

# MA4000 Series

## Silicon planer type

For stabilization of power supply

### ■ Features

- DHD construction for high reliability
- 5mm pitch insertion possible
- Wide voltage rank which is further subdivided.
- Sharp rising performance
- Wide voltage range :  $V_Z = 2.0$  to 39V

### ■ 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	$P_{tot}^{*1}$	370	mW
Non-repetitive reverse surge power dissipation	$P_{ZSM}^{*2}$	30	W
Junction temperature	$T_j$	200	$^\circ\text{C}$
Storage temperature	$T_{stg}$	- 65 to +200	$^\circ\text{C}$

\* 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	Condition	min	typ	max	Unit
Forward voltage	$V_F$	$I_F = 10\text{mA}$		0.8	0.9	V
Zener voltage	$V_Z^{*2}$	$I_Z$ ..... 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				$\mu\text{A}$
	$I_{R2}$	$V_R$ ..... Specified value				$\mu\text{A}$
Temperature coefficient of zener voltage	$S_Z^{*3}$	$I_Z$ ..... Specified value				$\text{mV}/^\circ\text{C}$
Terminal capacitance	$C_t$	$V_R$ ..... Specified value				pF

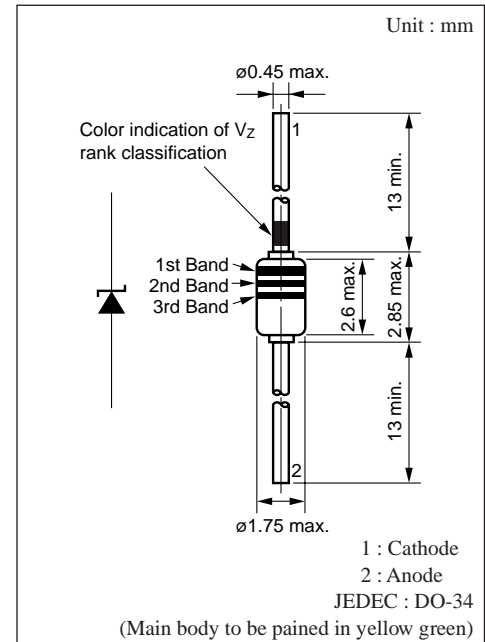
Refer to the electrical characteristics list of P455 to P457

Note 1. Rated input/output frequency : 50MHz

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 20ms after power application

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



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

L rank	M rank	H rank
Black	Blue	Red

### ■ Electrical Characteristics (T<sub>a</sub>= 25°C)

- V<sub>Z</sub>= 2.0 to 6.8V (I<sub>Z</sub>= 5mA)

