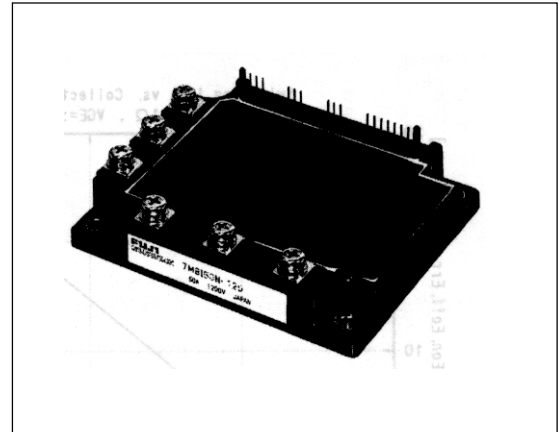


### IGBT MODULE (N-series)

1200V / 50A (7 in one-package)



#### ■ Features

- High Speed Switching
- Voltage Drive
- Low Inductance Module Structure
- Dynamic Brake Circuit

#### ■ Applications

- Inverter for Motor Drive
- AC and DC Servo Drive Amplifier
- Uninterruptible Power Supply

#### ■ Maximum ratings and characteristics

● Absolute maximum ratings (Tc=25°C unless without specified)

Item	Symbol	Condition	Rating	Unit	
Inverter(IGBT)	Collector-Emitter voltage	V <sub>CES</sub>	1200	V	
	Gate-Emitter voltage	V <sub>GES</sub>	±20	V	
	Collector current	DC	I <sub>C</sub>	50	A
		1ms	I <sub>CP</sub>	100	A
		DC	-I <sub>C</sub>	50	A
Collector power dissipation 1 device	P <sub>C</sub>		400	W	
Brake(IGBT+FWD)	Collector-Emitter voltage	V <sub>CES</sub>	1200	V	
	Gate-Emitter voltage	V <sub>GES</sub>	±20	V	
	Collector current	DC	I <sub>C</sub>	25	A
		1ms	I <sub>CP</sub>	50	A
	Collector power dissipation 1 device	P <sub>C</sub>		200	W
	Repetitive peak reverse voltage	V <sub>RRM</sub>		1200	V
	Average forward current	I <sub>F(AV)</sub>		1	A
Surge current	I <sub>FSM</sub>	10ms	50	A	
Operating junction temperature	T <sub>j</sub>		+150	°C	
Storage temperature	T <sub>stg</sub>		-40 to +125	°C	
Isolation voltage	V <sub>iso</sub>	AC : 1 minute	AC 2500	V	
Mounting screw torque	Mounting*1		3.5	N·m	
	Terminal*1		3.5		

\*1 Recommendable value : 2.5 to 3.5 N·m

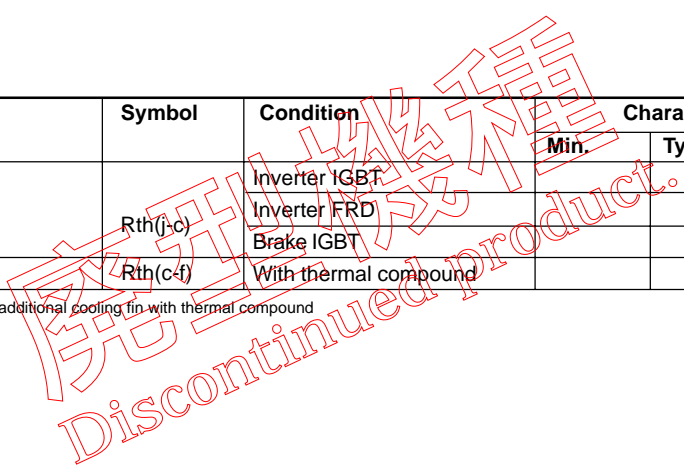
● Electrical characteristics (Tj=25°C unless without specified)

