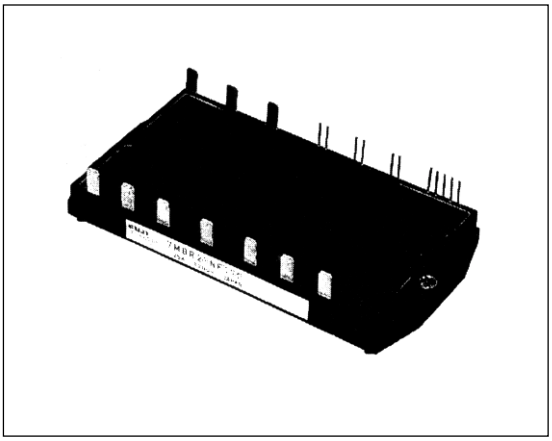
IGBT MODULE

1200V / 10A / 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}		1200	V
	Gate-Emitter voltage		V_{GES}		±20	V
	Collector current	DC	I_C		10	A
		1ms	I_{CP}		20	A
		DC	$-I_C$		10	A
	Collector power disspation	1 device	P_C		60	W
Brake	Collector-Emitter voltage		V_{CES}		1200	V
	Gate-Emitter voltage		V_{GES}		±20	V
	Collector current	DC	I_C		5	A
		1ms	I_{CP}		12.5	A
	Collector power disspation	1 device	P_C		40	W
	Repetitive peak reverse voltage		V_{RRM}		1200	V
	Average forward current		$I_{F(AV)}$		1	A
	Surge current		I_{FSM}	10ms	50	A
Converter	Repetitive peak reverse voltage		V_{RRM}		1600	V
	Non-Repetitive peak reverse voltage		V_{RSM}		1700	V
	Average output current		I_O	50Hz/60Hz sine wave	25	A
	Surge current (Non-Repetitive)		I_{FSM}	Tj=150°C, 10ms	320	A
	I^2t (Non-Repetitive)			Tj=150°C, 10ms	512	A^2s
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)**

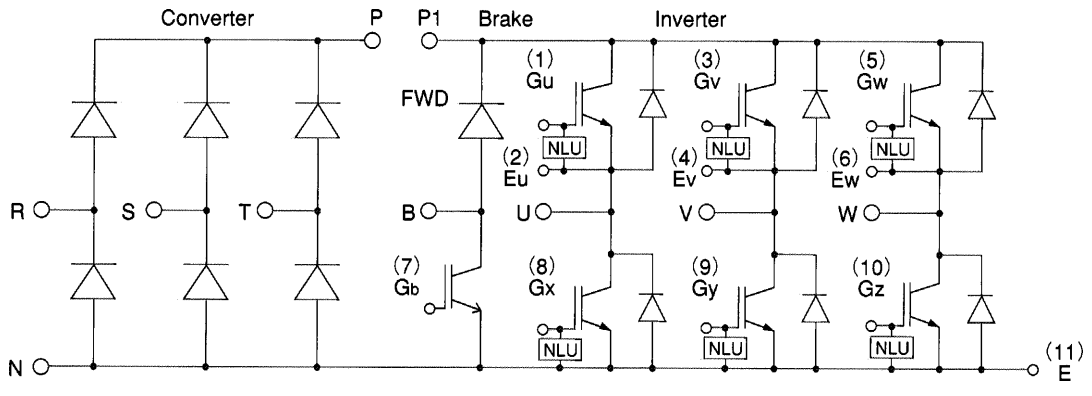
Item		Symbol	Condition	Characteristics			Unit
				Min.	Typ.	Max.	
Inverter (IGBT)	Zero gate voltage collector current	I_{CES}	V_{CE}=1200V, V_{GE}=0V, Tj=25°C			1.0	mA
	Gate-Emitter leakage current	I_{GES}	V_{CE}=0V, V_{GE}=±20V			100	nA
	Gate-Emitter threshold voltage	$V_{GE(th)}$	V_{CE}=20V, I_C=10mA	4.5		7.5	V
	Collector-Emitter saturation voltage	$V_{CE(sat)}$	V_{GE}=15V, Ic=10A			3.3	V
	Collector-Emitter voltage	-V_{CE}	-Ic=10A			3.0	V
	Input capacitance	C_{ies}	V_{GE}=0V, V_{CE}=10V, f=1MHz		2100		pF
	Switching time	t_{on}	V_{CC}=600V			1.2	µs
		t_r	I_C=10A			0.6	µs
		t_{off}	V_{GE}=±15V			1.5	µs
		t_f	R_G=62 ohm			0.5	µs
	Reverse recovery time of FRD	t_{rr}	I_F=10A,V_{GE}=-10V,-di/dt=50A/µs			350	ns
Brake (IGBT)	Zero gate voltage collector current	I_{CES}	V_{CES}=1200V, V_{GE}=0V			1.0	mA
	Gate-Emitter leakage current	I_{GES}	V_{CE}=0V, V_{GE}=±20V			100	nA
	Collector-Emitter saturation voltage	$V_{CE(sat)}$	I_C=5A, V_{GE}=15V			3.55	V
	Switching time	t_{on}	V_{CC}=600V			0.8	µs
		t_r	I_C=5A			0.6	µs
		t_{off}	V_{GE}=±15V			1.5	µs
		t_f	R_G= 120 ohm			0.5	µs
Brake (FWD)	Reverse current	I_{RRM}					
	Reverse recovery time	t_{rr}					
Converter	Forward voltage	V_{FM}	I_F=25A			1.4	V
	Reverse current	I_{RRM}	V_R=V_{RRM}			1.0	mA

