

SPECIFICATION

(TENTATIVE)

Device Name : IGBT

Type Name : 1MBH50D-060S

Spec. No. : MS5F 4622

Date : June-21-1999

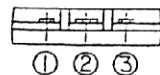
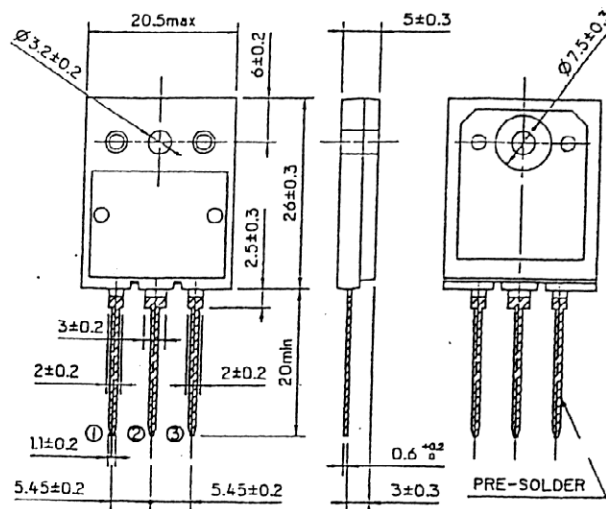
This material and the information herein is the property of Fuji Electric Co., Ltd. They shall be neither reproduced, copied, lent, or disclosed in any way whatsoever for the use of any third party nor used for the manufacturing purposes without the express written consent of Fuji Electric Co., Ltd.

Fuji Electric Co., Ltd.
Matsumoto Factory

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

1MBH50D-060S

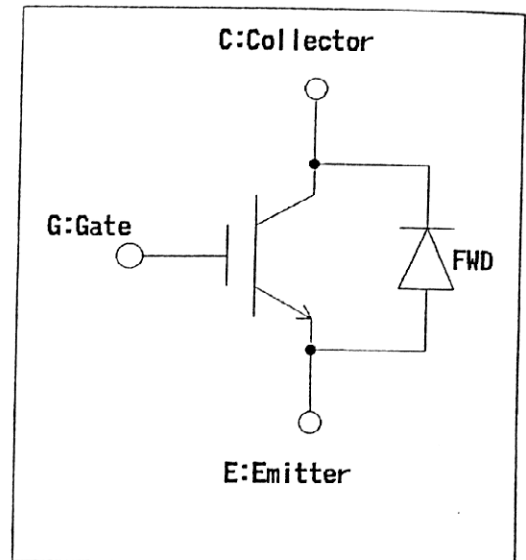
1. Outline Drawing



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)

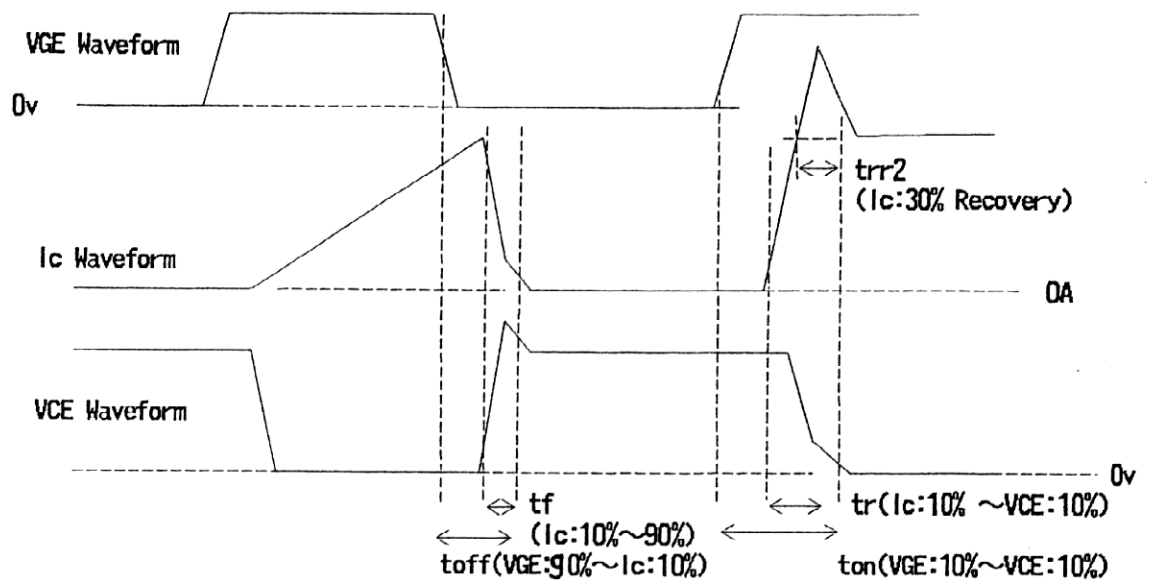
Items		Symbols	Characteristics			Conditions	Unit
			min.	typ.	max.		
Zero gate voltage Collector Current		I_{CES}	—	—	1.0	$V_{GE} = 0V$ $V_{CE} = 600V$	mA
Gate-Emitter leakage Current		I_{GES}	—	—	10	$V_{CE} = 0V$ $V_{GE} = \pm 30V$	μA
Gate-Emitter Threshold Voltage		$V_{GE(th)}$	4.0	5.0	6.0	$V_{CE} = 20V$ $I_c = 50mA$	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

