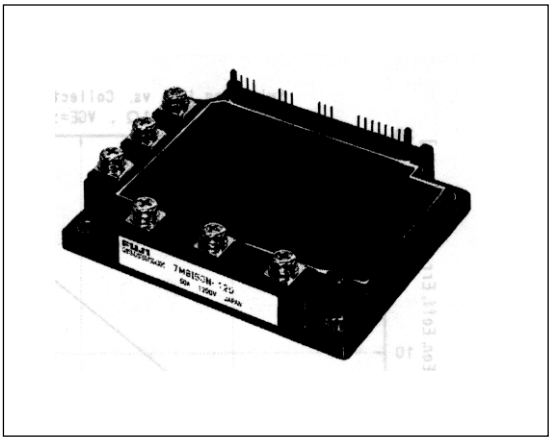
IGBT MODULE (N-series)

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_{CES}		1200	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 disspation	1 device	P_C		400	W
Brake(IGBT+FWD)	Collector-Emitter voltage		V_{CES}		1200	V
	Gate-Emitter voltage		V_{GES}		±20	V
	Collector current	DC	I_C		25	A
		1ms	I_{CP}		50	A
	Collector power disspation	1 device	P_C		200	W
	Repetitive peak reverse voltage		V_{RRM}		1200	V
	Average forward current		$I_{F(AV)}$		1	A
	Surge current		I_{FSM}	10ms	50	A
Operating junction temperature			T_j		+150	℃
Storage temperature			T_{stg}		-40 to +125	°C
Isolation voltage			V_{iso}	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)**

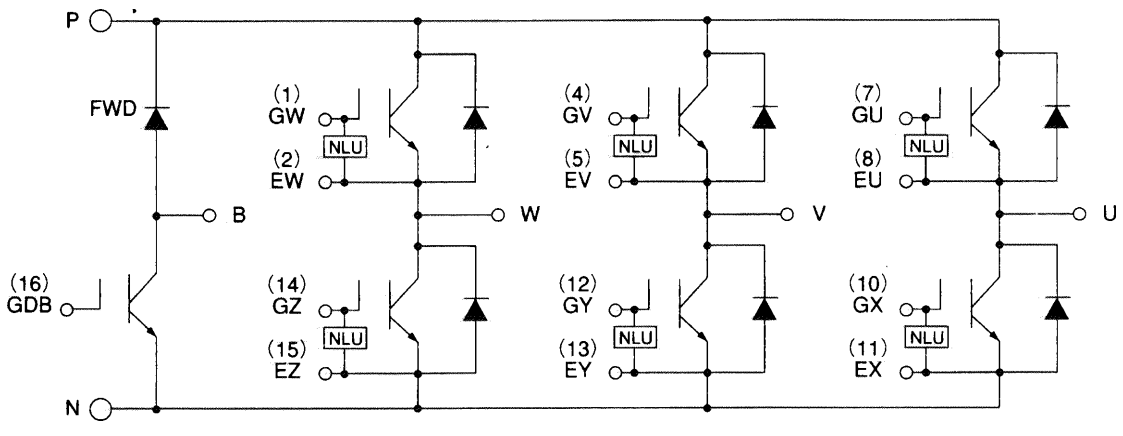
Item		Symbol	Condition	Characteristics			Unit
				Min.	Typ.	Max.	
Inverter (IGBT)	Zero gate voltage collector current	I_{CES}	Tj=25°C, V_{CE}=1200V, V_{GE}=0V			3.0	mA
	Gate-Emitter leakage current	I_{GES}	V_{CE}=0V, V_{GE}=±20V			15	µA
	Gate-Emitter threshold voltage	$V_{GE(th)}$	V_{CE}=20V, I_C=50mA	4.5		7.5	V
	Collector-Emitter saturation voltage	$V_{CE(sat)}$	V_{GE}=15V, Ic=50A			3.3	V
	Collector-Emitter voltage	-V_{CE}	-Ic=50A			3.0	V
	Input capacitance	C_{ies}	V_{GE}=0V, V_{CE}=10V, f=1MHz		8000		pF
	Switching time	t_{on}	V_{CC}=600V			1.2	µs
		t_{off}	I_C=50A			1.5	µs
		t_f	V_{GE}=±15V, R_G=24 ohm			0.5	µs
	Reverse recovery time of FRD	t_{rr}	I_F=50A,V_{GE}=-10V,-di/dt=150A/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=25A, V_{GE}=15V			3.3	V
	Switching time	t_{on}	V_{CC}=600V			1.2	µs
		t_{off}	I_C=25A			1.5	µs
		t_f	V_{GE}=±15V, R_G=51ohm			0.5	µs
Brake (FWD)	Reverse current	I_{RRM}	V_R=V_{RRM}			1.0	mA
	Reverse recovery time	t_{rr}				600	ns

