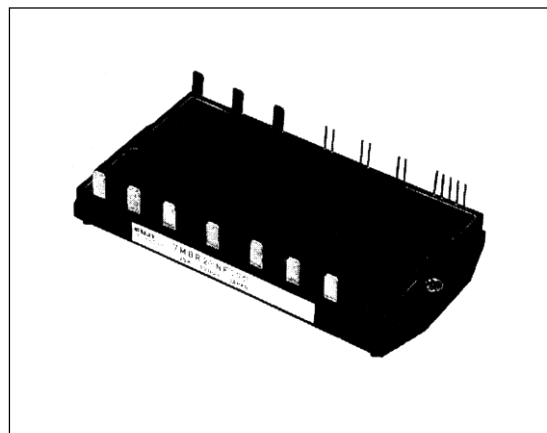


## IGBT MODULE (N series)

1200V / 15A / 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 <sub>CES</sub>		1200	V	
	Gate-Emitter voltage		V <sub>GES</sub>		±20	V	
	Collector current	DC	I <sub>C</sub>		15	A	
		1ms	I <sub>CP</sub>		30	A	
		DC	-I <sub>C</sub>		15	A	
Collector power dissipation		1 device	P <sub>C</sub>		120	W	
Brake	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>		10	A	
		1ms	I <sub>CP</sub>		25	A	
	Collector power dissipation		1 device	P <sub>C</sub>		88	W
	Repetitive peak reverse voltage		V <sub>R</sub> RM		1200	V	
	Average forward current		I <sub>F</sub> (AV)		1	A	
	Surge current		I <sub>FSM</sub>	10ms	50	A	
Converter	Repetitive peak reverse voltage		V <sub>R</sub> RM		1600	V	
	Non-Repetitive peak reverse voltage		V <sub>R</sub> SM		1700	V	
	Average output current		I <sub>O</sub>	50Hz/60Hz sine wave	25	A	
	Surge current (Non-Repetitive)		I <sub>FSM</sub>	T <sub>J</sub> =150°C, 10ms	320	A	
	I <sup>2</sup> t (Non-Repetitive)			T <sub>J</sub> =150°C, 10ms	512	A²s	
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 min.	AC 2500	V	
Mounting screw torque					1.7 * <sub>1</sub>	N·m	

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

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

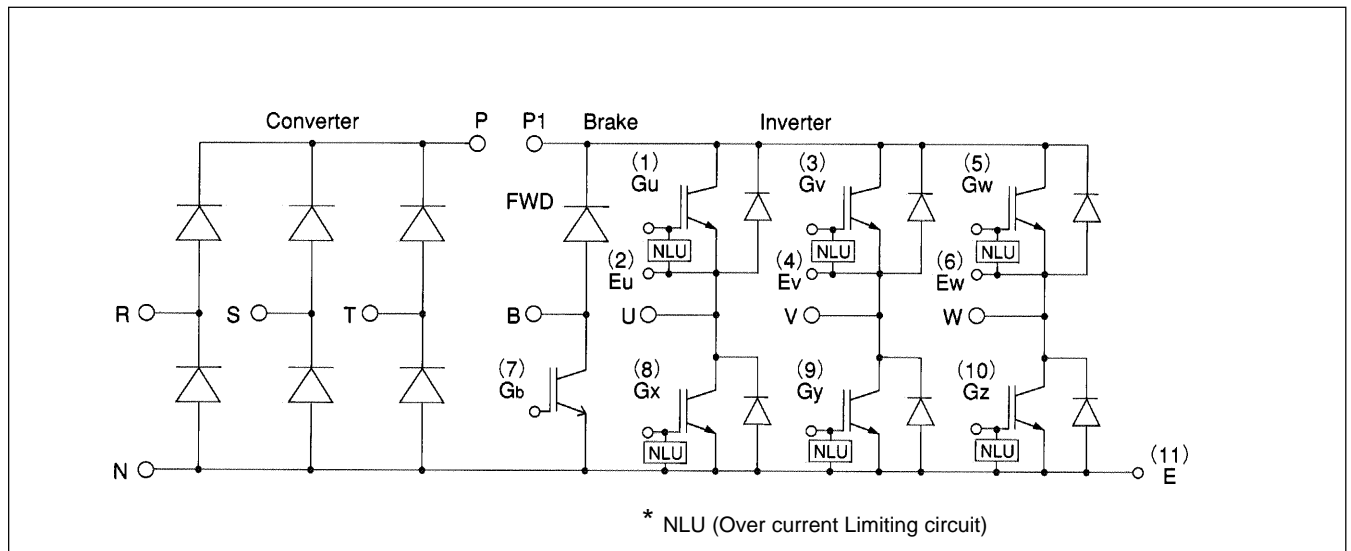
Item	Symbol	Condition	Characteristics			Unit
			Min.	Typ.	Max.	
Inverter (IGBT)	Zero gate voltage collector current	ICES	VCE=1200V, VGE=0V, Tj=25°C			1.0
	Gate-Emitter leakage current	IGES	VCE=0V, VGE=±20V			20
	Gate-Emitter threshold voltage	VGE(th)	VCE=20V, IC=15mA			4.5
	Collector-Emitter saturation voltage	VCE(sat)	VGE=15V, IC=15A			3.3
	Collector-Emitter voltage	-VCE	-IC=15A			3.0
	Input capacitance	Cies	VGE=0V, VCE=10V, f=1MHz			2400
	Switching time	ton	VCC=600V			1.2
		tr	IC=15A			0.6
		toff	VGE=±15V			1.5
		tf	RG=82 ohm			0.5
	Reverse recovery time of FRD	trr	IF=15A, VGE=-10V, -di/dt=50A/μs			350
Brake (IGBT)	Zero gate voltage collector current	ICES	VCE=1200V, VGE=0V			1.0
	Gate-Emitter leakage current	IGES	VCE=0V, VGE=±20V			100
	Collector-Emitter saturation voltage	VCE(sat)	IC=10A, VGE=15V			3.3
	Switching time	ton	VCC=600V			0.8
		tr	IC=10A			0.6
		toff	VGE=±15V			1.5
Brake (FWD)	Reverse current	IRRM	VR=1200V			1.0
	Reverse recovery time	trr				600
Converter	Forward voltage	VFM	IF=25A			1.4
	Reverse current	IRRM	VR=1600V			1.0

