

SPECIFICATION

DEVICE NAME : IGBT
 TYPE NAME : 1MBH05D-060
 SPEC. No. :
 DATE :

Fuji Electric Co.,Ltd.

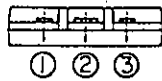
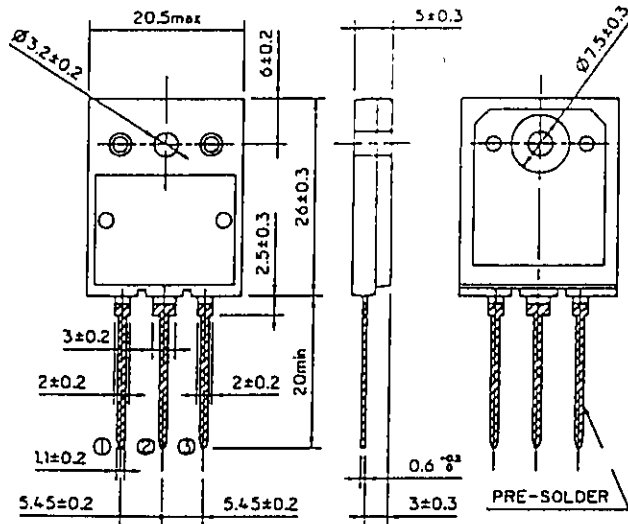
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Ratings and characteristics of Fuji IGBT

1MBH05D-060

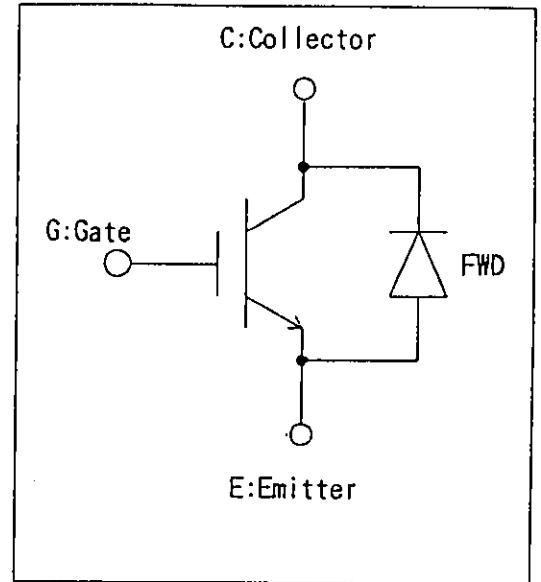
1. Outline Drawing



CONNECTION

- ① GATE
- ② COLLECTOR
- ③ EMITTER

2. Equivalent circuit



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

Items	Symbols	Ratings	Units		
Collector-Emitter Voltage	V_{CES}	600	V		
Gate-Emitter Voltage	V_{GES}	± 20	V		
Collector Current	DC	$T_c=25^\circ\text{C}$	I_{C25}	21	A
		$T_c=120^\circ\text{C}$	I_{C120}	5	A
	1ms	$T_c=25^\circ\text{C}$	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	$^\circ\text{C}$		
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}			20	$V_{CE} = 0V$ $V_{GE} = \pm 20V$	μA
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		$V_{GE} = 0V$	pF
Output capacitance	C_{oes}		85		$V_{CE} = 10V$	
Reverse transfer capacitance	C_{res}		15		$f = 1MHz$	
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)	μs
		t_r		0.6		
	Turn-off time	t_{off}		1.0		
		t_f		0.35		
	Turn-on time	t_{on}		0.16	$V_{CC} = 300V$ $I_C = 5A$ $V_{GE} = +15V$ $R_G = 33\Omega$ (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	$I_F = 5A, V_{GE} = -10V$ $V_R = 200V$ $di/dt = 100A/\mu s$	μs

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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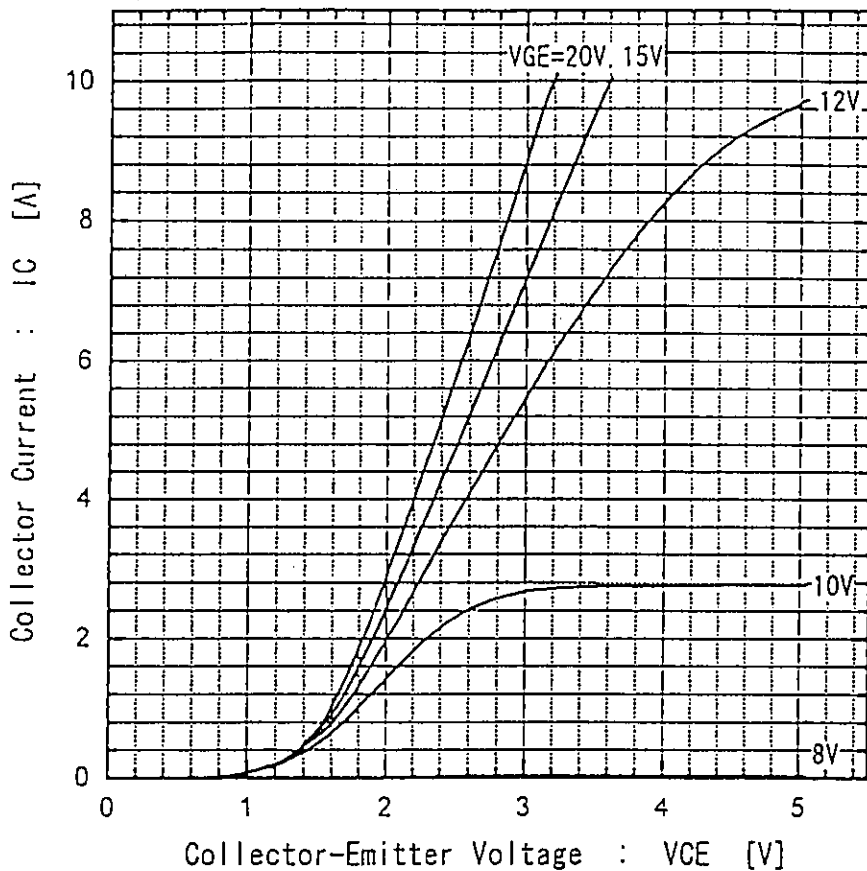
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3/12

