

# 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.                | MS5F 4091 |
| CHECKED | July 15-97 | T. Iguchi |          |  |                         |           |

## Revised Records

[illegible]

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H04-004-06

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▪ 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 Tradmark
  - 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 .

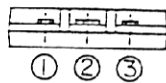
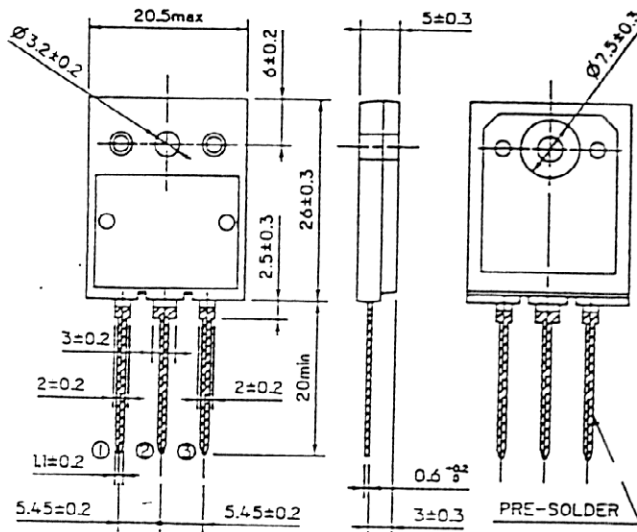
▪ Packing

Packing style follows our packing specification MS5Q0026 .

# Ratings and characteristics of Fuji IGBT

## 1MBH10D-120

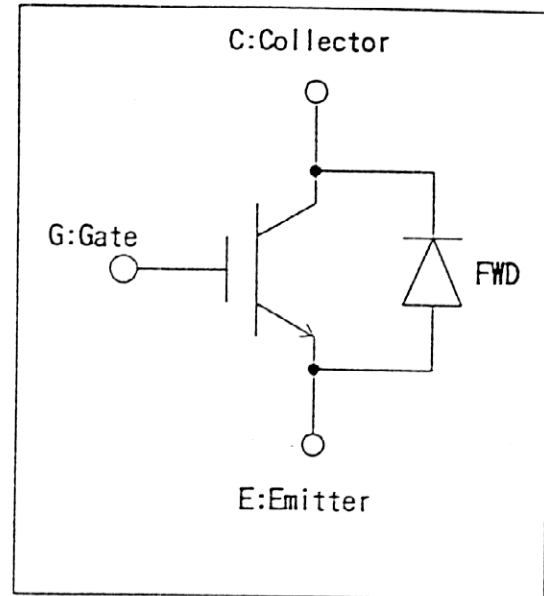
### 1. Outline Drawing



#### 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<br>Collector Current  |                  | $I_{CES}$     |                 |      | 1.0  | $V_{GE} = 0V$<br>$V_{CE} = 1200V$                                                          | mA      |
| Gate-Emitter<br>leakage Current         |                  | $I_{GES}$     |                 |      | 20   | $V_{CE} = 0V$<br>$V_{GE} = \pm 22V$                                                        | $\mu A$ |
| Gate-Emitter<br>Threshold Voltage       |                  | $V_{GE(th)}$  | 5.5             |      | 8.5  | $V_{CE} = 20V$<br>$I_C = 10mA$                                                             | V       |
| Collector-Emitter<br>Saturation Voltage |                  | $V_{CE(sat)}$ |                 |      | 3.5  | $V_{GE} = 15V$<br>$I_C = 10A$                                                              | V       |
| Input capacitance                       |                  | $C_{ies}$     |                 | 1200 |      | $V_{GE} = 0V$                                                                              | pF      |
| Output capacitance                      |                  | $C_{oes}$     |                 | 250  |      | $V_{CE} = 10V$                                                                             |         |
| Reverse transfer<br>capacitance         |                  | $C_{res}$     |                 | 80   |      | $f = 1MHz$                                                                                 |         |
| Switching<br>Time                       | Turn-on<br>time  | $t_{on}$      |                 |      | 1.2  | $V_{CC} = 600V$<br>$I_C = 10A$<br>$V_{GE} = \pm 15V$<br>$R_G = 160\Omega$<br>(Half Bridge) | $\mu s$ |
|                                         |                  | $t_r$         |                 |      | 0.6  |                                                                                            |         |
|                                         | Turn-off<br>time | $t_{off}$     |                 |      | 1.5  |                                                                                            |         |
|                                         |                  | $t_f$         |                 |      | 0.5  |                                                                                            |         |
|                                         | Turn-on<br>time  | $t_{on}$      |                 | 0.16 |      | $V_{CC} = 600V$<br>$I_C = 10A$<br>$V_{GE} = +15V$<br>$R_G = 16\Omega$<br>(Half Bridge)     |         |
|                                         |                  | $t_r$         |                 | 0.11 |      |                                                                                            |         |
|                                         | Turn-off<br>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 | $I_F = 10A, V_{GE} = -10V$<br>$V_R = 200V$<br>$di/dt = 100A/\mu s$                         | $\mu s$ |

