

# MAZ1000 Series (MA1000 Series)

## Silicon planar type

For stabilization of power supply

### ■ Features

- High reliability, achieved by the combination the planar type and the glass seal
- Large power dissipation:  $P_D = 500$  mW (With a printed-circuit board)
- Wide voltage range:  $V_Z = 2.0$  V to 39 V
- Easy-to-use because of the finely divided zener voltage ranks, such as L, M, and H ranks
- Sharp rising performance

### ■ Absolute Maximum Ratings $T_a = 25^\circ\text{C}$

Parameter	Symbol	Rating	Unit
Average forward current	$I_{F(AV)}$	250	mA
Repetitive peak forward current	$I_{FRM}$	250	mA
Total power dissipation <sup>*1</sup>	$P_{tot}$	500	mW
Non-repetitive reverse surge power dissipation <sup>*2</sup>	$P_{ZSM}$	30	W
Junction temperature	$T_j$	200	°C
Storage temperature	$T_{stg}$	-65 to +200	°C

Note) \*1 : With a printed-circuit board

\*2 :  $t = 100 \mu\text{s}$ ,  $T_j = 150^\circ\text{C}$

### ■ Common Electrical Characteristics $T_a = 25^\circ\text{C}$ <sup>\*1</sup>

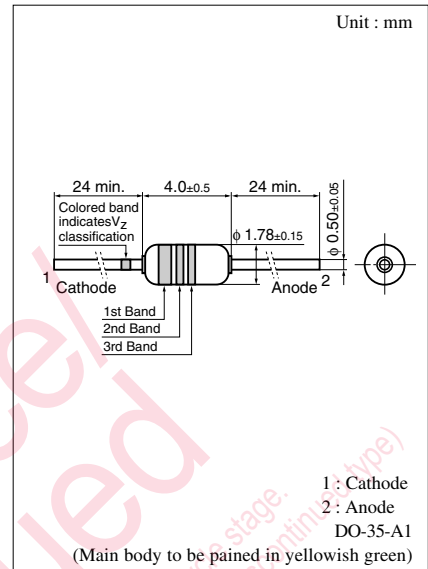
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Forward voltage (DC)	$V_F$	$I_F = 10$ mA		0.8	0.9	V
Zener voltage <sup>*2</sup>	$V_Z$	$I_Z$ ..... Specified value				V
Operating resistance	$R_{ZK}$	$I_Z$ ..... Specified value	Refer to the list of the electrical characteristics within part numbers			$\Omega$
	$R_Z$	$I_Z$ ..... Specified value				
Reverse current	$I_R$	$V_R$ ..... Specified value				
Temperature coefficient of zener voltage <sup>*3</sup>	$S_Z$	$I_Z$ ..... Specified value				mV/°C
Terminal capacitance	$C_t$	$V_R$ ..... Specified value				pF

Note) 1. Rated input/output frequency: 5 MHz

2. \*1 : The  $V_Z$  value is for the temperature of 25°C. In other cases, carry out the temperature compensation.

\*2 : Guaranteed at 20 ms after power application.

\*3 :  $T_j = 25^\circ\text{C}$  to 150°C



### •Color indication of $V_Z$ rank classification

L rank	M rank	H rank
Black	Blue	Red

Note) The part number in parenthesis shows conventional part number.

■ Electrical characteristics within part numbers  $T_a = 25^\circ\text{C}$

•  $V_Z = 2.0\text{ V to } 6.8\text{ V}$  ( $I_Z = 5\text{ mA}$ )

