

Messrs. Rockwell Automation Co.,Ltd.

# SPECIFICATION

Device Name : IGBT

Type Name : 1MBH05D-060-S06TT

Spec. No. : MS5F-4083

Date : June-11-1998

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Fuji Electric Co.,Ltd.  
Matsumoto Factory

	DATE	NAME	APPROVED	Fuji Electric Co.,Ltd.		
DRAWN	June-11-98	K. Sawada		DWG. NO.	MS5F4083	1/14
CHECKED	June-11-98	T. Igarashi				



• Scope

This specification is applied to Fuji discrete IGBT 1MBH05D-060  
supplied for Rockwell Automation Co.,Ltd.

• Construction

1. Package dimension  
There is a package dimension in 4/14 page .
2. Outview  
There are no remarkable flaws on a product .
3. Indication
  - ① Trademark
  - ② Type Name
  - ③ Lot No.

• Ratings and Characteristics

1. There are some ratings and characteristics tables in 4/14 page and 5/14 page .
2. There are some performance curves in from 6/14 page to 14/14 page .

• Packing

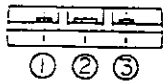
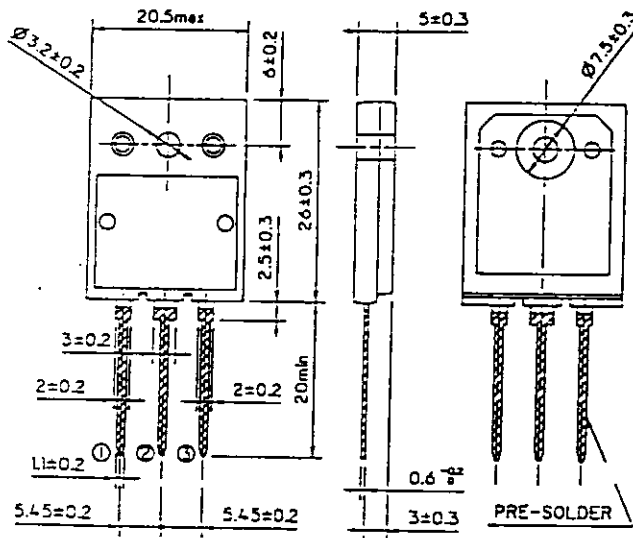
Packing style follows our packing specification ~~MS500026~~.

MS5Q 0030 . ②

Ratings and characteristics of Fuji IGBT

1MBH05D-060

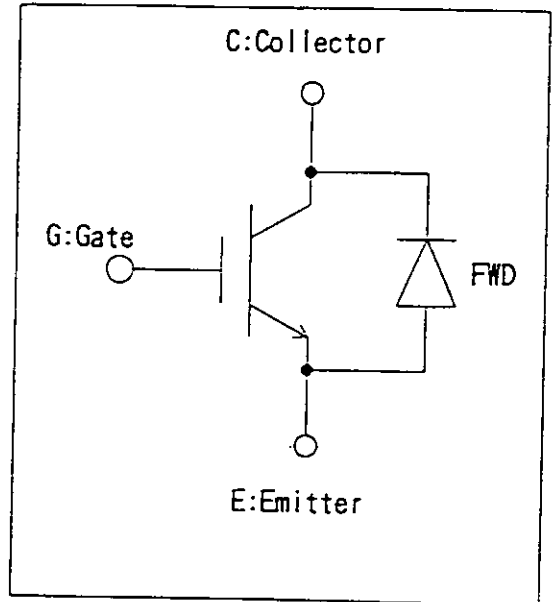
1. Outline Drawing



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		$V_{GES}$	±22	V	
Collector Current	DC	Tc=25 °C	$I_{C25}$	21	A
		Tc=120°C	$I_{C120}$	5	A
	1ms	Tc=25 °C	$I_{cp}$	52	A
IGBT Max. Power Dissipation		$P_c$	80	W	
FWD Max. Power Dissipation		$P_c$	40	W	
Operating Temperature		$T_j$	+ 150	°C	
Storage Temperature		$T_{stg}$	-40 ~ +150	°C	
Mounting Screw Torque		—	70	N · cm	

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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	$I_{GES}$			20	$V_{CE} = 0V$ $V_{GE} = \pm 22V$	$\mu A$
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	5.5		8.5	$V_{CE} = 20V$ $I_C = 5mA$	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$			3.0	$V_{GE} = 15V$ $I_C = 5A$	V
Input capacitance	$C_{ies}$		400		$V_{CE} = 0V$ $V_{CE} = 10V$ $f = 1MHz$	pF
Output capacitance	$C_{oes}$		85			
Reverse transfer capacitance	$C_{res}$		15			
Switching Time	Turn-on time	$t_{on}$		1.2	$V_{CC} = 300V$ $I_C = 5A$ $V_{GE} = \pm 15V$ $R_G = 330\Omega$ (Half Bridge)	$\mu s$
		$t_r$		0.6		
	Turn-off time	$t_{off}$		1.0		
		$t_f$		0.35		
	Turn-on time	$t_{on}$		0.16	$V_{CC} = 300V$ $I_C = 5A$ $V_{GE} = +15V$ $R_G = 33\Omega$ (Half Bridge)	
		$t_r$		0.11		
	Turn-off time	$t_{off}$		0.30		
		$t_f$		0.35		
FWD forward voltage drop	$V_F$			3.0	$I_F = 5A$	V
Reverse recovery time	$t_{rr}$			0.3	$I_F = 5A, V_{GE} = -10V$ $V_R = 200V$ $di/dt = 100A/\mu s$	$\mu s$

5. Thermal resistance characteristics

Items	Symbols	Characteristics			Conditions	Unit
		min.	typ.	max.		
Thermal resistance	$R_{th(j-c)}$			1.56	IGBT	$^{\circ}C/W$
	$R_{th(j-c)}$			3.12	FWD	