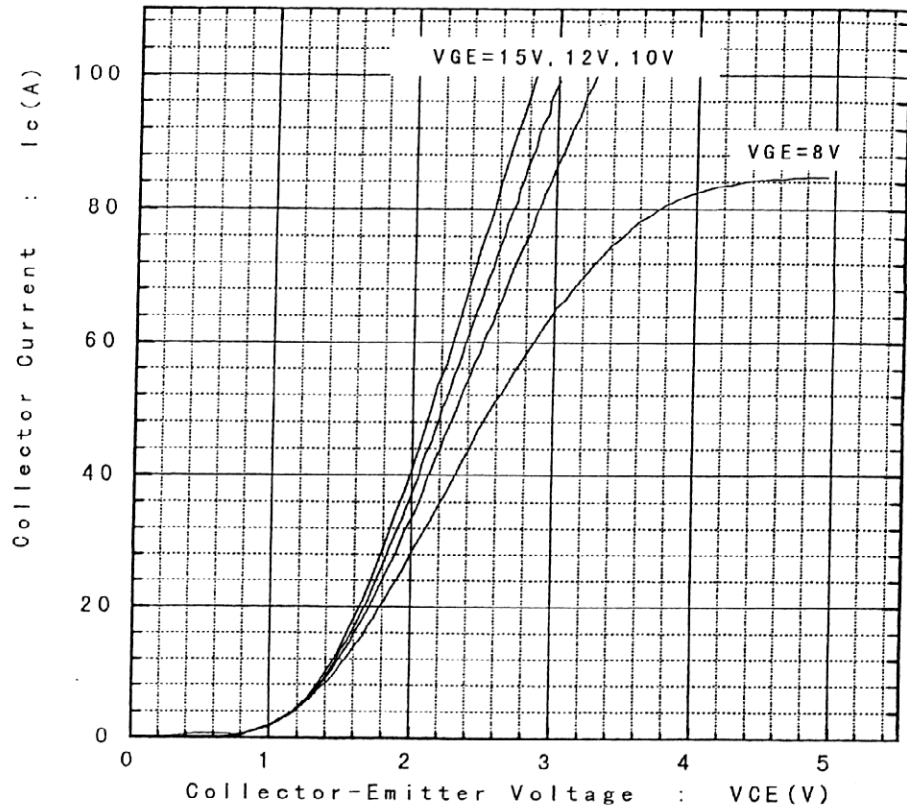
Items	Symbols	Characteristics			Conditions	Unit
		min.	typ.	max.		
Thermal resistance	$R_{th(j-c)}$	—	—	0.54	IGBT	$^{\circ}\text{C/W}$
	$R_{th(j-c)}$	—	—	0.83	FWD	

6. Switching waveform

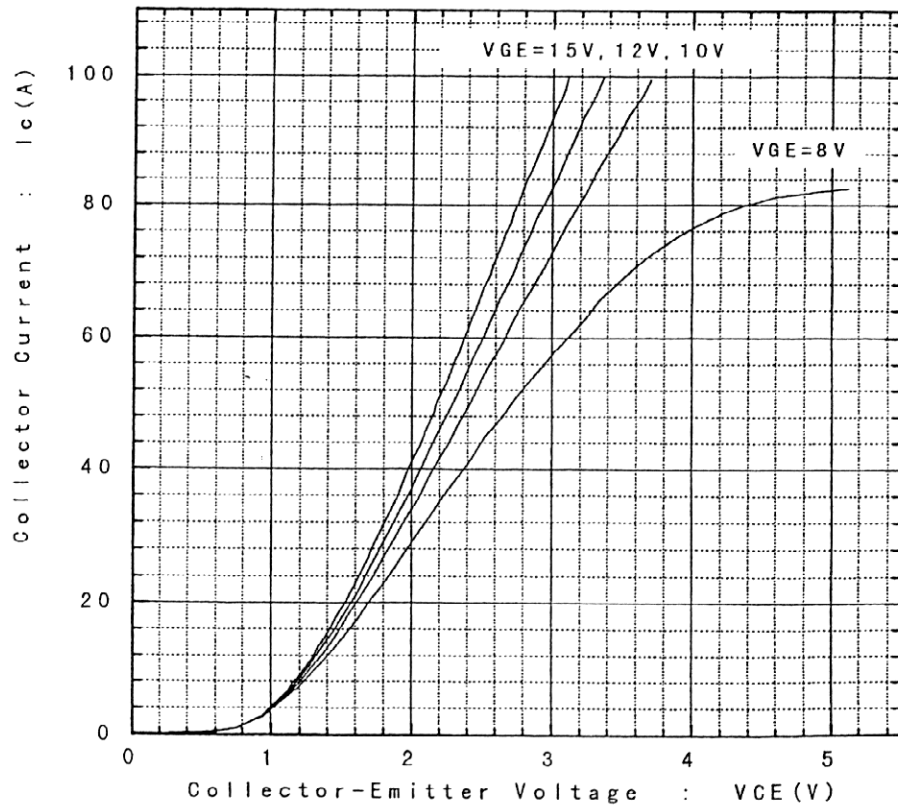


This material and the information herein is the property of Fuji Electric Co., Ltd. They shall be neither reproduced, copied, lent, or disclosed in any way whatsoever for the use of any third party nor used for the manufacturing purposes without the express written consent of Fuji Electric Co., Ltd.

