

# 1MBC05-060, 1MBC05D-060, 1MBG05D-060

Molded IGBT

## 600V / 5A

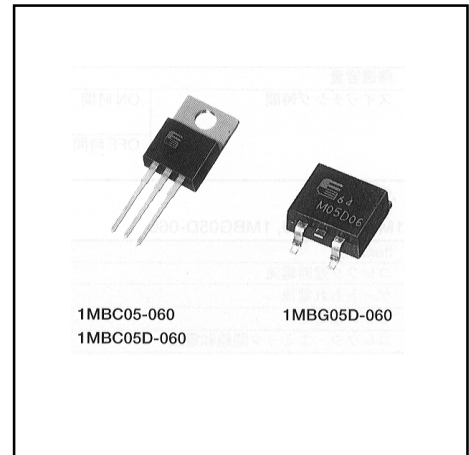
## Molded Package

### ■ Features

- Small molded package
- Low power loss
- Soft switching with low switching surge and noise
- High reliability, high ruggedness (RBSOA, SCSOA etc.)
- Comprehensive line-up

### ■ Applications

- Inverter for Motor drive
- AC and DC Servo drive amplifier
- Uninterruptible power supply



### ■ Maximum ratings and characteristics

- Absolute maximum ratings (at  $T_c=25^\circ\text{C}$  unless otherwise specified)

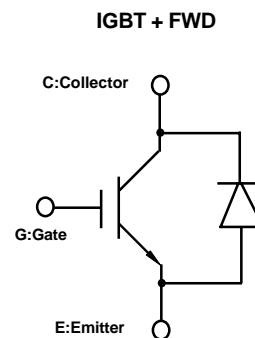
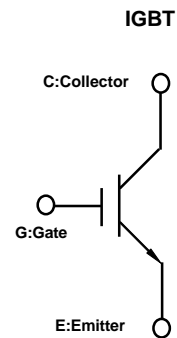
#### 1MBC05-060 / IGBT

Item	Symbol	Rating	Unit		
Collector-Emitter voltage	$V_{CES}$	600	V		
Gate-Emitter voltage	$V_{GES}$	$\pm 20$	V		
Collector current	DC	$T_c=25^\circ\text{C}$	$I_{C25}$	13	A
		$T_c=100^\circ\text{C}$	$I_{C100}$	5	A
	1ms	$T_c=25^\circ\text{C}$	$I_{cp}$	52	A
Max. power dissipation(IGBT)	$P_c$	50	W		
Operating temperature	$T_j$	+150	$^\circ\text{C}$		
Storage temperature	$T_{stg}$	-40 to +150	$^\circ\text{C}$		
Screw torque	-	40	N·m		

#### 1MBC05D-060, 1MBG05D-060 / IGBT+FWD

Item	Symbol	Rating	Unit		
Collector-Emitter voltage	$V_{CES}$	600	V		
Gate-Emitter voltage	$V_{GES}$	$\pm 20$	V		
Collector current	DC	$T_c=25^\circ\text{C}$	$I_{C25}$	13	A
		$T_c=100^\circ\text{C}$	$I_{C100}$	5	A
	1ms	$T_c=25^\circ\text{C}$	$I_{cp}$	52	A
Max. power dissipation (IGBT)	$P_c$	50	W		
Max. power dissipation (FWD)	$P_c$	25	W		
Operating temperature	$T_j$	+150	$^\circ\text{C}$		
Storage temperature	$T_{stg}$	-40 to +150	$^\circ\text{C}$		
Screw torque	-	40	N·m		

### ■ Equivalent Circuit Schematic



● Electrical characteristics (at Tj=25°C unless otherwise specified)

1MBC05-060 / IGBT

Item	Symbol	Characteristics			Conditions	Unit
		Min.	Typ.	Max.		
Zero gate voltage collector current	ICES	–	–	1.0	VGE=0V, VCE=600V	mA
Gate-Emitter leakage current	IGES	–	–	20	VCE=0V, VGE=±20V	µA
Gate-Emitter threshold voltage	VGE(th)	5.5	–	8.5	VCE=20V, Ic=5mA	V
Collector-Emitter saturation voltage	VCE(sat)	–	–	3.0	VGE=15V, Ic=5A	V
Input capacitance	Cies	–	400	–	VGE=0V	pF
Output capacitance	Coes	–	85	–	VCE=10V	
Reverse transfer capacitance	Cres	–	15	–	f=1MHz	
Turn-on time	ton	–	–	1.2	VCC=300V Ic=5A	µs
	tr	–	–	0.6	VGE=±15V	
Turn-off time	toff	–	–	1.0	RG=330 ohm	(Half Bridge)
	tf	–	–	0.35		

