	.25	.1	10.40	.65	110	740
1N4469	15.0	17.0	9	600	.25	.05	12.00	.75	95	640
1N4470	16.0	15.5	10	600	.25	.05	12.80	.80	90	600
1N4471	18.0	14.0	11	650	.25	.05	14.40	.83	79	520
1N4472	20.0	12.5	12	650	.25	.05	16.00	.95	71	480
1N4473	22.0	11.5	14	650	.25	.05	17.60	1.00	65	420
1N4474	24.0	10.5	16	700	.25	.05	19.20	1.10	60	400
1N4475	27.0	9.5	18	700	.25	.05	21.60	1.30	53	340
1N4476	30.0	8.5	20	750	.25	.05	24.00	1.40	48	320
1N4477	33.0	7.5	25	800	.25	.05	26.40	1.50	43	300
1N4478	36.0	7.0	27	850	.25	.05	28.80	1.70	40	260
1N4479	39.0	6.5	30	900	.25	.05	31.20	1.80	37	220
1N4480	43.0	6.0	40	950	.25	.05	34.40	1.90	33	200
1N4481	47.0	5.5	50	1000	.25	.05	37.60	2.10	30	190
1N4482	51.0	5.0	60	1100	.25	.05	40.80	2.30	28	180
1N4483	56.0	4.5	70	1300	.25	.05	44.80	2.50	26	170
1N4484	62.0	4.0	80	1500	.25	.05	49.60	2.70	23	150
1N4485	68.0	3.7	100	1700	.25	.05	54.40	3.00	21	140
1N4486	75.0	3.3	130	2000	.25	.05	60.00	3.30	19	126
1N4487	82.0	3.0	160	2500	.25	.05	65.60	3.60	17	116
1N4488	91.0	2.8	200	3000	.25	.05	72.80	4.00	16	100
1N4489	100.0	2.5	250	3100	.25	.05	80.00	4.40	14.0	90
1N4490	110.0	2.3	300	4000	.25	.05	88.0	5.0	13.	83
1N4491	120.0	2.0	400	4500	.25	.05	96.0	5.5	12.	80
1N4492	130.0	1.9	500	5000	.25	.05	104.0	6.0	11.	69
1N4493	150.0	1.7	700	6000	.25	.05	120.0	7.0	9.5	57
1N4494	160.0	1.6	1000	6500	.25	.05	128.0	8.0	8.9	54
1N4495	180.0	1.4	1300	7000	.25	.05	144.0	10.0	7.9	49
1N4496	200.0	1.2	1500	8000	.25	.05	160.0	12.0	7.2	46

* Upon request, units can be supplied with a 50% decrease in indicated reverse current.

NOTES

Note (1) - Zener Voltage (V_Z)

The zener voltage is measured with the junction of the diode at thermal equilibrium and in an air ambient of 25° C. The leads of the regulator are to be held by heat sinks 3/8" from the body of the device.

Note (2) - Dynamic Resistance (Z_{zt} and Z_{zk})

The dynamic resistance is derived from the A. C. voltage by superimposing an A. C. current (60 cycles) having an RMS value of 10% of the D. C. current on the D. C. test current.

Note (3) - Reverse Current (I_R)

The reverse current is measured at the applied reverse voltage (V_R). For zener voltages above 10 volts, the reverse current is measured at 80% of the zener nominal voltage indicated.

Note (4) - Voltage Regulation (ΔV_Z)

The zener voltage regulation factor is determined by measuring the voltage at 10% of the maximum specified zener current (I_{ZM}). The zener current is then increased to a value of 50% of the maximum specified zener current (I_{ZM}) and maintained at this level for a period of 90 seconds. The change in zener voltage when the current is varied from the 10% to the 50% level shall not exceed the maximum value indicated for the given regulator type. During this measurement the leads are heat sunk 3/8" from the body in free air and at 25° C.

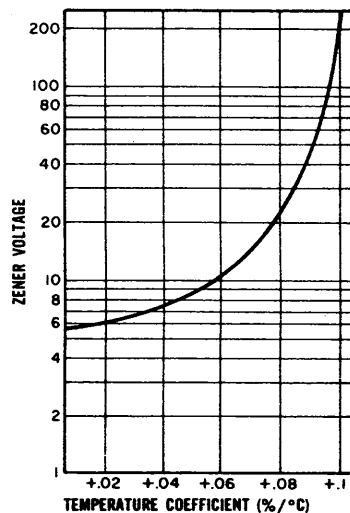
Note (5) - Maximum Zener Current (I_{ZM})

The maximum zener current indicated is calculated for a wattage dissipation of 1.5 Watts. This value of zener current has been chosen for the purpose of standardization of the voltage regulation specification. The maximum allowable zener current for various conditions of heat sinking can be calculated using the Power Nomograph to determine the maximum allowable power dissipation under a given condition of operation.

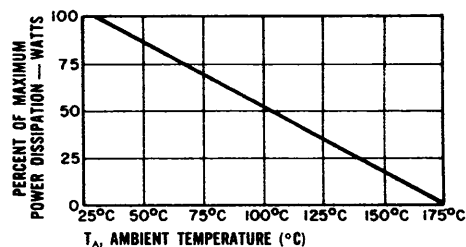
Note (6) - Maximum Reverse Surge Current (I_{Rt})

The maximum recurrent surge current is applied in the reverse region while the regulator is operating at the specified test current (I_{zt}) for the specific device. The wave shape is a 1/2 sine wave or equivalent square wave of 1/120 second duration.

