

SPECIFICATION

DEVICE NAME : IGBT

TYPE NAME : 1MBH20D-060

SPEC. No. : MS5F 4086

DATE : July-15-1997

Fuji Electric Co., Ltd.
Matsumoto Factory

	DATE	NAME	APPROVED	Fuji Electric Co., Ltd.	
DRAWN	July-15-1997	T. Sawada		DWG. NO.	MS5F4086
CHECKED	July-15-1997	T. Agarashi			

Revised Records

Date	Classi- fication	Ind.	Content	Applied date	Drawn	Checked	Approved
July- 15-1997	enactment	—	—————	Issued date	—	<i>J. J. Jelle</i>	

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▪ Scope

This specification is applied to Fuji discrete IGBT 1MBH20D-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

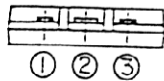
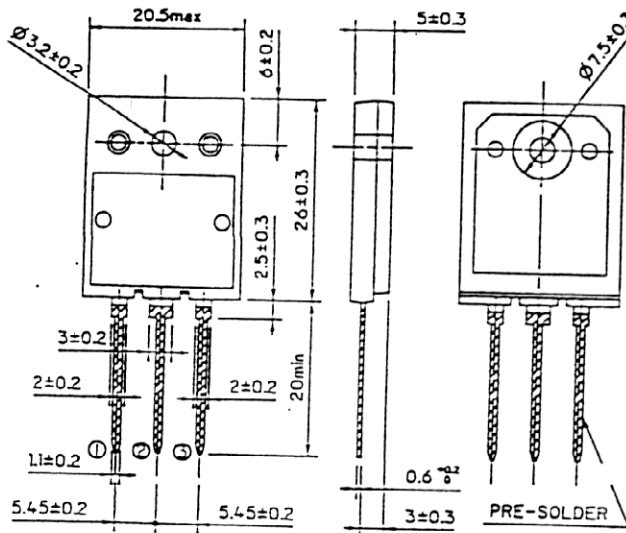
Packing style follows our packing specification MS5Q0026 .

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Ratings and characteristics of Fuji IGBT

1MBH20D-060

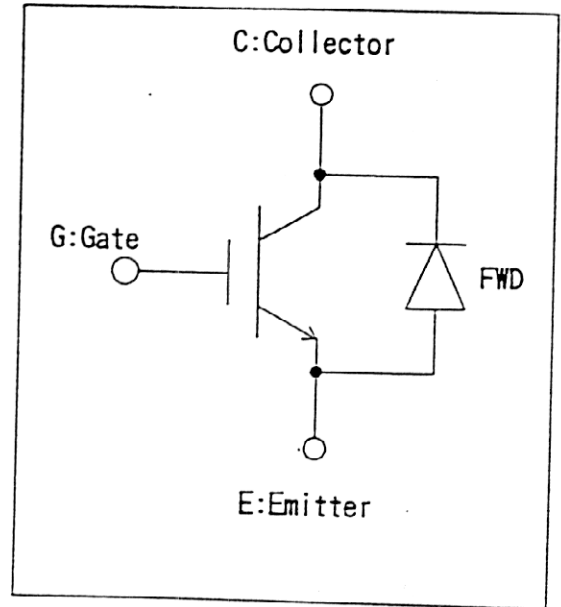
1. Outline Drawing



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}	45 A
		Tc=110°C	I_{C110}	20 A
	1ms	Tc=25 °C	I_{cp}	152 A
IGBT Max. Power Dissipation		P_c	170	W
FWD Max. Power Dissipation		P_c	95	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	$V_{CE} = 0V$ $V_{GE} = \pm 22V$	μA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	5.5		8.5	$V_{CE} = 20V$ $I_C = 20mA$	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$			3.0	$V_{GE} = 15V$ $I_C = 20A$	V
Input capacitance	C_{ies}		1300		$V_{GE} = 0V$	pF
Output capacitance	C_{oes}		300		$V_{CE} = 10V$	
Reverse transfer capacitance	C_{res}		70		$f = 1MHz$	
Switching Time	Turn-on time	t_{on}		1.2	$V_{CC} = 300V$ $I_C = 20A$ $V_{GE} = \pm 15V$ $R_G = 120\Omega$ (Half Bridge)	μs
		t_r		0.6		
	Turn-off time	t_{off}		1.0		
		t_f		0.35		
	Turn-on time	t_{on}	0.16		$V_{CC} = 300V$ $I_C = 20A$ $V_{GE} = +15V$ $R_G = 12\Omega$ (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	$I_F = 20A$	V
Reverse recovery time	t_{rr}			0.3	$I_F = 20A, V_{GE} = -10V$ $V_R = 200V$ $di/dt = 100A/\mu s$	μs

5. Thermal resistance characteristics

Items	Symbols	Characteristics			Conditions	Unit
		min.	typ.	max.		
Thermal resistance	$R_{th(j-c)}$			0.73	IGBT	$^{\circ}C/W$
	$R_{th(j-c)}$			1.31	FWD	