1MBC05D-060, 1MBG05D-060 / IGBT+FWD

Item	Symbol	Characteristics			Conditions	Unit
		Min.	Typ.	Max.		
Zero gate voltage collector current	ICES	–	–	1.0	VGE=0V, VCE=600V	mA
Gate-Emitter leakage current	IGES	–	–	20	VCE=0V, VGE=±20V	µA
Gate-Emitter threshold voltage	VGE(th)	5.5	–	8.5	VCE=20V, Ic=5mA	V
Collector-Emitter saturation voltage	VCE(sat)	–	–	3.0	VGE=15V, Ic=5A	V
Input capacitance	Cies	–	400	–	VGE=0V	pF
Output capacitance	Coes	–	85	–	VCE=10V	
Reverse transfer capacitance	Cres	–	15	–	f=1MHz	
Turn-on time	ton	–	–	1.2	VCC=300V, Ic=5A	µs
	tr	–	–	0.6	VGE=±15V	
Turn-off time	toff	–	–	1.0	RG=330 ohm	(Half Bridge)
	tf	–	–	0.35		
FWD forward on voltage	VF	–	–	3.0	IF=5A, VGE=0V	V
Reverse recovery time	trr	–	–	0.3	IF=5A, VGE=-10V, di/dt=100A/µs	µs

● Thermal resistance characteristics

1MBC05-060 / IGBT

Item	Symbol	Characteristics			Conditions	Unit
		Min.	Typ.	Max.		
Thermal resistance	Rth(j-c)	–	–	2.50	IGBT	°C/W

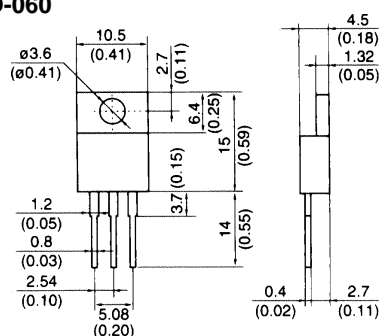
1MBC05D-060, 1MBG05D-060 / IGBT+FWD

Item	Symbol	Characteristics			Conditions	Unit
		Min.	Typ.	Max.		
Thermal resistance	Rth(j-c)	–	–	2.50	IGBT	°C/W
	Rth(j-c)	–	–	5.00	FWD	°C/W

■ Outline drawings, mm

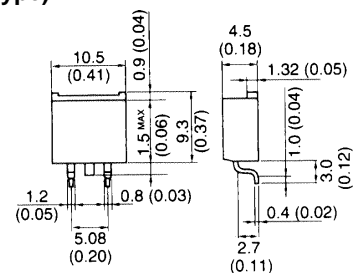
1MBC05-060, 1MBC05D-060

TO-220AB



1MBG05D-060

T pack-S (SMD type)