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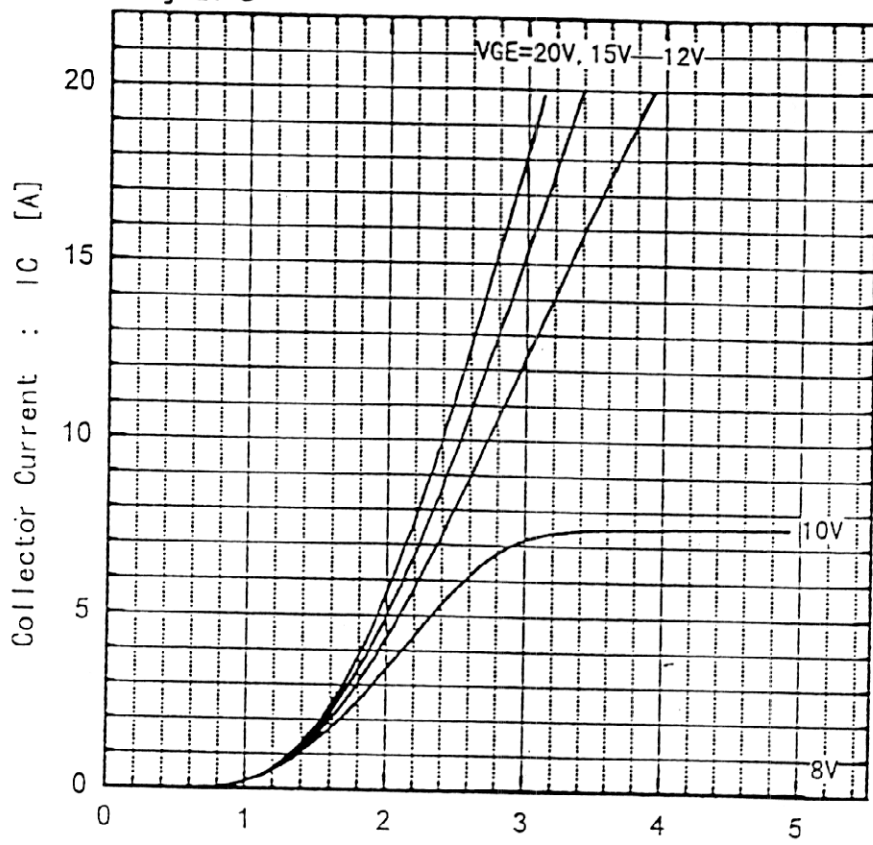
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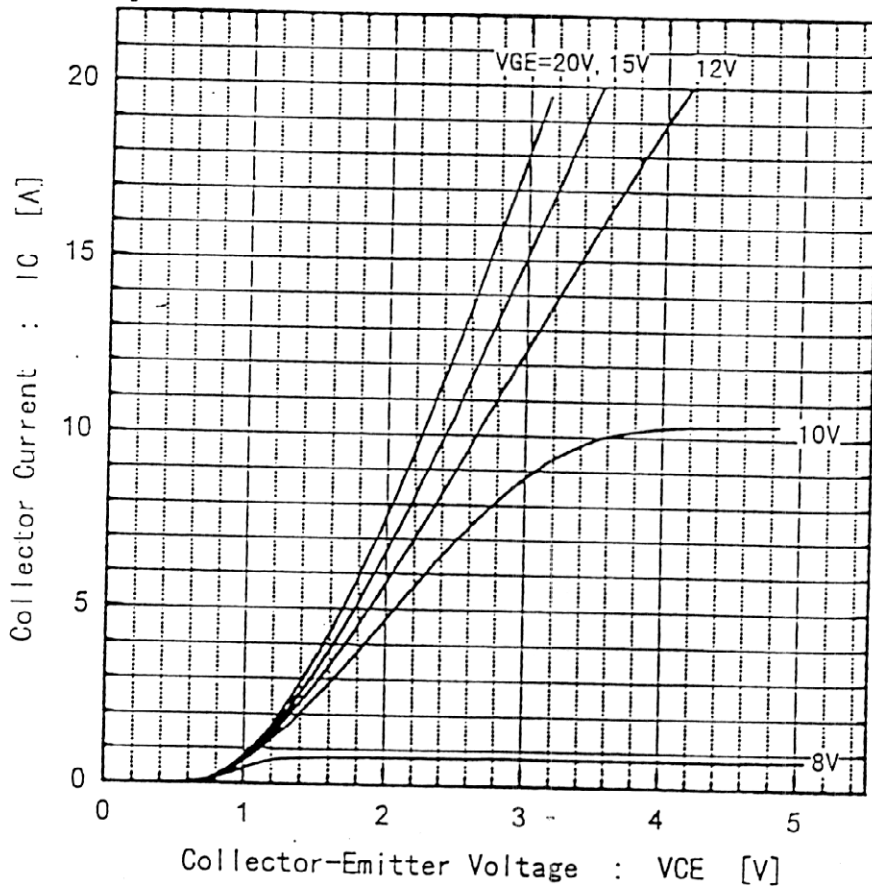
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Collector Current vs. Collector-Emitter Voltage  
 $T_j=25^{\circ}\text{C}$



Collector-Emitter Voltage :  $V_{CE}$  [V]  
Collector Current vs. Collector-Emitter Voltage  
 $T_j=125^{\circ}\text{C}$