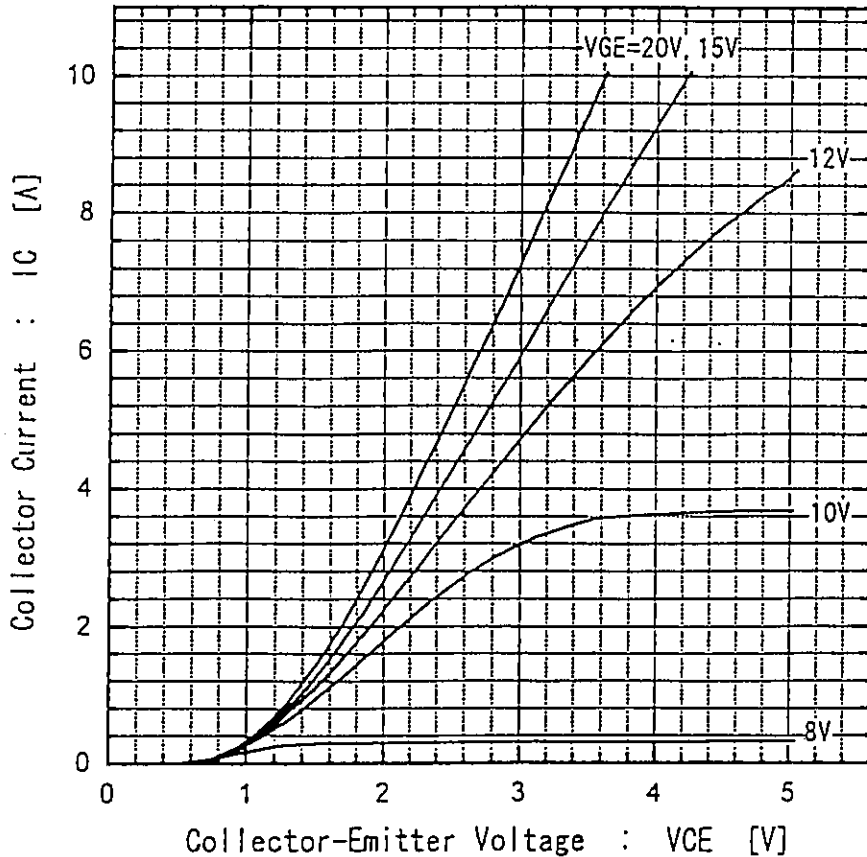
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Collector Current vs. Collector-Emitter Voltage
 $T_j=25^\circ\text{C}$



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



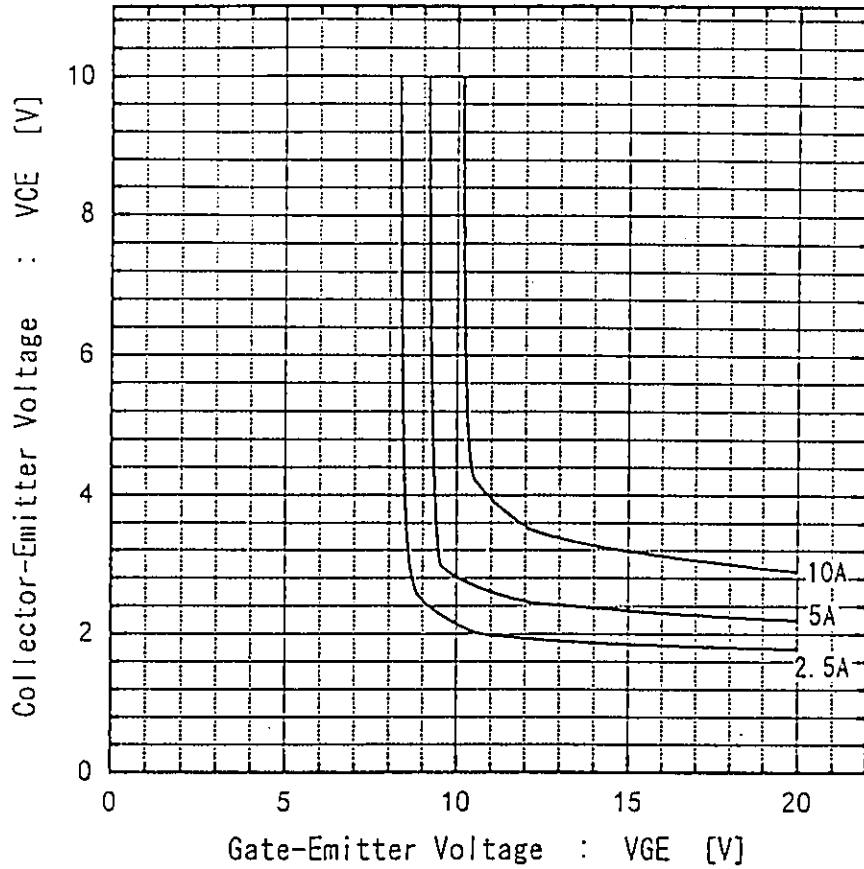
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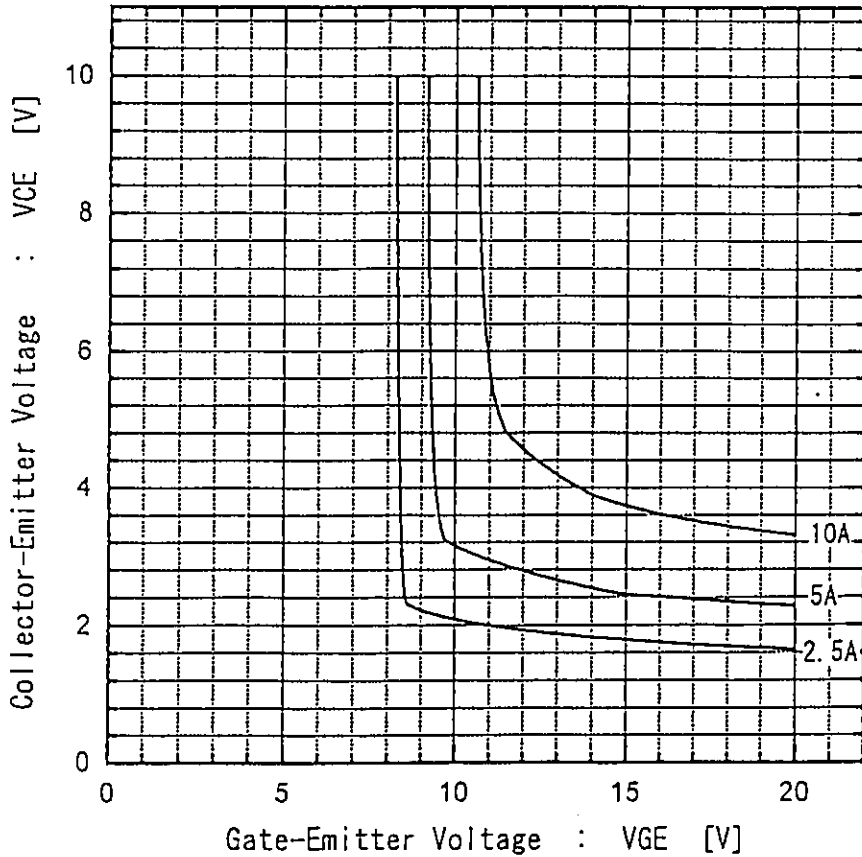
4/12