● **Thermal Characteristics**

Item	Symbol	Condition	Characteristics			Unit
			Min.	Typ.	Max.	
Thermal resistance (1 device)	Rth(j-c)	Inverter IGBT			1.67	°C/W
		Inverter FRD			3.30	
		Brake IGBT			3.12	
		Converter Diode			3.40	
Contact thermal resistance *	Rth(c-f)	With thermal compound		0.05		

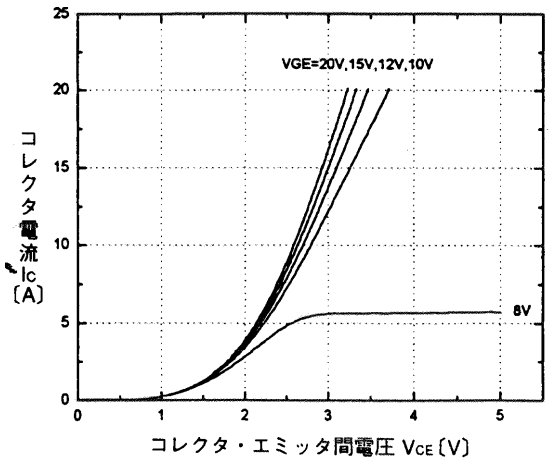
* This is the value which is defined mounting on the additional cooling fin with thermal compound

■ Equivalent Circuit Schematic

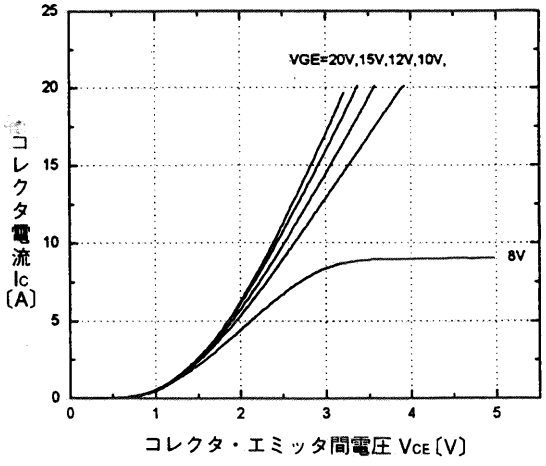


* NLU (Over current Limiting circuit)