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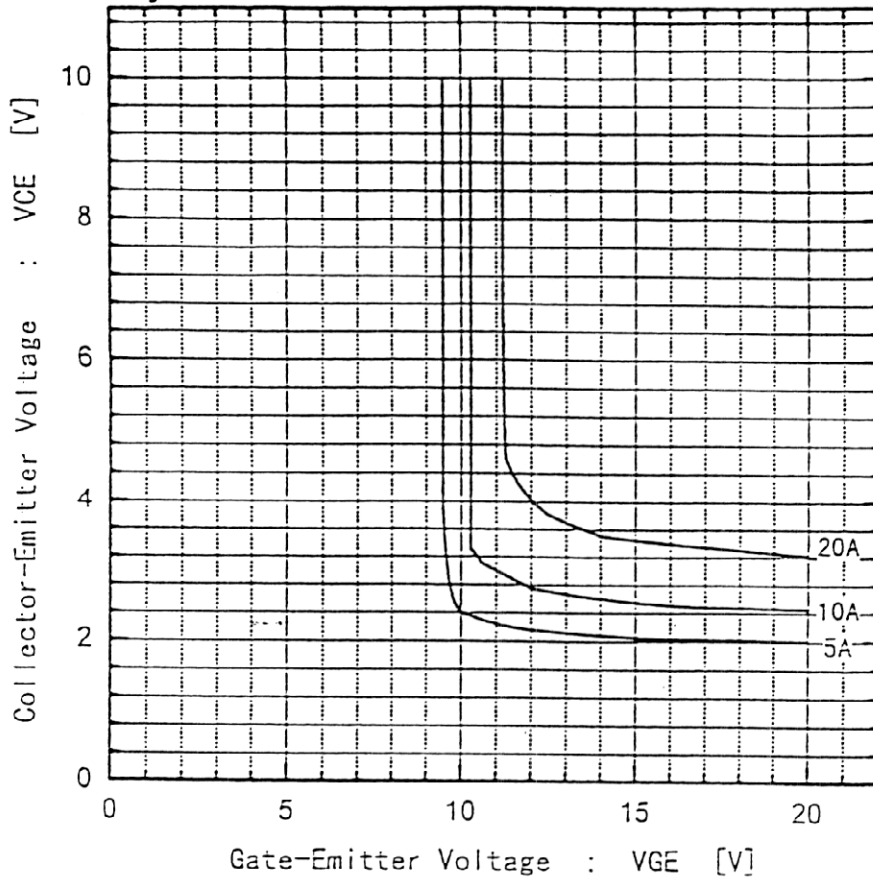
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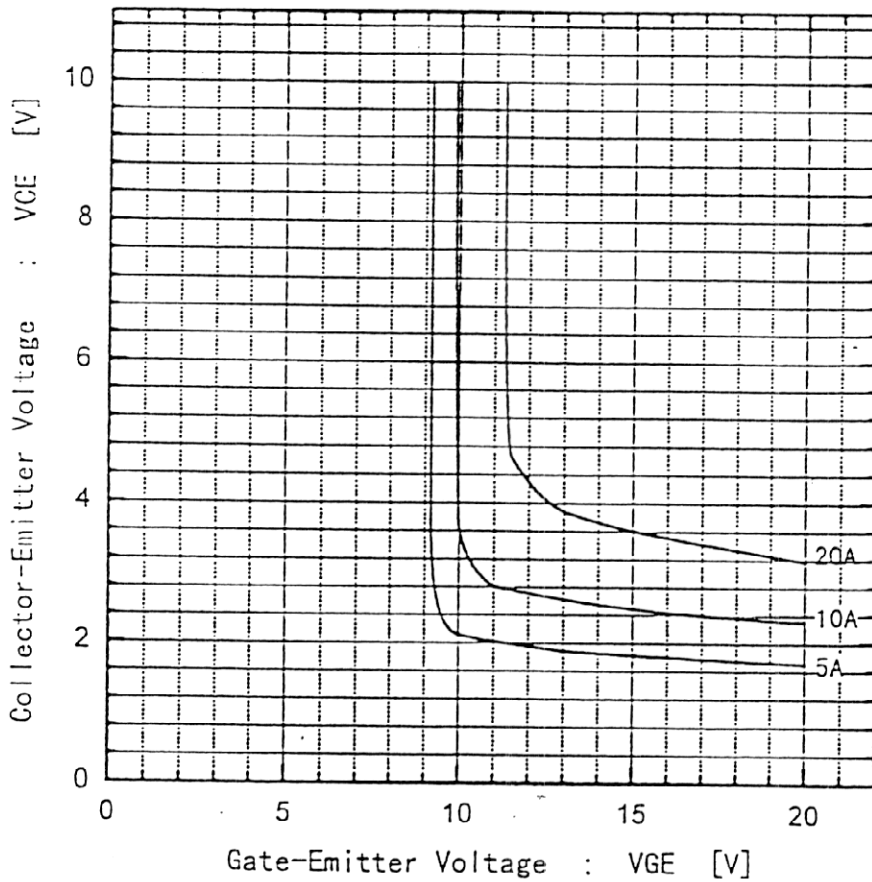
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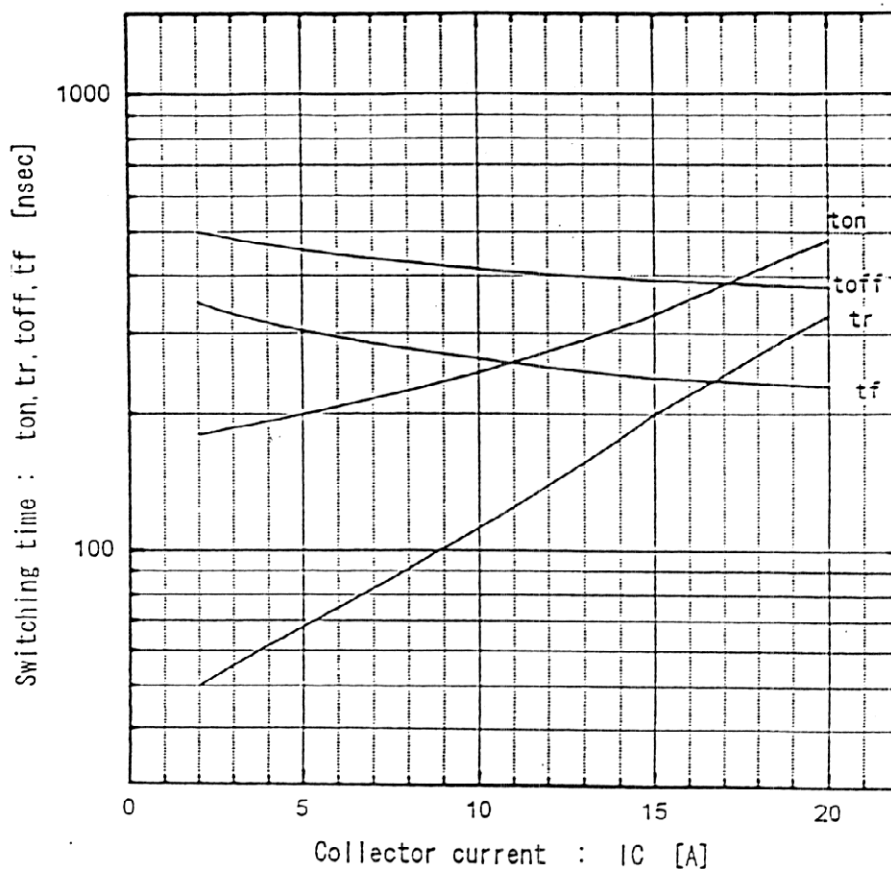
Collector-Emitter Voltage vs Gate-Emitter Voltage  
 $T_j=25^{\circ}\text{C}$



