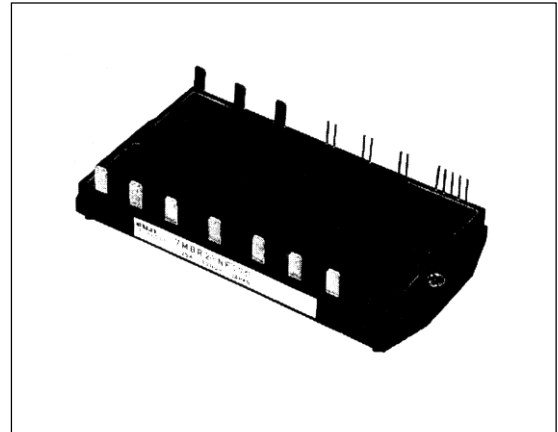


IGBT MODULE

600V / 50A / PIM



■ Features

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

■ Applications

- Inverter for Motoe 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	Collector-Emitter voltage		V _{CES}		600	V
	Gate-Emitter voltage		V _{GES}		±20	V
	Collector current	DC	I _C		50	A
		1ms	I _{CP}		100	A
		DC	-I _C		50	A
Collector power dissipation 1 device		P _C		200	W	
Brake	Collector-Emitter voltage		V _{CES}		600	V
	Gate-Emitter voltage		V _{GES}		±20	V
	Collector current	DC	I _C		50	A
		1ms	I _{CP}		100	A
	Collector power dissipation 1 device		P _C		200	W
	Repetitive peak reverse voltage		V _{RRM}		600	V
	Average forward current		I _{F(AV)}		1	A
Surge current		I _{FSM}	10ms	50	A	
Converter	Repetitive peak reverse voltage		V _{RRM}		800	V
	Non-Repetitive peak reverse voltage		V _{RSM}		900	V
	Average output current		I _O	50Hz/60Hz sine wave	50	A
	Surge current (Non-Repetitive)		I _{FSM}	T _J =150°C, 10ms	350	A
	I ² t (Non-Repetitive)			T _J =150°C, 10ms	648	A ² s
Operating junction temperature			T _J		+150	°C
Storage temperature			T _{stg}		-40 to +125	°C
Isolation voltage			V _{iso}	AC : 1 min.	AC 2500	V
Mounting screw torque					1.7 *1	N·m

*1 Recommendable value : 1.3 to 1.7 N·m (M4)