Item	Symbol	Condition	Characteristics			Unit	
			Min.	Typ.	Max.		
Inverter (IGBT)	Zero gate voltage collector current	ICES	Tj=25°C, VCE=1200V, VGE=0V			3.0	mA
	Gate-Emitter leakage current	IGES	VCE=0V, VGE=±20V			15	µA
	Gate-Emitter threshold voltage	VGE(th)	VCE=20V, IC=50mA			4.5	V
	Collector-Emitter saturation voltage	VCE(sat)	VGE=15V, IC=50A			3.3	V
	Collector-Emitter voltage	-VCE	-IC=50A			3.0	V
	Input capacitance	Cies	VGE=0V, VCE=10V, f=1MHz			8000	pF
	Switching time	ton	VCC=600V			1.2	µs
toff		IC=50A			1.5	µs	
tf		VGE=±15V, RG=24 ohm			0.5	µs	
Reverse recovery time of FRD	trr	IF=50A, VGE=-10V, -di/dt=150A/µs			350	ns	
Brake (IGBT)	Zero gate voltage collector current	ICES	VCE=1200V, VGE=0V			1.0	mA
	Gate-Emitter leakage current	IGES	VCE=0V, VGE=±20V			100	nA
	Collector-Emitter saturation voltage	VCE(sat)	IC=25A, VGE=15V			3.3	V
	Switching time	ton	VCC=600V			1.2	µs
		toff	IC=25A			1.5	µs
tf		VGE=±15V, RG=51ohm			0.5	µs	
Brake (FWD)	Reverse current	IRRM	VR=VRRM			1.0	mA
	Reverse recovery time	trr				600	ns

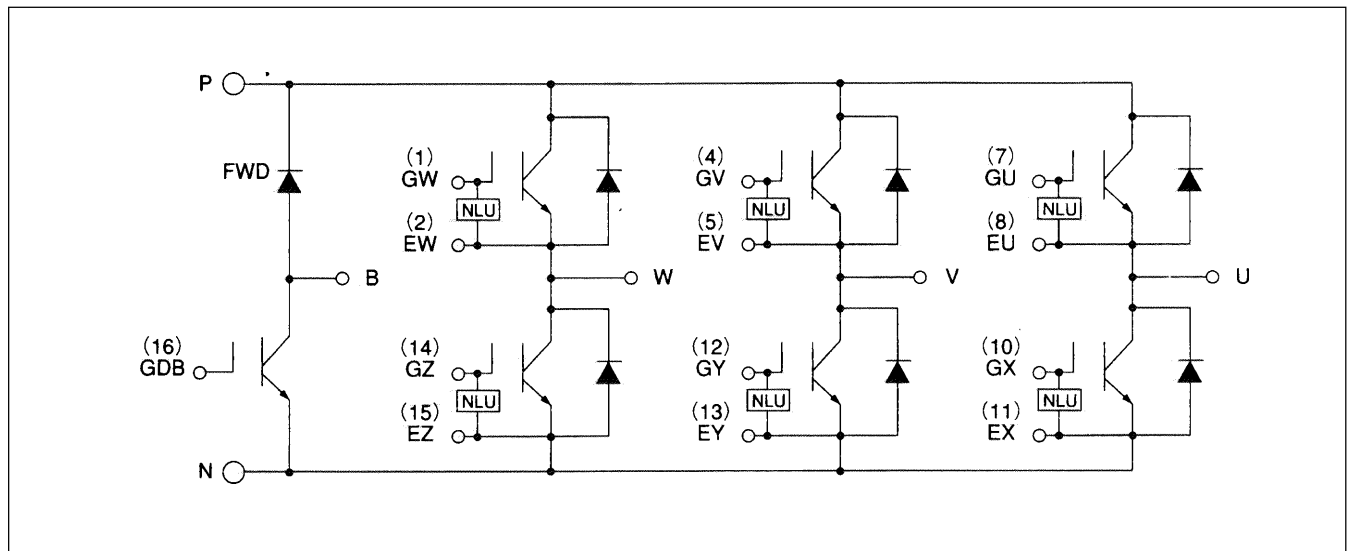
● Thermal Characteristics

Item	Symbol	Condition	Characteristics			Unit
			Min.	Typ.	Max.	
Thermal resistance ( 1 device )	Rth(j-c)	Inverter IGBT			0.31	°C/W
		Inverter FRD			0.85	
		Brake IGBT			0.63	
Contact thermal resistance *	Rth(c-f)	With thermal compound		0.05		