TYPICAL TEMPERATURE
COEFFICIENT CHARACTERISTICS



POWER TEMPERATURE DERATING CURVE



The MicroSemiconductor Corporation 1.5 Watt zener regulator (1N4460-1N4496) will replace any zener regulator that has a wattage rating of 1.5 watts or less within zener voltage breakdown of 6.8 to 200.0 volts, including aluminum can units, epoxies or other glass units. Here are some of the JEDEC types it will replace and outperform:

150 mW	250 mW	250 mW	250 mW	400 mW	500 mW	750 mW	1 Watt	1 Watt	1 Watt	1.5 Watt
1N1313	1N710	1N764	1N4099	1N957	1N5235	1N3675	1N1767	1N3016	1N4735	1N3785
through	through	through	through	through	through	through	through	through	through	through
1N1327	1N745	1N769	1N4135	1N992	1N5281	1N3703	1N1802	1N3051	1N4764	1N3820

NOMOGRAPH FOR DETERMINING MAXIMUM ALLOWABLE ZENER POWER

LEAD LENGTH
FROM BODY
INCHES

0.750
0.725
0.700
0.675
0.650
0.625
0.600
0.575
0.550
0.525
0.500
0.475
0.450
0.425
0.400
0.375
0.350
0.325
0.300
0.275
0.250

This nomograph allows the designer to accurately relate the maximum power dissipation in the zener diode to the major parameters that could affect it:

Example: The diode is mounted between two heatsinks, .690" apart. The heatsink temperature at the point in which the lead enters is found to be 50° C. It is now a simple matter to find the maximum power which could be dissipated in the zener diode.

1. Determine L: $2L = .690"$
(diode body length)
 $L = .300"$

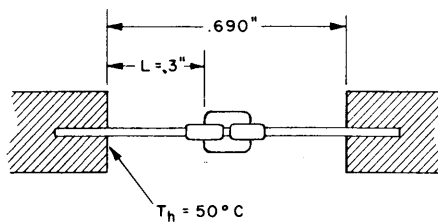
2. Align the .300 point on the L scale with the 50° C point on the T_h scale. Read on the same alignment on the W scale:
 $W = 3.3 \text{ Watts}$

HEAT SINK
TEMPERATURE
°C

25
35
45
55
65
75
85
95
105
115
120
125
130
135
140
145
150
155
160

MAXIMUM POWER
ALLOWABLE
WATTS

4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.90
0.80
0.70
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.23
0.22



LEGEND

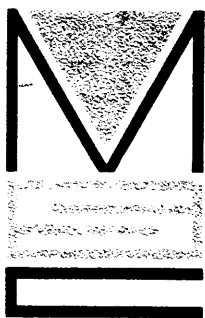
L = Length of one lead

T_h = Temperature of the heatsink at the point of lead entry

PRICES

Type	1-99 pieces	100-999 pieces	Terms: Net 30 days
1N4460 - 1N4488	3.55 each	2.73 each	FOB Culver City, California 90230
1N4489 - 1N4500	4.32 "	3.33 "	

Prices not valid for Export



MICROSEMICONDUCTOR CORPORATION

11200 PLAYS COURT - CULVER CITY, CALIFORNIA
TELEPHONE EX 1-8271 - UP 0-2974 Area Code 213
FAX 213-343-6470

BULLETIN 606
MICRO SIZE
MACRO RELIABILITY
1N5063 - 1N5117

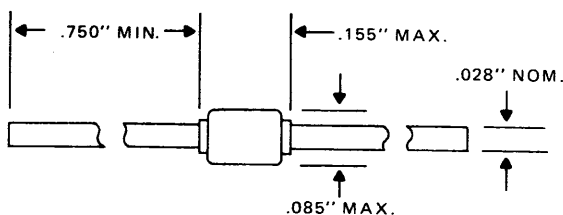
3 WATT MICROMINIATURE ZENER GLASS DIODES

MicroSemiconductor's family of 3 Watt microminiature zener diodes was developed specifically for microcircuitry and other applications where space limitations and/or high performance requirements are of prime concern. The combination of outstanding performance characteristics with a micro package provides a perfect match with the stringent demands of Space Age circuitry.

NEW FEATURES

Reverse Current, Small Signal Breakdown Impedance and Breakdown Voltage Regulation are high performance characteristics which are conventionally specified. Reverse current limits can be specified at levels less than $.025 \mu\text{A}_{dc}$ at 85% of zener voltage at 25°C .

MECHANICAL OUTLINE



Package: Double hermetically sealed glass

Leads: Tin dipped copper

Marking: Alpha-numerical with JEDEC number, using high temperature tape affixed to the body of the diode/color bands.

Polarity: Indicated by diode symbol/cathode stripe.

NOTE: The diode may be mounted in any position.

The Micro package enables direct replacement of most lower rated regulators. This package is smaller than most .25 Watt packages. Circuit package redesign is unnecessary to gain the safety advantage associated with the high power rating.