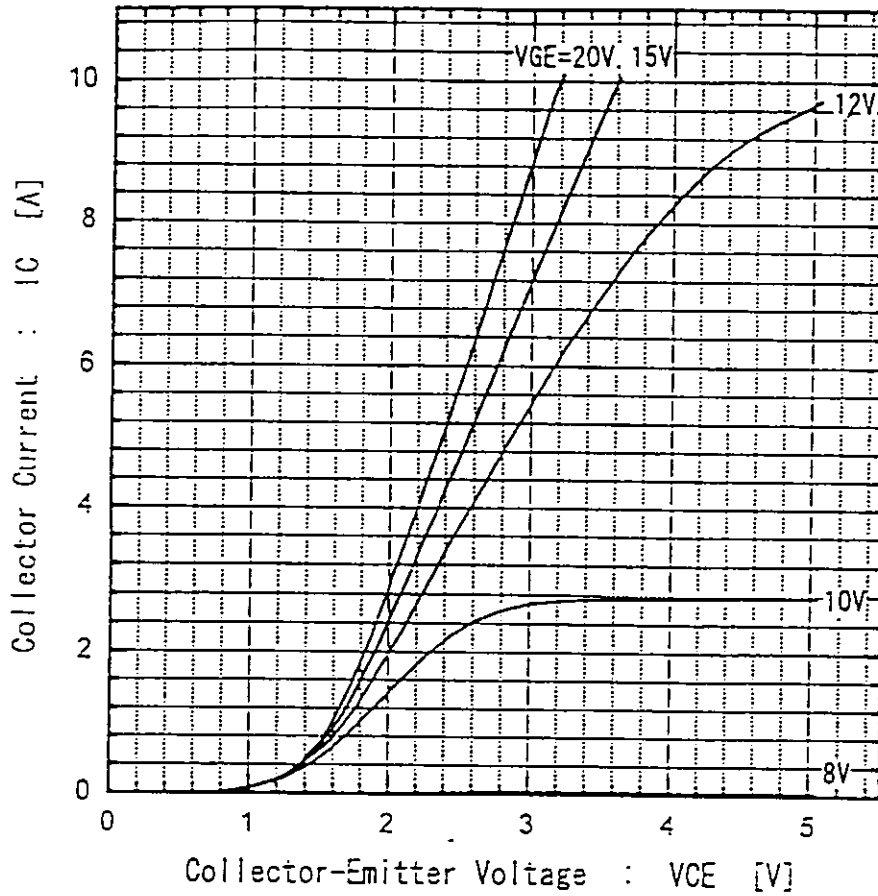
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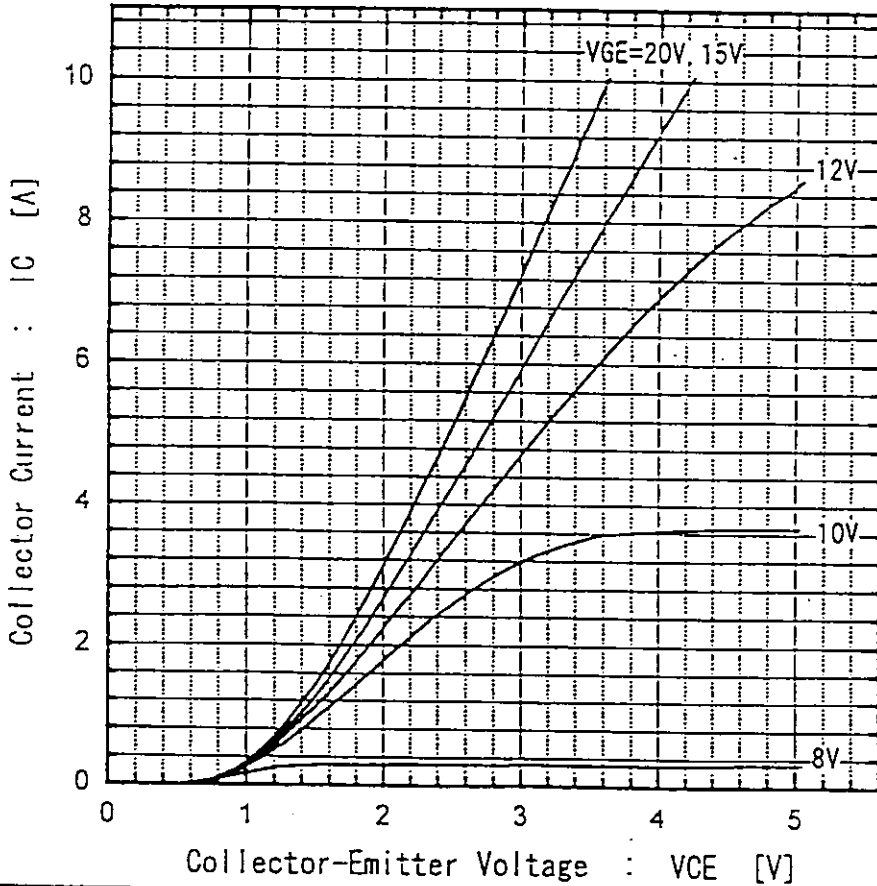
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Collector Current vs. Collector-Emitter Voltage  
 $T_j=25^\circ\text{C}$