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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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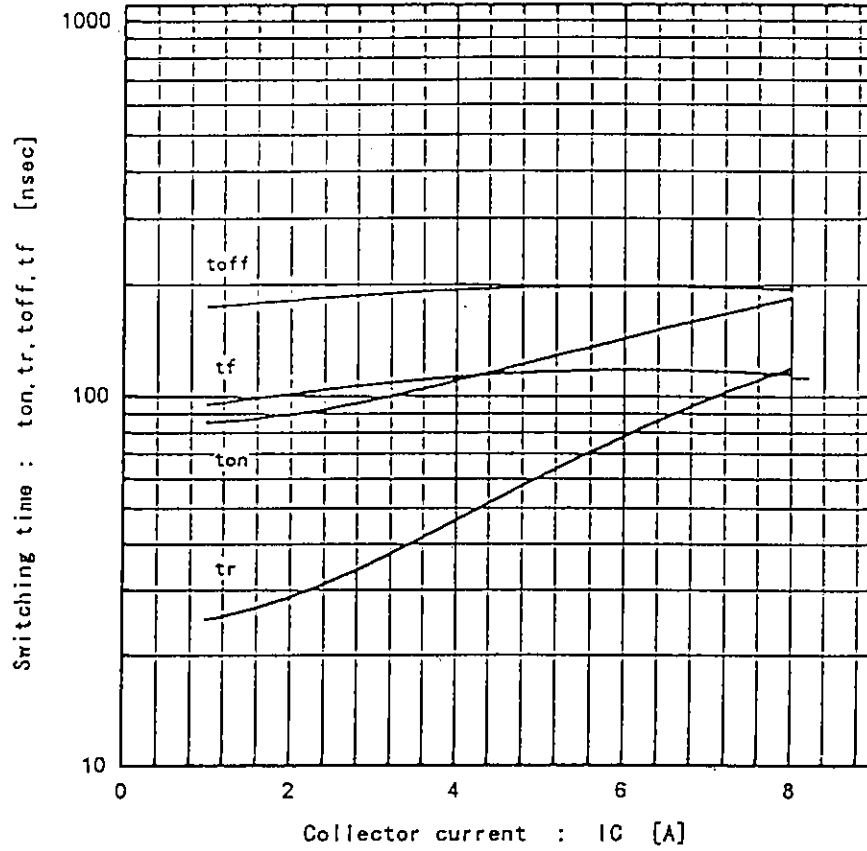
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5/12

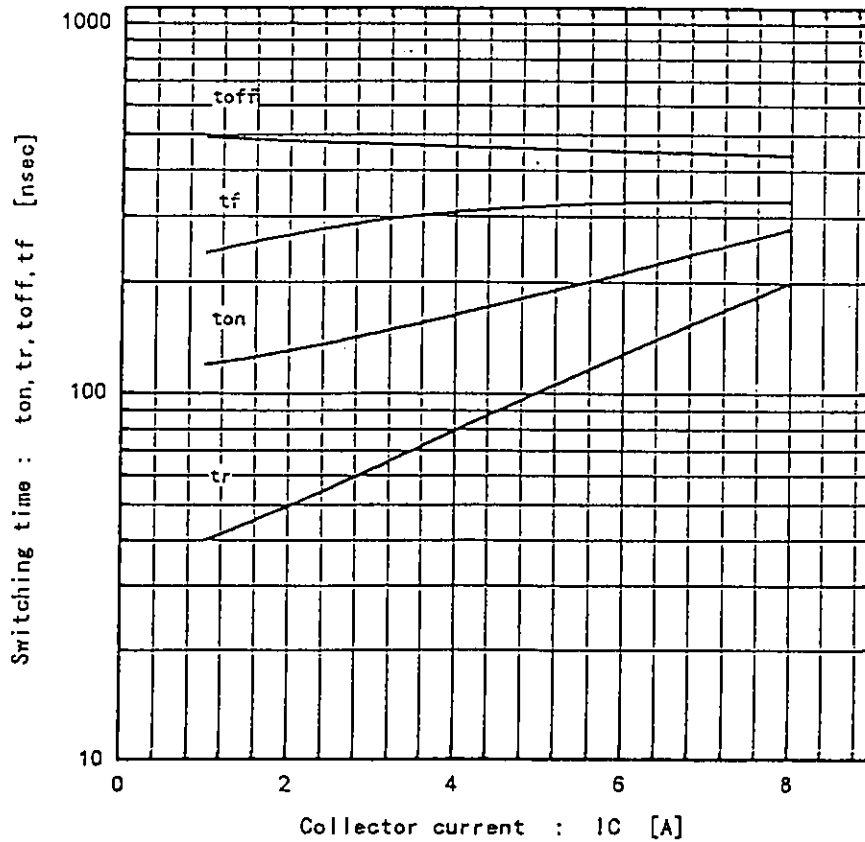
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Switching time vs. Collector current
 $V_{CC}=300V, R_G=33\Omega, V_{GE}=\pm 15V, T_j=25^\circ C$



