

# SPECIFICATION

DEVICE NAME : IGBT

TYPE NAME : 1MBH10D-120

SPEC. No. : MS5F 4091

DATE : July-15-1997

Fuji Electric Co., Ltd.  
Matsumoto Factory

	DATE	NAME	APPROVED	Fuji Electric Co., Ltd.	
DRAWN	July 15-97	T. Sawada		DWG. NO.	MS5F4091
CHECKED	July 15-97	T. Igarashi			



▪ Scope

This specification is applied to Fuji discrete IGBT 1MBH10D-120  
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

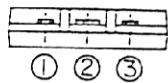
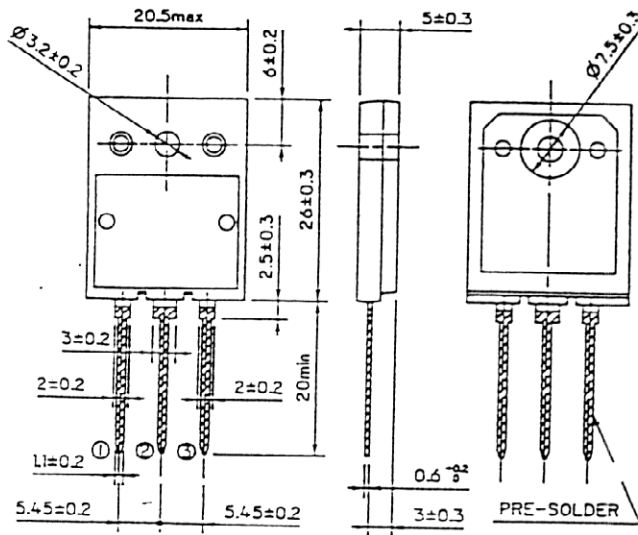
Packing style follows our packing specification MS5Q0026 .

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# Ratings and characteristics of Fuji IGBT

## 1MBH10D-120

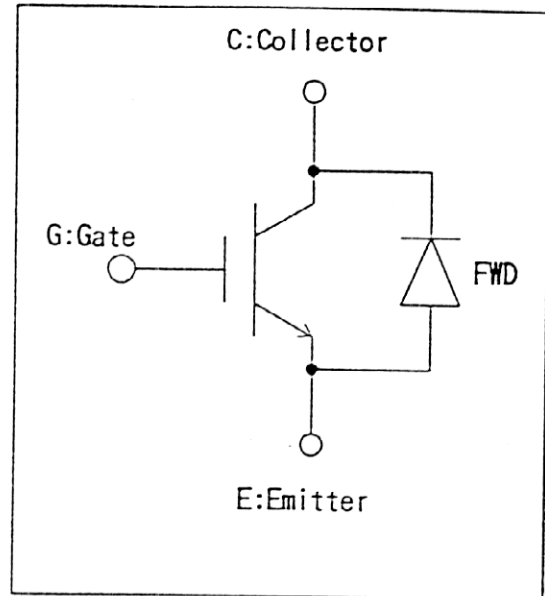
### 1. Outline Drawing



#### CONNECTION

- ① GATE
- ② COLLECTOR
- ③ EMITTER

### 2. Equivalent circuit



### 3. Absolute maximum ratings (Tc=25°C)

Items		Symbols	Ratings	Units	
Collector-Emitter Voltage		$V_{CES}$	1200	V	
Gate-Emitter Voltage		$V_{GES}$	±22	V	
Collector Current	DC	Tc=25 °C	$I_{C25}$	18	A
		Tc=105°C	$I_{C105}$	10	A
	1ms	Tc=25 °C	$I_{cp}$	48	A
IGBT Max. Power Dissipation		$P_c$	155	W	
FWD Max. Power Dissipation		$P_c$	105	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	$V_{GE} = 0V$ $V_{CE} = 1200V$	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	$V_{CE} = 20V$ $I_C = 10mA$	V	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$			3.5	$V_{GE} = 15V$ $I_C = 10A$	V	
Input capacitance	$C_{ies}$		1200		$V_{GE} = 0V$	pF	
Output capacitance	$C_{oes}$		250		$V_{CE} = 10V$		
Reverse transfer capacitance	$C_{res}$		80		$f = 1MHz$		
Switching Time	Turn-on time	$t_{on}$		1.2	$V_{CC} = 600V$ $I_C = 10A$ $V_{GE} = \pm 15V$ $R_G = 160\Omega$ (Half Bridge)	$\mu s$	
		$t_r$		0.6			
	Turn-off time	$t_{off}$		1.5			
		$t_f$		0.5			
	Turn-on time	$t_{on}$		0.16			$V_{CC} = 600V$ $I_C = 10A$ $V_{GE} = +15V$ $R_G = 16\Omega$ (Half Bridge)
		$t_r$		0.11			
Turn-off time	$t_{off}$		0.30				
	$t_f$		0.50				
FWD forward voltage drop	$V_F$			3.0	$I_F = 10A$	V	
Reverse recovery time	$t_{rr}$			0.35	$I_F = 10A, V_{GE} = -10V$ $V_R = 200V$ $di/dt = 100A/\mu s$	$\mu s$	

5. Thermal resistance characteristics

Items	Symbols	Characteristics			Conditions	Unit
		min.	typ.	max.		
Thermal resistance	$R_{th(j-c)}$			0.80	IGBT	$^{\circ}C/W$
	$R_{th(j-c)}$			1.19	FWD	