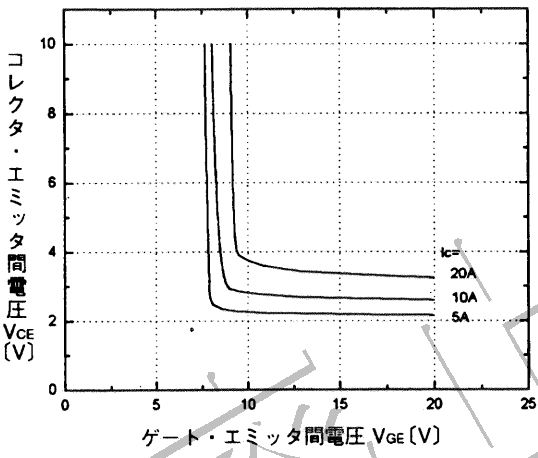
■ Characteristics (Representative)



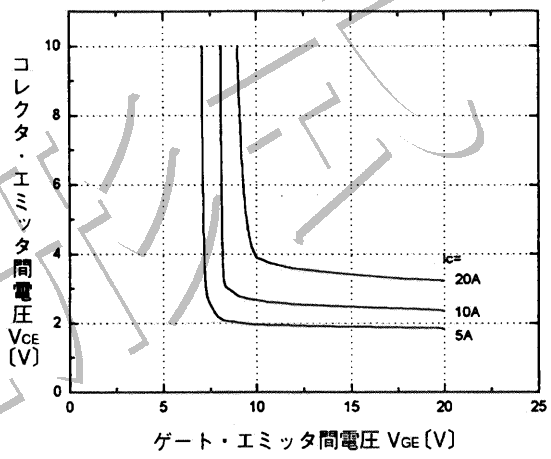
コレクタ電流－コレクタ・エミッタ間電圧特性(Tj＝25℃)〈INV部〉
Collector current vs. Collector-Emitter voltage〈INV〉



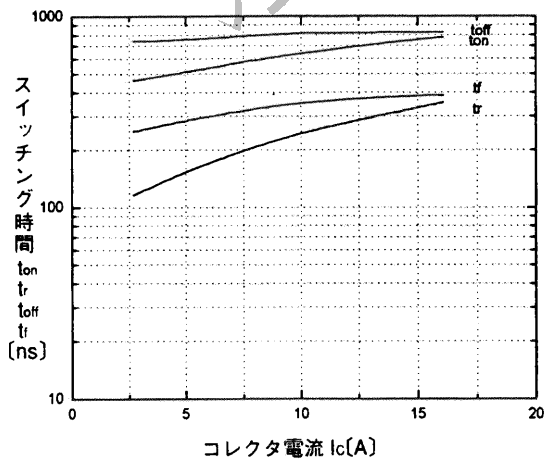
コレクタ電流－コレクタ・エミッタ間電圧特性(Tj＝125℃)〈INV部〉
Collector current vs. Collector-Emitter voltage〈INV〉



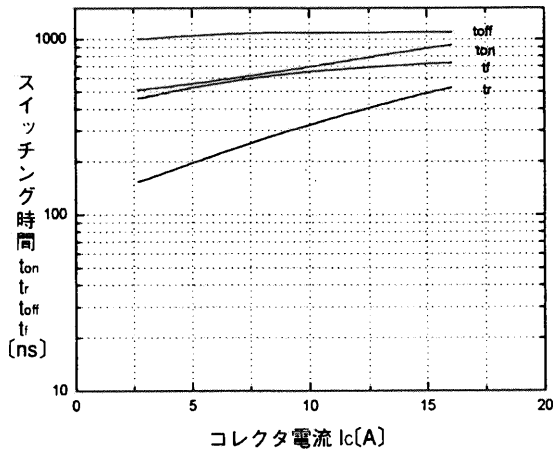
コレクタ・エミッタ間電圧－ゲート・エミッタ間電圧特性(Tj＝25℃)〈INV部〉
Collector-Emitter voltage vs. Gate-Emitter voltage〈INV〉