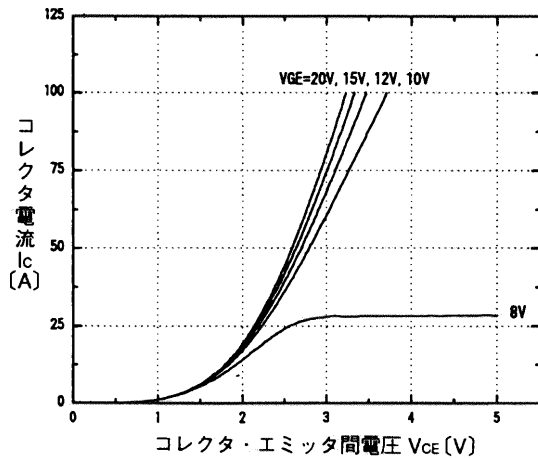
\* This is the value which is defined mounting on the additional cooling fin with thermal compound



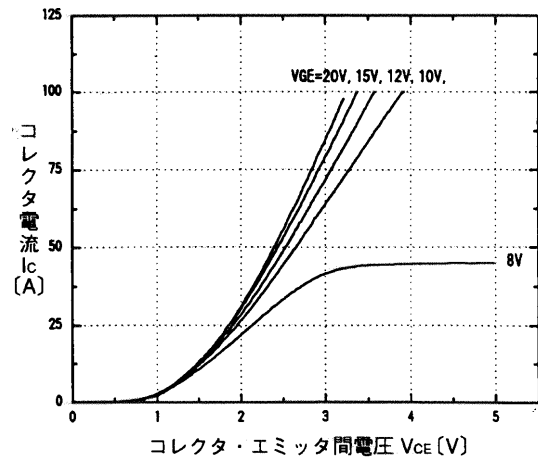
■ Equivalent Circuit Schematic



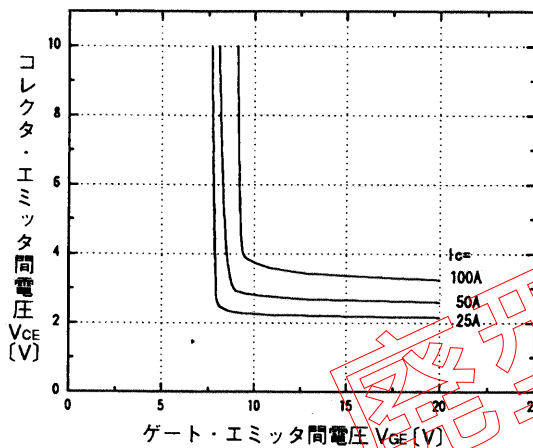
■ Characteristics (Representative)



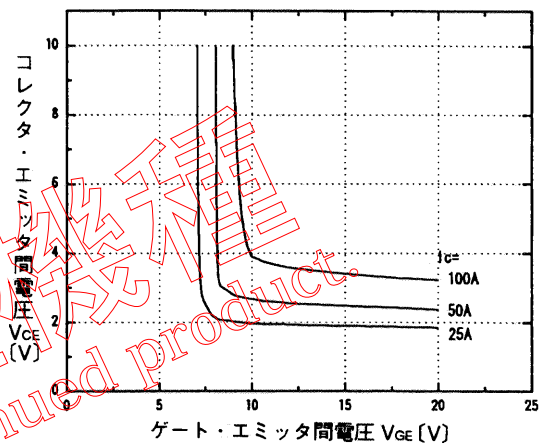
コレクタ電流-コレクタ・エミッタ間電圧特性 ( $T_j=25^\circ\text{C}$ ) <INV部>  
Collector current vs. Collector-Emitter voltage <INV>



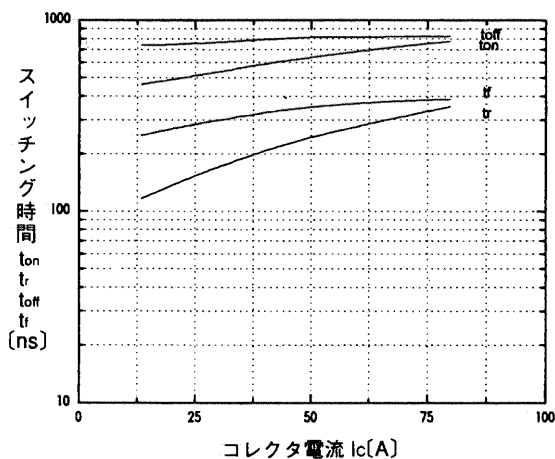
コレクタ電流-コレクタ・エミッタ間電圧特性 ( $T_j=125^\circ\text{C}$ ) <INV部>  
Collector current vs. Collector-Emitter voltage <INV>