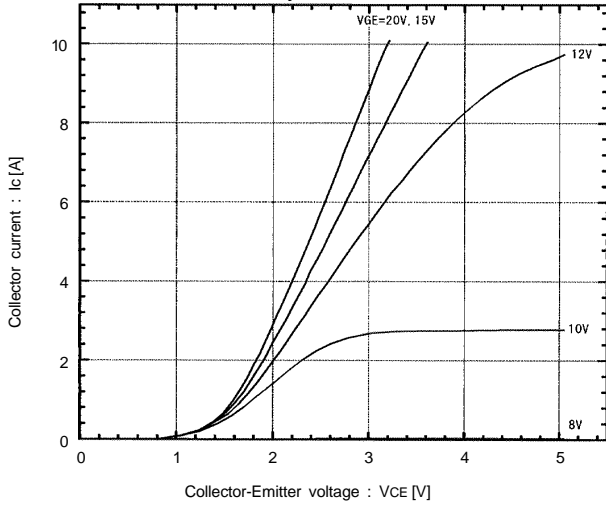


Characteristics

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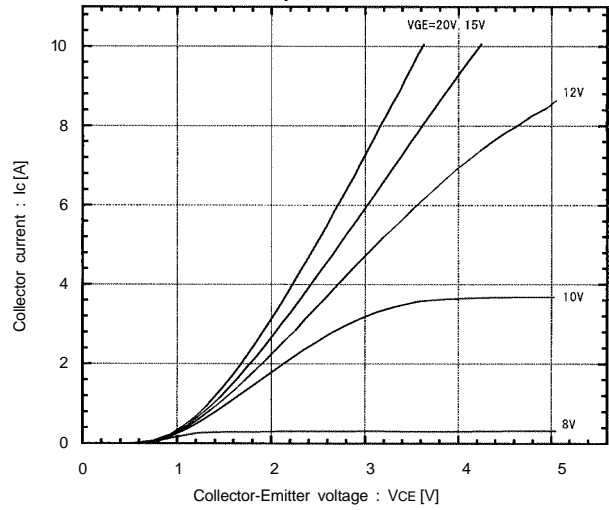
Collector current vs. Collector-Emmitter voltage

T<sub>j</sub>=25°C



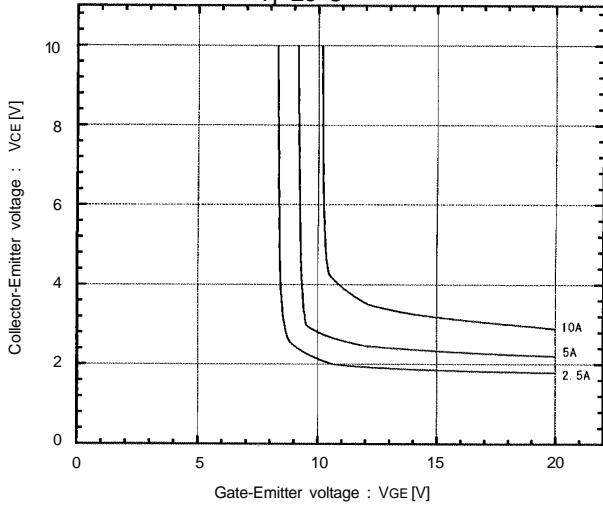
Collector current vs. Collector-Emmitter voltage

T<sub>j</sub>=125°C



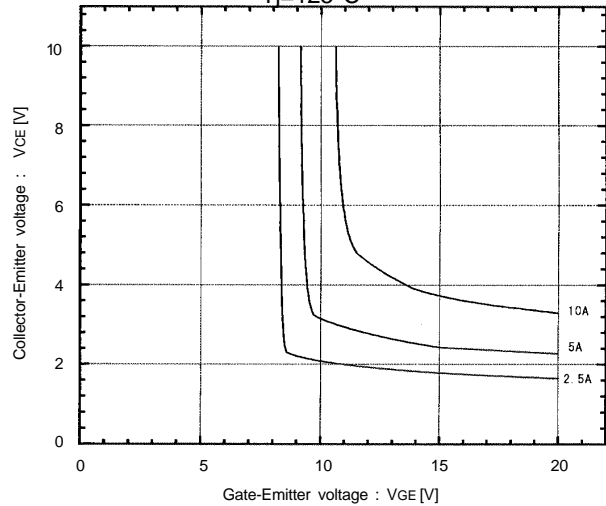
Collector-Emmitter vs. Gate-Emmitter voltage

T<sub>j</sub>=25°C



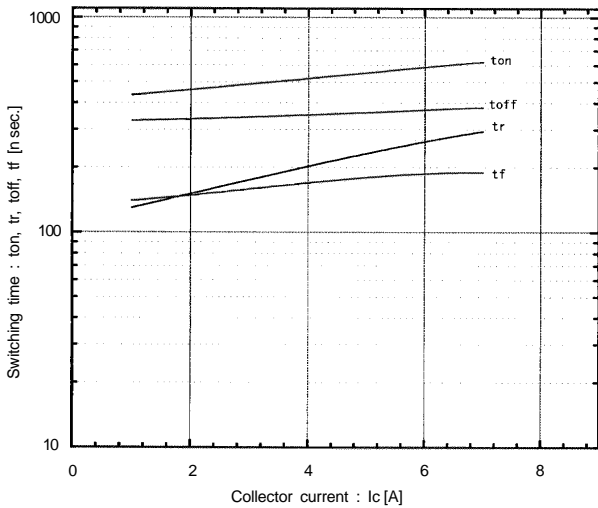
Collector-Emmitter vs. Gate-Emmitter voltage