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



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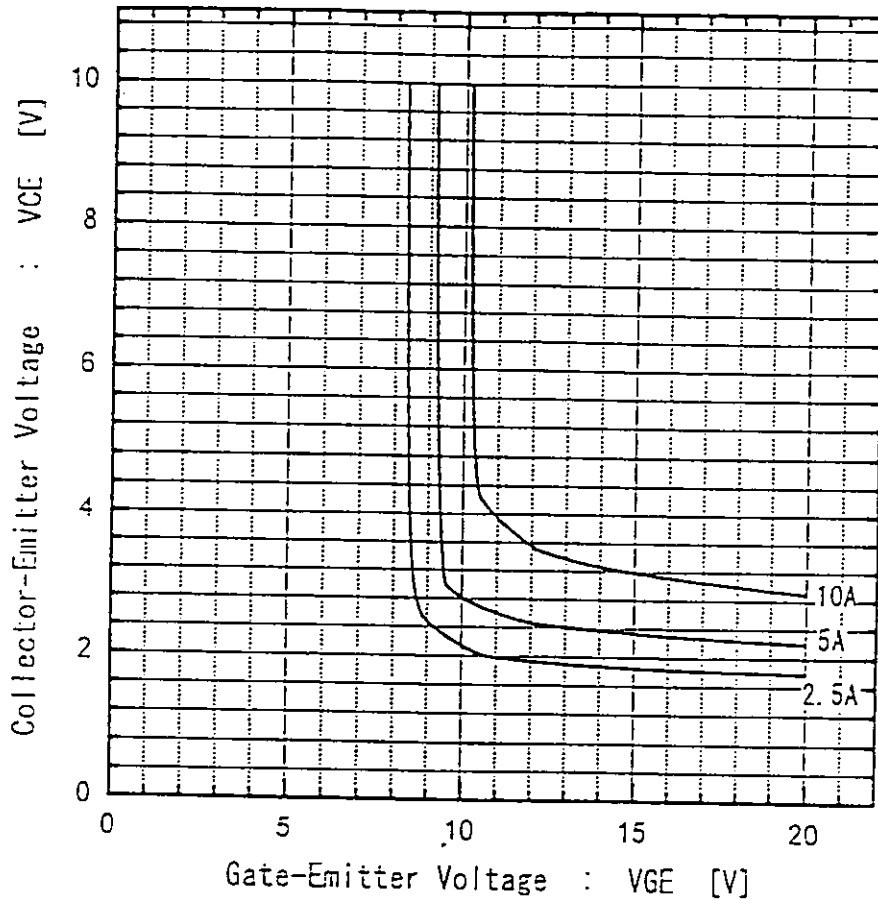
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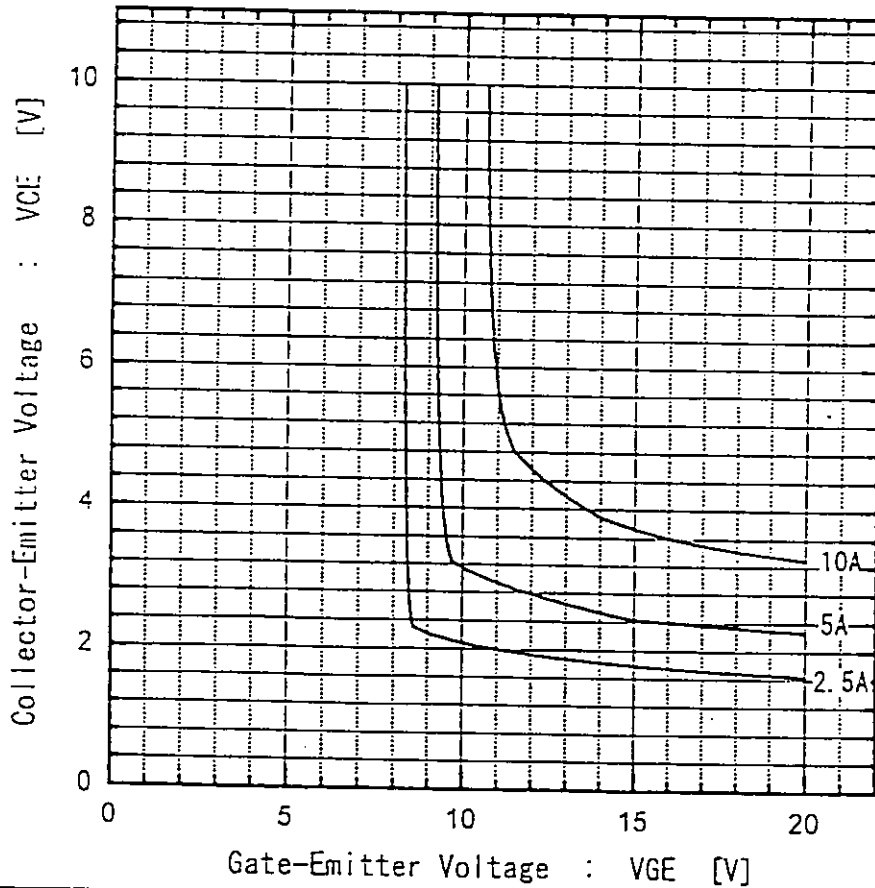
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Collector-Emitter Voltage vs Gate-Emitter Voltage  
 $T_j=25^\circ\text{C}$



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



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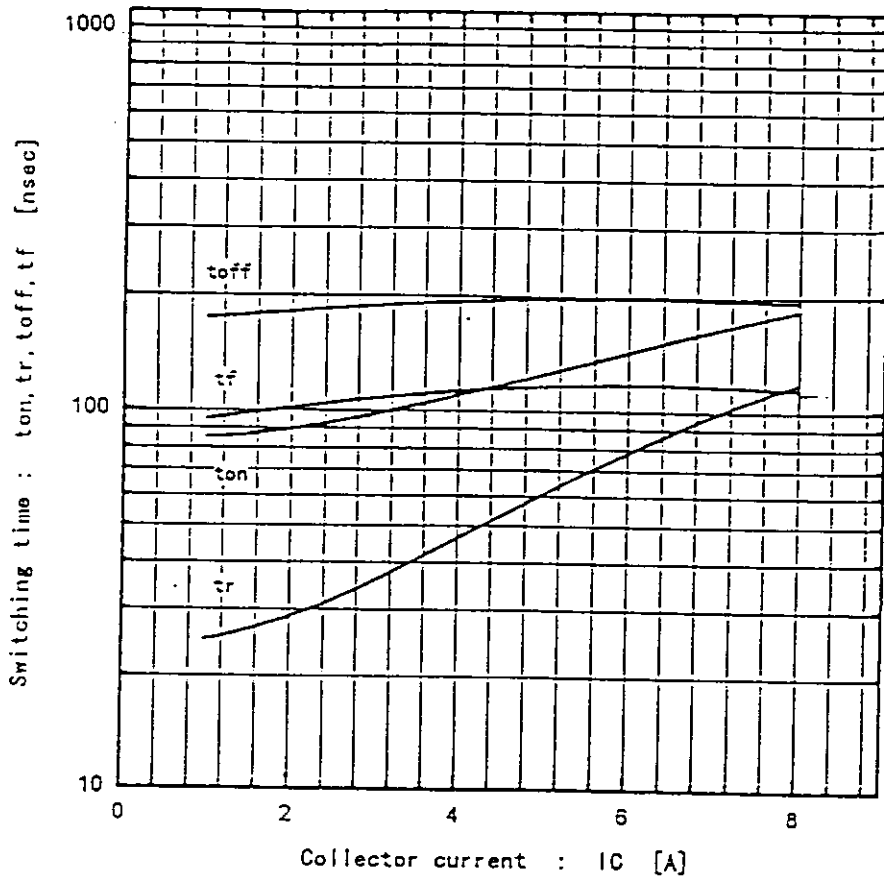
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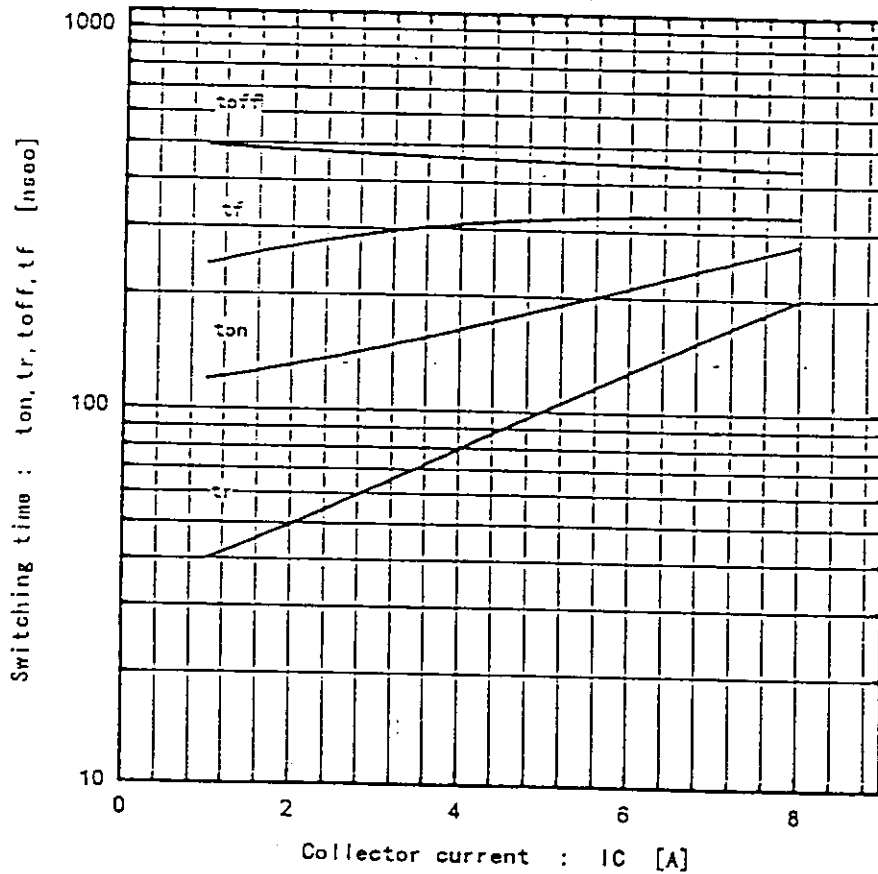
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Switching time vs. Collector current  
 $V_{cc}=300V, R_G=33\Omega, V_{GE}=\pm 15V, T_j=25^\circ C$