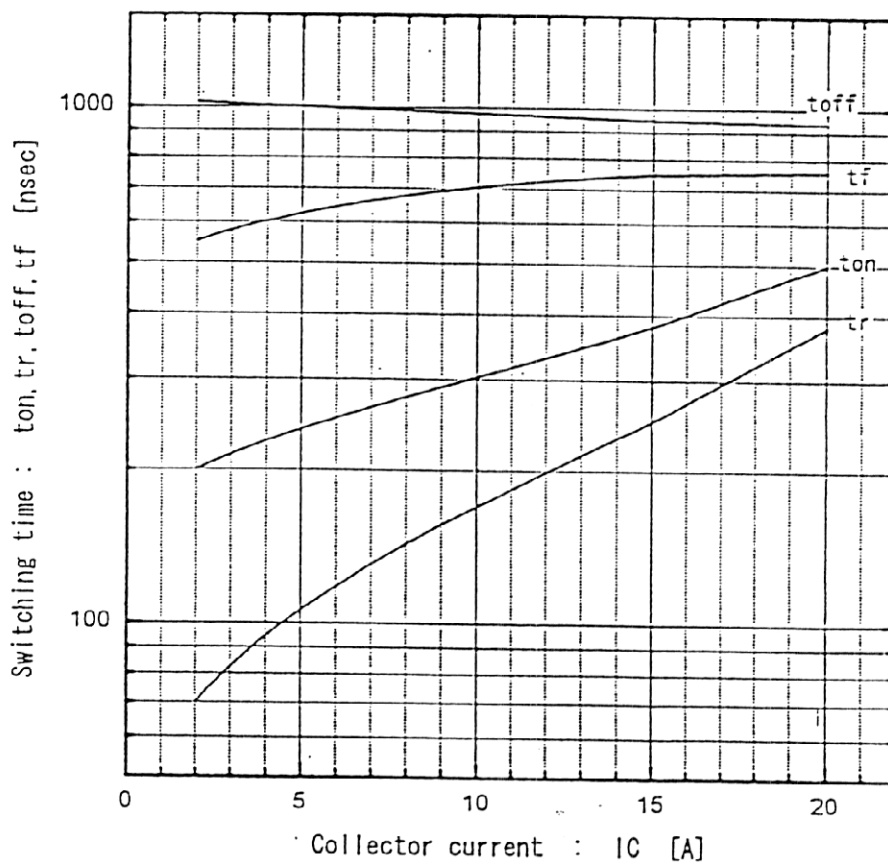
Collector-Emitter Voltage vs Gate-Emitter Voltage  
 $T_j=125^{\circ}\text{C}$



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  
 $V_{CC}=600V$ ,  $R_G=16\Omega$ ,  $V_{GE}=\pm 15V$ ,  $T_j=25^\circ C$



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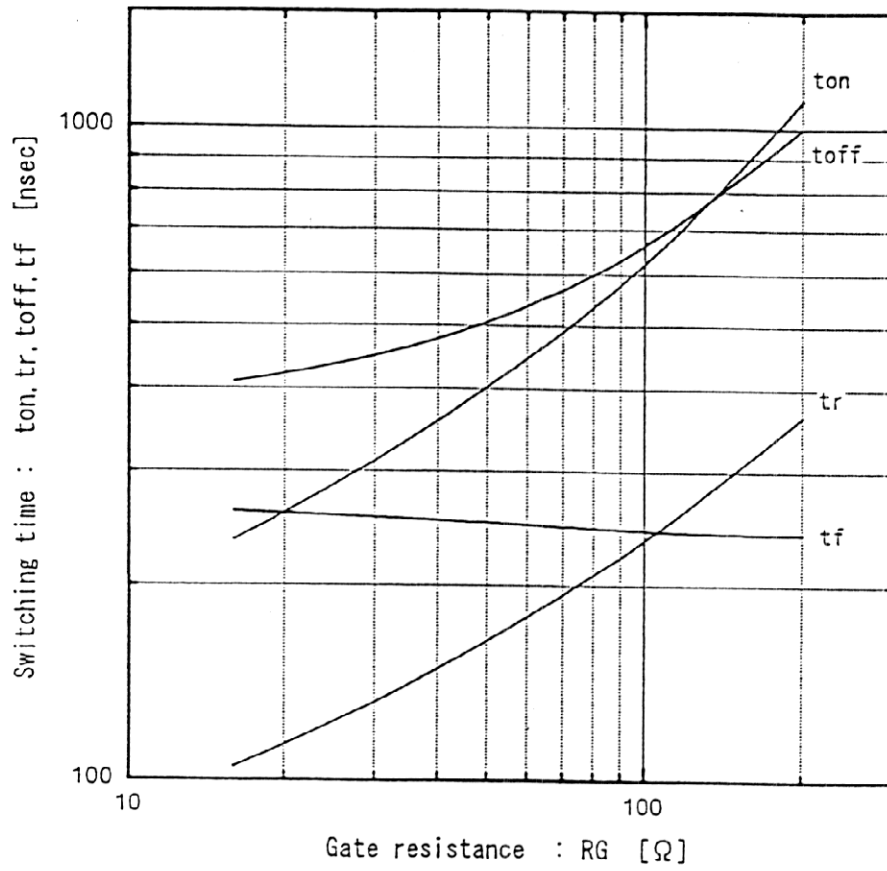
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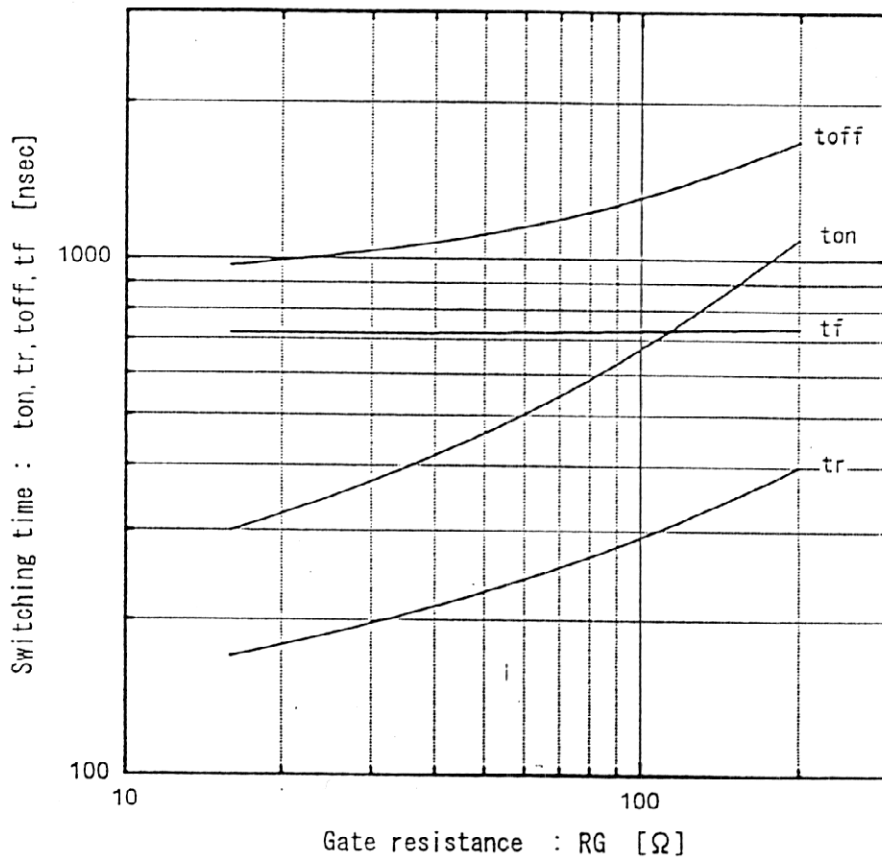
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Switching time vs.  $R_G$   
 $V_{CC}=600V$ ,  $I_C=10A$ ,  $V_{GE}=\pm 15V$ ,  $T_j=25^\circ C$



