

SPECIFICATION

(TENTATIVE)

Device Name : IGBT

Type Name : 1MBH50D-060S

Spec. No. : MS5F 4622

Date : June-21-1999

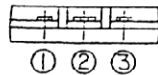
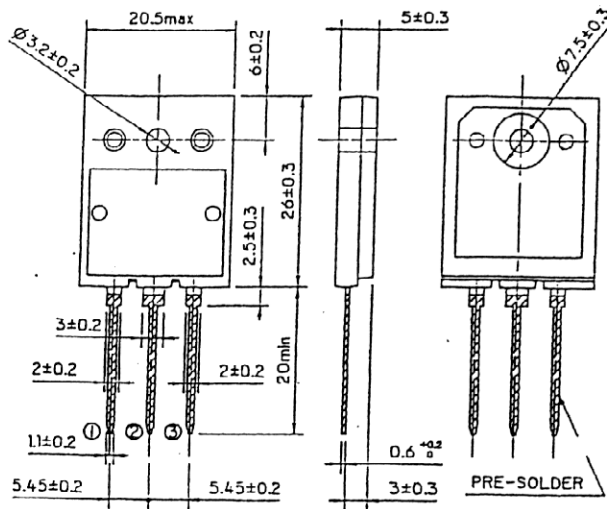
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Fuji Electric Co.,Ltd.
Matsumoto Factory

	DATE	NAME	APPROVED	Fuji Electric Co.,Ltd.		
DRAWN	June-21-99	X. Suzuki		DWG. NO.	MS5F 4622	1/13
CHECKED	Jun-21-'99	T. HOSEN	T. HOSEN			

1MBH50D-060S

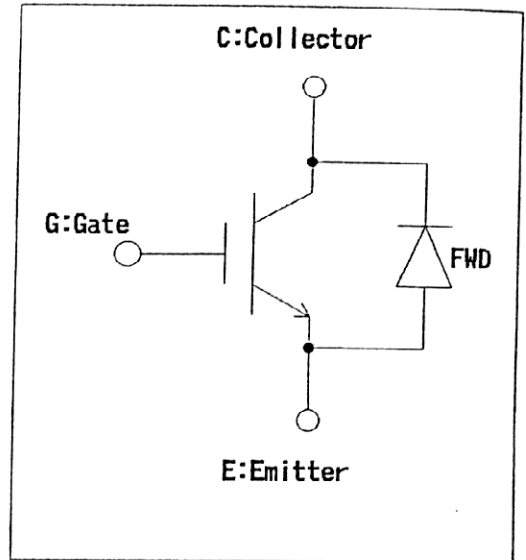
1. Outline Drawing



CONNECTION

- ① GATE
- ② COLLECTOR
- ③ EMITTER

2. Equivalent circuit



3. Absolute maximum ratings ($T_c=25^\circ\text{C}$)

Items		Symbols	Ratings	Units	
Collector-Emitter Voltage		V_{CES}	600	V	
Gate-Emitter Voltage		V_{GES}	± 30	V	
Collector Current	DC	$T_c=25^\circ\text{C}$	I_{C25}	75	A
		$T_c=100^\circ\text{C}$	I_{C100}	50	A
	1ms	$T_c=25^\circ\text{C}$	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	$^\circ\text{C}$	
Storage Temperature		T_{stg}	-40 ~ +150	$^\circ\text{C}$	
Mounting Screw Torque		—	70	N · cm	

4. Electrical Characteristics (at Tc=25°C unless otherwise specified)

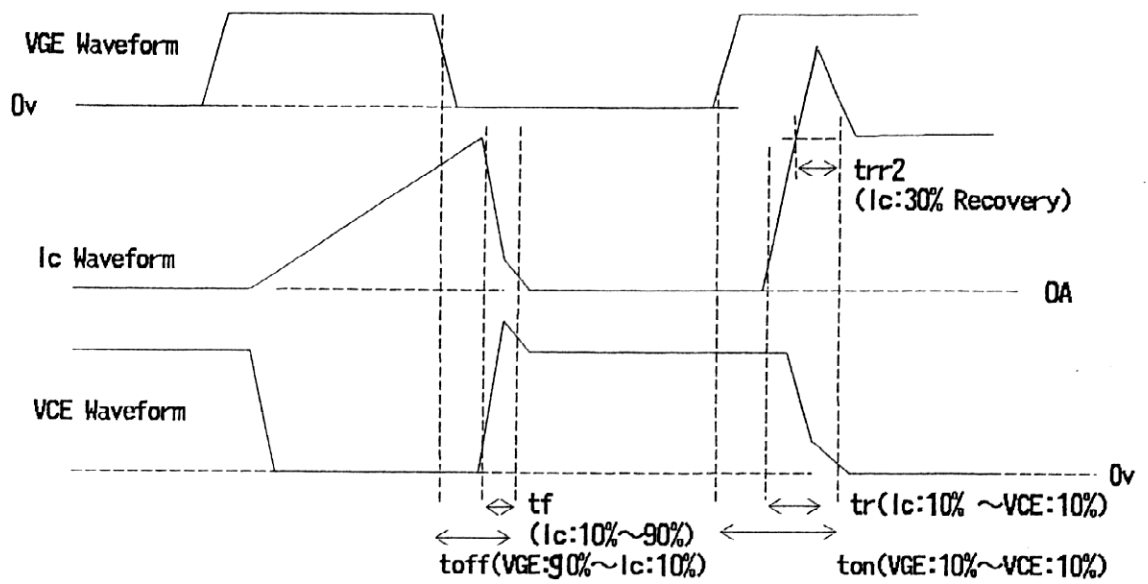
Items		Symbols	Characteristics			Conditions	Unit	
			min.	typ.	max.			
Zero gate voltage Collector Current		I_{CES}	—	—	1.0	$V_{GE} = 0V$ $V_{CE} = 600V$	mA	
Gate-Emitter leakage Current		I_{GES}	—	—	10	$V_{CE} = 0V$ $V_{GE} = \pm 30V$	μA	
Gate-Emitter Threshold Voltage		$V_{GE(th)}$	4.0	5.0	6.0	$V_{CE} = 20V$ $I_C = 50mA$	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	Turn-on time	$t_{on} \times$	—	0.15			—
			$t_r \times$	—	0.09	—		
			t_{rr2}	—	0.03	—		
		Turn-off time	t_{off}	—	0.50	0.62		
			t_f	—	0.10	0.17		
FWD forward voltage		V_F	—	2.0	2.5	$I_F = 50A, V_{GE} = 0V$		
Reverse recovery time		t_{rr}	—	0.60	0.10	$I_F = 50A, V_{GE} = -10V$ $V_R = 300V,$ $dv/dt = 100A/\mu S$	μS	

