

# 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
Repetitive peak forward current	$I_{FRM}$	250	mA
Total power dissipation*1	$P_{tot}$	370	mW
Non-repetitive reverse surge power dissipation*2	$P_{ZSM}$	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

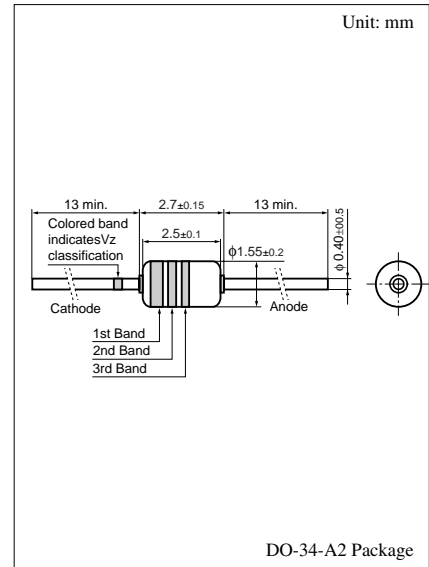
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Forward voltage	$V_F$	$I_F = 10\text{ mA}$		0.8	0.9	V
Zener voltage*2	$V_Z$	$I_Z$ Specified value				V
Zener knee operating resistance	$R_{ZK}$	$I_Z$ Specified value				$\Omega$
Zener operating resistance	$R_Z$	$I_Z$ Specified value				$\Omega$
Reverse current	$I_{R1}$	$V_R$ Specified value				$\mu\text{A}$
	$I_{R2}$	$V_R$ Specified value				$\mu\text{A}$
Temperature coefficient of zener voltage*3	$S_Z$	$I_Z$ 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

Rank	L	M	H
Color	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				Zener operating resistance				Temperature coefficient of zener voltage			Terminal capacitance		Marking symbol (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																
MAZ40200L	1.88	—	2.12	0.5	120	—	—	—	100	1	2000	-3.5	-1.5	0	375	450	Red	Black	Black
MAZ40200H	2.01	—	2.24																
MAZ4022	2.08	—	2.45																
MAZ40220L	2.08	—	2.33	0.7	120	—	—	—	100	1	2000	-3.5	-1.5	0	375	450	Red	Red	Red
MAZ40220H	2.20	—	2.45																
MAZ4024	2.28	2.4	2.7																
MAZ40240L	2.28	—	2.56	1	120	—	—	—	100	1	2000	-3.5	-1.6	0	375	450	Red	Yellow	Yellow
MAZ40240H	2.4	—	2.7																
MAZ4027	2.5	2.7	2.9																
MAZ40270L	2.5	—	2.75	1	100	—	—	—	100	1	1000	-3.5	-2	0	350	450	Red	Purple	Purple
MAZ40270H	2.65	—	2.9																
MAZ4030	2.8	3.0	3.2																
MAZ40300L	2.83	2.9	2.97	1	50	—	—	85	100	1	1000	-3.5	-2.1	0	350	450	Orange	Black	Black
MAZ40300M	2.93	3.0	3.08																
MAZ40300H	3.02	3.1	3.18																
MAZ4033	3.1	3.3	3.5																
MAZ40330L	3.12	3.2	3.28	1	20	—	—	83	100	1	1000	-3.5	-2.4	0	325	450	Orange	Orange	Orange
MAZ40330M	3.22	3.3	3.38																
MAZ40330H	3.32	3.4	3.49																
MAZ4036	3.4	3.6	3.8																
MAZ40360L	3.41	3.5	3.59	1	10	—	—	81	100	1	1000	-3.5	-2.4	0	300	450	Orange	Blue	Blue
MAZ40360M	3.51	3.6	3.69																
MAZ40360H	3.61	3.7	3.79																
MAZ4039	3.7	3.9	4.1																
MAZ40390L	3.71	3.8	3.9	1	10	—	—	79	100	1	1000	-3.5	-2.5	0	300	450	Orange	White	White
MAZ40390M	3.8	3.9	4.0																
MAZ40390H	3.9	4.0	4.1																
MAZ4043	4.0	4.3	4.6																
MAZ40430L	4.03	4.1	4.26	1	10	—	—	75	100	1	1000	-3.5	-2.5	0	275	450	Yellow	Orange	Orange
MAZ40430M	4.17	4.3	4.4																
MAZ40430H	4.31	4.4	4.54																
MAZ4047	4.4	4.7	5.0																
MAZ40470L	4.45	4.6	4.69	1	3	—	—	50	80	1	900	-3.5	-1.4	0.2	130	180	Yellow	Purple	Purple
MAZ40470M	4.59	4.7	4.83																
MAZ40470H	4.74	4.9	4.99																
MAZ4051	4.8	5.1	5.4																
MAZ40510L	4.87	5.0	5.12	2	2	—	—	40	60	1	800	-2.7	0.8	1.2	110	160	Green	Brown	Brown
MAZ40510M	5.0	5.1	5.26																
MAZ40510H	5.14	5.3	5.4																
MAZ4056	5.3	5.6	6.0																
MAZ40560L	5.3	5.4	5.58	2	1	—	—	15	40	1	500	-2	1.2	2.5	95	140	Green	Blue	Blue
MAZ40560M	5.48	5.6	5.76																
MAZ40560H	5.66	5.8	5.95																
MAZ4062	5.8	6.2	6.6																
MAZ40620L	5.85	6.0	6.15	4	3	5.3	60	6	20	0.5	300	0.4	2.3	3.7	90	130	Blue	Red	Red
MAZ40620M	6.05	6.2	6.36			5.5													
MAZ40620H	6.24	6.4	6.56			5.7													
MAZ4068	6.4	6.8	7.2																
MAZ40680L	6.44	6.6	6.77	4	2	5.9	60	6	15	0.5	140	1.2	3	4.5	85	110	Blue	Gray	Gray
MAZ40680M	6.64	6.8	6.98			6.1													
MAZ40680H	6.85	7.0	7.2			6.3													