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

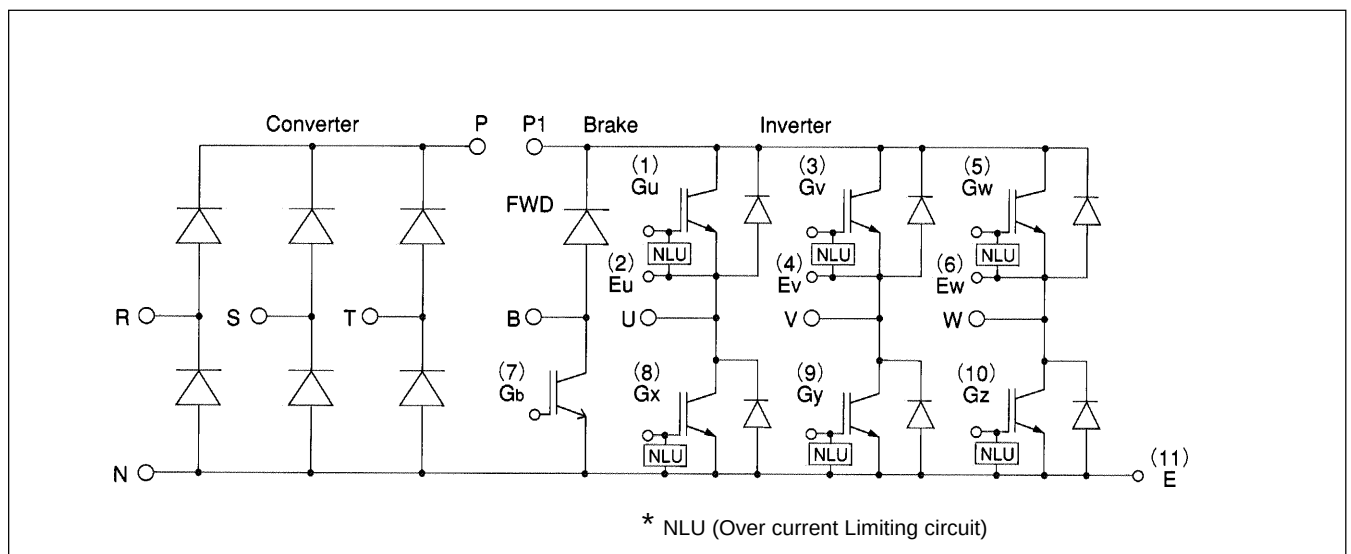
Item	Symbol	Condition	Characteristics			Unit
			Min.	Typ.	Max.	
Inverter (IGBT)	Zero gate voltage collector current	ICES	VCE=600V, VGE=0V			1.0 mA
	Gate-Emitter leakage current	IGES	VCE=0V, VGE=±20V			20 μA
	Gate-Emitter threshold voltage	VGE(th)	VCE=20V, Ic=50mA			4.5 V
	Collector-Emitter saturation voltage	VCE(sat)	VGE=15V, Ic=50A			2.8 V
	Collector-Emitter voltage	-VCE	-Ic=50A			3.0 V
	Input capacitance	Cies	VGE=0V, VCE=10V, f=1MHz			3300 pF
	Switching time	ton	VCC=300V			1.2 μs
		tr	Ic=50A			0.6 μs
		toff	VGE=±15V			1.5 μs
		tr	RG=51 ohm			0.35 μs
	Reverse recovery time of FRD	trr	IF=50A, VGE=-10V, -di/dt=150A/μs			300 ns
Brake (IGBT)	Zero gate voltage collector current	ICES	VCE=600V, VGE=0V			1.0 mA
	Gate-Emitter leakage current	IGES	VCE=0V, VGE=±20V			100 nA
	Collector-Emitter saturation voltage	VCE(sat)	Ic=15A, VGE=15V			2.8 V
	Switching time	ton	VCC=300V			0.8 μs
		tr	Ic=50A			0.6 μs
		toff	VGE=±15V			1.0 μs
		tr	RG=51 ohm			0.35 μs
Brake (FWD)	Reverse current	IRRM	VR=600V			1.0 mA
	Reverse recovery time	trr				600 ns
Converter	Forward voltage	VFM	IF=50A			1.55 V
	Reverse current	IRRM	VR=800V			1.0 mA

● Thermal Characteristics

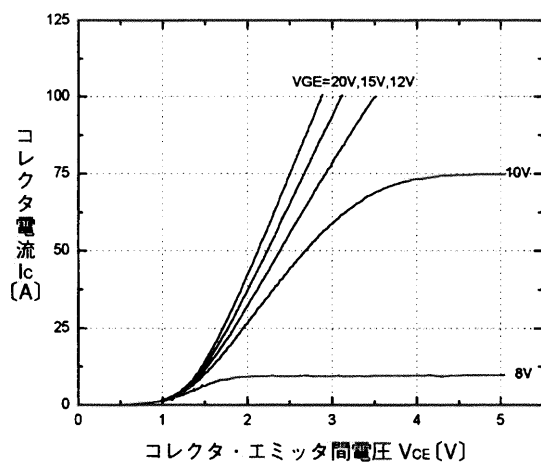
Item	Symbol	Condition	Characteristics			Unit
			Min.	Typ.	Max.	
Thermal resistance (1 device)	Rth(j-c)	Inverter IGBT			0.63	°C/W
		Inverter FRD			1.60	
		Brake IGBT			0.63	
		Converter Diode			2.10	
Contact thermal resistance *	Rth(c-f)	With thermal compound		0.05		