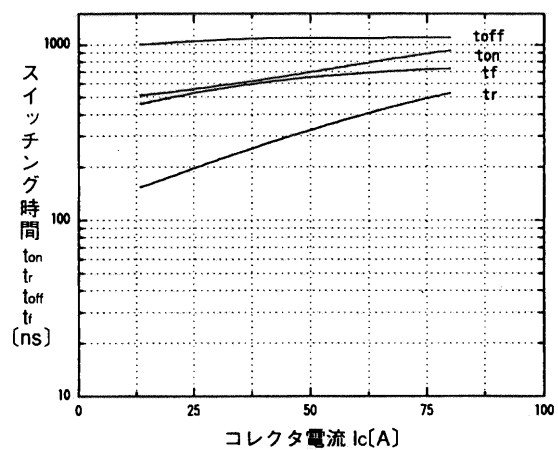
コレクタ・エミッタ間電圧-ゲート・エミッタ間電圧特性 ( $T_j=25^\circ\text{C}$ ) <INV部>  
Collector-Emitter voltage vs. Gate-Emitter voltage <INV>



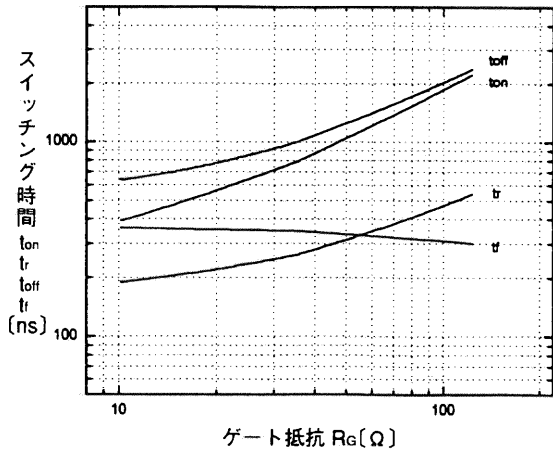
コレクタ・エミッタ間電圧-ゲート・エミッタ間電圧特性 ( $T_j=125^\circ\text{C}$ ) <INV部>  
Collector-Emitter voltage vs. Gate-Emitter voltage <INV>



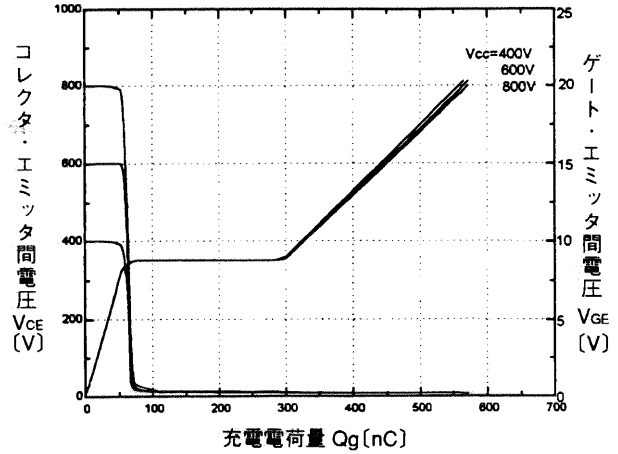
スイッチング時間-コレクタ電流特性 ( $T_j=25^\circ\text{C}$ ) <INV部>  
Switching time vs. Collector current <INV>



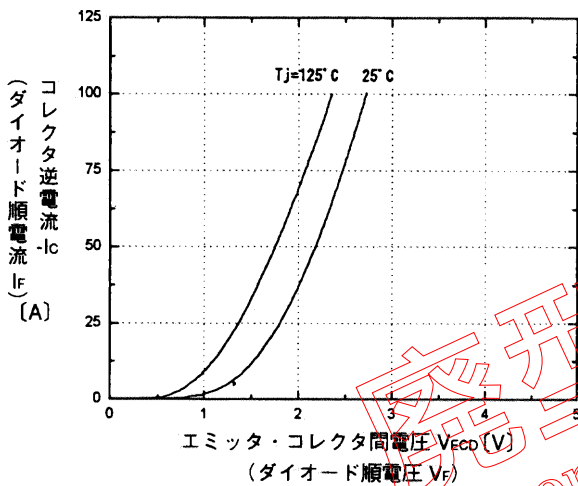
スイッチング時間-コレクタ電流特性 ( $T_j=125^\circ\text{C}$ ) <INV部>  
Switching time vs. Collector current <INV>



