

**Microsemi Corp.**  
The diode experts

SANTA ANA, CA

SCOTTSDALE, AZ

For more information call:  
(602) 941-6300

**1N5221  
thru  
1N5281  
DO-7**

## FEATURES

- 2.4 THRU 200 VOLTS
- COMPACT PACKAGE

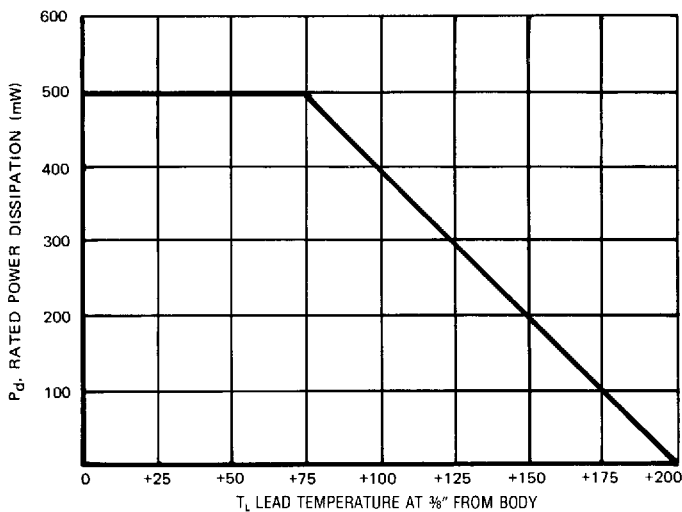
## MAXIMUM RATINGS

Operating and Storage Temperature:  $-65^{\circ}\text{C}$  to  $+200^{\circ}\text{C}$   
DC Power Dissipation: 500 mW  
Power Derating: 4.0 mW/ $^{\circ}\text{C}$  above  $75^{\circ}\text{C}$   
Forward Voltage @ 200 mA: 1.1 Volts

## ELECTRICAL CHARACTERISTICS

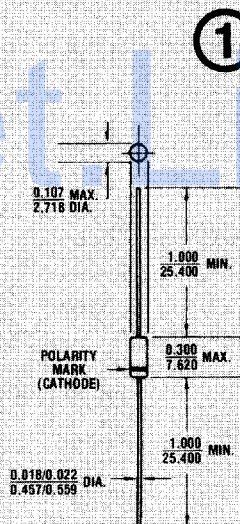
See following page for table of parameter values. (Fig. 3)

Table as shown on following page (Fig. 3) lists JEDEC type numbers, which indicate a tolerance of  $\pm 20\%$  with guaranteed limits on only  $V_Z$ ,  $I_r$ , and  $V_f$ . Devices with guaranteed limits on all six parameters are indicated by suffix A for  $\pm 10\%$  tolerance and suffix B for  $\pm 5\%$  tolerance. Also available with suffix C or D which indicates 2% and 1% tolerance respectively.