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

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

Part number	Zener voltage			Reverse current				Zener operating resistance				Temperature coefficient of zener voltage			Terminal capacitance		Marking symbol (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.																	
MAZ4075	7.0	7.5	7.9			6.5														
MAZ40750L	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	
MAZ40750M	7.29	7.5	7.67			6.7														
MAZ40750H	7.51	7.7	7.89			7.0														
MAZ4082	7.7	8.2	8.7			7.2														
MAZ40820L	7.77	7.9	8.17	5	0.5	7.2	60	6	15	0.5	120	3.2	4.6	6.2	75	95	Gray	Red	Red	
MAZ40820M	8.03	8.2	8.43			7.5														
MAZ40820H	8.29	8.5	8.7			7.7														
MAZ4091	8.5	9.1	9.6			8														
MAZ40910L	8.58	8.8	9.02	6	0.2	8	60	6	15	0.5	130	3.8	5.5	7	70	90	White	Brown	Brown	
MAZ40910M	8.87	9.1	9.33			8.3														
MAZ40910H	9.14	9.4	9.6			8.6														
MAZ4100	9.4	10	10.6			8.9														
MAZ41000L	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	—	
MAZ41000M	9.75	10	10.25			9.2														
MAZ41000H	10.07	10.3	10.59			9.5														
MAZ4110	10.4	11	11.6			9.9														
MAZ41100L	10.4	10.7	10.94	7	0.1	9.9	60	10	20	0.5	170	5.4	7.4	9	65	85	Brown	Brown	—	
MAZ41100M	10.73	11	11.28			10.2														
MAZ41100H	11.05	11.3	11.6			10.5														
MAZ4120	11.4	12	12.7			10.9														
MAZ41200L	11.4	11.7	11.96	8	0.1	10.9	60	10	25	0.5	170	6	8.4	10	65	85	Brown	Red	—	
MAZ41200M	11.73	12	12.33			11.2														
MAZ41200H	12.06	12.3	12.68			11.5														
MAZ4130	12.4	13	14.1			11.9														
MAZ41300L	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	—	
MAZ41300M	12.73	13	13.4			12.2														
MAZ41300H	13.25	13.7	14.08			12.7														
MAZ41400M	13.65	14	14.35	9	0.1	13.1	60	10	30	0.5	170	7	10	13	60	80	Brown	Yellow	—	
MAZ4150	13.9	15	15.6			13.4														
MAZ41500L	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	—	
MAZ41500M	14.6	15	15.35			14.1														
MAZ41500H	14.95	15.3	15.6			14.4														
MAZ4160	15.3	16	17.1			14.8														
MAZ41600L	15.3	15.7	16.09	11	0.05	14.8	60	10	40	0.5	170	10.4	12.4	14	52	75	Brown	Blue	—	
MAZ41600M	15.7	16	16.5			15.2														
MAZ41600H	16.26	16.7	17.1			15.7														
MAZ4180	16.9	18	19.1			16.4														
MAZ41800L	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	—	
MAZ41800M	17.55	18	18.45			17														
MAZ41800H	18.2	18.7	19.1			17.7														
MAZ4200	18.8	20	21.2			18.3														
MAZ42000L	18.85	19.3	19.81	14	0.05	18.3	60	15	55	0.5	180	14.4	16.4	18	36	60	Red	Black	—	
MAZ42000M	19.50	20	20.5			19														
MAZ42000H	20.15	20.7	21.19			19.6														