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

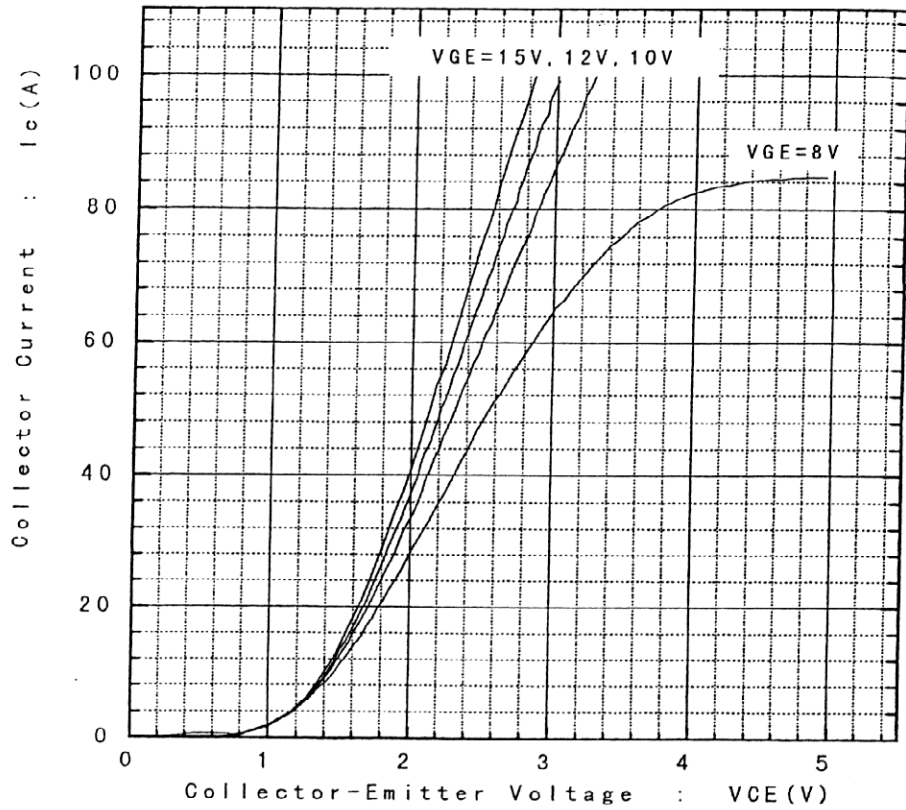
5. Thermal resistance characteristics

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

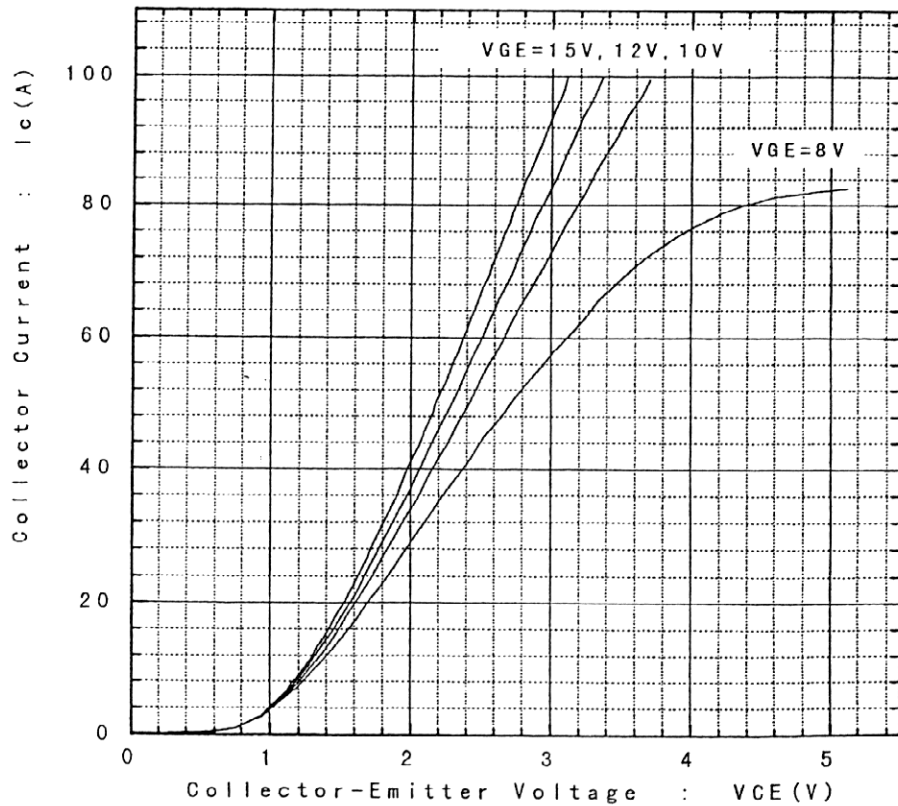
6. Switching waveform



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



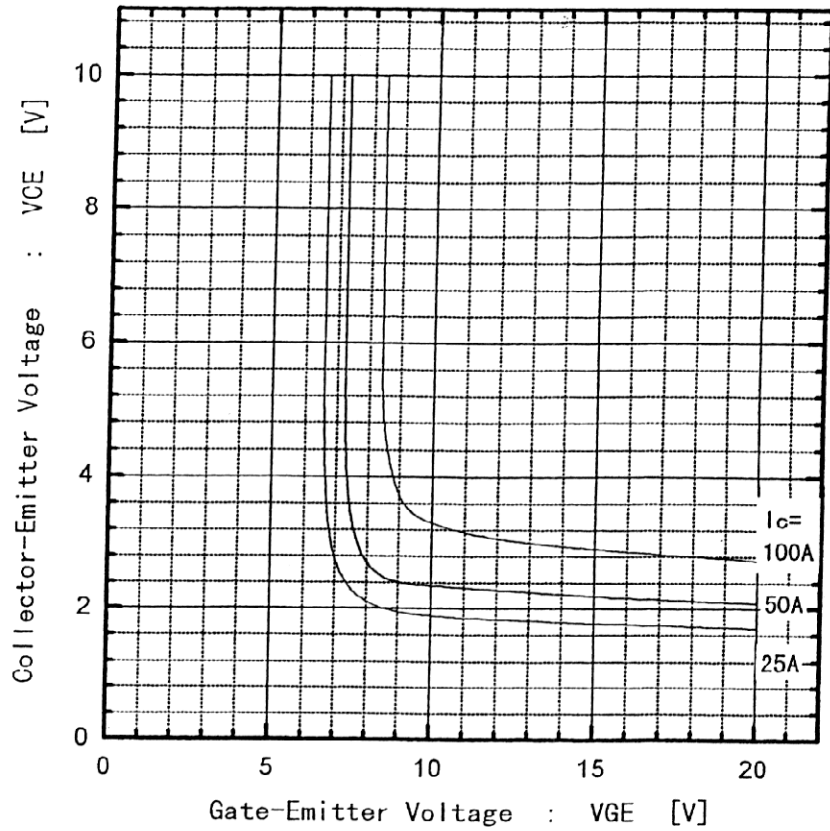
Collector Current vs. Collector-Emitter Voltage
 $T_j = 125^\circ\text{C}$