**FIGURE 2**  
POWER DERATING CURVE

**SILICON  
500 mW  
ZENER DIODES**



**FIGURE 1**  
All dimensions in INCH  
m.m.

## MECHANICAL CHARACTERISTICS

**CASE:** Hermetically sealed glass case. DO-7.

**FINISH:** All external surfaces are corrosion resistant and leads solderable.

**THERMAL RESISTANCE:**  $300^{\circ}\text{C}/\text{W}$  (Typical) junction to lead at 0.375-inches from body.

**POLARITY:** Diode to be operated with the banded end positive with respect to the opposite end.

# 1N5221 thru 1N5281 DO-7

## \*ELECTRICAL CHARACTERISTICS @ 25°C

JEDEC Type No. Note 1	Nominal Zener Voltage $V_z$ @ $I_{zT}$ Volts	Test Current $I_{zT}$ mA	Max Zener Impedance A & B Suffix Only Note 2		Max Reverse Leakage Current				Max Zener Voltage Temp. Coeff. ( $\alpha_{Vz}$ ) (% / °C) Note 3
			$Z_{zT}$ @ $I_{zT}$ Ohms	$Z_{zK}$ @ $I_{zK} = 0.25$ mA Ohms	A, B, C & D Suffix Only			Non-Suffix $I_z$ @ $V_z$ Used For Suffix A $\mu$ A	
					$I_z$ @ $V_z$ $\mu$ A	A	B, C & D		
1N5221	2.4	20	30	1200	100	0.95	1.0	200	-0.085
1N5222	2.5	20	30	1250	100	0.95	1.0	200	-0.085
1N5223	2.7	20	30	1300	75	0.95	1.0	150	-0.080
1N5224	2.8	20	30	1400	75	0.95	1.0	150	-0.080
1N5225	3.0	20	29	1600	50	0.95	1.0	100	-0.075
1N5226	3.3	20	28	1600	25	0.95	1.0	100	-0.070
1N5227	3.6	20	24	1700	15	0.95	1.0	100	-0.065
1N5228	3.9	20	23	1900	10	0.95	1.0	75	-0.060
1N5229	4.3	20	22	2000	5.0	0.95	1.0	50	$\pm 0.055$
1N5230	4.7	20	19	1900	5.0	1.9	2.0	50	$\pm 0.030$
1N5231	5.1	20	17	1600	5.0	1.9	2.0	50	$\pm 0.030$
1N5232	5.6	20	11	1600	5.0	2.9	3.0	50	+0.038
1N5233	6.0	20	7.0	1600	5.0	3.3	3.5	50	+0.038
1N5234	6.2	20	7.0	1900	5.0	3.8	4.0	50	+0.045
1N5235	6.8	20	5.0	750	3.0	4.8	5.0	30	+0.050
1N5236	7.5	20	6.0	500	3.0	5.7	6.0	30	+0.058
1N5237	8.2	20	8.0	500	3.0	6.2	6.5	30	+0.062
1N5238	8.7	20	6.0	600	3.0	6.2	6.5	30	+0.065
1N5239	9.1	20	10	600	3.0	6.7	7.0	30	+0.068
1N5240	10	20	17	600	3.0	7.6	8.0	30	+0.075
1N5241	11	20	22	600	2.0	8.0	8.4	30	+0.076
1N5242	12	20	30	600	1.0	8.7	9.1	10	+0.077
1N5243	13	9.5	13	600	0.5	9.4	9.9	10	+0.079
1N5244	14	9.0	10	600	0.1	9.5	10	10	+0.082
1N5245	15	8.5	16	600	0.1	10.5	11	10	+0.082
1N5246	16	7.8	17	600	0.1	11.4	12	10	+0.083
1N5247	17	7.4	19	600	0.1	12.4	13	10	+0.084
1N5248	18	7.0	21	600	0.1	13.3	14	10	+0.085
1N5249	19	6.6	23	600	0.1	13.3	14	10	+0.086
1N5250	20	6.2	25	600	0.1	14.3	15	10	+0.086
1N5251	22	5.6	29	600	0.1	16.2	17	10	+0.087
1N5252	24	5.2	33	600	0.1	17.1	18	10	+0.088
1N5253	25	5.0	35	600	0.1	18.1	19	10	+0.089
1N5254	27	4.6	41	600	0.1	20	21	10	+0.090
1N5255	28	4.5	44	600	0.1	20	21	10	+0.091
1N5256	30	4.2	49	600	0.1	22	23	10	+0.091
1N5257	33	3.8	58	700	0.1	24	25	10	+0.092
1N5258	36	3.4	70	700	0.1	26	27	10	+0.093
1N5259	39	3.2	80	800	0.1	29	30	10	+0.094
1N5260	43	3.0	93	900	0.1	31	33	10	+0.095
1N5261	47	2.7	105	1000	0.1	34	36	10	+0.095
1N5262	51	2.5	125	1100	0.1	37	39	10	+0.096
1N5263	56	2.2	150	1300	0.1	41	43	10	+0.096
1N5264	60	2.1	170	1400	0.1	44	46	10	+0.097
1N5265	62	2.0	185	1400	0.1	45	47	10	+0.097
1N5266	68	1.8	230	1600	0.1	49	52	10	+0.097
1N5267	75	1.7	270	1700	0.1	53	56	10	+0.098
1N5268	82	1.5	330	2000	0.1	59	62	10	+0.098
1N5269	87	1.4	370	2200	0.1	65	68	10	+0.099
1N5270	91	1.4	400	2300	0.1	66	69	10	+0.099
1N5271	100	1.3	500	2600	0.1	72	76	10	+0.110
1N5272	110	1.1	750	3000	0.1	80	84	10	+0.110
1N5273	120	1.0	900	4000	0.1	86	91	10	+0.110
1N5274	130	0.95	1100	4500	0.1	94	99	10	+0.110
1N5275	140	0.90	1300	4500	0.1	101	106	10	+0.110
1N5276	150	0.85	1500	5000	0.1	108	114	10	+0.110
1N5277	160	0.80	1700	5500	0.1	116	122	10	+0.110
1N5278	170	0.74	1900	5500	0.1	123	129	10	+0.110
1N5279	180	0.68	2200	6000	0.1	130	137	10	+0.110
1N5280	190	0.66	2400	6500	0.1	137	144	10	+0.110
1N5281	200	0.65	2500	7000	0.1	144	152	10	+0.110