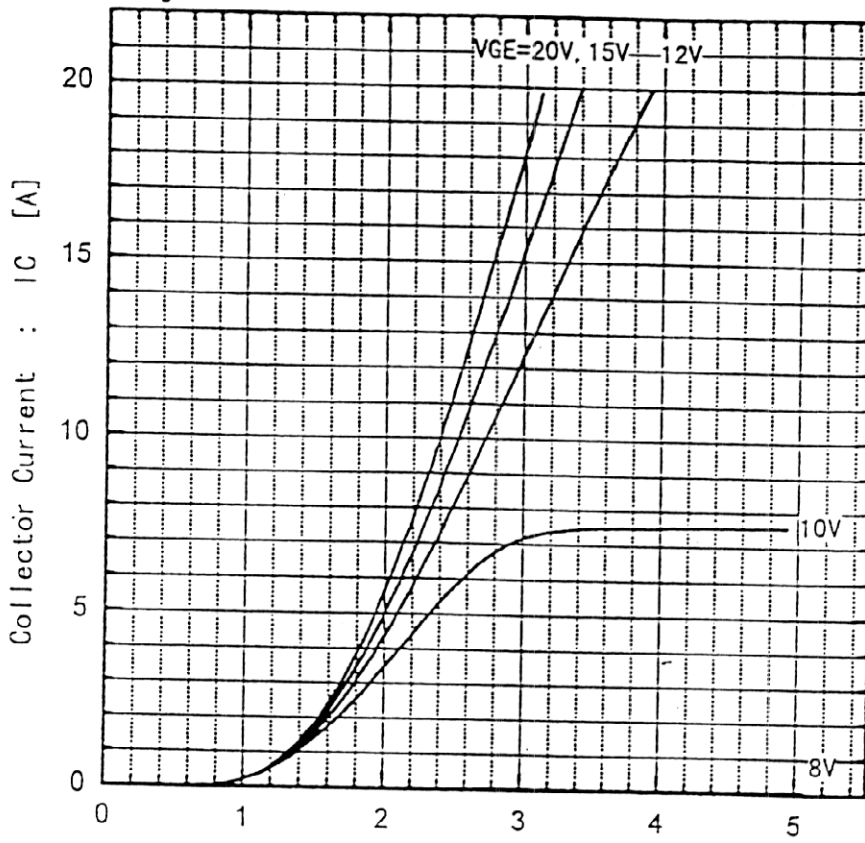
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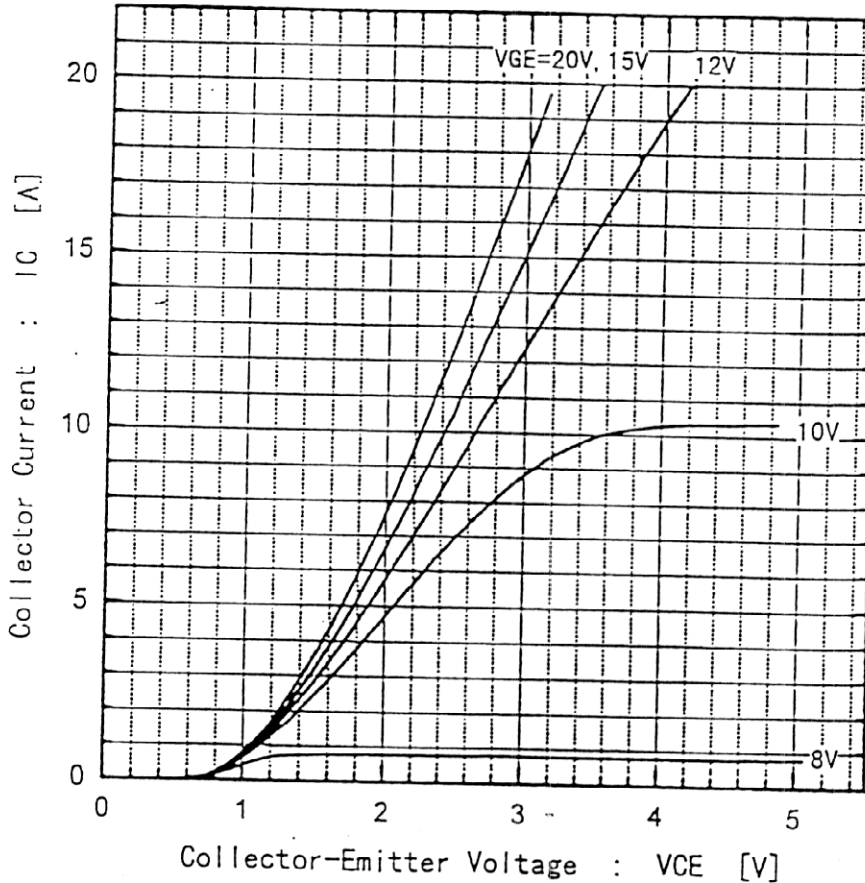
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Collector Current vs. Collector-Emitter Voltage  
 $T_j=25^\circ\text{C}$