The weaknesses associated with the typical thin oxide passivation are eliminated by the thick, true mixed glass passivation developed by MicroSemiconductor and applied to this family of devices. Totally stable operation at temperatures above 200°C is now attainable since the device surface is removed as a performance limiting factor.

DESIGN AND CONSTRUCTION

Double device protection is provided by the thick hard glass surface passivation and the hard glass-to-metal hermetic seal of the Micro package. An inert atmosphere in the extremely small space between the two glass walls precludes the trapping of potentially dangerous contaminants.

The bond between the silicon die and the two heat sinking terminal studs results in very low thermal impedance. In 25°C free air with normal mounting, this package has demonstrated capability of dissipating 3 Watts.

Without the usual "whisker" and with a reduced number of component parts reliability is enhanced. Extremely high levels of mechanical shock, vibration and acceleration are withstood easily by this construction.

Assembly in present and future microcircuit applications is made easy by the axial leaded Micro package. Many different lead materials are available upon request.

ING. ERICH SOMMER
ELEKTRONIK-GMBH
6 FRANKFURT/M. 1
JAHNSTRASSE 43

TABLE 1

The purpose of these tables is to give additional information on our Zener characteristics, including reverse leakage just before the knee, variation of zener voltage at different current levels, and variation of zener impedance - with change in operating current.

The leakage current is measured at 85% of the minimum voltage of a type. For instance, a 10 volt $\pm 10\%$ zener has a V_Z minimum of 9.0 volts, and 85% of this is 7.6 volts. A short cut would be to multiply the nominal voltage by 76%.

Table I shows the prime parameters under 3 watt rated conditions.

Table II shows the change in zener voltage as current is varied. At the top of each column is a multiple of our test current (1.33 I_Z , for example). This indicates the current at which the voltage is obtained. For example, for the 30 volt MZ830, the typical change in voltage from nominal to .33 I_Z is 0.6 volts. Just subtract 29.4 from 30.0. The test current is .33 x 25 mA, or 8.3 mA.

Another point - notice that we call the 750 mW column the 3.0 watt test current. This is because industry practice is to test at a current corresponding to 1/4 of power rating.

Table II also gives changes in zener impedance (Z_Z) with test current. Referring to it, you will notice how Z_Z increases as current decreases. For example, the 10 volt MZ810 goes from 4 ohms at 75 mA to 40 ohms at 6.2 mA (.083 x 75 mA) and to 500 ohms at 250 mA.

NOTES

** Measured with 35 millisecond pulse.

* For ordering 5% voltage tolerance, change the first numeral of type number from 8 to 7 (the MZ806 becomes MZ706) or from 2 to 1 (MZ210 becomes MZ110).

* For ordering 20% voltage tolerance, change the first numeral of type number from 8 to 9 (MZ806 becomes MZ906) or from 2 to 3 (MZ210 becomes MZ310).

(1) These ratings apply when diodes are mounted on turret terminals (.060" x 3/8" high) on 1/2" centers.

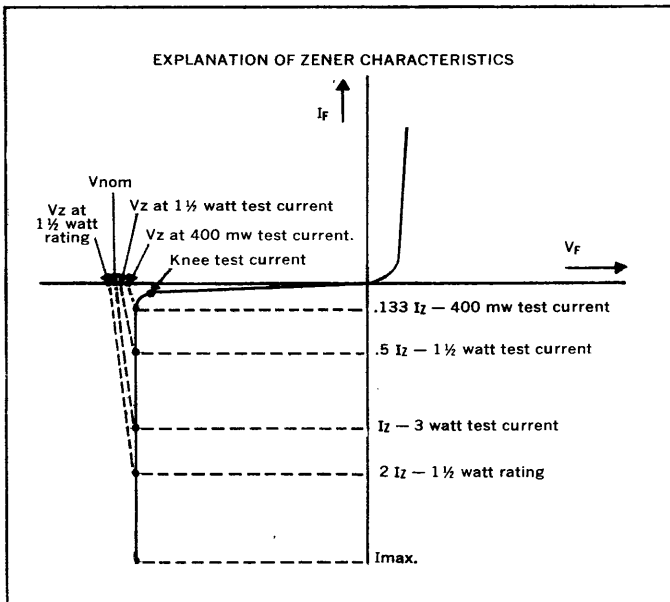
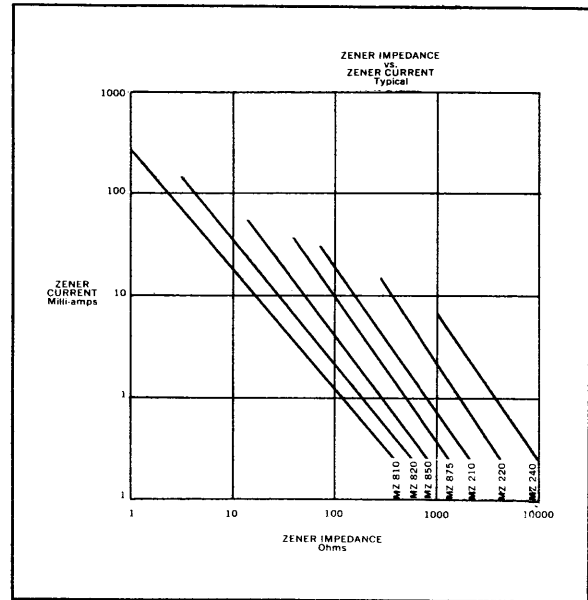
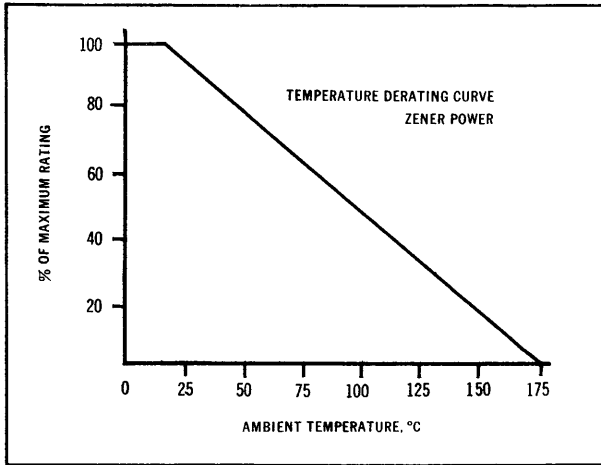
(2) Zener Impedance is derived from the 60-cycle AC voltage created when AC current with RMS value of 10% of DC zener test current is superimposed on the test current.

