

SPECIFICATION

(TENTATIVE)

Device Name : IGBT

Type Name : 1MBH50D-060S

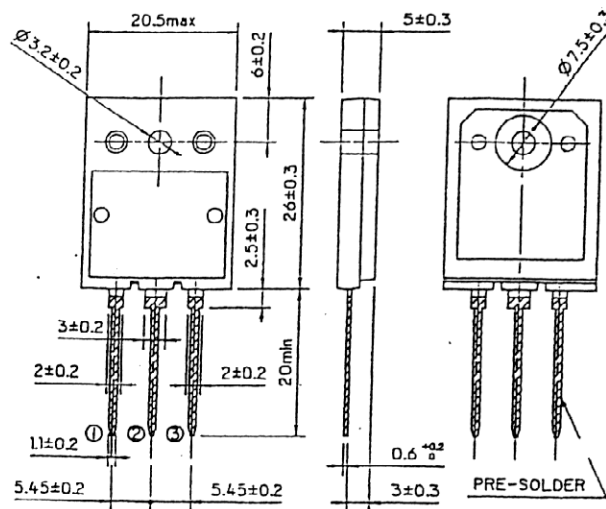
Spec. No. : MS5F 4622

Date : June-21-1999

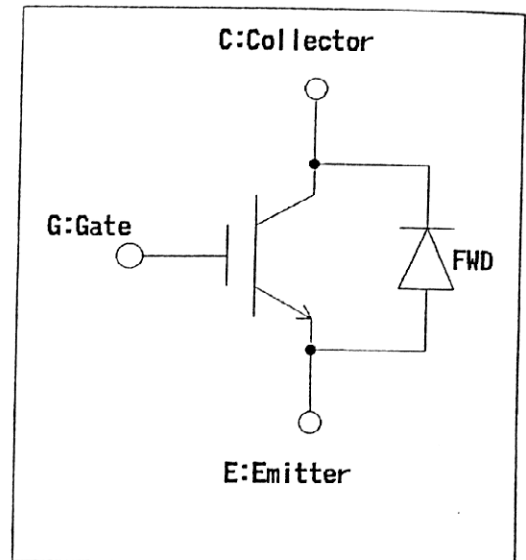
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Fuji Electric Co., Ltd.
Matsumoto Factory

	DATE	NAME	APPROVED		Fuji Electric Co., Ltd.	
DRAWN	June-21-99	X. Suzuki			DWG. NO.	MS5F 4622
CHECKED	Jun-21-99	T. HOSEN				
			T. HOSEN			1/13

1MBH50D-060S**1. Outline Drawing****CONNECTION**

- ① GATE
② COLLECTOR
③ EMITTER

2. Equivalent circuit**3. Absolute maximum ratings (Tc=25°C)**

Items			Symbols	Ratings	Units
Collector-Emitter Voltage			V_{CES}	600	V
Gate-Emitter Voltage			V_{GES}	±30	V
Collector Current	DC	Tc=25 °C	I_{C25}	75	A
		Tc=100°C	I_{C100}	50	A
	1ms	Tc=25 °C	I_{cp}	150	A
IGBT Max. Power Dissipation			P_c	230	W
FWD Max. Power Dissipation			P_c	150	W
Operating Temperature			T_j	+ 150	°C
Storage Temperature			T_{stg}	-40 ~ +150	°C
Mounting Screw Torque			—	70	N · cm

4. Electrical Characteristics (at $T_c=25^{\circ}\text{C}$ unless otherwise specified)

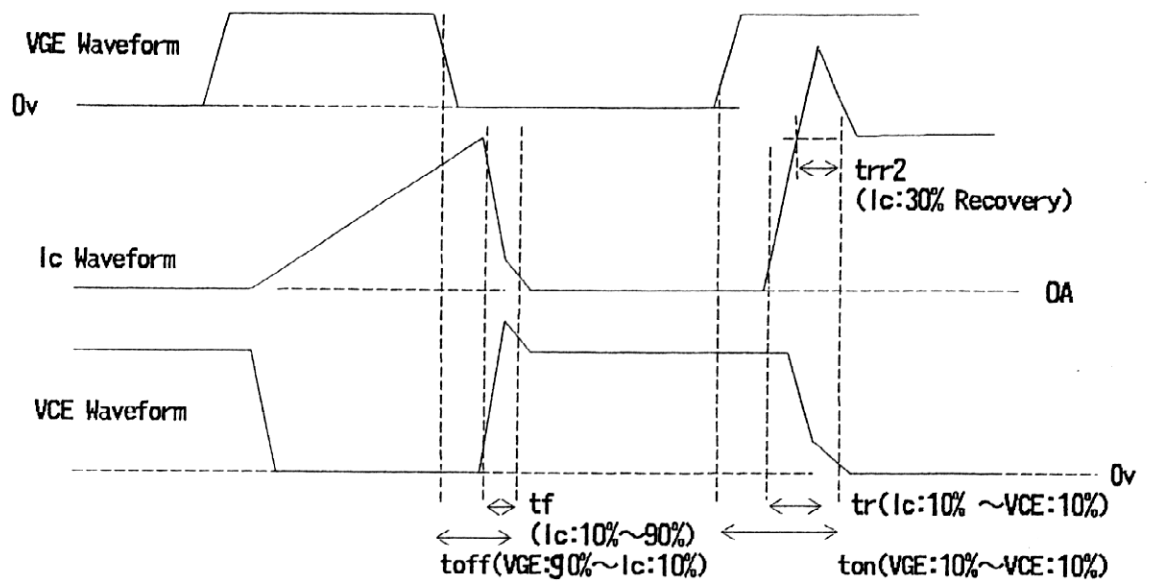
Items		Symbols	Characteristics			Conditions	Unit
			min.	typ.	max.		
Zero gate voltage Collector Current		I_{CES}	—	—	1.0	$V_{GE} = 0V$ $V_{CE} = 600V$	mA
Gate-Emitter leakage Current		I_{GES}	—	—	10	$V_{CE} = 0V$ $V_{GE} = \pm 30V$	μA
Gate-Emitter Threshold Voltage		$V_{GE(th)}$	4.0	5.0	6.0	$V_{CE} = 20V$ $I_c = 50mA$	V
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	—	2.4	2.9	$V_{GE} = 15V$ $I_c = 50A$	V
Input capacitance		C_{ies}	—	2500	—	$V_{GE} = 0V$	pF
Output capacitance		C_{oes}	—	240	—	$V_{CE} = 25V$	
Reverse transfer capacitance		C_{res}	—	130	—	$f = 1MHz$	
Switching Time	Turn-on time	$t_{on} \times$	—	0.15	—	$V_{CC} = 300V$ $I_c = 50A$ $V_{GE} = \pm 15V$ $R_G = 33 \Omega$ (Half Bridge)	μs
		$t_r \times$	—	0.09	—		
		t_{rr2}	—	0.03	—		
	Turn-off time	t_{off}	—	0.50	0.62	Inductance Load	
		t_f	—	0.10	0.17		
	Turn-on time	$t_{on} \times$	—	0.15	—	$V_{CC} = 300V$ $I_c = 50A$ $V_{GE} = +15V$ $R_G = 8.0 \Omega$ (Half Bridge)	
		$t_r \times$	—	0.09	—		
		t_{rr2}	—	0.03	—		
	Turn-off time	t_{off}	—	0.50	0.62	Inductance Load	
		t_f	—	0.10	0.17		
FWD forward voltage		V_F	—	2.0	2.5	$I_F=50A, V_{GE}=0V$	μs
Reverse recovery time		t_{rr}	—	0.60	0.10	$I_F=50A, V_{GE}=-10V$ $V_R=300V,$ $dv/dt=100A/\mu s$	