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



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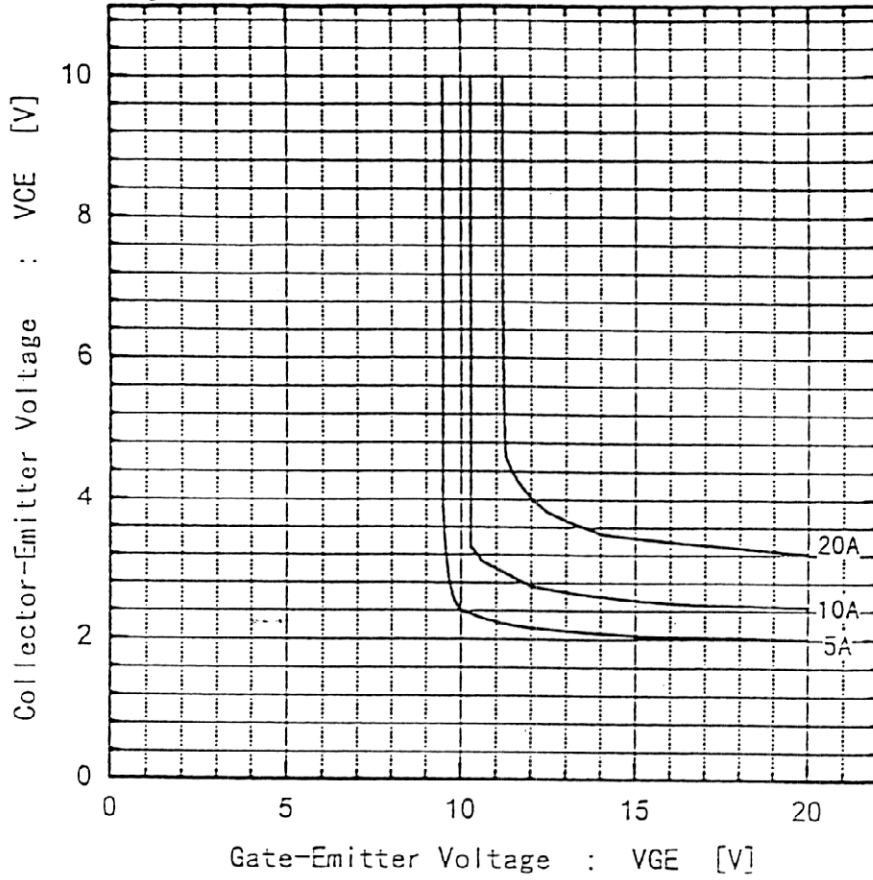
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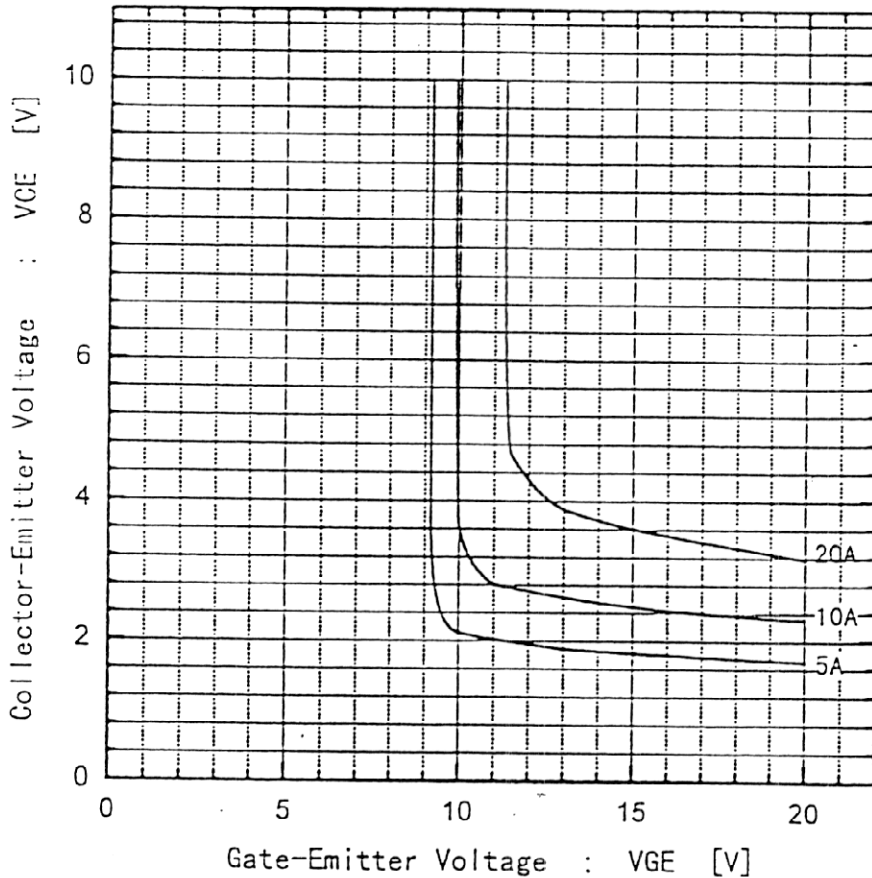
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Collector-Emitter Voltage vs Gate-Emitter Voltage  
 $T_j=25^\circ\text{C}$



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



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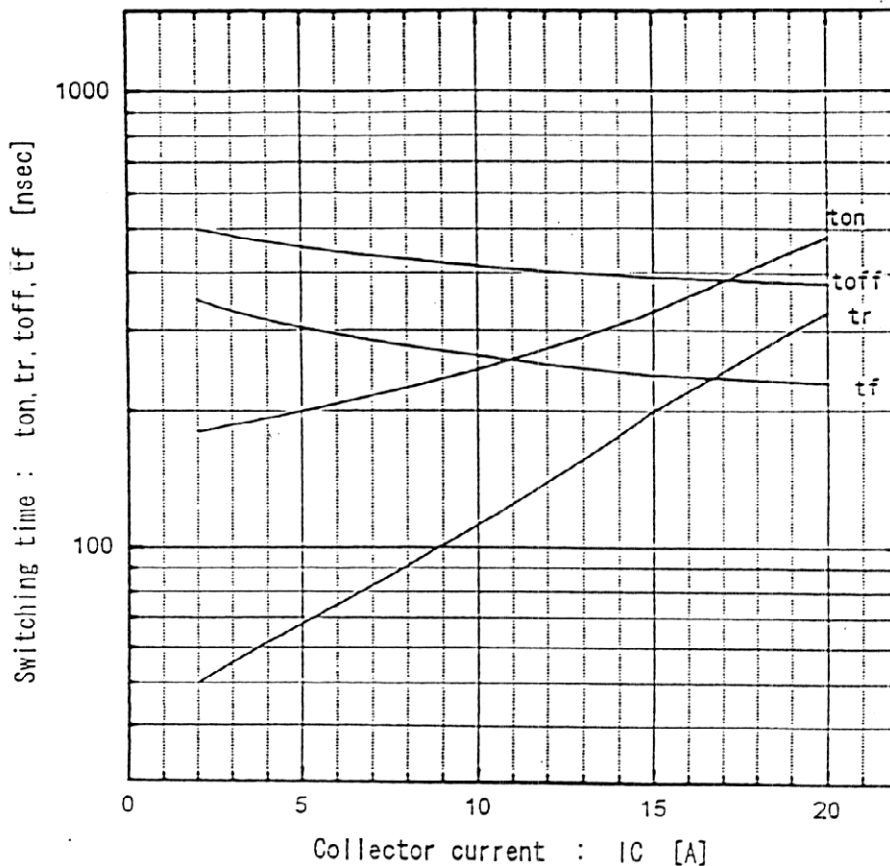
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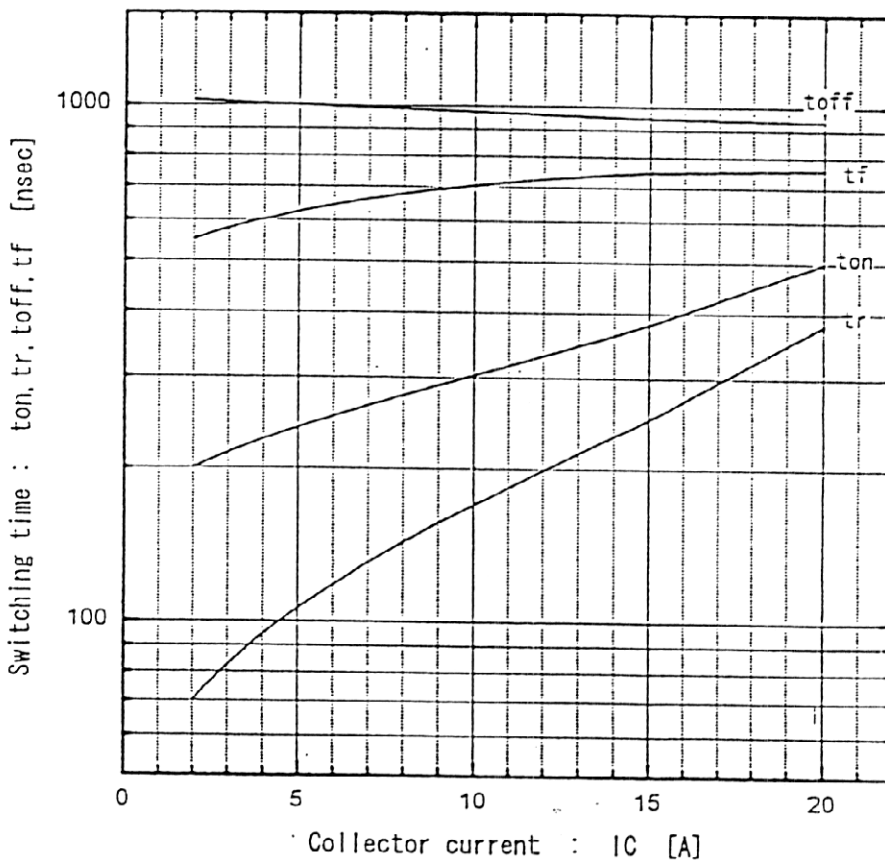
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Switching time vs. Collector current  
 $V_{CC}=600V$ ,  $R_G=16\Omega$ ,  $V_{GE}=\pm 15V$ ,  $T_j=25^\circ C$