Part Number	Zener voltage			Reverse current				Operating resistance				Temperature coefficient of zener voltage			Terminal capacitance		Marking (Color indication) Main body: Yellowish green				
	$V_Z$ (V) $I_Z = 5\text{ mA}$			$I_{R1}$ ( $\mu\text{A}$ ) $V_R$ (V)		$I_{R2}$ ( $\mu\text{A}$ ) $V_R$ (V)		$R_Z$ ( $\Omega$ ) $I_Z = 5\text{ mA}$		$R_{ZK}$ ( $\Omega$ ) $I_Z$ (mA)		$S_Z$ (mV/ $^\circ\text{C}$ ) $I_Z = 5\text{ mA}$			$C_t$ (pF) ( $V_R = 0\text{ V}$ ) $f = 1\text{ MHz}$		1st.	2nd.	3rd.		
	Min	Nom	Max	Max	Max	Typ	Max	Typ	Max	Min	Typ	Max	Typ	Max							
MAZ1020	1.88	—	2.24	0.5	120	—	—	5	100	1	2000	-3.5	-1.5	0	375	450	Red	Black	Black		
MAZ1020-L	1.88	—	2.12																		
MAZ1020-H	2.01	—	2.24																		
MAZ1022	2.08	—	2.45	0.7	120	—	—	5	100	1	2000	-3.5	-1.5	0	375	450	Red	Red	Red		
MAZ1022-L	2.08	—	2.33																		
MAZ1022-H	2.20	—	2.45																		
MAZ1024	2.28	2.4	2.7	1	120	—	—	—	100	1	2000	-3.5	-1.6	0	375	450	Red	Yellow	Yellow		
MAZ1024-L	2.28	—	2.56																		
MAZ1024-H	2.4	—	2.7																		
MAZ1027	2.5	2.7	2.9	1	100	—	—	—	100	1	1000	-3.5	-2	0	350	450	Red	Purple	Purple		
MAZ1027-L	2.5	2.6	2.75																		
MAZ1027-H	2.65	2.8	2.9																		
MAZ1030	2.8	3.0	3.2	1	50	—	—	85	100	1	1000	-3.5	-2.1	0	350	450	Orange	Black	Black		
MAZ1030-L	2.83	2.9	2.97																		
MAZ1030-M	2.93	3.0	3.08																		
MAZ1030-H	3.02	3.1	3.18																		
MAZ1033	3.1	3.3	3.5	1	20	—	—	83	100	1	1000	-3.5	-2.4	0	325	450	Orange	Orange	Orange		
MAZ1033-L	3.12	3.2	3.28																		
MAZ1033-M	3.22	3.3	3.38																		
MAZ1033-H	3.32	3.4	3.49																		
MAZ1036	3.4	3.6	3.8	1	10	—	—	81	100	1	1000	-3.5	-2.4	0	300	450	Orange	Blue	Blue		
MAZ1036-L	3.41	3.5	3.59																		
MAZ1036-M	3.51	3.6	3.69																		
MAZ1036-H	3.61	3.7	3.79																		
MAZ1039	3.7	3.9	4.1	1	10	—	—	79	100	1	1000	-3.5	-2.5	0	300	450	Orange	White	White		
MAZ1039-L	3.71	3.8	3.9																		
MAZ1039-M	3.8	3.9	4.0																		
MAZ1039-H	3.9	4.0	4.1																		
MAZ1043	4.0	4.3	4.6	1	10	—	—	75	100	1	1000	-3.5	-2.5	0	275	450	Yellow	Orange	Orange		
MAZ1043-L	4.03	4.1	4.26																		
MAZ1043-M	4.17	4.3	4.4																		
MAZ1043-H	4.31	4.4	4.54																		
MAZ1047	4.4	4.7	5.0	1	3	—	—	50	80	1	900	-3.5	-1.4	0.2	130	180	Yellow	Purple	Purple		
MAZ1047-L	4.45	4.6	4.69																		
MAZ1047-M	4.59	4.7	4.83																		
MAZ1047-H	4.74	4.9	4.99																		
MAZ1051	4.8	5.1	5.4	2	2	—	—	40	60	1	800	-2.7	-0.8	1.2	110	160	Green	Brown	Brown		
MAZ1051-L	4.87	5.0	5.12																		
MAZ1051-M	5.0	5.1	5.26																		
MAZ1051-H	5.14	5.3	5.4																		
MAZ1056	5.3	5.6	6.0	2	1	—	—	15	40	1	500	-2	1.2	2.5	95	140	Green	Blue	Blue		
MAZ1056-L	5.3	5.4	5.58																		
MAZ1056-M	5.48	5.6	5.76																		
MAZ1056-H	5.66	5.8	5.95																		
MAZ1062	5.8	6.2	6.6	4	3	—	—	5.3	60	6	20	0.5	300	0.4	2.3	3.7	90	130	Blue	Red	Red
MAZ1062-L	5.85	6.0	6.15					5.3													
MAZ1062-M	6.05	6.2	6.36					5.5													
MAZ1062-H	6.24	6.4	6.56					5.7													
MAZ1068	6.4	6.8	7.2	4	2	—	—	5.9	60	6	15	0.5	140	1.2	3	4.5	85	110	Blue	Gray	Gray
MAZ1068-L	6.44	6.6	6.77					5.9													
MAZ1068-M	6.64	6.8	6.98					6.1													
MAZ1068-H	6.85	7.0	7.2					6.3													