● **Thermal Characteristics**

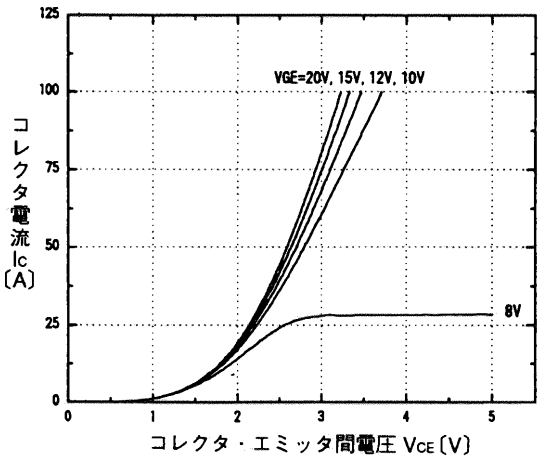
Item	Symbol	Condition	Characteristics			Unit
			Min.	Typ.	Max.	
Thermal resistance (1 device)	Rth(j-c)	Inverter IGBT			0.31	°C/W
		Inverter FRD			0.85	
		Brake IGBT			0.63	
Contact thermal resistance *	Rth(c-f)	With thermal compound		0.05		

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

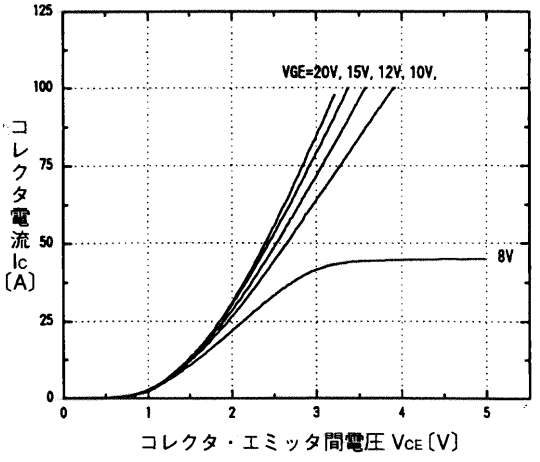
■ Equivalent Circuit Schematic



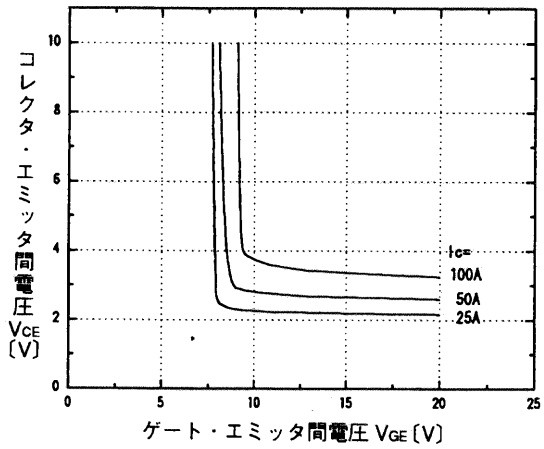
■ Characteristics (Representative)



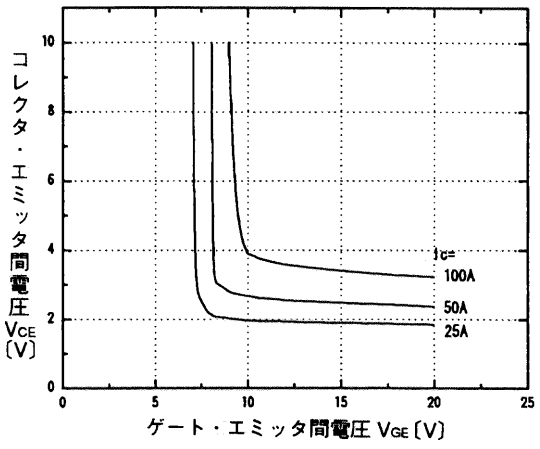
コレクタ電流－コレクタ・エミッタ間電圧特性(T_j＝25℃)〈INV部〉
Collector current vs. Collector-Emitter voltage〈INV〉