Switching time vs. Collector current  
 $V_{CC}=500V$ ,  $R_G=16\Omega$ ,  $V_{GE}=\pm 15V$ ,  $T_j=25^\circ C$



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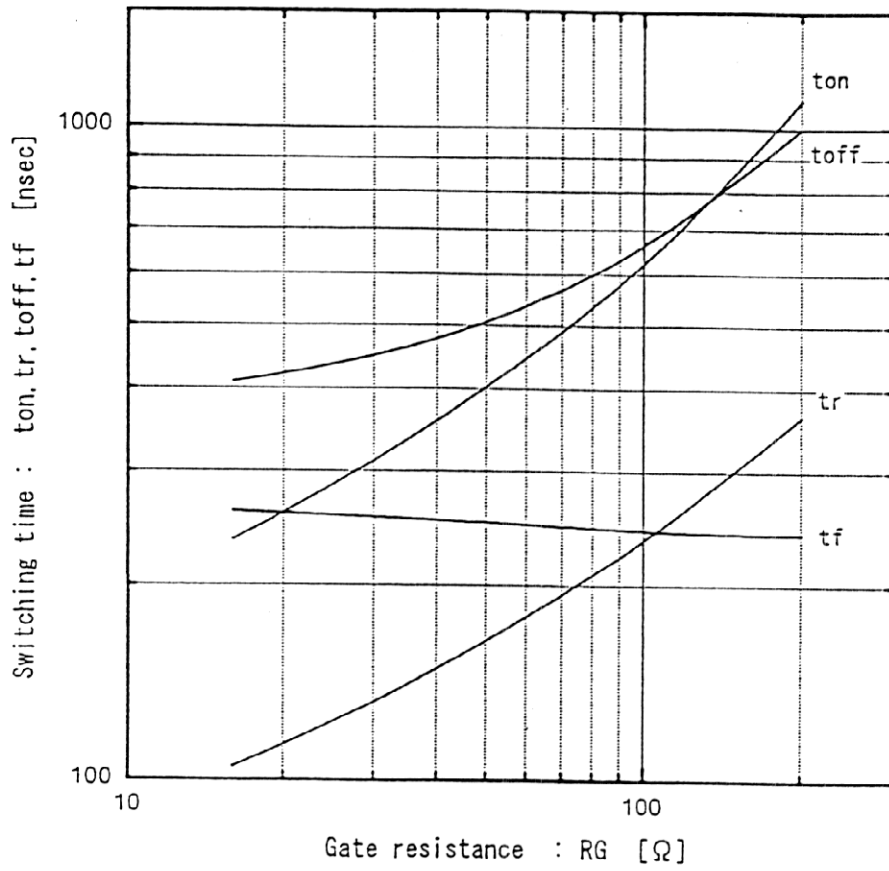
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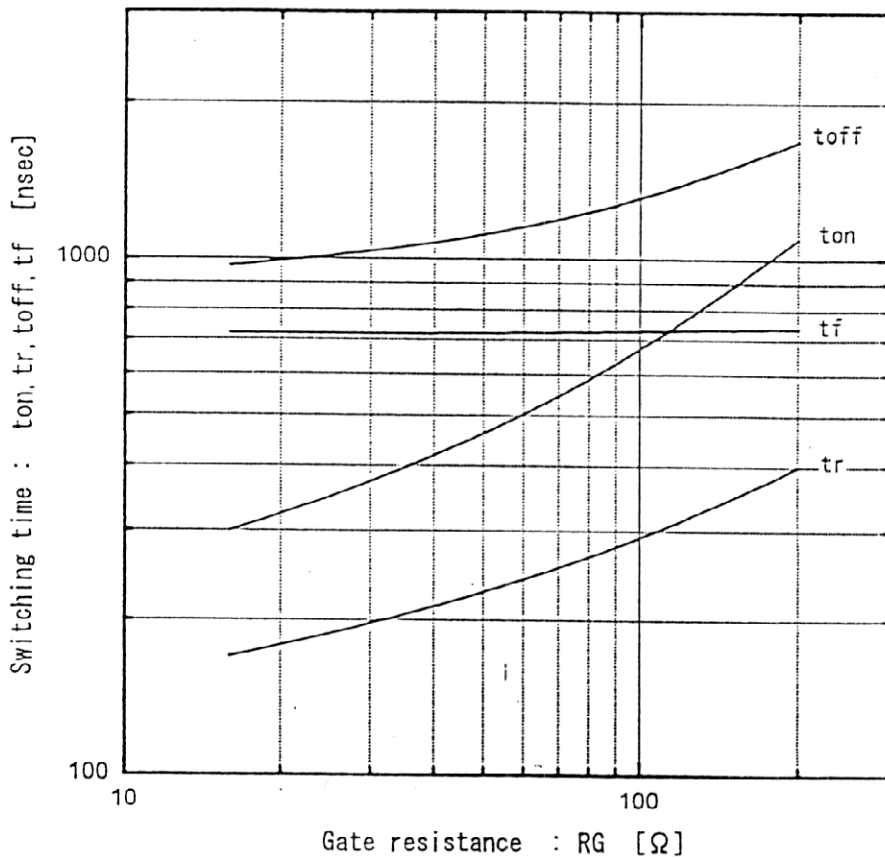


