

# MA200A

## Silicon epitaxial planer type

For switching circuits

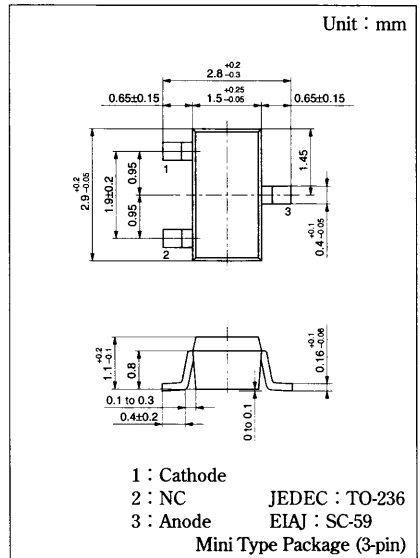
### ■ Features

- Small reverse current  $I_R$ , with extremely small leakage current
- $t_{rr}$  of a soft recovery type

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

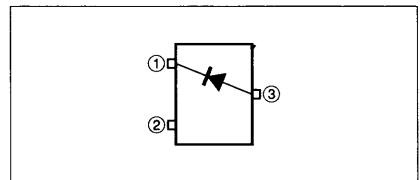
Parameter	Symbol	Rating	Unit
Reverse voltage (DC)	$V_R$	80	V
Peak reverse voltage	$V_{RM}$	80	V
Forward current (DC)	$I_{F(AV)}$	100	mA
Peak forward current	$I_{FM}$	225	mA
Non-repetitive peak forward surge current	$I_{FSM}^*$	500	mA
Junction temperature	$T_j$	150	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$

\*  $t=1\text{s}$



Marking Symbol : M4L

### ■ Internal Connection



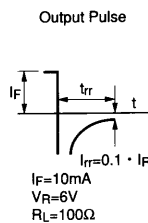
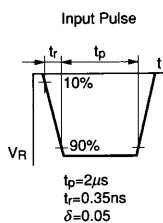
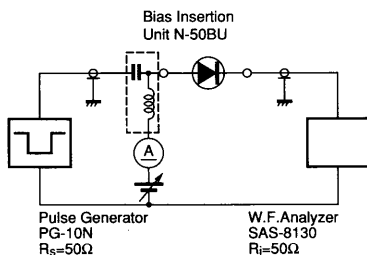
Switching/Composite Diodes

### ■ Electrical Characteristics ( $T_a=25^\circ\text{C}$ )

Parameter	Symbol	Condition	min	typ	max	Unit
Reverse current (DC)	$I_{R1}$	$V_R=75\text{V}$			10	nA
	$I_{R2}$	$V_R=5\text{V}, T_a=85^\circ\text{C}$			20	nA
Forward voltage (DC)	$V_F$	$I_F=100\text{mA}$			1.2	V
Reverse voltage (DC)	$V_R$	$I_R=100\mu\text{A}$	80			V
Terminal capacitance	$C_t$	$V_R=0\text{V}, f=1\text{MHz}$			2.5	pF
Reverse recovery time	$t_{rr}^*$	$I_F=10\text{mA}, V_R=6\text{V}$ $I_{rr}=0.1 \cdot I_R, R_L=100\Omega$			100	ns

© Rated input/output frequency : 100MHz

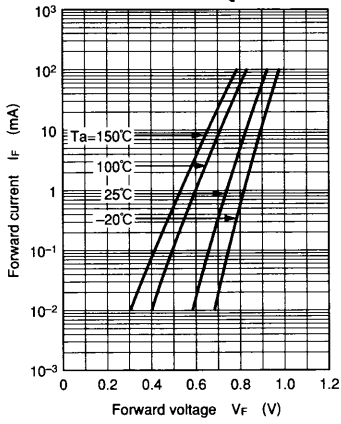
\*  $t_{rr}$  measuring circuit



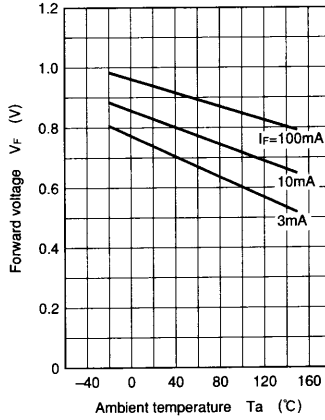
### ■ Marking



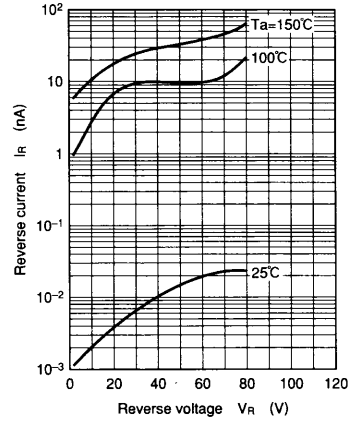
$I_F - V_F$



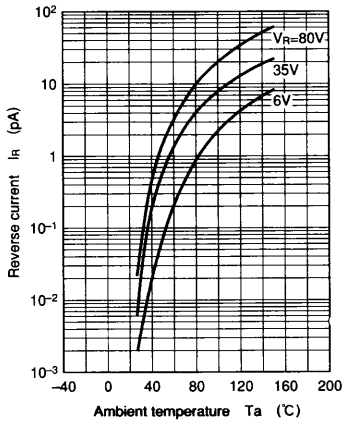
$V_F - T_a$



$I_R - V_R$



$I_R - T_a$



# MA200K

## Silicon epitaxial planer type

For switching circuits

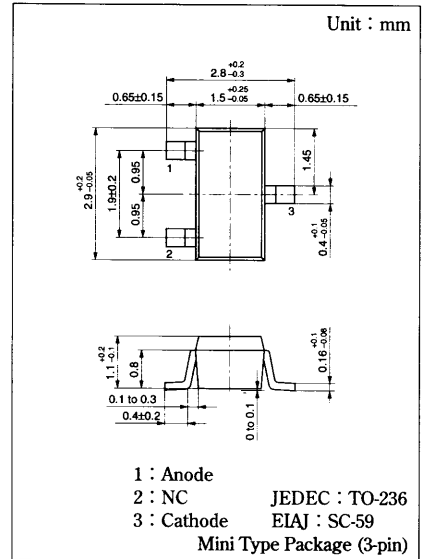
### ■ Features

- Small reverse current  $I_R$ , with extremely small leakage current
- $t_{rr}$  of a soft recovery type

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

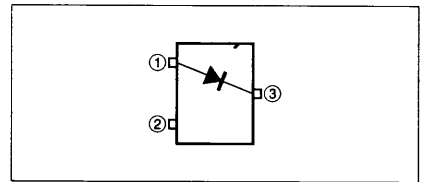
Parameter	Symbol	Rating	Unit
Reverse voltage (DC)	$V_R$	80	V
Peak reverse voltage	$V_{RM}$	80	V
Forward current (DC)	$I_F$	100	mA
Peak forward current	$I_{FM}$	225	mA
Non-repetitive peak forward surge current	$I_{FSM}^*$	500	mA
Junction temperature	$T_j$	150	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$