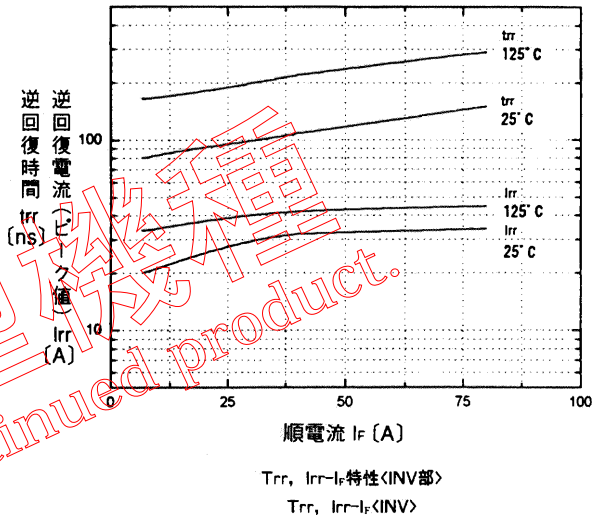
スイッチング時間-ゲート抵抗特性 ( $T_j=25^\circ\text{C}$ ) <INV部>  
Switching time vs. Gate resistance <INV>



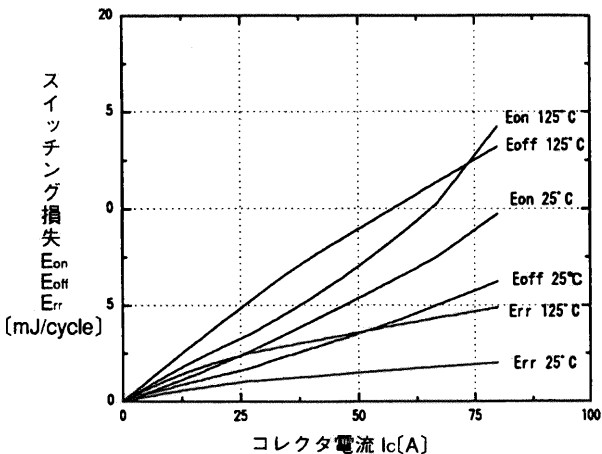
ダイナミック入力特性 ( $T_j=25^\circ\text{C}$ ) <INV部>  
Dynamic input characteristic <INV>



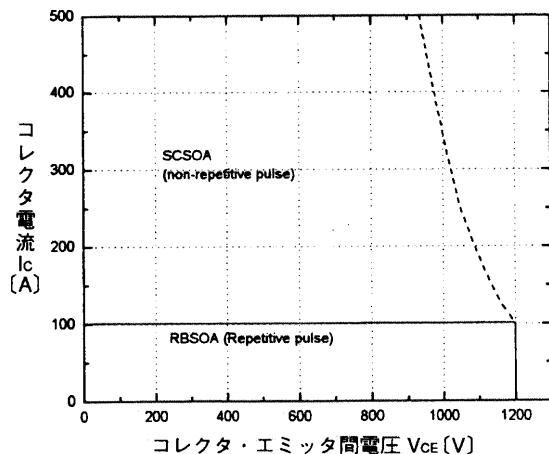
高速フリーホイールダイオード順電圧特性 <INV部>  
Forward voltage of free wheel diode <INV>