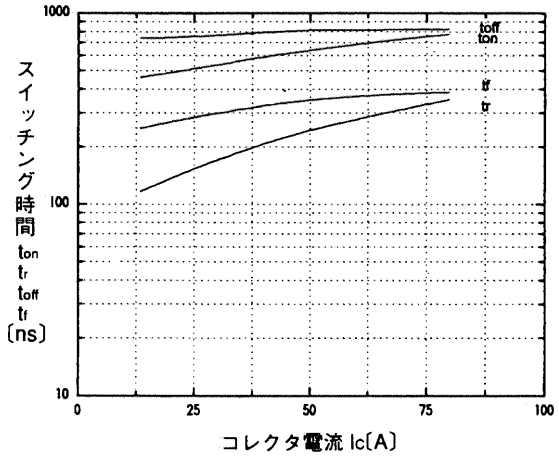
コレクタ電流－コレクタ・エミッタ間電圧特性(T_j＝125℃)〈INV部〉
Collector current vs. Collector-Emitter voltage〈INV〉



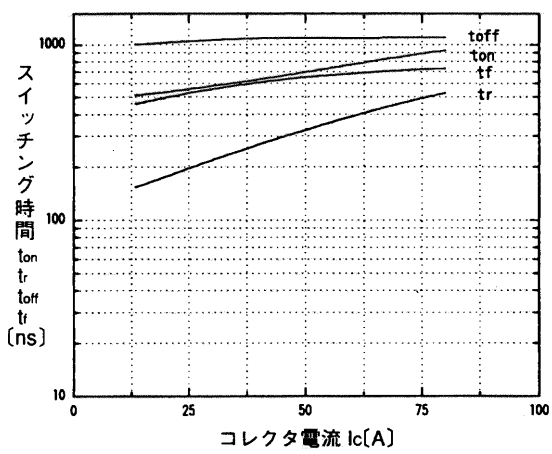
コレクタ・エミッタ間電圧－ゲート・エミッタ間電圧特性(T_j＝25℃)〈INV部〉
Collector-Emitter voltage vs. Gate-Emitter voltage〈INV〉



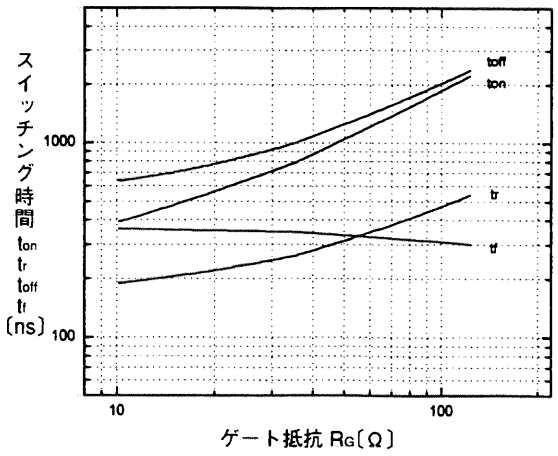
コレクタ・エミッタ間電圧－ゲート・エミッタ間電圧特性(T_j＝125℃)〈INV部〉
Collector-Emitter voltage vs. Gate-Emitter voltage〈INV〉



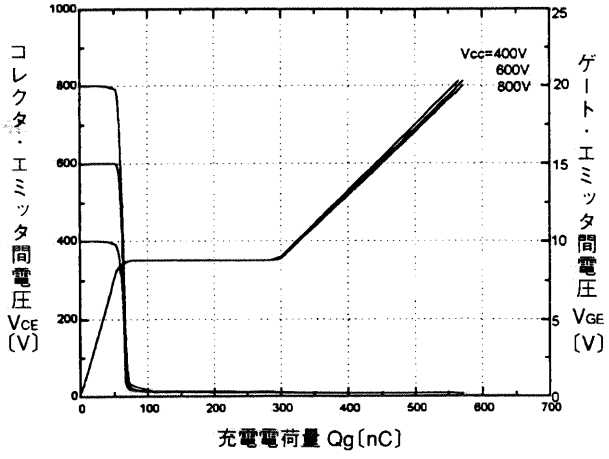
スイッチング時間－コレクタ電流特性(T_j＝25℃)〈INV部〉
Switching time vs. Collector current〈INV〉