■ Electrical characteristics within part numbers (continued)  $T_a = 25^\circ\text{C}$

•  $V_Z = 7.5\text{ V to } 22\text{ V}$  ( $I_Z = 5\text{ mA}$ )

Part Number	Zener voltage			Reverse current				Operating resistance				Temperature coefficient of zener voltage			Terminal capacitance		Marking (Color indication) Main body: Yellowish green																	
	$V_Z$ (V) $I_Z = 5\text{ mA}$			$I_{R1}$ ( $\mu\text{A}$ ) $V_R$		$I_{R2}$ ( $\mu\text{A}$ ) $V_R$		$R_Z$ ( $\Omega$ ) $I_Z = 5\text{ mA}$		$R_{ZK}$ ( $\Omega$ ) $I_Z$		$S_Z$ (mV/ $^\circ\text{C}$ ) $I_Z = 5\text{ mA}$			$C_t$ (pF) ( $V_R = 0\text{ V}$ ) $f = 1\text{ MHz}$																			
	Min	Mom	Max	(V)	Max	(V)	Max	Typ	Max	(mA)	Max	Min	Typ	Max	Typ	Max																		
	1st.	2nd.	3rd.																															
MAZ1075	7.0	7.5	7.9			6.5																												
MAZ1075-L	7.07	7.3	7.43	5	1	6.5	60	6	15	0.5	120	2.5	4	5.3	80	100	Purple	Green	Green															
MAZ1075-M	7.29	7.5	7.67			6.7																												
MAZ1075-H	7.51	7.7	7.89			7.0																												
MAZ1082	7.7	8.2	8.7	5	0.5	7.2	60	6	15	0.5	120	3.2	4.6	6.2	75	95	Gray	Red	Red															
MAZ1082-L	7.77	7.9	8.17			7.2																												
MAZ1082-M	8.03	8.2	8.43			7.5																												
MAZ1082-H	8.29	8.5	8.7			7.7																												
MAZ1091	8.5	9.1	9.6	6	0.2	8	60	6	15	0.5	130	3.8	5.5	7	70	90	White	Brown	Brown															
MAZ1091-L	8.58	8.8	9.02			8																												
MAZ1091-M	8.87	9.1	9.33			8.3																												
MAZ1091-H	9.14	9.4	9.6			8.6																												
MAZ1100	9.4	10	10.6			8.9																												
MAZ1100-L	9.44	9.7	9.92	7	0.2	8.9	60	8	20	0.5	130	4.5	6.4	8	70	90	Brown	Black	—															
MAZ1100-M	9.75	10	10.25			9.2																												
MAZ1100-H	10.07	10.3	10.59			9.5																												
MAZ1110	10.4	11	11.6	7	0.1	9.9	60	10	20	0.5	170	5.4	7.4	9	65	85	Brown	Brown	—															
MAZ1110-L	10.4	10.7	10.94			9.9																												
MAZ1110-M	10.73	11	11.28			10.2																												
MAZ1110-H	11.05	11.3	11.6			10.5																												
MAZ1120	11.4	12	12.7	8	0.1	10.9	60	10	25	0.5	170	6	8.4	10	65	85	Brown	Red	—															
MAZ1120-L	11.4	11.7	11.96			10.9																												
MAZ1120-M	11.73	12	12.33			11.2																												
MAZ1120-H	12.06	12.3	12.68			11.5																												
MAZ1130	12.4	13	14.1			11.9																												
MAZ1130-L	12.4	12.7	12.99	9	0.1	11.9	60	10	30	0.5	170	7	9.4	11	60	80	Brown	Orange	—															
MAZ1130-M	12.73	13	13.4			12.2																												
MAZ1130-H	13.25	13.7	14.08			12.7																												
MAZ1140-M	13.65	14	14.35	9	0.1	13.1	60	10	30	0.5	170	7	10	13	60	80	Brown	Yellow	—															
MAZ1150	13.9	15	15.6			13.4																												
MAZ1150-L	13.9	14.3	14.76			10														0.05	13.4	60	10	30	0.5	170	9.2	11.4	13	55	75	Brown	Green	—
MAZ1150-M	14.6	15	15.35																		14.1													
MAZ1150-H	14.95	15.3	15.6	14.4																														
MAZ1160	15.3	16	17.1	11	0.05	14.8	60	10	40	0.5	170	10.4	12.4	14	52	75	Brown	Blue	—															
MAZ1160-L	15.3	15.7	16.09			14.8																												
MAZ1160-M	15.7	16	16.5			15.2																												
MAZ1160-H	16.26	16.7	17.1			15.7																												
MAZ1180	16.9	18	19.1			16.4																												
MAZ1180-L	16.9	17.3	17.76	13	0.05	16.4	60	10	45	0.5	170	12.4	14.4	16	47	70	Brown	Gray	—															
MAZ1180-M	17.55	18	18.45			17																												
MAZ1180-H	18.2	18.7	19.1			17.7																												
MAZ1200	18.8	20	21.2	14	0.05	18.3	60	15	55	0.5	180	14.4	16.4	18	36	60	Red	Black	—															
MAZ1200-L	18.85	19.3	19.81			18.3																												
MAZ1200-M	19.50	20	20.5			19																												
MAZ1200-H	20.15	20.7	21.19			19.6																												
MAZ1220	20.8	22	23.3	15	0.05	20.3	60	20	55	0.5	180	16.4	18.4	20	34	60	Red	Red	—															
MAZ1220-L	20.8	21.3	21.86			20.3																												
MAZ1220-M	21.45	22	22.55			20.9																												
MAZ1220-H	22.1	22.7	23.24			21.6																												