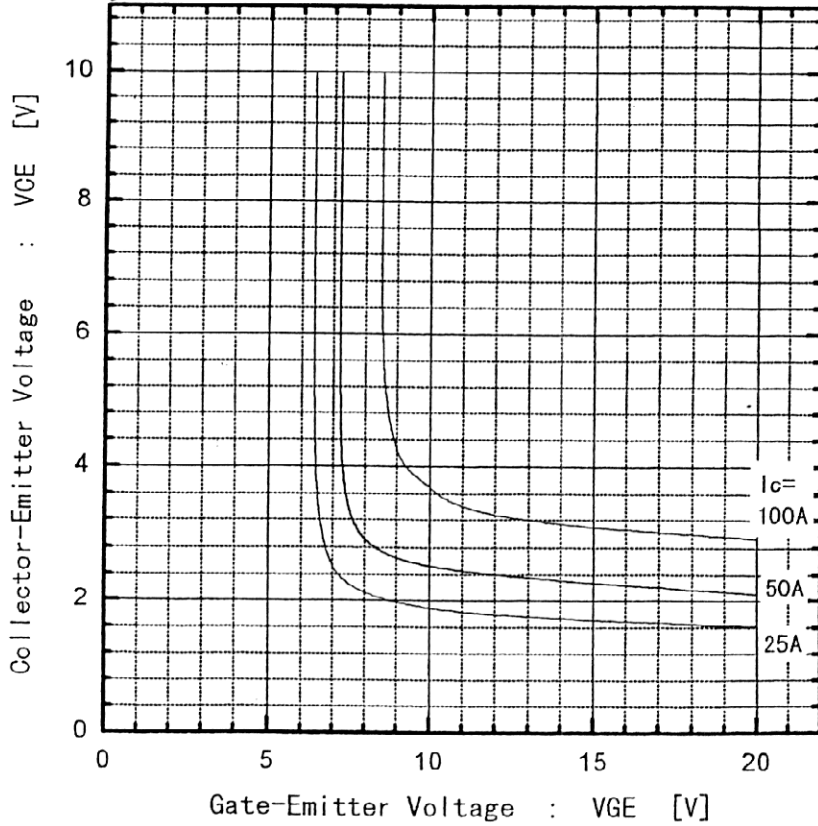
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Collector-Emitter Voltage vs Gate-Emitter Voltage
 $T_j=25^\circ\text{C}$



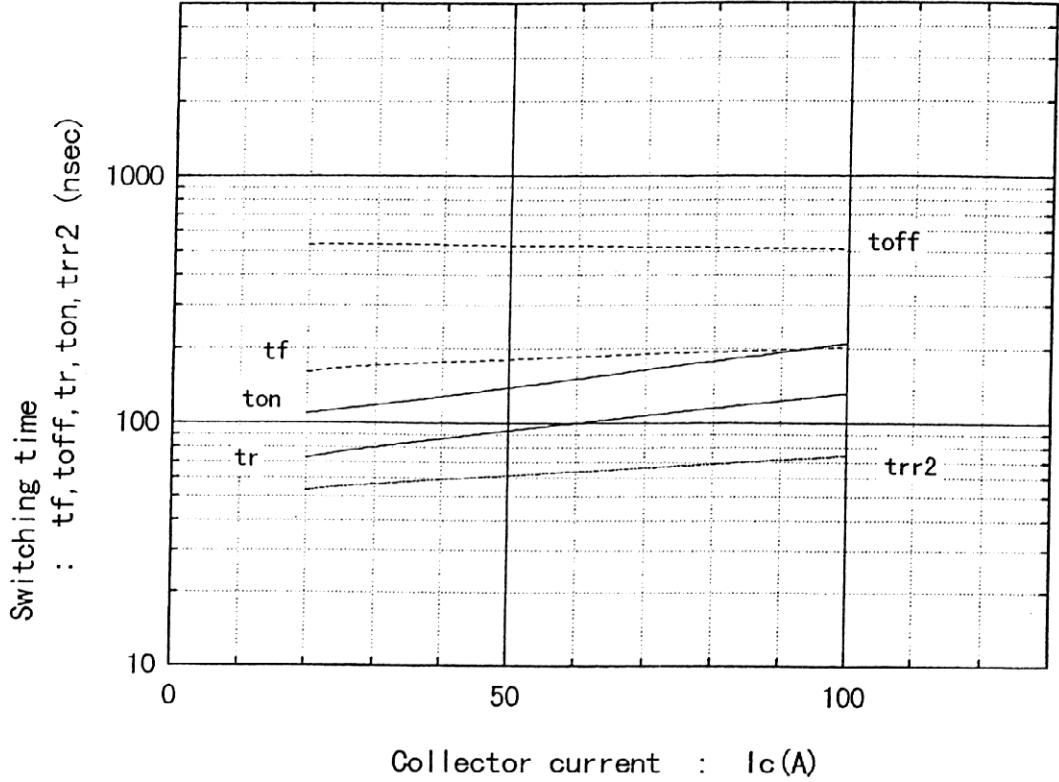
Collector-Emitter Voltage vs Gate-Emitter Voltage
 $T_j=125^\circ\text{C}$