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

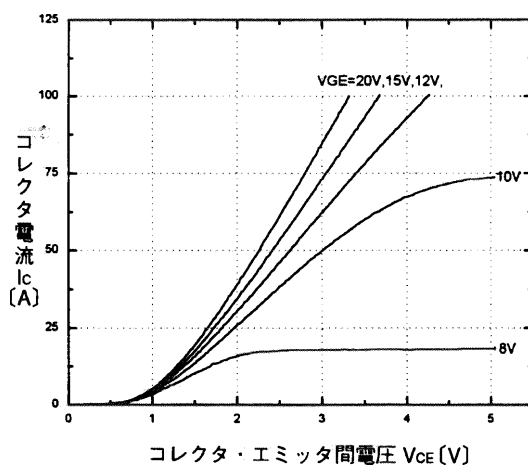
■ Equivalent Circuit Schematic



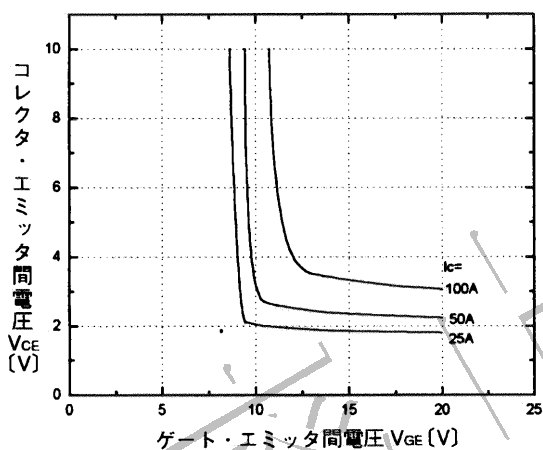
■ Characteristics (Representative)



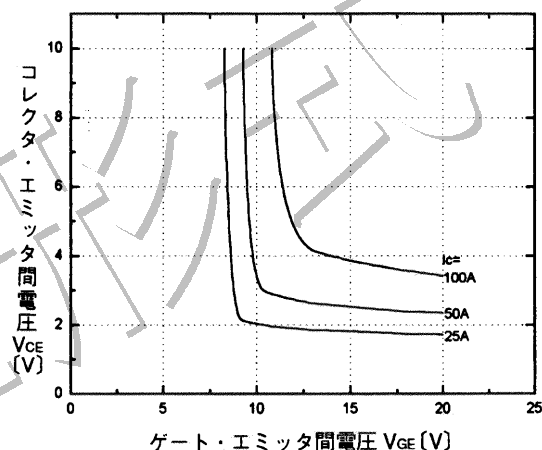
コレクタ電流－コレクタ・エミッタ間電圧特性 ($T_j = 25^\circ\text{C}$) <INV部>
Collector current vs. Collector-Emitter voltage <INV>



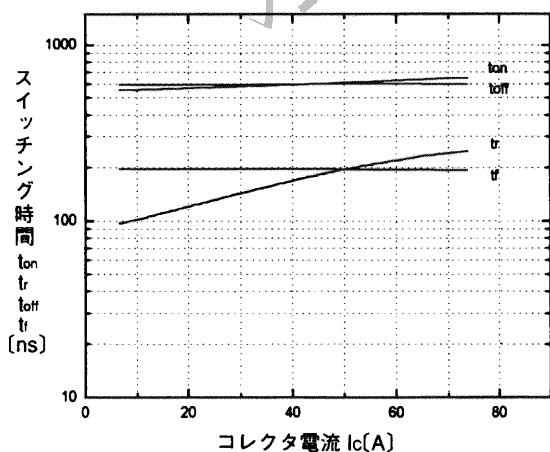
コレクタ電流－コレクタ・エミッタ間電圧特性 ($T_j = 125^\circ\text{C}$) <INV部>
Collector current vs. Collector-Emitter voltage <INV>



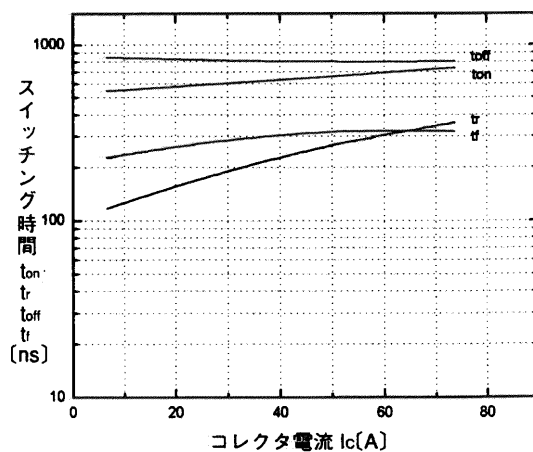
コレクタ・エミッタ間電圧－ゲート・エミッタ間電圧特性 ($T_j = 25^\circ\text{C}$) <INV部>
Collector-Emitter voltage vs. Gate-Emitter voltage <INV>