FIGURE 3

\*JEDEC registered data

**NOTE 1** The electrical characteristics are measured after allowing the device to stabilize for 20 seconds when mounted with a  $\frac{1}{16}$ " minimum lead length from the case.

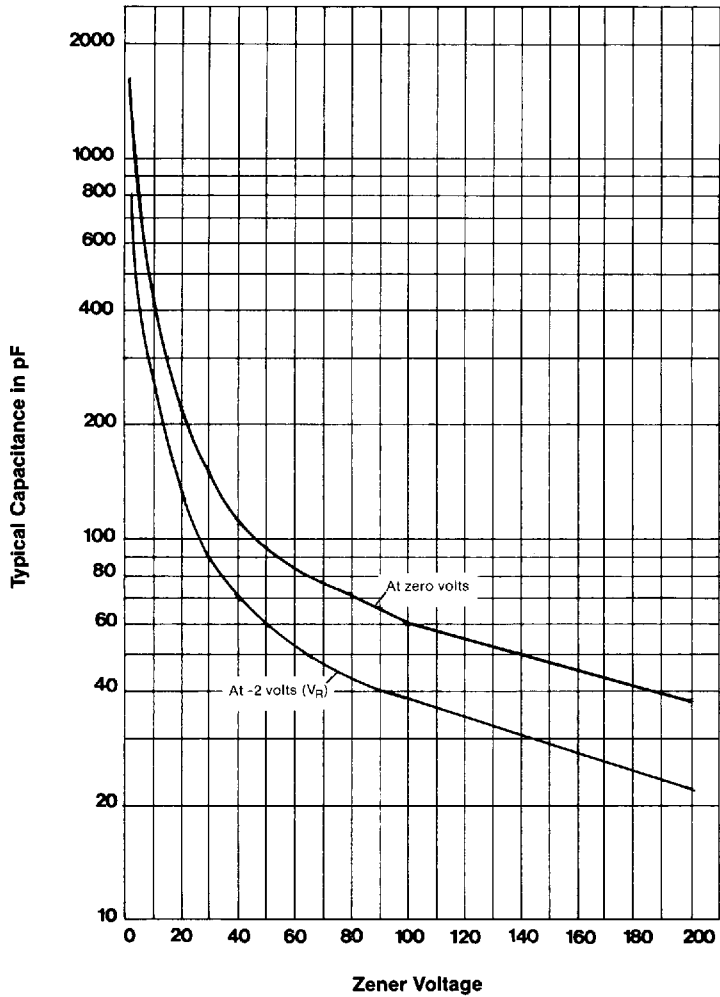
**NOTE 2** The zener impedance is derived from the 60 HZ ac voltage, which results when an ac current having an r.m.s. value equal to 10% of the DC zener current ( $I_{zT}$  or  $I_{zK}$ ) is superimposed on  $I_{zT}$  or  $I_{zK}$ . Zener impedance is measured at two points to insure a sharp knee on the breakdown curve, thereby eliminating unstable units.