T<sub>j</sub>=125°C



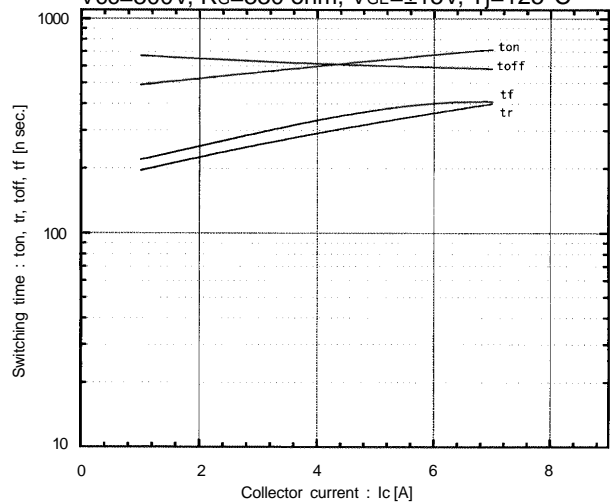
Switching time vs. Collector current

V<sub>CC</sub>=300V, R<sub>G</sub>=330 ohm, V<sub>GE</sub>=±15V, T<sub>j</sub>=25°C



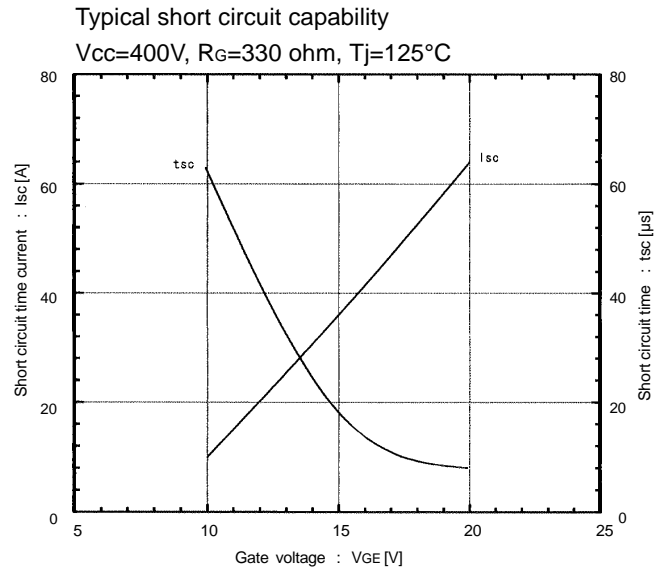
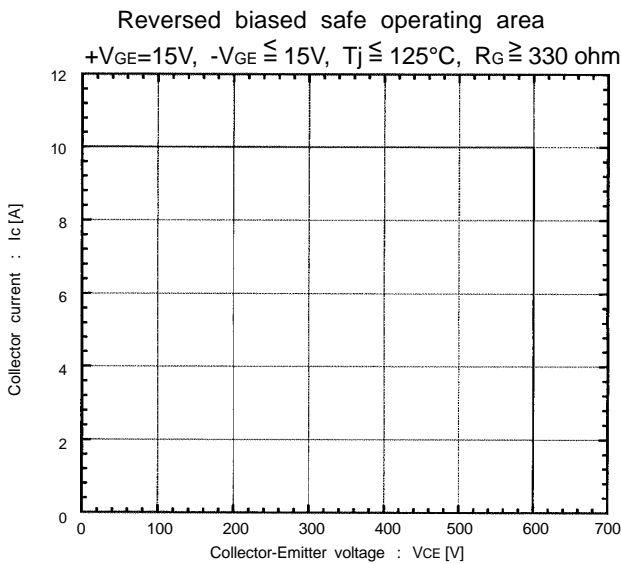