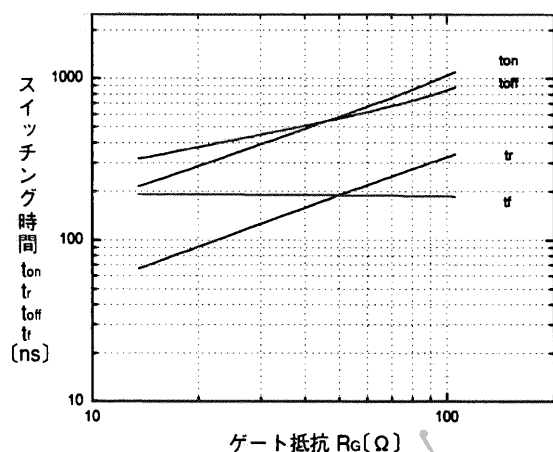
コレクタ・エミッタ間電圧－ゲート・エミッタ間電圧特性 ($T_j = 125^\circ\text{C}$) <INV部>
Collector-Emitter voltage vs. Gate-Emitter voltage <INV>



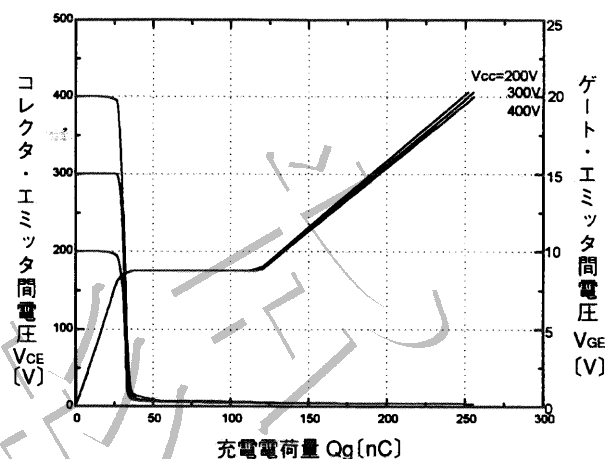
スイッチング時間－コレクタ電流特性 ($T_j = 25^\circ\text{C}$) <INV部>
Switching time vs. Collector current <INV>



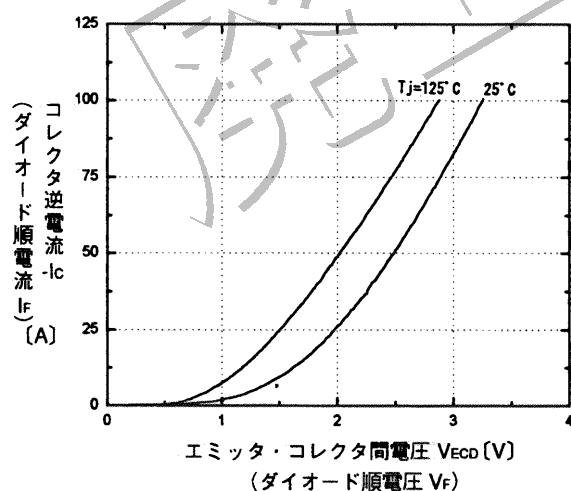
スイッチング時間－コレクタ電流特性 ($T_j = 125^\circ\text{C}$) <INV部>
Switching time vs. Collector current <INV>



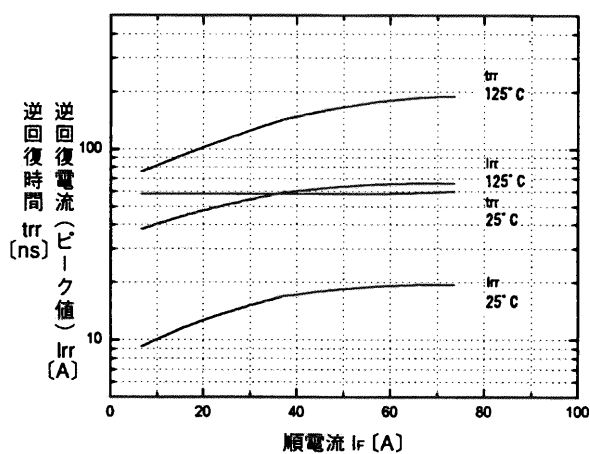
スイッチング時間-ゲート抵抗特性 ($T_j = 25^\circ\text{C}$) <INV部>
Switching time vs. Gate resistance <INV>