\*  $t=1s$



Marking Symbol : M4M

### ■ Internal Connection



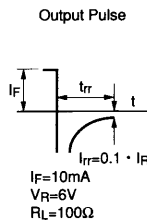
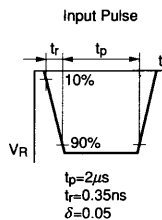
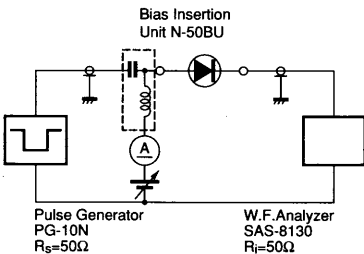
Switching/  
Composite  
Diodes

### ■ Electrical Characteristics ( $T_a=25^\circ\text{C}$ )

Parameter	Symbol	Condition	min	typ	max	Unit
Reverse current (DC)	$I_{R1}$	$V_R=75V$			10	nA
	$I_{R2}$	$V_R=5V, T_a=85^\circ\text{C}$			20	nA
Forward voltage (DC)	$V_F$	$I_F=100\text{mA}$			1.2	V
Reverse voltage (DC)	$V_R$	$I_R=100\mu\text{A}$	80			V
Terminal capacitance	$C_t$	$V_R=0V, f=1\text{MHz}$			2.5	pF
Reverse recovery time	$t_{rr}^*$	$I_F=10\text{mA}, V_R=6V$ $I_{rr}=0.1 \cdot I_R, R_L=100\Omega$			100	ns

©Rated input/output frequency : 100MHz

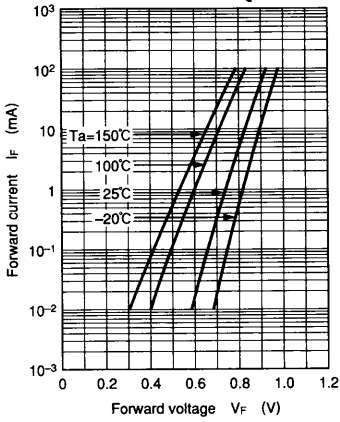
\*  $t_{rr}$  measuring circuit



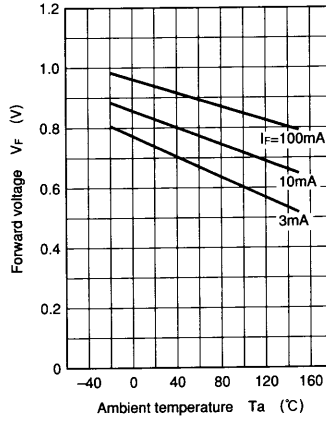
### ■ Marking



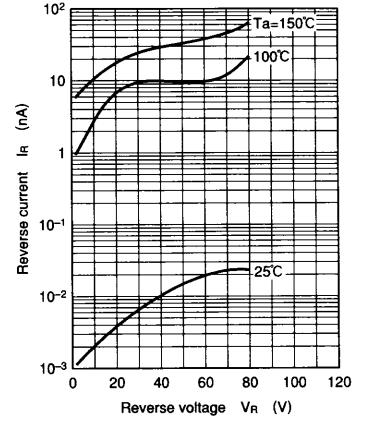
$I_F - V_F$



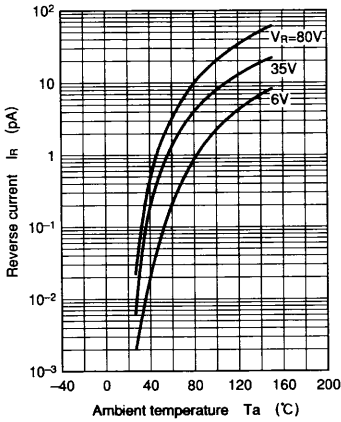
$V_F - T_a$



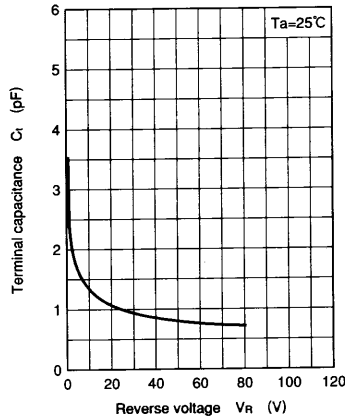
$I_R - V_R$



$I_R - T_a$



$C_t - V_R$



# MA200WA

## Silicon epitaxial planer type

For switching circuits

### ■ Features

- Small reverse current  $I_R$  with extremely small leakage current
- $t_{rr}$  of a soft recovery type

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

Parameter	Symbol	Rating	Unit
Reverse voltage (DC)	$V_R$	80	V
Peak reverse voltage	$V_{RM}$	80	V
Forward current (DC)	Single	100	mA
	Double	150	
Peak forward current	Single	225	mA
	Double	340	
Non-repetitive peak forward surge current	Single	500	mA
	Double	750	
Junction temperature	$T_j$	150	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$

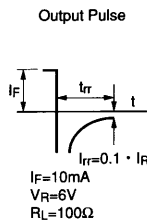
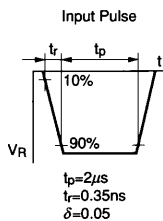
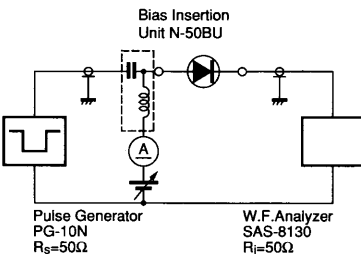
\*  $t=1\text{s}$

### ■ Electrical Characteristics ( $T_a=25^\circ\text{C}$ )

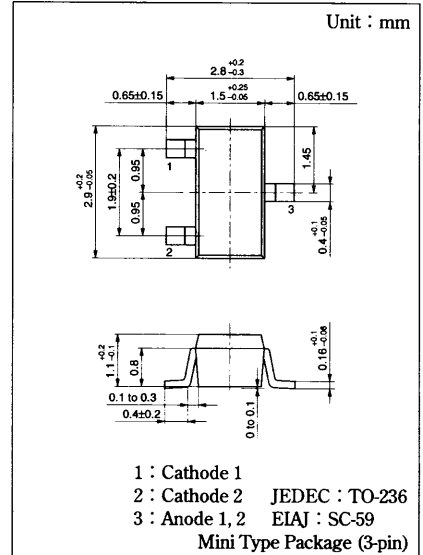
Parameter	Symbol	Condition	min	typ	max	Unit
Reverse current (DC)	$I_{R1}$	$V_R=75\text{V}$			10	nA
	$I_{R2}$	$V_R=5\text{V}, T_a=85^\circ\text{C}$			20	nA
Forward voltage (DC)	$V_F$	$I_F=100\text{mA}$			1.2	V
Reverse voltage (DC)	$V_R$	$I_R=100\mu\text{A}$	80			V
Terminal capacitance	$C_t$	$V_R=0\text{V}, f=1\text{MHz}$			2.5	pF
Reverse recovery time	$t_{rr}^*$	$I_F=10\text{mA}, V_R=6\text{V}$ $I_{rr}=0.1 \cdot I_R, R_L=100\Omega$			100	ns