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



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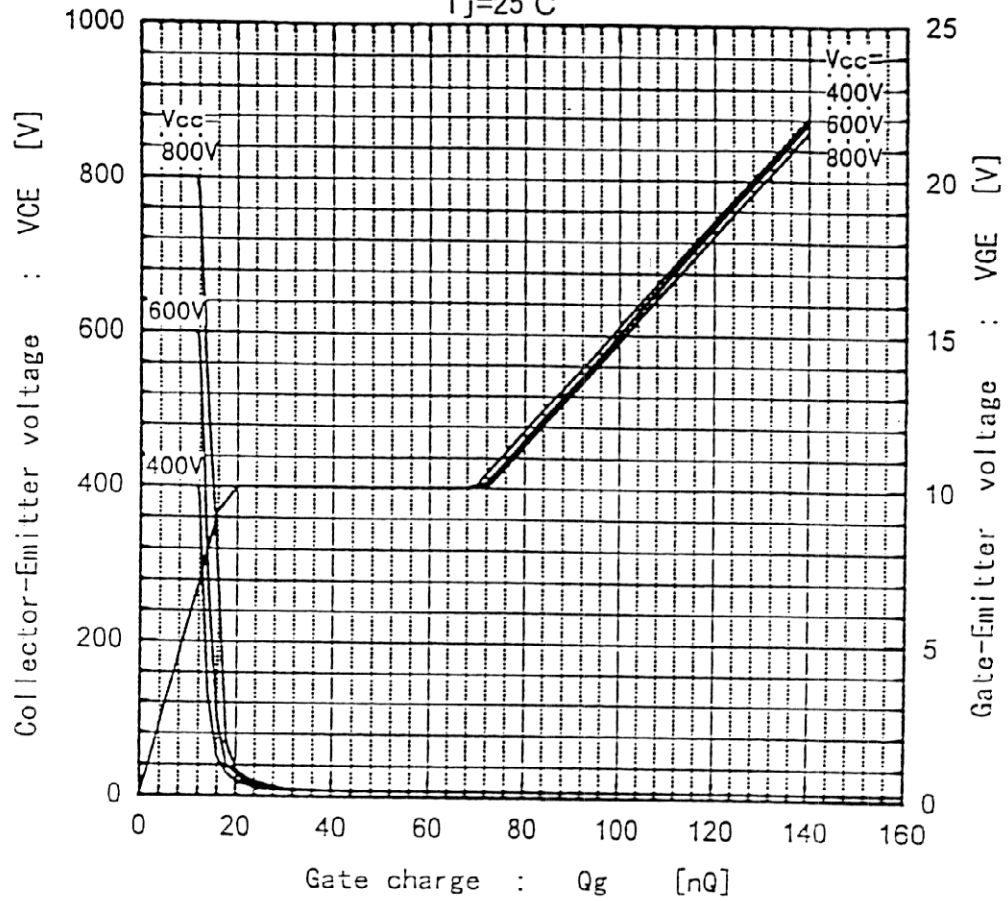
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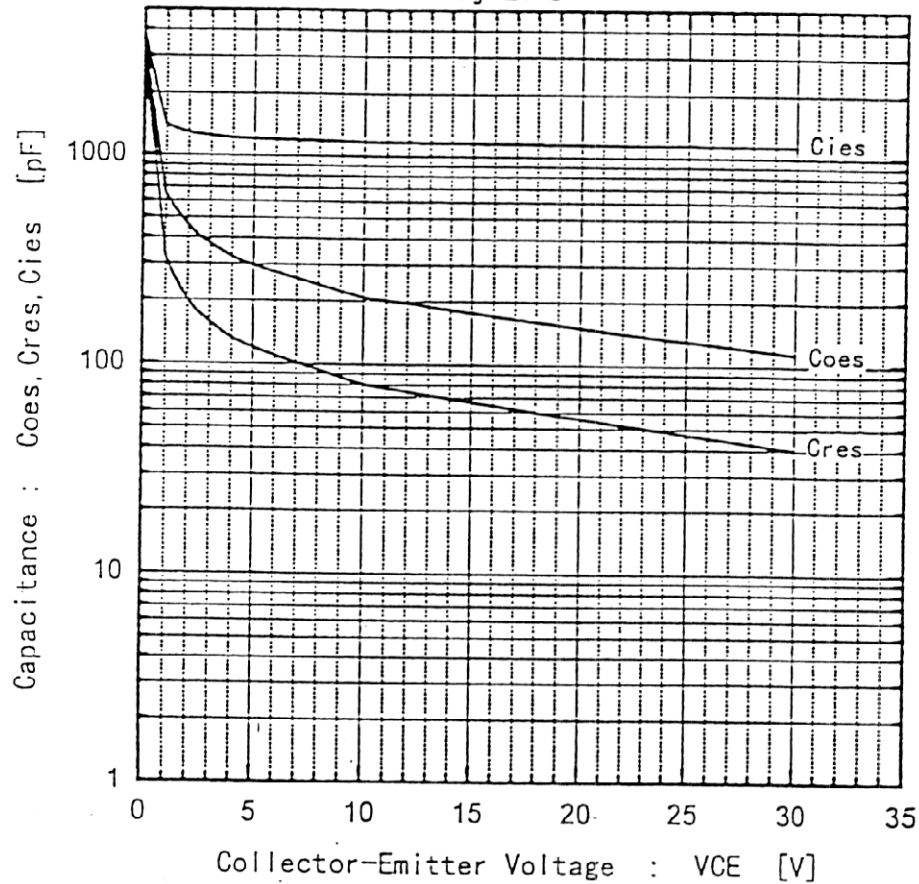
# Dynamic input characteristics