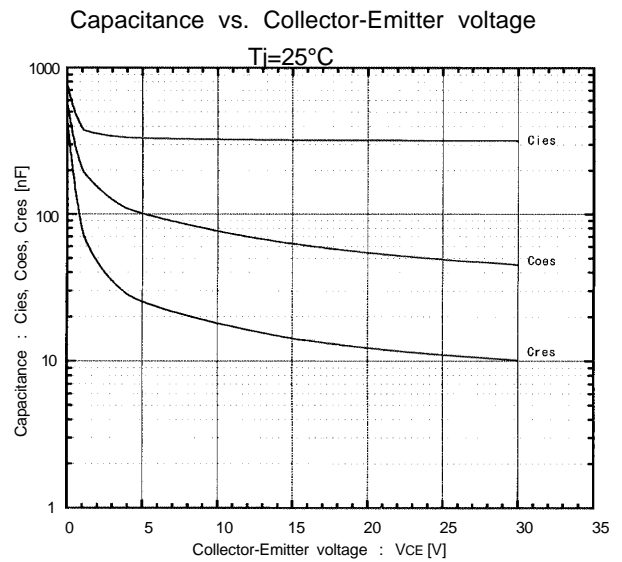
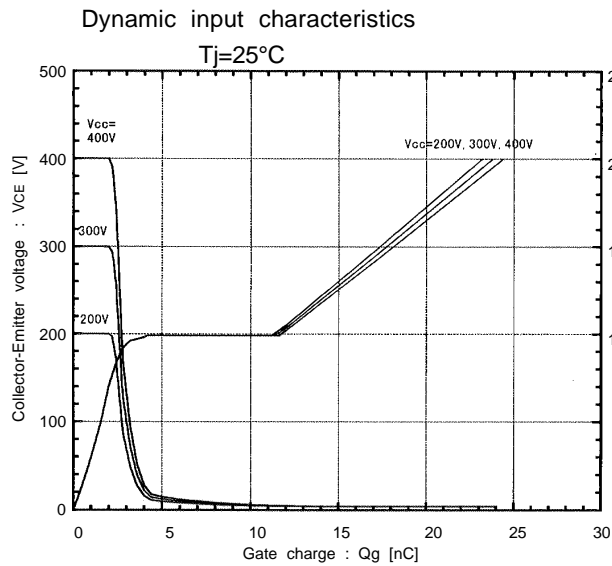
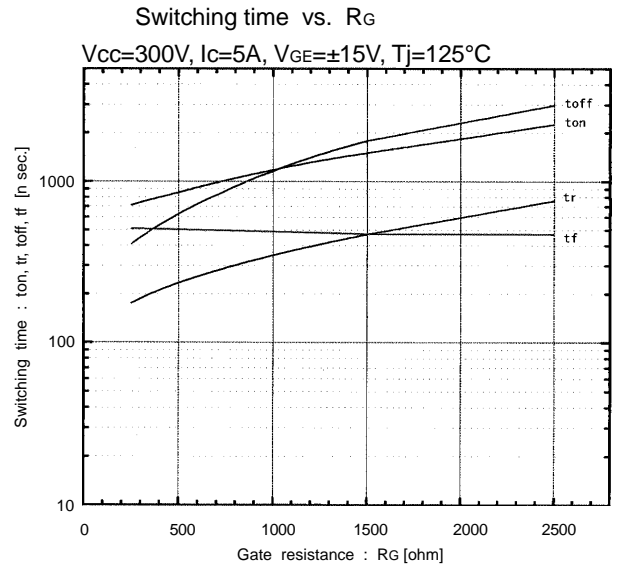
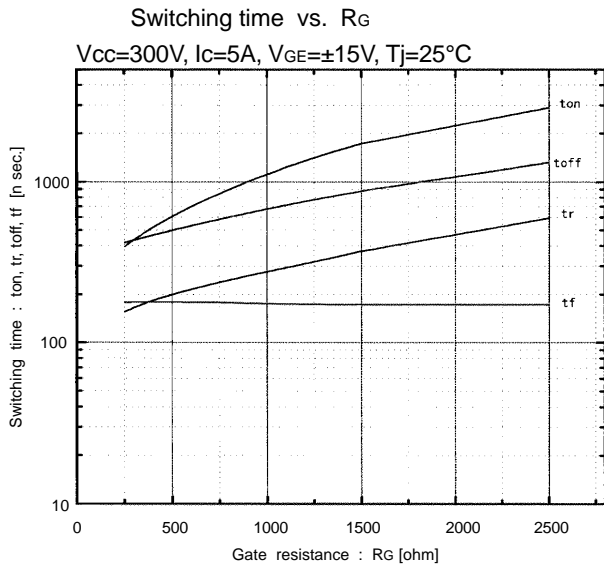
Switching time vs. Collector current

V<sub>CC</sub>=300V, R<sub>G</sub>=330 ohm, V<sub>GE</sub>=±15V, T<sub>j</sub>=125°C