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

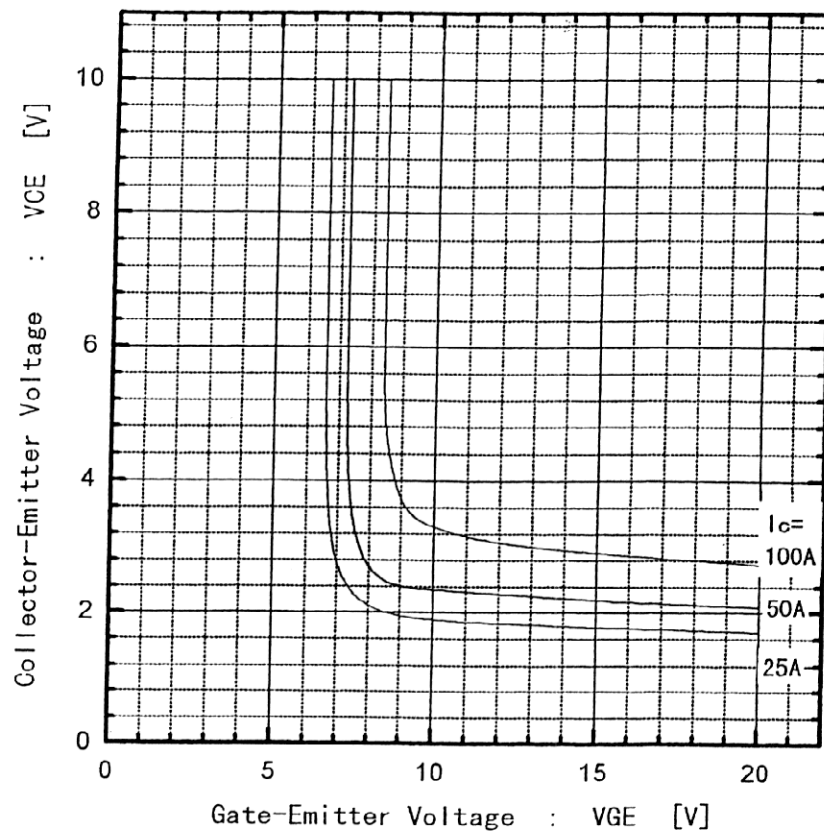


Collector Current vs. Collector-Emitter Voltage
 $T_j = 125^\circ\text{C}$

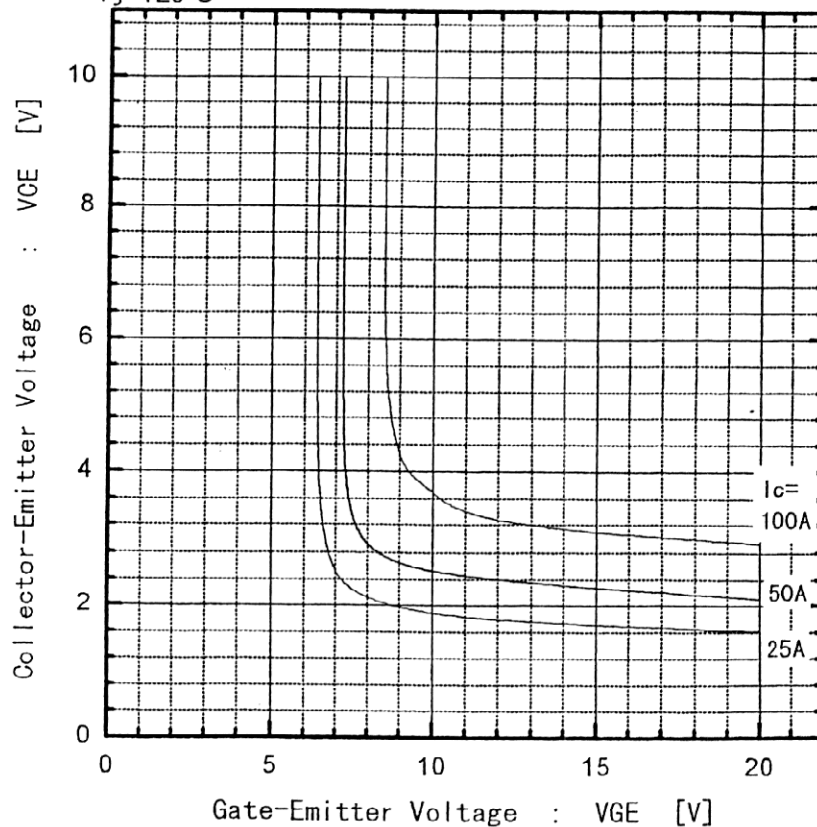


This material and the information herein is the property of Fuji Electric Co., Ltd. They shall be neither reproduced, copied, lent, or disclosed in any way whatsoever for the use of any third party nor used for the manufacturing purposes without the express written consent of Fuji Electric Co., Ltd.

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



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

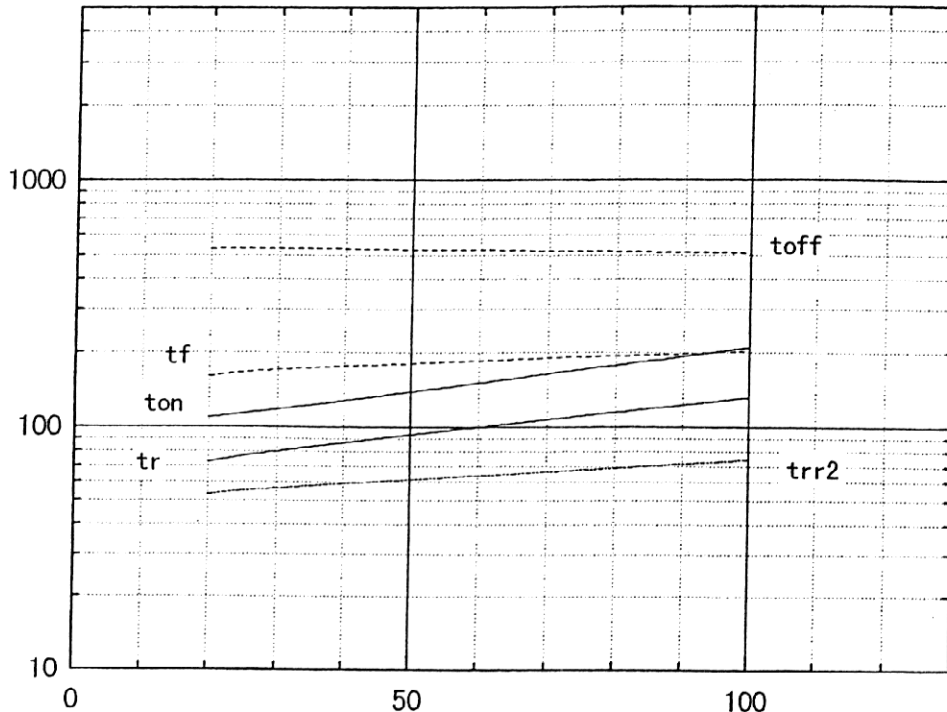


This material and the information herein is the property of Fuji Electric Co., Ltd. They shall be neither reproduced, copied, lent, or disclosed in any way whatsoever for the use of any third party nor used for the manufacturing purposes without the express written consent of Fuji Electric Co., Ltd.