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



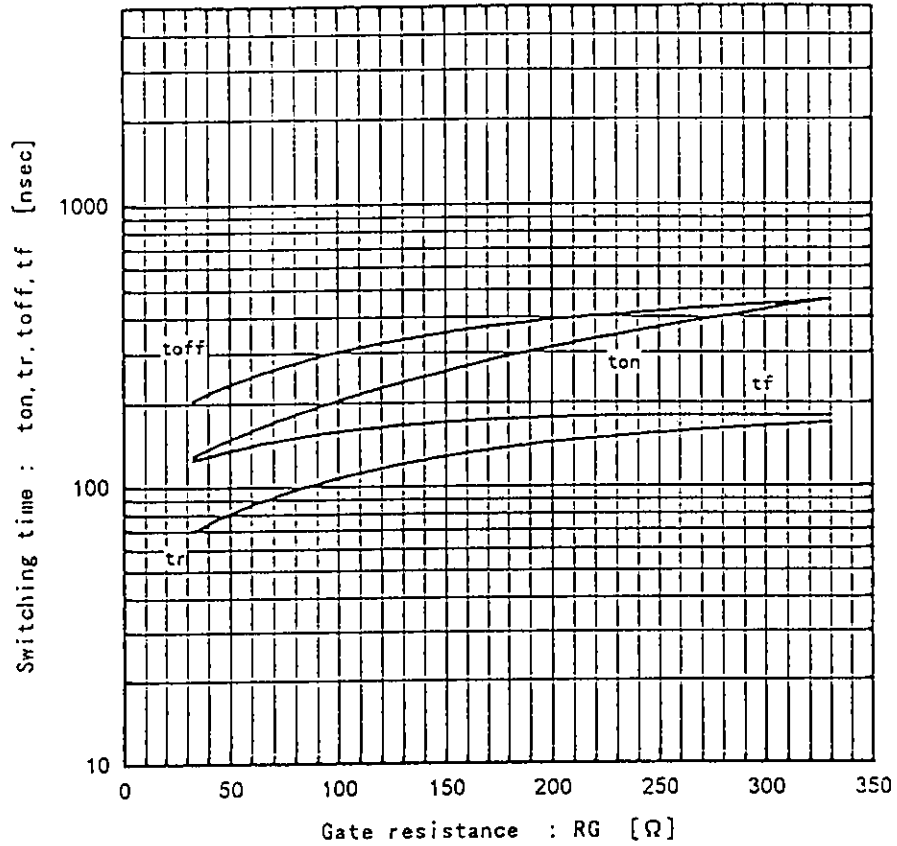
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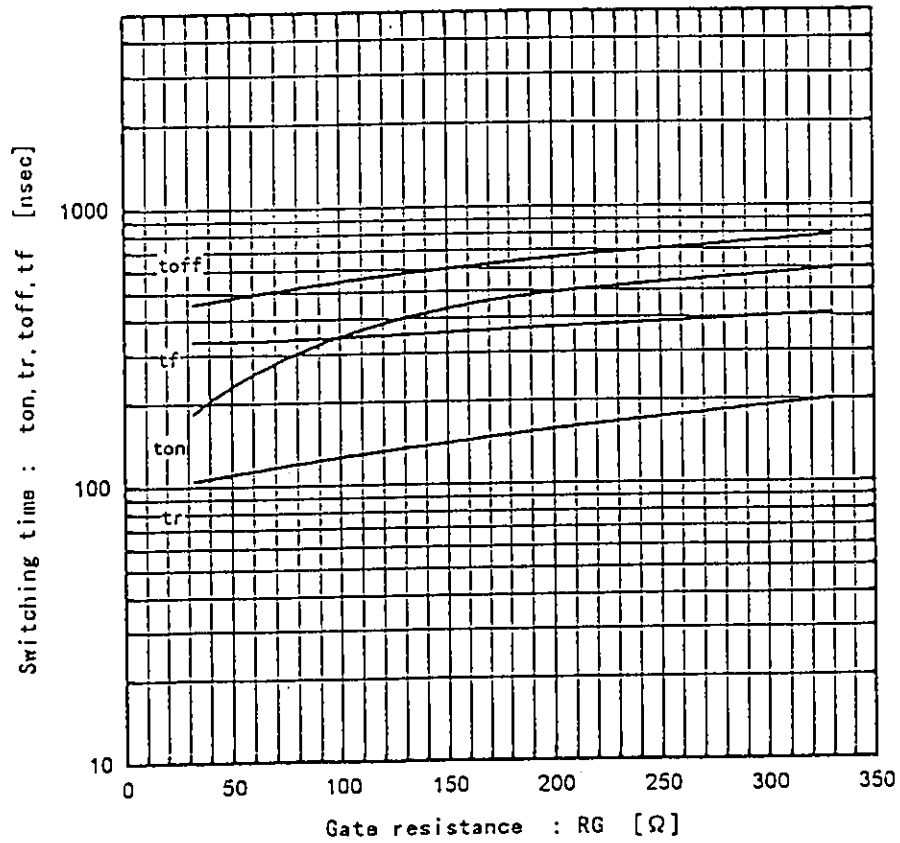
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Switching time vs. RG
 $V_{CC}=300V, I_C=5A, V_{GE}=\pm 15V, T_j=25^\circ C$