**NOTE 3** Temperature coefficient ( $\alpha_{Vz}$ ). Test conditions for temperature coefficient are as follows:

- $I_{zT} = 7.5$  mA,  $T_1 = 25^\circ\text{C}$ ,  $T_2 = 125^\circ\text{C}$  (1N5221A, B thru 1N5242A, B.)
- $I_{zT} = \text{Rated } I_{zT}$ ,  $T_1 = 25^\circ\text{C}$ ,  $T_2 = 125^\circ\text{C}$  (1N5243A, B thru 1N5281A, B.)

Device to be temperature stabilized with current applied prior to reading breakdown voltage at the specified ambient temperature.

**1N5221 thru 1N5281 DO-7**



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**FIGURE 4**  
CAPACITANCE VS. ZENER VOLTAGE  
(TYPICAL)

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**1N5221  
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1N5281  
DO-35**

**FEATURES**

- 2.4 THRU 200 VOLTS
- COMPACT PACKAGE
- CONSULT FACTORY FOR VOLTAGES ABOVE 200 V

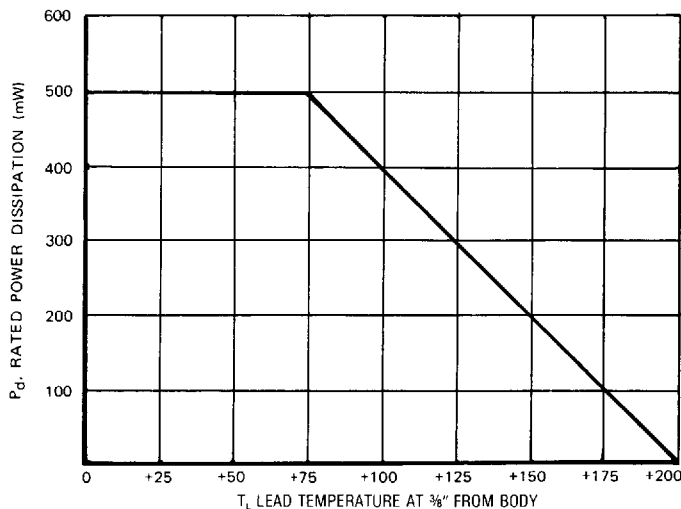
**MAXIMUM RATINGS**

Operating and Storage Temperature:  $-65^{\circ}\text{C}$  to  $+200^{\circ}\text{C}$   
DC Power Dissipation: 500 mW  
Power Derating: 4.0 mW/ $^{\circ}\text{C}$  above  $75^{\circ}\text{C}$   
Forward Voltage @ 200 mA: 1.1 Volts

**ELECTRICAL CHARACTERISTICS**

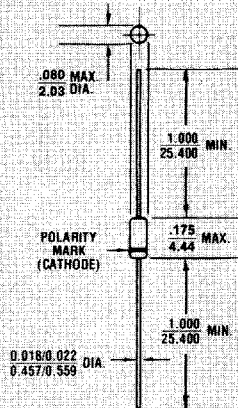
See following page for table of parameter values. (Fig. 3)

Table as shown on following page (Fig. 3) lists JEDEC type numbers, which indicate a tolerance of  $\pm 20\%$  with guaranteed limits on only  $V_Z$ ,  $I_f$ , and  $V_f$ . Devices with guaranteed limits on all six parameters are indicated by suffix A for  $\pm 10\%$  tolerance and suffix B for  $\pm 5\%$  tolerance. Also available with suffix C or D which indicates 2% and 1% tolerance respectively.



**FIGURE 2**  
POWER DERATING CURVE

**SILICON  
500 mW  
ZENER DIODES**



**FIGURE 1**  
All dimensions in  $\frac{\text{INCH}}{\text{m.m.}}$

**MECHANICAL CHARACTERISTICS**

CASE: Hermetically sealed glass case DO-35.

FINISH: All external surfaces are corrosion resistant and leads solderable.

THERMAL RESISTANCE:  $150^{\circ}\text{C}/\text{W}$  (Typical) junction to lead at 0.375-inches from body.

POLARITY: Diode to be operated with the banded end positive with respect to the opposite end.