■ Electrical characteristics within part numbers (continued)  $T_a = 25^\circ\text{C}$

•  $V_Z = 24\text{ V}$  ( $I_Z = 5\text{ mA}$ )

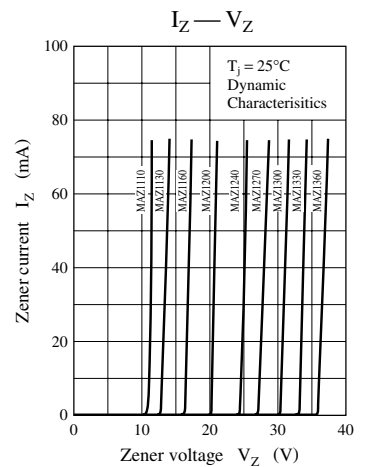
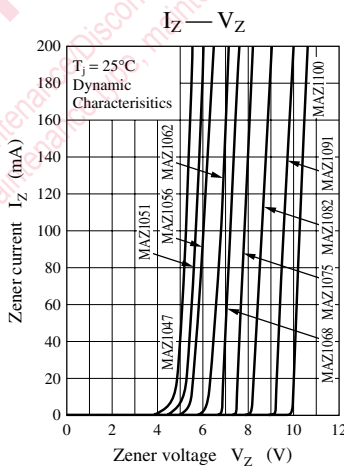
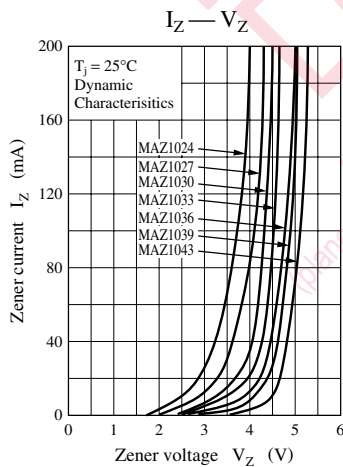
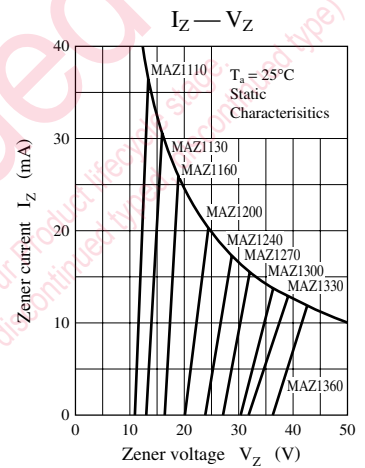
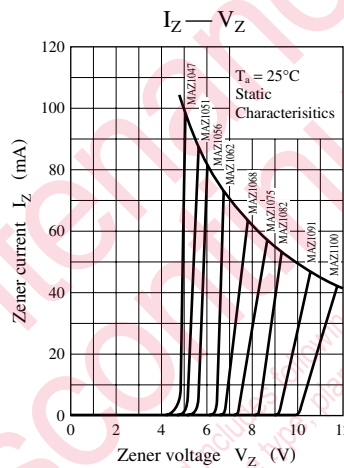
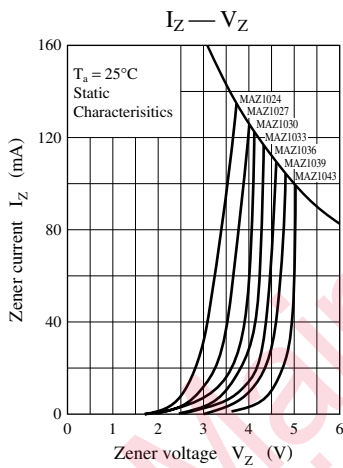
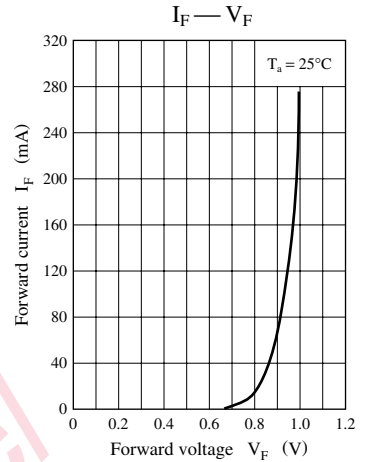
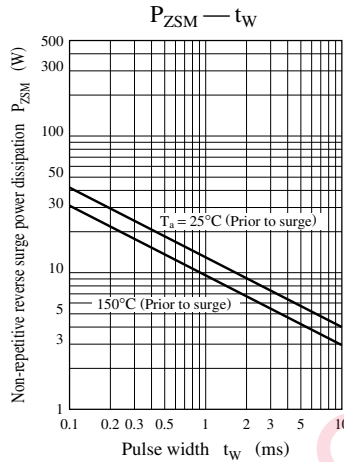
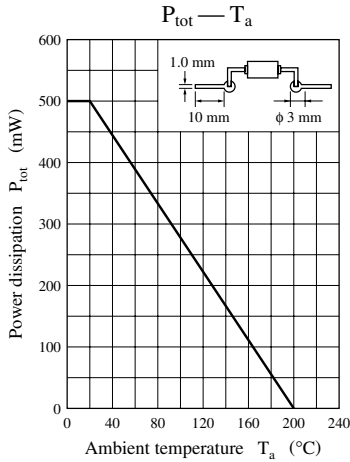
Part Number	Zener voltage			Reverse current				Operating resistance				Temperature coefficient of zener voltage			Terminal capacitance		Marking (Color indication) Main body: Yellowish green		
	$V_Z$ (V) $I_Z = 5\text{ mA}$			$I_{R1}$ ( $\mu\text{A}$ ) $V_R$		$I_{R2}$ ( $\mu\text{A}$ ) $V_R$		$R_Z$ ( $\Omega$ ) $I_Z = 5\text{ mA}$		$R_{ZK}$ ( $\Omega$ ) $I_Z$		$S_Z$ (mV/ $^\circ\text{C}$ ) $I_Z = 5\text{ mA}$			$C_t$ (pF) ( $V_R = 0\text{ V}$ ) $f = 1\text{ MHz}$				
	Min	Nom	Max	(V)	Max	(V)	Max	Typ	Max	(mA)	Max	Min	Typ	Max	Typ	Max	1st.	2nd.	3rd.
	MAZ1240	22.8	24	25.6	17	0.05	22.3	60	25	70	0.5	180	18.4	20.4	22	33	55	Red	Yellow
MAZ1240-L	22.8	23.3	23.97	22.3															
MAZ1240-M	23.5	24	24.7	23.8															
MAZ1240-H	24.35	25	25.6	23.8															