Part Number	Zener voltage			Reverse current				Operating resistance				Temperature coefficient of zener voltage			Terminal capacitance		Marking (Color indication Main body: Yellow green)		
	V <sub>Z</sub> (V) I <sub>Z</sub> = 5mA			I <sub>R1</sub>		I <sub>R2</sub> (μA)		R <sub>Z</sub> (Ω)		R <sub>ZK</sub>		S <sub>Z</sub> (mV/°C) I <sub>Z</sub> = 5mA			C <sub>t</sub> (pF) (V <sub>R</sub> = 0V) f=1MHz		1st.	2nd.	3rd.
	min	nom	max	V <sub>R</sub> (V)	max (μA)	V <sub>R</sub> (V)	max (μA)	I <sub>Z</sub> = 5mA typ	max	I <sub>Z</sub> (mA)	max (Ω)	min	typ	max	typ	max			
MA4020	1.88	—	2.24	0.5	120	—	—	—	100	1	2000	-3.5	-1.5	0	375	450	Red	Black	Black
MA4020-L	1.88	—	2.12																
MA4020-H	2.01	—	2.24																
MA4022	2.08	—	2.45	0.7	120	—	—	—	100	1	2000	-3.5	-1.5	0	375	450	Red	Red	Red
MA4022-L	2.08	—	2.33																
MA4022-H	2.20	—	2.45																
MA4024	2.28	2.4	2.7	1	120	—	—	—	100	1	2000	-3.5	-1.6	0	375	450	Red	Yellow	Yellow
MA4024-L	2.28	—	2.56																
MA4024-H	2.4	—	2.7																
MA4027	2.5	2.7	2.9	1	100	—	—	—	100	1	1000	-3.5	-2	0	350	450	Red	Purple	Purple
MA4027-L	2.5	—	2.75																
MA4027-H	2.65	—	2.9																
MA4030	2.8	3.0	3.2	1	50	—	—	85	100	1	1000	-3.5	-2.1	0	350	450	Orange	Black	Black
MA4030-L	2.83	2.9	2.97																
MA4030-M	2.93	3.0	3.08																
MA4030-H	3.02	3.1	3.18																
MA4033	3.1	3.3	3.5	1	20	—	—	83	100	1	1000	-3.5	-2.4	0	325	450	Orange	Orange	Orange
MA4033-L	3.12	3.2	3.28																
MA4033-M	3.22	3.3	3.38																
MA4033-H	3.32	3.4	3.49																
MA4036	3.4	3.6	3.8	1	10	—	—	81	100	1	1000	-3.5	-2.4	0	300	450	Orange	Blue	Blue
MA4036-L	3.41	3.5	3.59																
MA4036-M	3.51	3.6	3.69																
MA4036-H	3.61	3.7	3.79																
MA4039	3.7	3.9	4.1	1	10	—	—	79	100	1	1000	-3.5	-2.5	0	300	450	Orange	White	White
MA4039-L	3.71	3.8	3.9																
MA4039-M	3.8	3.9	4.0																
MA4039-H	3.9	4.0	4.1																
MA4043	4.0	4.3	4.6	1	10	—	—	75	100	1	1000	-3.5	-2.5	0	275	450	Yellow	Orange	Orange
MA4043-L	4.03	4.1	4.26																
MA4043-M	4.17	4.3	4.4																
MA4043-H	4.31	4.4	4.54																
MA4047	4.4	4.7	5.0	1	3	—	—	50	80	1	900	-3.5	-1.4	0.2	130	180	Yellow	Purple	Purple
MA4047-L	4.45	4.6	4.69																
MA4047-M	4.59	4.7	4.83																
MA4047-H	4.74	4.9	4.99																
MA4051	4.8	5.1	5.4	2	2	—	—	40	60	1	800	-2.7	0.8	1.2	110	160	Green	Brown	Brown
MA4051-L	4.87	5.0	5.12																
MA4051-M	5.0	5.1	5.26																
MA4051-H	5.14	5.3	5.4																
MA4056	5.3	5.6	6.0	2	1	—	—	15	40	1	500	-2	1.2	2.5	95	140	Green	Blue	Blue
MA4056-L	5.3	5.4	5.58																
MA4056-M	5.48	5.6	5.76																
MA4056-H	5.66	5.8	5.95																
MA4062	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
MA4062-L	5.85	6.0	6.15																
MA4062-M	6.05	6.2	6.36																
MA4062-H	6.24	6.4	6.56																
MA4068	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
MA4068-L	6.44	6.6	6.77																
MA4068-M	6.64	6.8	6.98																
MA4068-H	6.85	7.0	7.2																

●  $V_Z = 7.5$  to  $20V$  ( $I_Z = 5mA$ )