● Thermal Characteristics

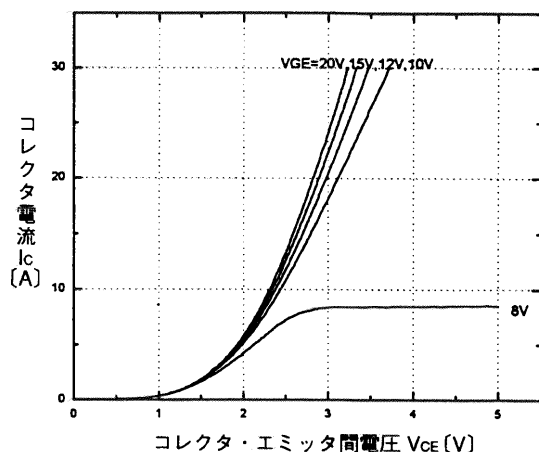
Item	Symbol	Condition	Characteristics			Unit
			Min.	Typ.	Max.	
Thermal resistance ( 1 device )	Rth(j-c)	Inverter IGBT			1.04	°C/W
		Inverter FRD			2.78	
		Brake IGBT			1.04	
		Converter Diode			3.40	
		With thermal compound		0.05		
Contact thermal resistance *	Rth(c-f)	With thermal compound		0.05		

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

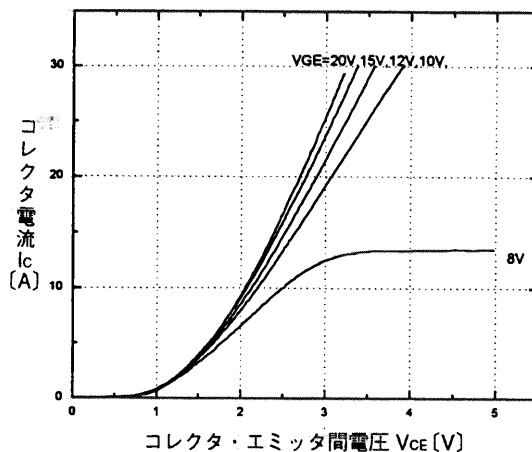
■ Equivalent Circuit Schematic



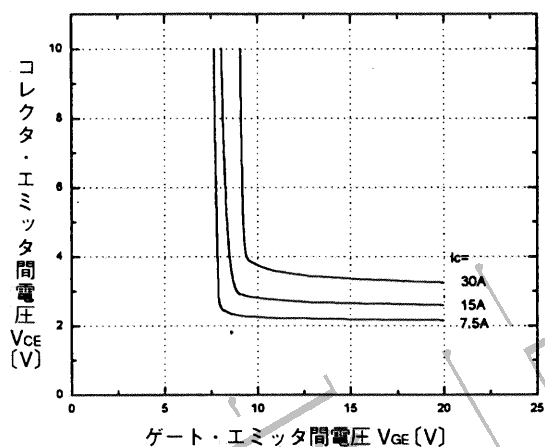
## ■ Characteristics (Representative)



