

Zeners 1N5221B - 1N5257B

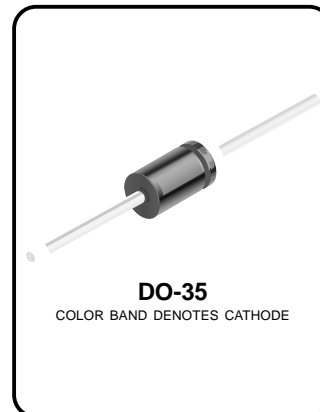
Zeners (1N5221B - 1N5257B)

Absolute Maximum Ratings*

$T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Value	Units
P_D	Power Dissipation	500	mW
	Derate above 75°C	4.0	mW/ $^\circ\text{C}$
T_{STG}	Storage Temperature Range	-65 to +200	$^\circ\text{C}$
T_J	Maximum Junction Operating Temperature	+ 200	$^\circ\text{C}$
	Lead Temperature (1/16" from case for 10 seconds)	+ 230	$^\circ\text{C}$
	Surge Power**	10	W

Tolerance: B = 5%



*These ratings are limiting values above which the serviceability of the diode may be impaired.

**Non-recurrent square wave PW= 8.3 ms, TA= 50 degrees C.

NOTES:

- 1) These ratings are based on a maximum junction temperature of 200 degrees C.
- 2) These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

Electrical Characteristics

$T_A = 25^\circ\text{C}$ unless otherwise noted

Device	V_Z (V)	Z_Z (Ω) @	I_{ZT} (mA)	Z_{ZK} (Ω) @	I_{ZK} (mA)	I_R (μA) @	V_R (V)	T_C (%/ $^\circ\text{C}$)
1N5221B	2.4	30	20	1,200	0.25	100	1.0	- 0.080
1N5223B	2.7	30	20	1,300	0.25	75	1.0	- 0.075
1N5226B	3.3	28	20	1,600	0.25	25	1.0	- 0.07
1N5227B	3.6	24	20	1,700	0.25	15	1.0	- 0.065
1N5228B	3.9	23	20	1,900	0.25	10	1.0	- 0.06
1N5229B	4.3	22	20	2,000	0.25	5.0	1.0	+/- 0.055
1N5230B	4.7	19	20	1,900	0.25	2.0	2.0	+/- 0.03
1N5231B	5.1	17	20	1,600	0.25	2.0	2.0	+/- 0.03
1N5232B	5.6	11	20	1,600	0.25	3.0	3.0	0.038
1N5233B	6.0	7.0	20	1,600	0.25	3.5	3.5	0.038
1N5234B	6.2	7.0	20	1,000	0.25	4.0	4.0	0.045
1N5235B	6.8	5.0	20	750	0.25	5.0	5.0	0.05
1N5236B	7.5	6.0	20	500	0.25	6.0	6.0	0.058
1N5237B	8.2	8.0	20	500	0.25	6.5	6.5	0.062
1N5238B	8.7	8.0	20	600	0.25	6.5	6.5	0.065
1N5239B	9.1	10	20	600	0.25	7.0	7.0	0.068
1N5240B	10	17	20	600	0.25	8.0	8.0	0.075
1N5241B	11	22	20	600	0.25	8.4	8.4	0.076

V_F Forward Voltage = 1.1 V Maximum @ $I_F = 200$ mA for all 1N5200 series

Zeners (1N5221B - 1N5257B)

(continued)

Electrical Characteristics (Continued)

$T_A = 25^\circ\text{C}$ unless otherwise noted

Device	V_Z (V)	Z_Z (Ω) @ I_{ZT} (mA)	Z_{ZK} (Ω) @ I_{ZK} (mA)	V_R (V) @ I_R (μA)	T_C (%/ $^\circ\text{C}$)
1N5242B	12	30 20	600 0.25	9.1 0.1	0.077
1N5243B	13	13 9.5	600 0.25	9.9 0.1	0.079
1N5244B	14	15 9.0	600 0.25	10 0.1	0.080
1N5245B	15	16 8.5	600 0.25	11 0.1	0.082
1N5246B	16	17 7.8	600 0.25	12 0.1	0.083
1N5247B	17	19 7.4	600 0.25	13 0.1	0.084
1N5248B	18	21 7.0	600 0.25	14 0.1	0.085
1N5249B	19	23 6.6	600 0.25	14 0.1	0.085
1N5250B	20	25 6.2	600 0.25	15 0.1	0.086
1N5251B	22	29 5.6	600 0.25	17 0.1	0.087
1N5252B	24	33 5.2	600 0.25	18 0.1	0.088
1N5253B	25	35 5.0	600 0.25	19 0.1	0.088
1N5254B	27	41 4.6	600 0.25	21 0.1	0.089
1N5255B	28	44 4.5	600 0.25	21 0.1	0.090
1N5256B	30	49 4.2	600 0.25	23 0.1	0.091
1N5257B	33	58 3.8	700 0.25	25 0.1	0.092

V_F Forward Voltage = 1.1 V Maximum @ $I_F = 200$ mA for all 1N5200 series

Zeners (1N5221B - 1N5257B)

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1N5223B through 1N5258B

Silicon Epitaxial Planar Zener Diodes for Voltage Regulation



ADE-208-137B (Z)

Rev.2
Dec. 2001

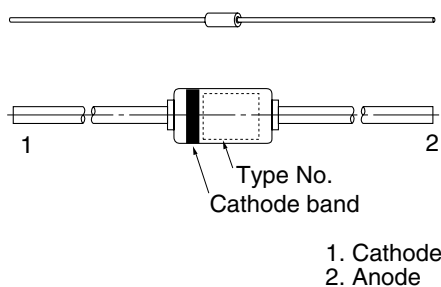
Features

- Glass package DO-35 structure ensures high reliability.
- Wide spectrum from 2.7 V through 36 V of zener voltage provide flexible application.