(3) Figures shown are for a peak sinusoidal surge current of 8.3 msec. duration using 60-

MSC Type ± 10% Tolerance* and JEDEC Type ± 5% Tolerance	Industry Equiva- lent	ELECTRICAL CHARACTERISTICS AT 3 WATT LEVEL						
		Nom. Voltage @ 3 Watt Test Current * *	Max. Continuous Current (1)	Leakage Current	3. 0 Watt Test Current	Zener Impedance @ 3.0 Watt Test Current (2)	Tempera- ture Coeff. @ 3. 0 Watt Test Current	Breakdown Voltage Regulation
MZ806	UZ806	6.8	440	500	75	2	.04	0.7
IN5063		6.8	440	500	75	2	.04	0.7
MZ807	UZ807	7.5	400	300	75	2	.04	0.7
IN5064		7.5	400	300	75	2	.04	0.7
MZ808	UZ808	8.2	360	200	75	3	.05	0.7
IN5065		8.2	360	200	75	3	.05	0.7
MZ809	UZ809	9.1	330	100	75	3	.05	0.7
IN5066		9.1	330	100	75	3	.05	0.7
MZ810	UZ810	10.0	300	40	75	4	.06	0.7
IN5067		10.0	300	40	75	4	.06	0.7
MZ811		11.0	275	25	70	5	.07	0.7
IN5068		11.0	275	25	70	5	.07	0.7
MZ812	UZ812	12.0	250	10	65	5	.07	0.7
MZ813	UZ813	13.0	230	10	50	6	.07	0.7
IN5069		13.0	230	10	50	6	.07	0.7
MZ814	UZ814	14.0	210	10	50	6	.07	0.7
IN5070		14.0	210	10	50	6	.07	0.7
MZ815	UZ815	15.0	200	10	50	6	.07	0.8
IN5071		15.0	200	10	50	6	.07	0.8
MZ816	UZ816	16.0	185	5	50	7	.07	0.9
IN5072		16.0	185	5	50	7	.07	0.9
MZ818	UZ818	18.0	170	5	40	8	.08	1.0
IN5073		18.0	170	5	40	8	.08	1.0
MZ820	UZ820	20.0	150	5	40	9	.08	1.4
MZ822	UZ822	22.0	135	5	30	10	.08	1.8
IN5074		22.0	135	5	30	10	.08	1.8
MZ824	UZ824	24.0	125	5	30	10	.08	2.0
IN5075		24.0	125	5	30	10	.08	2.0
MZ827	UZ827	27.0	110	1	25	12	.09	2.0
IN5076		27.0	110	1	25	12	.09	2.0
MZ830	UZ830	30.0	100	1	25	15	.09	2.5
IN5077		30.0	100	1	25	15	.09	2.5
MZ833	UZ833	33.0	90	1	20	21	.09	2.8
IN5078		33.0	90	1	20	21	.09	2.8
MZ836	UZ836	36.0	85	1	20	21	.09	3.0
IN5079		36.0	85	1	20	21	.09	3.0
MZ839		39.0	80	1	20	27	.095	3.0
IN5080		39.0	80	1	20	27	.095	3.0
MZ840	UZ840	40.0	75	1	20	27	.095	3.0
IN5081		40.0	75	1	20	27	.095	3.0
MZ843		43.0	70	1	15	35	.095	3.3
IN5082		43.0	70	1	15	35	.095	3.3
MZ845	UZ845	45.0	65	1	15	37	.095	3.5
IN5083		45.0	65	1	15	37	.095	3.5
MZ847		47.0	62	1	15	43	.095	3.5
IN5084		47.0	62	1	15	43	.095	3.5
MZ850	UZ850	50.0	60	1	15	50	.095	3.6
IN5085		50.0	60	1	15	50	.095	3.6
MZ851		51.0	60	1	15	50	.095	3.8
IN5086		51.0	60	1	15	50	.095	3.8
MZ856	UZ856	56	55	1	10	70	.095	4.0
IN5087		56	55	1	10	70	.095	4.0