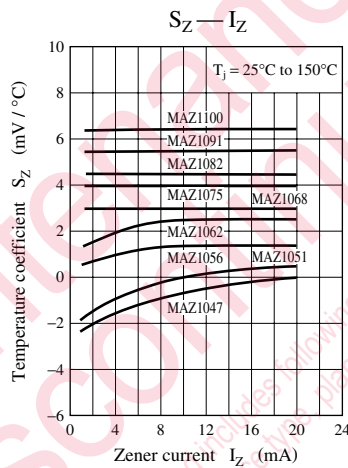
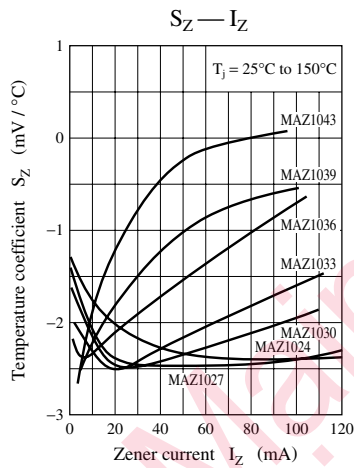
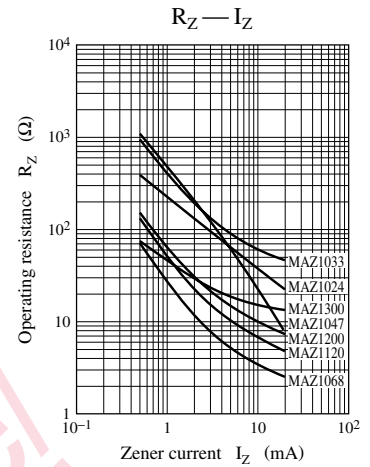
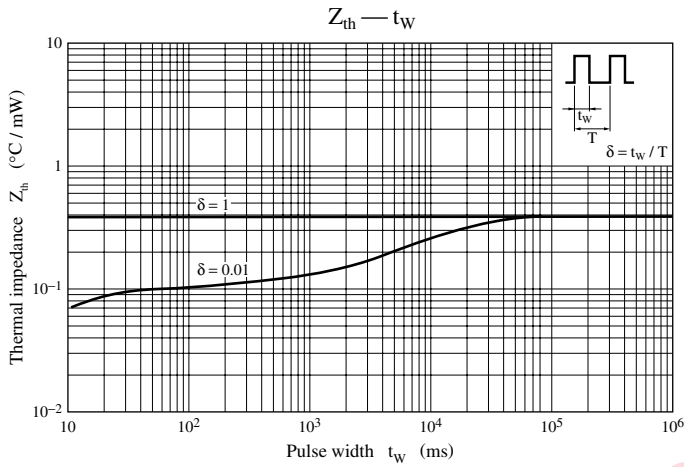
•  $V_Z = 27\text{ V to }39\text{ V}$  ( $I_Z = 2\text{ mA}$ )

