

# MAZ4000 Series (MA4000 Series)

## Silicon planar type

For stabilization of power supply

### ■ Features

- High reliability, achieved by the DHD structure
- Allowing to insert to a 5 mm pitch hole
- Finely divided zener-voltage rank
- Sharp rising performance
- Wide voltage range:  $V_Z = 2.0\text{ V to }39\text{ V}$

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

Parameter	Symbol	Rating	Unit
Average forward current	$I_{F(AV)}$	250	mA
Instantaneous forward current	$I_{FRM}$	250	mA
Total power dissipation <sup>*1</sup>	$P_{tot}$	370	mW
Non-repetitive reverse surge power dissipation <sup>*2</sup>	$P_{ZSM}$	30	W
Junction temperature	$T_j$	200	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-65 to +200	$^\circ\text{C}$

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

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

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

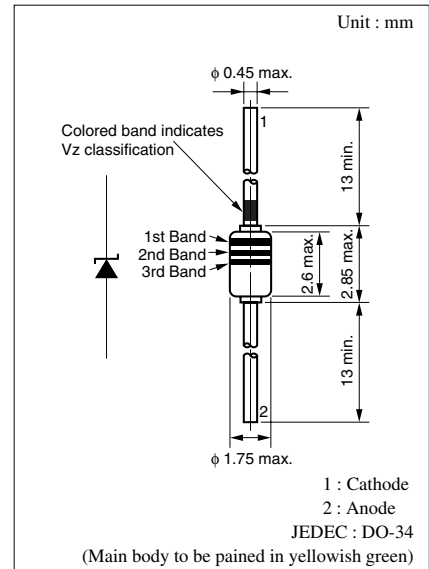
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Forward voltage	$V_F$	$I_F = 10\text{ mA}$		0.8	0.9	V
Zener voltage <sup>*2</sup>	$V_Z$	$I_Z$ ..... Specified value				V
Operating resistance	$R_{ZK}$	$I_Z$ ..... Specified value				$\Omega$
	$R_Z$	$I_Z$ ..... Specified value				$\Omega$
Reverse current	$I_{R1}$	$V_R$ ..... Specified value	Refer to the list of the electrical characteristics within part numbers			$\mu\text{A}$
	$I_{R2}$	$V_R$ ..... Specified value				$\mu\text{A}$
Temperature coefficient of zener voltage <sup>*3</sup>	$S_Z$	$I_Z$ ..... Specified value				$\text{mV}/^\circ\text{C}$
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  $25^\circ\text{C}$ . In other cases, carry out the temperature compensation.