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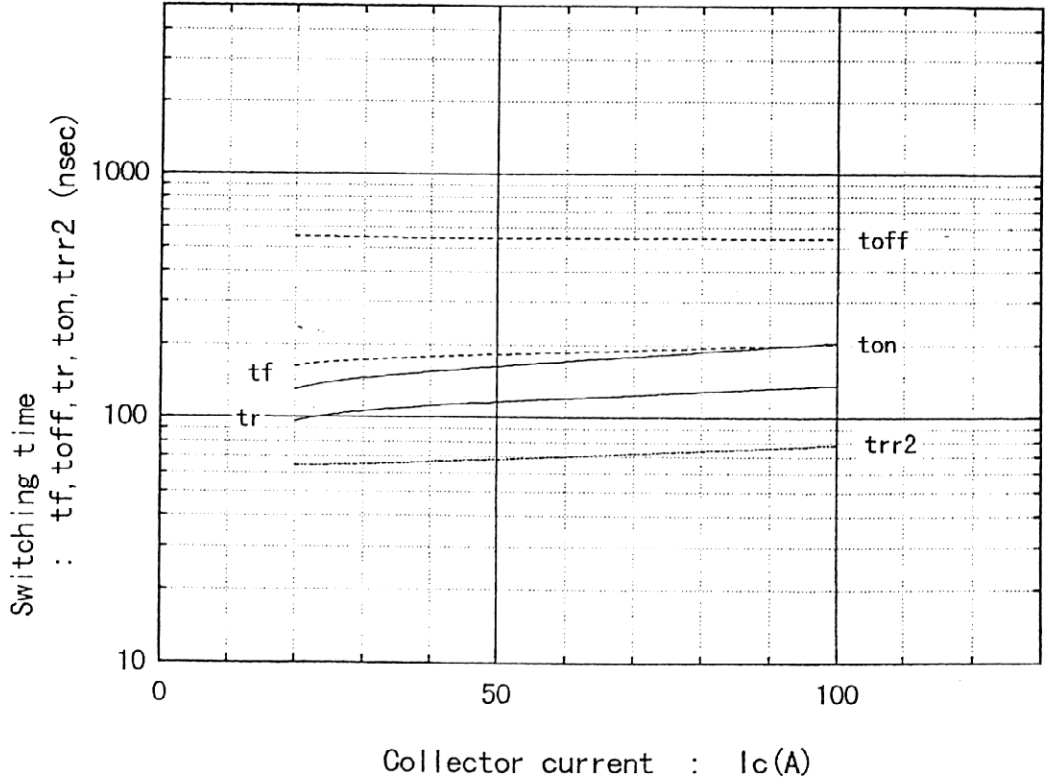
Switching time vs Collector current

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



Switching time vs Collector current

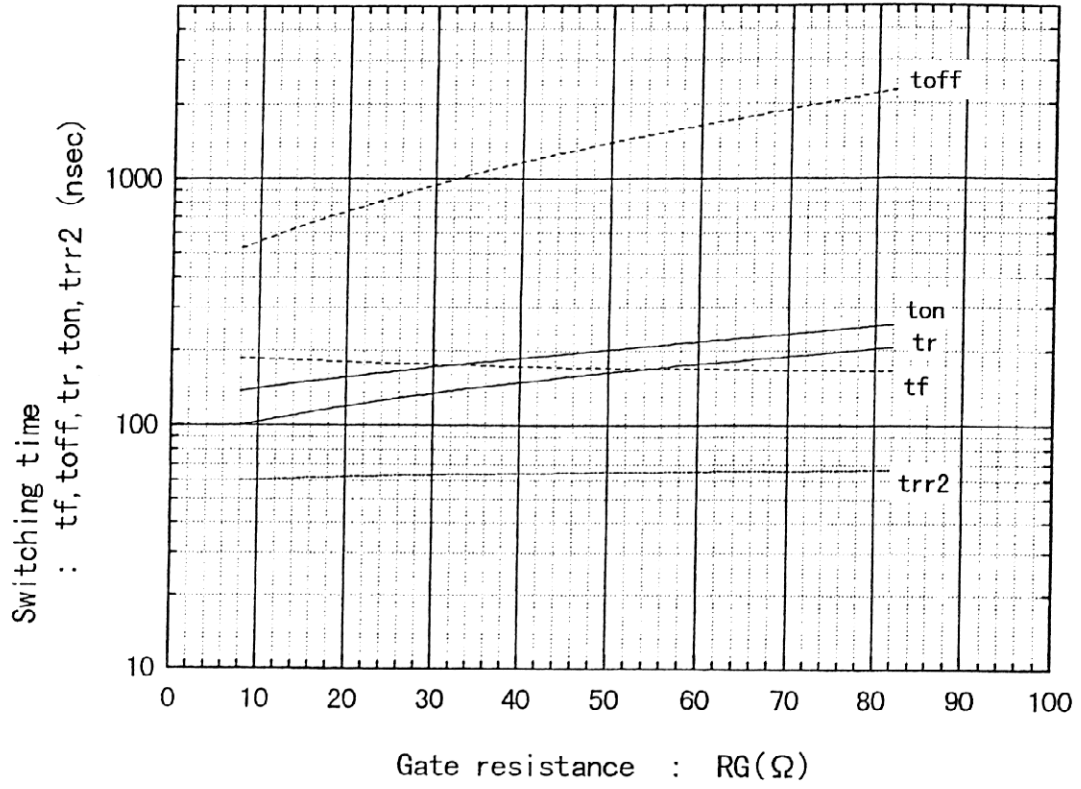
$V_{CC}=300V, R_G=33\ \Omega, V_{GE}=\pm 15V, T_j=125^\circ C$