© Rated input/output frequency : 100MHz

\*  $t_{rr}$  measuring circuit

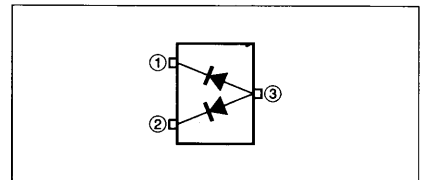


### ■ Marking



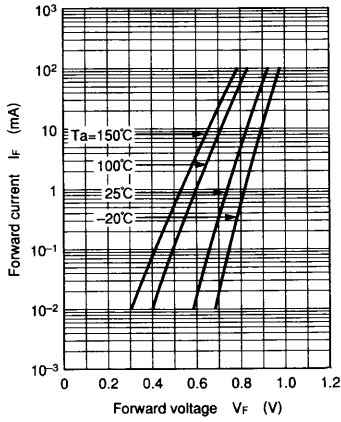
Marking Symbol : M4N

### ■ Internal Connection

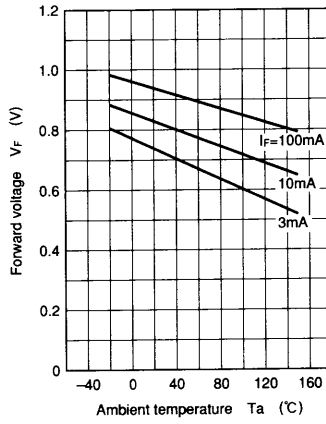


Switching/  
Composite  
Diodes

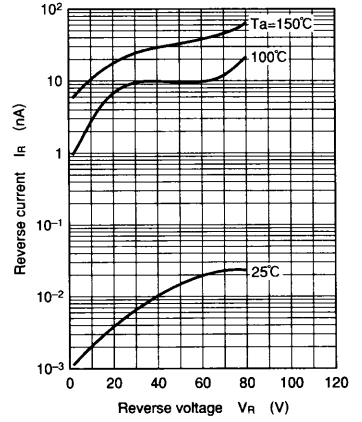
$I_F - V_F$



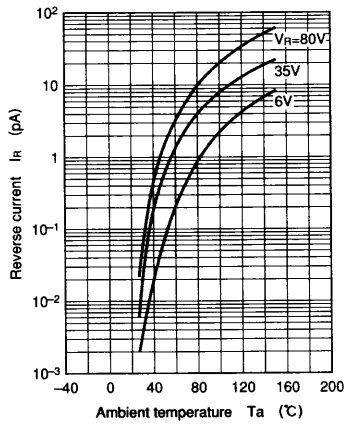
$V_F - T_a$



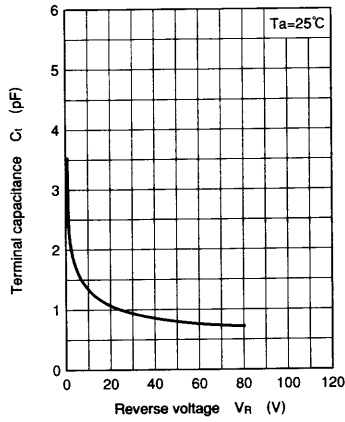
$I_R - V_R$



$I_R - T_a$



$C_t - V_R$



# MA200WK

## Silicon epitaxial planer type

For switching circuits

### ■ Features

- Small reverse current  $I_R$ , with extremely small leakage current
- $t_{rr}$  of a soft recovery type

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

Parameter	Symbol	Rating	Unit
Reverse voltage (DC)	$V_R$	80	V
Peak reverse voltage	$V_{RM}$	80	V
Forward current (DC)	Single	100	mA
	Double	150	
Peak forward current	Single	225	mA
	Double	340	
Non-repetitive peak forward surge current	Single	500	mA
	Double	750	
Junction temperature	$T_j$	150	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$

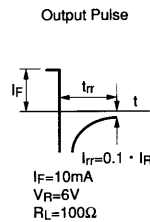
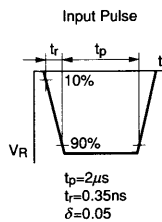
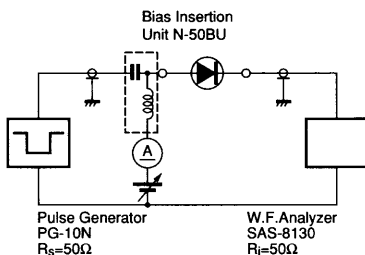
\*  $t=1\text{s}$

### ■ Electrical Characteristics ( $T_a=25^\circ\text{C}$ )

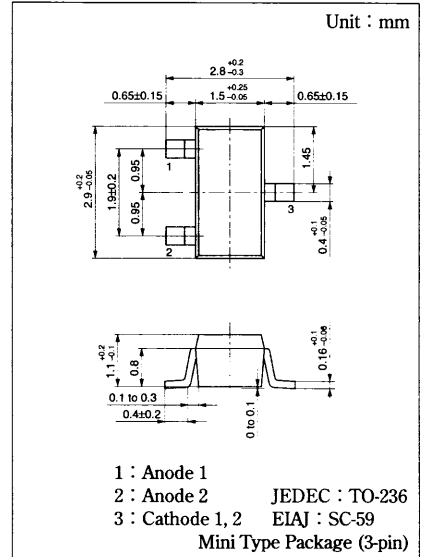
Parameter	Symbol	Condition	min	typ	max	Unit
Reverse current (DC)	$I_{R1}$	$V_R=75\text{V}$			100	nA
	$I_{R2}$	$V_R=5\text{V}, T_a=85^\circ\text{C}$			20	nA
Forward voltage (DC)	$V_F$	$I_F=100\text{mA}$			1.2	V
Reverse voltage (DC)	$V_R$	$I_R=100\mu\text{A}$	80			V
Terminal capacitance	$C_t$	$V_R=0\text{V}, f=1\text{MHz}$			2.5	pF
Reverse recovery time	$t_{rr}^*$	$I_F=10\text{mA}, V_R=6\text{V}$ $I_{rr}=0.1 \cdot I_R, R_L=100\Omega$			100	ns