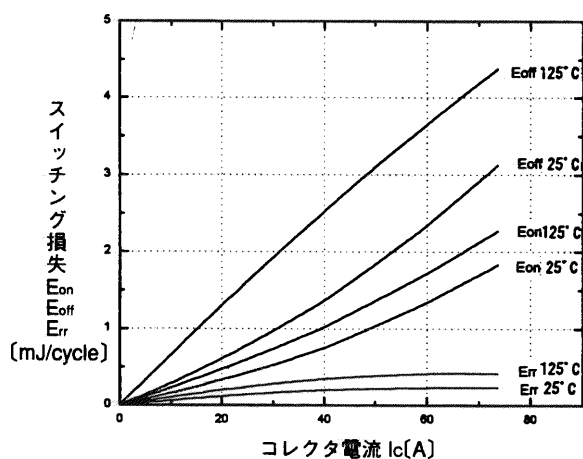
ダイナミック入力特性 ($T_j = 25^\circ\text{C}$) <INV部>
Dynamic input characteristic <INV>



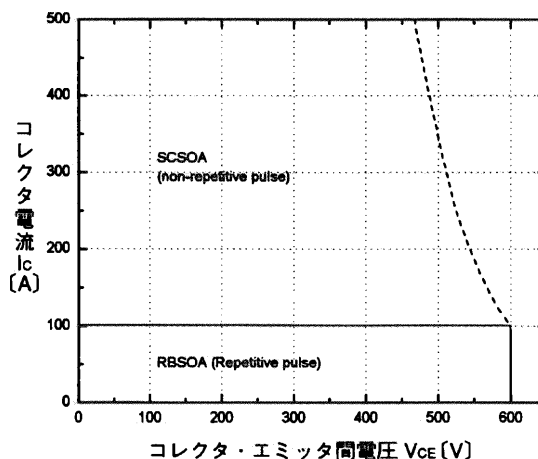
高速フリーホイールダイオード順電圧特性 <INV部>
Forward voltage of free wheel diode <INV>



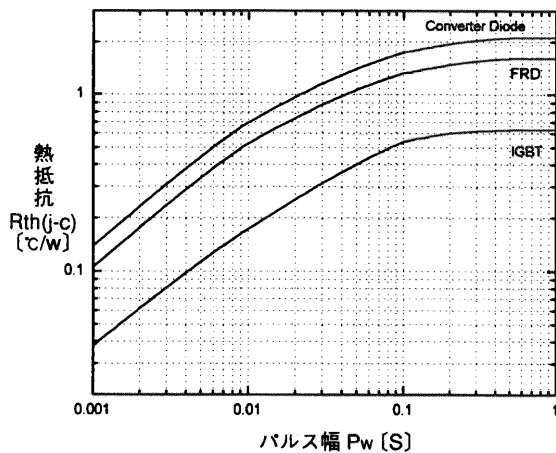
T_{rr} , I_{rr} - I_f 特性 <INV部>
 T_{rr} , I_{rr} - I_f <INV>



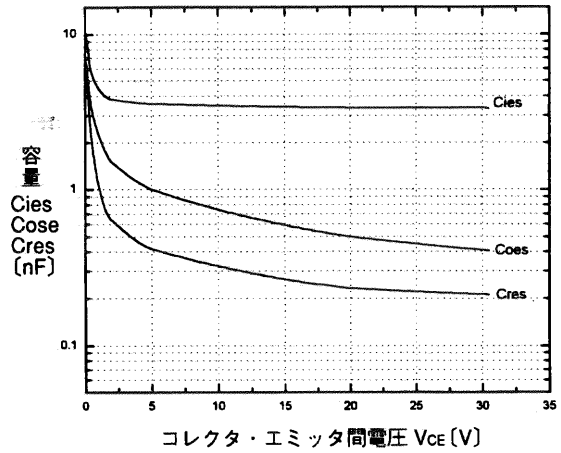
スイッチング損失-コレクタ電流特性 <INV部>
Switching loss vs. Collector current <INV>