Switching time vs. Collector current  
 $V_{cc}=300V, R_G=33\Omega, V_{GE}=\pm 15V, T_j=25^\circ C$



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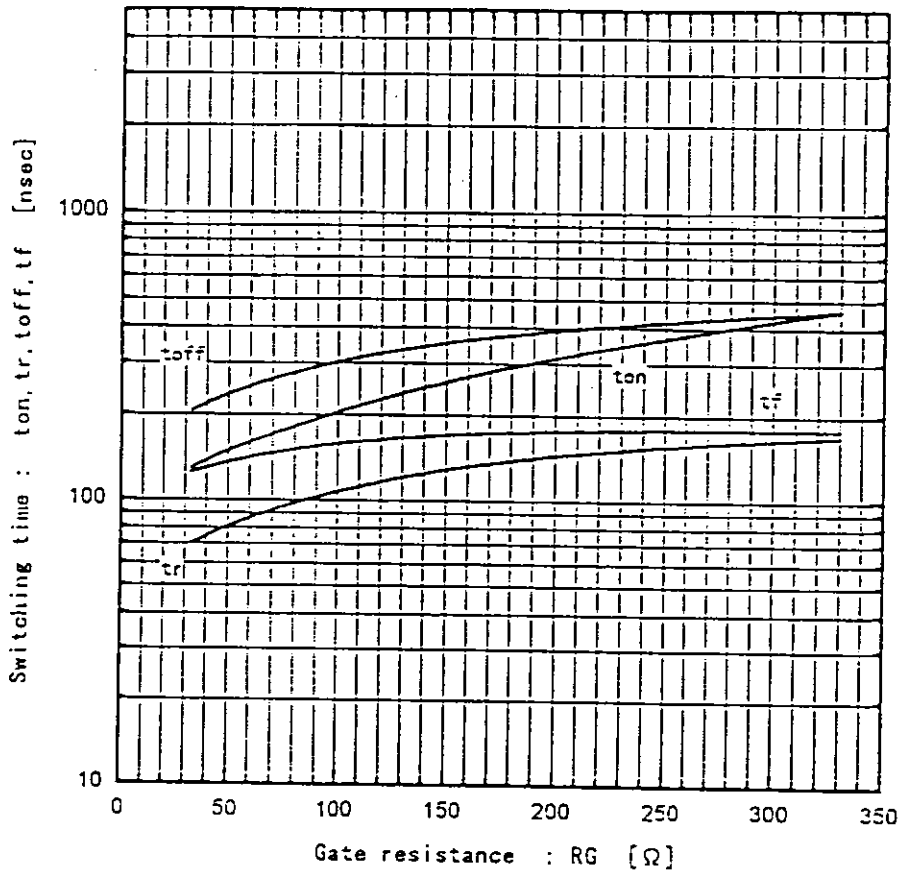
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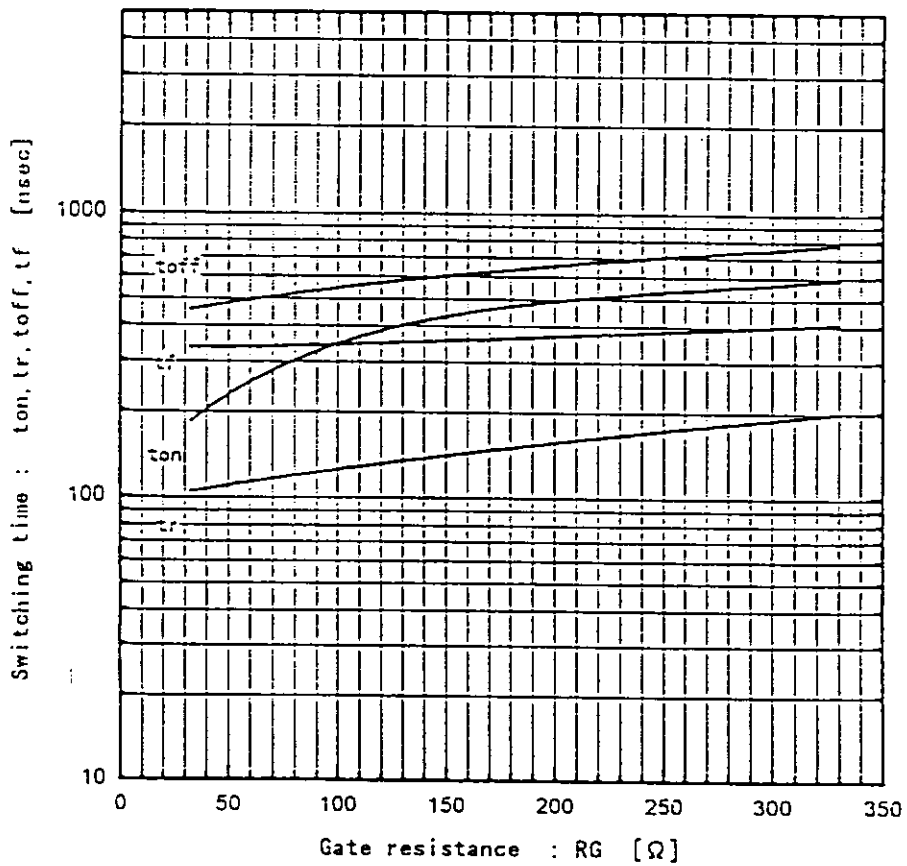
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Switching time vs. RG  
 $V_{cc}=300V, I_C=5A, V_{GE}=\pm 15V, T_j=25^\circ C$