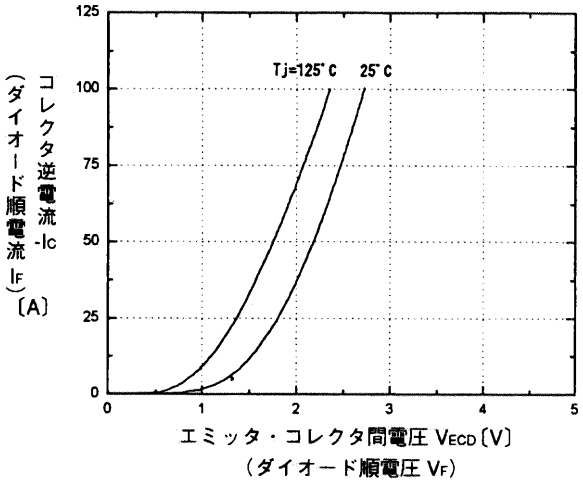
スイッチング時間－コレクタ電流特性(T_j＝125℃)〈INV部〉
Switching time vs. Collector current〈INV〉



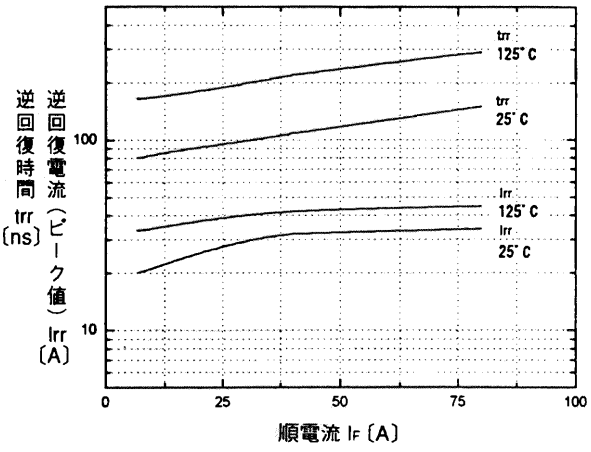
スイッチング時間ーゲート抵抗特性(T_j=25℃)<INV部>
Switching time vs. Gate resistance<INV>



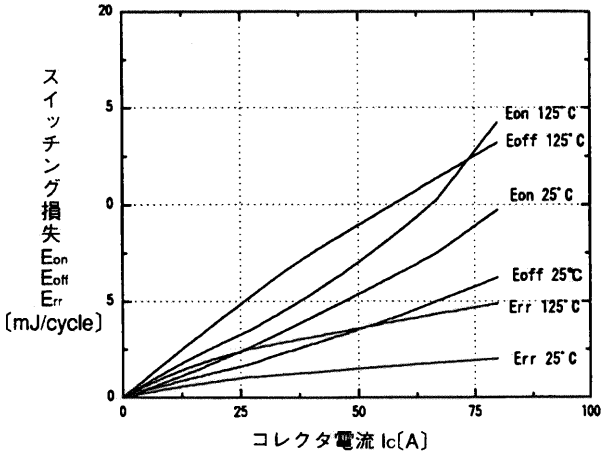
ダイナミック入力特性(T_j=25℃)<INV部>
Dynamic input characteristic<INV>



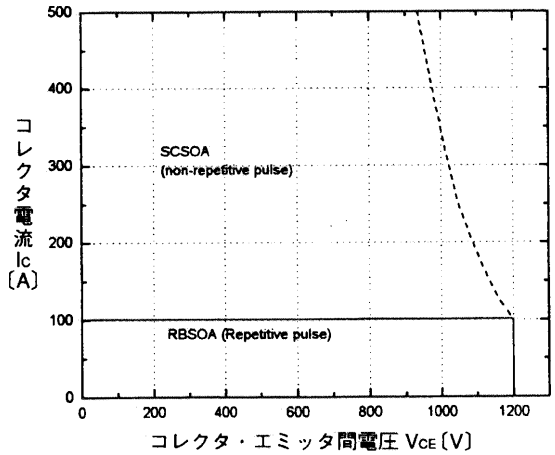
高速フリーホイルダイオード順電圧特性<INV部>
Forward voltage of free wheel diode<INV>