Part Number	Zener voltage			Reverse current				Operating resistance				Temperature coefficient of zener voltage			Terminal capacitance		Marking (Color indication) Main body: Yellowish green		
	$V_Z$ (V) $I_Z = 2\text{ mA}$			$I_{R1}$ ( $\mu\text{A}$ ) $V_R$		$I_{R2}$ ( $\mu\text{A}$ ) $V_R$		$R_Z$ ( $\Omega$ ) $I_Z = 2\text{ mA}$		$R_{ZK}$ ( $\Omega$ ) $I_Z$		$S_Z$ (mV/ $^\circ\text{C}$ ) $I_Z = 2\text{ mA}$			$C_t$ (pF) ( $V_R = 0\text{ V}$ ) $f = 1\text{ MHz}$				
	Min	Nom	Max	(V)	Max	(V)	Max	Typ	Max	(mA)	Max	Min	Typ	Max	Typ	Max	1st.	2nd.	3rd.
	MAZ1270	25.1	27	28.9	19	0.05	24.8	60	25	80	0.5	200	21.4	23.4	25.3	30	50	Red	Purple
MAZ1270-L	25.3	26	26.7	24.8															
MAZ1270-M	26.3	27	27.7	25.8															
MAZ1270-H	27.3	28	28.7	26.8															
MAZ1300	28	30	32	21	0.05	27.8	60	30	80	0.5	200	24.4	26.6	29.4	27	50	Orange	Black	—
MAZ1300-L	28.3	29	29.7			27.8													
MAZ1300-M	29.3	30	30.8			28.8													
MAZ1300-H	30.2	31	31.8			29.7													
MAZ1330	31	33	35	23	0.05	30.7	60	35	80	0.5	200	27.4	29.7	33.4	25	45	Orange	Orange	—
MAZ1330-L	31.2	32	32.8			30.7													
MAZ1330-M	32.2	33	33.8			31.7													
MAZ1330-H	33.2	34	34.9			32.7													
MAZ1360	34	36	38	25	0.05	33.6	60	35	90	0.5	200	30.4	33	37.4	23	45	Orange	Blue	—
MAZ1360-L	34.1	35	35.9			33.6													
MAZ1360-M	35.1	36	36.9			34.6													
MAZ1360-H	36.1	37	37.9			35.6													
MAZ1390	37	—	41	27	0.05	36	60	—	130	0.5	250	33.4	36.4	41.2	21	45	Orange	White	—
MAZ1390-L	37.1	—	39			36													
MAZ1390-M	38	—	40			36													
MAZ1390-H	39	—	41			36													

Note) 1. The  $V_Z$  value is the one after power application for 20 ms at  $T_a = 25^\circ\text{C}$ .

2. The zener voltage temperature coefficient is the one for  $T_j = 25^\circ\text{C}$  to  $150^\circ\text{C}$ .





Zener Diodes	
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## Request for your special attention and precautions in using the technical information and semiconductors described in this book

- (1) If any of the products or technical information described in this book is to be exported or provided to non-residents, the laws and regulations of the exporting country, especially, those with regard to security export control, must be observed.
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- (3) The products described in this book are intended to be used for standard applications or general electronic equipment (such as office equipment, communications equipment, measuring instruments and household appliances).  
Consult our sales staff in advance for information on the following applications:
  - Special applications (such as for airplanes, aerospace, automobiles, traffic control equipment, combustion equipment, life support systems and safety devices) in which exceptional quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or harm the human body.
  - Any applications other than the standard applications intended.
- (4) The products and product specifications described in this book are subject to change without notice for modification and/or improvement. At the final stage of your design, purchasing, or use of the products, therefore, ask for the most up-to-date Product Standards in advance to make sure that the latest specifications satisfy your requirements.
- (5) When designing your equipment, comply with the range of absolute maximum rating and the guaranteed operating conditions (operating power supply voltage and operating environment etc.). Especially, please be careful not to exceed the range of absolute maximum rating on the transient state, such as power-on, power-off and mode-switching. Otherwise, we will not be liable for any defect which may arise later in your equipment.
  - Even when the products are used within the guaranteed values, take into the consideration of incidence of break down and failure mode, possible to occur to semiconductor products. Measures on the systems such as redundant design, arresting the spread of fire or preventing glitch are recommended in order to prevent physical injury, fire, social damages, for example, by using the products.
- (6) Comply with the instructions for use in order to prevent breakdown and characteristics change due to external factors (ESD, EOS, thermal stress and mechanical stress) at the time of handling, mounting or at customer's process. When using products for which damp-proof packing is required, satisfy the conditions, such as shelf life and the elapsed time since first opening the packages.
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