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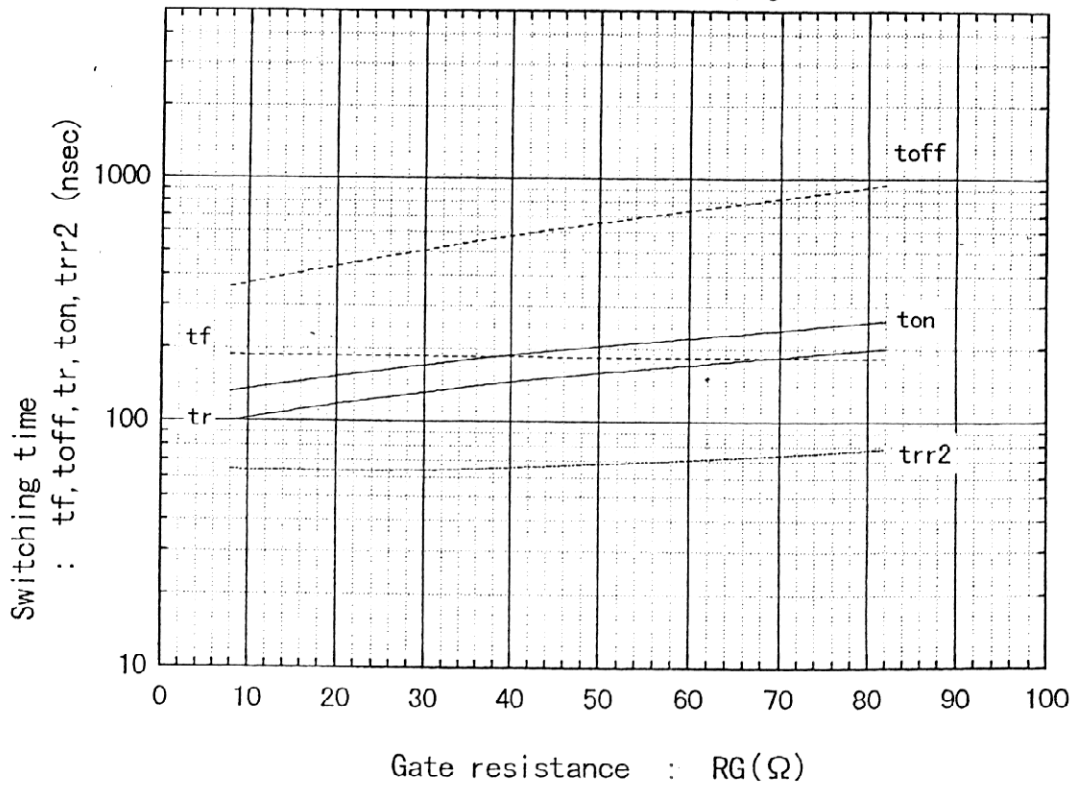
Switching time vs RG

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

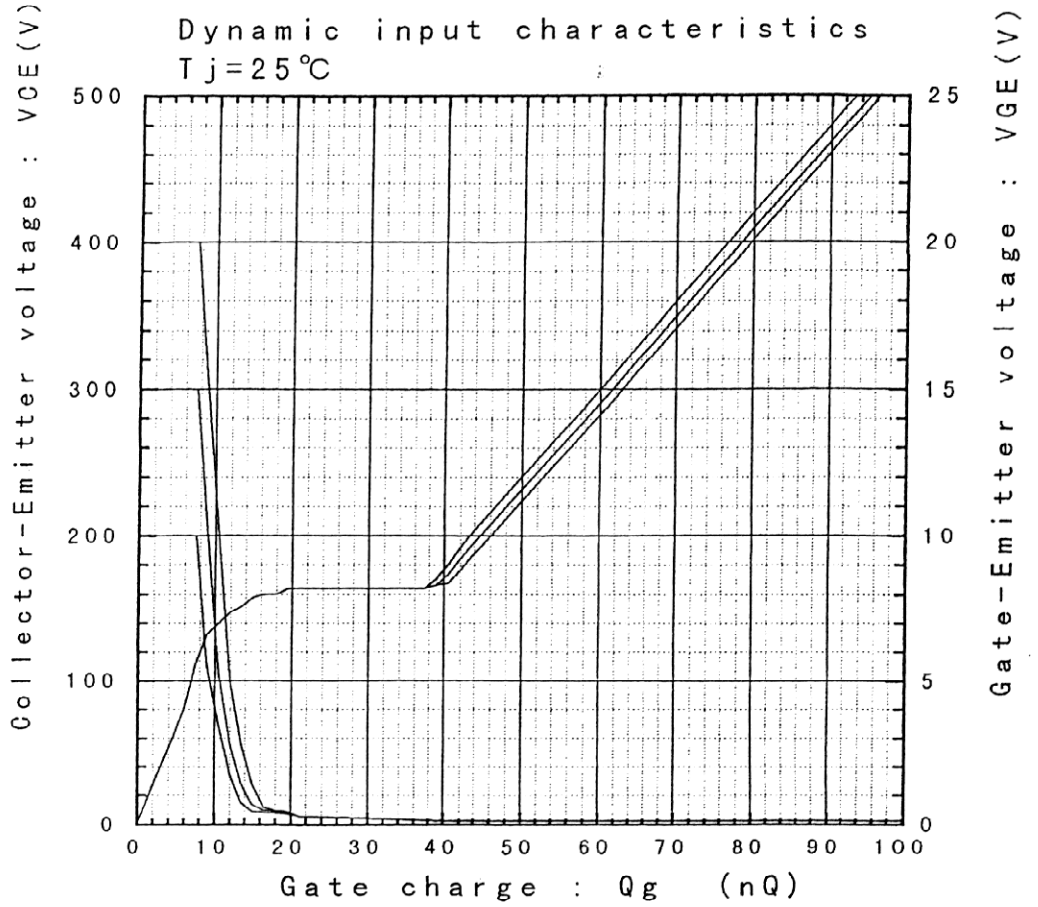


Switching time vs RG

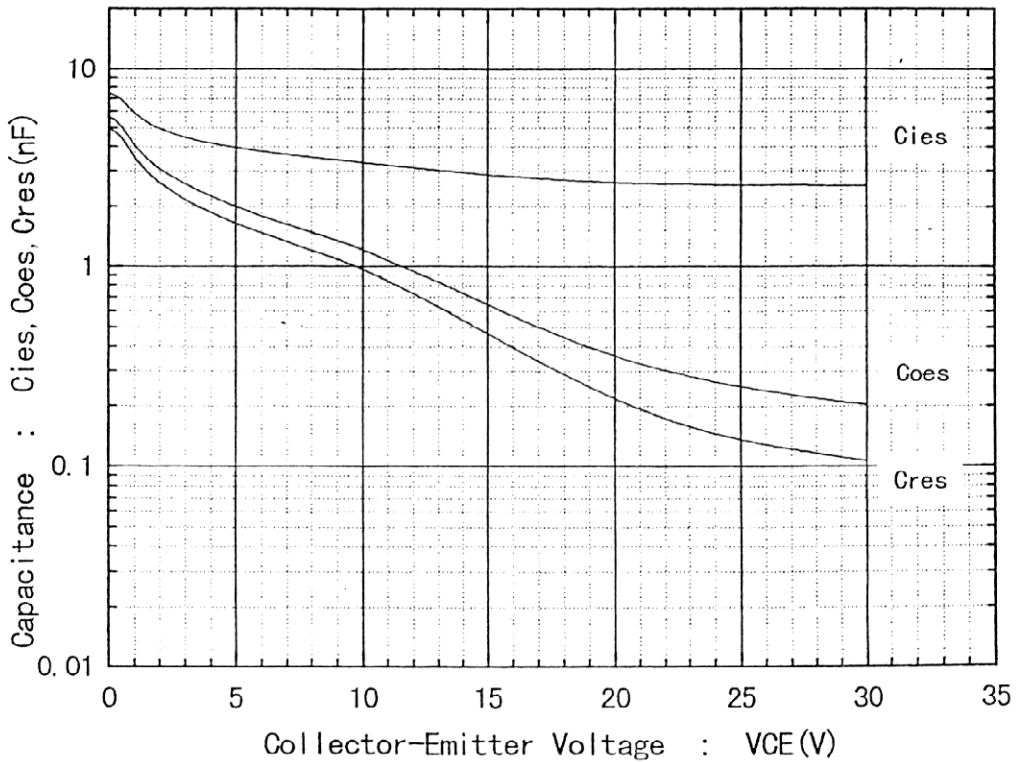
$V_{cc}=300V, I_c=50A, V_{GE}=\pm 15V, T_j=125^\circ C$