© Rated input/output frequency : 100MHz

\*  $t_{rr}$  measuring circuit

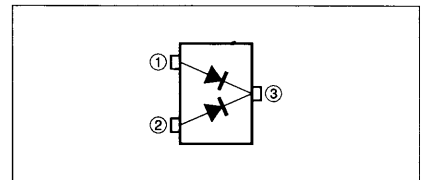


### ■ Marking



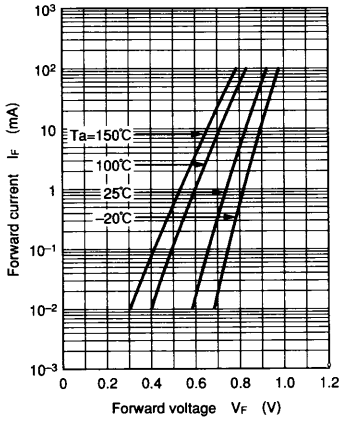
Marking Symbol : M4D

### ■ Internal Connection

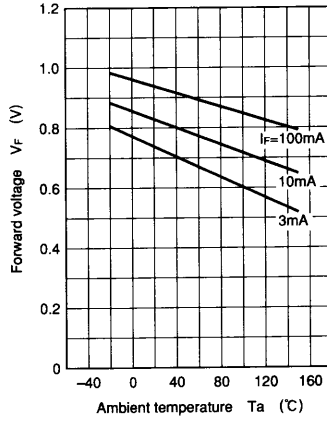


Switching/Composite Diodes

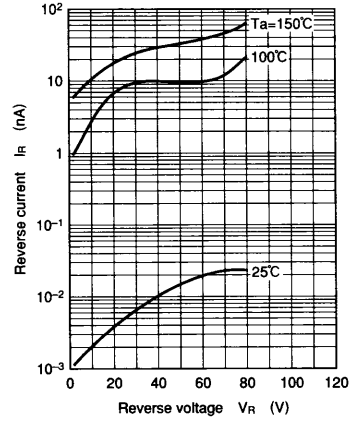
$I_F - V_F$



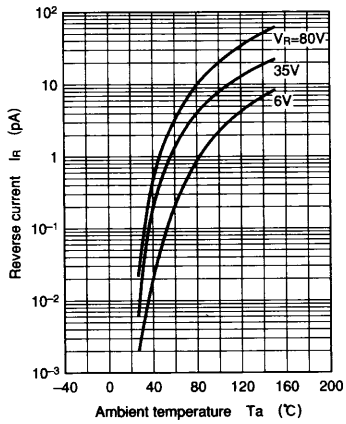
$V_F - T_a$



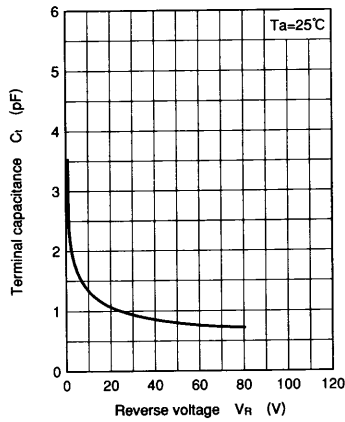
$I_R - V_R$



$I_R - T_a$



$C_t - V_R$





# MA204WA, MA205WA

## Silicon epitaxial planer type

For switching circuits

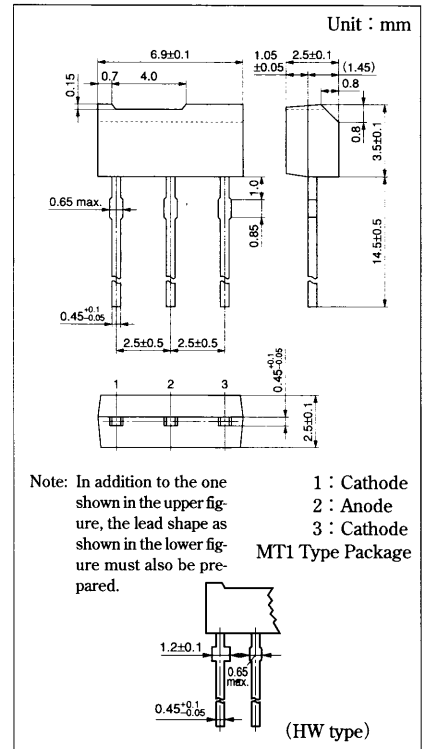
### ■ Features

- Short reverse recovery period  $t_{rr}$
- Small capacity between pins,  $C_t$
- Supply in radial taping manner possible

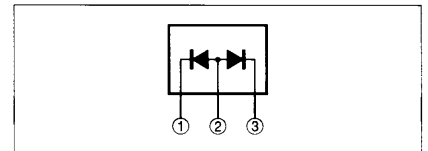
### ■ Absolute Maximum Ratings ( $T_a=25^\circ\text{C}$ )

Parameter	Symbol	Rating	Unit	
Reverse voltage (DC)	MA204WA	$V_R$	40	V
	MA205WA		80	
Peak reverse voltage	MA204WA	$V_{RM}$	40	V
	MA205WA		80	
Forward current (DC)	Single	$I_F$	100	mA
	Double		150	
Peak forward current	Single	$I_{FM}$	225	mA
	Double		340	
Non-repetitive peak forward surge current	Single	$I_{FSM}^*$	500	mA
	Double		750	
Junction temperature	$T_j$	150	$^\circ\text{C}$	
Storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$	

\*  $t=1\text{s}$



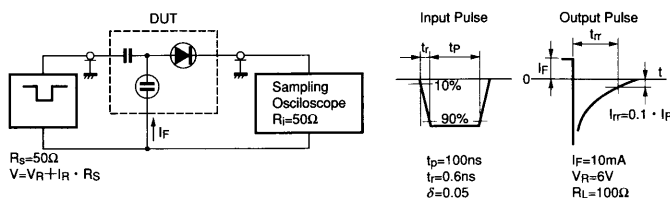
### ■ Internal Connection



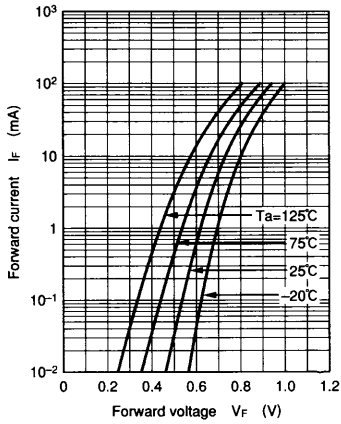
### ■ Electrical Characteristics ( $T_a=25^\circ\text{C}$ )

Parameter	Symbol	Condition	min	typ	max	Unit
Reverse current (DC)	MA204WA	$V_R=35\text{V}$			0.1	$\mu\text{A}$
	MA205WA	$V_R=75\text{V}$			0.1	
Forward voltage (DC)	$V_F$	$I_F=100\text{mA}$			1.2	V
Reverse voltage (DC)	MA204WA	$I_R=100\ \mu\text{A}$	40			V
	MA205WA		80			
Terminal capacitance	$C_t$	$V_R=0\text{V}, f=1\text{MHz}$			4	pF
Reverse recovery time	$t_{rr}^*$	$I_F=10\text{mA}, V_R=6\text{V}$ $I_{rr}=0.1 \cdot I_R, R_L=100\ \Omega$			10	ns