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

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



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

L rank	M rank	H rank
Black	Blue	Red

Note) The part number in the 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					
MAZ4020	1.88	—	2.24	0.5	120	—	—	100	1	2000	-3.5	-1.5	0	375	450	Red	Black	Black	
MAZ4020-L	1.88	—	2.12																
MAZ4020-H	2.01	—	2.24																
MAZ4022	2.08	—	2.45	0.7	120	—	—	100	1	2000	-3.5	-1.5	0	375	450	Red	Red	Red	
MAZ4022-L	2.08	—	2.33																
MAZ4022-H	2.20	—	2.45																
MAZ4024	2.28	2.4	2.7	1	120	—	—	100	1	2000	-3.5	-1.6	0	375	450	Red	Yellow	Yellow	
MAZ4024-L	2.28	—	2.56																
MAZ4024-H	2.4	—	2.7																
MAZ4027	2.5	2.7	2.9	1	100	—	—	100	1	1000	-3.5	-2	0	350	450	Red	Purple	Purple	
MAZ4027-L	2.5	—	2.75																
MAZ4027-H	2.65	—	2.9																
MAZ4030	2.8	3.0	3.2	1	50	—	—	85	100	1	1000	-3.5	-2.1	0	350	450	Orange	Black	Black
MAZ4030-L	2.83	2.9	2.97																
MAZ4030-M	2.93	3.0	3.08																
MAZ4030-H	3.02	3.1	3.18																
MAZ4033	3.1	3.3	3.5	1	20	—	—	83	100	1	1000	-3.5	-2.4	0	325	450	Orange	Orange	Orange
MAZ4033-L	3.12	3.2	3.28																
MAZ4033-M	3.22	3.3	3.38																
MAZ4033-H	3.32	3.4	3.49																
MAZ4036	3.4	3.6	3.8	1	10	—	—	81	100	1	1000	-3.5	-2.4	0	300	450	Orange	Blue	Blue
MAZ4036-L	3.41	3.5	3.59																
MAZ4036-M	3.51	3.6	3.69																
MAZ4036-H	3.61	3.7	3.79																
MAZ4039	3.7	3.9	4.1	1	10	—	—	79	100	1	1000	-3.5	-2.5	0	300	450	Orange	White	White
MAZ4039-L	3.71	3.8	3.9																
MAZ4039-M	3.8	3.9	4.0																
MAZ4039-H	3.9	4.0	4.1																
MAZ4043	4.0	4.3	4.6	1	10	—	—	75	100	1	1000	-3.5	-2.5	0	275	450	Yellow	Orange	Orange
MAZ4043-L	4.03	4.1	4.26																
MAZ4043-M	4.17	4.3	4.4																
MAZ4043-H	4.31	4.4	4.54																
MAZ4047	4.4	4.7	5.0	1	3	—	—	50	80	1	900	-3.5	-1.4	0.2	130	180	Yellow	Purple	Purple
MAZ4047-L	4.45	4.6	4.69																
MAZ4047-M	4.59	4.7	4.83																
MAZ4047-H	4.74	4.9	4.99																
MAZ4051	4.8	5.1	5.4	2	2	—	—	40	60	1	800	-2.7	0.8	1.2	110	160	Green	Brown	Brown
MAZ4051-L	4.87	5.0	5.12																
MAZ4051-M	5.0	5.1	5.26																
MAZ4051-H	5.14	5.3	5.4																
MAZ4056	5.3	5.6	6.0	2	1	—	—	15	40	1	500	-2	1.2	2.5	95	140	Green	Blue	Blue
MAZ4056-L	5.3	5.4	5.58																
MAZ4056-M	5.48	5.6	5.76																
MAZ4056-H	5.66	5.8	5.95																
MAZ4062	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
MAZ4062-L	5.85	6.0	6.15																
MAZ4062-M	6.05	6.2	6.36																
MAZ4062-H	6.24	6.4	6.56																
MAZ4068	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
MAZ4068-L	6.44	6.6	6.77																
MAZ4068-M	6.64	6.8	6.98																
MAZ4068-H	6.85	7.0	7.2																

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

•  $V_Z = 7.5\text{ V to }20\text{ V}$  ( $I_Z = 5\text{ mA}$ )