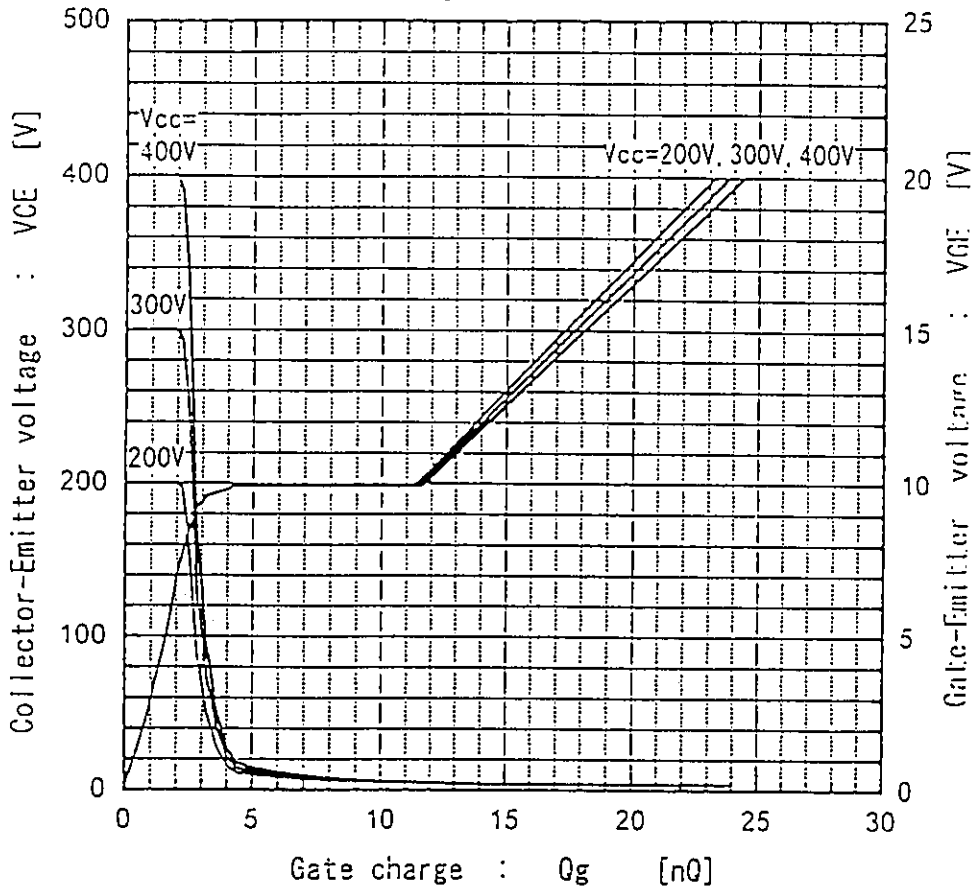


Switching time vs. RG
 $V_{CC}=300V, I_C=5A, V_{GE}=\pm 15V, T_j=125^\circ C$

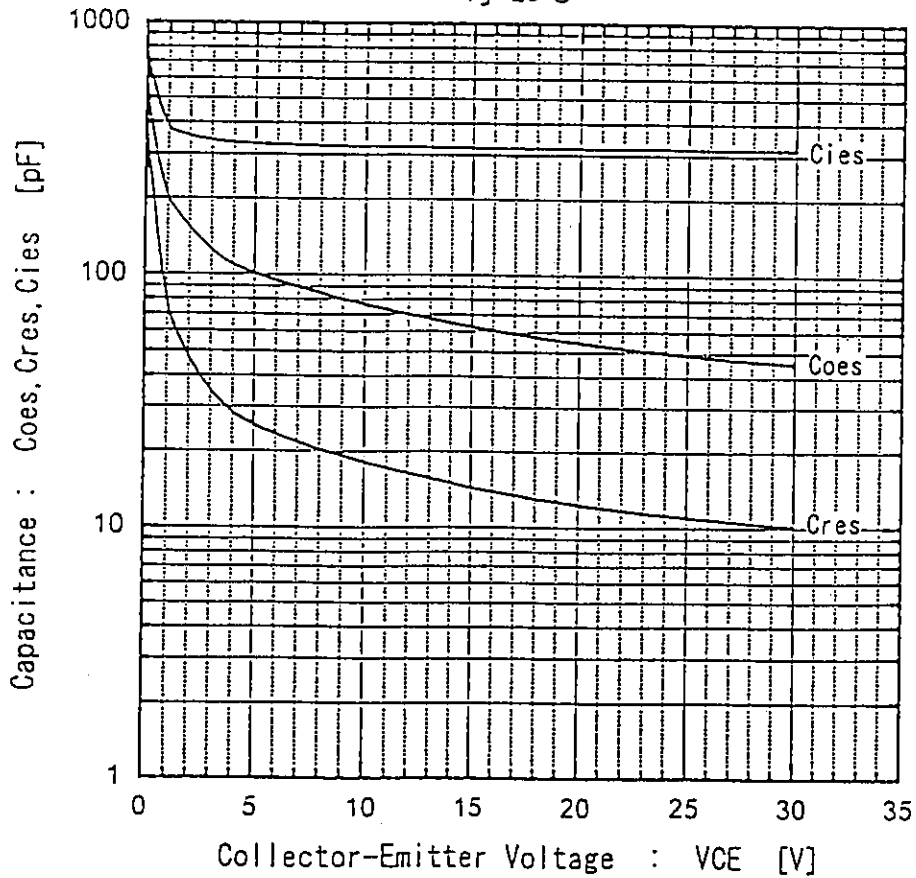


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Dynamic input characteristics
Tj=25°C