※ Turn-on characteristics include t_{rr2} . See figure.A in next page.

5. Thermal resistance characteristics

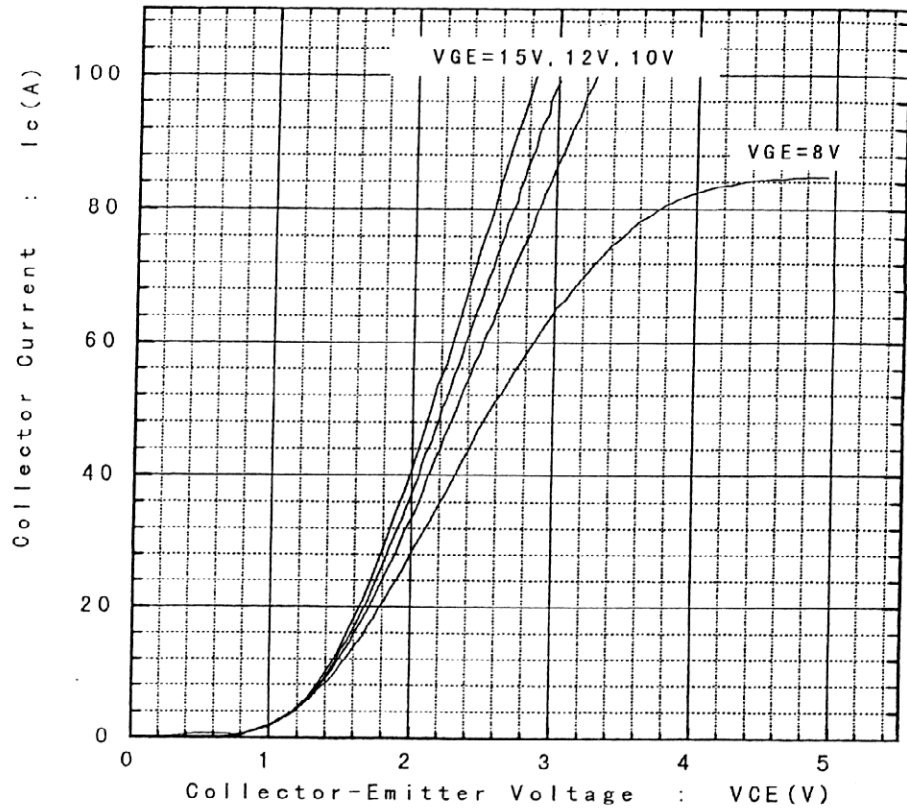
Items	Symbols	Characteristics			Conditions	Unit
		min.	typ.	max.		
Thermal resistance	$R_{th(j-c)}$	—	—	0.54	IGBT	$^{\circ}\text{C/W}$
	$R_{th(j-c)}$	—	—	0.83	FWD	

6. Switching waveform

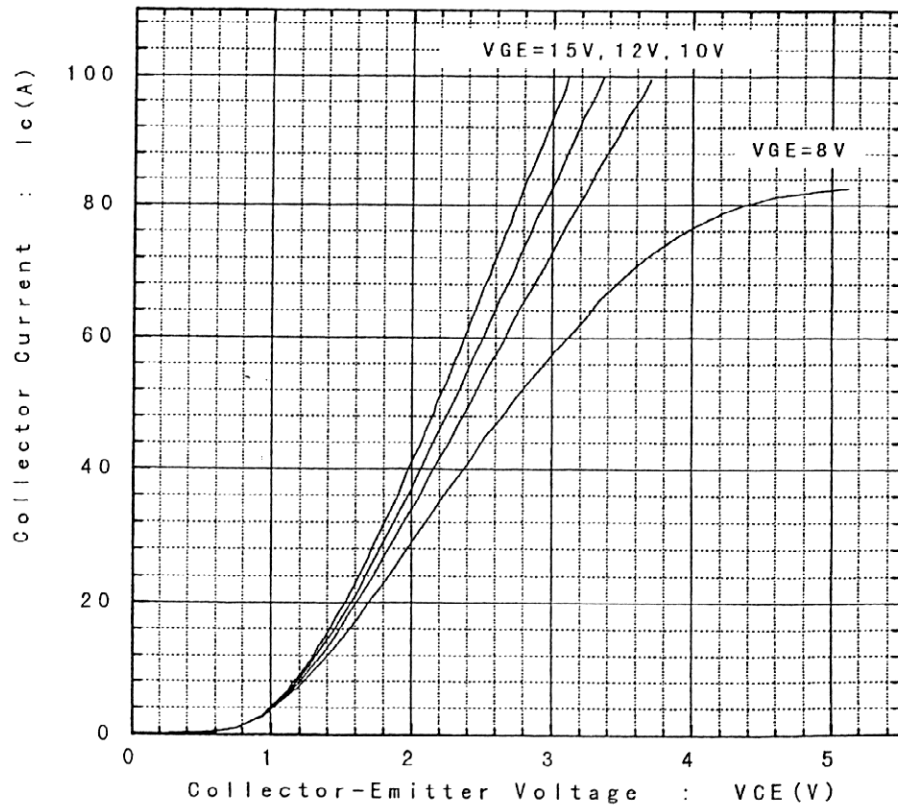


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Collector Current vs. Collector-Emitter Voltage
 $T_j = 25^\circ\text{C}$