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

•  $V_Z = 22.0\text{ V to } 24.0\text{ V}$  ( $I_Z = 5\text{ mA}$ )

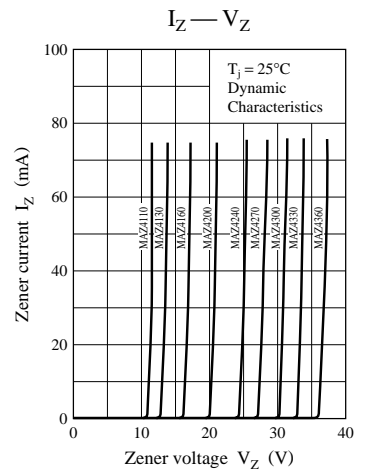
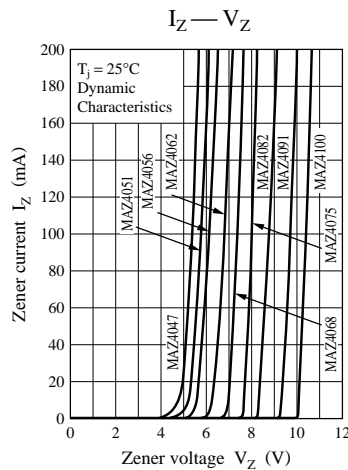
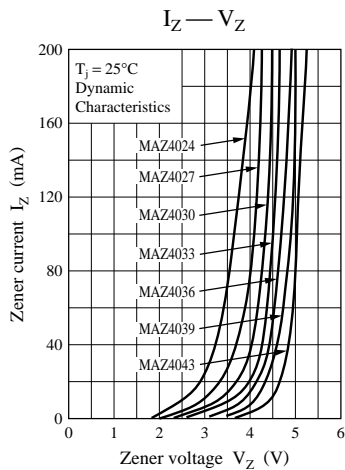
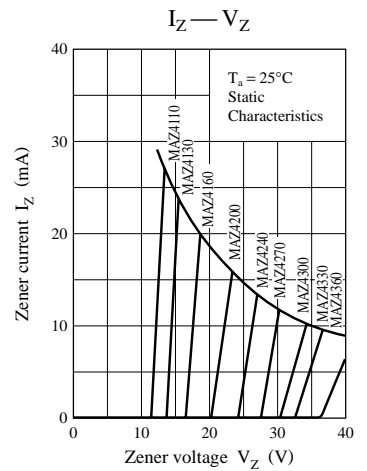
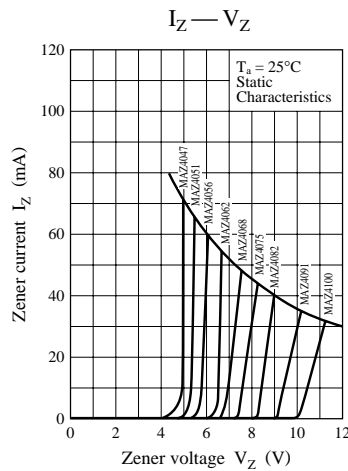
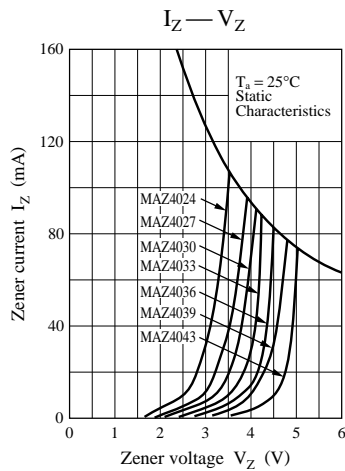
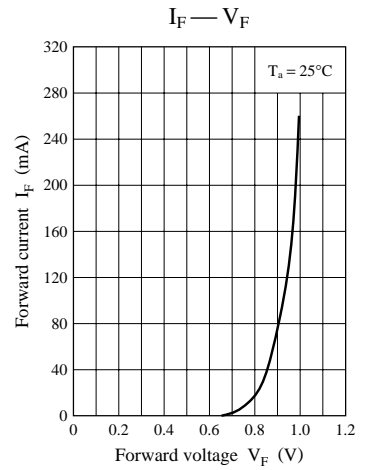
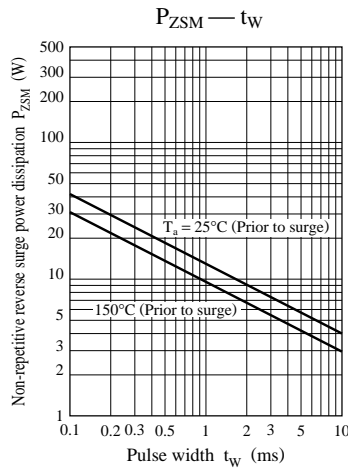
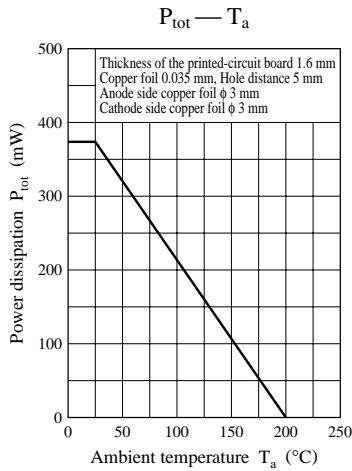
Part number	Zener voltage			Reverse current				Zener operating resistance				Temperature coefficient of zener voltage			Terminal capacitance		Marking symbol (Color indication) Main body: Yellowish green		
	$V_Z$ (V)			$I_{R1}$ ( $\mu\text{A}$ )		$I_{R2}$ ( $\mu\text{A}$ )		$R_Z$ ( $\Omega$ )		$R_{ZK}$ ( $\Omega$ )		$S_Z$ (mV/ $^\circ\text{C}$ )			$C_t$ (pF)				
	$I_Z = 5\text{ mA}$			$V_R$	Max	$V_R$	Max	$I_Z = 5\text{ mA}$		$I_Z$		$I_Z = 5\text{ mA}$			$(V_R = 0\text{ V})$				
	Min	Nom	Max	(V)	Max	(V)	Max	Typ	Max	(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			21.6													
MAZ4240	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	—
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													