Characteristics

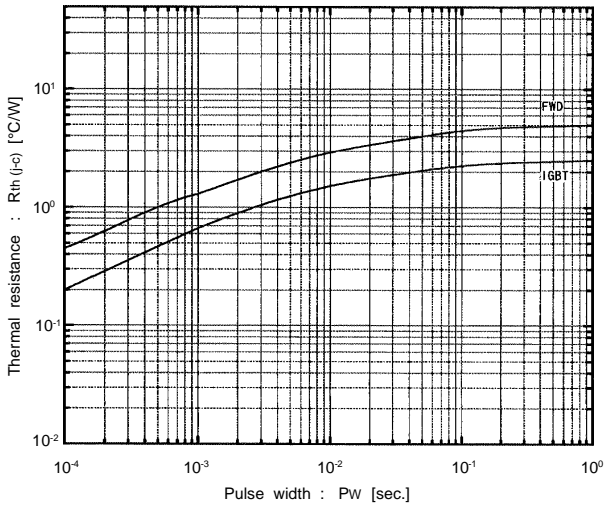
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■ Characteristics

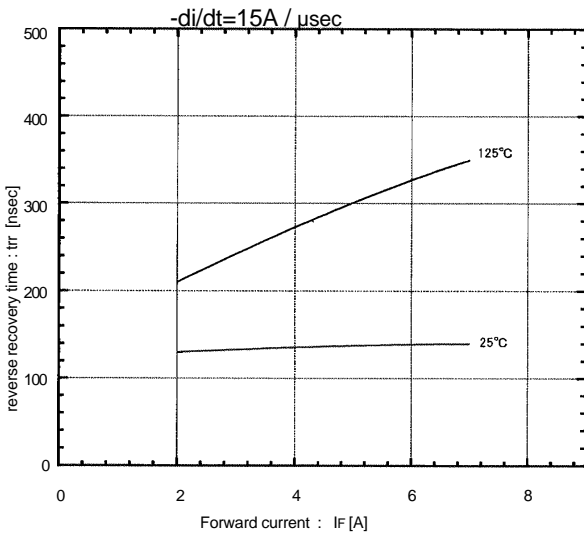
1MBC05-060,1MBC05D-060,1MBG05D-060

Transient thermal resistance

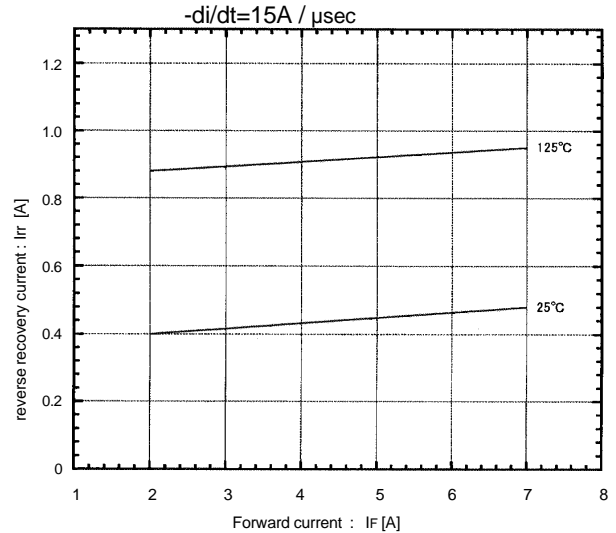


1MBC05D-060,1MBG05D-060

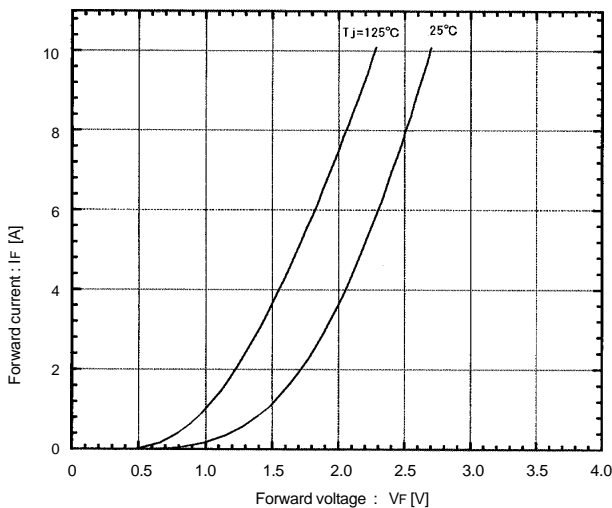
Reverse recovery time vs. Forward current



Reverse recovery current vs. Forward current



Forward current vs. Forward voltage



Reverse recovery time characteristics vs. -di/dt