Ordering Information

Type No.	Cathode band	Mark	Package Code
1N5223B through 1N5258B	Black	Type No.	DO-35

Pin Arrangement



1N5223B through 1N5258B

Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Value	Unit
Power dissipation	Pd	500	mW
Surge power dissipation	Pd(surge) * ¹	10	W
Lead temperature	T _L * ²	230	°C
Junction temperature	T _J * ³	200	°C
Storage temperature	Tstg	-65 to +200	°C

Notes: 1. Non-recurrent square wave, pw = 8.3 ms, T_J = 55°C, T_J is prior to surge.

2. Less than 1/16" from the case for 10 seconds.

3. By standard printed board, see fig 2.

Electrical Characteristics

(Ta = 25°C)

	V _Z (V)	I _R (μA)		Z _{ZT} (Ω)		Z _{ZK} (Ω)		γ _Z (%/°C) * ¹	V _F * ² (V)	
		Test Condition		Test Condition		Test Condition				
		I _Z (mA)	Max	V _R (V)	Max	I _{ZT} (mA)	Max			I _{ZK} (mA)
1N5223B	2.7 ± 5 (%)	20	75	1.0	30	20	1300	0.25	-0.08	1.1
1N5224B	2.8 ± 5 (%)	20	75	1.0	30	20	1400	0.25	-0.08	1.1
1N5225B	3.0 ± 5 (%)	20	50	1.0	29	20	1600	0.25	-0.075	1.1
1N5226B	3.3 ± 5 (%)	20	25	1.0	28	20	1600	0.25	-0.07	1.1
1N5227B	3.6 ± 5 (%)	20	15	1.0	24	20	1700	0.25	-0.065	1.1
1N5228B	3.9 ± 5 (%)	20	10	1.0	23	20	1900	0.25	-0.06	1.1
1N5229B	4.3 ± 5 (%)	20	5	1.0	22	20	2000	0.25	±0.055	1.1
1N5230B	4.7 ± 5 (%)	20	5	2.0	19	20	1900	0.25	±0.03	1.1
1N5231B	5.1 ± 5 (%)	20	5	2.0	17	20	1600	0.25	±0.03	1.1
1N5232B	5.6 ± 5 (%)	20	5	3.0	11	20	1600	0.25	+0.038	1.1
1N5233B	6.0 ± 5 (%)	20	5	3.5	7	20	1600	0.25	+0.038	1.1
1N5234B	6.2 ± 5 (%)	20	5	4.0	7	20	1000	0.25	+0.045	1.1
1N5235B	6.8 ± 5 (%)	20	3	5.0	5	20	750	0.25	+0.05	1.1
1N5236B	7.5 ± 5 (%)	20	3	6.0	6	20	500	0.25	+0.058	1.1
1N5237B	8.2 ± 5 (%)	20	3	6.5	8	20	500	0.25	+0.062	1.1
1N5238B	8.7 ± 5 (%)	20	3	6.5	8	20	600	0.25	+0.065	1.1

Notes: 1. 1N5223 to 1N5242: I_Z = 7.5 mA, 1N5243 to 1N5258: I_Z = I_Z, Ta = 25°C to 125°C

2. Tested with DC, I_F = 200 mA

Electrical Characteristics (cont)

(Ta = 25°C)