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Switching time vs.  $R_G$   
 $V_{CC}=600V, I_C=10A, V_{GE}=\pm 15V, T_j=25^\circ C$



Switching time vs.  $R_G$   
 $V_{CC}=600V, I_C=10A, V_{GE}=\pm 15V, T_j=125^\circ C$



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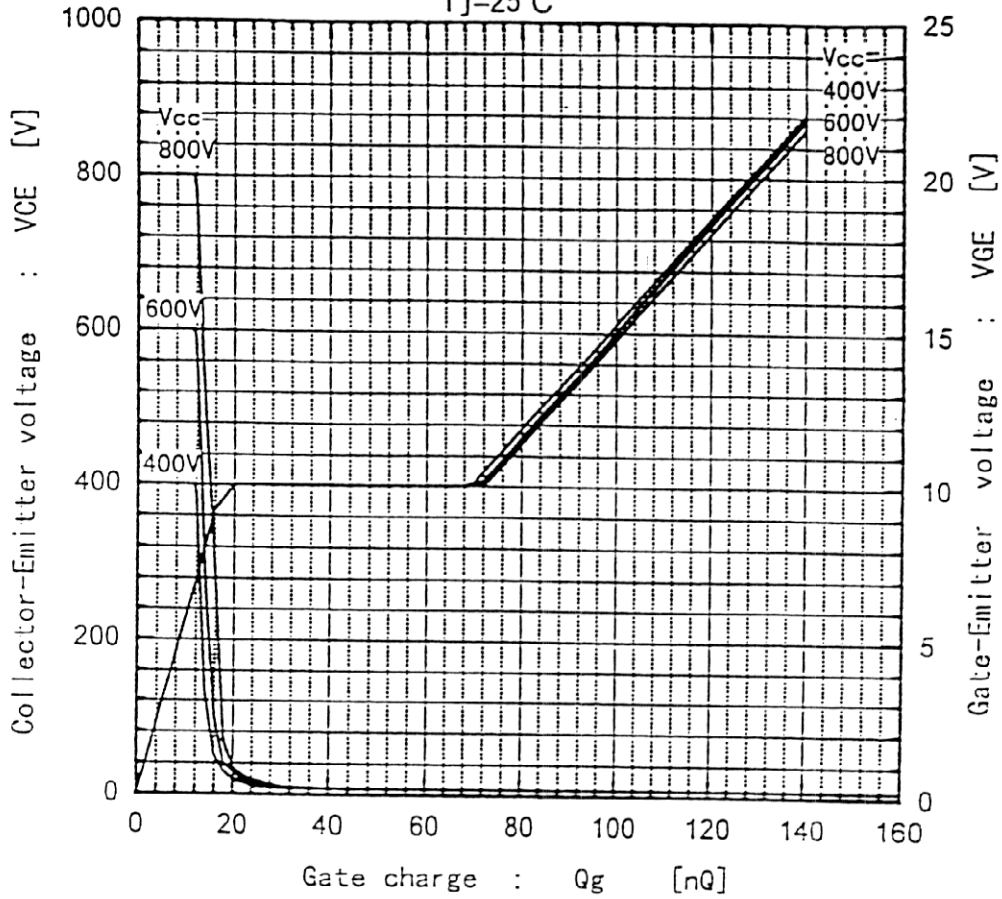
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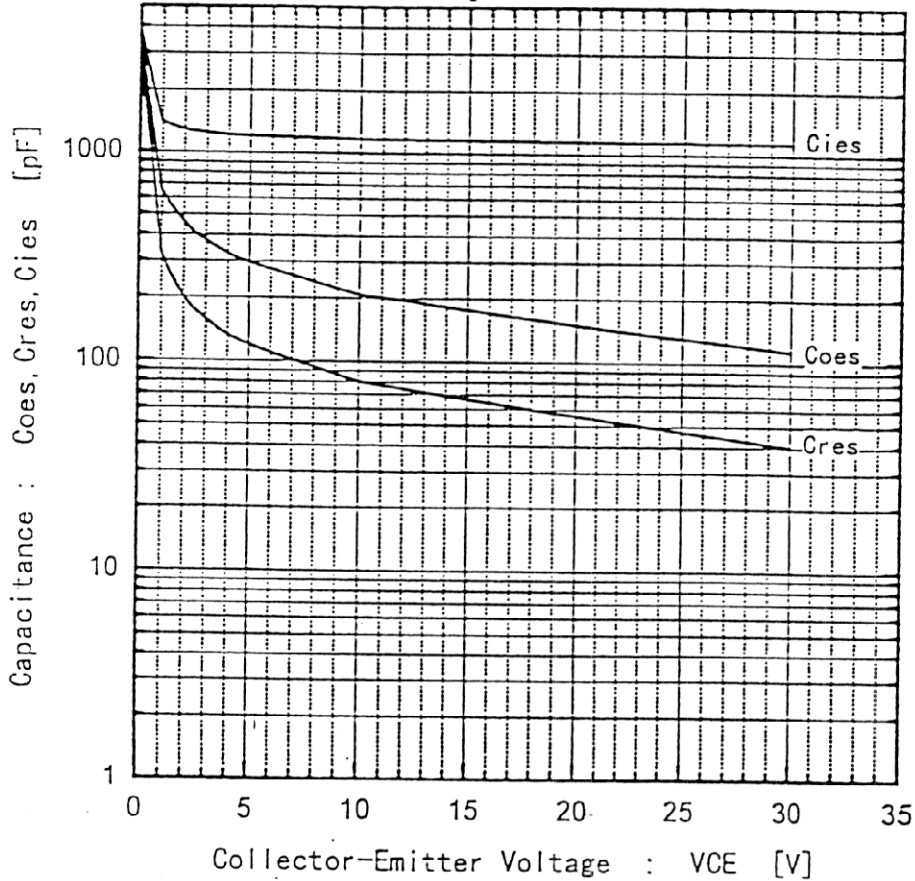
### Dynamic input characteristics