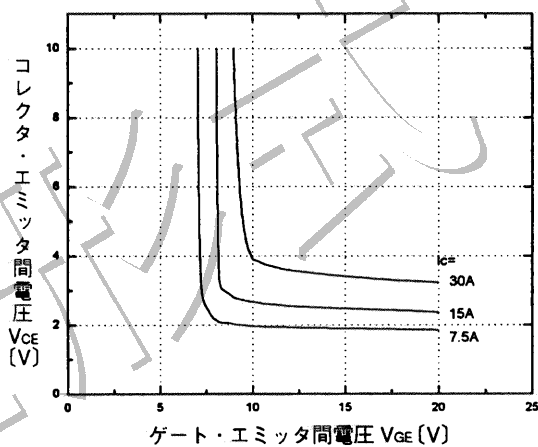
コレクタ電流－コレクタ・エミッタ間電圧特性 ( $T_j = 25^\circ\text{C}$ ) <INV部>  
Collector current vs. Collector-Emitter voltage <INV>



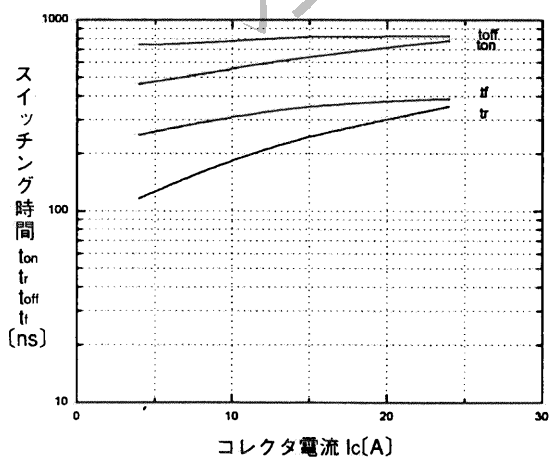
コレクタ電流－コレクタ・エミッタ間電圧特性 ( $T_j = 125^\circ\text{C}$ ) <INV部>  
Collector current vs. Collector-Emitter voltage <INV>



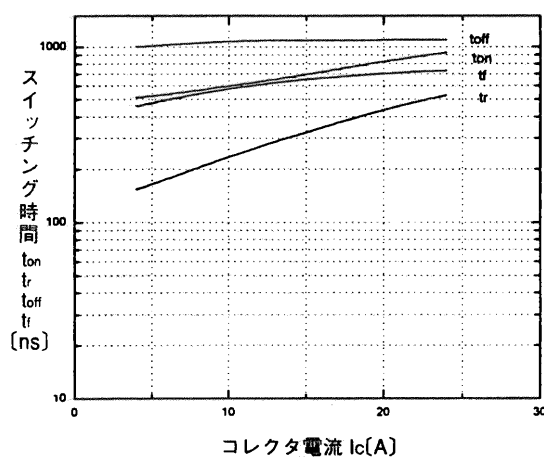
コレクタ・エミッタ間電圧－ゲート・エミッタ間電圧特性 ( $T_j = 25^\circ\text{C}$ ) <INV部>  
Collector-Emitter voltage vs. Gate-Emitter voltage <INV>



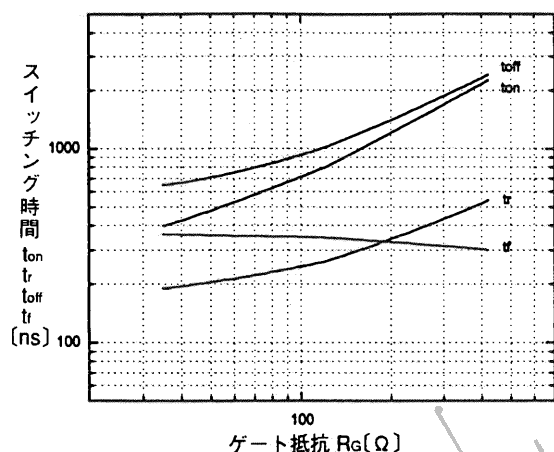
コレクタ・エミッタ間電圧－ゲート・エミッタ間電圧特性 ( $T_j = 125^\circ\text{C}$ ) <INV部>  
Collector-Emitter voltage vs. Gate-Emitter voltage <INV>



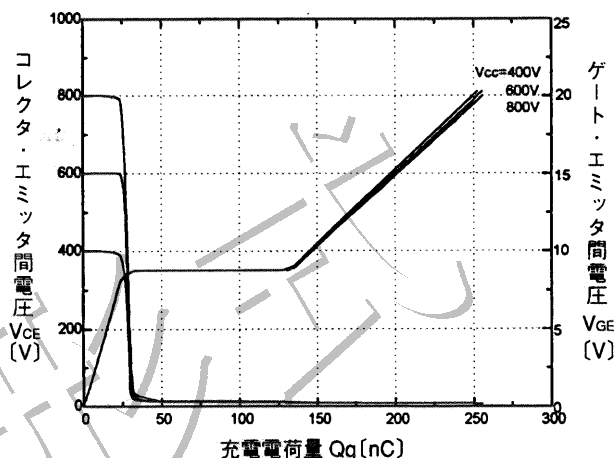
スイッチング時間－コレクタ電流特性 ( $T_j = 25^\circ\text{C}$ ) <INV部>  
Switching time vs. Collector current <INV>