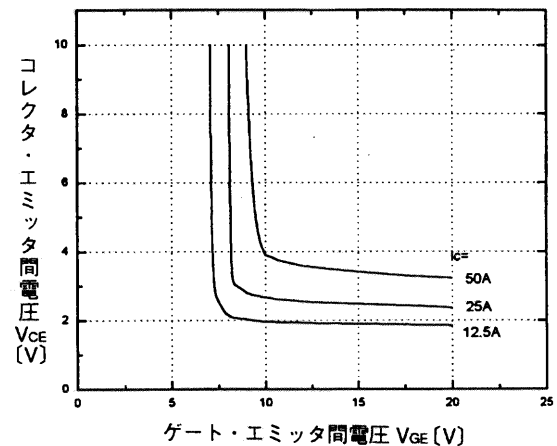
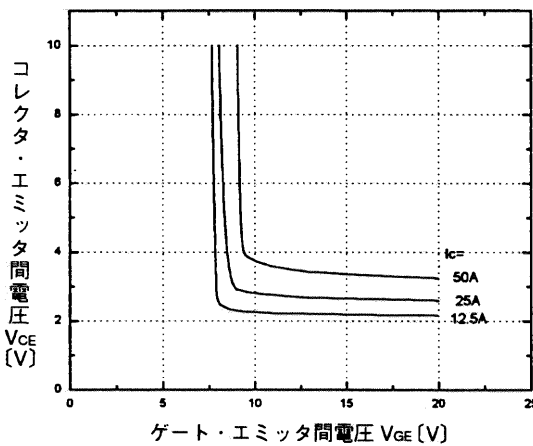
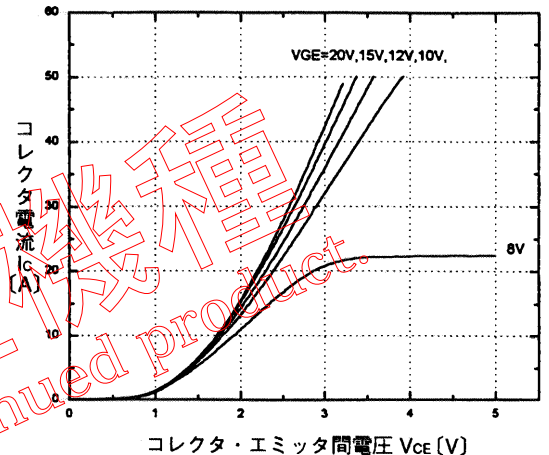
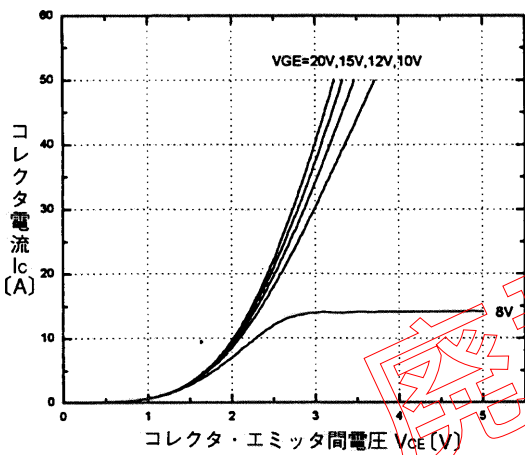
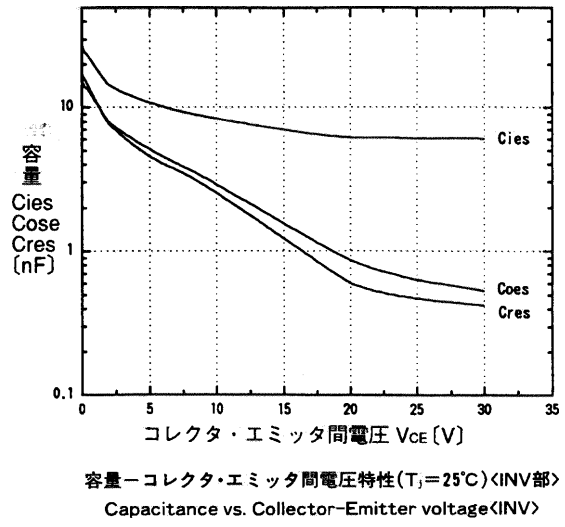
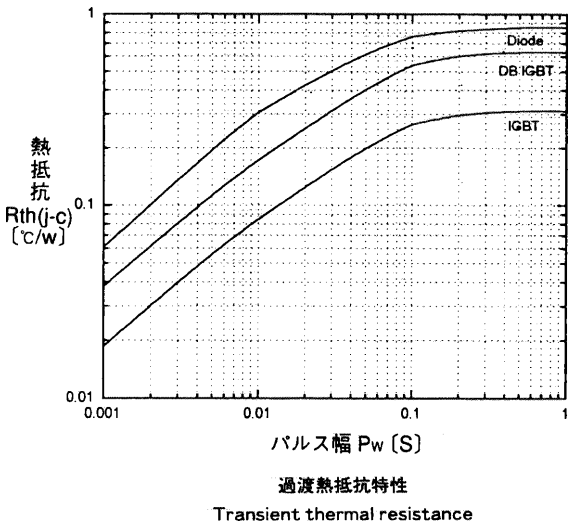
$T_{rr}$ ,  $I_{rr}$ - $I_f$  特性 <INV部>  
 $T_{rr}$ ,  $I_{rr}$ - $I_f$  <INV>