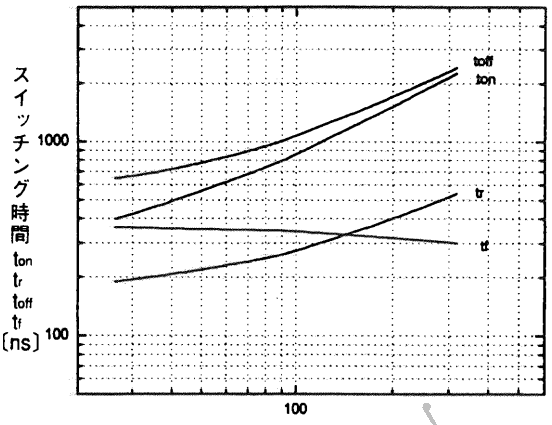
コレクタ・エミッタ間電圧－ゲート・エミッタ間電圧特性(Tj＝125℃)〈INV部〉
Collector-Emitter voltage vs. Gate-Emitter voltage〈INV〉



スイッチング時間－コレクタ電流特性(Tj＝25℃)〈INV部〉
Switching time vs. Collector current〈INV〉



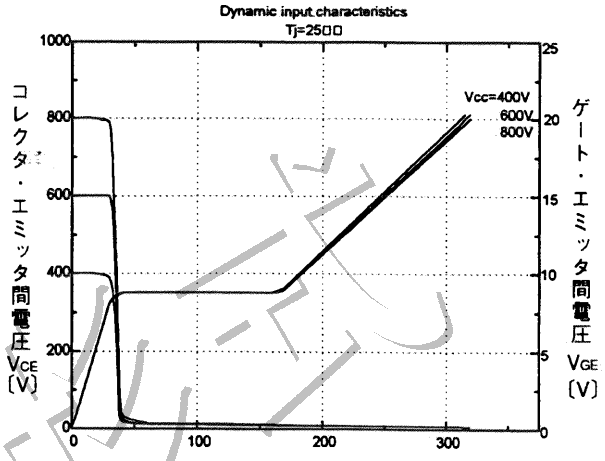
スイッチング時間－コレクタ電流特性(Tj＝125℃)〈INV部〉
Switching time vs. Collector current〈INV〉