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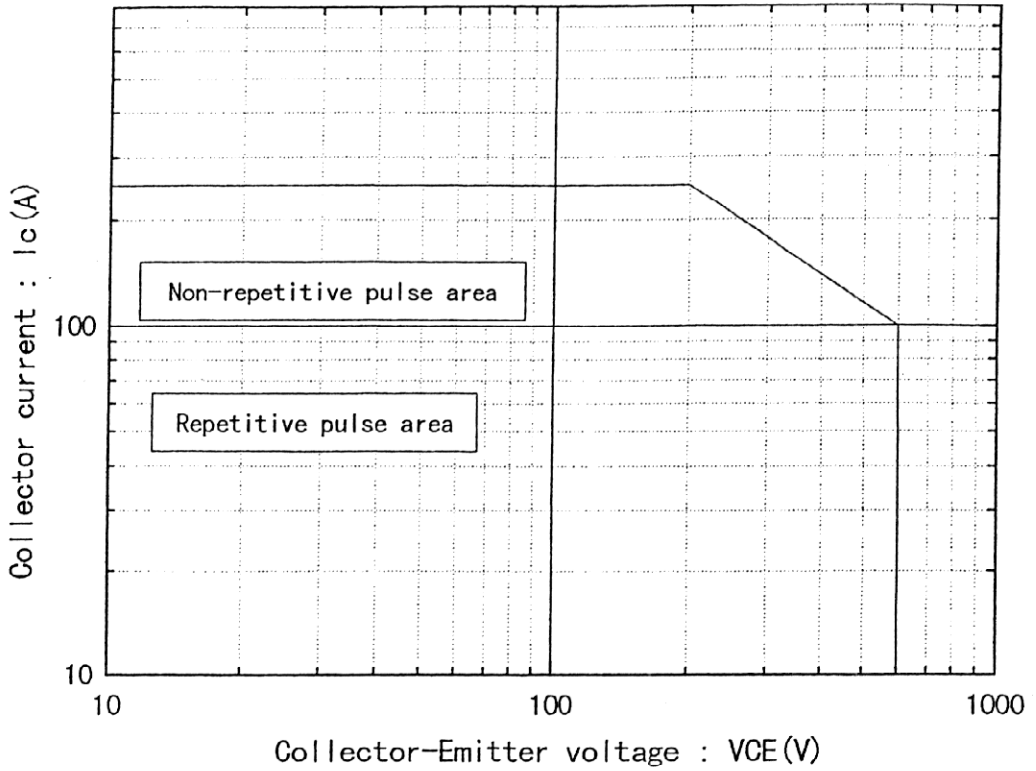
Capacitance vs. Collector-Emitter Voltage $T_j = 25^\circ\text{C}$



1MBH50D-060S

Reverse Biased Safe Operating Area

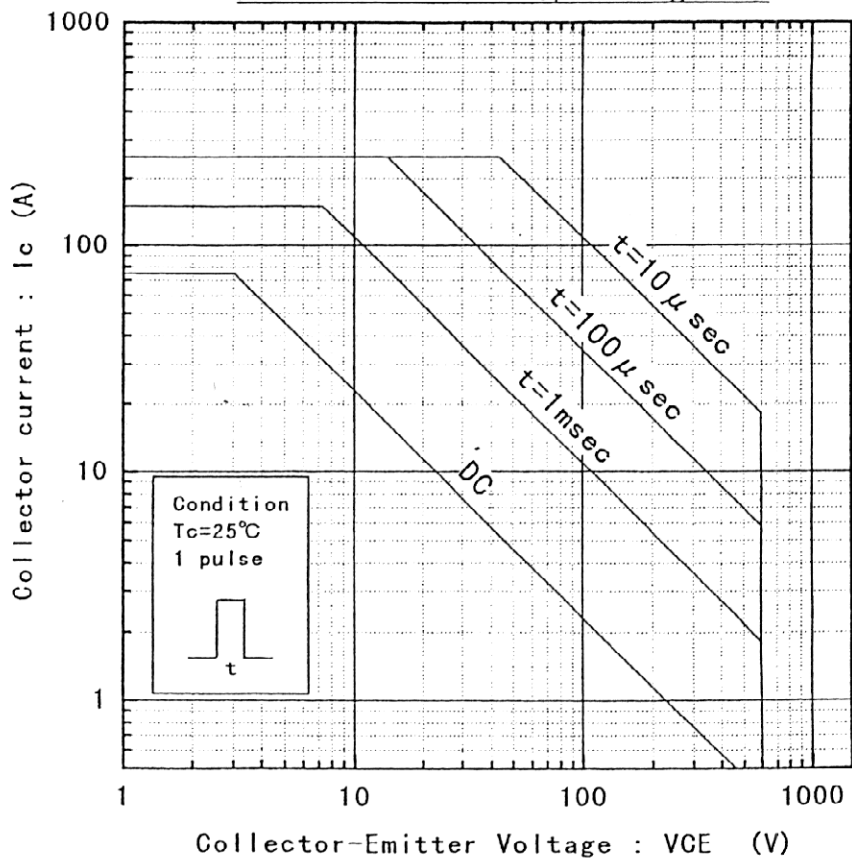
$R_G=8\Omega$, $+V_{GE}\leq 30V$, $-V_{GE}=15V$, $T_j\leq 125^\circ C$