	V_z (V)	I_R (μ A)		Z_{zT} (Ω)		Z_{zK} (Ω)		γ_z (%/°C) *1	V_F **2 (V)		
		Test Condition		Test Condition		Test Condition				Test Condition	
		I_z (mA)	Max	V_R (V)	Max	I_{zT} (mA)	Max			I_{zK} (mA)	Max
1N5239B	9.1 ± 5 (%)	20	3	7.5	10	20	600	0.25	+0.068	1.1	
1N5240B	10 ± 5 (%)	20	3	8.0	17	20	600	0.25	+0.075	1.1	
1N5241B	11 ± 5 (%)	20	2	8.4	22	20	600	0.25	+0.076	1.1	
1N5242B	12 ± 5 (%)	20	1	9.1	30	20	600	0.25	+0.077	1.1	
1N5243B	13 ± 5 (%)	9.5	0.5	9.9	13	9.5	600	0.25	+0.079	1.1	
1N5244B	14 ± 5 (%)	9.0	0.1	10	15	9.0	600	0.25	+0.082	1.1	
1N5245B	15 ± 5 (%)	8.5	0.1	11	16	8.5	600	0.25	+0.082	1.1	
1N5246B	16 ± 5 (%)	7.8	0.1	12	17	7.8	600	0.25	+0.083	1.1	
1N5247B	17 ± 5 (%)	7.4	0.1	13	19	7.4	600	0.25	+0.084	1.1	
1N5248B	18 ± 5 (%)	7.0	0.1	14	21	7.0	600	0.25	+0.085	1.1	
1N5249B	19 ± 5 (%)	6.6	0.1	14	23	6.6	600	0.25	+0.086	1.1	
1N5250B	20 ± 5 (%)	6.2	0.1	15	25	6.2	600	0.25	+0.086	1.1	
1N5251B	22 ± 5 (%)	5.6	0.1	17	29	5.6	600	0.25	+0.087	1.1	
1N5252B	24 ± 5 (%)	5.2	0.1	18	33	5.2	600	0.25	+0.088	1.1	
1N5253B	25 ± 5 (%)	5.0	0.1	19	35	5.0	600	0.25	+0.089	1.1	
1N5254B	27 ± 5 (%)	4.6	0.1	21	41	4.6	600	0.25	+0.090	1.1	
1N5255B	28 ± 5 (%)	4.5	0.1	21	44	4.5	600	0.25	+0.091	1.1	
1N5256B	30 ± 5 (%)	4.2	0.1	23	49	4.2	600	0.25	+0.091	1.1	
1N5257B	33 ± 5 (%)	3.8	0.1	25	58	3.8	700	0.25	+0.092	1.1	
1N5258B	36 ± 5 (%)	3.4	0.1	27	70	3.4	700	0.25	+0.093	1.1	

Notes: 1. 1N5223 to 1N5242: $I_z = 7.5$ mA, 1N5243 to 1N5258: $I_z = I_z$, Ta = 25°C to 125°C2. Tested with DC, $I_F = 200$ mA