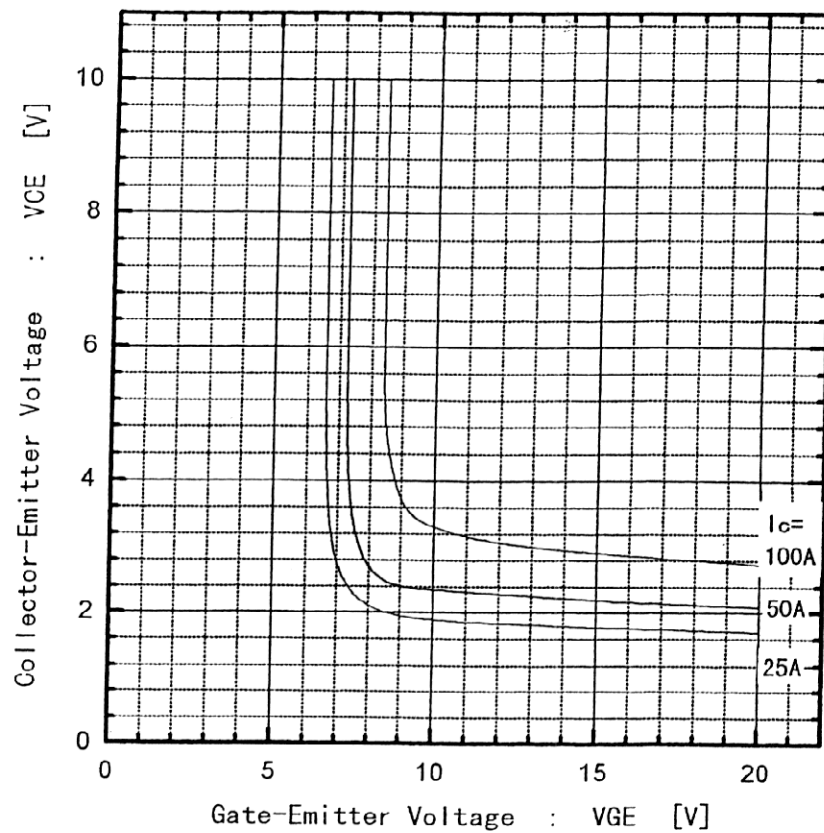


Collector Current vs. Collector-Emitter Voltage
 $T_j = 125^\circ\text{C}$

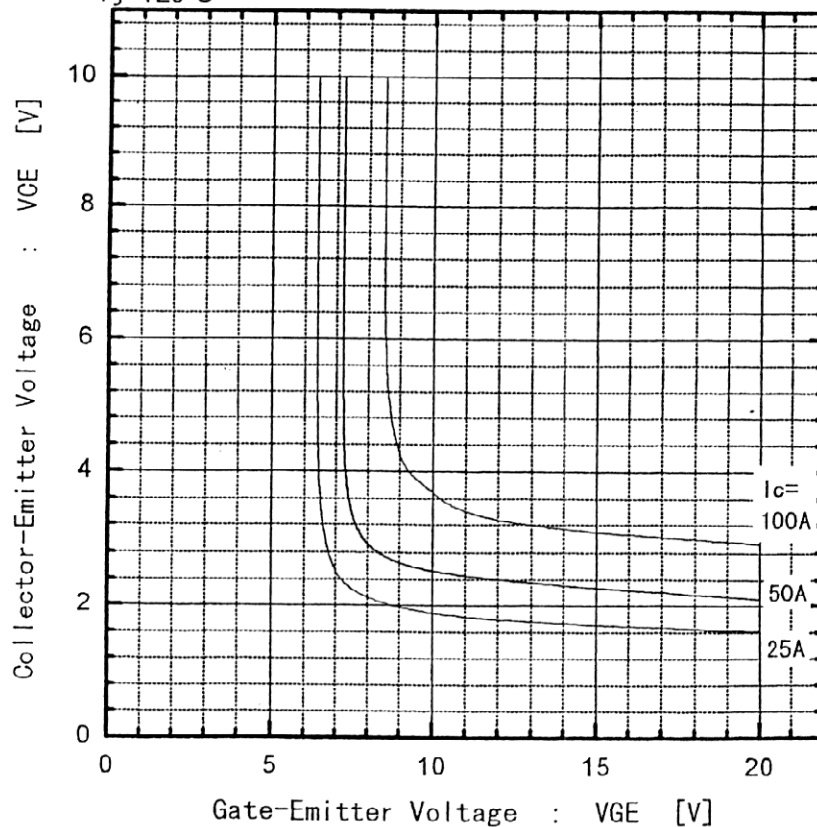


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Collector-Emitter Voltage vs Gate-Emitter Voltage
 $T_j = 25^\circ\text{C}$