Switching time vs. RG  
 $V_{cc}=300V, I_C=5A, V_{GE}=\pm 15V, T_j=125^\circ C$



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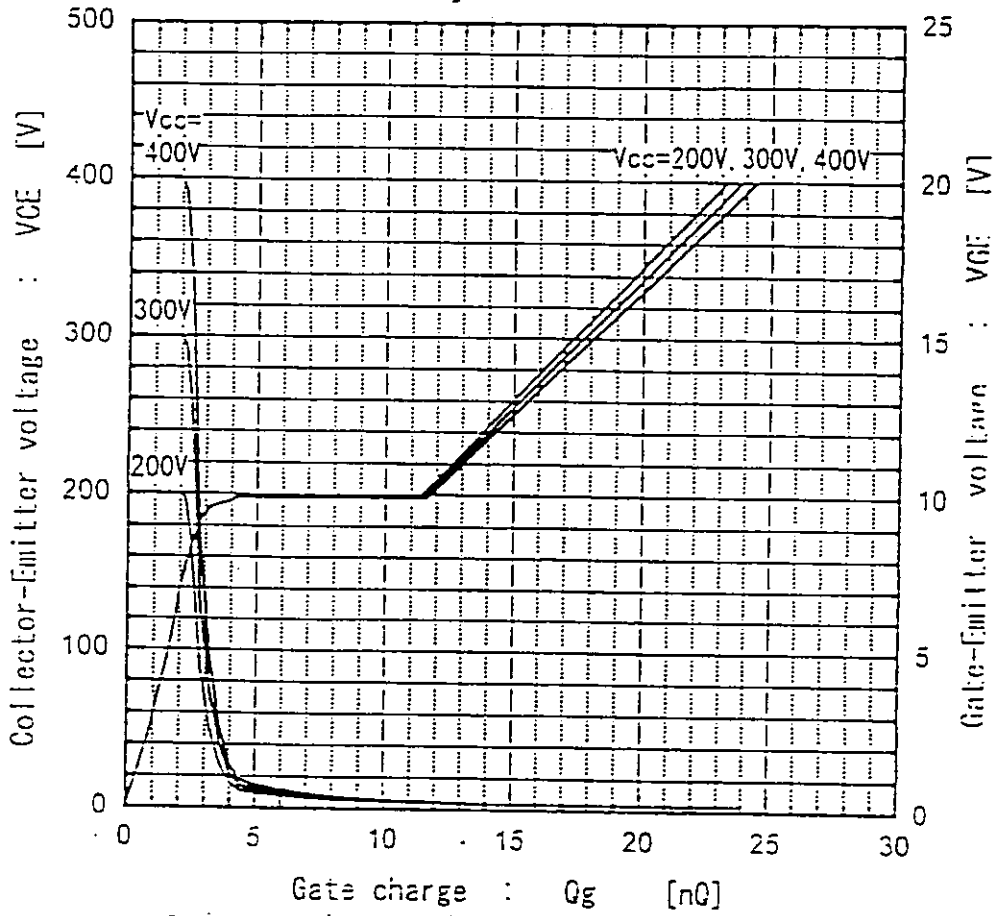
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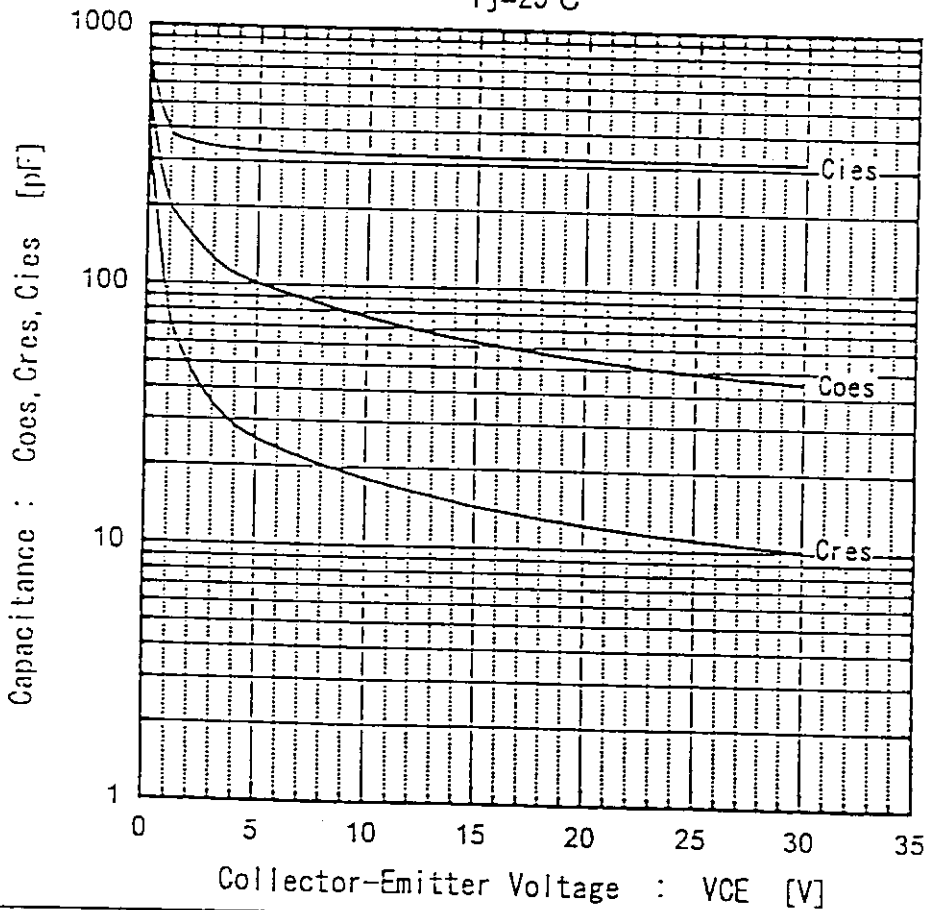
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Dynamic input characteristics  
 $T_j=25^\circ\text{C}$