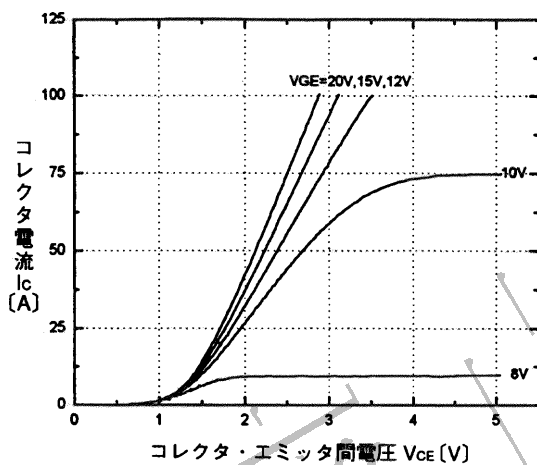
安全動作領域(逆バイアス) ($T_j \leq 125^\circ\text{C}$) <INV部>
Reverse biased safe operating area <INV>



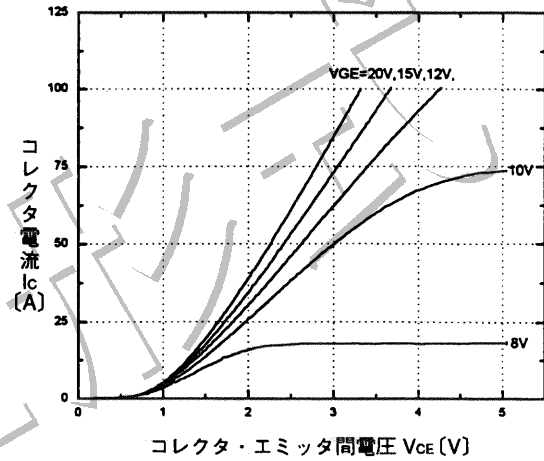
過渡熱抵抗特性
Transient thermal resistance



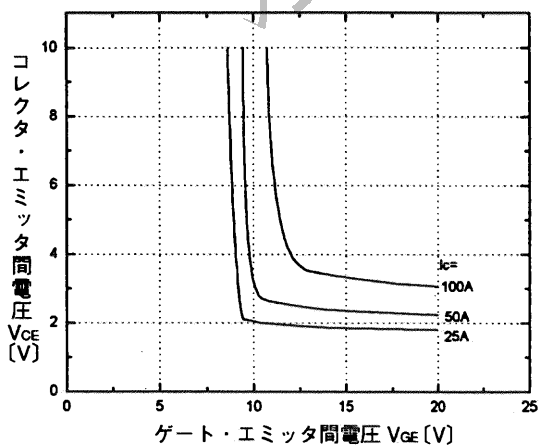
容量-コレクタ・エミッタ間電圧特性 ($T_j=25^\circ\text{C}$) <INV部>
Capacitance vs. Collector-Emitter voltage <INV>



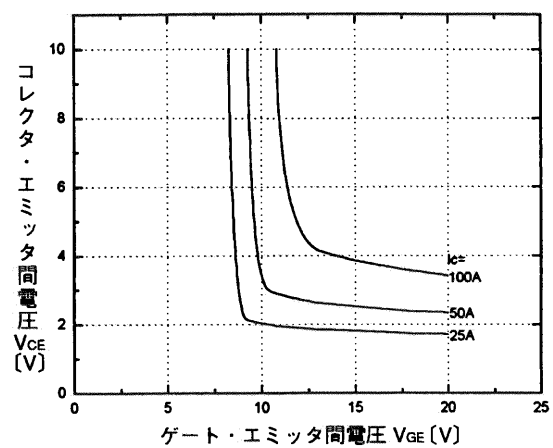
コレクタ電流-コレクタ・エミッタ間電圧特性 ($T_j=25^\circ\text{C}$) <ブレーキ部>
Collector current vs. Collector-Emitter voltage <BRAKE>