Capacitance vs. Collector-Emmitter voltage
Tj=25°C



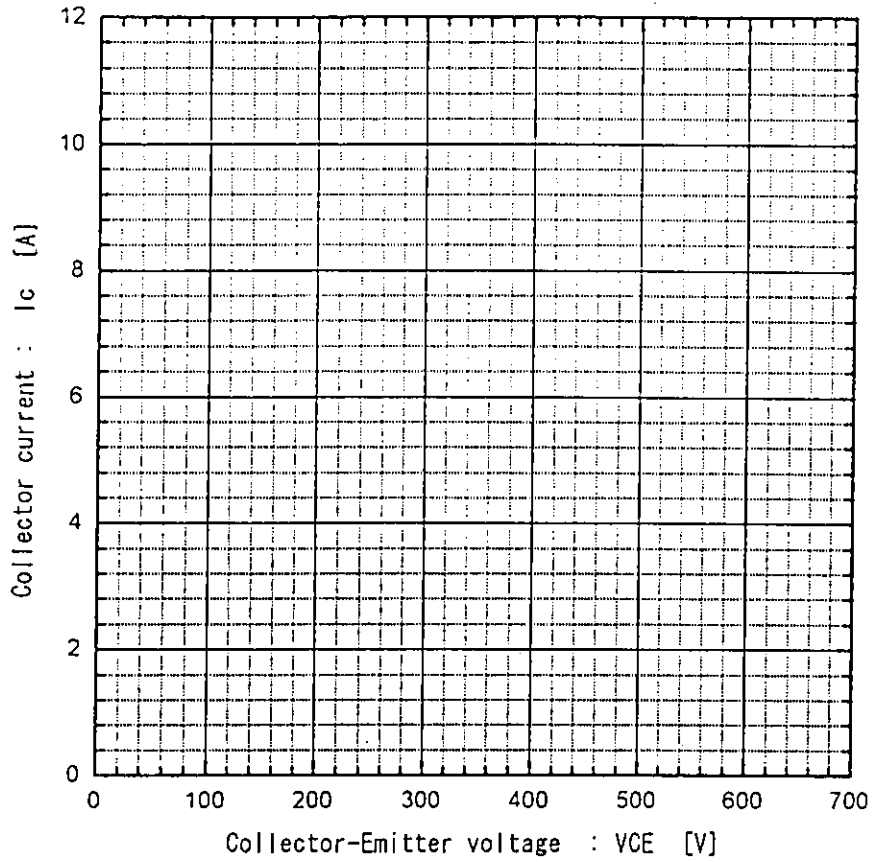
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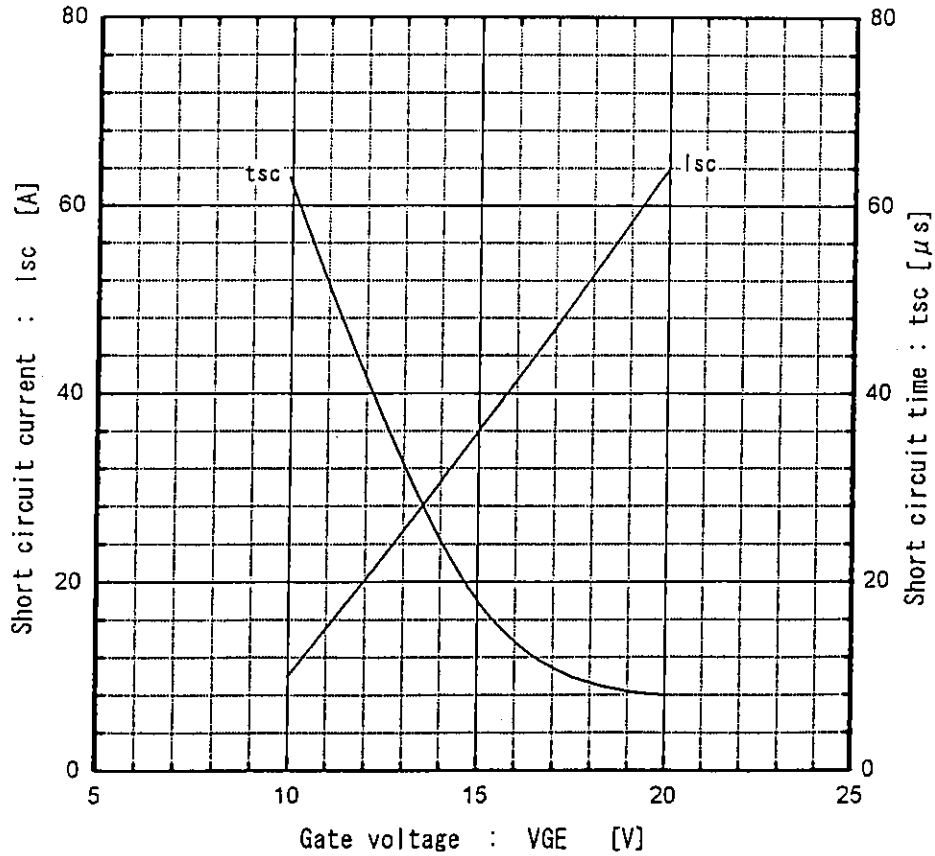
8/12

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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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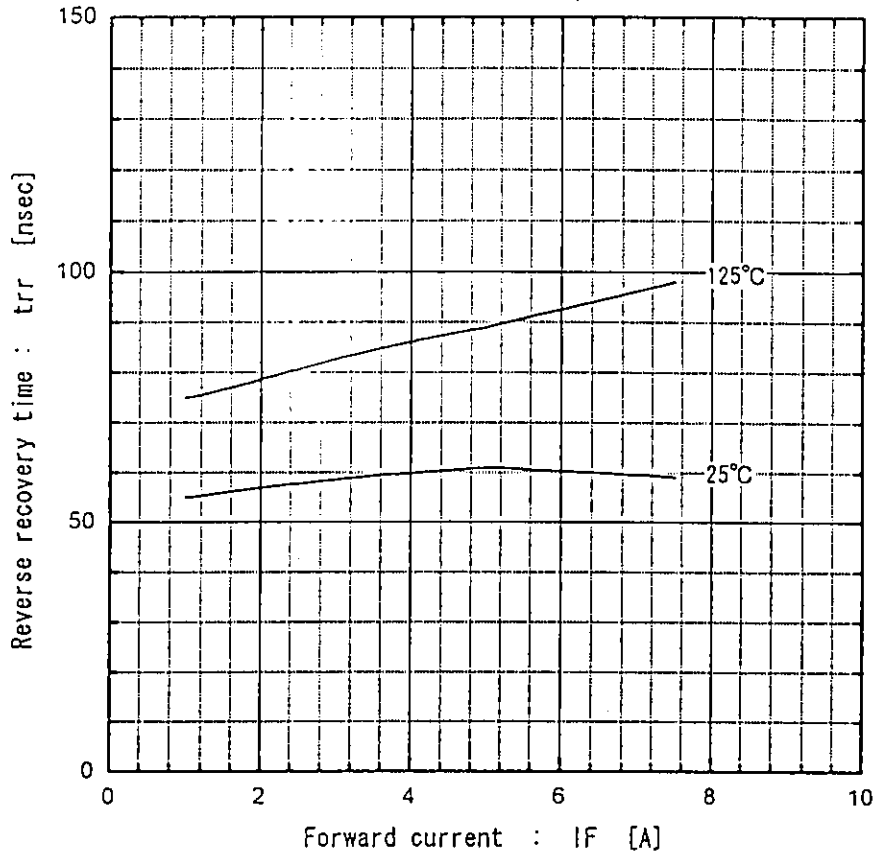
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9/12