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



Capacitance vs. Collector-Emitter voltage

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



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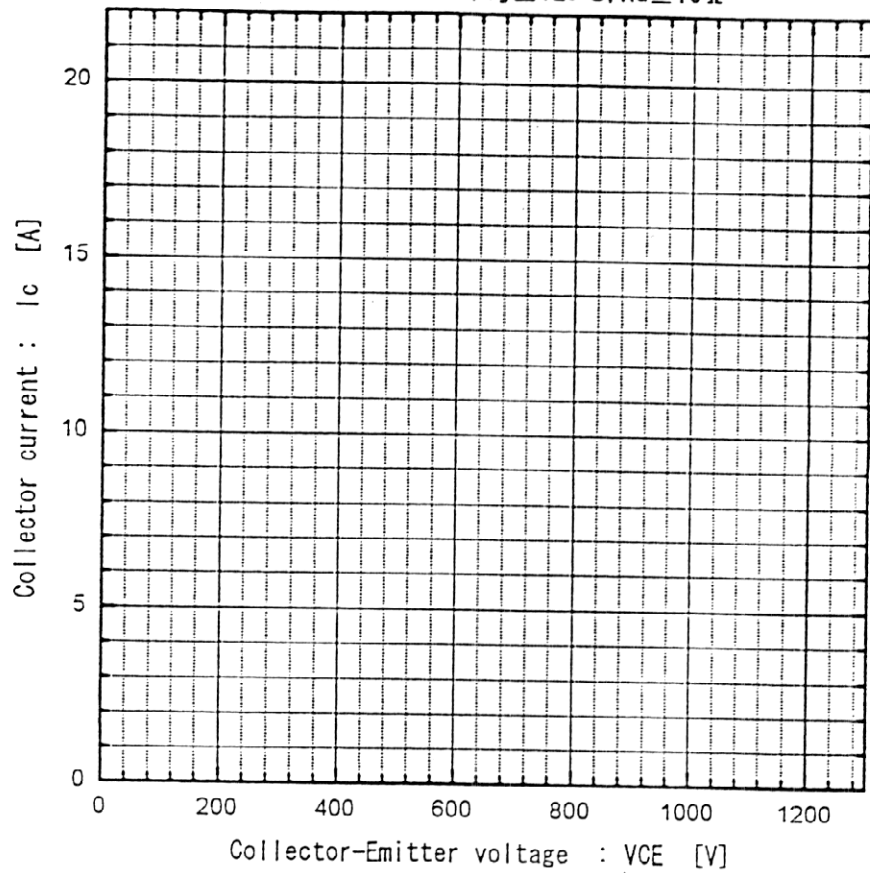
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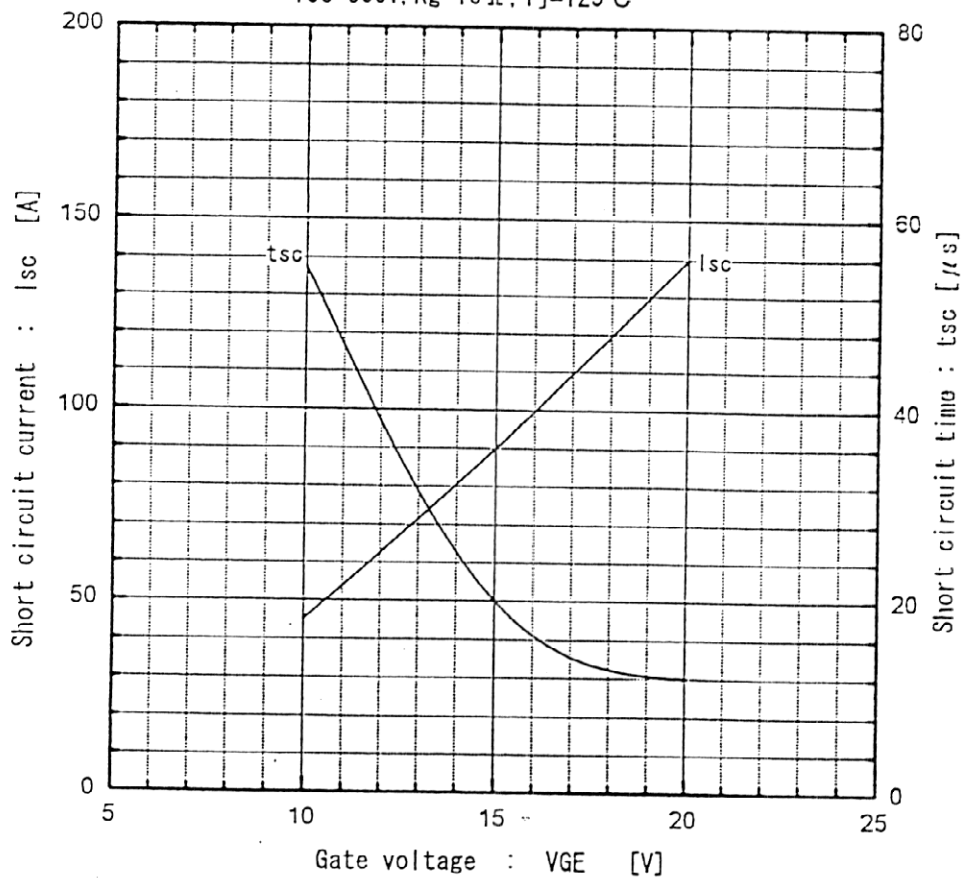
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Reverse Biased Safe Operating Area  
 $+V_{GE}=15V, -V_{GE} \leq 15V, T_j \leq 125^{\circ}C, R_g \geq 16\Omega$