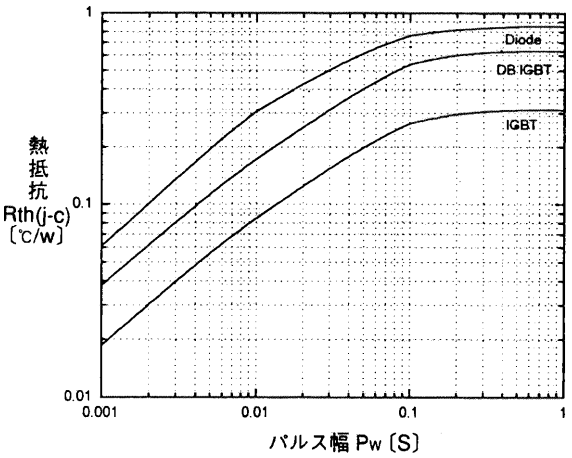
Trr, Irr-I_F特性<INV部>
Trr, Irr-I_F<INV>



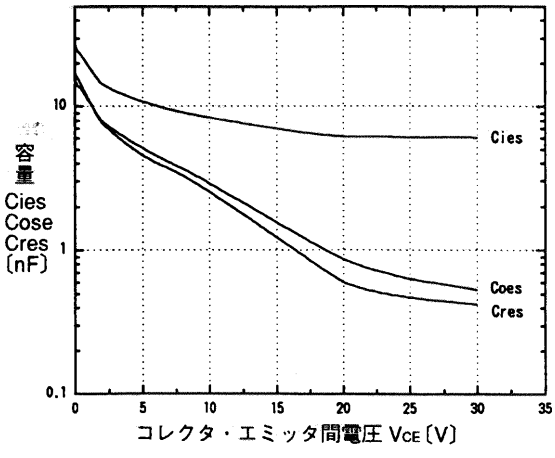
スイッチング損失ーコレクタ電流特性<INV部>
Switching loss vs, Collector current<INV>



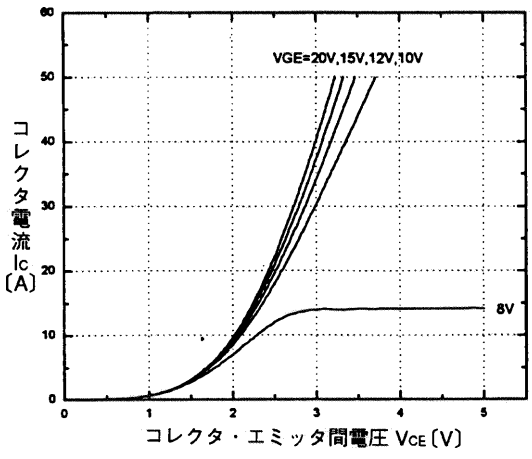
安全動作領域(逆バイアス)(T_j≦125℃)<INV部>
Reverse biased safe operating area<INV>



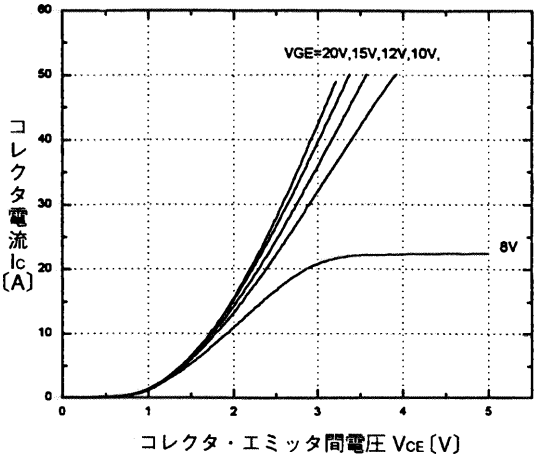
過渡熱抵抗特性
Transient thermal resistance



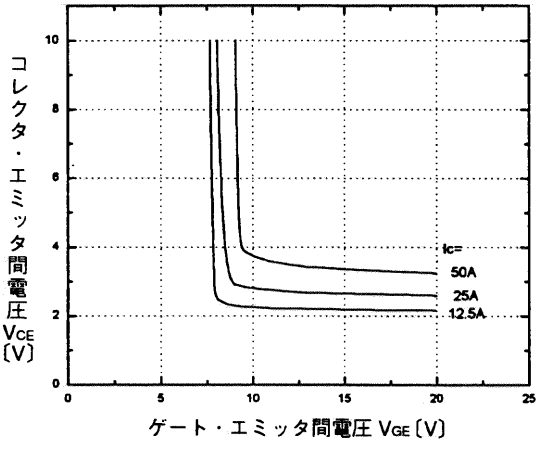
容量－コレクタ・エミッタ間電圧特性(T_j＝25℃)〈INV部〉
Capacitance vs. Collector-Emitter voltage〈INV〉