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)			$I_{R1}$ ( $\mu\text{A}$ )	$I_{R2}$ ( $\mu\text{A}$ )	$R_Z$ ( $\Omega$ )		$R_{ZK}$ ( $\Omega$ )		$S_Z$ (mV/ $^\circ\text{C}$ )			$C_t$ (pF)						
	$I_Z = 5\text{ mA}$			$V_R$	$V_R$	$I_Z = 5\text{ mA}$		$I_Z$		$I_Z = 5\text{ mA}$			$(V_R = 0\text{ V})$						
	Min	Nom	Max	(V)	Max	Typ	Max	(mA)	Max	Min	Typ	Max	Typ	Max	1st.	2nd.	3rd.		
MAZ4075	7.0	7.5	7.9	5	1	60	6	15	0.5	120	2.5	4	5.3	80	100	Purple	Green	Green	
MAZ4075-L	7.07	7.3	7.43																6.5
MAZ4075-M	7.29	7.5	7.67																6.7
MAZ4075-H	7.51	7.7	7.89																7.0
MAZ4082	7.7	8.2	8.7	5	0.5	60	6	15	0.5	120	3.2	4.6	6.2	75	95	Gray	Red	Red	
MAZ4082-L	7.77	7.9	8.17																7.2
MAZ4082-M	8.03	8.2	8.43																7.5
MAZ4082-H	8.29	8.5	8.7																7.7
MAZ4091	8.5	9.1	9.6	6	0.2	60	6	15	0.5	130	3.8	5.5	7	70	90	White	Brown	Brown	
MAZ4091-L	8.58	8.8	9.02																8
MAZ4091-M	8.87	9.1	9.33																8.3
MAZ4091-H	9.14	9.4	9.6																8.6
MAZ4100	9.4	10	10.6	7	0.2	60	8	20	0.5	130	4.5	6.4	8	70	90	Brown	Black	—	
MAZ4100-L	9.44	9.7	9.92																8.9
MAZ4100-M	9.75	10	10.25																9.2
MAZ4100-H	10.07	10.3	10.59																9.5
MAZ4110	10.4	11	11.6	7	0.1	60	10	20	0.5	170	5.4	7.4	9	65	85	Brown	Brown	—	
MAZ4110-L	10.4	10.7	10.94																9.9
MAZ4110-M	10.73	11	11.28																10.2
MAZ4110-H	11.05	11.3	11.6																10.5
MAZ4120	11.4	12	12.7	8	0.1	60	10	25	0.5	170	6	8.4	10	65	85	Brown	Red	—	
MAZ4120-L	11.4	11.7	11.96																10.9
MAZ4120-M	11.73	12	12.33																11.2
MAZ4120-H	12.06	12.3	12.68																11.5
MAZ4130	12.4	13	14.1	9	0.1	60	10	30	0.5	170	7	9.4	11	60	80	Brown	Orange	—	
MAZ4130-L	12.4	12.7	12.99																11.9
MAZ4130-M	12.73	13	13.4																12.2
MAZ4130-H	13.25	13.7	14.08																12.7
MAZ4140-M	13.65	14	14.35	10	0.05	60	10	30	0.5	170	9.2	11.4	13	55	75	Brown	Green	—	
MAZ4150	13.9	15	15.6																13.4
MAZ4150-L	13.9	14.3	14.76																14.1
MAZ4150-M	14.6	15	15.35																14.4
MAZ4150-H	14.95	15.3	15.6	11	0.05	60	10	40	0.5	170	10.4	12.4	14	52	75	Brown	Blue	—	
MAZ4160	15.3	16	17.1																14.8
MAZ4160-L	15.3	15.7	16.09																14.8
MAZ4160-M	15.7	16	16.5																15.2
MAZ4160-H	16.26	16.7	17.1	15.7															
MAZ4180	16.9	18	19.1	13	0.05	60	10	45	0.5	170	12.4	14.4	16	47	70	Brown	Gray	—	
MAZ4180-L	16.9	17.3	17.76																16.4
MAZ4180-M	17.55	18	18.45																17
MAZ4180-H	18.2	18.7	19.1																17.7
MAZ4200	18.8	20	21.2	14	0.05	60	15	55	0.5	180	14.4	16.4	18	36	60	Red	Black	—	
MAZ4200-L	18.85	19.3	19.81																18.3
MAZ4200-M	19.50	20	20.5																19
MAZ4200-H	20.15	20.7	21.19																19.6

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

•  $V_Z = 22\text{ V to } 24\text{ V}$  ( $I_Z = 5\text{ mA}$ )