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



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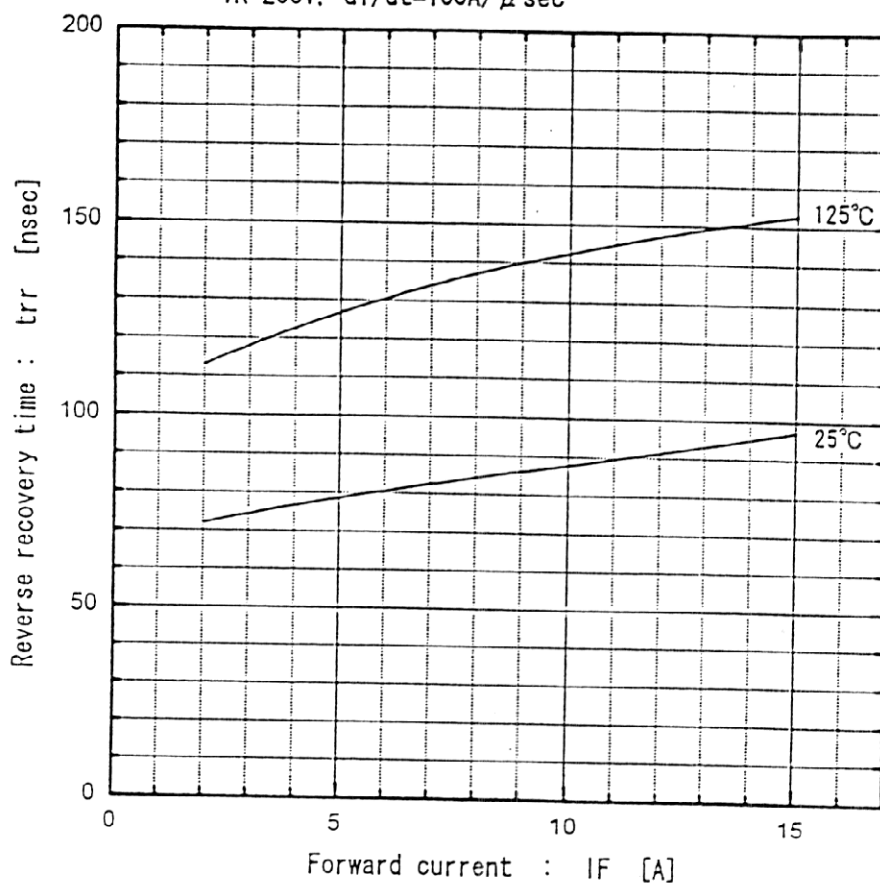
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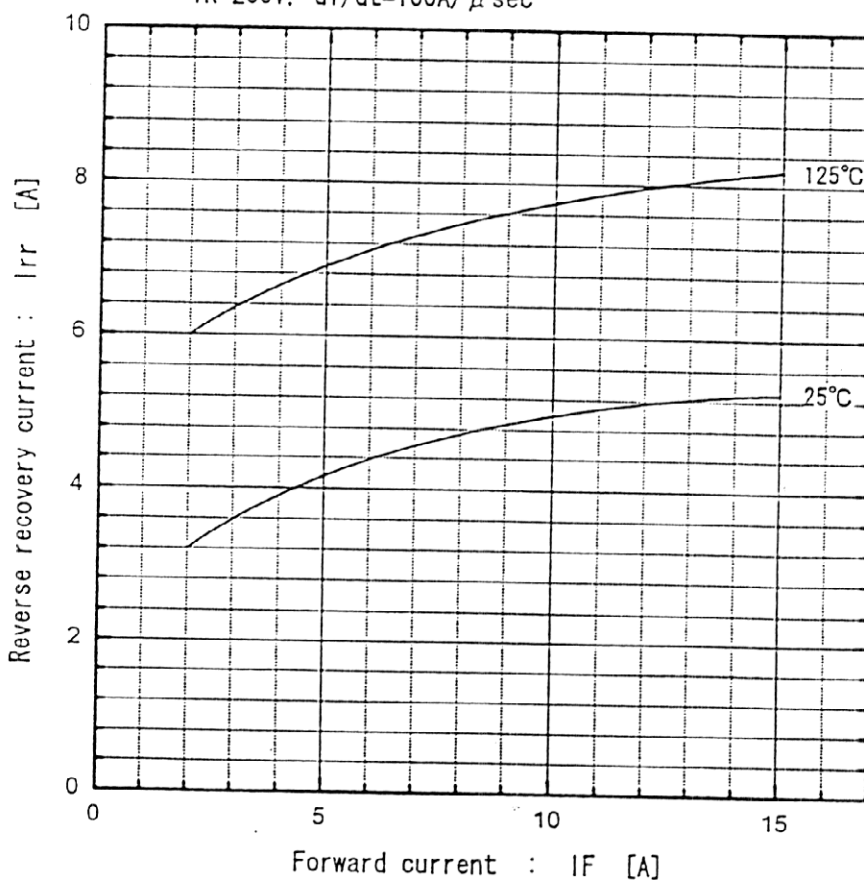
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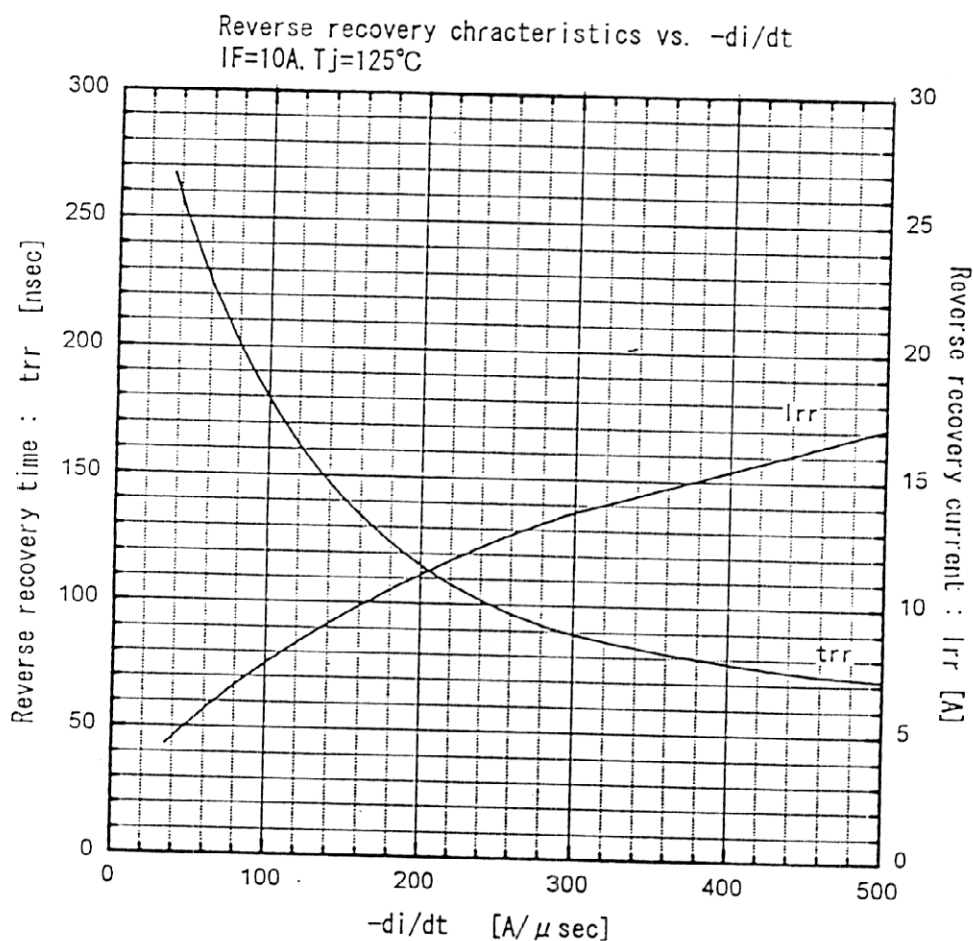
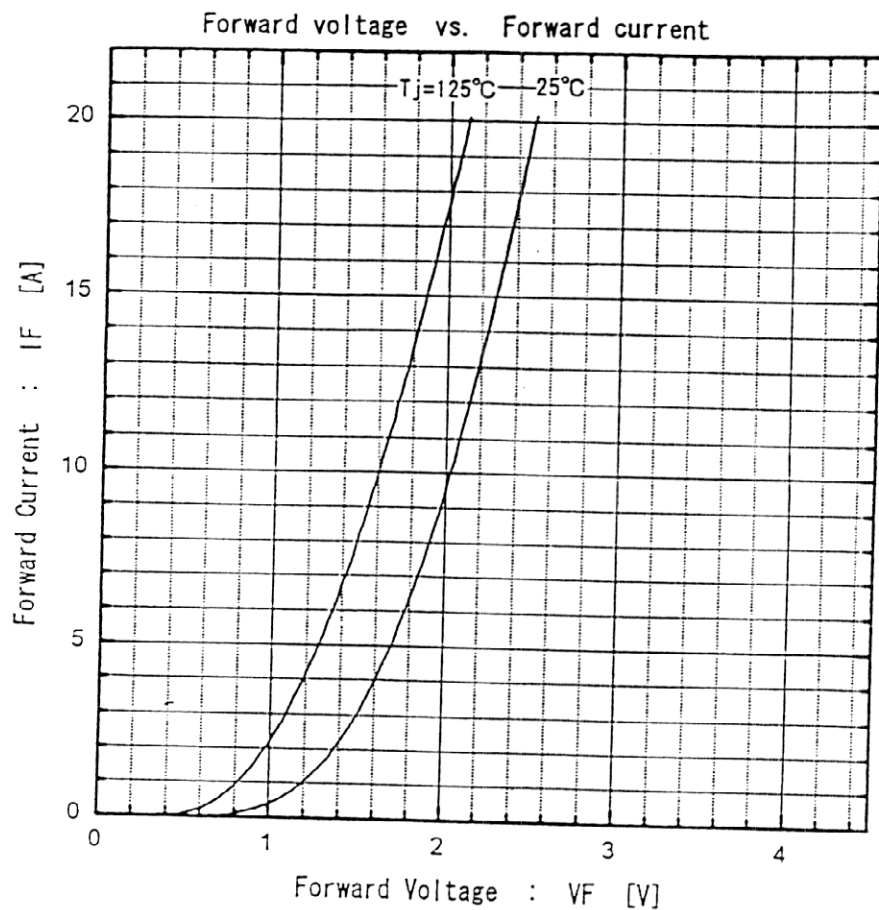
Reverse recovery time vs. Forward current  
 $V_R=200V, -di/dt=100A/\mu sec$