MZ860	UZ860	60	50	1	10	70	.095	4.8
IN5088		60	50	1	10	70	.095	4.8
MZ862		62	45	1	10	75	.095	4.8
IN5089		62	45	1	10	75	.095	4.8
MZ868		68	45	1	10	85	.095	5.7
IN5090		68	45	1	10	85	.095	5.7
MZ870	UZ870	70	45	1	10	90	.095	5.8
IN5091		70	45	1	10	90	.095	5.8
MZ375	UZ875	75	40	1	10	100	.095	6.8
IN5092		75	40	1	10	100	.095	6.8
MZ880	UZ880	80	35	1	10	115	.095	7.7
IN5093		80	35	1	10	115	.095	7.7
MZ882		82	35	1	10	120	.095	7.8
IN5094		82	35	1	10	120	.095	7.8
MZ890	UZ890	90	30	1	8.0	150	.095	8.0
MZ891		91	30	1	8.0	155	.095	8.0
IN5095		91	30	1	8.0	155	.095	8.0
MZ210	UZ210	100	30	1	5.0	175	.100	9.0
MZ211	UZ211	110	25	1	5.0	250	.100	9.0
IN5096		110	25	1	5.0	250	.100	9.0
MZ212	UZ212	120	25	1	5.0	325	.100	11.0
IN5097		120	25	1	5.0	325	.100	11.0
MZ213	UZ213	130	20	1	5.0	375	.100	14.0
IN5098		130	20	1	5.0	375	.100	14.0
MZ214	UZ214	140	20	1	5.0	550	.100	14.0
IN5099		140	20	1	5.0	550	.100	14.0
MZ215	UZ215	150	20	1	5.0	650	.100	15.0
MZ216	UZ216	160	20	1	4.0	700	.100	16.0
IN5100		160	20	1	4.0	700	.100	16.0
MZ217	UZ217	170	18	1	4.0	750	.100	16.0
IN5101		170	18	1	4.0	750	.100	16.0
MZ218	UZ218	180	18	1	4.0	850	.100	17.0
IN5102		180	18	1	4.0	850	.100	17.0
MZ219	UZ219	190	15	1	4.0	900	.100	17.0
IN5103		190	15	1	4.0	900	.100	17.0
MZ220	UZ220	200	15	1	4.0	950	.100	17.0
IN5104		200	15	1	4.0	950	.100	17.0
MZ222	UZ222	220	15	1	3.0	1100	.100	18.0
IN5105		220	15	1	3.0	1100	.100	18.0
MZ224	UZ224	240	12	1	3.0	1300	.105	21.0
IN5106		240	12	1	3.0	1300	.105	21.0
MZ226	UZ226	260	12	1	3.0	1500	.105	21.0
IN5107		260	12	1	3.0	1500	.105	21.0
MZ227		270	10	1	3.0	1600	.105	22.0
IN5108		270	10	1	3.0	1600	.105	22.0
MZ228	UZ228	280	10	1	3.0	1700	.105	23.0
IN5109		280	10	1	3.0	1700	.105	23.0
MZ230	UZ230	300	10	1	3.0	1900	.105	26.0
IN5110		300	10	1	3.0	1900	.105	26.0
MZ232	UZ232	320	9	1	2.0	2100	.105	26.0
IN5111		320	9	1	2.0	2100	.105	26.0
MZ233		330	9	1	2.0	2250	.105	30.0
IN5112		330	9	1	2.0	2250	.105	30.0
MZ234	UZ234	340	9	1	2.0	2400	.110	33.0
IN5113		340	9	1	2.0	2400	.110	33.0
MZ236	UZ 236	360	8	1	2.0	2700	.110	33.0
IN5114		360	8	1	2.0	2700	.110	33.0
MZ238	UZ238	380	8	1	2.0	3000	.110	34.0
IN5115		380	8	1	2.0	3000	.110	34.0
MZ239		390	7	1	2.0	3250	.110	37.0
IN5116		390	7	1	2.0	3250	.110	37.0
MZ240	UZ240	400	7	1	2.0	3500	.110	40.0
IN5117		400	7	1	2.0	3500	.110	40.0