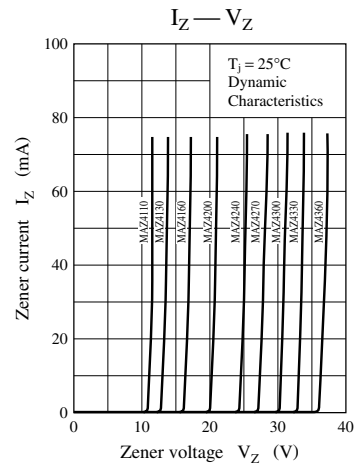
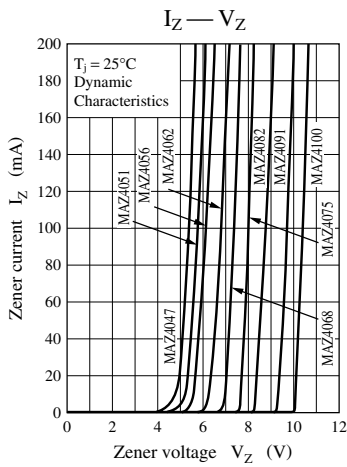
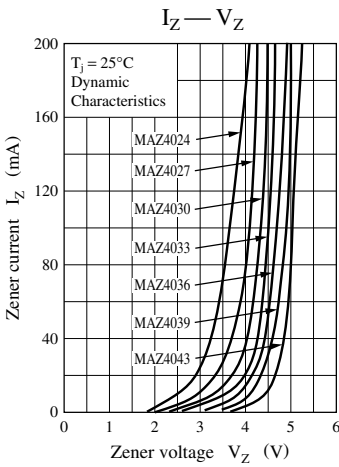
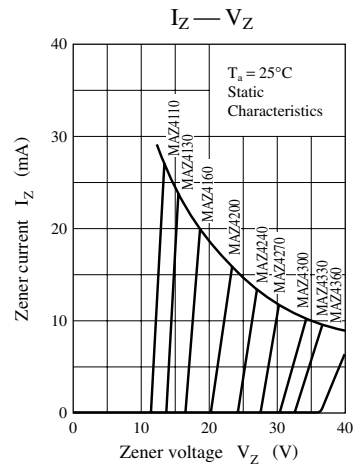
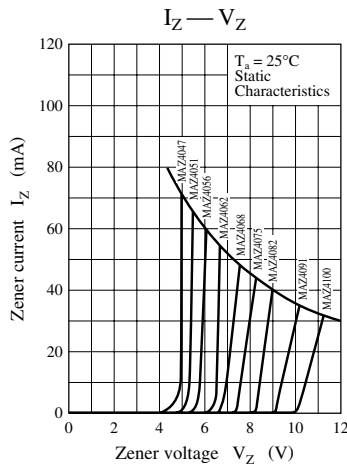
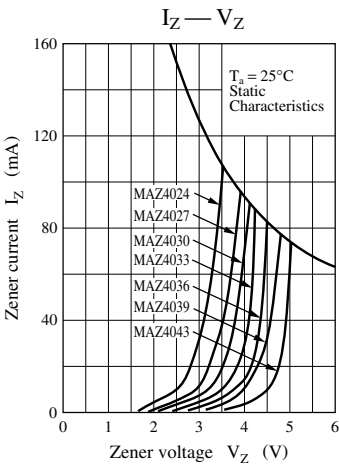
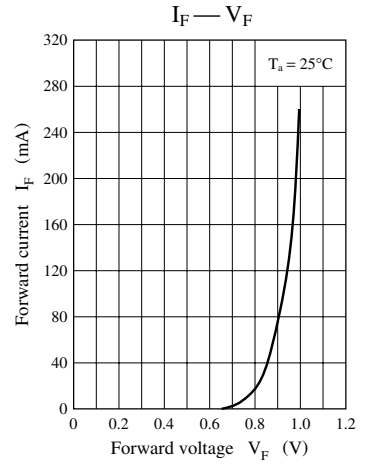
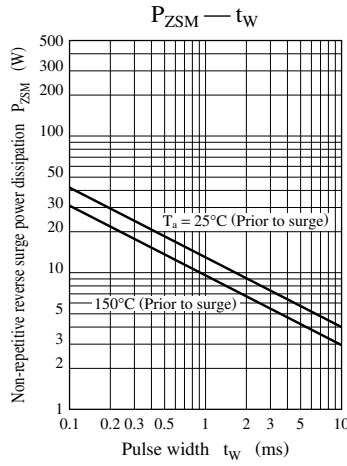
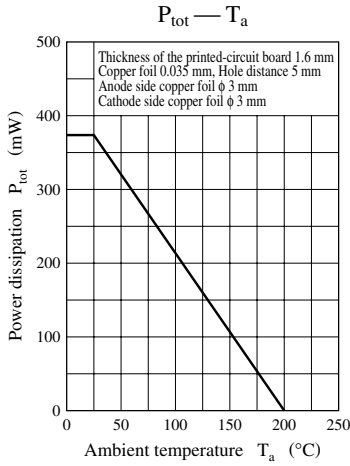
Part Number	Zener voltage			Reverse current		Operating resistance				Temperature coefficient of zener voltage			Terminal capacitance		Marking (Color indication) Main body: Yellowish green					
	$V_Z$ (V) $I_Z = 5\text{ mA}$			$I_{R1}$ ( $\mu\text{A}$ ) $V_R$		$I_{R2}$ ( $\mu\text{A}$ ) $V_R$		$R_Z$ ( $\Omega$ ) $I_Z = 5\text{ mA}$		$R_{ZK}$ ( $\Omega$ ) $I_Z$		$S_Z$ (mV/ $^\circ\text{C}$ ) $I_Z = 5\text{ mA}$						$C_t$ (pF) ( $V_R = 0\text{ V}$ ) $f = 1\text{ MHz}$		
	Min	Nom	Max	$V_R$ (V)	Max	$V_R$ (V)	Max	$I_Z$ Typ	Max	$I_Z$ (mA)	Max	Min	Typ	Max	Typ	Max				
															1st.	2nd.	3rd.			
MAZ4220	20.8	22	23.3	15	0.05	20.3	60	20	5.5	0.5	180	16.4	18.4	20	34	60	Red	Red	—	
MAZ4220-L	20.8	21.3	21.86																	20.3
MAZ4220-M	21.45	22	22.55																	20.9
MAZ4220-H	22.1	22.7	23.24	17	0.05	21.6	60	25	70	0.5	180	18.4	20.4	22	33	55	Red	Yellow	—	
MAZ4240	22.8	24	25.6																	22.3
MAZ4240-L	22.8	23.3	23.97																	22.3
MAZ4240-M	23.5	24	24.7																	23
MAZ4240-H	24.35	25	25.6	23.8																