ゲート抵抗 R_G〔Ω〕

スイッチング時間ーゲート抵抗特性(T_j=25°C)〈INV部〉

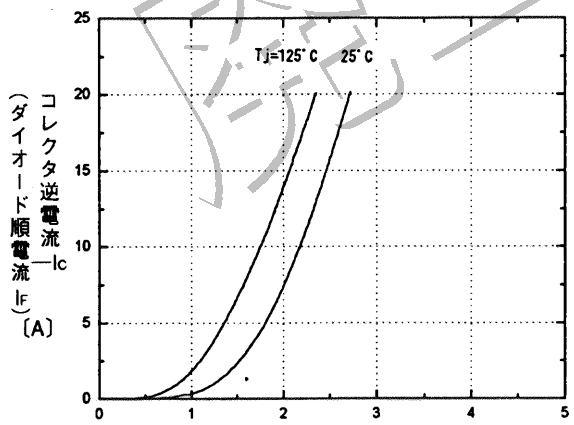
Switching time vs. Gate resistance〈INV〉



充電電荷量 Qg〔nC〕

ダイナミック入力特性(T_j=25°C)〈INV部〉

Dynamic input characteristic〈INV〉

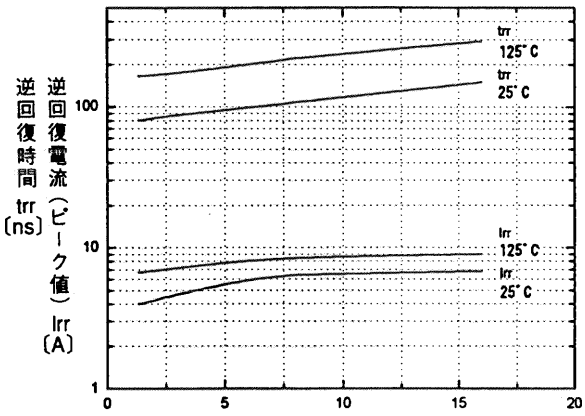


エミッタ・コレクタ間電圧 V_{ECD}〔V〕

（ダイオード順電圧 V_F）

高速フリーホイルダイオード順電圧特性〈INV部〉

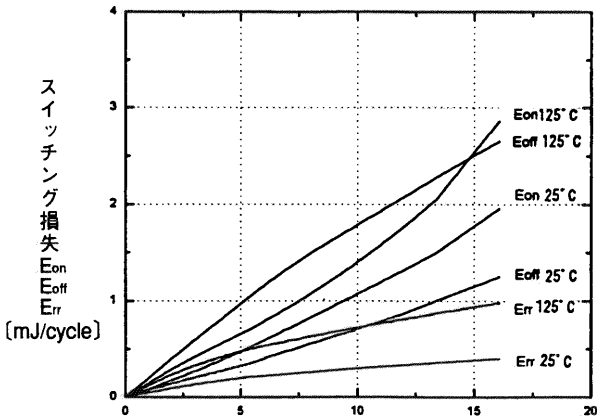
Forward voltage of free wheel diode〈INV〉



順電流 I_F〔A〕

Trr, Irr-I_F特性〈INV部〉

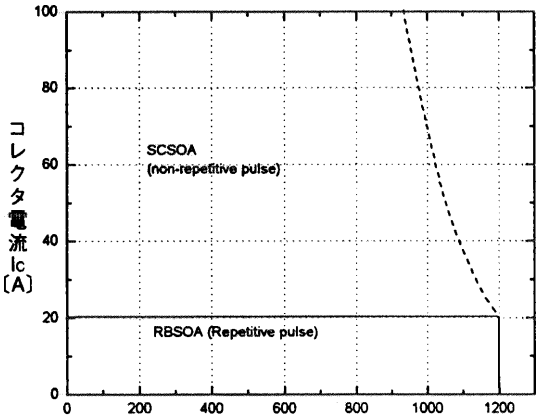
Trr, Irr-I_F〈INV〉



コレクタ電流 Ic〔A〕

スイッチング損失ーコレクタ電流特性〈INV部〉

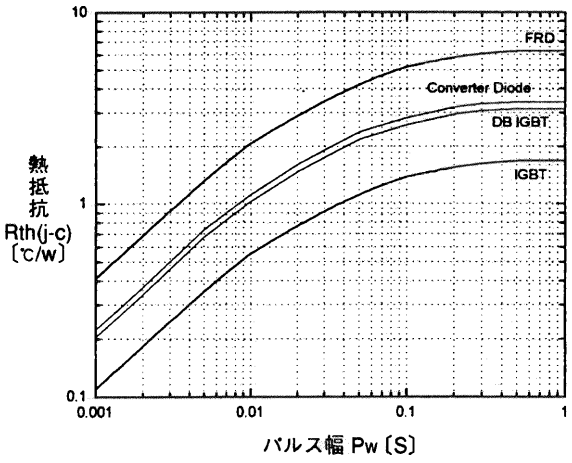
Switching loss vs, Collector current〈INV〉