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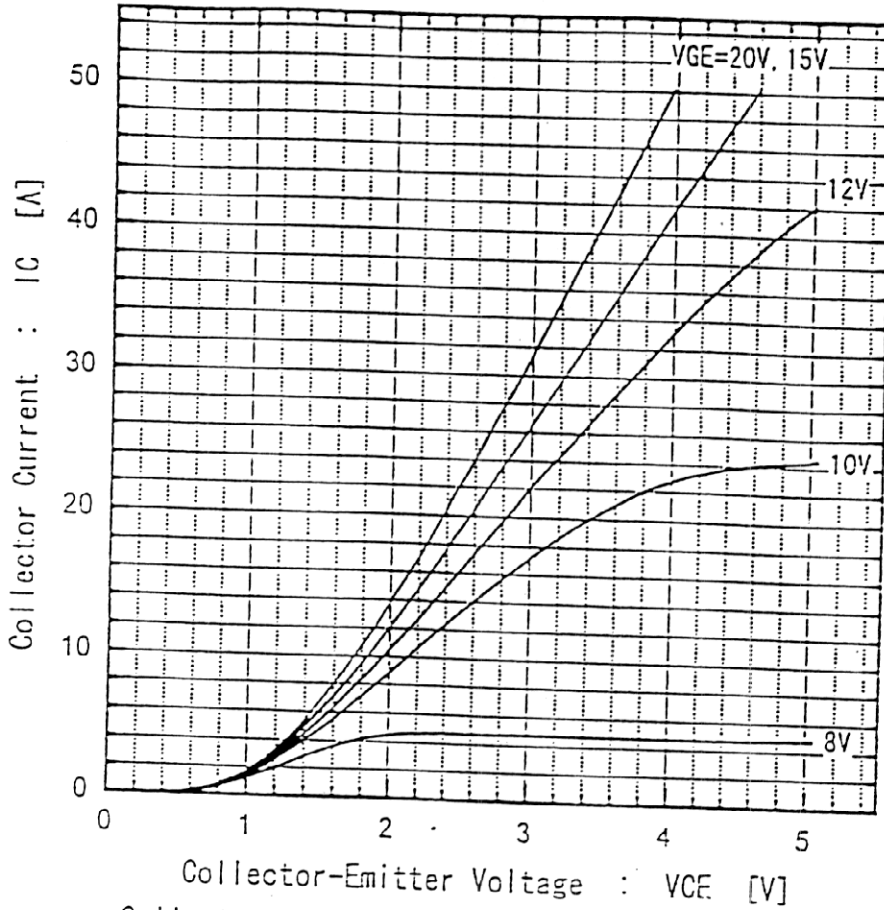
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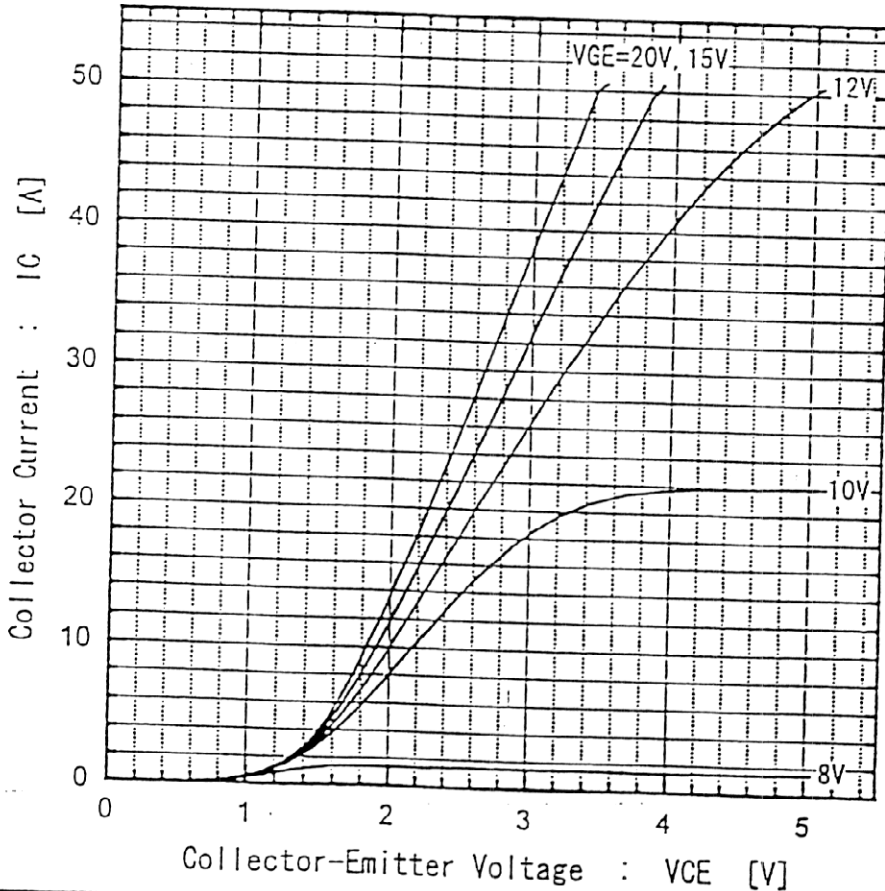
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Collector Current vs. Collector-Emitter Voltage
 $T_j = 125^\circ\text{C}$



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



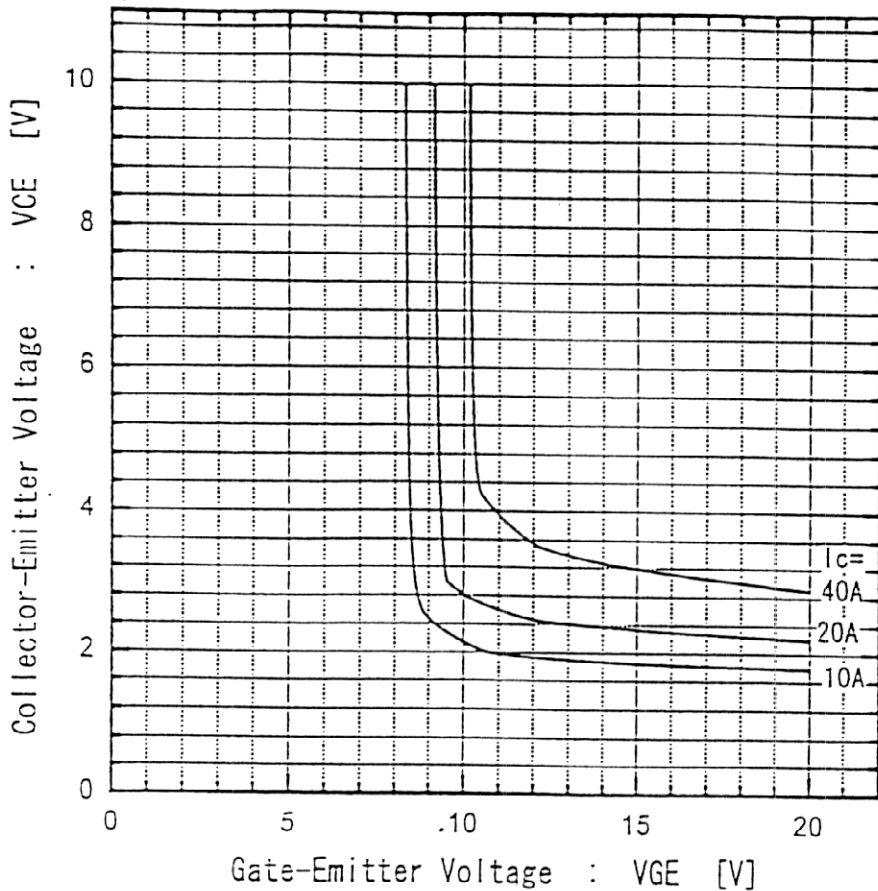
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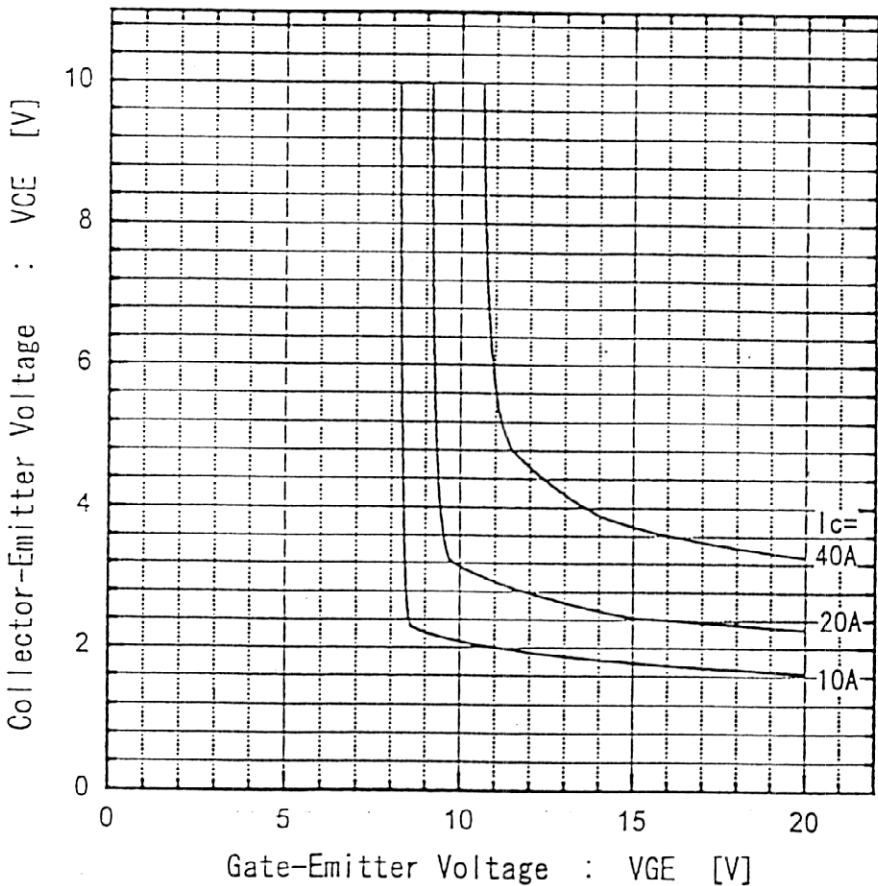
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Collector-Emitter Voltage vs Gate-Emitter Voltage
 $T_j=25^\circ\text{C}$