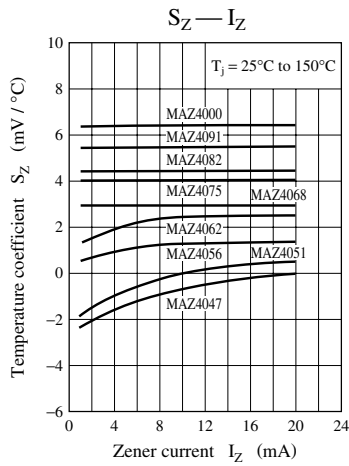
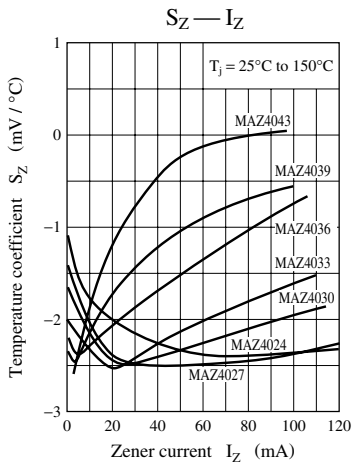
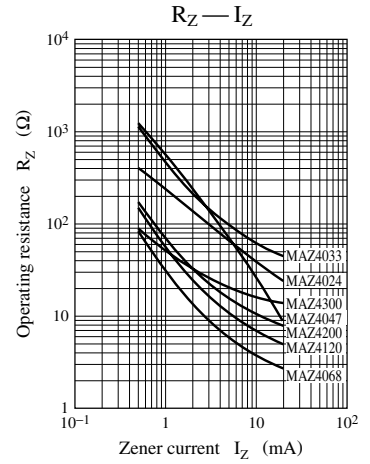
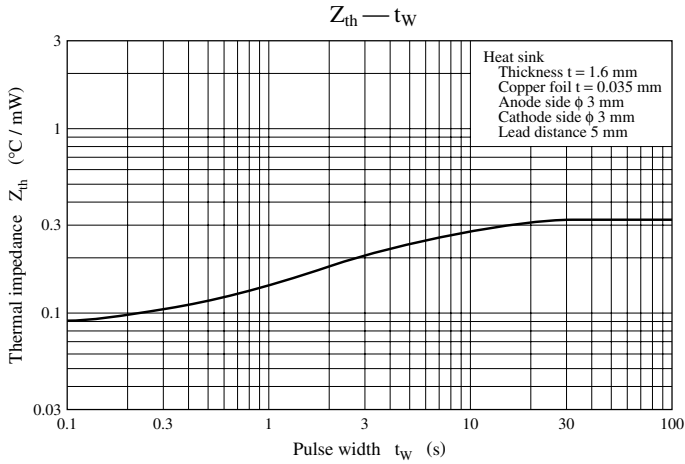
•  $V_Z = 27\text{ V to } 39\text{ V}$  ( $I_Z = 2\text{ mA}$ )