Main Characteristic

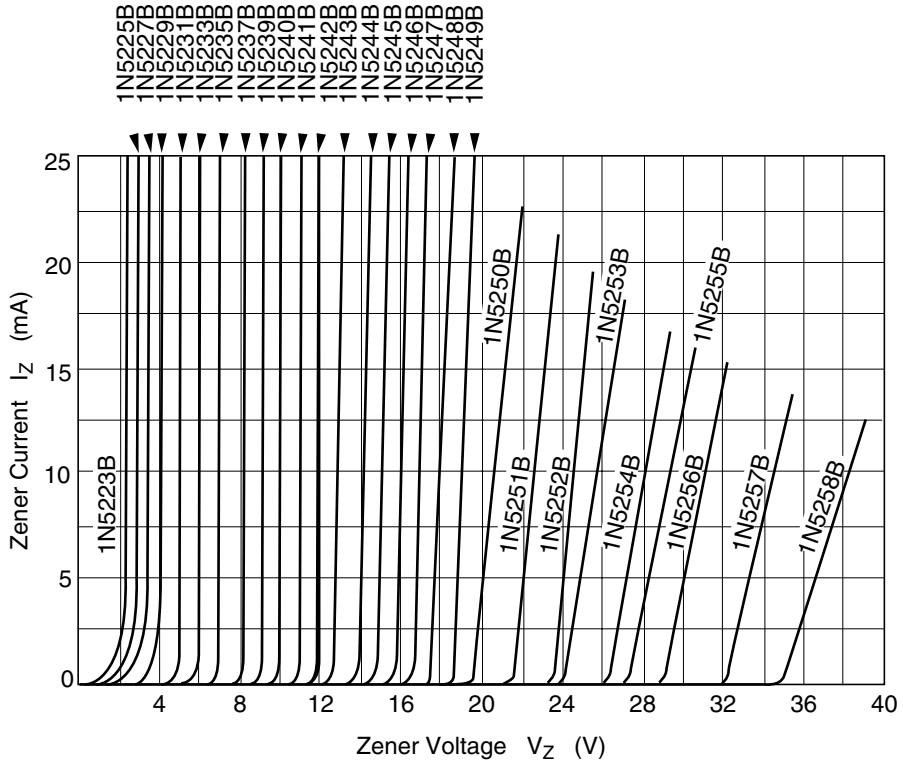


Fig.1 Zener current vs. Zener voltage

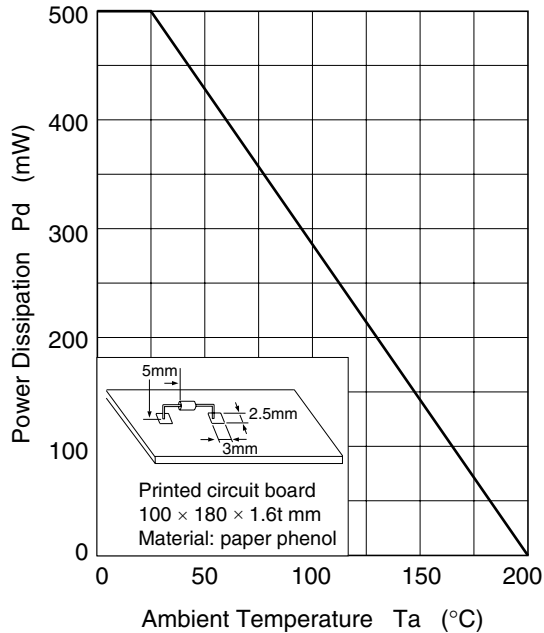
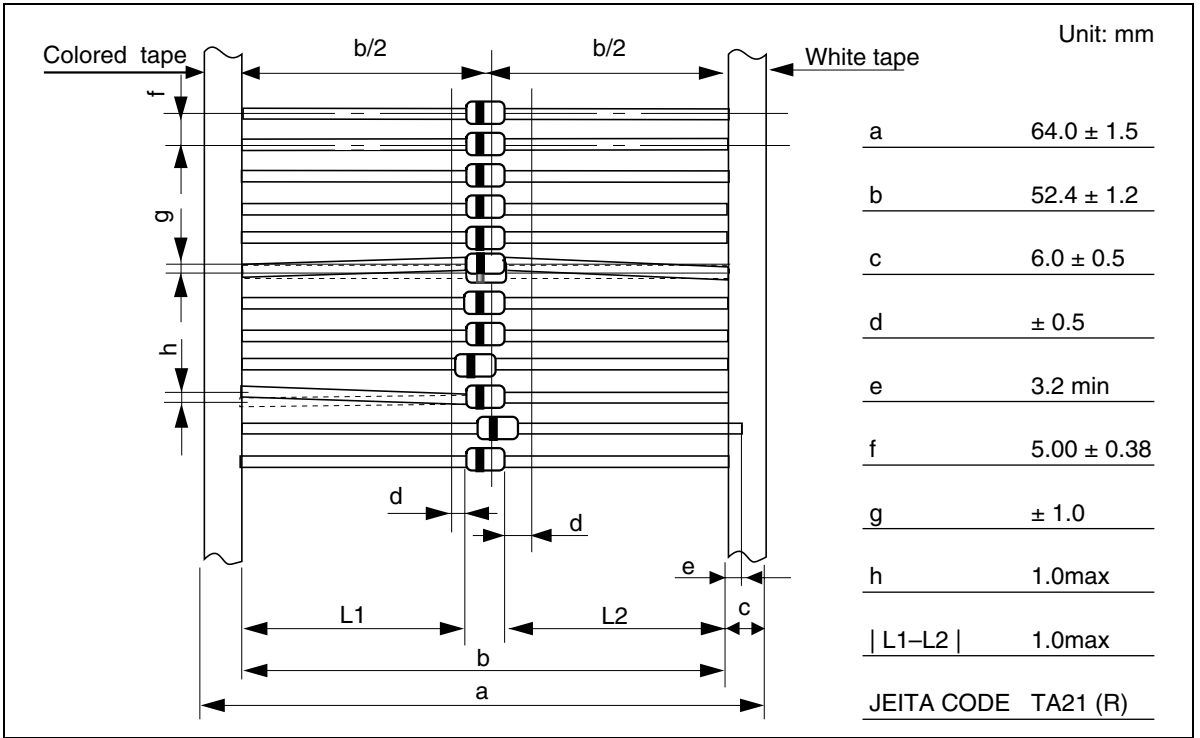
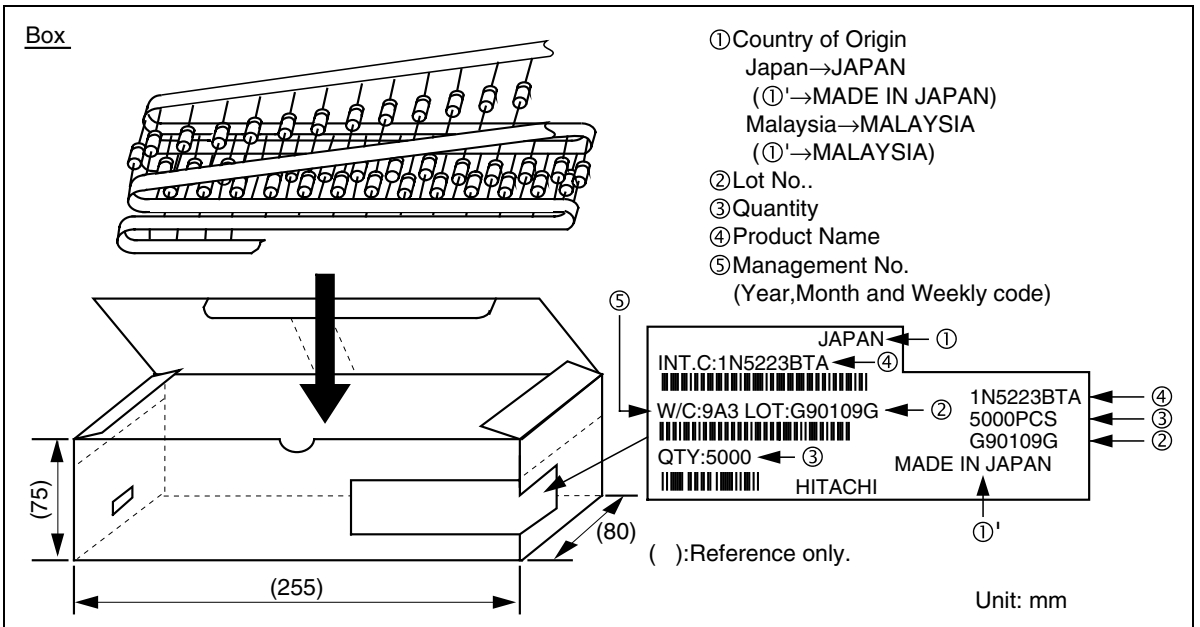