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)

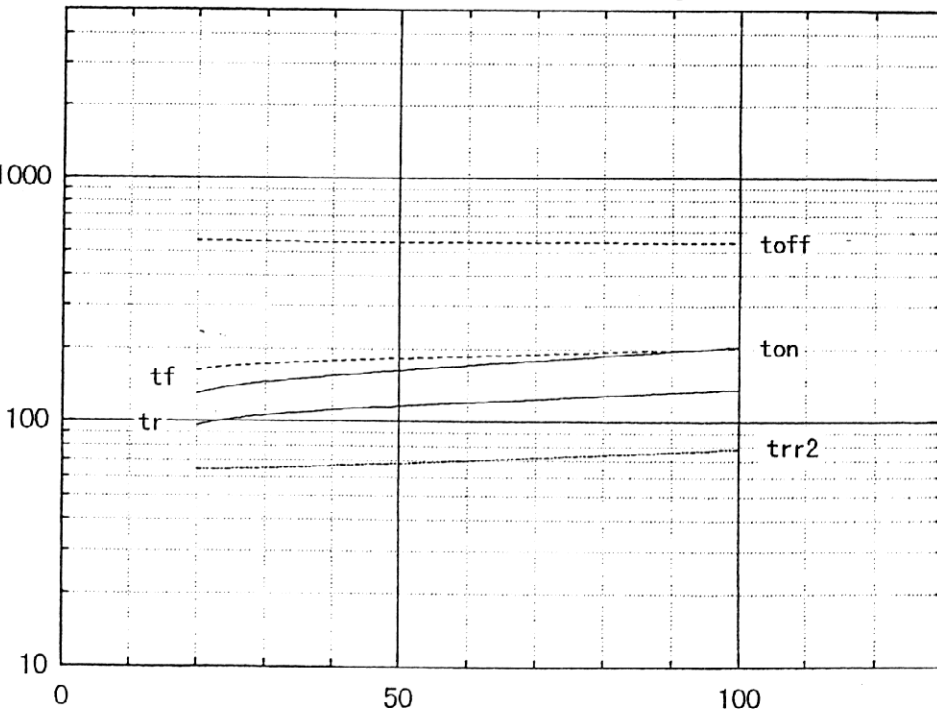


Collector current : $I_c(A)$

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)

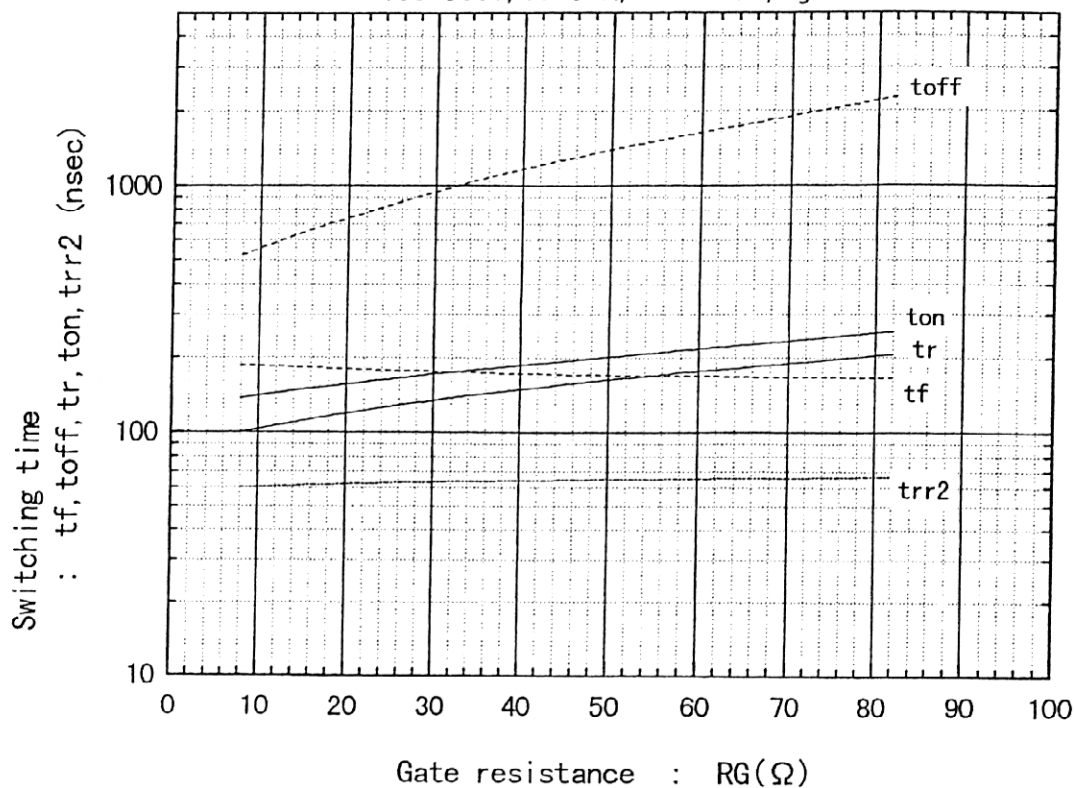


Collector current : $I_c(A)$

This material and the information herein is the property of Fuji Electric Co., Ltd. They shall be neither reproduced, copied, lent, or disclosed in any way whatsoever for the use of any third party nor used for the manufacturing purposes without the express written consent of Fuji Electric Co., Ltd.