スイッチング損失-コレクタ電流特性 <INV部>  
Switching loss vs. Collector current <INV>

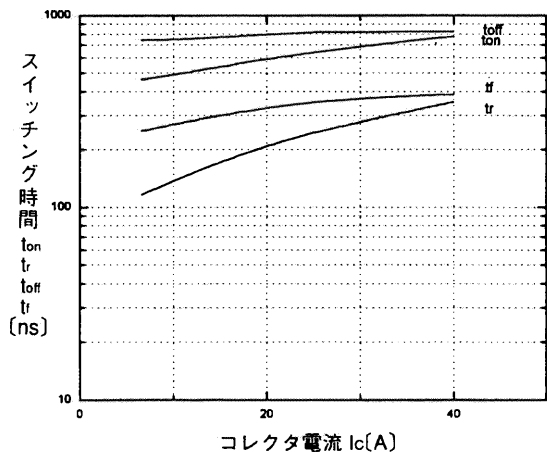


安全動作領域(逆バイアス) ( $T_j \leq 125^\circ\text{C}$ ) <INV部>  
Reverse biased safe operating area <INV>

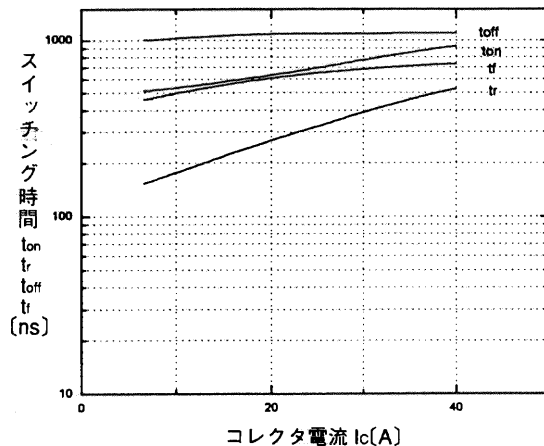


コレクタ・エミッタ間電圧-ゲート・エミッタ間電圧特性 ( $T_j=25^\circ\text{C}$ ) <ブレーキ部>  
Collector-Emitter voltage vs. Gate-Emitter voltage <BRAKE>

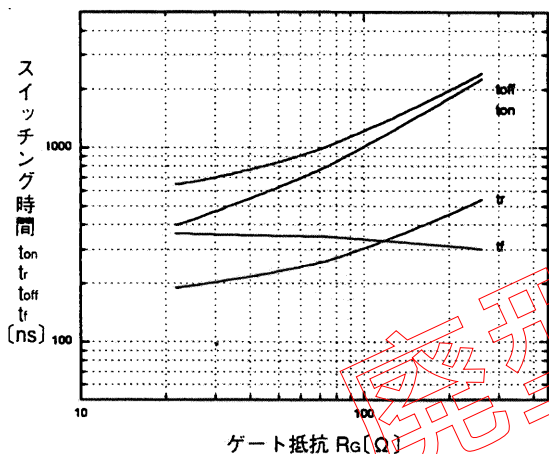
コレクタ・エミッタ間電圧-ゲート・エミッタ間電圧特性 ( $T_j=125^\circ\text{C}$ ) <ブレーキ部>  
Collector-Emitter voltage vs. Gate-Emitter voltage <BRAKE>