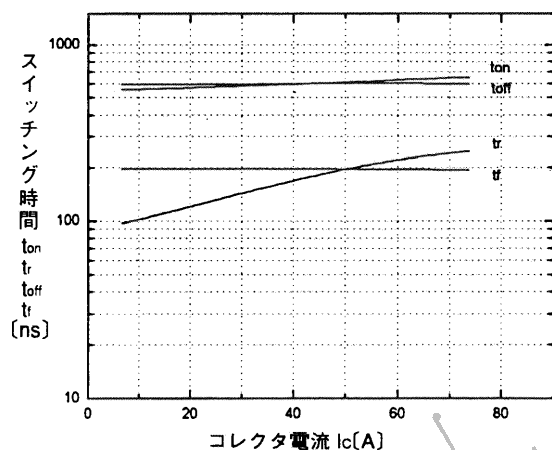
コレクタ電流-コレクタ・エミッタ間電圧特性 ($T_j=125^\circ\text{C}$) <ブレーキ部>
Collector current vs. Collector-Emitter voltage <BRAKE>



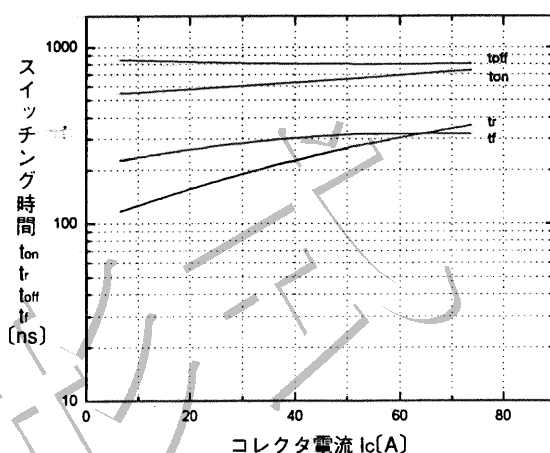
コレクタ・エミッタ間電圧-ゲート・エミッタ間電圧特性 ($T_j=25^\circ\text{C}$) <ブレーキ部>
Collector-Emitter voltage vs. Gate-Emitter voltage <BRAKE>



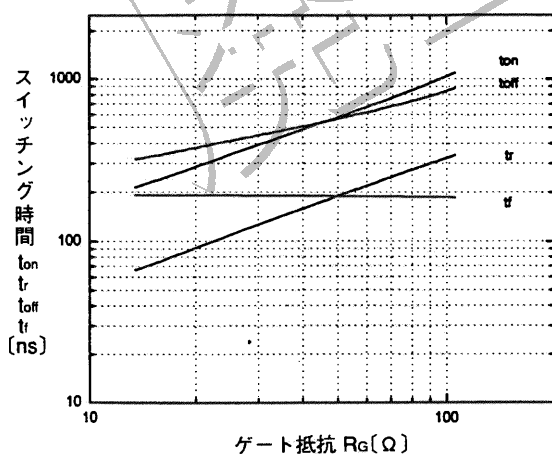
コレクタ・エミッタ間電圧-ゲート・エミッタ間電圧特性 ($T_j=125^\circ\text{C}$) <ブレーキ部>
Collector-Emitter voltage vs. Gate-Emitter voltage <BRAKE>



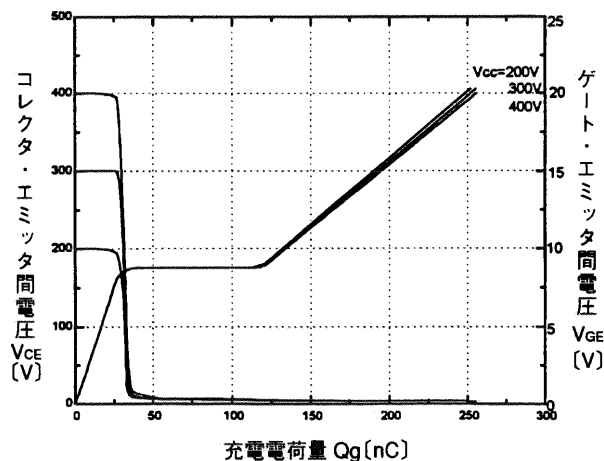
スイッチング時間-コレクタ電流特性 ($T_j=25^\circ\text{C}$)<ブレーキ部>
Switching time vs. Collector current<BRAKE>