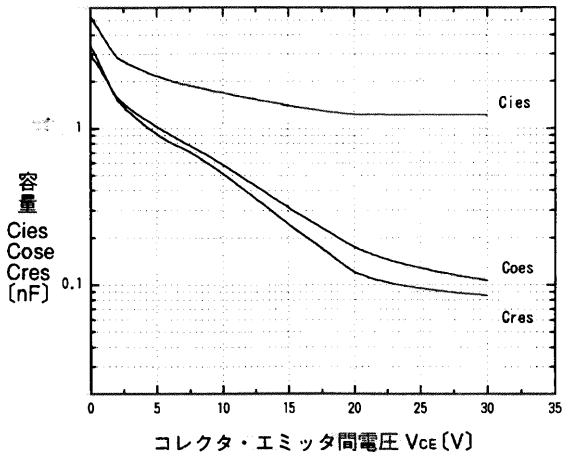
コレクタ・エミッタ間電圧 V_{CE}〔V〕

安全動作領域(逆バイアス)(T_j≦125°C)〈INV部〉

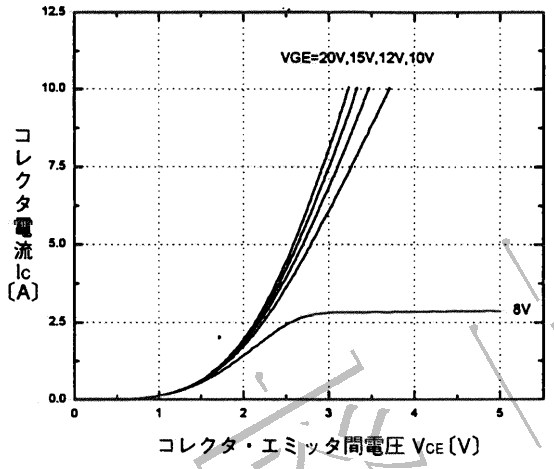
Reverse biased safe operating area〈INV〉



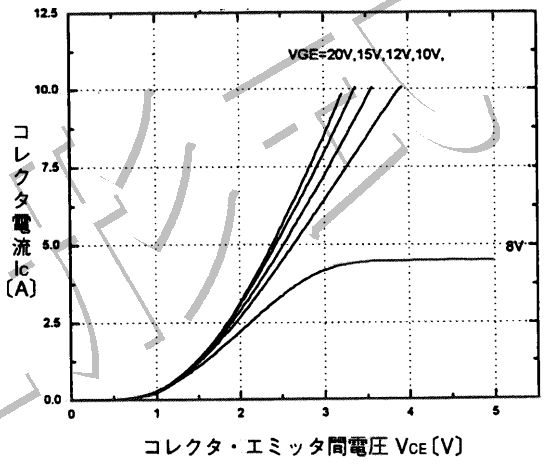
過渡熱抵抗特性
Transient thermal resistance



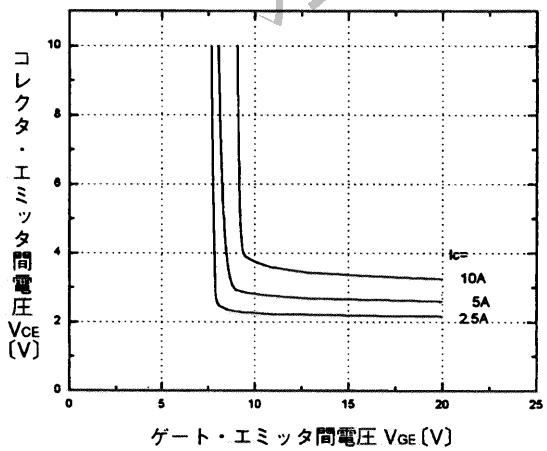
容量－コレクタ・エミッタ間電圧特性(T_j＝25℃)〈INV部〉
Capacitance vs. Collector-Emitter voltage〈INV〉



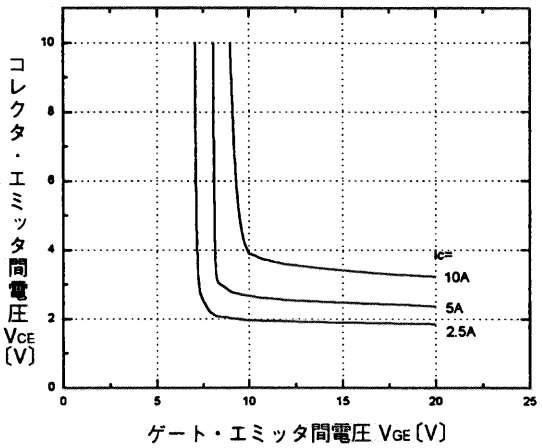
コレクタ電流－コレクタ・エミッタ間電圧特性(T_j＝25℃)〈ブレーキ部〉
Collector current vs. Collector-Emitter voltage〈BRAKE〉