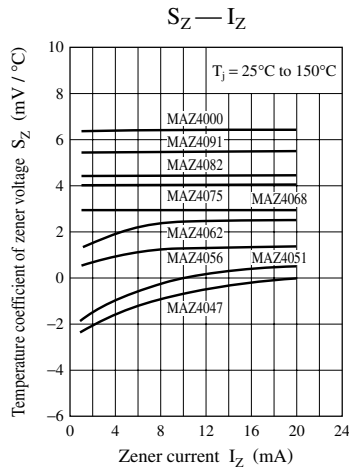
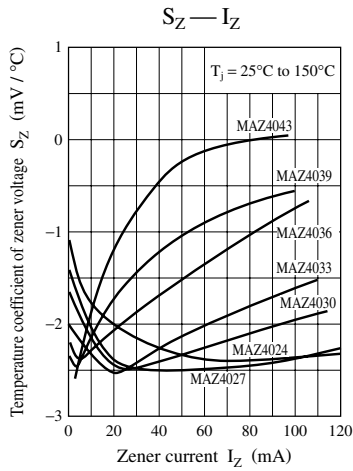
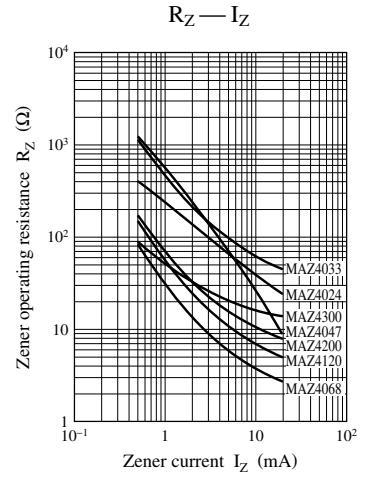
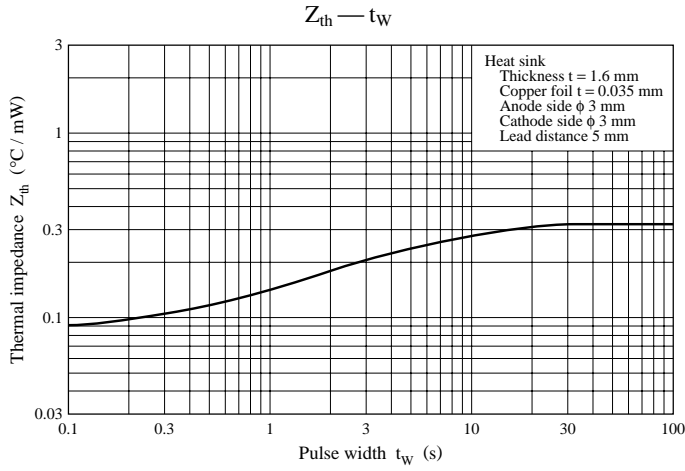
•  $V_Z = 27.0\text{ V to } 39.0\text{ V}$  ( $I_Z = 2\text{ mA}$ )

Part number	Zener voltage			Reverse current				Zener operating resistance				Temperature coefficient of zener voltage			Terminal capacitance		Marking symbol (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)				
	$I_Z = 2\text{ mA}$			$V_R$	Max	$V_R$	Max	$I_Z = 2\text{ mA}$		$I_Z$		$I_Z = 2\text{ mA}$			$(V_R = 0\text{ V})$				
	Min	Nom	Max	(V)	Max	(V)	Max	Typ	Max	(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	—
MAZ42700L	25.3	26	26.7			24.8													
MAZ42700M	26.3	27	27.7			25.8													
MAZ42700H	27.3	28	28.7			26.8													
MAZ4300	28	30	32	21	0.05	27.8	60	30	80	0.5	200	24.4	26.6	29.4	27	50	Orange	Black	—
MAZ43000L	28.3	29	29.7			27.8													
MAZ43000M	29.3	30	30.8			28.8													
MAZ43000H	30.2	31	31.8			29.7													
MAZ4330	31	33	35	23	0.05	30.7	60	35	80	0.5	200	27.4	29.7	33.4	25	45	Orange	Orange	—
MAZ43300L	31.2	32	32.8			30.7													
MAZ43300M	32.2	33	33.8			31.7													
MAZ43300H	33.2	34	34.9			32.7													
MAZ4360	34	36	38	25	0.05	33.6	60	35	90	0.5	200	30.4	33	37.4	23	45	Orange	Blue	—
MAZ43600L	34.1	35	35.9			33.6													
MAZ43600M	35.1	36	36.9			34.6													
MAZ43600H	36.1	37	37.9			35.6													
MAZ4390	37	—	41	27	0.05	36	60	—	130	0.5	250	33.4	36.4	41.2	21	45	Orange	White	—
MAZ43900L	37.1	—	39			36													
MAZ43900M	38	—	40			36													
MAZ43900H	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  $T_j = 25^\circ\text{C to } 150^\circ\text{C}$ .





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