Collector-Emitter Voltage vs Gate-Emitter Voltage
 $T_j = 125^\circ\text{C}$

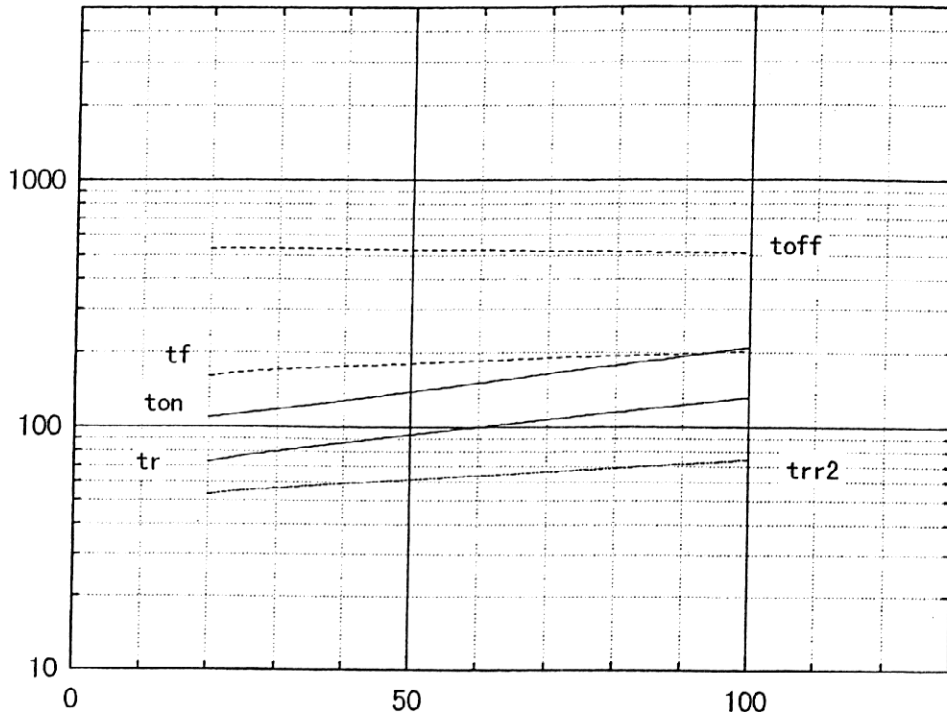


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Switching time vs Collector current

$V_{CC}=300V$, $R_G=8\ \Omega$, $V_{GE}=+15V$, $T_j=125^\circ C$

Switching time
: $t_f, t_{off}, t_r, t_{on}, t_{rr2}$ (nsec)

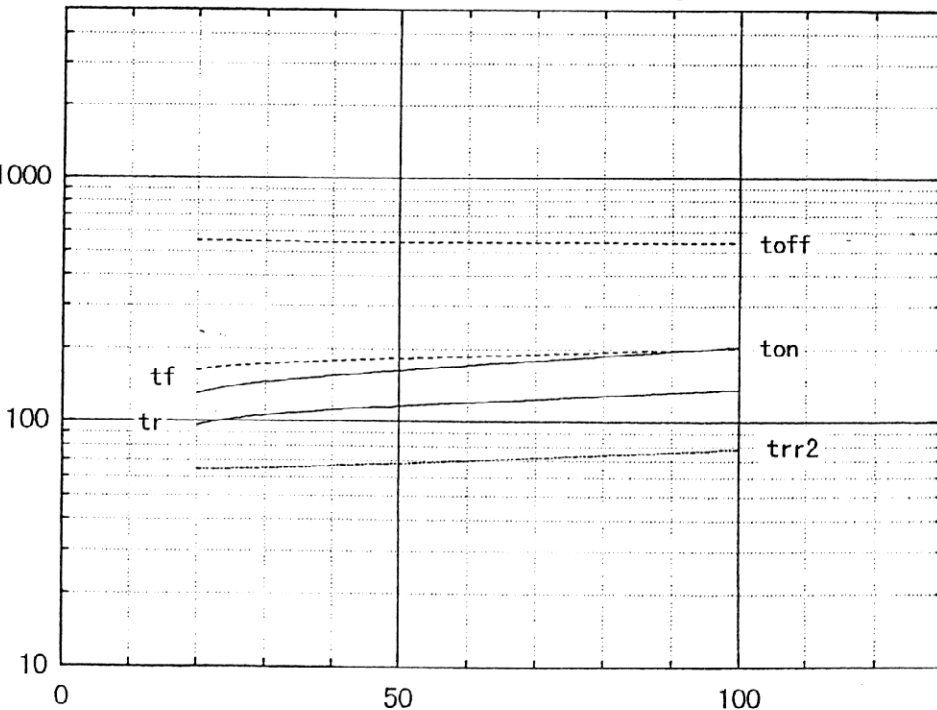


Collector current : $I_c(A)$

Switching time vs Collector current

$V_{CC}=300V$, $R_G=33\ \Omega$, $V_{GE}=\pm 15V$, $T_j=125^\circ C$

Switching time
: $t_f, t_{off}, t_r, t_{on}, t_{rr2}$ (nsec)