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



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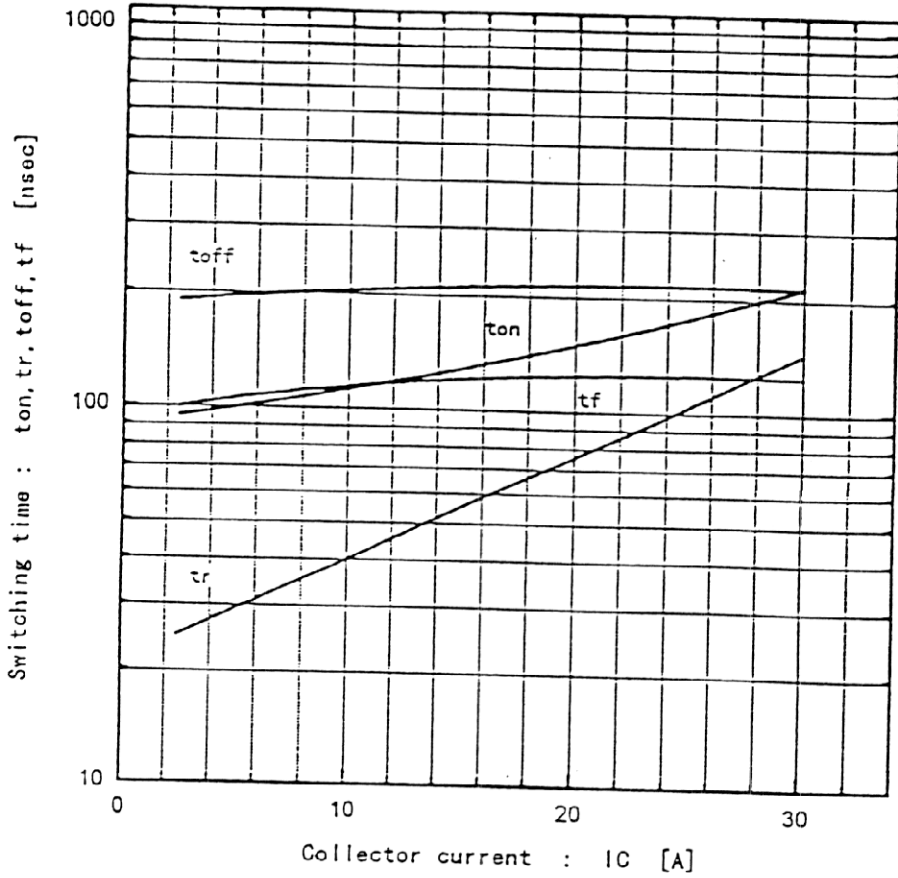
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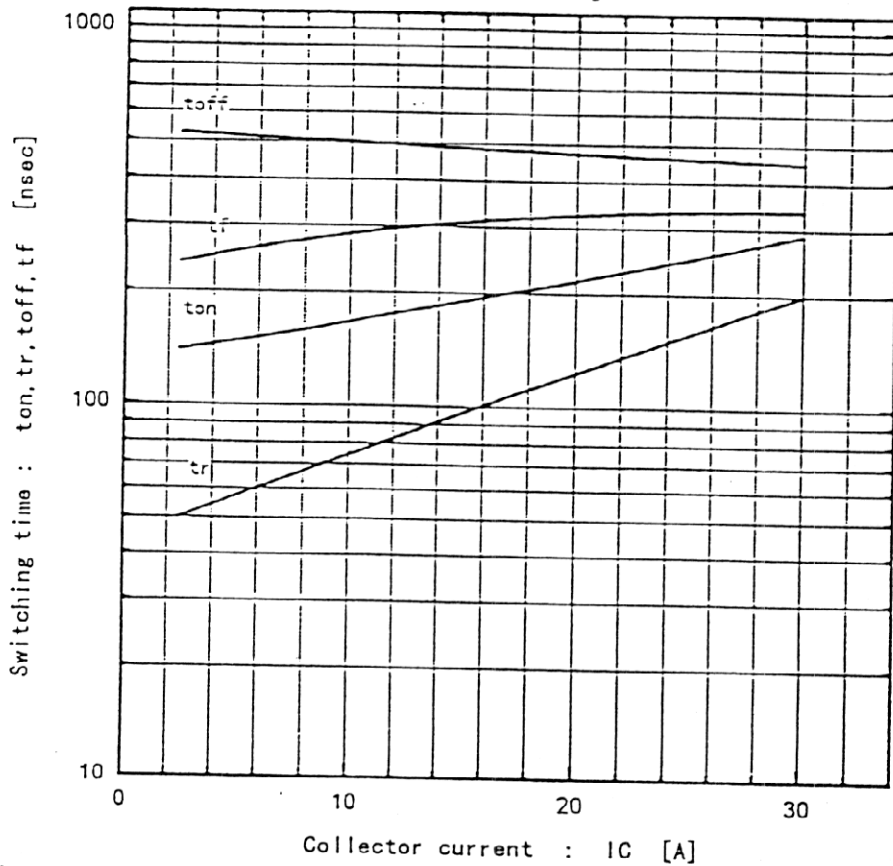
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Switching time vs. Collector current
 $V_{CC}=300V, R_G=12\Omega, V_{GE}=\pm 15V, T_j=25^\circ C$