ELECTRICAL CHARACTERISTICS AT OTHER LEVELS

ELECTRICAL CHARACTERISTICS AT OTHER LEVELS												MSC Type ± 10% Tolerance* and JEDEC Type ± 5% Tolerance	
ZENER VOLTAGE							Max. Surge Current (3)	3.0 Watt Test Current	ZENER IMPEDANCE (2)				
at 1.5 Watt Rating	at 1.0 Watt Rating	at 3.0 Watt Test Current	at 1.5 Watt Test Current	at 1.0 Watt Test Current	at 400 mW Test Current	at 250 mW Test Current			3.0 Watt Test Current	3.0 Watt Test Current	at 250 mW Test Current		Knee Test Current
V _Z @ 2 I _Z 1500 mW	V _Z @ 1.33 I _Z 1000 mW	V _Z @ I _Z 750 mW	V _Z @ .5 I _Z 375 mW	V _Z @ .33 I _Z 250 mW	V _Z @ .133 I _Z 100 mW	V _Z @ .083 I _Z 62.5 mW			I _{Surge} (Amps)	I _Z (mA)	Z _Z (ohms)		Z _Z @ .083 I _Z ohms
7.00 7.00 7.75 7.75 8.45 8.45 9.35 9.35 10.3 10.3 11.3 11.3 12.4 13.4 13.4 14.4 14.4 15.4 15.4 16.4 16.4 18.5 18.5 20.7 22.7 22.7 24.7 24.7 27.8 27.8 30.8 30.8 34.3 34.3 37.4 37.4 41.0 41.0 42.0 42.0 45.0 45.0 47.0 47.0 49.0 49.0 52.0 52.0 53.0 53.0 58.0 58.0 63.0 63.0 65.0 65.0 71.5 71.5 73.5 73.5 79.0 79.0 85.0 85.0 87.0 87.0 95.0 96.0 96.0 105 115 115 127 127 139 139 149 149 159 169 169 179 179 189 189 199 199 209 209 229 229 252 252 272 272 283 283 294 294 315 315 335 335 324 324 358 358 378 378 400 400 323 323 426 426	6.85 6.85 7.55 7.55 8.25 8.25 9.15 9.15 10.1 10.1 11.1 11.1 12.1 13.1 13.1 14.1 14.1 15.1 15.1 16.1 16.1 18.1 18.1 20.2 22.2 22.2 24.2 24.2 27.2 27.2 30.2 30.2 33.4 33.4 36.4 36.4 39.5 39.5 40.5 40.5 43.5 43.5 45.5 45.5 47.5 47.5 49.0 49.0 50.5 50.5 51.5 51.5 56.5 56.5 61.0 61.0 63.0 63.0 66.0 66.0 68.0 68.0 71.0 71.0 76.0 76.0 81.0 81.0 83.0 83.0 91.5 92.5 92.5 101 111 111 122 122 132 132 142 142 152 162 162 172 172 182 182 192 192 202 202 222 222 243 243 263 263 273 273 284 284 304 304 324 324 344 344 364 364 385 385 396 396 408 408	6.80 6.80 7.50 7.50 8.20 8.20 9.10 9.10 10.0 10.0 11.0 11.0 12.0 13.0 13.0 14.0 14.0 15.0 15.0 16.0 16.0 18.0 18.0 20.0 22.0 22.0 24.0 24.0 27.0 27.0 30.0 30.0 33.0 33.0 36.0 36.0 39.0 39.0 40.0 40.0 43.0 43.0 45.0 45.0 47.0 47.0 49.0 49.0 50.0 50.0 51.0 51.0 56.0 56.0 60.0 60.0 62.0 62.0 68.0 68.0 70.0 70.0 75.0 75.0 80.0 80.0 82.0 82.0 90.0 91.0 91.0 100 110 110 120 120 130 130 140 140 150 160 160 170 170 180 180 190 190 200 200 220 220 240 240 260 260 270 270 280 280 300 300 320 320 340 340 360 360 380 380 390 390 400 400	6.75 6.75 7.45 7.45 8.10 8.10 8.95 8.95 9.80 9.80 10.9 10.9 11.9 12.8 12.8 13.8 13.8 14.8 14.8 15.8 15.8 17.8 17.8 20.0 22.0 22.0 23.7 23.7 26.6 26.6 29.6 29.6 32.5 32.5 35.4 35.4 38.0 38.0 39.0 39.0 42.0 42.0 44.0 44.0 46.0 46.0 48.6 48.6 49.6 49.6 50.5 50.5 55.0 55.0 59.0 59.0 61.0 61.0 66.5 66.5 68.5 68.5 73.0 73.0 78.0 78.0 80.0 80.0 88.0 89.0 89.0 97.0 107 107 117 117 126 126 136 136 145 155 155 165 165 175 175 185 185 195 195 215 215 234 234 254 254 264 264 274 274 289 289 309 309 328 328 348 348 366 366 380 380 390 390	6.70 6.70 7.40 7.40 8.00 8.00 8.85 8.85 9.70 9.70 10.8 10.8 11.8 12.7 12.7 13.7 13.7 14.7 14.7 15.7 15.7 17.7 17.7 20.0 22.0 22.0 23.6 23.6 26.4 26.4 29.4 29.4 32.3 32.3 35.2 35.2 37.8 37.8 38.8 38.8 41.8 41.8 43.8 43.8 45.8 45.8 48.6 48.6 49.6 49.6 50.5 50.5 54.2 54.2 58.5 58.5 61.0 61.0 66.0 66.0 68.0 68.0 72.4 72.4 77.0 77.0 79.3 79.3 87.2 88.2 88.2 96.2 106 106 116 116 125 125 135 135 144 154 154 164 164 174 174 184 184 194 194 214 214 232 232 251 251 261 261 271 271 288 288 308 308 325 325 345 345 370 370 380 380	6.65 6.65 7.35 7.35 7.90 7.90 8.75 8.75 9.60 9.60 10.7 10.7 11.7 12.6 12.6 13.6 13.6 14.6 14.6 15.6 15.6 17.6 17.6 20.0 22.0 22.0 23.5 23.5 26.2 26.2 29.2 29.2 32.1 32.1 35.0 35.0 37.6 37.6 38.6 38.6 41.6 41.6 43.6 43.6 45.6 45.6 48.2 48.2 49.2 49.2 50.5 50.5 54.2 54.2 58.0 58.0 61.0 61.0 65.5 65.5 67.5 67.5 71.8 71.8 76.6 76.6 79.9 79.9 87.4 87.4 87.4 95.4 105 105 115 115 124 124 134 134 143 153 153 163 163 173 173 183 183 193 193 213 213 230 230 248 248 258 258 278 278 300 300 318 318 340 340 362 362 376 376	6.60 6.60 7.30 7.30 7.80 7.80 8.65 8.65 9.50 9.50 10.6 10.6 11.6 12.5 12.5 13.5 13.5 14.5 14.5 15.5 15.5 17.5 17.5 20.0 22.0 22.0 23.4 23.4 26.0 26.0 29.0 29.0 31.9 31.9 34.8 34.8 37.4 37.4 38.4 38.4 41.4 41.4 43.4 43.4 45.4 45.4 48.0 48.0 49.8 49.8 50.8 50.8 54.8 54.8 58.5 58.5 61.5 61.5 66.0 66.0 68.0 68.0 72.2 72.2 77.2 77.2 85.6 86.6 86.6 94.6 104 104 114 114 123 123 133 133 142 152 152 162 162 172 172 182 182 192 192 212 212 228 228 246 246 256 256 276 276 300 300 318 318 340 340 360 360	10.0 10.0 8.0 8.0 7.0 7.0 6.0 6.0 5.0 5.0 4.5 4.5 4.0 4.0 4.0 4.0 3.0 3.0 3.0 3.0 2.0 2.0 2.0 2.0 2.0 2.0 1.5 1.5 1.5 1.5 1.2 1.2 1.0 1.0 1.0 1.0 0.8 0						