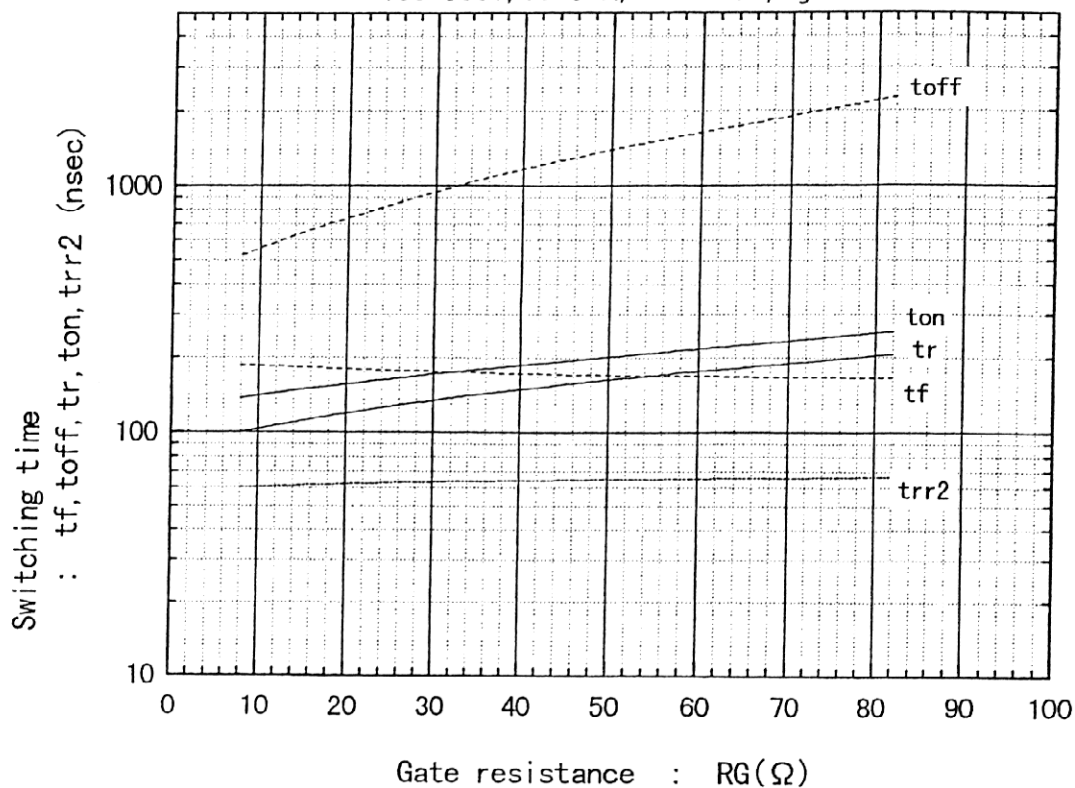


Collector current : $I_c(A)$

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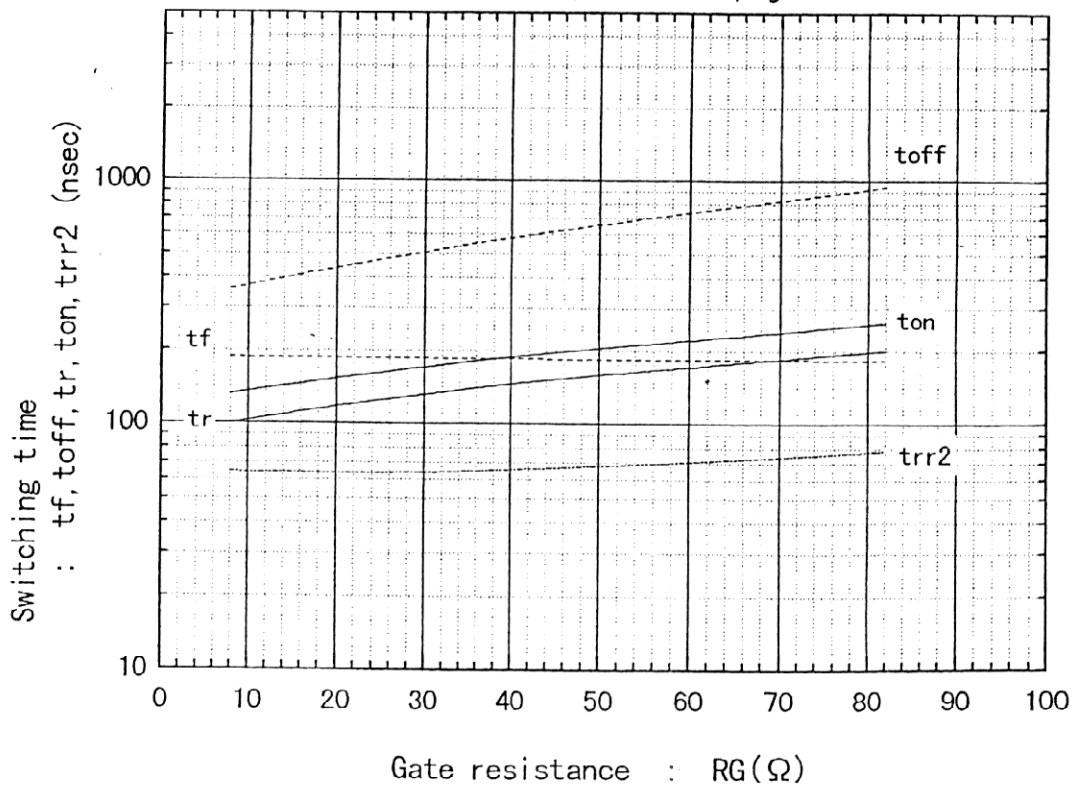
Switching time vs RG