$T_j = 25^\circ\text{C}$



### Capacitance vs. Collector-Emitter voltage

$T_j = 25^\circ\text{C}$



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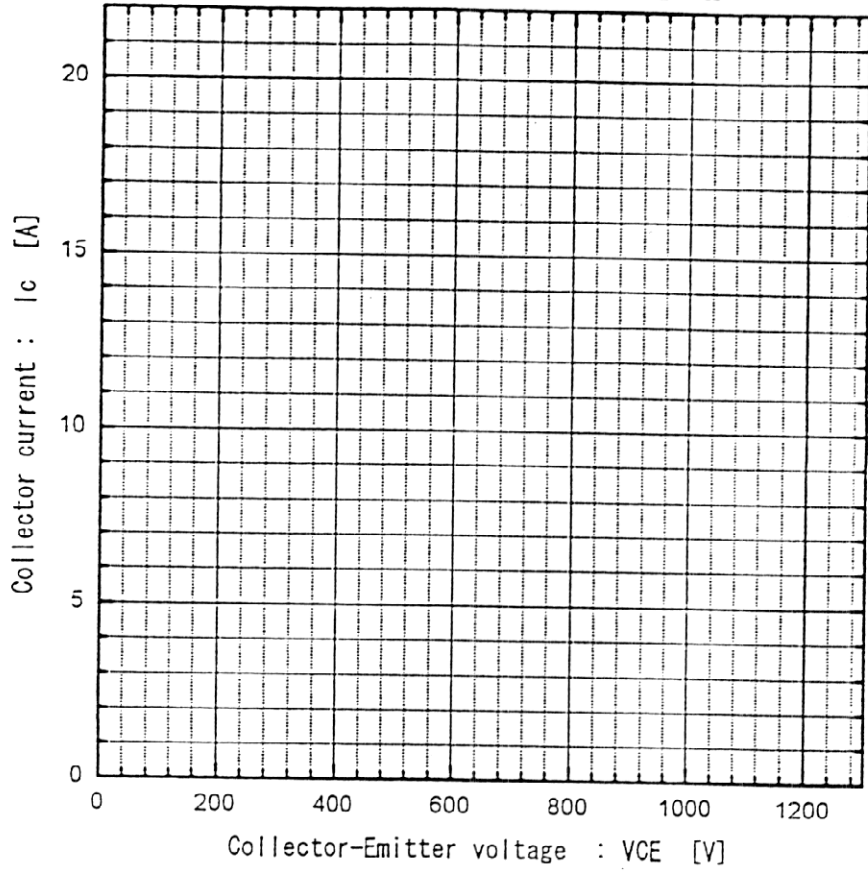
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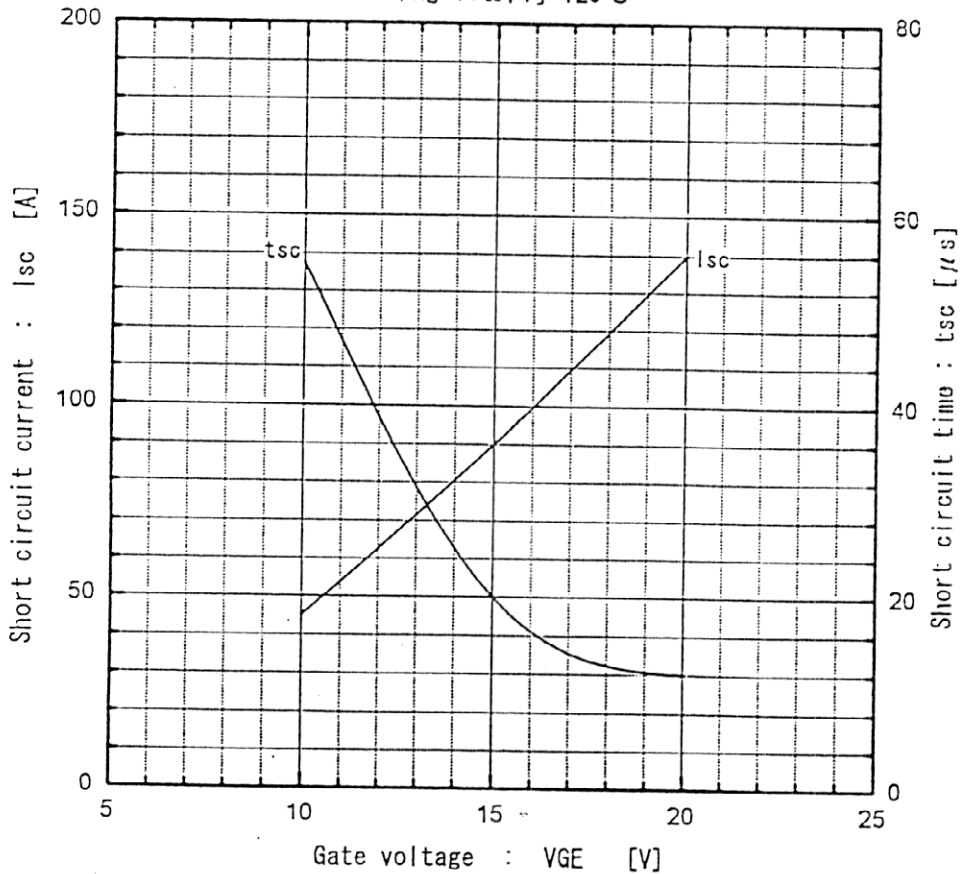
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Reverse Biased Safe Operating Area  
 $+V_{GE}=15V, -V_{GE} \leq 15V, T_j \leq 125^\circ C, R_G \geq 16\Omega$