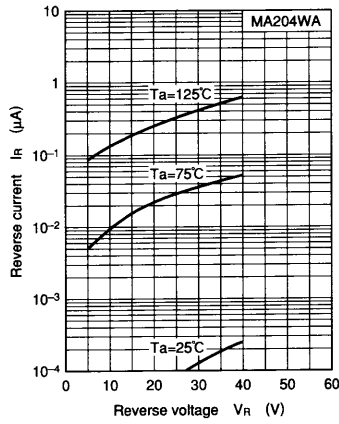
\*  $t_{rr}$  measuring circuit



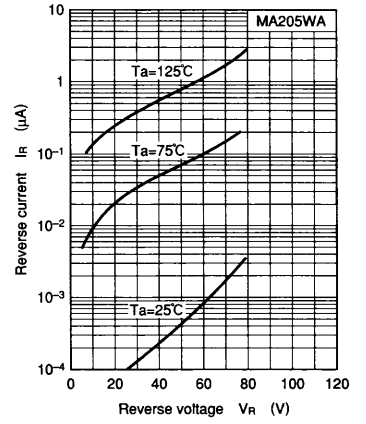
$I_F - V_F$



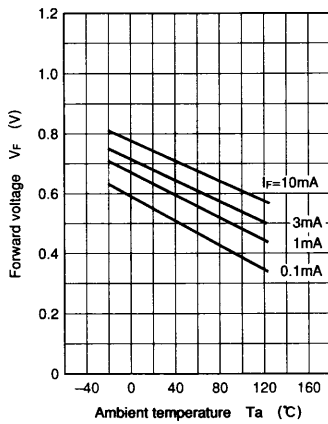
$I_R - V_R$



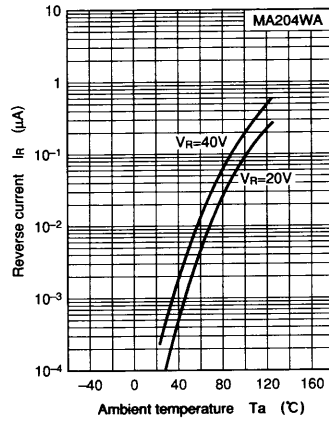
$I_R - V_R$



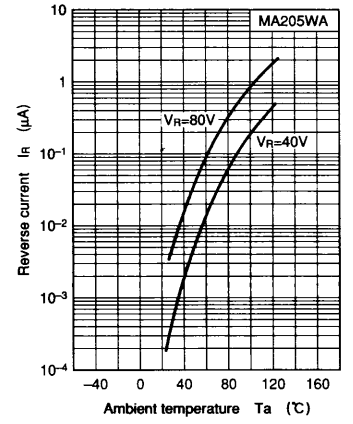
$V_F - T_a$



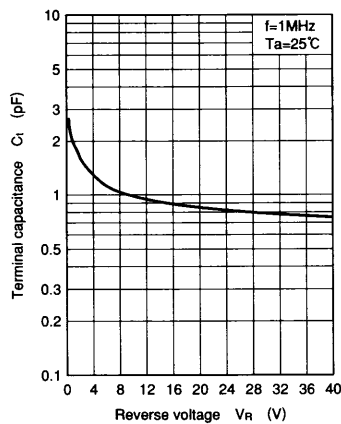
$I_R - T_a$



$I_R - T_a$



$C_t - V_R$



# MA204WK, MA205WK

## Silicon epitaxial planer type

For switching circuits

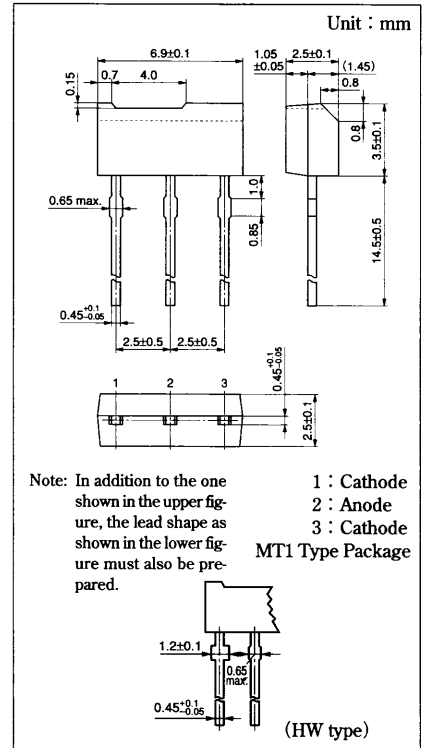
### ■ Features

- Short reverse recovery period  $t_{rr}$
- Small capacity between pins,  $C_t$
- Supply in radial taping manner possible

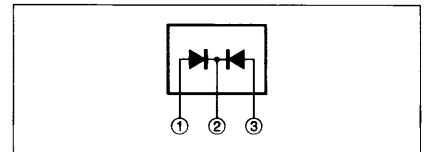
### ■ Absolute Maximum Ratings ( $T_a=25^\circ\text{C}$ )

Parameter	Symbol	Rating	Unit
Reverse voltage (DC)	MA204WK	40	V
	MA205WK	80	
Peak reverse voltage	MA204WK	40	V
	MA205WK	80	
Forward current (DC)	Single	100	mA
	Double	150	
Peak forward current	Single	225	mA
	Double	340	
Non-repetitive peak forward surge current	Single	500	mA
	Double	750	
Junction temperature	$T_j$	150	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$

\*  $t=1\text{s}$



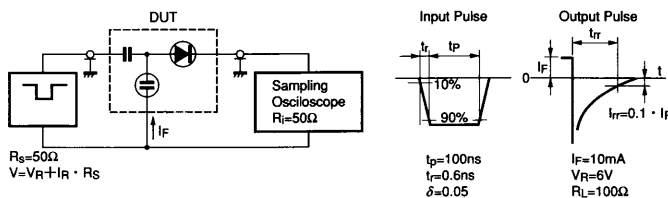
### ■ Internal Connection



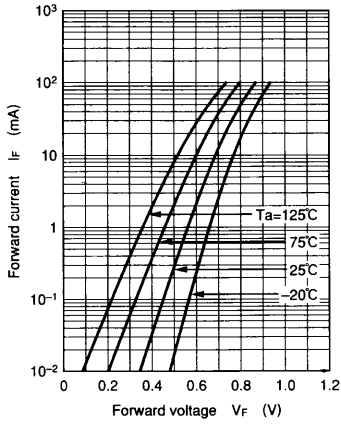
### ■ Electrical Characteristics ( $T_a=25^\circ\text{C}$ )

Parameter	Symbol	Condition	min	typ	max	Unit
Reverse current (DC)	MA204WK	$V_R=35\text{V}$			0.1	$\mu\text{A}$
	MA205WK	$V_R=75\text{V}$			0.1	
Forward voltage (DC)	$V_F$	$I_F=100\text{mA}$			1.2	V
Reverse voltage (DC)	$V_R$	$I_R=100\mu\text{A}$	40			V
			80			
Terminal capacitance	$C_t$	$V_R=0\text{V}, f=1\text{MHz}$			4	pF
Reverse recovery time	$t_{rr}^*$	$I_F=10\text{mA}, V_R=6\text{V}$ $I_{rr}=0.1 \cdot I_R, R_L=100\Omega$			3	ns