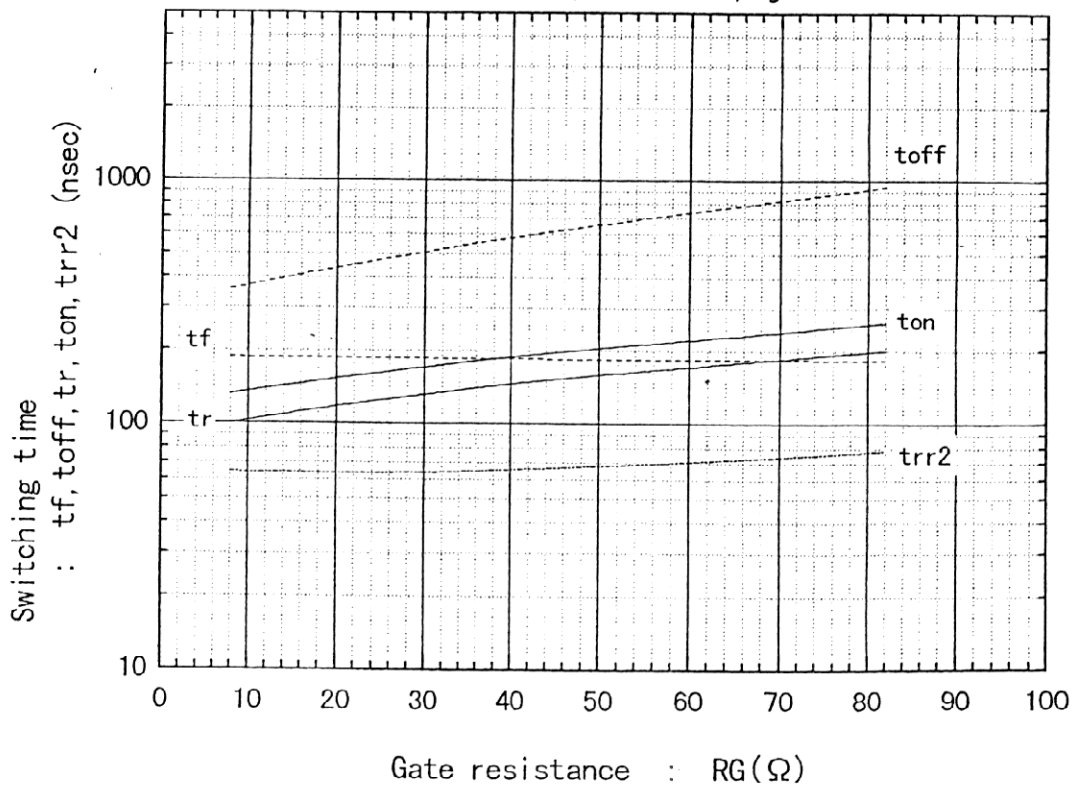
Switching time vs RG

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

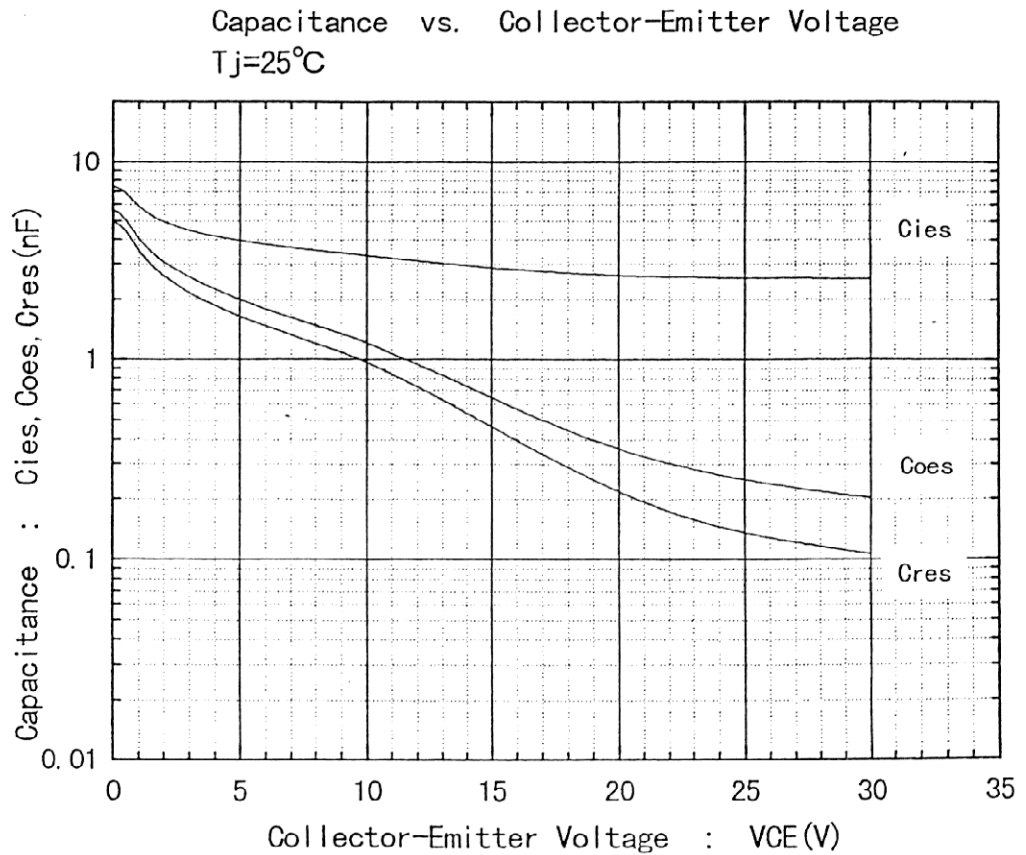
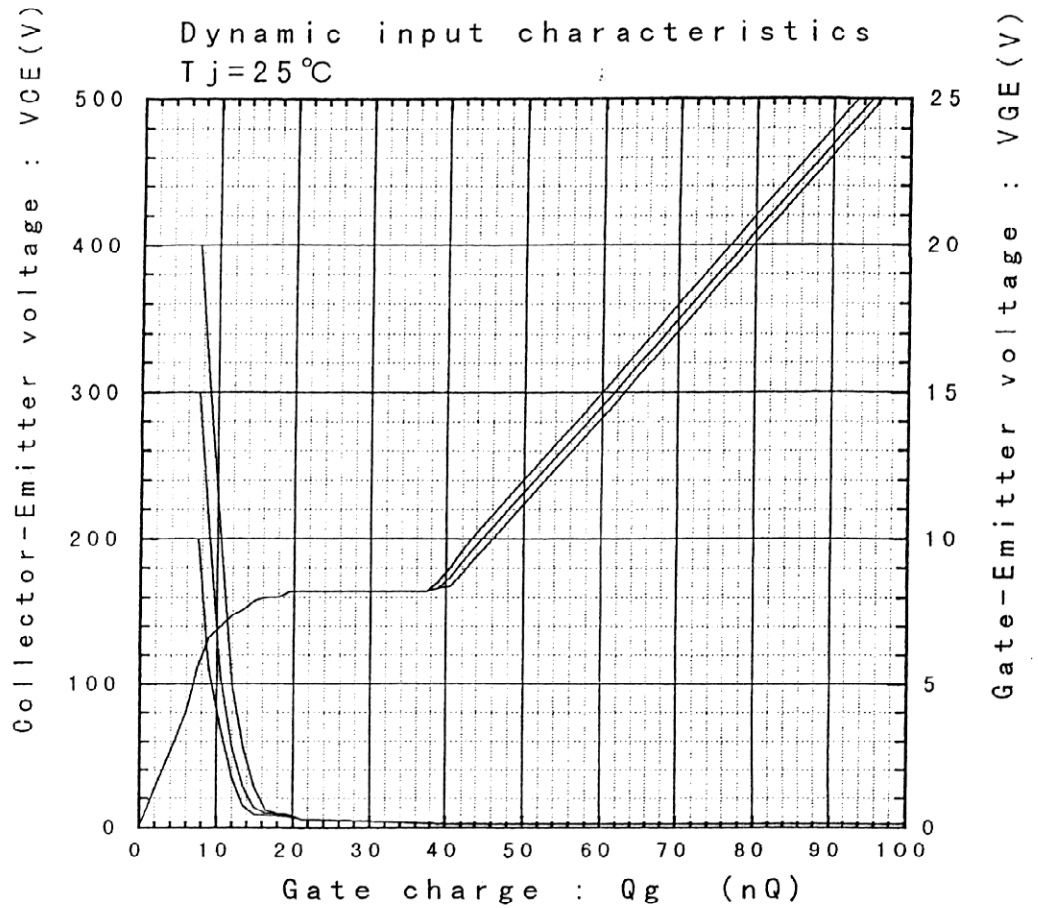