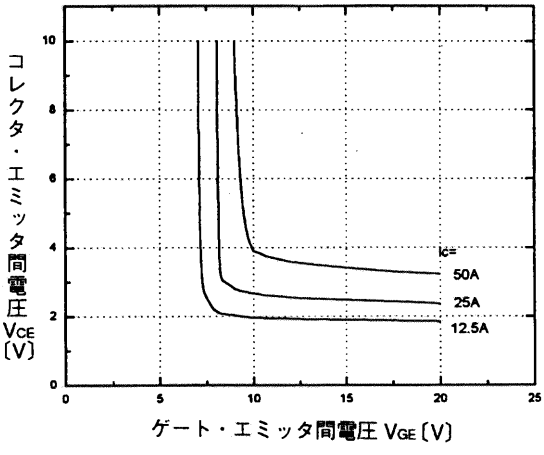
コレクタ電流－コレクタ・エミッタ間電圧特性(T_j＝25℃)〈ブレーキ部〉
Collector current vs. Collector-Emitter voltage〈BRAKE〉



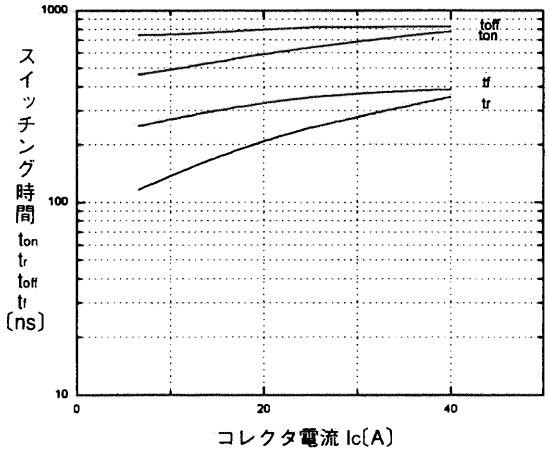
コレクタ電流－コレクタ・エミッタ間電圧特性(T_j＝125℃)〈ブレーキ部〉
Collector current vs. Collector-Emitter voltage〈BRAKE〉



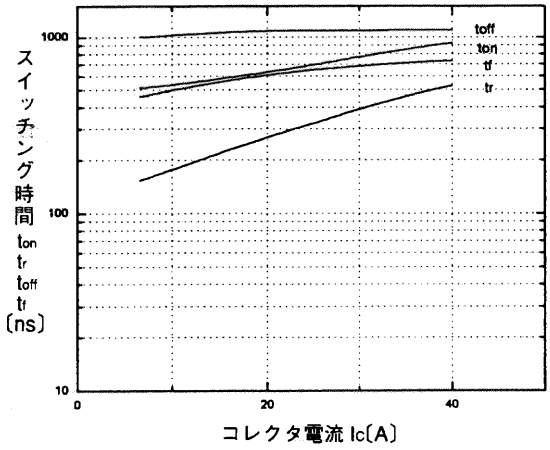
コレクタ・エミッタ間電圧－ゲート・エミッタ間電圧特性(T_j＝25℃)〈ブレーキ部〉
Collector-Emitter voltage vs. Gate-Emitter voltage〈BRAKE〉



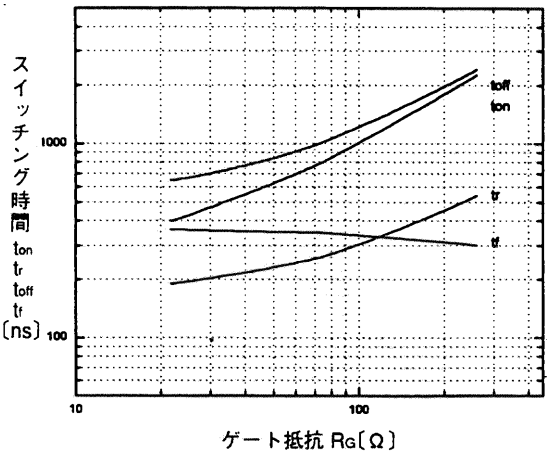
コレクタ・エミッタ間電圧－ゲート・エミッタ間電圧特性(T_j＝125℃)〈ブレーキ部〉
Collector-Emitter voltage vs. Gate-Emitter voltage〈BRAKE〉