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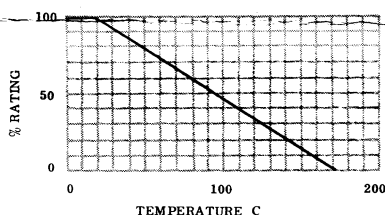
BULLETIN 608
MICRO SIZE
MACRO RELIABILITY
1N4954-1N4996
1N5118 1N5134

ING. ERICH SOMMER
ELEKTRONIK-GMBH
6 FRANKFURT/M. 1
JAHNSTRASSE 43

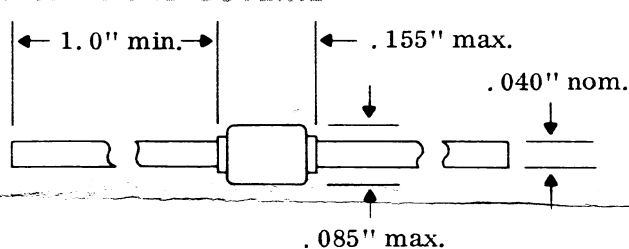
5 WATT MICRO GLASS ZENER DIODES

The 5 Watt Micro Zener glass diode is a silicon device featuring optimized power dissipation, low reverse leakage and dynamic impedance in a small rugged package. A double hermetic seal with a pyrolyzed glass junction surface, as well as a double stud glass seal, insures against reverse degradation. Devices are designed to meet or exceed requirements of MIL-S-19500 and MIL-STD-202 per MIL-STD-750.

**RATING vs
AMBIENT TEMPERATURE**



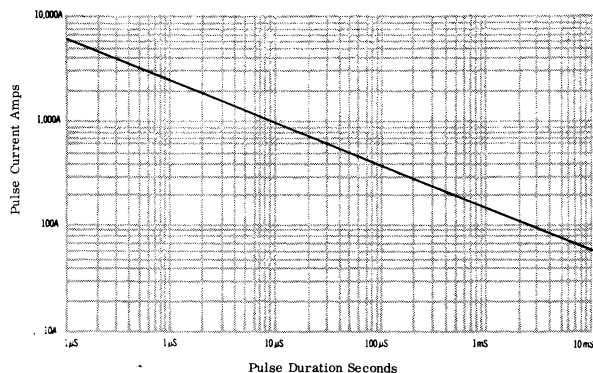
MECHANICAL OUTLINE



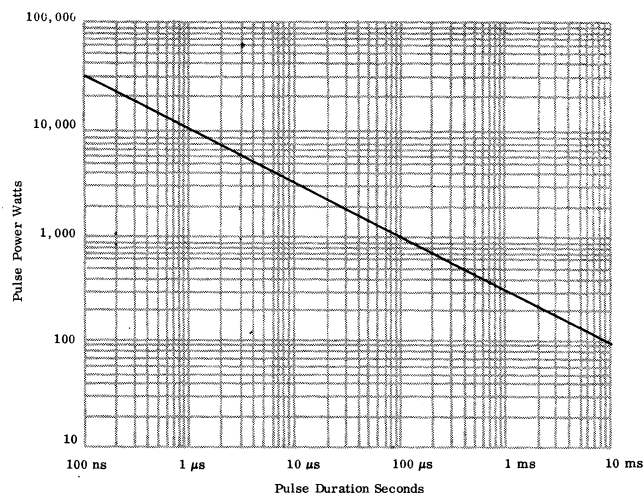
Lead Material: Silver. Tinned copper and dumet are available upon request. Dumet leads will reduce current handling capability by 25%.