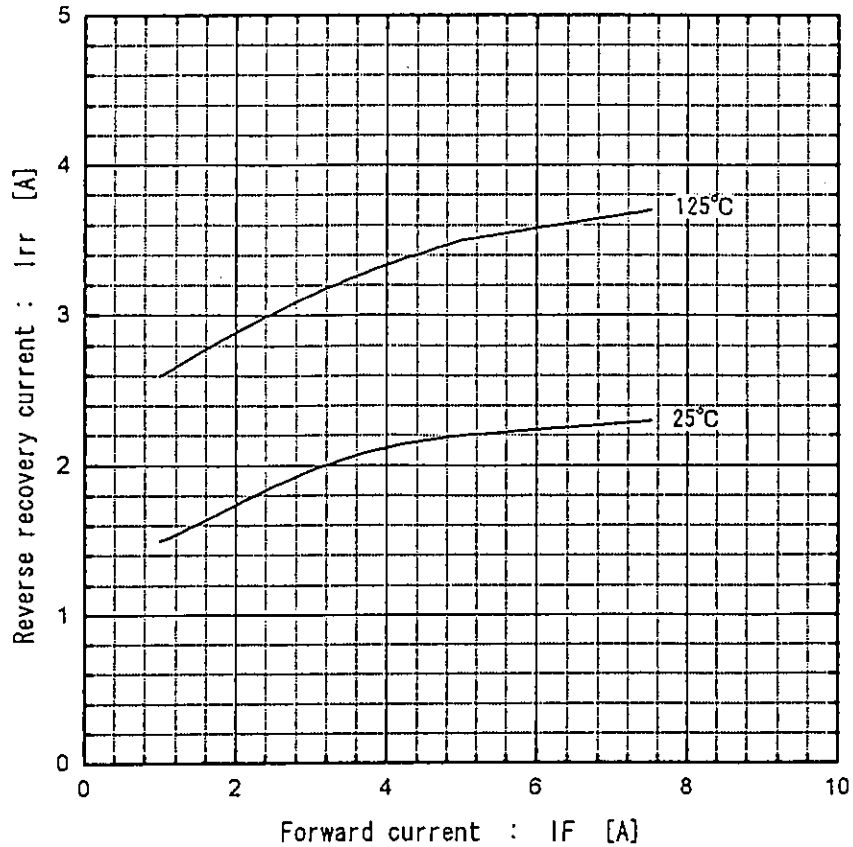
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Reverse recovery time vs. Forward current
 $VR=200V, -di/dt=100A/\mu sec$



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



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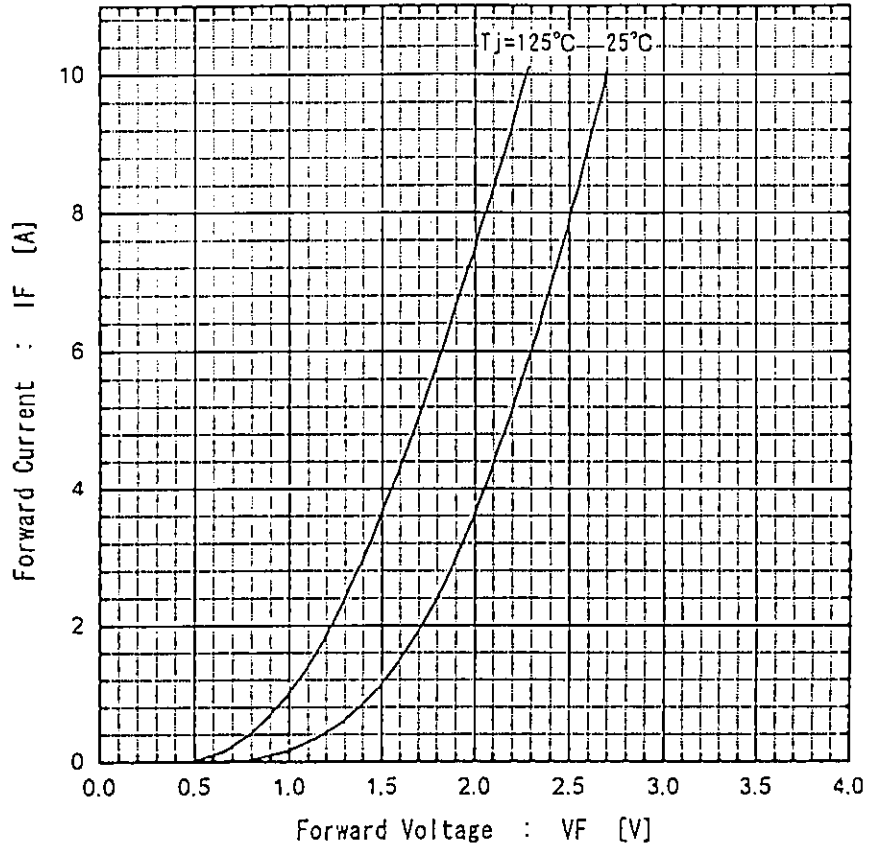
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10/12