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



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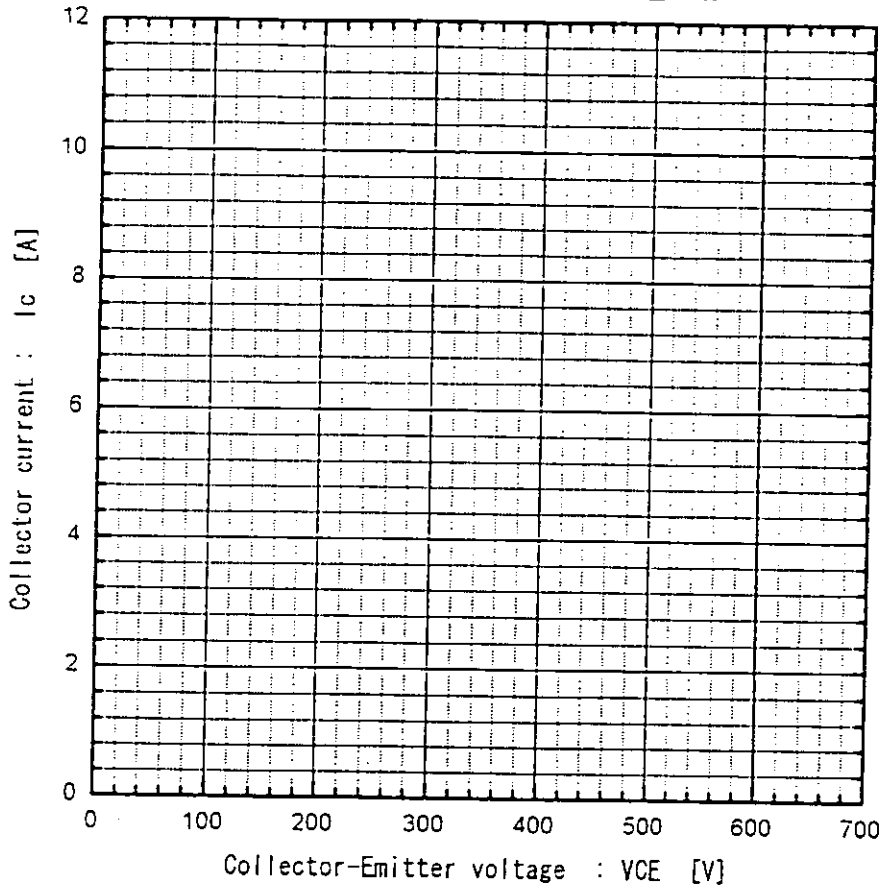
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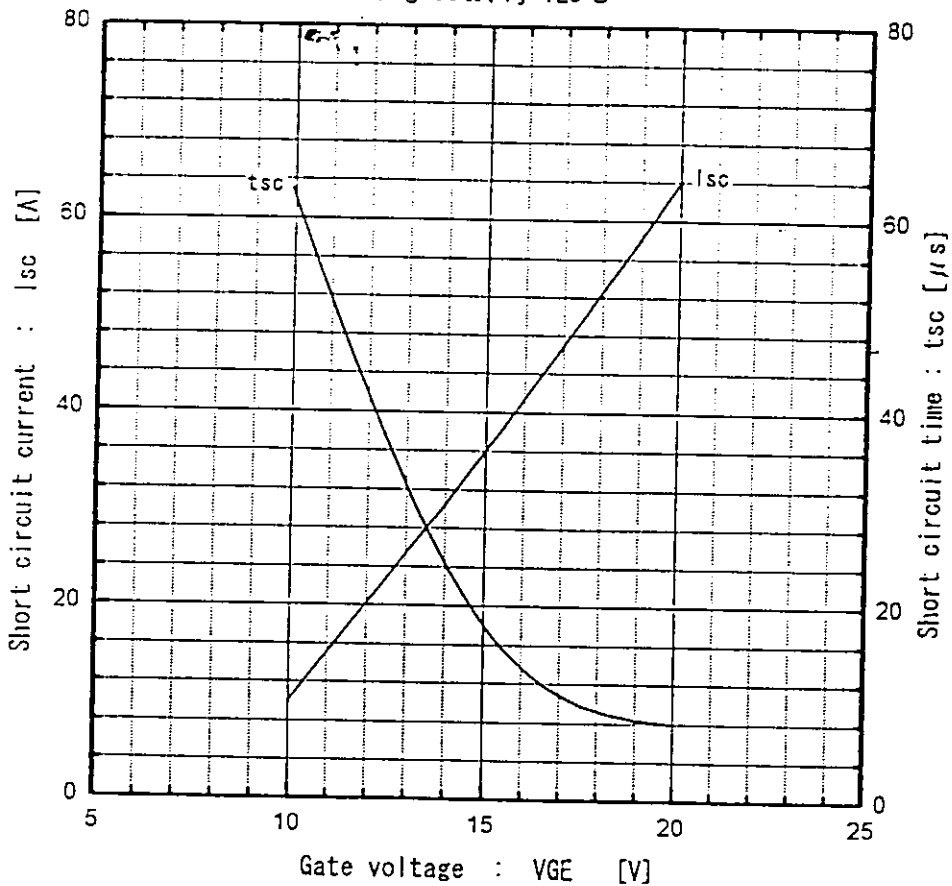
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Reverse Biased Safe Operating Area  
 $+V_{GE}=15V, -V_{GE} \leq 15V, T_j \leq 125^\circ C, R_g \geq 33\Omega$