$V_{cc}=300V, I_c=50A, V_{GE}=+15V, T_j=125^{\circ}C$

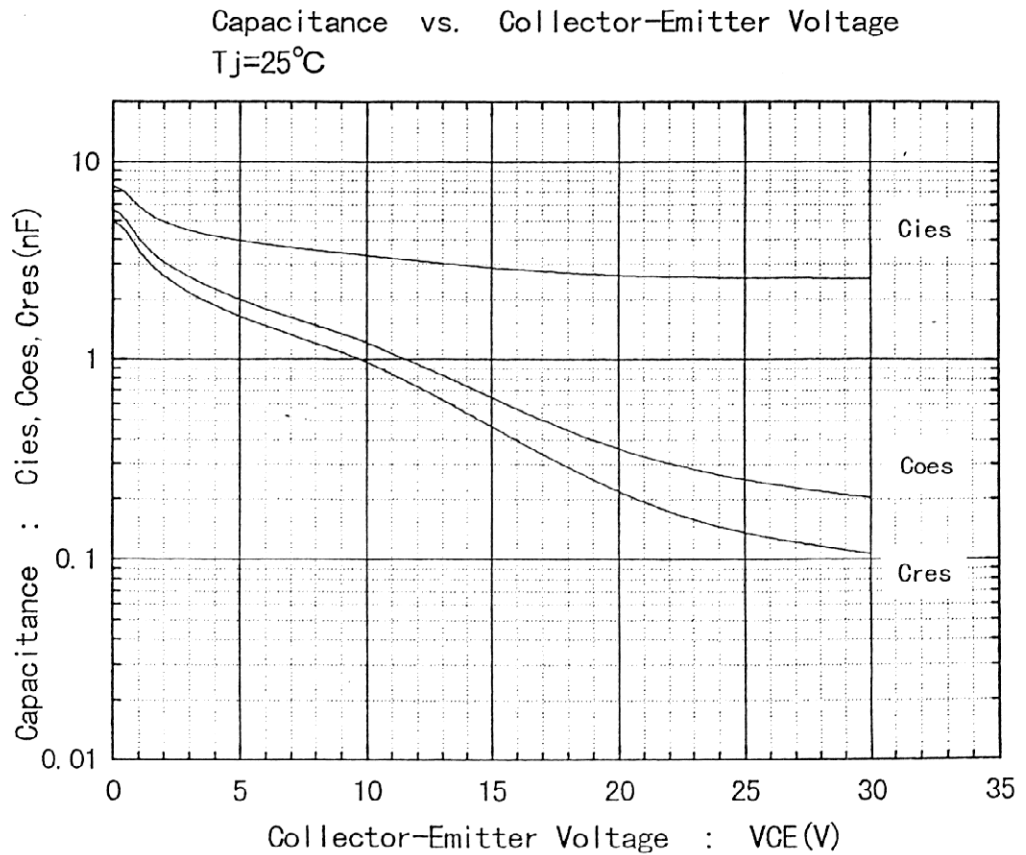
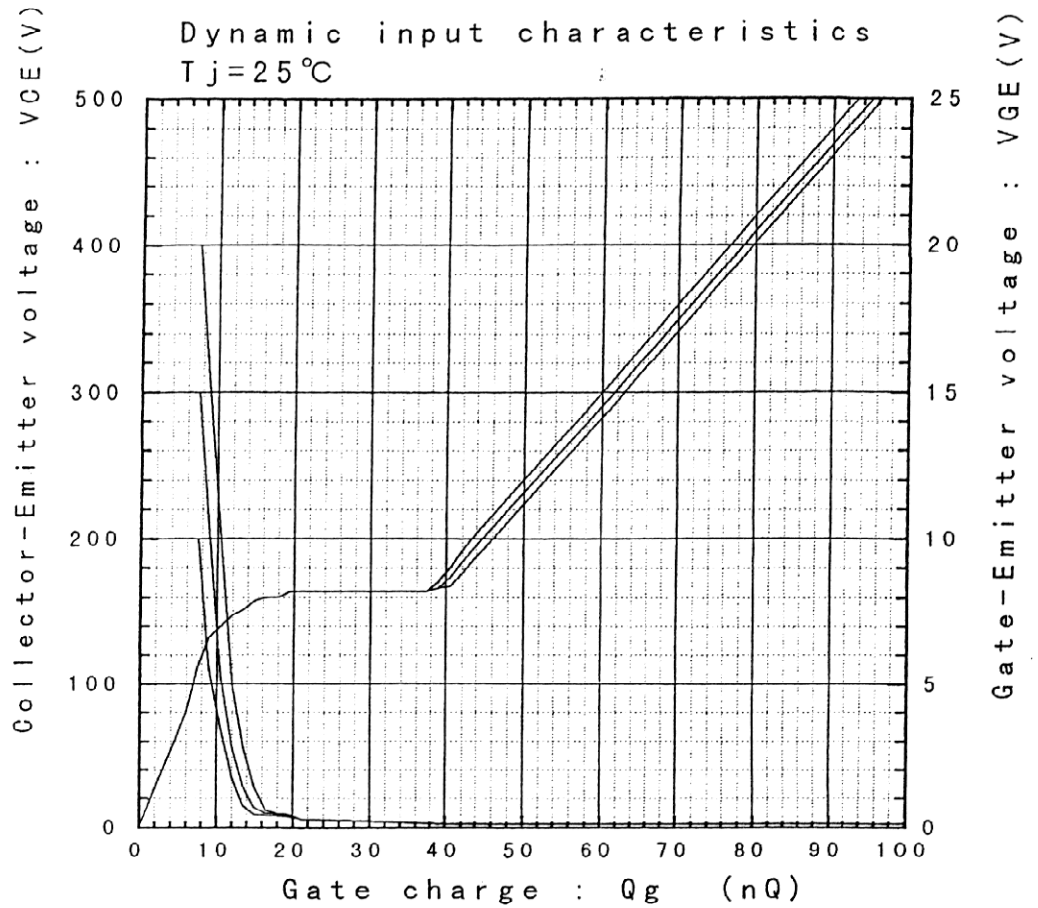


Switching time vs RG

$V_{cc}=300V, I_c=50A, V_{GE}=\pm 15V, T_j=125^{\circ}C$



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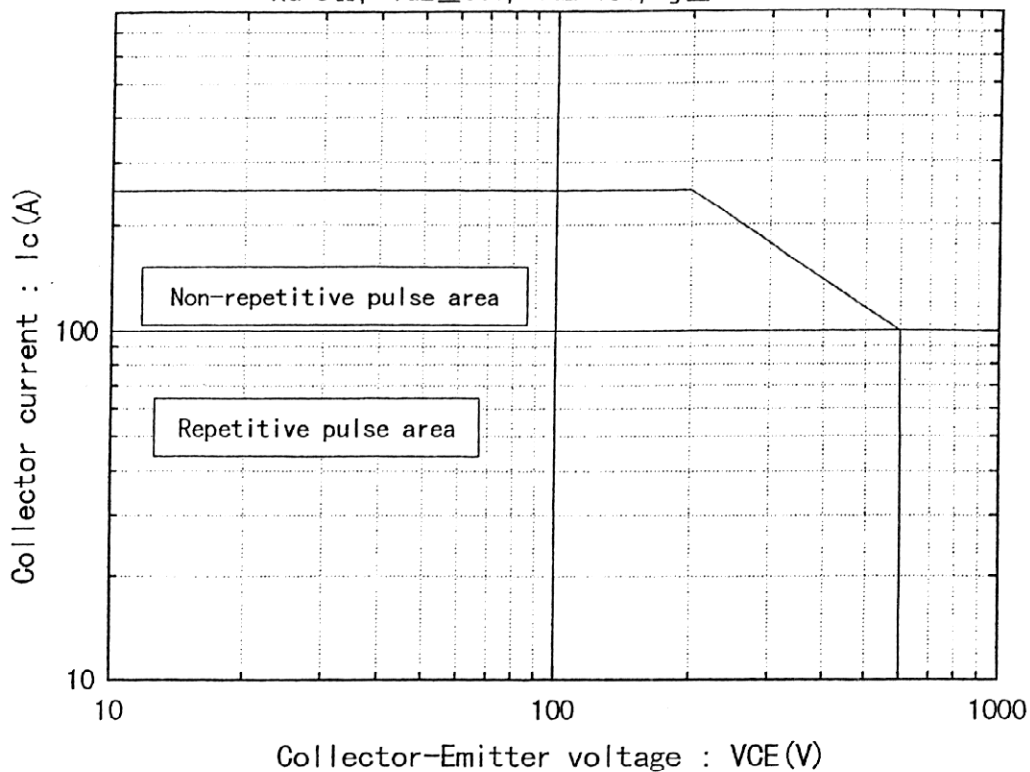