Typical short circuit capability  
 $V_{CC}=800V, R_G=16\Omega, T_j=125^\circ C$



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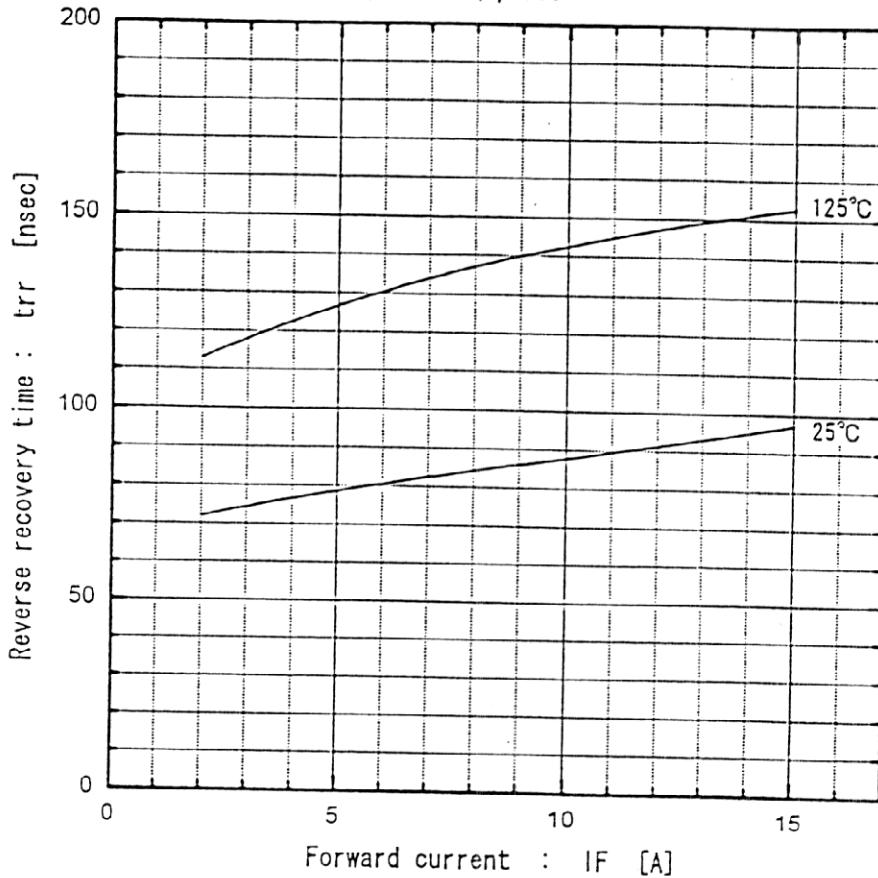
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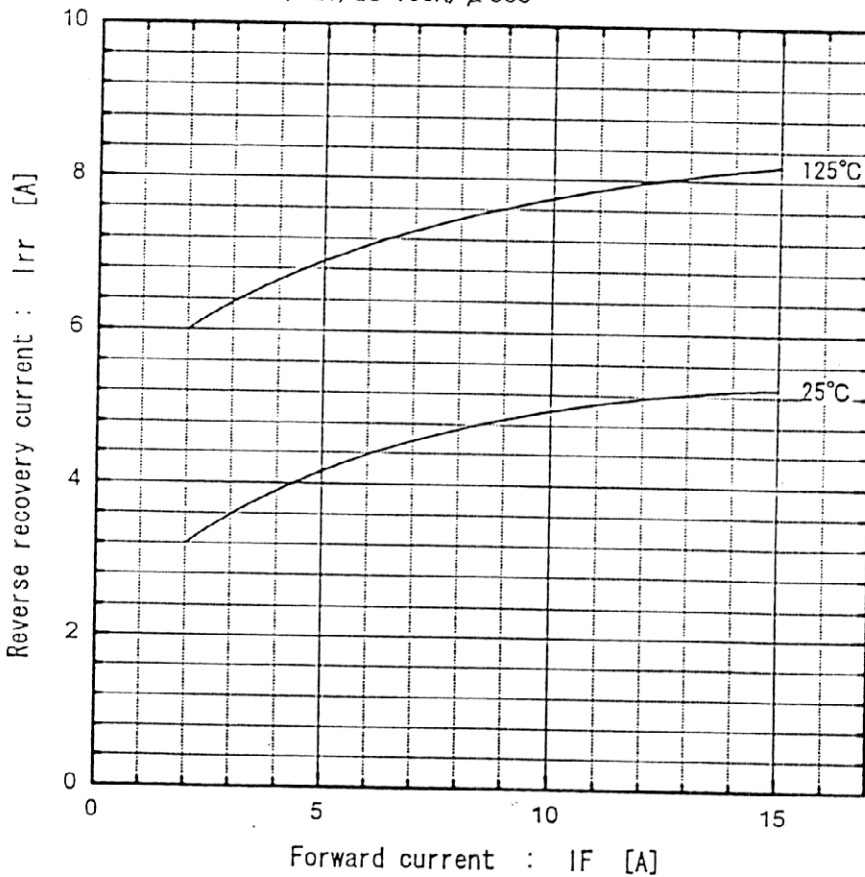


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Reverse recovery time vs. Forward current  
 $V_R=200V, -di/dt=100A/\mu sec$