Part Number	Zener voltage			Reverse current				Operating resistance				Temperature coefficient of zener voltage			Terminal capacitance		Marking (Color indication Main body: Yellow green)		
	$V_Z$ (V)			$I_{R1}$		$I_{R2}$		$R_Z(\Omega)$		$R_{ZK}$		$S_Z$ (mV/°C)			$C_t$ (pF)				
	$I_Z = 5mA$			$V_R$	max	$V_R$	max	$I_Z = 5mA$		$I_Z$	max	$I_Z = 5mA$			$(V_R = 0V)$				
	min	nom	max	(V)	( $\mu A$ )	(V)	( $\mu A$ )	typ	max	(mA)	( $\Omega$ )	min	typ	max	typ	max	1st.	2nd.	3rd.
MA4075	7.0	7.5	7.9	5	1	6.5	60	6	15	0.5	120	2.5	4	5.3	80	100	Purple	Green	Green
MA4075-L	7.07	7.3	7.43			6.5													
MA4075-M	7.29	7.5	7.67			6.7													
MA4075-H	7.51	7.7	7.89			7.0													
MA4082	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
MA4082-L	7.77	7.9	8.17			7.2													
MA4082-M	8.03	8.2	8.43			7.5													
MA4082-H	8.29	8.5	8.7			7.7													
MA4091	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
MA4091-L	8.58	8.8	9.02			8													
MA4091-M	8.87	9.1	9.33			8.3													
MA4091-H	9.14	9.4	9.6			8.6													
MA4100	9.4	10	10.6	7	0.2	8.9	60	8	20	0.5	130	4.5	6.4	8	70	90	Brown	Black	—
MA4100-L	9.44	9.7	9.92			8.9													
MA4100-M	9.75	10	10.25			9.2													
MA4100-H	10.07	10.3	10.59			9.5													
MA4110	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	—
MA4110-L	10.4	10.7	10.94			9.9													
MA4110-M	10.73	11	11.28			10.2													
MA4110-H	11.05	11.3	11.6			10.5													
MA4120	11.4	12	12.7	8	0.1	10.9	60	10	25	0.5	170	6	8.4	10	65	85	Brown	Red	—
MA4120-L	11.4	11.7	11.96			10.9													
MA4120-M	11.73	12	12.33			11.2													
MA4120-H	12.06	12.3	12.68			11.5													
MA4130	12.4	13	14.1	9	0.1	11.9	60	10	30	0.5	170	7	9.4	11	60	80	Brown	Orange	—
MA4130-L	12.4	12.7	12.99			11.9													
MA4130-M	12.73	13	13.4			12.2													
MA4130-H	13.25	13.7	14.08			12.7													
MA4140-M	13.65	14	14.35	9	0.1	13.1	60	10	30	0.5	170	7	10	13	60	80	Brown	Yellow	—
MA4150	13.9	15	15.6	10	0.05	13.4	60	10	30	0.5	170	9.2	11.4	13	55	75	Brown	Green	—
MA4150-L	13.9	14.3	14.76			13.4													
MA4150-M	14.6	15	15.35			14.1													
MA4150-H	14.95	15.3	15.6			14.4													
MA4160	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	—
MA4160-L	15.3	15.7	16.09			14.8													
MA4160-M	15.7	16	16.5			15.2													
MA4160-H	16.26	16.7	17.1			15.7													
MA4180	16.9	18	19.1	13	0.05	16.4	60	10	45	0.5	170	12.4	14.4	16	47	70	Brown	Gray	—
MA4180-L	16.9	17.3	17.76			16.4													
MA4180-M	17.55	18	18.45			17													
MA4180-H	18.2	18.7	19.1			17.7													
MA4200	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	—
MA4200-L	18.85	19.3	19.81			18.3													
MA4200-M	19.50	20	20.5			19													
MA4200-H	20.15	20.7	21.19			19.6													

●  $V_Z = 22$  to  $24V$  ( $I_Z = 5mA$ )