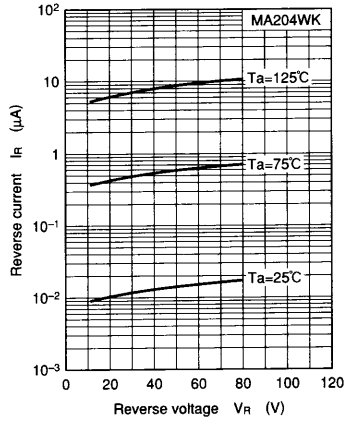
\*  $t_{rr}$  measuring circuit



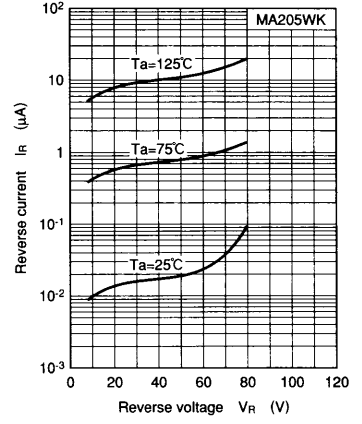
$I_F - V_F$



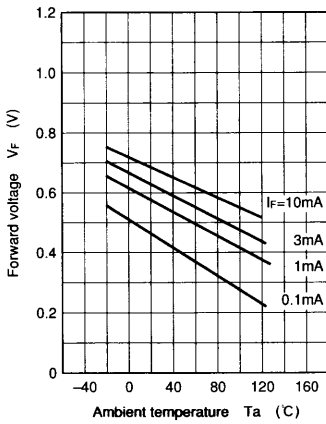
$I_R - V_R$



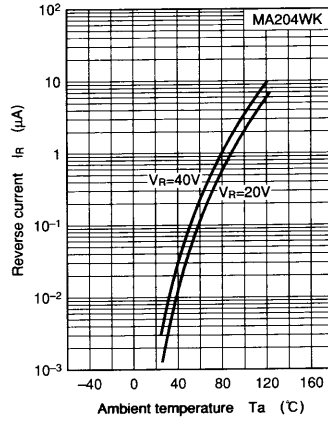
$I_R - V_R$



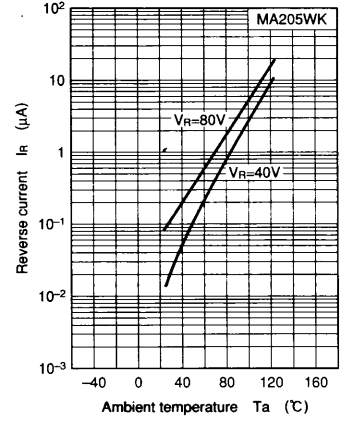
$V_F - T_a$



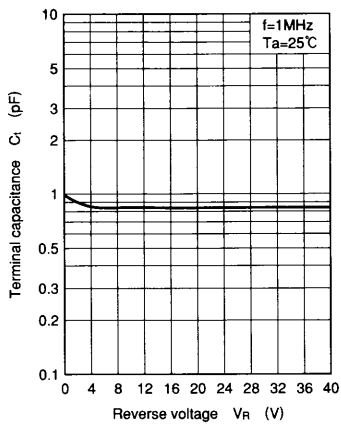
$I_R - T_a$



$I_R - T_a$



$C_t - V_R$



# MA206

## Silicon epitaxial planer type

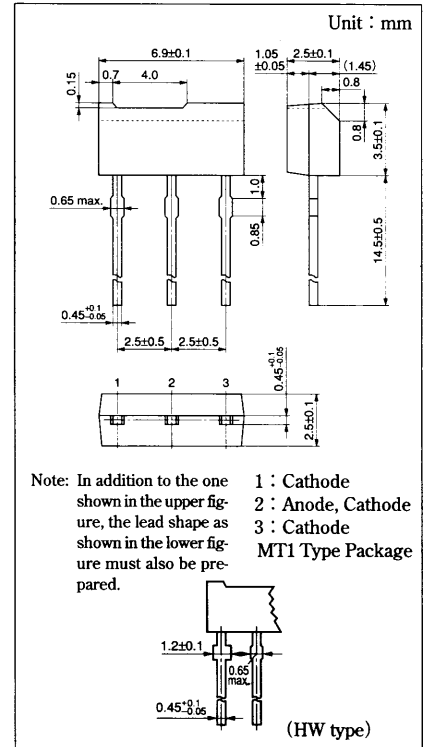
For switching circuits

### ■ Features

- Small capacity between pins,  $C_t$
- Series connection
- Supply in radial tapering manner possible

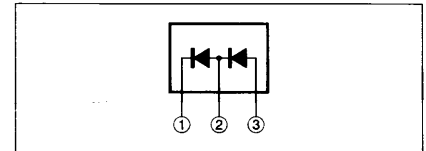
### ■ Absolute Maximum Ratings ( $T_a=25^\circ\text{C}$ )

Parameter	Symbol	Rating	Unit
Reverse voltage (DC)	$V_R$	40	V
Peak reverse voltage	$V_{RM}$	40	V
Forward current (DC)	$I_F$	100	mA
Peak forward current	$I_{FM}$	200	mA
Junction temperature	$T_j$	150	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$



Switching  
Composite  
Diodes

### ■ Internal Connection

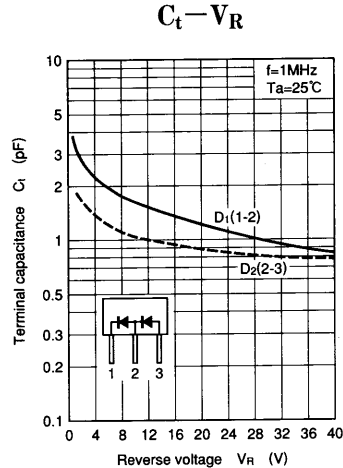
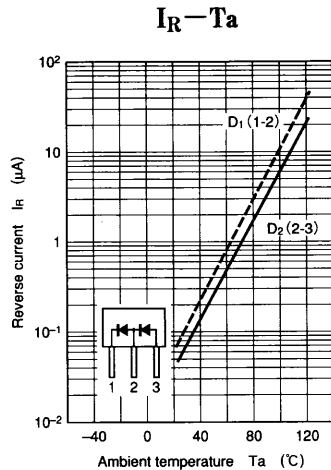
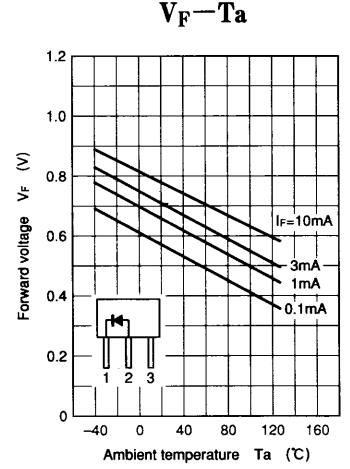
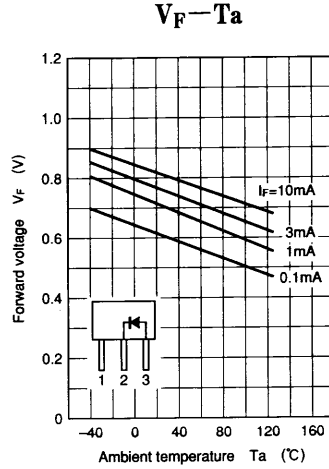
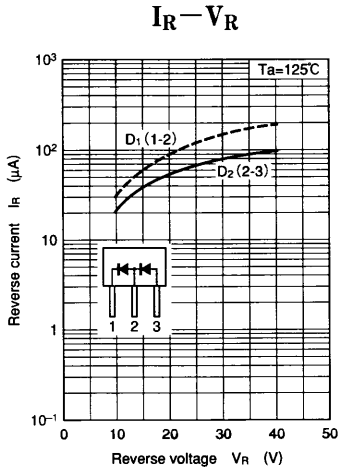
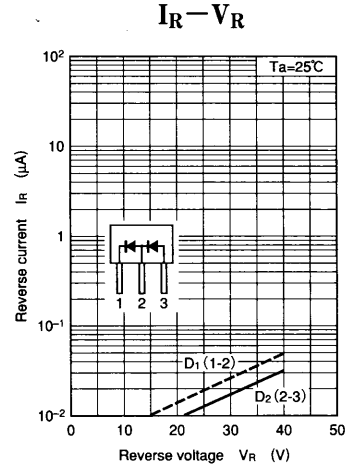
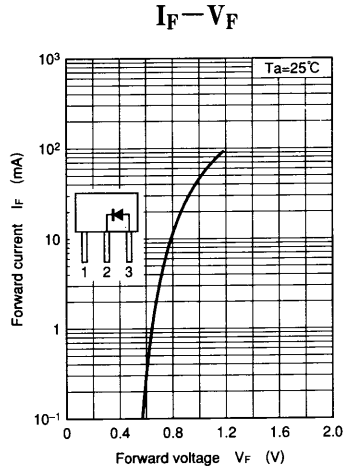
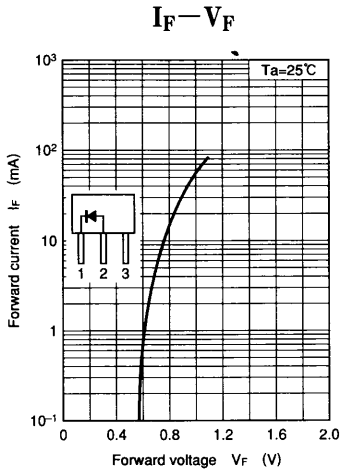