Switching time vs RG

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



This material and the information herein is the property of Fuji Electric Co., Ltd. They shall be neither reproduced, copied, lent, or disclosed in any way whatsoever for the use of any third party nor used for the manufacturing purposes without the express written consent of Fuji Electric Co., Ltd.

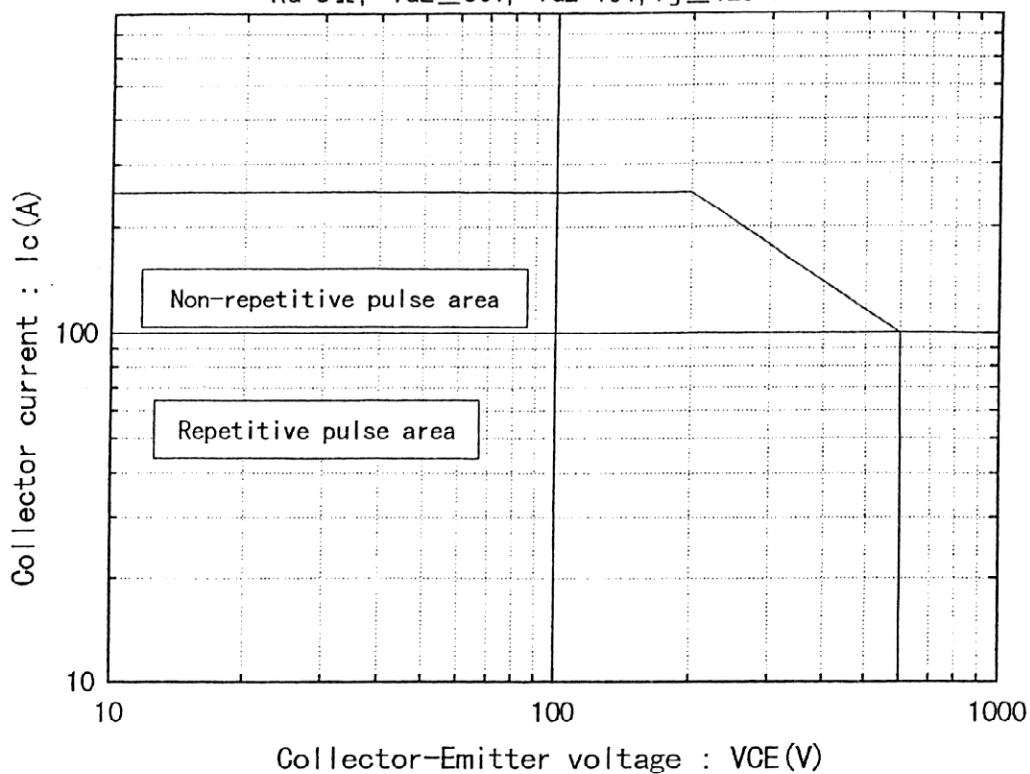


This material and the information herein is the property of Fuji Electric Co., Ltd. They shall be neither reproduced, copied, lent, or disclosed in any way whatsoever for the use of any third party nor used for the manufacturing purposes without the express written consent of Fuji Electric Co., Ltd.