Switching time vs. Collector current
 $V_{CC}=300V, R_G=12\Omega, V_{GE}=\pm 15V, T_j=125^\circ C$



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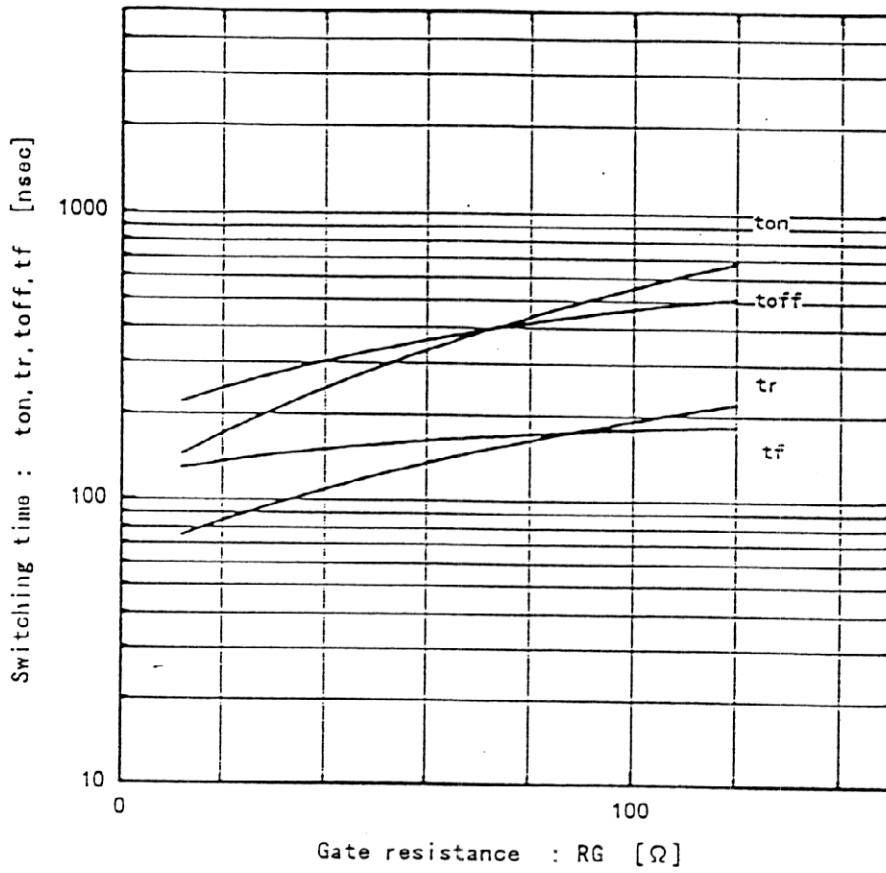
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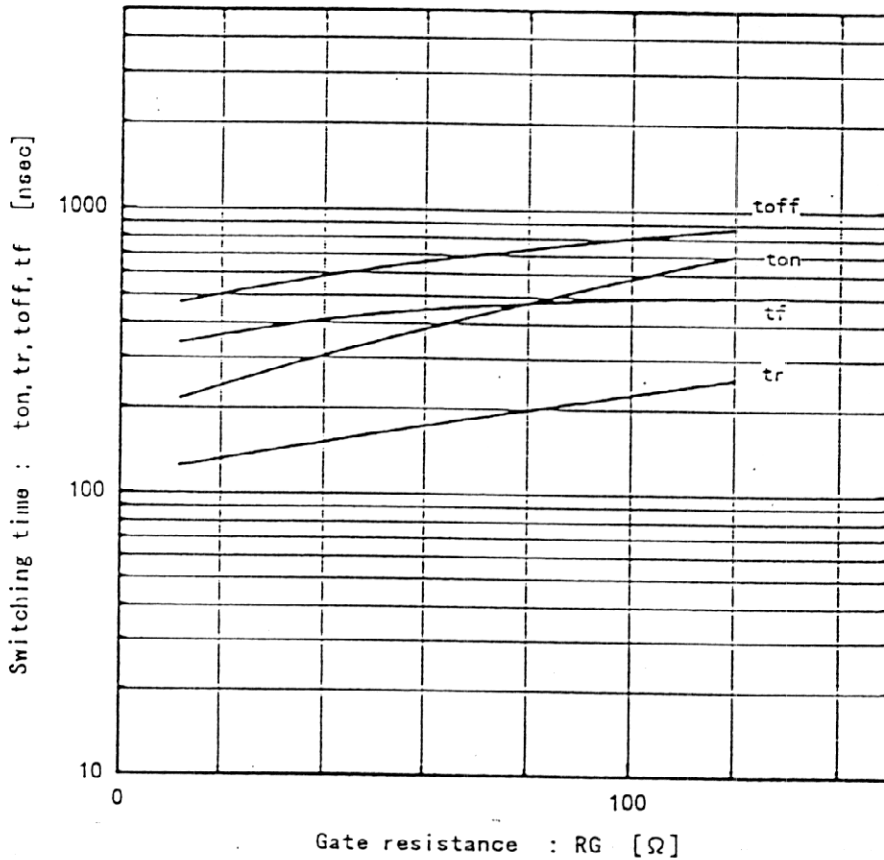
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Switching time vs. RG
 $V_{cc}=300V, I_C=20A, V_{GE}=\pm 15V, T_j=25^\circ C$