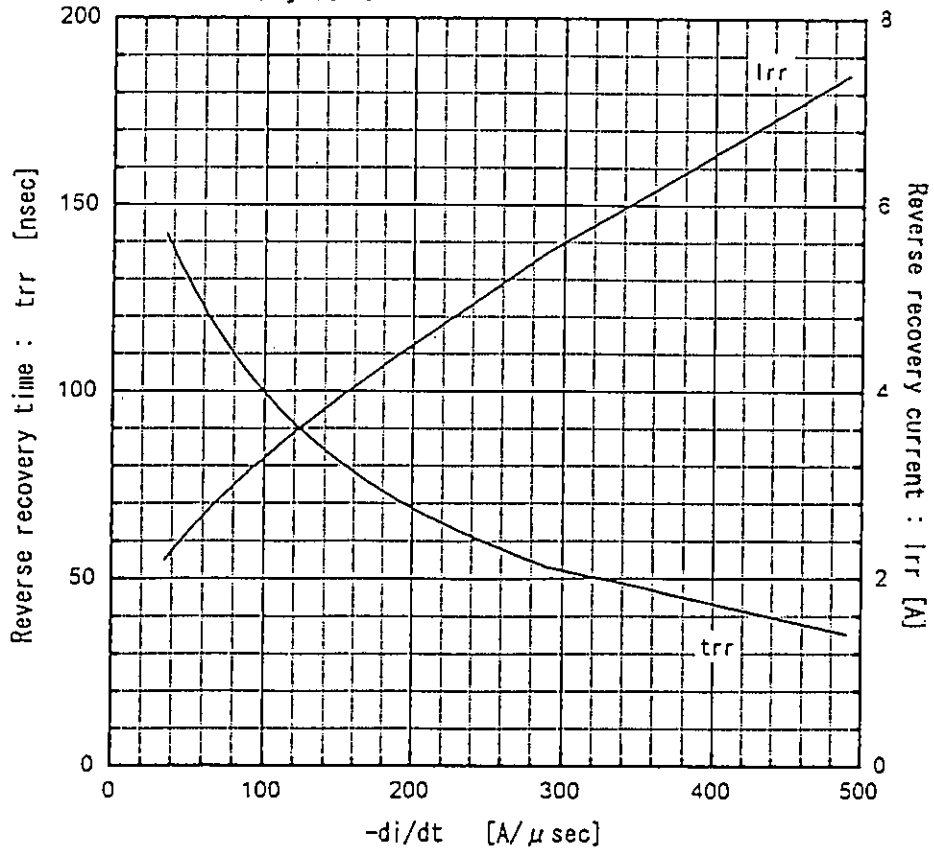
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Forward voltage vs. Forward current



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

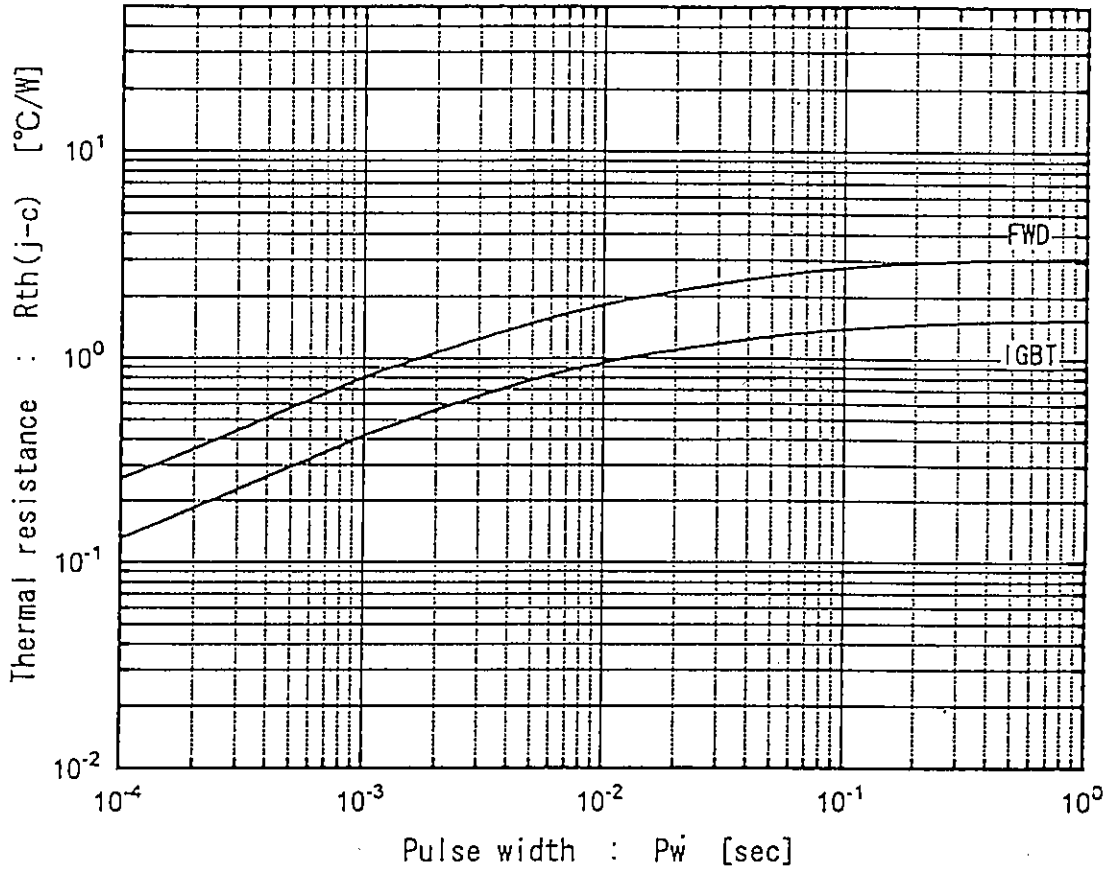


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11/2

Transient thermal resistance



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12/12

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