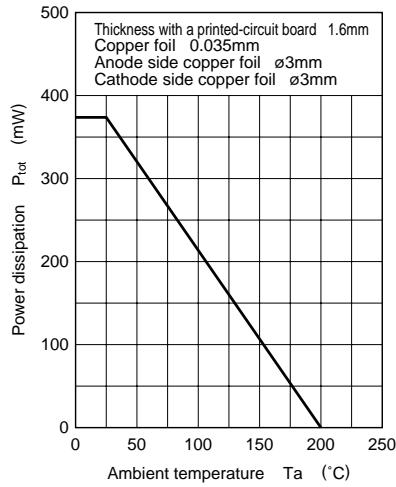
Part Number	Zener voltage			Reverse current				Operating resistance				Temperature coefficient of zener voltage			Terminal capacitance		Marking (Color indication Main body: Yellow green)		
	$V_Z$ (V)			$I_{R1}$		$I_{R2}$		$R_Z(\Omega)$		$R_{ZK}$		$S_Z$ (mV/°C)			$C_t$ (pF)		1st.	2nd.	3rd.
	$I_Z = 5mA$			$V_R$	max	$V_R$	max	$I_Z = 5mA$		$I_Z$	max	$I_Z = 5mA$			$(V_R = 0V)$				
	min	nom	max	(V)	( $\mu A$ )	(V)	( $\mu A$ )	typ	max	(mA)	( $\Omega$ )	min	typ	max	typ	max	typ	max	
MA4220	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	—
MA4220-L	20.8	21.3	21.86			20.3													
MA4220-M	21.45	22	22.55			20.9													
MA4220-H	22.1	22.7	23.24			21.6													
MA4240	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	—
MA4240-L	22.8	23.3	23.97			22.3													
MA4240-M	23.5	24	24.7			23													
MA4240-H	24.35	25	25.6			23.8													

●  $V_Z = 27$  to  $39V$  ( $I_Z = 2mA$ )

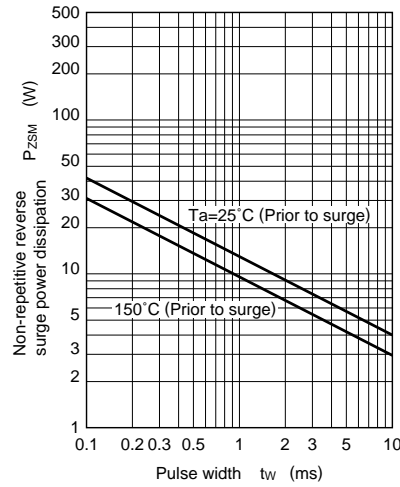
Part Number	Zener voltage			Reverse current				Operating resistance				Temperature coefficient of zener voltage			Terminal capacitance		Marking (Color indication Main body: Yellow green)		
	$V_Z$ (V)			$I_{R1}$		$I_{R2}$		$R_Z(\Omega)$		$R_{ZK}$		$S_Z$ (mV/°C)			$C_t$ (pF)		1st.	2nd.	3rd.
	$I_Z = 2mA$			$V_R$	max	$V_R$	max	$I_Z = 2mA$		$I_Z$	max	$I_Z = 2mA$			$(V_R = 0V)$				
	min	nom	max	(V)	( $\mu A$ )	(V)	( $\mu A$ )	typ	max	(mA)	( $\Omega$ )	min	typ	max	typ	max	typ	max	
MA4270	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	—
MA4270-L	25.3	26	26.7			24.8													
MA4270-M	26.3	27	27.7			25.8													
MA4270-H	27.3	28	28.7			26.8													
MA4300	28	30	32	21	0.05	27.8	60	30	80	0.5	200	24.4	26.6	29.4	27	50	Orange	Black	—
MA4300-L	28.3	29	29.7			27.8													
MA4300-M	29.3	30	30.8			28.8													
MA4300-H	30.2	31	31.8			29.7													
MA4330	31	33	35	23	0.05	30.7	60	35	80	0.5	200	27.4	29.7	33.4	25	45	Orange	Orange	—
MA4330-L	31.2	32	32.8			30.7													
MA4330-M	32.2	33	33.8			31.7													
MA4330-H	33.2	34	34.9			32.7													
MA4360	34	36	38	24	0.05	33.6	60	35	90	0.5	200	30.4	33	37.4	23	45	Orange	Blue	—
MA4360-L	34.1	35	35.9			33.6													
MA4360-M	35.1	36	36.9			34.6													
MA4360-H	36.1	37	37.9			35.6													
MA4390	37	—	41	27	0.05	36	60	—	130	0.5	250	33.4	36.4	41.2	21	45	Orange	White	—
MA4390-L	37.1	—	39			36													
MA4390-M	38	—	40			36													
MA4390-H	39	—	41			36													

Note 1. The  $V_Z$  value is the one after power application for 20ms at  $T_a = 25^\circ C$ .Note 2. The Zener voltage temperature coefficient is the one for  $T_j = 25$  to  $150^\circ C$ .