1MBH50D-060S

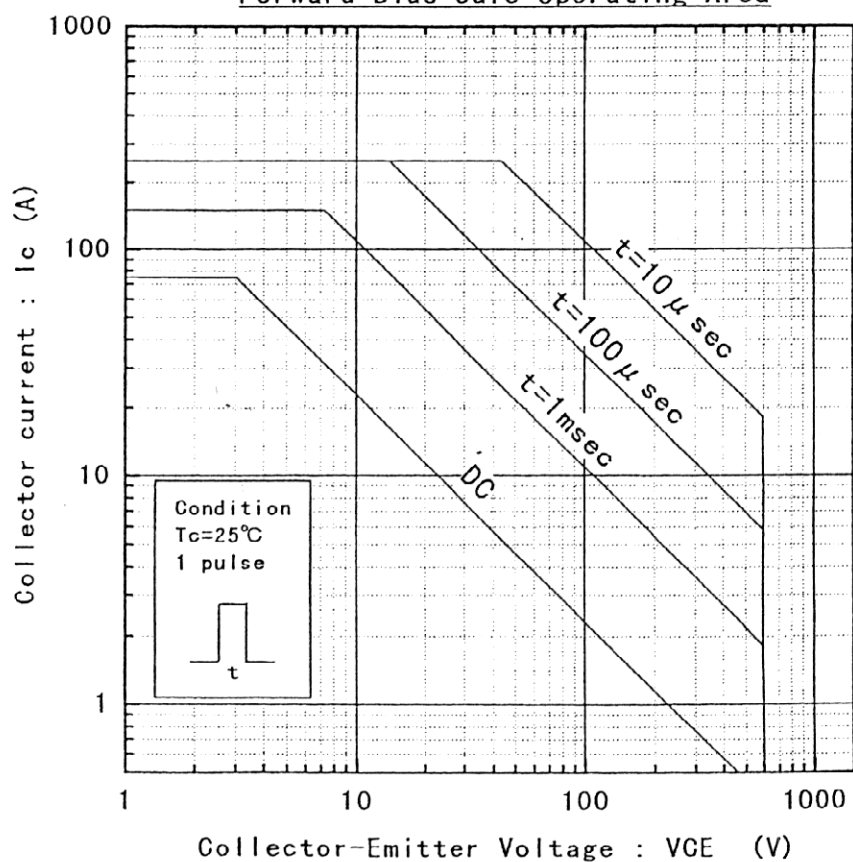
Reverse Biased Safe Operating Area

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



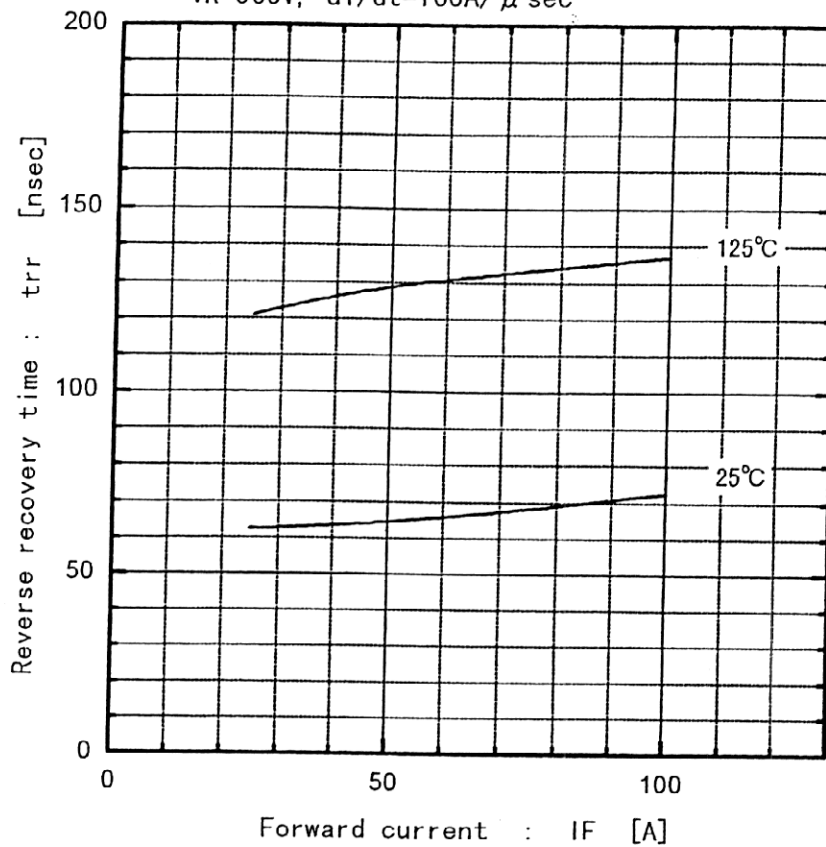
1MBH50D-060S

Forward Bias Safe Operating Area

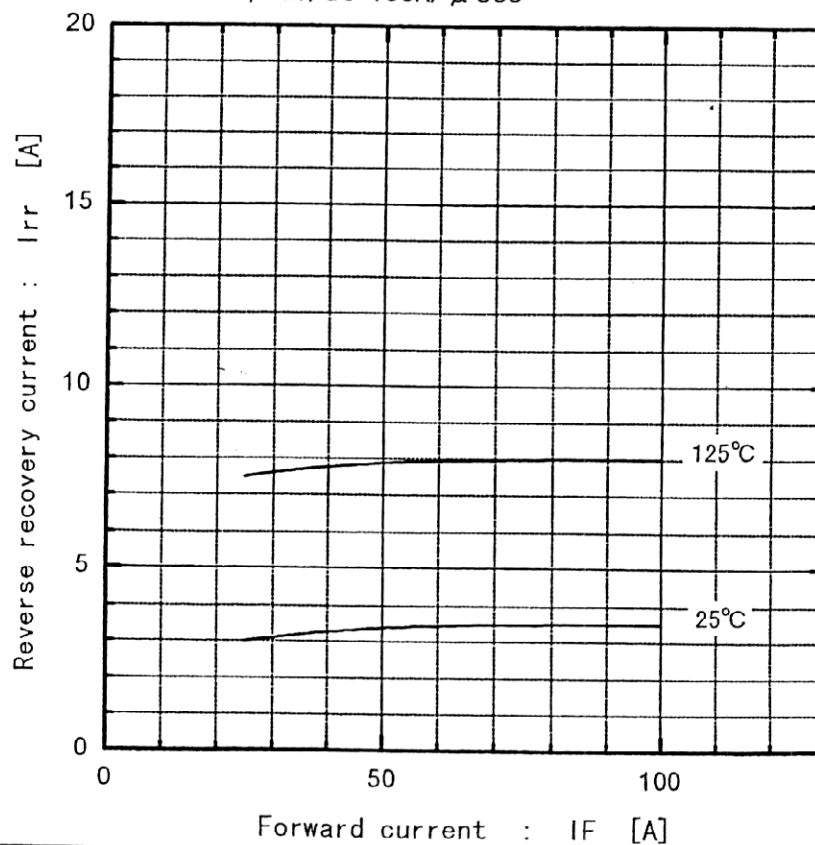


This material and the information herein is the property of Fuji Electric Co., Ltd. They shall be neither reproduced, copied, lent, or disclosed in any way whatsoever for the use of any third party nor used for the manufacturing purposes without the express written consent of Fuji Electric Co., Ltd.