## 1N5221 thru 1N5281 DO-35

## \*ELECTRICAL CHARACTERISTICS @ 25°C

JEDEC Type No. Note 1	Nominal Zener Voltage $V_Z @ I_{ZT}$ Volts	Test Current $I_{ZT}$ mA	Max Zener Impedance A & B Suffix Only Note 2		Max Reverse Leakage Current			Max Zener Voltage Temp. Coeff. (A & B Suffix Only) $\alpha_{Vz}$ (%/°C) Note 3	
			$Z_{zk} @ I_{Zk} = 0.25$ mA Ohms	$Z_{zk} @ I_{Zk} = 0.25$ mA Ohms	A, B, C & D Suffix Only		Non-Suffix		
					$I_{Lk}$ $\mu$ A	$V_{Lk}$ Volts	$I_{Lk} @ V_{Lk}$ Used For Suffix A $\mu$ A		
1N5221	2.4	20	30	1200	100	0.95	1.0	200	-0.085
1N5222	2.5	20	30	1250	100	0.95	1.0	200	-0.085
1N5223	2.7	20	30	1300	75	0.95	1.0	150	-0.080
1N5224	2.8	20	30	1400	75	0.95	1.0	150	-0.080
1N5225	3.0	20	29	1600	50	0.95	1.0	100	-0.075
1N5226	3.3	20	28	1600	25	0.95	1.0	100	-0.070
1N5227	3.6	20	24	1700	15	0.95	1.0	100	-0.065
1N5228	3.9	20	23	1900	10	0.95	1.0	75	-0.060
1N5229	4.3	20	22	2000	5.0	0.95	1.0	50	$\pm 0.055$
1N5230	4.7	20	19	1900	5.0	1.9	2.0	50	$\pm 0.330$
1N5231	5.1	20	17	1600	5.0	1.9	2.0	50	$\pm 0.030$
1N5232	5.6	20	11	1600	5.0	2.9	3.0	50	+0.038
1N5233	6.0	20	7.0	1600	5.0	3.3	3.5	50	+0.038
1N5234	6.2	20	7.0	1000	5.0	3.8	4.0	50	+0.045
1N5235	6.8	20	5.0	750	3.0	4.8	5.0	30	+0.050
1N5236	7.5	20	6.0	500	3.0	5.7	6.0	30	+0.058
1N5237	8.2	20	8.0	500	3.0	6.2	6.5	30	+0.062
1N5238	8.7	20	8.0	600	3.0	6.2	6.5	30	+0.065
1N5239	9.1	20	10	600	3.0	6.7	7.0	30	+0.068
1N5240	10	20	17	600	3.0	7.6	8.0	30	+0.075
1N5241	11	20	22	600	2.0	8.0	8.4	30	+0.076
1N5242	12	20	30	600	1.0	8.7	9.1	10	+0.077
1N5243	13	9.5	13	600	0.5	9.4	9.9	10	+0.079
1N5244	14	9.0	15	600	0.1	9.5	10	10	+0.082
1N5245	15	8.5	16	600	0.1	10.5	11	10	+0.082
1N5246	16	7.8	17	600	0.1	11.4	12	10	+0.083
1N5247	17	7.4	19	600	0.1	12.4	13	10	+0.084
1N5248	18	7.0	21	600	0.1	13.3	14	10	+0.085
1N5249	19	6.6	23	600	0.1	13.3	14	10	+0.086
1N5250	20	6.2	25	600	0.1	14.3	15	10	+0.086
1N5251	22	5.6	29	600	0.1	16.2	17	10	+0.087
1N5252	24	5.2	33	600	0.1	17.1	18	10	+0.088
1N5253	25	5.0	35	600	0.1	18.1	19	10	+0.089
1N5254	27	4.6	41	600	0.1	20	21	10	+0.090
1N5255	28	4.5	44	600	0.1	20	21	10	+0.091
1N5256	30	4.2	49	600	0.1	22	23	10	+0.091
1N5257	33	3.8	58	700	0.1	24	25	10	+0.092
1N5258	36	3.4	70	700	0.1	26	27	10	+0.093
1N5259	39	3.2	80	800	0.1	29	30	10	+0.094
1N5260	43	3.0	93	900	0.1	31	33	10	+0.095
1N5261	47	2.7	105	1000	0.1	34	36	10	+0.095
1N5262	51	2.5	125	1100	0.1	37	39	10	+0.096
1N5263	56	2.2	150	1300	0.1	41	43	10	+0.096
1N5264	60	2.1	170	1400	0.1	44	46	10	+0.097
1N5265	62	2.0	185	1400	0.1	45	47	10	+0.097
1N5266	68	1.8	230	1600	0.1	49	52	10	+0.097
1N5267	75	1.7	270	1700	0.1	53	56	10	+0.098
1N5268	82	1.5	330	2000	0.1	59	62	10	+0.098
1N5269	87	1.4	370	2200	0.1	65	68	10	+0.099
1N5270	91	1.4	400	2300	0.1	66	69	10	+0.099
1N5271	100	1.3	500	2600	0.1	72	76	10	+0.110
1N5272	110	1.1	750	3000	0.1	80	84	10	+0.110
1N5273	120	1.0	900	4000	0.1	86	91	10	+0.110
1N5274	130	0.95	1100	4500	0.1	94	99	10	+0.110
1N5275	140	0.90	1300	4500	0.1	101	106	10	+0.110
1N5276	150	0.85	1500	5000	0.1	108	114	10	+0.110
1N5277	160	0.80	1700	5500	0.1	116	122	10	+0.110
1N5278	170	0.74	1900	5500	0.1	123	129	10	+0.110
1N5279	180	0.68	2200	6000	0.1	130	137	10	+0.110
1N5280	190	0.66	2500	6500	0.1	137	144	10	+0.110
1N5281	200	0.65	2500	7000	0.1	144	152	10	+0.110