Switching time vs. RG
 $V_{cc}=300V, I_C=20A, V_{GE}=\pm 15V, T_j=125^\circ C$



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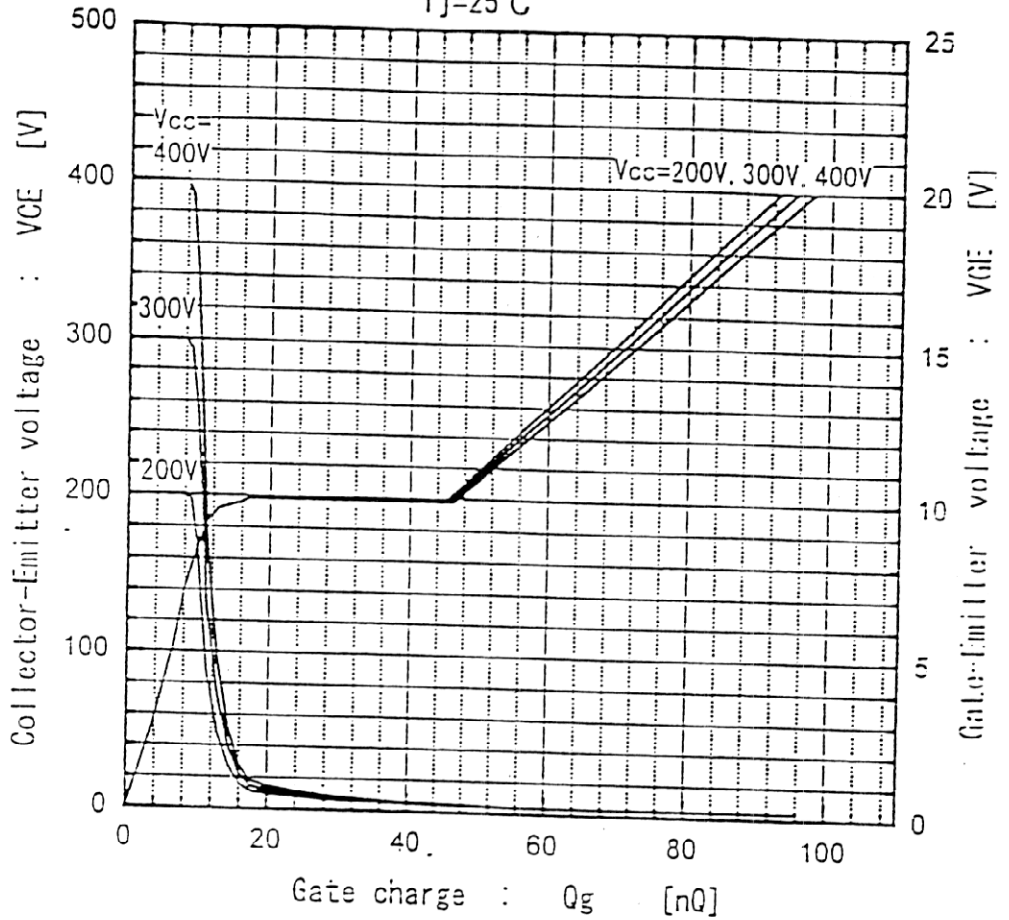
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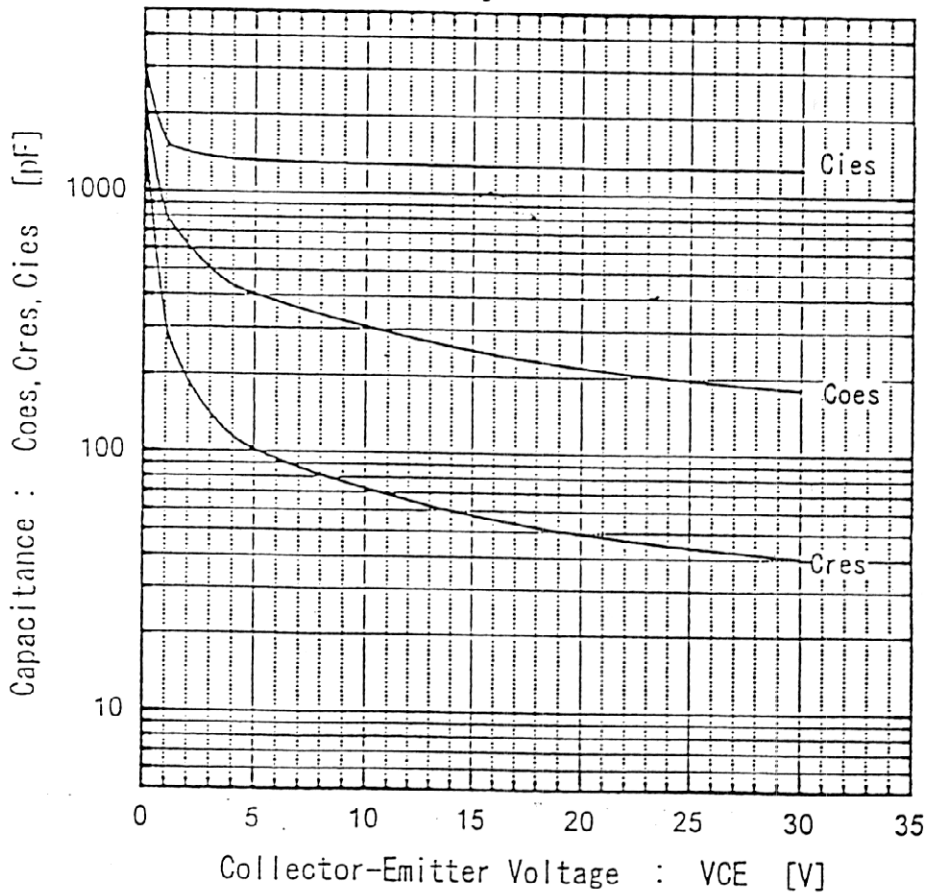
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Dynamic input characteristics
 $T_j=25^\circ\text{C}$