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

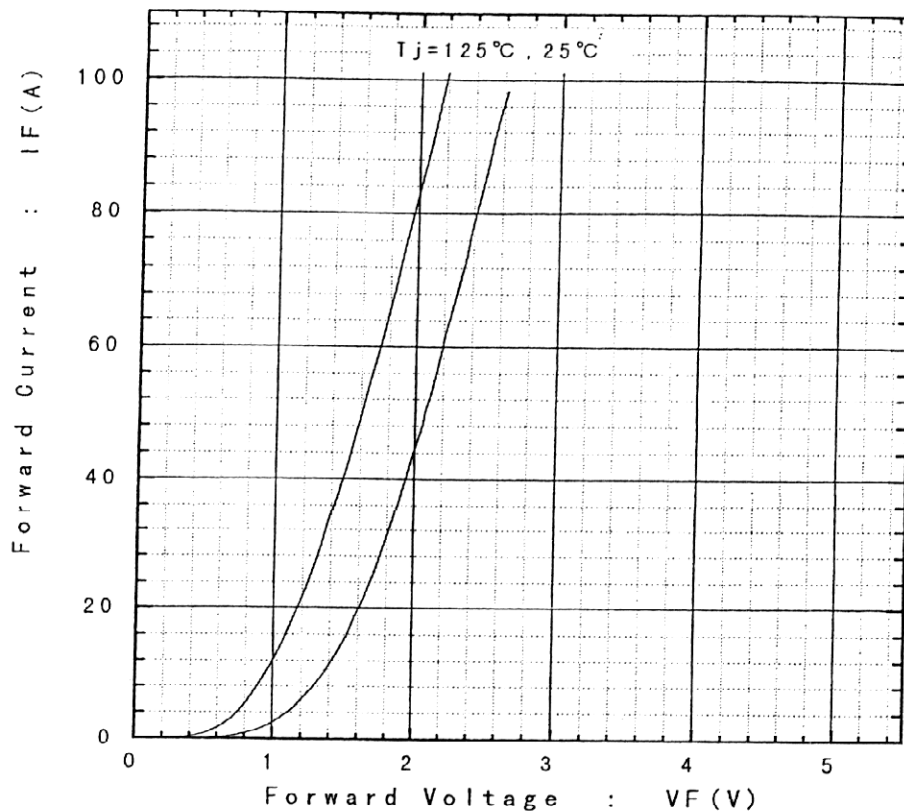


Reverse recovery current vs. Forward current
 $V_R=300V, -di/dt=100A/\mu sec$

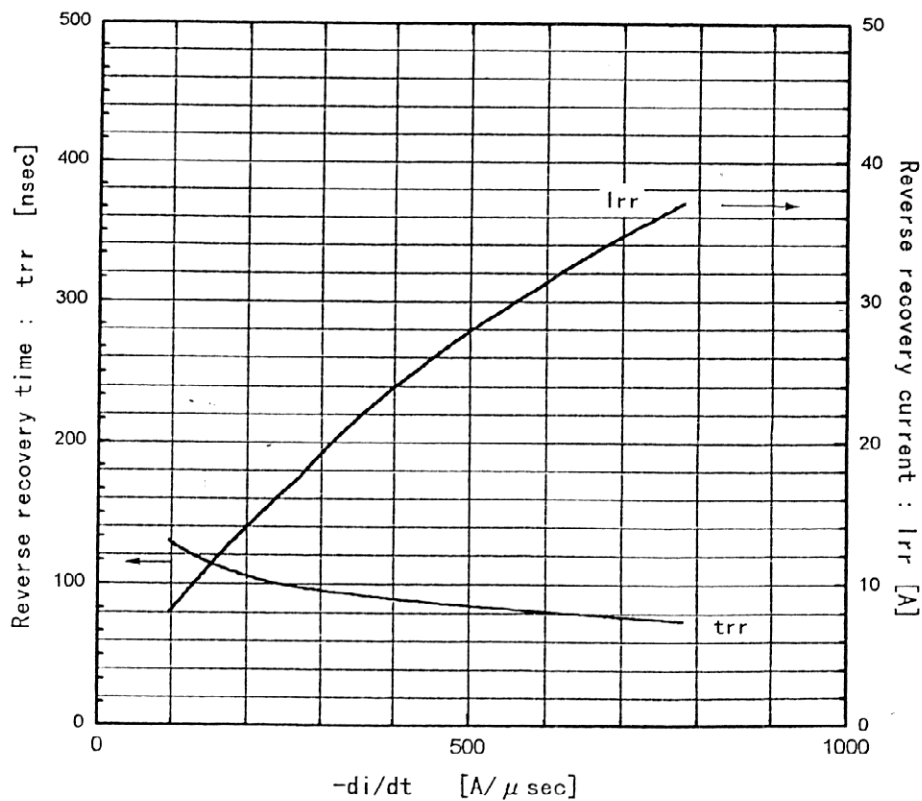


This material and the information herein is the property of Fuji Electric Co., Ltd. They shall be neither reproduced, copied, lent, or disclosed in any way whatsoever for the use of any third party nor used for the manufacturing purposes without the express written consent of Fuji Electric Co., Ltd.

Forward Voltage vs. Forward current



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



This material and the information herein is the property of Fuji Electric Co., Ltd. They shall be neither reproduced, copied, lent, or disclosed in any way whatsoever for the use of any third party nor used for the manufacturing purposes without the express written consent of Fuji Electric Co., Ltd.

Transient thermal resistance