①

\*JEDEC registered data

FIGURE 3

**NOTE 1** The electrical characteristics are measured after allowing the device to stabilize for 20 seconds when mounted with a  $\frac{1}{8}$ " minimum lead length from the case.

**NOTE 2** The zener impedance is derived from the 60 HZ ac voltage, which results when an ac current having an r.m.s. value equal to 10% of the DC zener current ( $I_{ZT}$  or  $I_{ZK}$ ) is superimposed on  $I_{ZT}$  or  $I_{ZK}$ . Zener impedance is measured at two points to insure a sharp knee on the breakdown curve, thereby, eliminating unstable units.

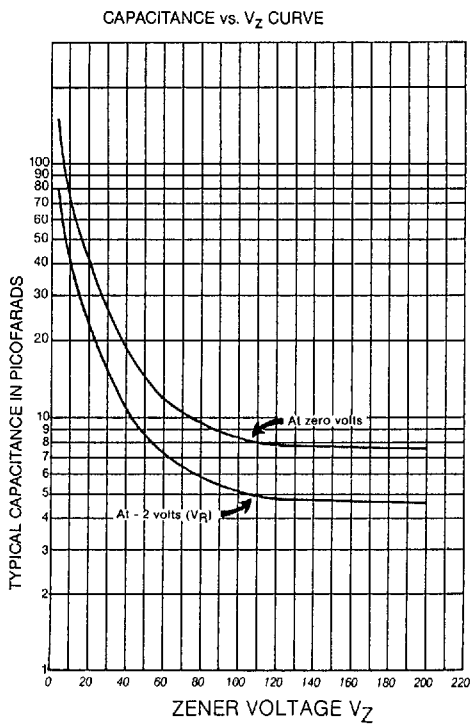
**NOTE 3** Temperature coefficient ( $\alpha_{Vz}$ ).

Test conditions for temperature coefficient are as follows:

- $I_{ZT} = 7.5$  mA,  $T_1 = 25^\circ\text{C}$ ,  
 $T_2 = 125^\circ\text{C}$  (1N5221A, B thru 1N5242A, B.)
- $I_{ZT} = \text{Rated } I_{ZT}$ ,  $T_1 = 25^\circ\text{C}$ ,  
 $T_2 = 125^\circ\text{C}$  (1N5243A, B thru 1N5281A, B.)

Device to be temperature stabilized with current applied prior to reading breakdown voltage at the specified ambient temperature.

# 1N5221 thru 1N5281 DO-35



**FIGURE 4**  
CAPACITANCE VS. ZENER VOLTAGE  
(TYPICAL)