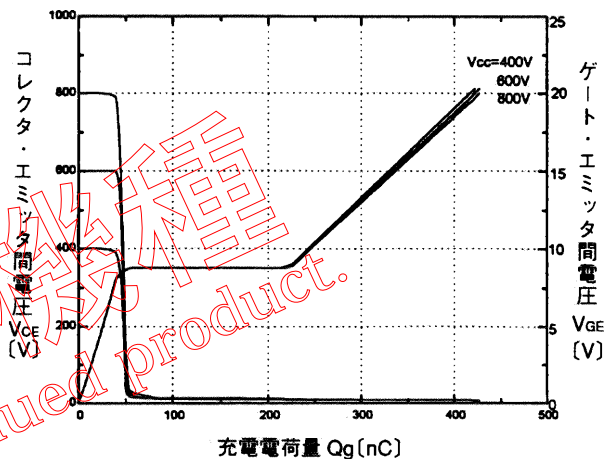
スイッチング時間-コレクタ電流特性 ( $T_j=25^\circ\text{C}$ )<ブレーキ部>  
Switching time vs. Collector current<BRAKE>



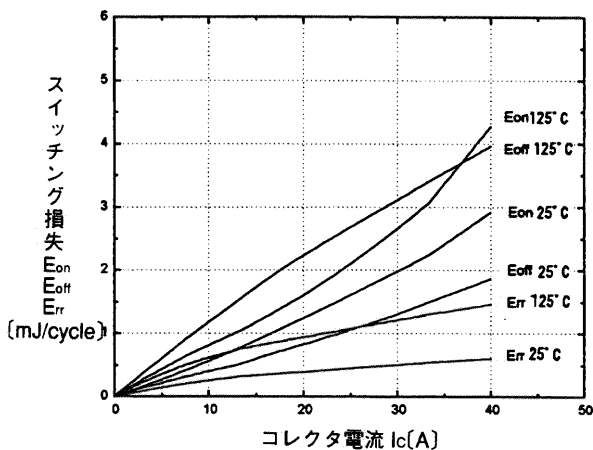
スイッチング時間-コレクタ電流特性 ( $T_j=125^\circ\text{C}$ )<ブレーキ部>  
Switching time vs. Collector current<BRAKE>



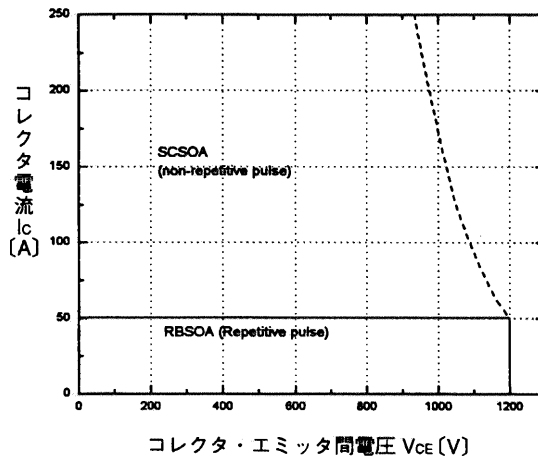
スイッチング時間-ゲート抵抗特性 ( $T_j=25^\circ\text{C}$ )<ブレーキ部>  
Switching time vs. Gate resistance<BRAKE>



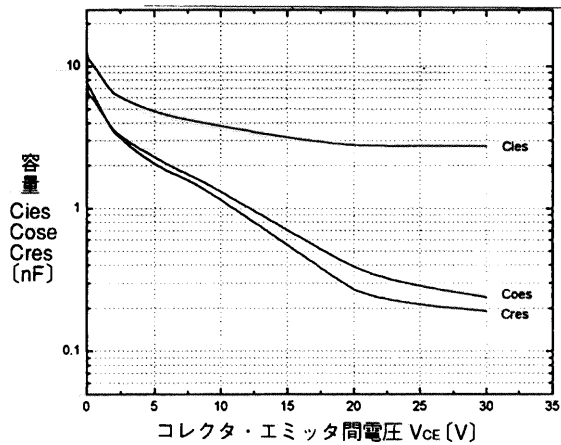
ダイナミック入力特性 ( $T_j=25^\circ\text{C}$ )<ブレーキ部>  
Dynamic input characteristic<BRAKE>



スイッチング損失-コレクタ電流特性<ブレーキ部>  
Switching loss vs. Collector current<BRAKE>



安全動作領域(逆バイアス) ( $T_j \leq 125^\circ\text{C}$ )<ブレーキ部>  
Reverse biased safe operating area<BRAKE>



容量-コレクタ・エミッタ間電圧特性 (T<sub>j</sub>=25°C) <ブレーキ部>  
 Capacitance vs. Collector-Emitter voltage <BRAKE>

■ Outline Drawings, mm