Typical short circuit capability  
 $V_{CC}=400V, R_g=33\Omega, T_j=125^\circ C$



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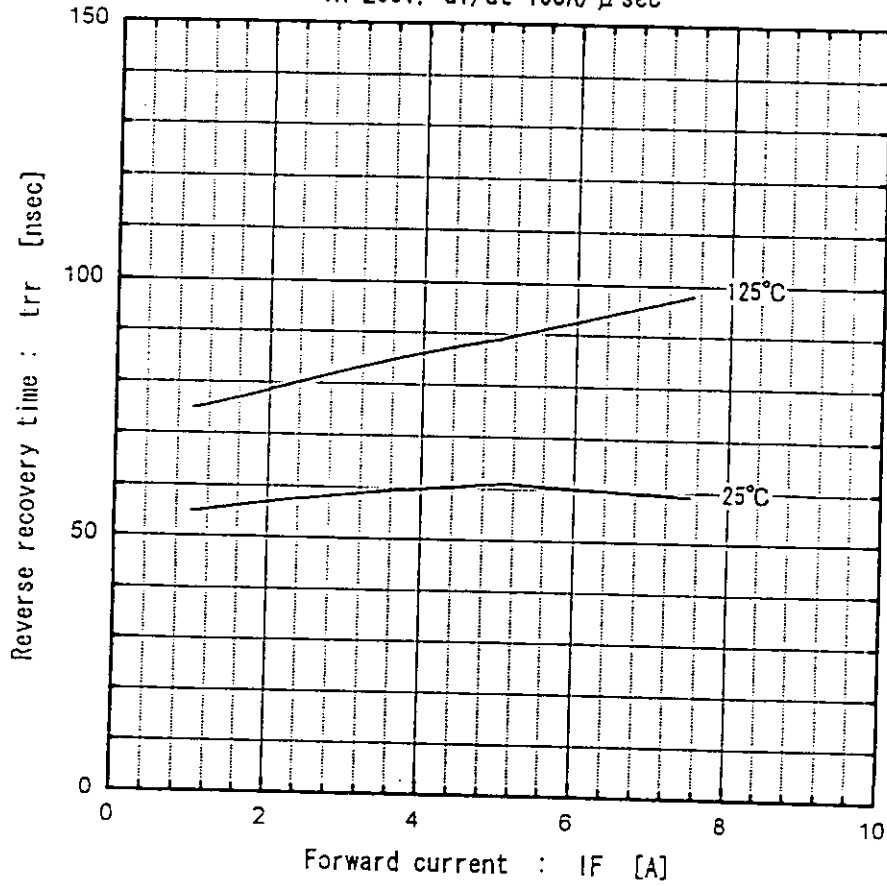
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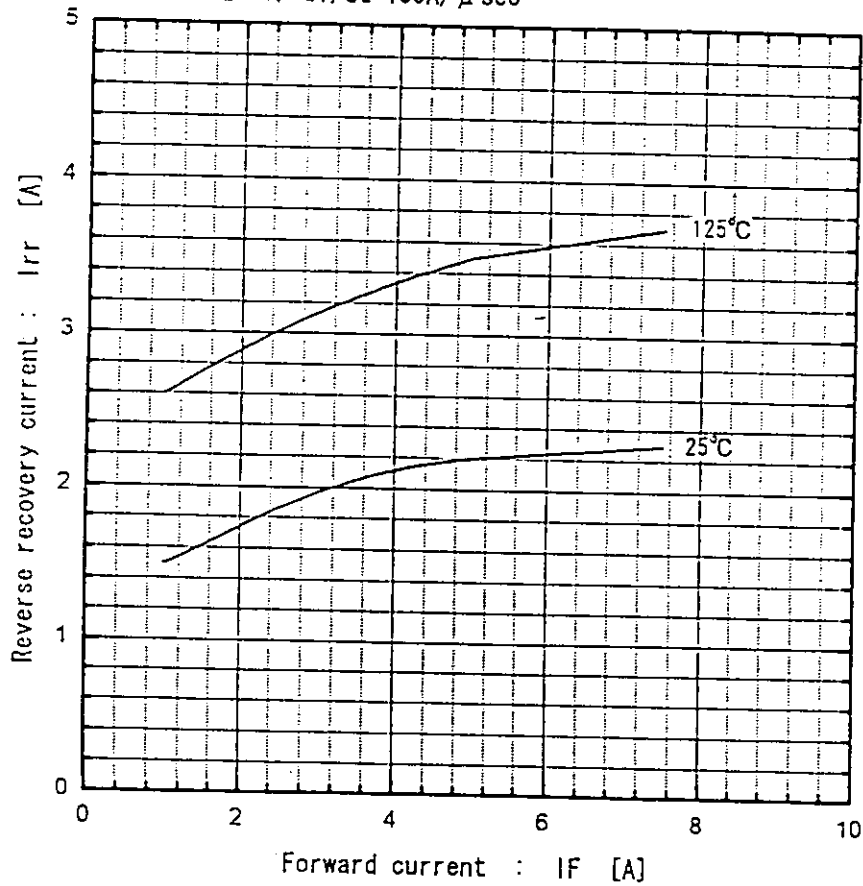
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Reverse recovery time vs. Forward current  
 $VR=200V, -di/dt=100A/\mu sec$