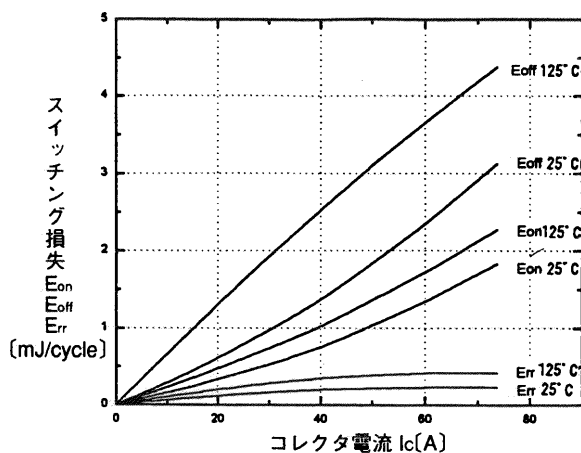
スイッチング時間-コレクタ電流特性 ($T_j=125^\circ\text{C}$)<ブレーキ部>
Switching time vs. Collector current<BRAKE>



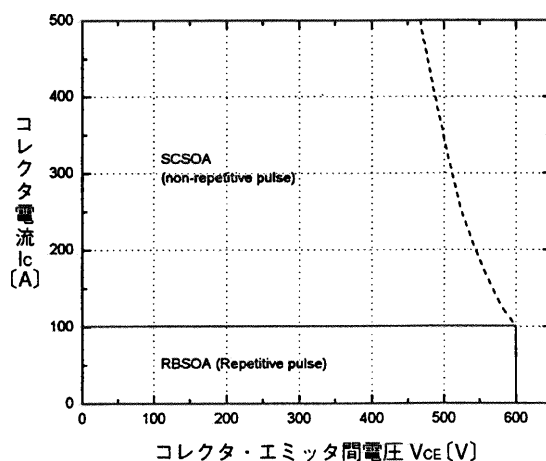
スイッチング時間-ゲート抵抗特性 ($T_j=25^\circ\text{C}$)<ブレーキ部>
Switching time vs. Gate resistance<BRAKE>



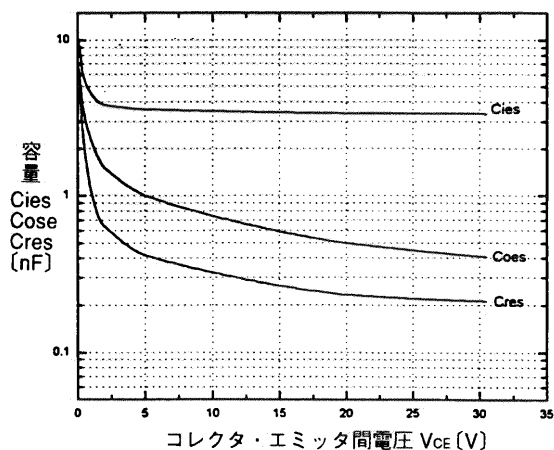
ダイナミック入力特性 ($T_j=25^\circ\text{C}$)<ブレーキ部>
Dynamic input characteristic<BRAKE>



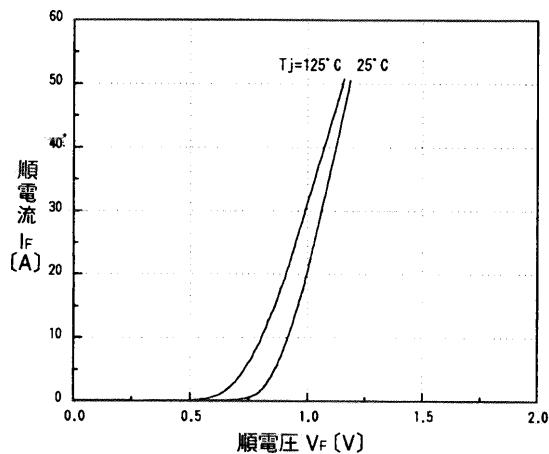
スイッチング損失-コレクタ電流特性<ブレーキ部>
Switching loss vs. Collector current<BRAKE>



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 ($T_j=25^{\circ}\text{C}$) <ブレーキ部>
Capacitance vs. Collector-Emitter voltage <BRAKE>



コンバータ部ダイオード順電圧特性
Converter Diode
Forward current vs. Forward voltage

■ Outline Drawings, mm