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



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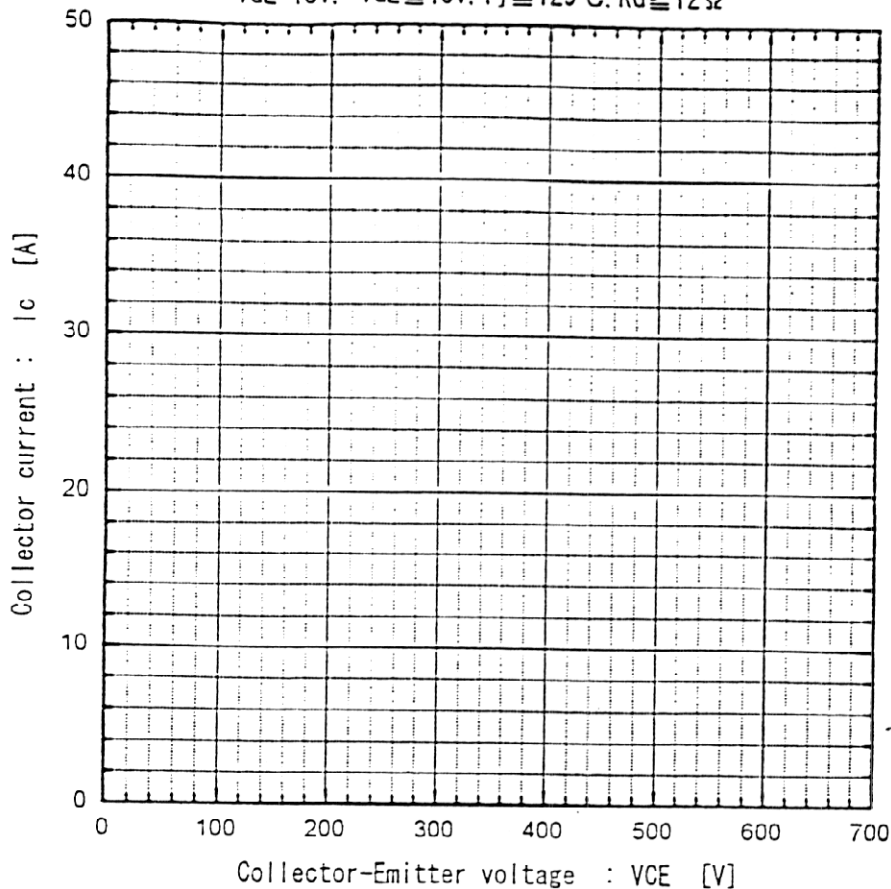
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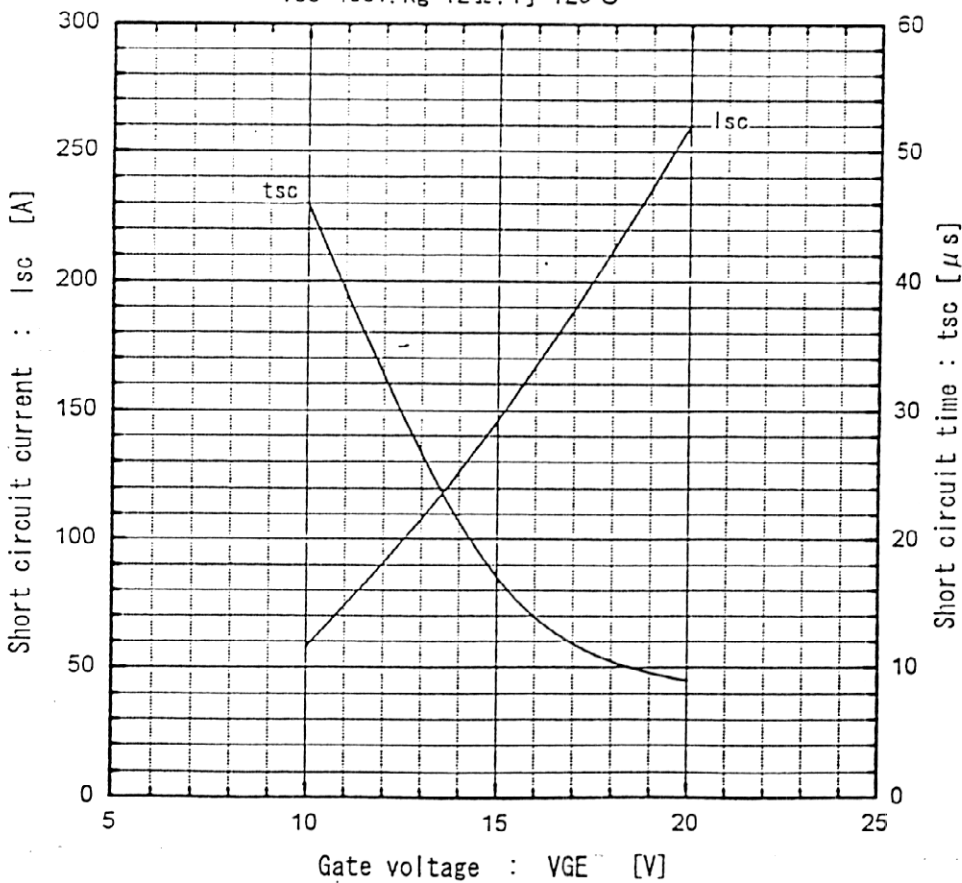
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Reverse Biased Safe Operating Area
 $+V_{GE}=15V, -V_{GE} \leq 15V, T_j \leq 125^\circ C, R_G \geq 12 \Omega$