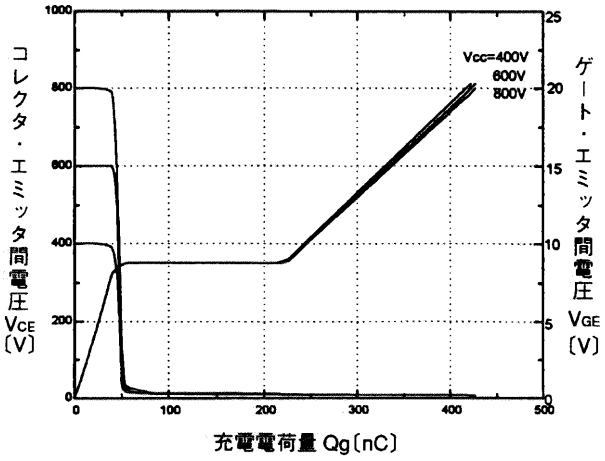
スイッチング時間ーコレクタ電流特性(T_j=25°C)〈ブレーキ部〉
Switching time vs. Collector current〈BRAKE〉



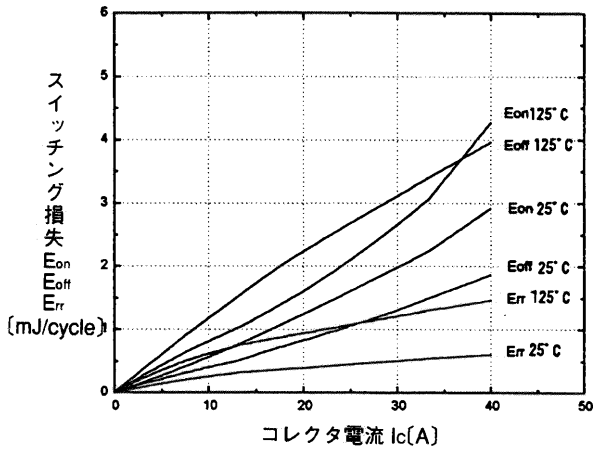
スイッチング時間ーコレクタ電流特性(T_j=125°C)〈ブレーキ部〉
Switching time vs. Collector current〈BRAKE〉



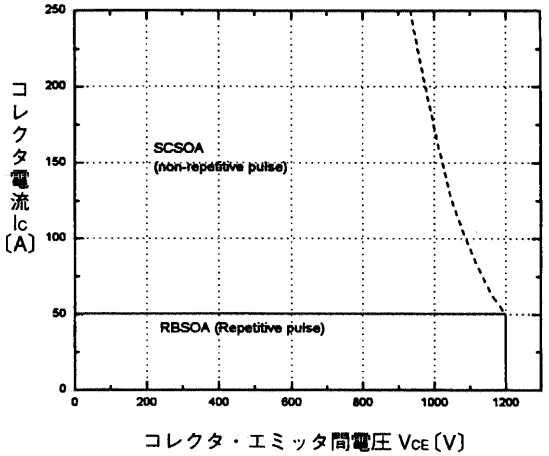
スイッチング時間ーゲート抵抗特性(T_j=25°C)〈ブレーキ部〉
Switching time vs. Gate resistance〈BRAKE〉



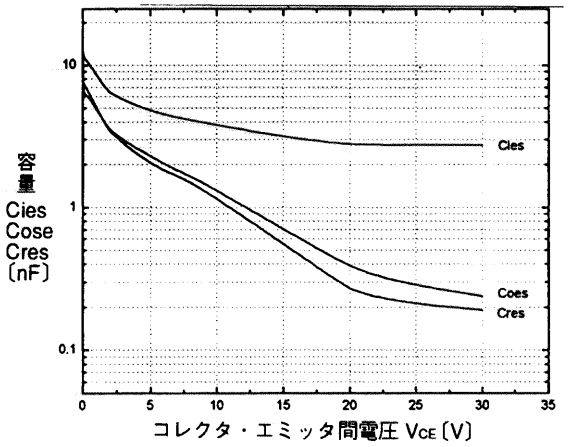
ダイナミック入力特性(T_j=25°C)〈ブレーキ部〉
Dynamic input characteristic〈BRAKE〉



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



安全動作領域(逆バイアス)(T_j≦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(T_j=25℃)〈ブレーキ部〉
Capacitance vs. Collector-Emitter voltage〈BRAKE〉

■ Outline Drawings, mm