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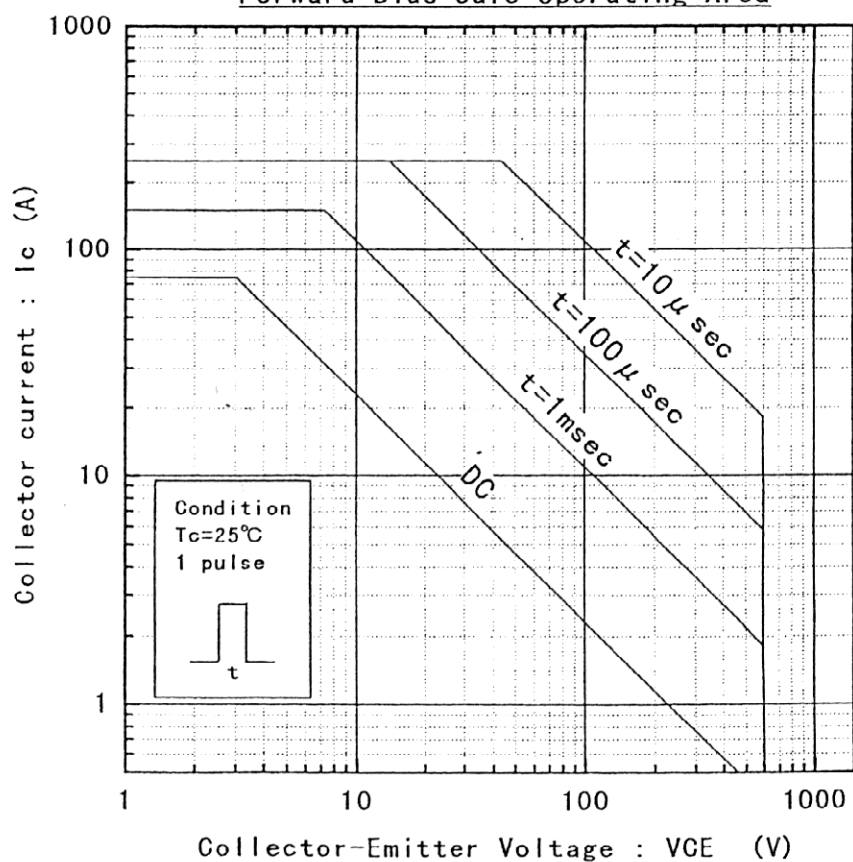
Reverse Biased Safe Operating Area