### ■ Electrical Characteristics ( $T_a=25^\circ\text{C}$ )

Parameter	Symbol	Condition	min	typ	max	Unit
Reverse current (DC)	$I_R$	$V_R=40\text{V}$			0.1	$\mu\text{A}$
Forward voltage (DC)	$V_F$	$I_F=100\text{mA}$			1.2	V
Reverse voltage (DC)	$V_R$	$I_R=100\ \mu\text{A}$	40			V
Terminal capacitance	$C_{t1}^{*1}$	$V_R=0\text{V}, f=1\text{MHz}$			5.5	pF
	$C_{t2}^{*2}$				3.0	pF

\*1 Between pins 1 and 2

\*2 Between pins 2 and 3



# MA207

## Silicon epitaxial planer type

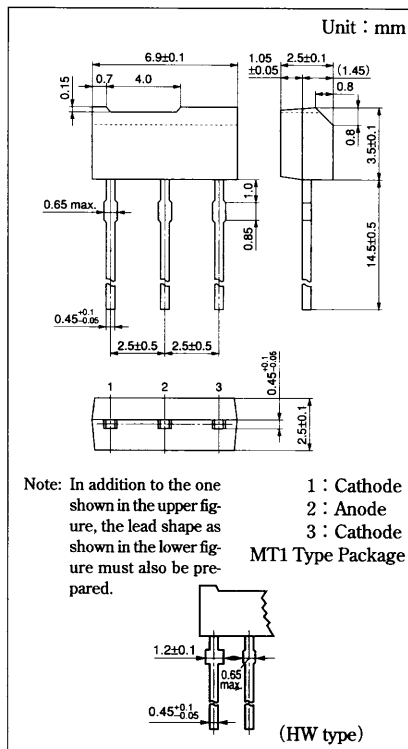
### For switching circuits

#### ■ Features

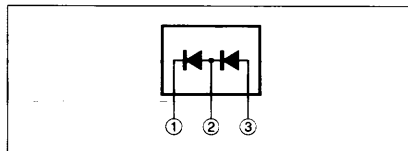
- Small capacity between pins,  $C_t$
- Series connection
- Supply in radial taping manner possible

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

Parameter	Symbol	Rating	Unit
Reverse voltage (DC)	$V_R$	80	V
Peak reverse voltage	$V_{RM}$	80	V
Forward current (DC)	$I_F$	100	mA
Peak forward current	$I_{FM}$	200	mA
Junction temperature	$T_j$	150	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$



#### ■ Internal Connection



#### ■ Electrical Characteristics ( $T_a=25^\circ\text{C}$ )

Parameter	Symbol	Condition	min	typ	max	Unit
Reverse current (DC)	$I_R$	$V_R=75\text{V}$			0.1	$\mu\text{A}$
Forward voltage (DC)	$V_F$	$I_F=100\text{mA}$			1.2	V
Reverse voltage (DC)	$V_R$	$I_R=100\mu\text{A}$	80			V
Terminal capacitance	$C_{t1}$ *1	$V_R=0\text{V}$ , $f=1\text{MHz}$			5.5	pF
	$C_{t2}$ *2				3.0	pF

\*1 Between pins 1 and 2

\*2 Between pins 2 and 3

# MA221, MA222, MA223

## Silicon epitaxial planer type

For high speed switching circuits

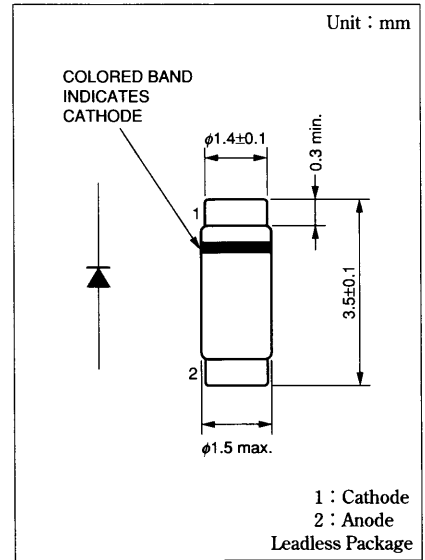
### ■ Features

- Extra-small cylindrical package, most favorable for high-density mounting
- Overall dimensions similar to those of resistor and capacitor (1/8W type), enabling sharing of the mounted equipment
- High switching speed and small capacity between pins,  $C_t$

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

Parameter	Symbol	Rating	Unit
Reverse voltage (DC)	MA221	35	V
	MA222	50	
	MA223	75	
Repetitive peak reverse voltage	MA221	35	V
	MA222	50	
	MA223	75	
Average forward current	$I_{F(AV)}$	100	mA
Peak forward current	$I_{FRM}$	225	mA
Non-repetitive peak forward surge current	$I_{FSM}^*$	500	mA
Junction temperature	$T_j$	200	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to +200	$^\circ\text{C}$

\*  $t=1s$



### ■ Electrical Characteristics ( $T_a=25^\circ\text{C}$ )

Parameter	Symbol	Condition	min	typ	max	Unit
Reverse current (DC)	MA221	$V_R=15V$			25	nA
		$V_R=30V$			0.1	$\mu\text{A}$
		$V_R=50V$			5	$\mu\text{A}$
	MA222	$V_R=15V$			25	nA
		$V_R=50V$			25	nA
		$V_R=75V$			5	$\mu\text{A}$
MA223	$V_R=20V$			25	nA	
	$V_R=75V$			5	$\mu\text{A}$	
	MA221	$V_R=35V, T_a=150^\circ\text{C}$			100	$\mu\text{A}$
MA222		$V_R=50V, T_a=150^\circ\text{C}$		100		
MA223		$V_R=75V, T_a=150^\circ\text{C}$		100		
Forward voltage (DC)	$V_F$	$I_F=100\text{mA}$		0.95	1.2	V
Reverse voltage (DC)	MA221	$I_R=5\mu\text{A}$	35			V
Terminal capacitance	$C_t$	$V_R=0V, f=1\text{MHz}$			2	pF
Reverse recovery time	MA221	$I_F=10\text{mA}, V_R=1V$			10	ns
	MA222/223	$I_{rr}=0.1 \cdot I_R, R_L=100\Omega$		2.2	4	