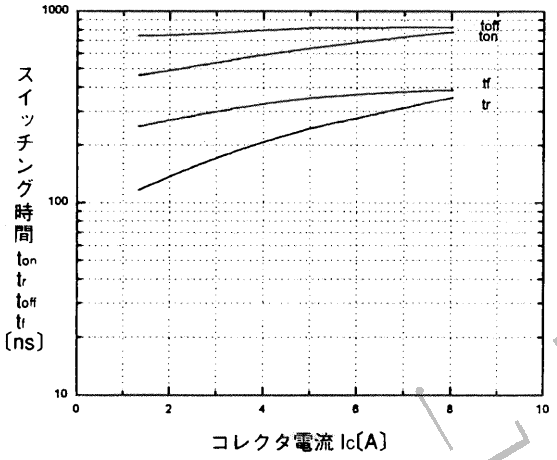
コレクタ電流－コレクタ・エミッタ間電圧特性(T_j＝125℃)〈ブレーキ部〉
Collector current vs. Collector-Emitter voltage〈BRAKE〉



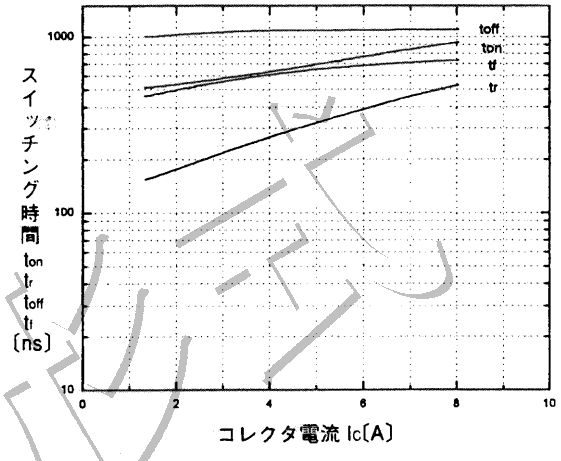
コレクタ・エミッタ間電圧－ゲート・エミッタ間電圧特性(T_j＝25℃)〈ブレーキ部〉
Collector-Emitter voltage vs. Gate-Emitter voltage〈BRAKE〉



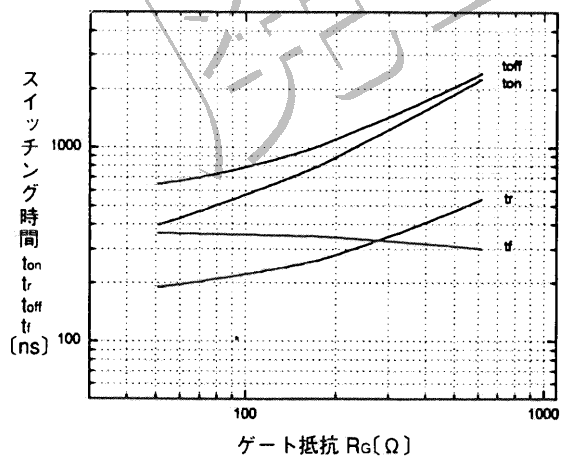
コレクタ・エミッタ間電圧－ゲート・エミッタ間電圧特性(T_j＝125℃)〈ブレーキ部〉
Collector-Emitter voltage vs. Gate-Emitter voltage〈BRAKE〉



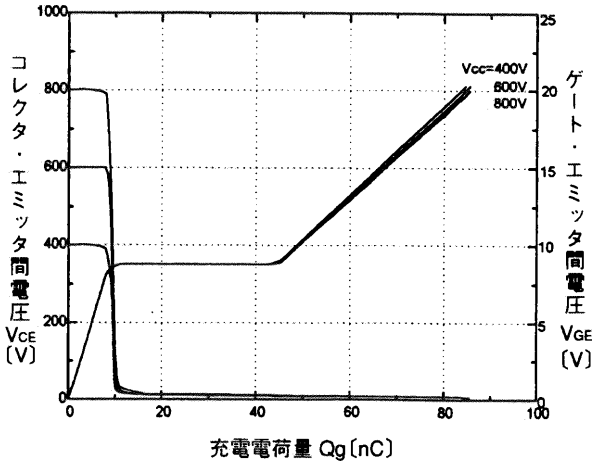
スイッチング時間－コレクタ電流特性(Tj＝25°C)〈ブレーキ部〉
Switching time vs. Collector current〈BRAKE〉