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



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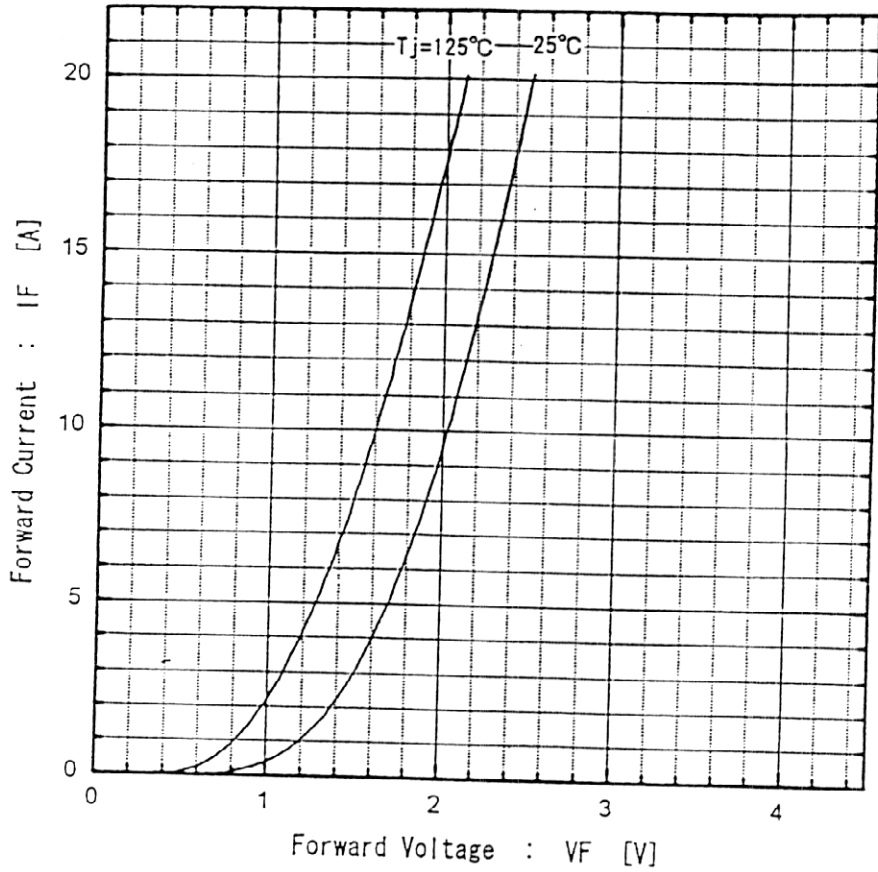
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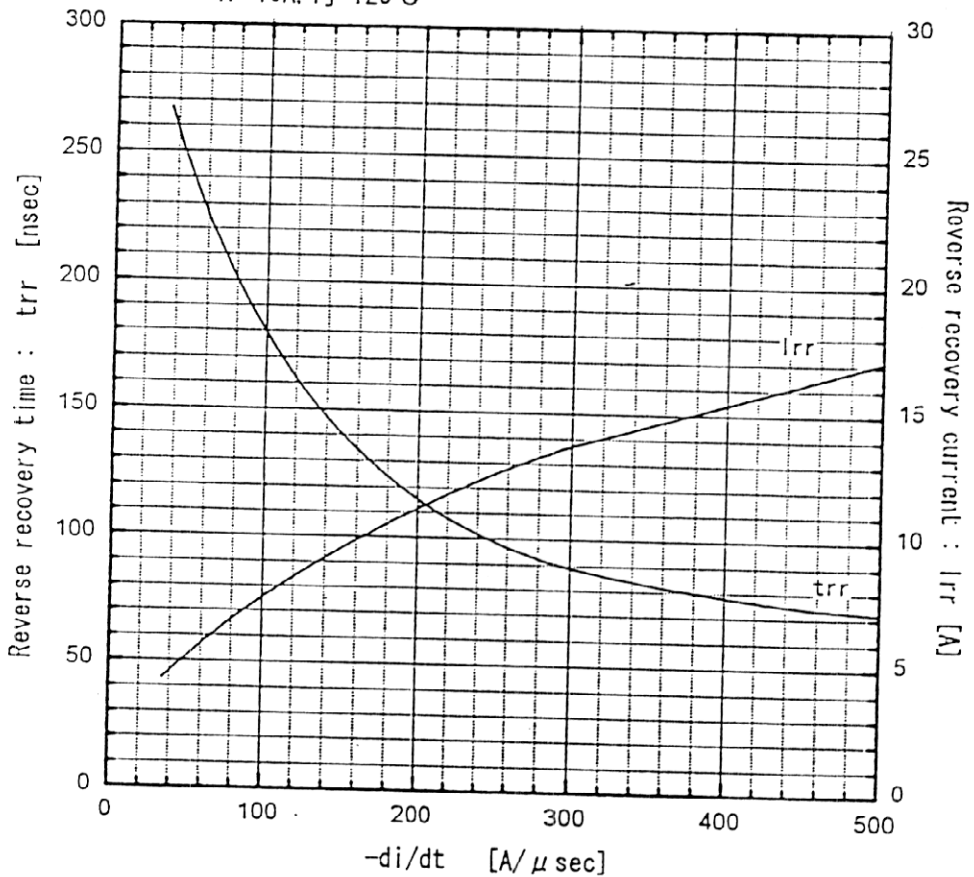
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Forward voltage vs. Forward current



Reverse recovery characteristics vs.  $-di/dt$   
IF=10A, Tj=125°C



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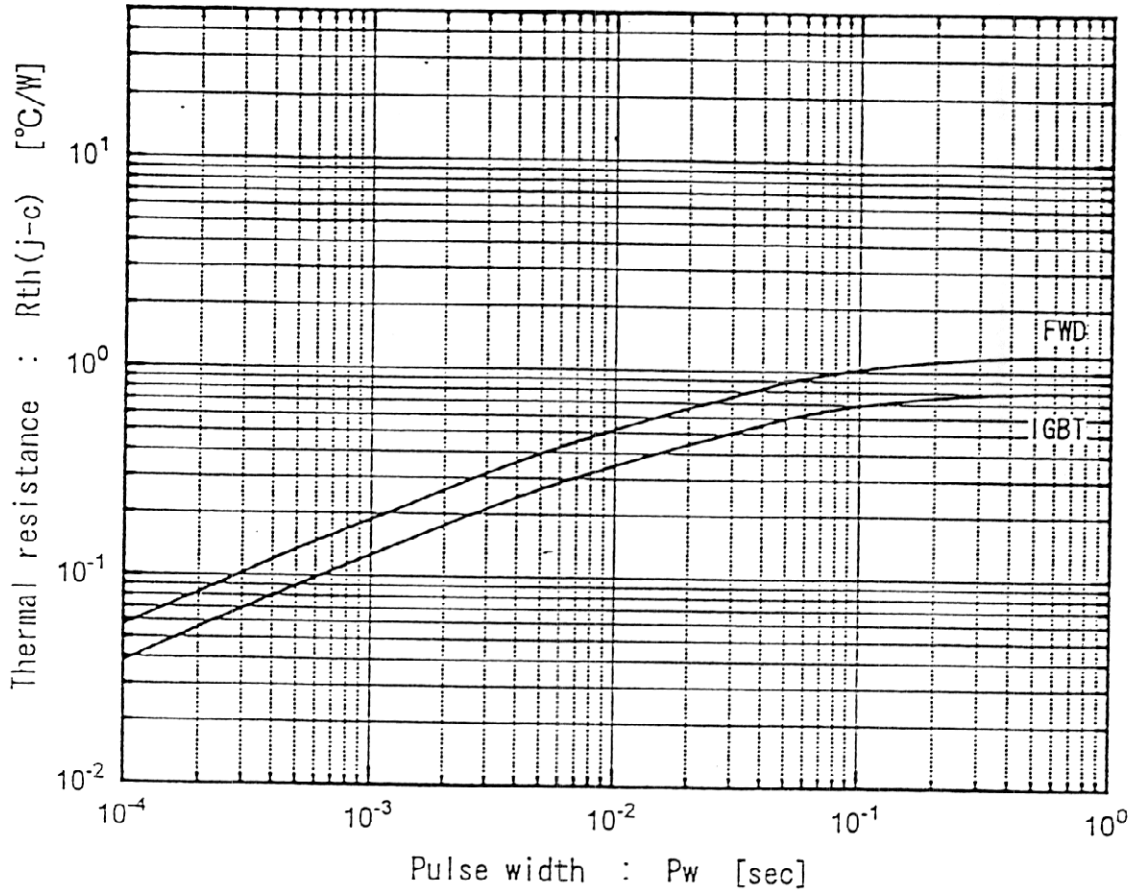
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### Transient thermal resistance



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