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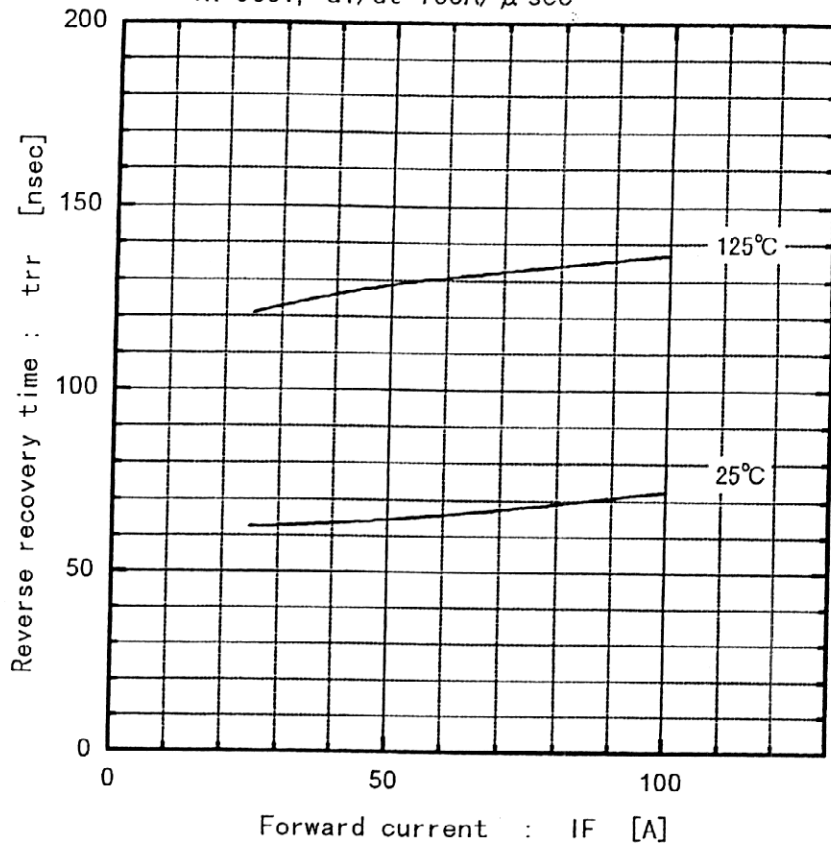
1MBH50D-060S

Forward Bias Safe Operating Area

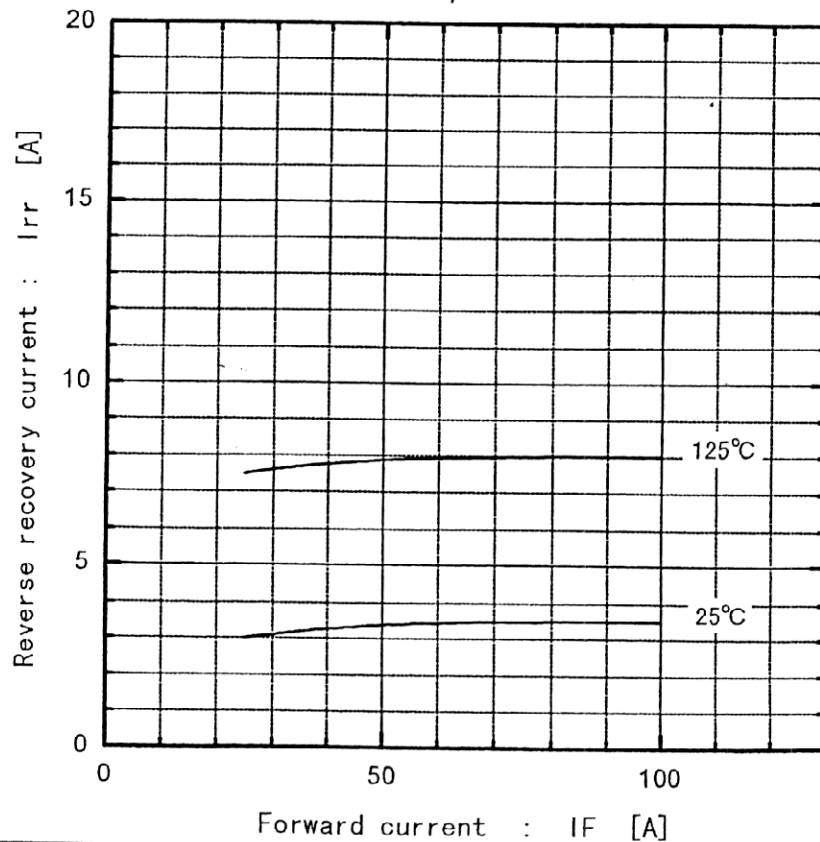


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Reverse recovery time vs. Forward current
VR=300V, -di/dt=100A/ μ sec