Fig.2 Power Dissipation vs. Ambient Temperature

Ammo Pack Taping (TA TYPE)

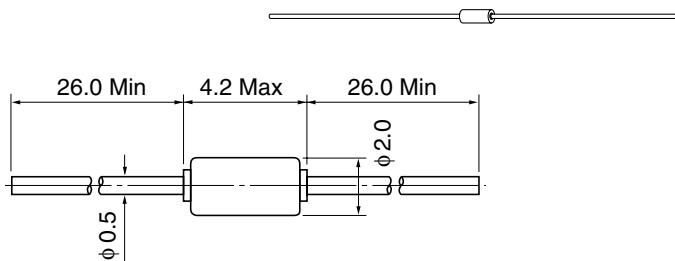


Taping appearance



Package Dimensions

As of July, 2001
Unit: mm



Hitachi Code	DO-35
JEDEC	Conforms
JEITA	Conforms
Mass (reference value)	0.13 g

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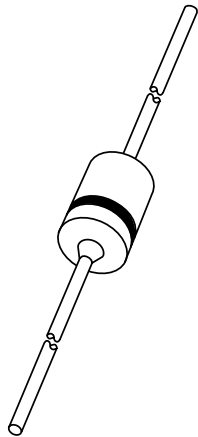
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DATA SHEET



1N5225B to 1N5267B Voltage regulator diodes

Product specification
Supersedes data of April 1992

1996 Apr 26

Voltage regulator diodes

1N5225B to 1N5267B

FEATURES

- Total power dissipation: max. 500 mW
- Tolerance series: $\pm 5\%$
- Working voltage range: nom. 3.0 to 75 V
- Non-repetitive peak reverse power dissipation: max. 40 W.

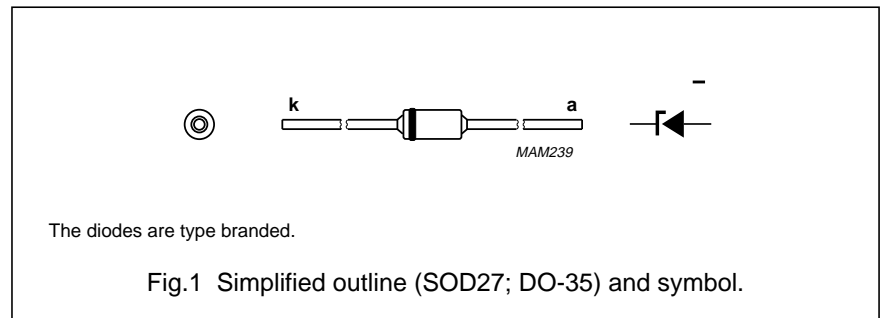
APPLICATIONS

- Low-power voltage stabilizers or voltage references.

DESCRIPTION

Low-power voltage regulator diodes in hermetically sealed leaded glass SOD27 (DO-35) packages.

The series consists of 43 types with nominal working voltages from 3.0 to 75 V.



LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_F	continuous forward current		–	250	mA
I_{ZSM}	non-repetitive peak reverse current	$t_p = 100 \mu\text{s}$; square wave; $T_j = 25 \text{ }^\circ\text{C}$ prior to surge	see Table "Per type"		
P_{tot}	total power dissipation	$T_{amb} = 50 \text{ }^\circ\text{C}$; lead length max.; note 1	–	400	mW
		Lead length 8 mm; note 2	–	500	mW
P_{ZSM}	non-repetitive peak reverse power dissipation	$t_p = 100 \mu\text{s}$; square wave; $T_j = 25 \text{ }^\circ\text{C}$ prior to surge; see Fig.3	–	40	W
		$t_p = 8.3 \text{ ms}$; square wave; $T_j \leq 55 \text{ }^\circ\text{C}$ prior to surge	–	10	W
T_{stg}	storage temperature		–65	+200	$^\circ\text{C}$
T_j	junction temperature		–65	+200	$^\circ\text{C}$

Notes

1. Device mounted on a printed circuit-board without metallization pad.
2. Tie-point temperature $\leq 75 \text{ }^\circ\text{C}$.

ELECTRICAL CHARACTERISTICS

Table 1

$T_j = 25 \text{ }^\circ\text{C}$; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
V_F	forward voltage	$I_F = 200 \text{ mA}$; see Fig.4	1.1	V

Voltage regulator diodes

1N5225B to 1N5267B

Per type

$T_j = 25\text{ }^\circ\text{C}$; unless otherwise specified.