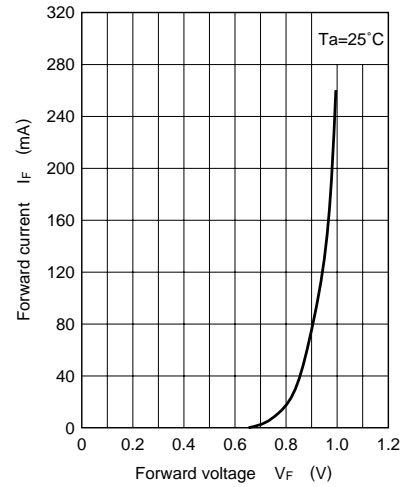
$P_{tot} - T_a$



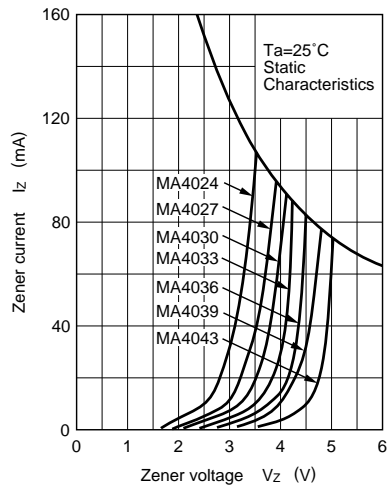
$P_{ZSM} - t_w$



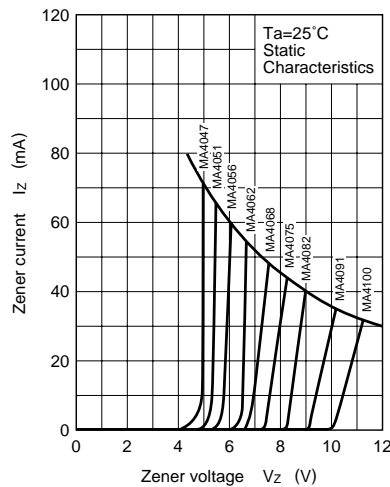
$I_F - V_F$



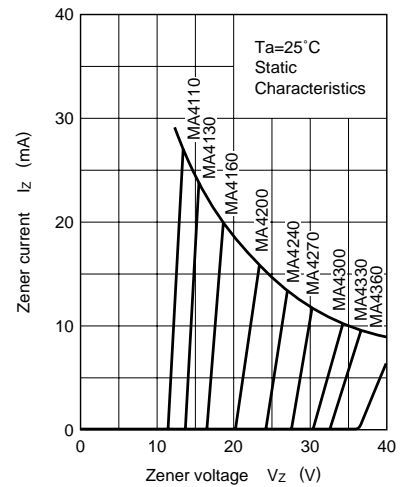
$I_Z - V_Z$



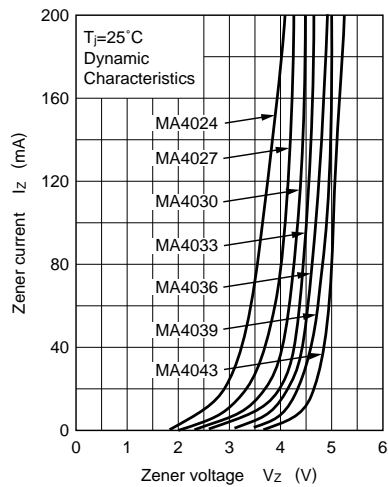
$I_Z - V_Z$