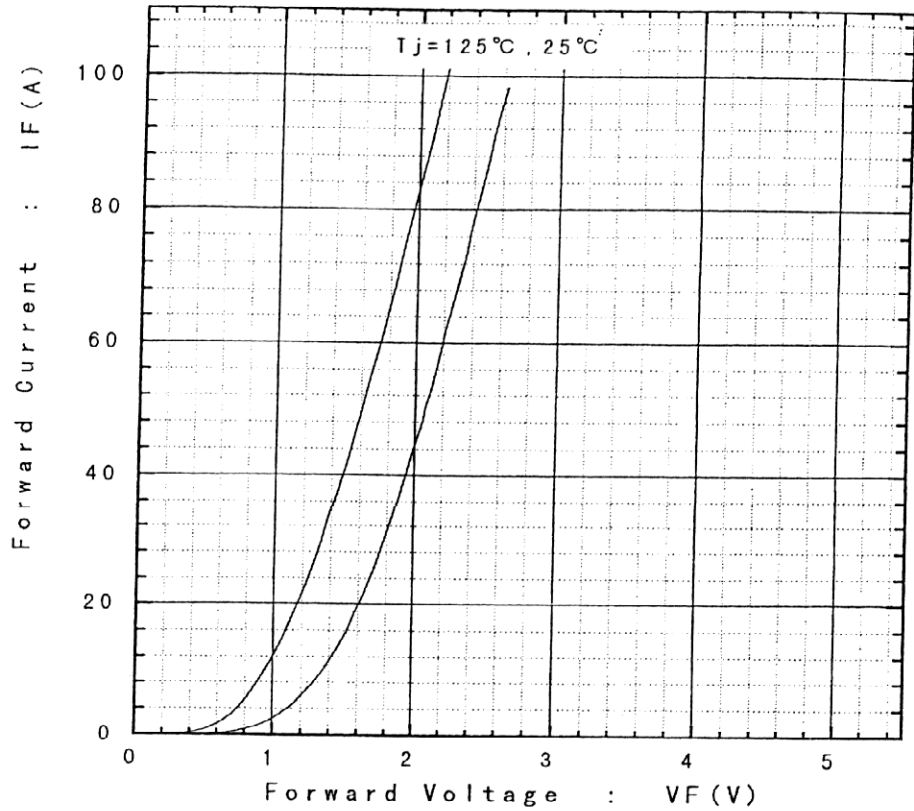


Reverse recovery current vs. Forward current
VR=300V, -di/dt=100A/ μ sec

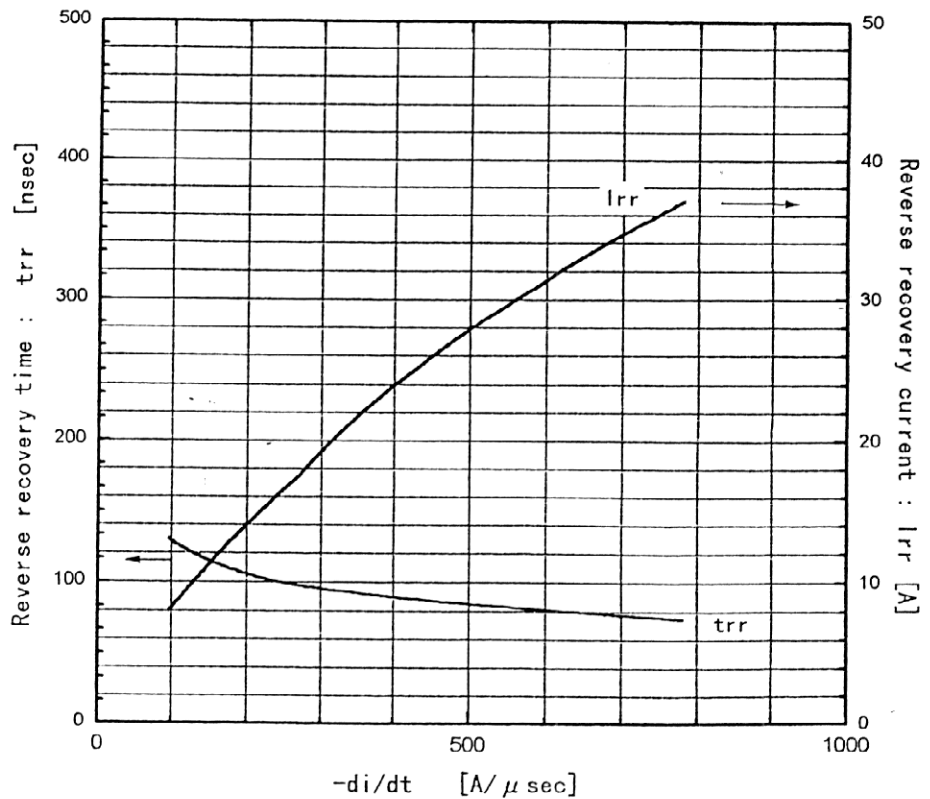


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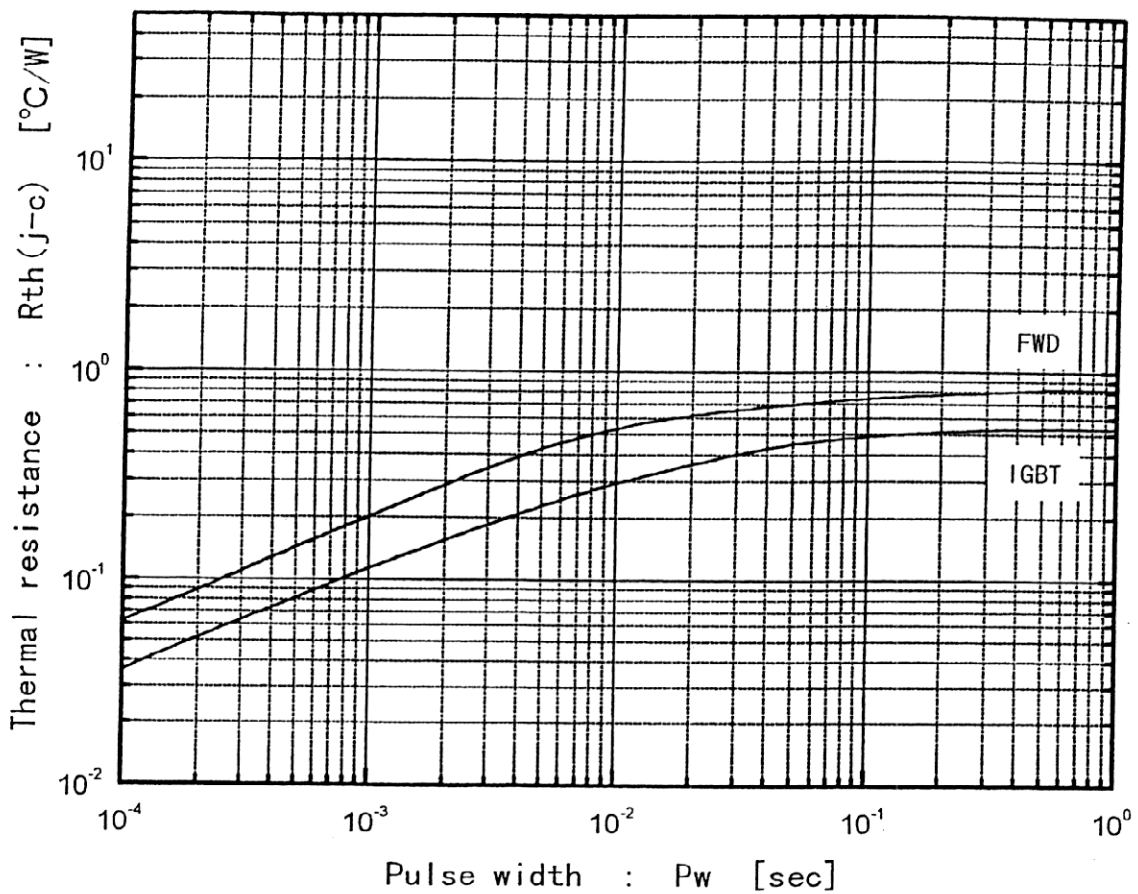
Forward Voltage vs. Forward current



Reverse recovery characteristics vs. $-di/dt$
 VR=300V, IF=50A, Tj=125°C



Transient thermal resistance



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