TYPE No.	WORKING VOLTAGE V_Z (V) ⁽¹⁾ at I_{Ztest}	DIFFERENTIAL RESISTANCE r_{dif} (Ω) at I_{Ztest}	TEMP. COEFF. S_Z (%/K) at I_{Ztest} ⁽²⁾	TEST CURRENT I_{Ztest} (mA)	DIODE CAP. C_d (pF) at $f = 1\text{ MHz}$; at $V_R = 0\text{ V}$	REVERSE CURRENT at REVERSE VOLTAGE		NON-REPETITIVE PEAK REVERSE CURRENT I_{ZSM} (A) $t_p = 100\text{ }\mu\text{s}$; $T_{amb} = 25\text{ }^\circ\text{C}$
	NOM.	MAX.	MAX.			I_R (μA)	V_R (V)	
						MAX.	MAX.	
1N5225B	3.0	1600	-0.075	20	450	50	1.0	6.0
1N5226B	3.3	1600	-0.070	20	450	25	1.0	6.0
1N5227B	3.6	1700	-0.065	20	450	15	1.0	6.0
1N5228B	3.9	1900	-0.060	20	450	10	1.0	6.0
1N5229B	4.3	2000	± 0.055	20	450	5	1.0	6.0
1N5230B	4.7	1900	± 0.030	20	450	5	1.5	6.0
1N5231B	5.1	1600	± 0.030	20	300	5	2.0	6.0
1N5232B	5.6	1600	+0.038	20	300	5	3.0	6.0
1N5233B	6.0	1600	+0.038	20	300	5	3.5	6.0
1N5234B	6.2	1000	+0.045	20	200	5	4.0	6.0
1N5235B	6.8	750	+0.050	20	200	3	5.0	6.0
1N5236B	7.5	500	+0.058	20	150	3	6.0	4.0
1N5237B	8.2	500	+0.062	20	150	3	6.5	4.0
1N5238B	8.7	600	+0.065	20	150	3	6.5	3.5
1N5239B	9.1	600	+0.068	20	150	3	7.0	3.0
1N5240B	10	600	+0.075	20	90	3	8.0	3.0
1N5241B	11	600	+0.076	20	85	2	8.4	2.5
1N5242B	12	600	+0.077	20	85	1	9.1	2.5
1N5243B	13	600	+0.079	9.5	80	0.5	9.9	2.5
1N5244B	14	600	+0.082	9.0	80	0.1	10.0	2.0
1N5245B	15	600	+0.082	8.5	75	0.1	11.0	2.0
1N5246B	16	600	+0.083	7.8	75	0.1	12.0	1.5
1N5247B	17	600	+0.084	7.4	75	0.1	13.0	1.5
1N5248B	18	600	+0.085	7.0	70	0.1	14.0	1.5
1N5249B	19	600	+0.086	6.6	70	0.1	14.0	1.5
1N5250B	20	600	+0.086	6.2	60	0.1	15.0	1.5

Voltage regulator diodes

1N5225B to 1N5267B

TYPE No.	WORKING VOLTAGE V_Z (V) ⁽¹⁾ at I_{Ztest}	DIFFERENTIAL RESISTANCE r_{dif} (Ω) at I_{Ztest}	TEMP. COEFF. S_Z (%/K) at I_Z ⁽²⁾	TEST CURRENT I_{Ztest} (mA)	DIODE CAP. C_d (pF) at $f = 1$ MHz; at $V_R = 0$ V	REVERSE CURRENT at REVERSE VOLTAGE		NON-REPETITIVE PEAK REVERSE CURRENT I_{ZSM} (A) $t_p = 100 \mu\text{s}$; $T_{amb} = 25^\circ\text{C}$
	NOM.	MAX.	MAX.			I_R (μA)	V_R (V)	
						MAX.	MAX.	
1N5251B	22	600	+0.087	5.6	60	0.1	17.0	1.25
1N5252B	24	600	+0.088	5.2	55	0.1	18.0	1.25
1N5253B	25	600	+0.089	5.0	55	0.1	19.0	1.25
1N5254B	27	600	+0.090	4.6	50	0.1	21.0	1.0
1N5255B	28	600	+0.091	4.5	50	0.1	21.0	1.0
1N5256B	30	600	+0.091	4.2	50	0.1	23.0	1.0
1N5257B	33	700	+0.092	3.8	45	0.1	25.0	0.9
1N5258B	36	700	+0.093	3.4	45	0.1	27.0	0.8
1N5259B	39	800	+0.094	3.2	45	0.1	30.0	0.7
1N5260B	43	900	+0.095	3.0	40	0.1	33.0	0.6
1N5261B	47	1000	+0.095	2.7	40	0.1	36.0	0.5
1N5262B	51	1100	+0.096	2.5	40	0.1	39.0	0.4
1N5263B	56	1300	+0.096	2.2	40	0.1	43.0	0.3
1N5264B	60	1400	+0.097	2.1	40	0.1	46.0	0.3
1N5265B	62	1400	+0.097	2.0	35	0.1	47.0	0.3
1N5266B	68	1600	+0.097	1.8	35	0.1	52.0	0.25
1N5267B	75	1700	+0.098	1.7	35	0.1	56.0	0.2

Notes

- V_Z is measured with device at thermal equilibrium while held in clips at 10 mm from body in still air at 25 °C.
- For types 1N5225B to 1N5242B the I_Z current is 7.5 mA; for 1N5243B and higher $I_Z = I_{Ztest}$. S_Z values valid between 25 °C and 125 °C.