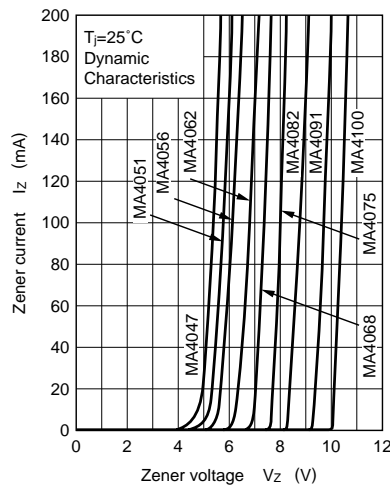
$I_Z - V_Z$



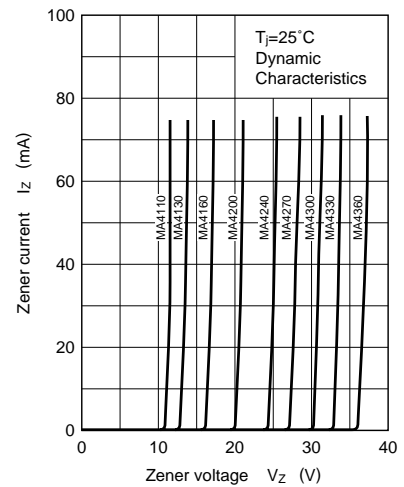
$I_Z - V_Z$



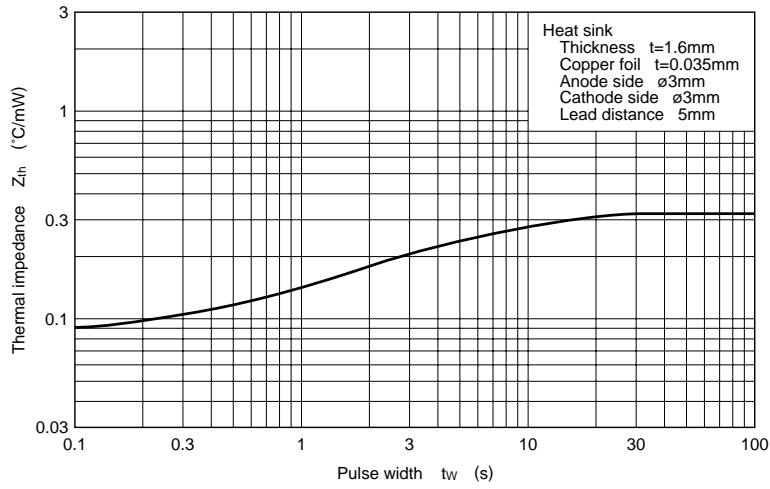
$I_Z - V_Z$



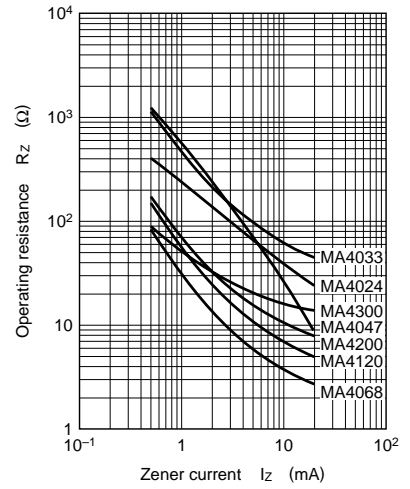
$I_Z - V_Z$



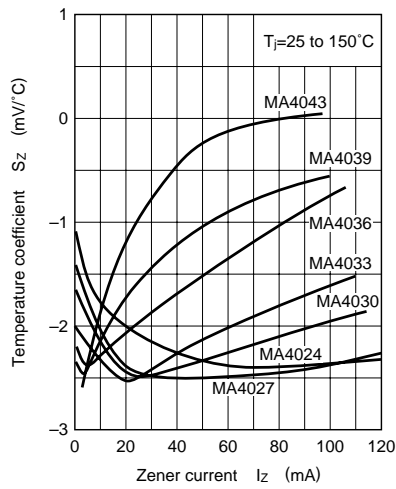
$Z_{th} - t_w$



$R_Z - I_Z$



$S_Z - I_Z$



$S_Z - I_Z$