Marking: Standard EIA color code from cathode end of body.

FORWARD SURGE CURRENT VS DURATION



REVERSE SURGE POWER VS DURATION



Type	Nominal Breakdown Voltage (1)	I _Z Test Current	Zener Impedance	Maximum I _Z D. C. Current	Breakdown Voltage Regulation	Reverse Surge Current @ 25° C	Reverse Voltage	Reverse Current
	(volts)	(mA)	(ohms)	(mA)	(volts)	(Amps)	(volts)	(μ A)
1N4954	6.8	175	1	660	.7	40	5.2	300
1N4955	7.5	175	1.5	600	.7	32	5.7	200
1N4956	8.2	150	1.5	550	.7	24	6.2	100
1N4957	9.1	150	2	495	.7	22	6.9	50
1N4958	10	125	2	450	.7	20	7.6	25
1N4959	11	125	2	410	.7	19	8.4	15
1N4960	12	100	2.5	375	.7	18	9.1	10
1N4961	13	100	3	345	.7	16	9.9	10
1N5118	14	100	3	320	.7	14	10.7	10
1N4962	15	75	3.5	300	.7	12	11.4	5.0
1N4963	16	75	3.5	280	.8	10	12.2	5.0
1N4964	18	65	4	250	1.0	9.0	13.7	5.0
1N4965	20	65	4.5	225	1.5	8.0	15.2	1.0
1N4966	22	50	5	205	1.8	7.0	16.7	1.0
1N4967	24	50	5	186	2.0	6.5	18.2	1.0
1N4968	27	50	6	167	2.0	6.0	20.6	1.0
1N4969	30	40	8	150	2.5	5.5	22.8	1.0
1N4970	33	40	10	136	2.8	5.0	25.1	1.0
1N4971	36	30	11	125	3.0	4.5	27.4	1.0
1N4972	39	30	14	115	3.0	4.0	29.7	1.0
1N5119	40	30	14	105	3.0	4.0	30.4	1.0
1N4973	43	30	20	105	3.3	3.5	32.7	1.0
1N5120	45	30	20	95	3.5	3.5	34.2	1.0
1N4974	47	25	25	96	3.5	3.2	35.8	1.0
1N5121	50	25	25	85	3.6	3.0	38.0	1.0
1N4975	51	25	27	88	3.6	3.0	38.8	1.0
1N4976	56	20	35	80	3.8	2.8	42.6	1.0
1N5122	60	20	40	75	4.1	2.5	45.6	1.0
1N4977	62	20	42	73	4.2	2.5	47.1	1.0
1N4978	68	20	44	67	4.4	2.2	51.7	1.0
1N5123	70	20	45	65	4.4	2.3	53.3	1.0
1N4979	75	20	45	60	4.7	2.0	56.0	1.0
1N5124	80	15	60	80	4.9	1.8	60.9	1.0
1N4980	82	15	65	55	4.9	1.8	62.2	1.0
1N5125	90	15	75	50	5.1	1.6	68.5	1.0
1N4981	91	15	75	50	5.1	1.6	69.2	1.0
1N4982	100	12	90	45	5.5	1.4	76.0	1.0
1N4983	110	12	125	41	6.0	1.2	83.6	1.0
1N4984	120	10	170	37.5	6.2	1.0	91.2	1.0
1N4985	130	10	190	34.5	6.5	.8	98.8	1.0
1N5126	140	8	230	33.0	7.0	.8	106.4	1.0
1N4986	150	8	330	30.0	8.0	.75	114.0	1.0
1N4987	160	8	350	28.0	10.0	.70	121.6	1.0
1N5127	170	8	380	27.0	11.0	.65	129.0	1.0
1N4988	180	5	430	25.0	12.0	.60	136.8	1.0
1N5128	190	5	450	24.0	13.0	.55	145.0	1.0
1N4989	200	5	480	22.5	14.0	.50	152.0	1.0
1N4990	220	5	550	20.5	15.0	.50	167.0	1.0
1N4991	240	5	650	18.7	18.0	.40	182.0	1.0
1N5129	260	5	650	17.0	19.0	.35	198.0	1.0
1N4992	270	5	800	16.6	20.0	.35	206.0	1.0
1N5130	280	4	850	16.0	21.0	.30	213.0	1.0
1N4993	300	4	950	15.0	22.0	.30	228.0	1.0
1N5131	320	4	1100	14.0	24.0	.24	244.0	1.0
1N4994	330	4	1175	13.6	25.0	.25	251.0	1.0
1N5132	340	4	1200	13.0	26.0	.23	259.0	1.0
1N4995	360	3	1400	12.5	28.0	.22	274.0	1.0
1N5133	380	3	1500	12.0	30.0	.21	289.0	1.0
1N4996	390	3	1800	11.5	31.0	.20	297.0	1.0
1N5134	400	3	1800	11.0	32.0	.20	304.0	1.0

Note: Tighter tolerances are available upon request. ||| (1) Measured with 35 millisecond pulse