Voltage regulator diodes

1N5225B to 1N5267B

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-tp}$	thermal resistance from junction to tie-point	lead length 10 mm	300	K/W
$R_{th\ j-a}$	thermal resistance from junction to ambient	lead length max.; see Fig.2 and note 1	380	K/W

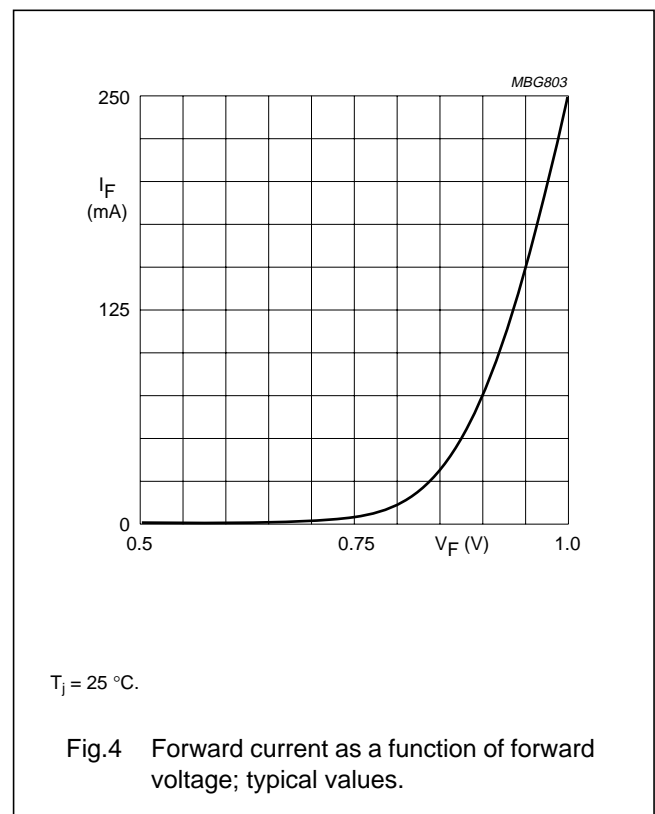
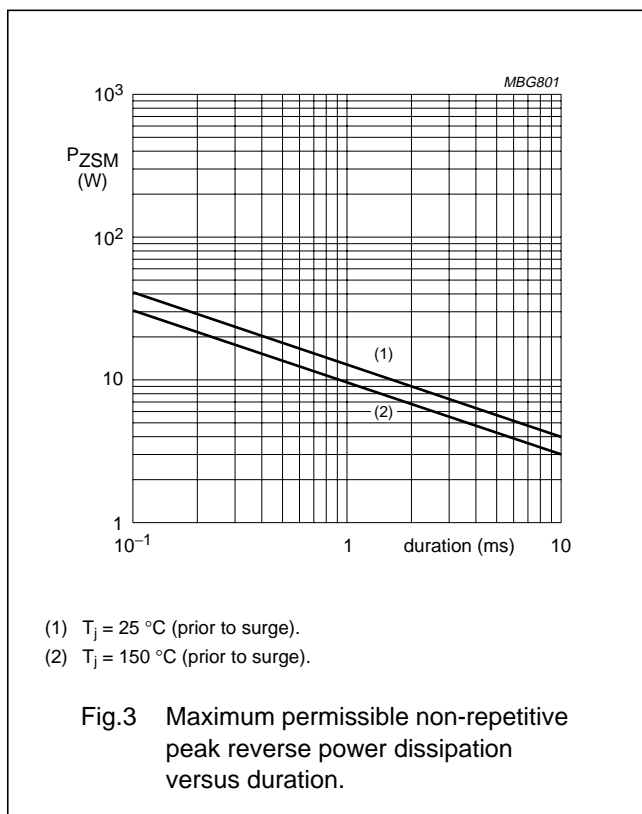
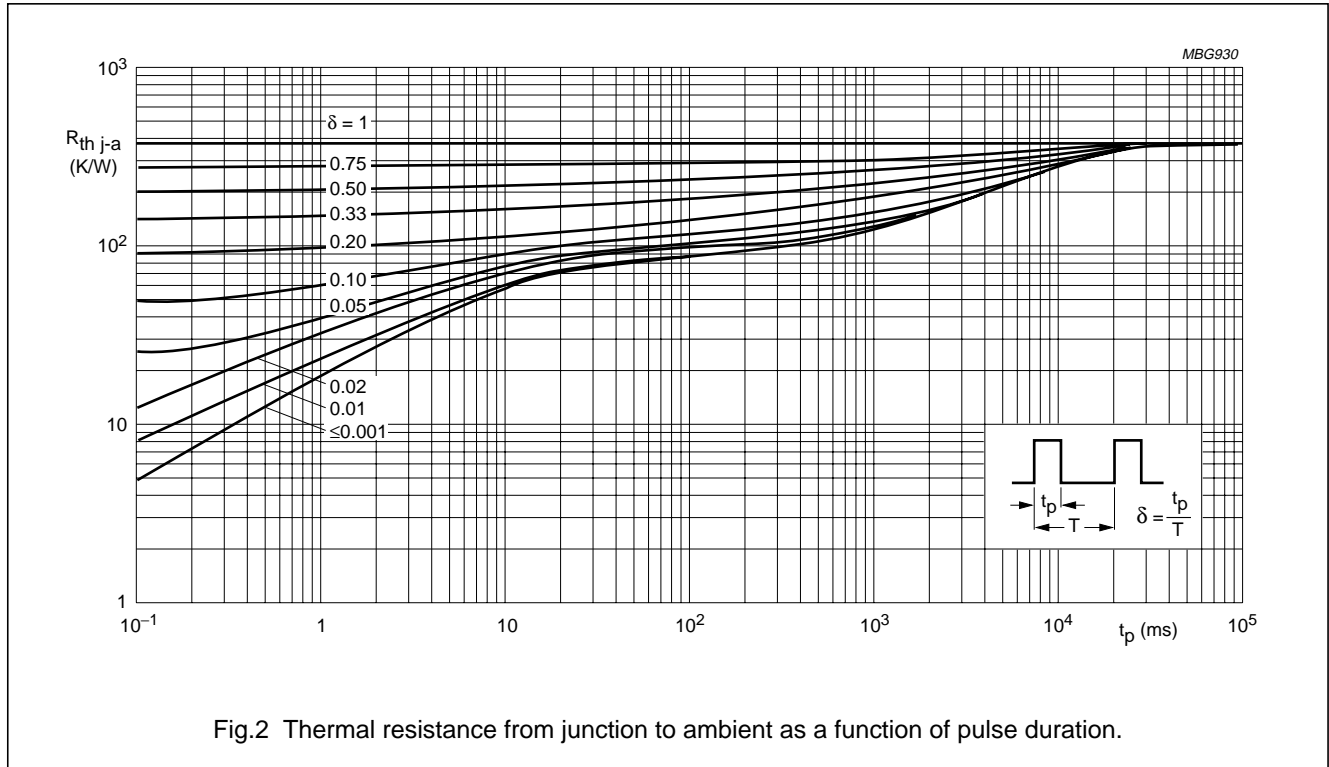
Note