Reverse recovery current vs. Forward current  
 $VR=200V, -di/dt=100A/\mu sec$



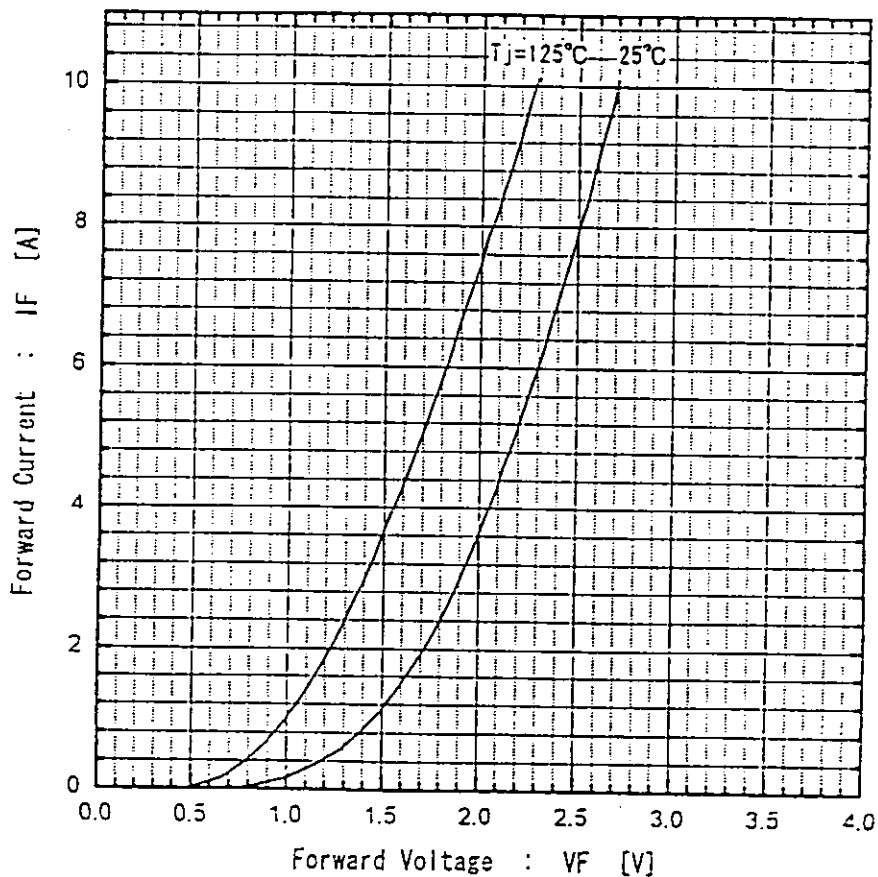
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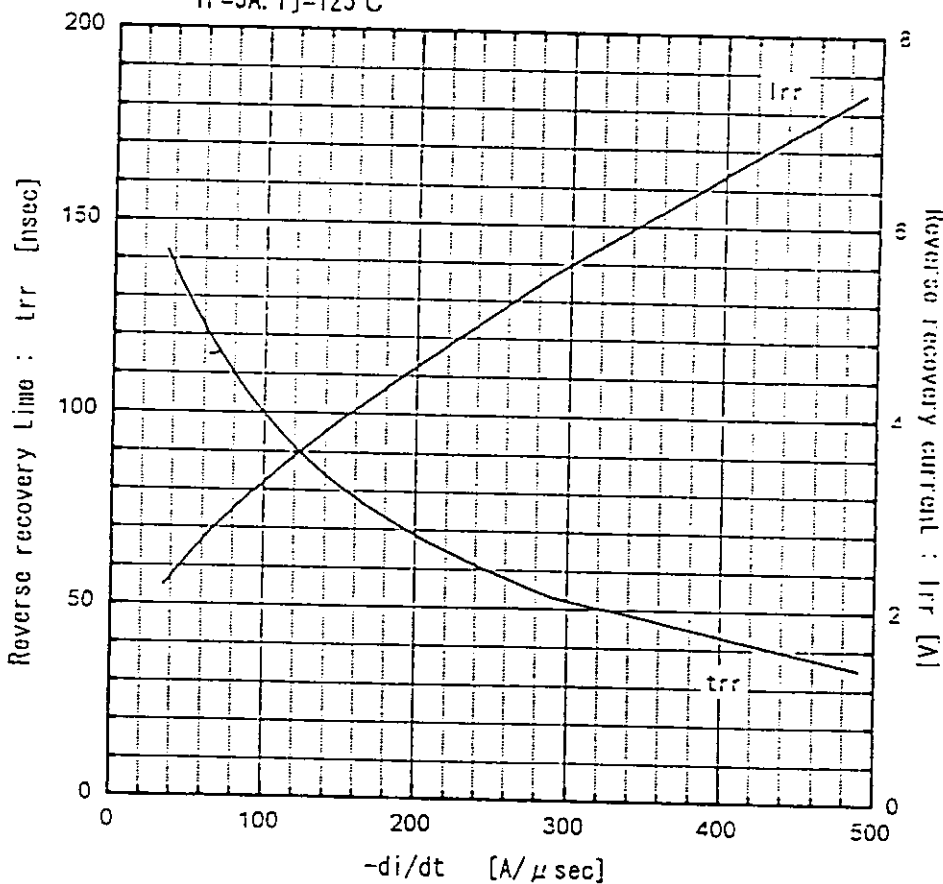
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Forward voltage vs. Forward current



Reverse recovery characteristics vs. -di/dt  
IF=5A, Tj=125°C



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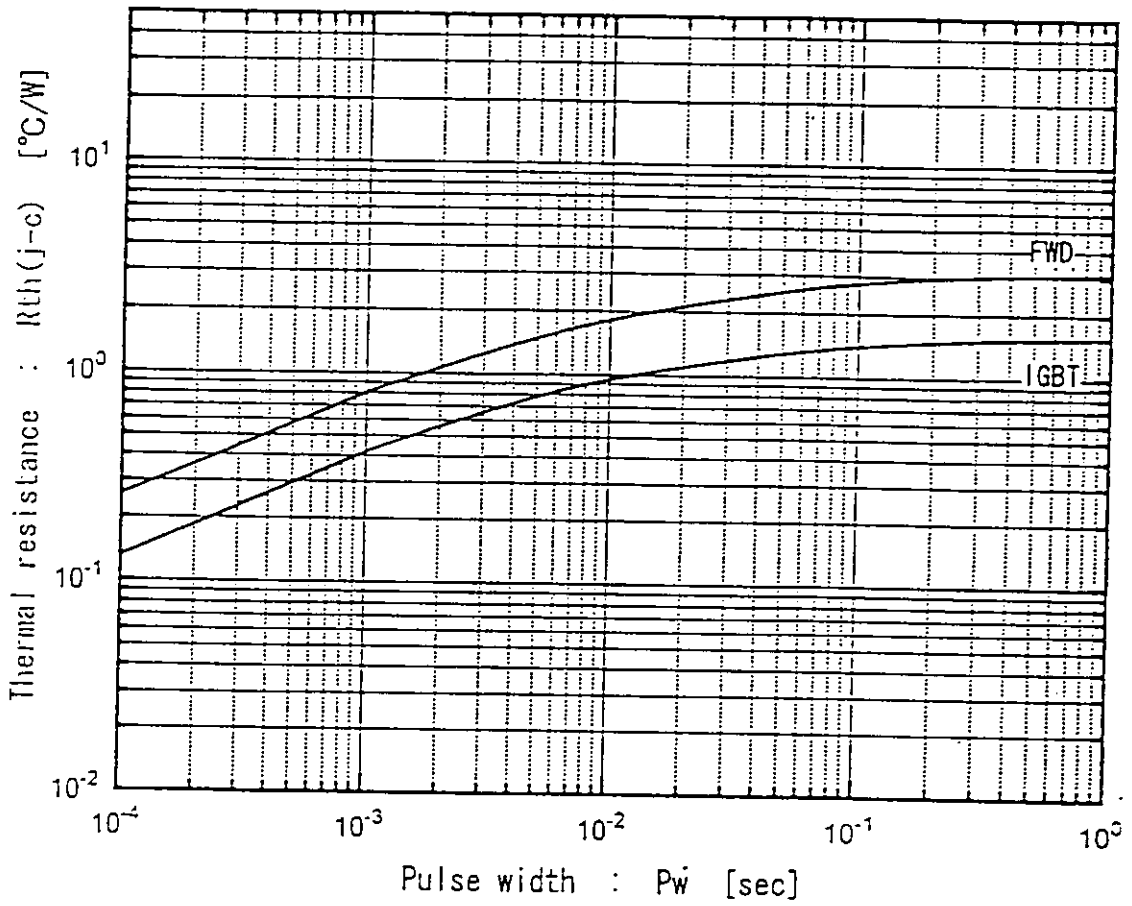
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### Transient thermal resistance



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