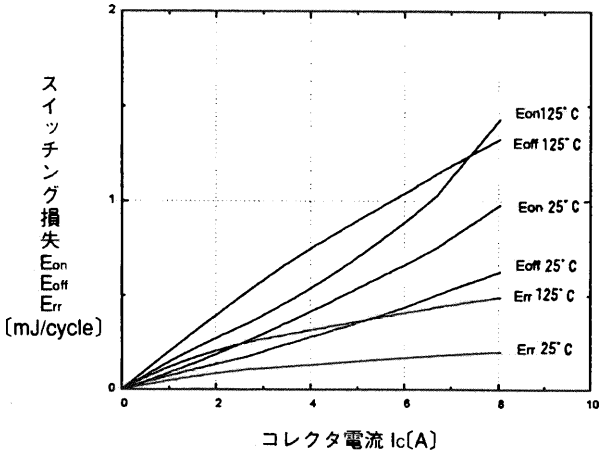
スイッチング時間－コレクタ電流特性(Tj＝125°C)〈ブレーキ部〉
Switching time vs. Collector current〈BRAKE〉



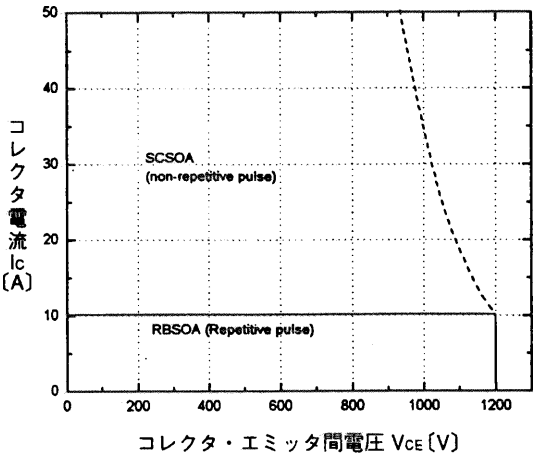
スイッチング時間－ゲート抵抗特性(Tj＝25°C)〈ブレーキ部〉
Switching time vs. Gate resistance〈BRAKE〉



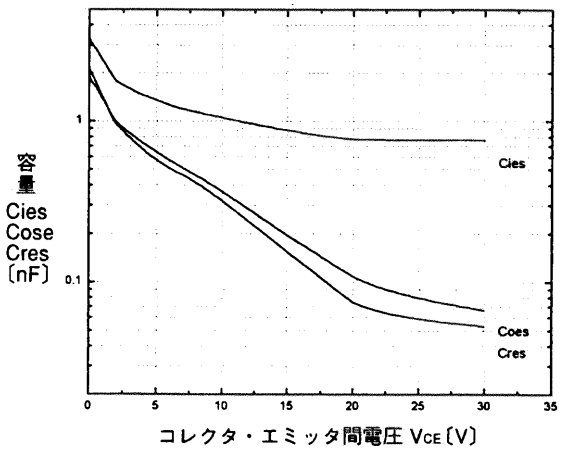
ダイナミック入力特性(Tj＝25°C)〈ブレーキ部〉
Dynamic input characteristic〈BRAKE〉



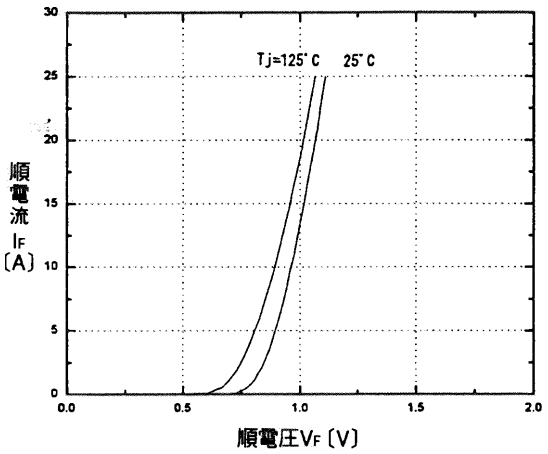
スイッチング損失－コレクタ電流特性〈ブレーキ部〉
Switching loss vs, Collector current〈BRAKE〉



安全動作領域(逆バイアス)(Tj≦125°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（Tj＝25°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

■ Outline Drawings, mm