$R_G=8\Omega$, $+V_{GE} \leq 30V$, $-V_{GE}=15V$, $T_j \leq 125^\circ C$



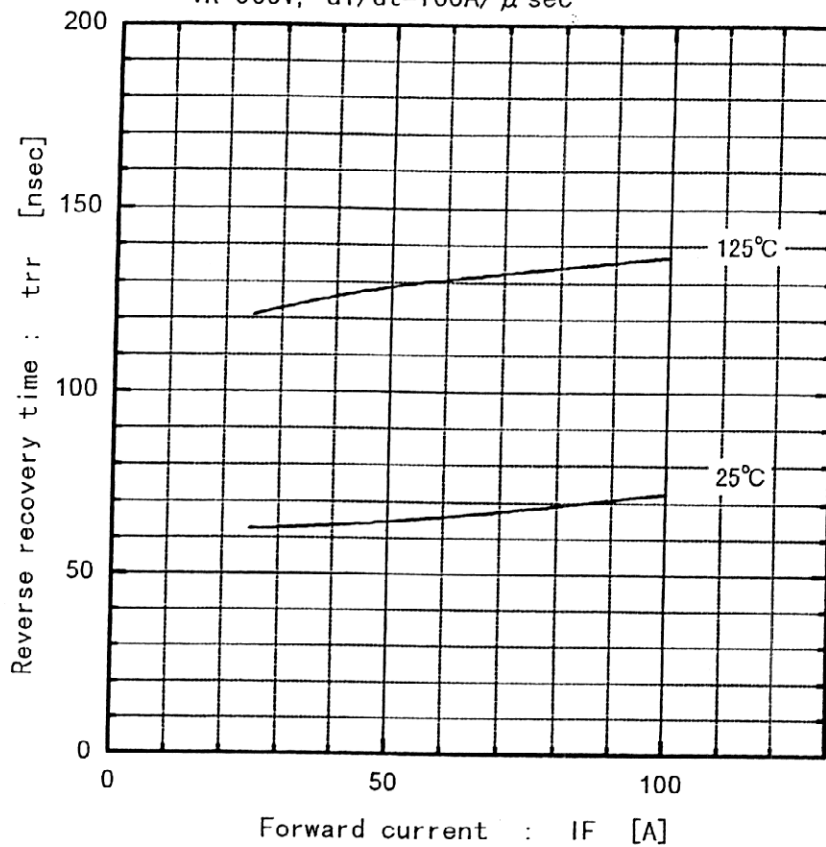
1MBH50D-060S

Forward Bias Safe Operating Area

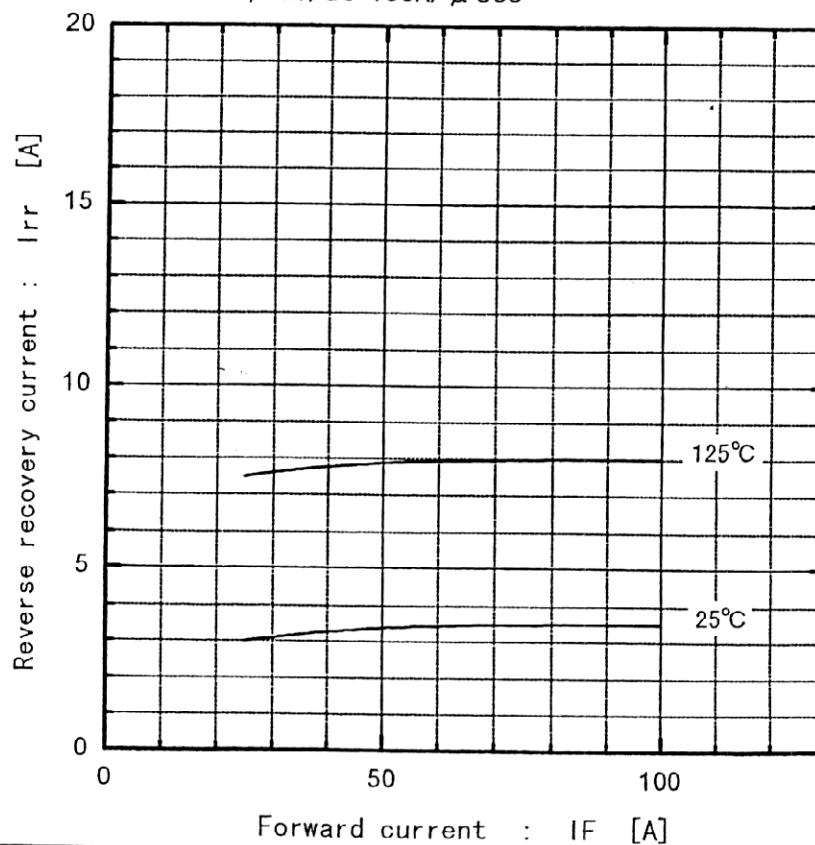


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Reverse recovery time vs. Forward current
VR=300V, $-di/dt=100A/\mu\text{sec}$

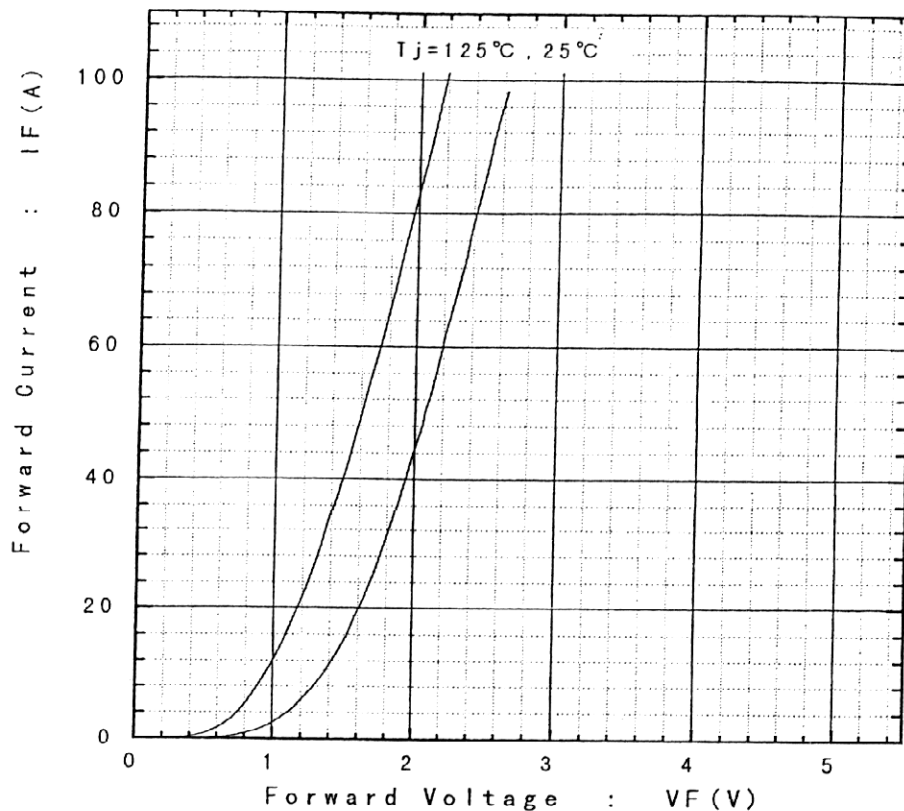


Reverse recovery current vs. Forward current
VR=300V, $-di/dt=100A/\mu\text{sec}$

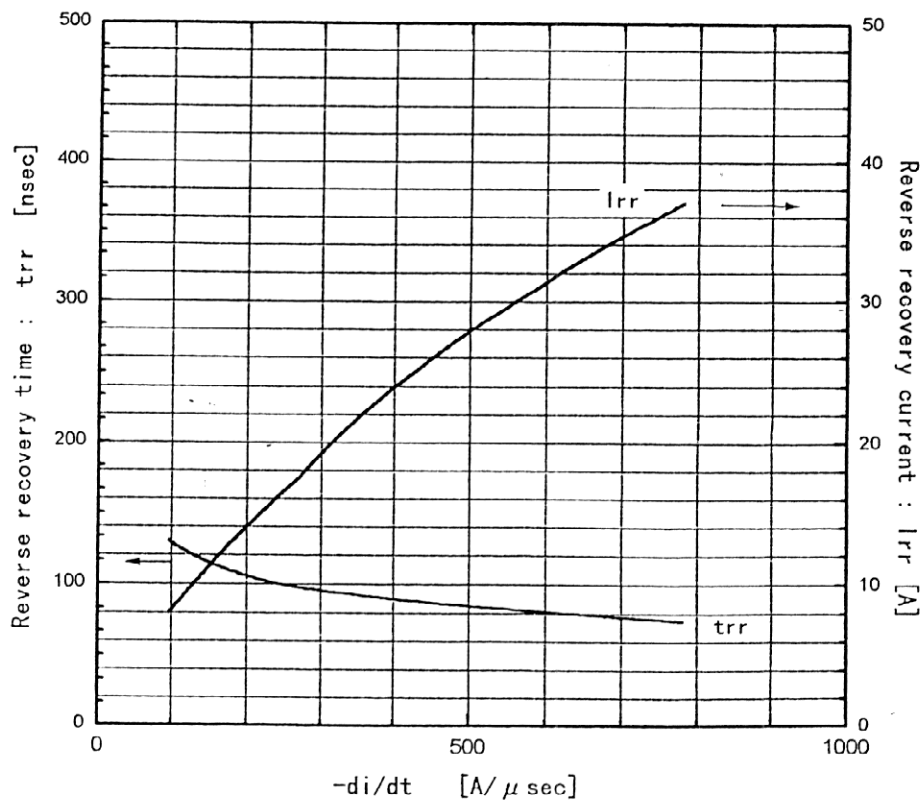


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Forward Voltage vs. Forward current



Reverse recovery characteristics vs. $-di/dt$
 $V_R = 300\text{V}$, $I_F = 50\text{A}$, $T_j = 125^\circ\text{C}$



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Transient thermal resistance