1. Device mounted on a printed circuit-board without metallization pad.

Voltage regulator diodes

1N5225B to 1N5267B

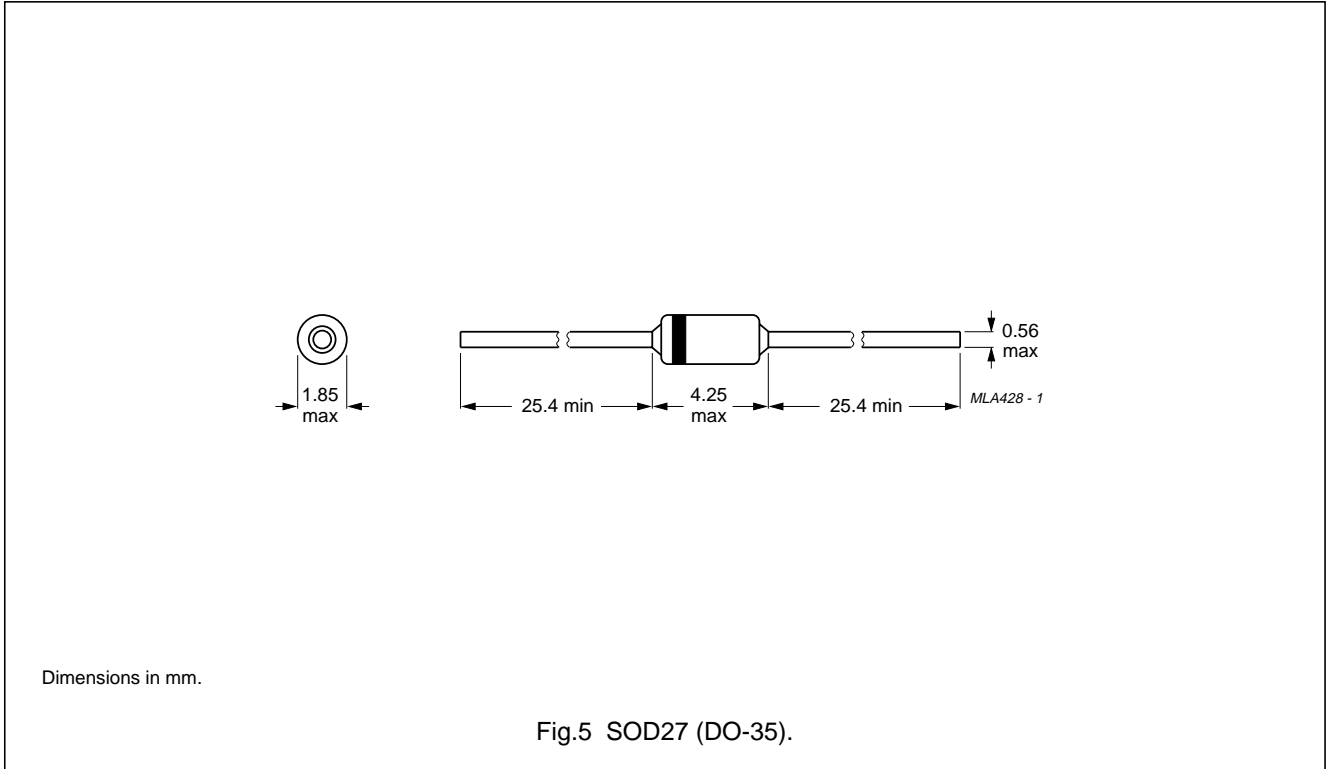
GRAPHICAL DATA



Voltage regulator diodes

1N5225B to 1N5267B

PACKAGE OUTLINE



DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

LIFE SUPPORT APPLICATIONS

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