©Rated input/output frequency : 100MHz (MA221), 250MHz (MA222, MA223)

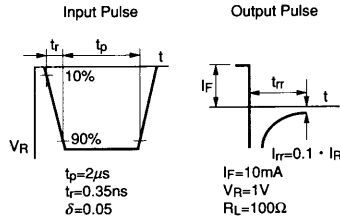
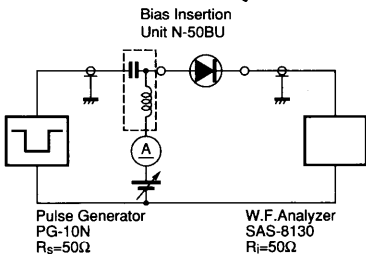
### ■ Cathode Indication

Type No.	MA221	MA222	MA223
Color	White	Green	Purple

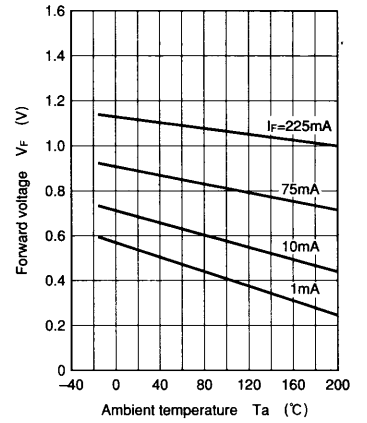


Common characteristics chart

\*  $t_{rr}$  measuring circuit

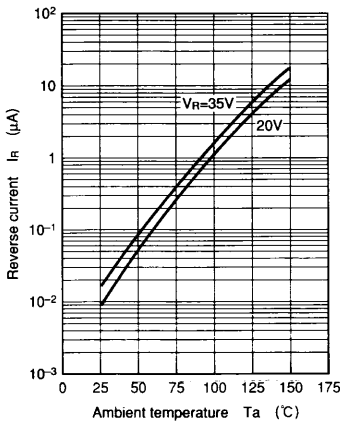


$V_F - T_a$

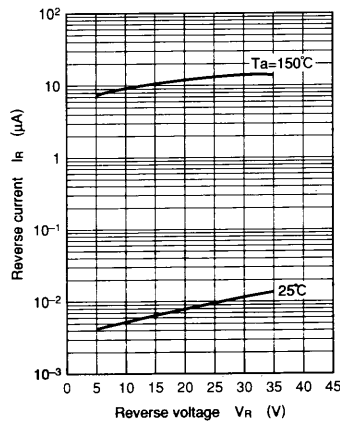


Characteristics chart of MA221

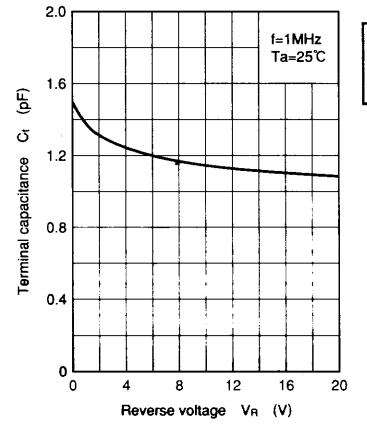
$I_R - T_a$



$I_R - V_R$



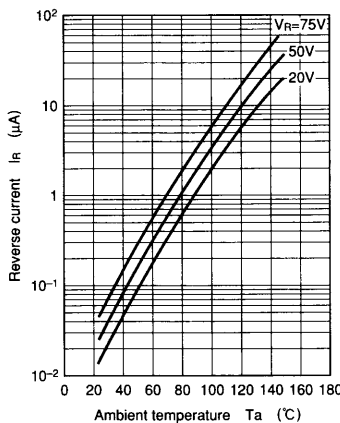
$C_t - V_R$



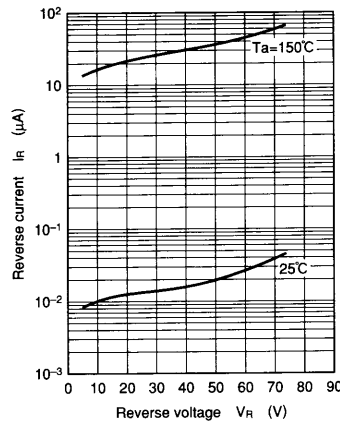
Switching/Composite Diodes

Characteristics chart of MA222 and MA223

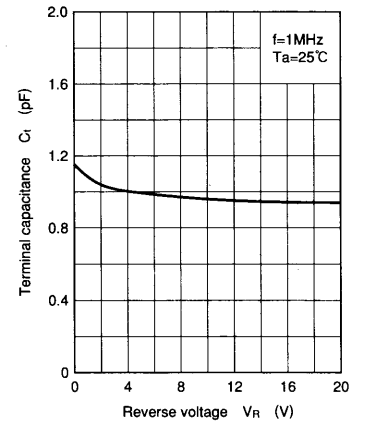
$I_R - T_a$



$I_R - V_R$



$C_t - V_R$



# MA999

## Silicon epitaxial planer type

For switching circuits

### ■ Features

- MA704A and MA151K chip with two elements incorporated
- Short reverse recovery period  $t_{rr}$
- Automatic mounting possible

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

#### ● Unit-1 (MA704A)

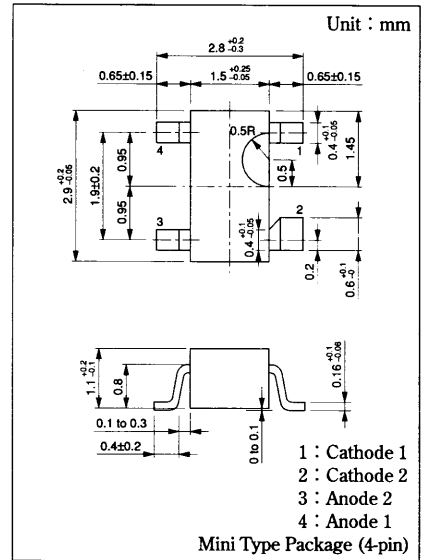
Parameter	Symbol	Rating	Unit
Reverse voltage (DC)	$V_R$	30	V
Peak reverse voltage	$V_{RM}$	30	V
Forward current (DC)	$I_F$	30	mA
Peak forward current	$I_{FM}$	150	mA
Junction temperature	$T_j$	125	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to +125	$^\circ\text{C}$

#### ● Unit-2 (MA151K)

Parameter	Symbol	Rating	Unit
Reverse voltage (DC)	$V_R$	40	V
Peak reverse voltage	$V_{RM}$	40	V
Forward current (DC)	$I_F$	100	mA
Peak forward current	$I_{FM}$	225	mA
Non-repetitive peak forward surge current	$I_{FSM}^*$	500	mA
Junction temperature	$T_j$	125	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to +125	$^\circ\text{C}$

\*  $t=1\text{s}$

### ■ Marking



### ■ Internal Connection