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	$V_R$ (V)	Max	$V_R$ (V)	Max	$I_Z$ Typ	Max	$I_Z$ (mA)	Max	Min	Typ	Max	Typ	Max				
															1st.	2nd.	3rd.			
MAZ4270	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	—	
MAZ4270-L	25.3	26	26.7																	24.8
MAZ4270-M	26.3	27	27.7																	25.8
MAZ4270-H	27.3	28	28.7	21	0.05	26.8	60	30	80	0.5	200	24.4	26.6	29.4	27	50	Orange	Black	—	
MAZ4300	28	30	32																	27.8
MAZ4300-L	28.3	29	29.7																	27.8
MAZ4300-M	29.3	30	30.8																	28.8
MAZ4300-H	30.2	31	31.8	23	0.05	29.7	60	35	80	0.5	200	27.4	29.7	33.4	25	45	Orange	Orange	—	
MAZ4330	31	33	35																	30.7
MAZ4330-L	31.2	32	32.8																	30.7
MAZ4330-M	32.2	33	33.8	31.7																
MAZ4330-H	33.2	34	34.9	25	0.05	32.7	60	35	90	0.5	200	30.4	33	37.4	23	45	Orange	Blue	—	
MAZ4360	34	36	38																	33.6
MAZ4360-L	34.1	35	35.9																	33.6
MAZ4360-M	35.1	36	36.9	34.6																
MAZ4360-H	36.1	37	37.9	27	0.05	35.6	60	—	130	0.5	250	33.4	36.4	41.2	21	45	Orange	White	—	
MAZ4390	37	—	41																	36
MAZ4390-L	37.1	—	39																	36
MAZ4390-M	38	—	40																	36
MAZ4390-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  $150^\circ\text{C}$ .





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

- (1) An export permit needs to be obtained from the competent authorities of the Japanese Government if any of the products or technologies described in this material and controlled under the "Foreign Exchange and Foreign Trade Law" is to be exported or taken out of Japan.
- (2) The technical information described in this material is limited to showing representative characteristics and applied circuit examples of the products. It does not constitute the warranting of industrial property, the granting of relative rights, or the granting of any license.
- (3) The products described in this material 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 material are subject to change without notice for reasons of 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 guaranteed values, in particular those of maximum rating, the range of operating power supply voltage and heat radiation characteristics. 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, redundant design is recommended, so that such equipment may not violate relevant laws or regulations because of the function of our products.
- (6) When using products for which dry packing is required, observe the conditions (including shelf life and after-unpacking standby time) agreed upon when specification sheets are individually exchanged.
- (7) No part of this material may be reprinted or reproduced by any means without written permission from our company.

## Please read the following notes before using the datasheets

- A. These materials are intended as a reference to assist customers with the selection of Panasonic semiconductor products best suited to their applications.  
Due to modification or other reasons, any information contained in this material, such as available product types, technical data, and so on, is subject to change without notice.  
Customers are advised to contact our semiconductor sales office and obtain the latest information before starting precise technical research and/or purchasing activities.
- B. Panasonic is endeavoring to continually improve the quality and reliability of these materials but there is always the possibility that further rectifications will be required in the future. Therefore, Panasonic will not assume any liability for any damages arising from any errors etc. that may appear in this material.
- C. These materials are solely intended for a customer's individual use.  
Therefore, without the prior written approval of Panasonic, any other use such as reproducing, selling, or distributing this material to a third party, via the Internet or in any other way, is prohibited.