Typical short circuit capability
 $V_{CC}=400V, R_G=12 \Omega, T_j=125^\circ C$



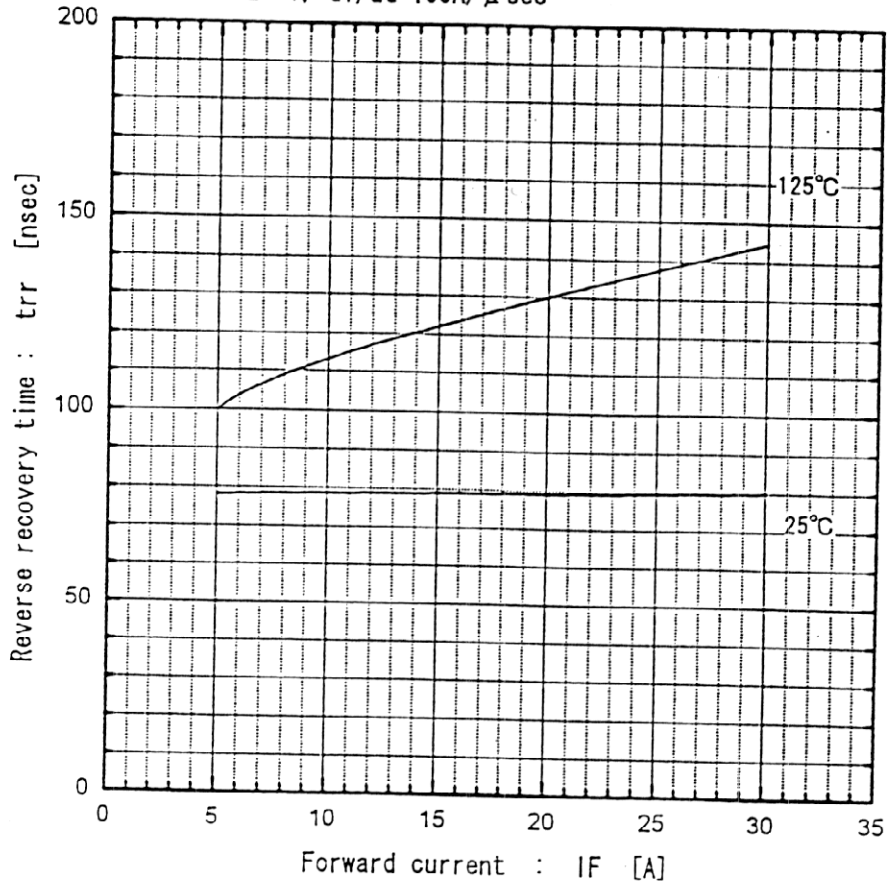
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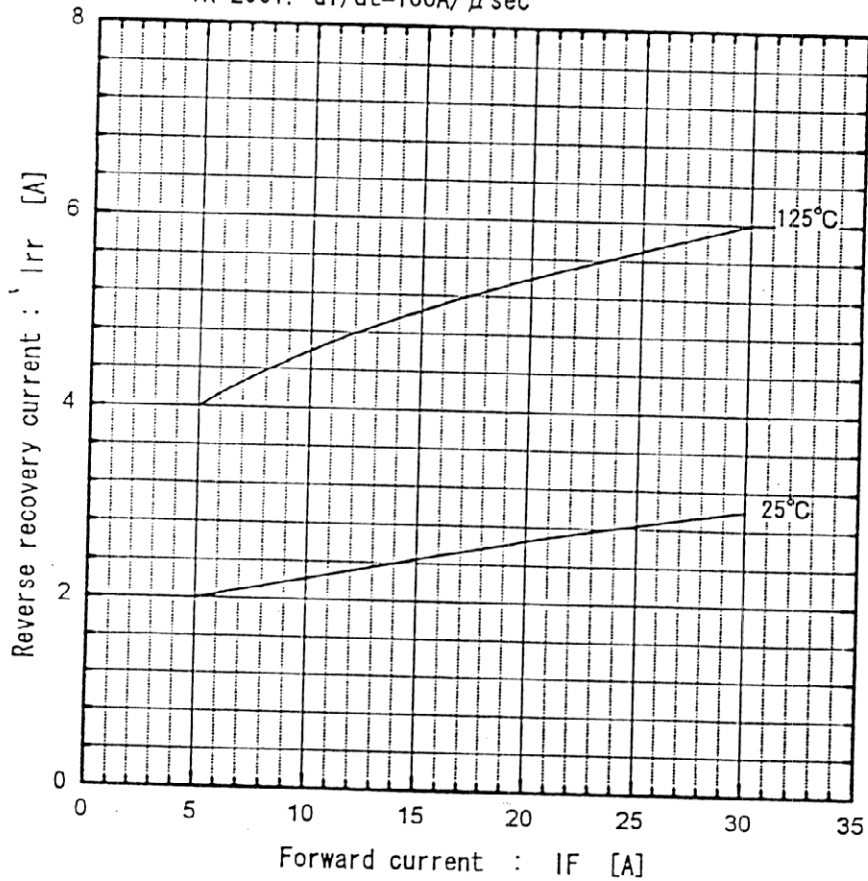
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Reverse recovery time vs. Forward current
 $V_R=200V, -di/dt=100A/\mu sec$