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



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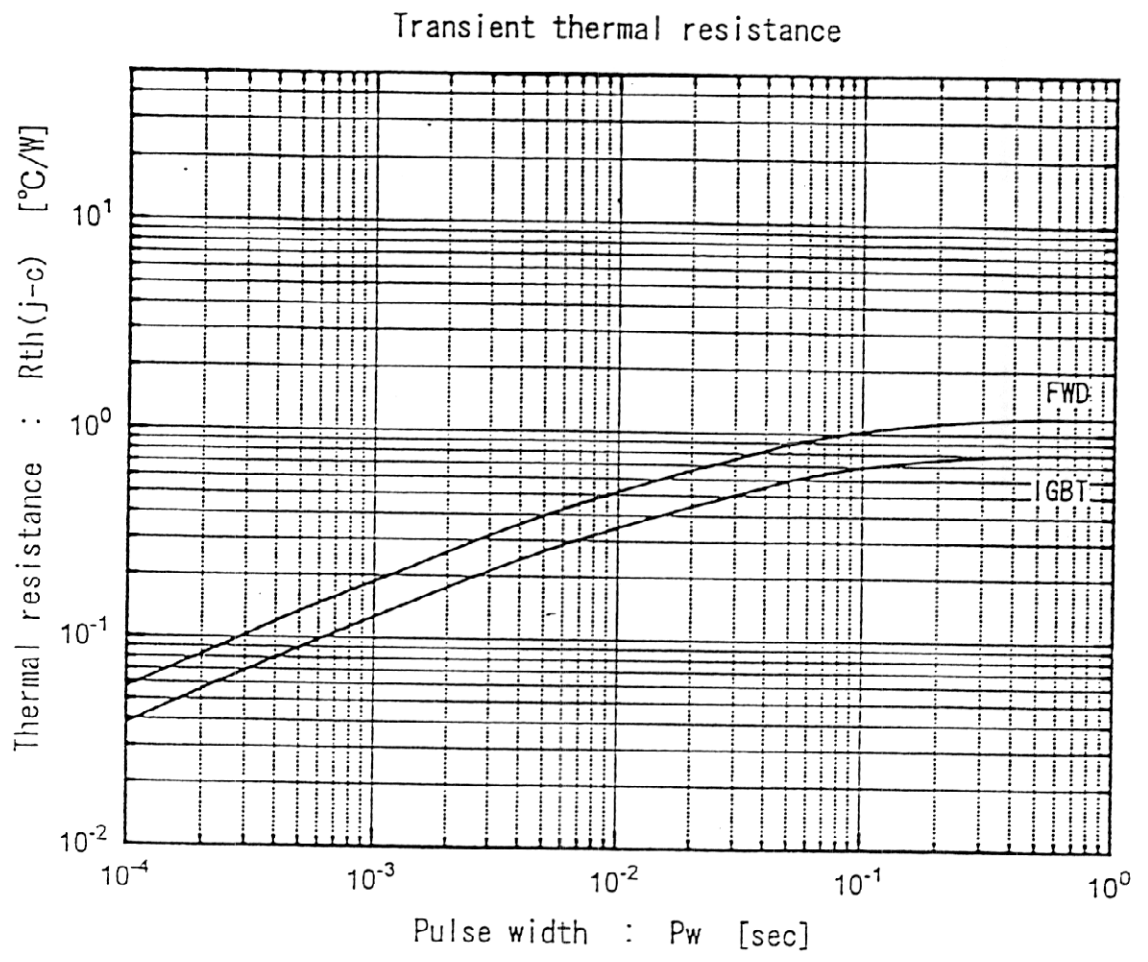
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