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



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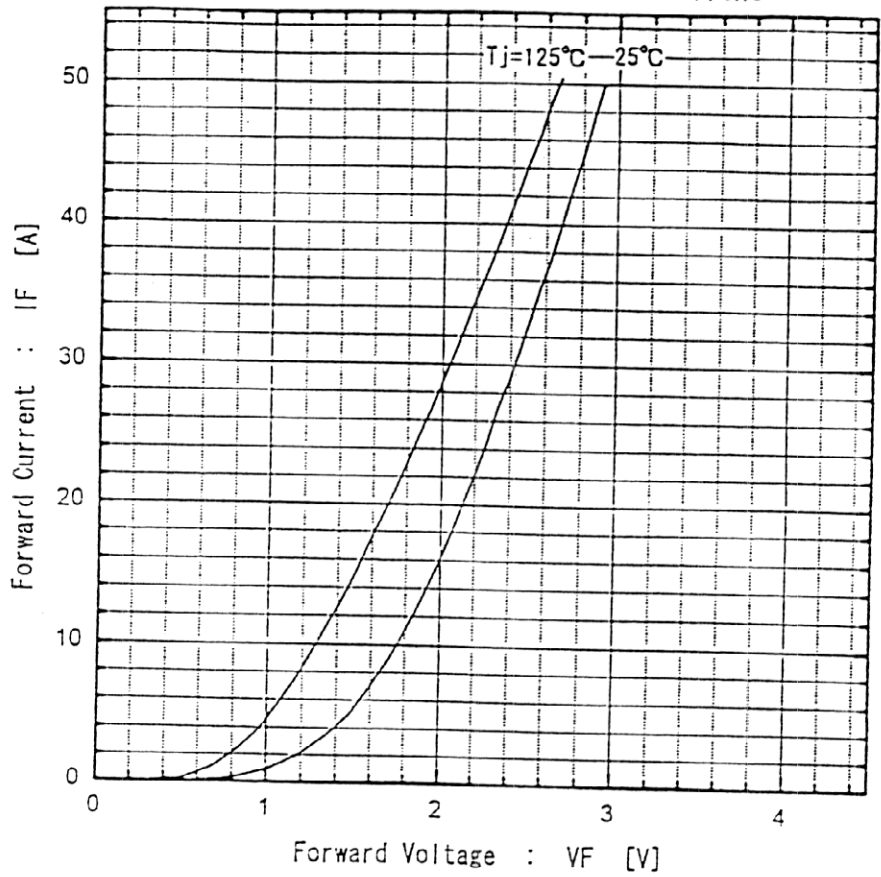
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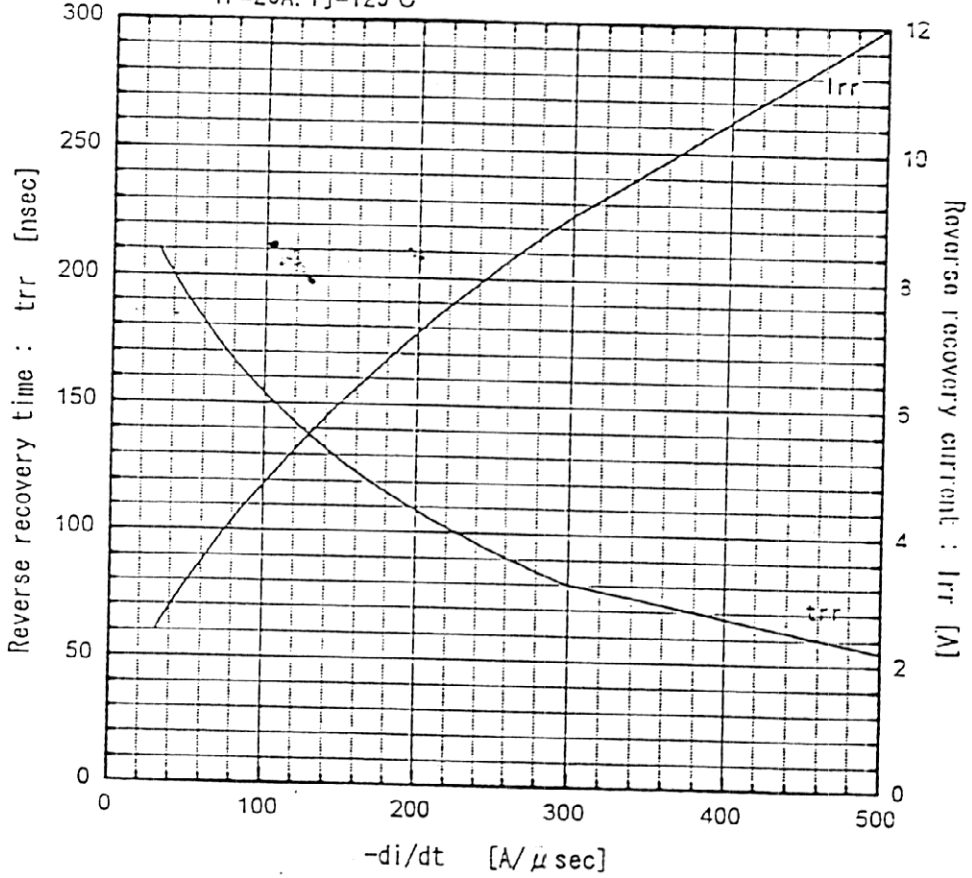
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Forward voltage vs. Forward current



Reverse recovery characteristics vs. $-di/dt$
 $I_F=20A, T_j=125^\circ C$



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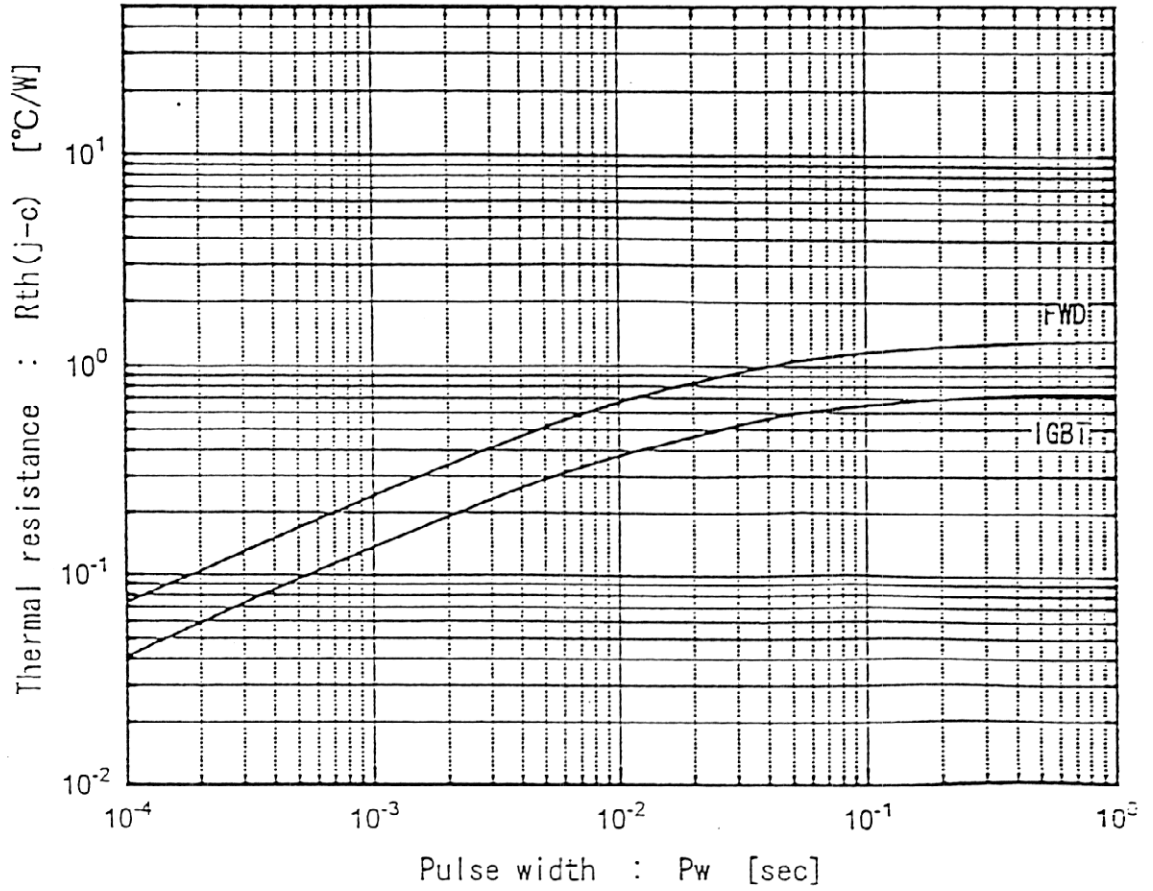
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Transient thermal resistance



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