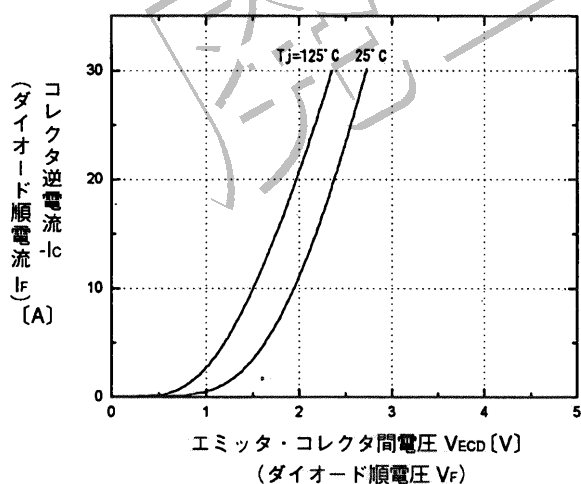
スイッチング時間－コレクタ電流特性 ( $T_j = 125^\circ\text{C}$ ) <INV部>  
Switching time vs. Collector current <INV>



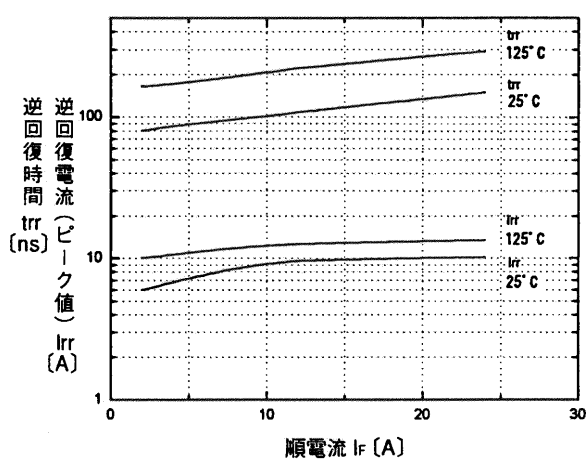
スイッチング時間-ゲート抵抗特性 ( $T_j = 25^\circ\text{C}$ ) <INV部>  
Switching time vs. Gate resistance <INV>



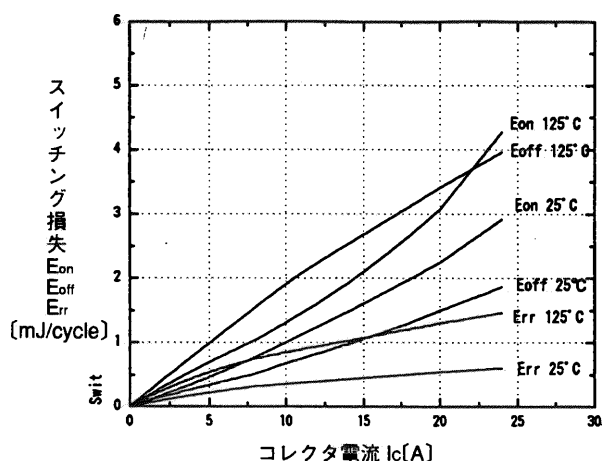
ダイナミック入力特性 ( $T_j = 25^\circ\text{C}$ ) <INV部>  
Dynamic input characteristic <INV>



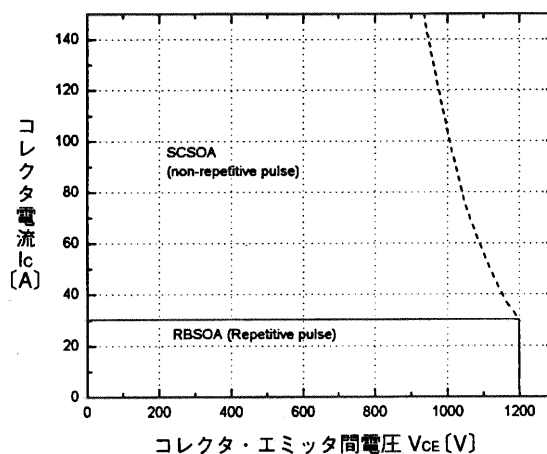
高速フリーホイールダイオード順電圧特性 <INV部>  
Forward voltage of free wheel diode <INV>



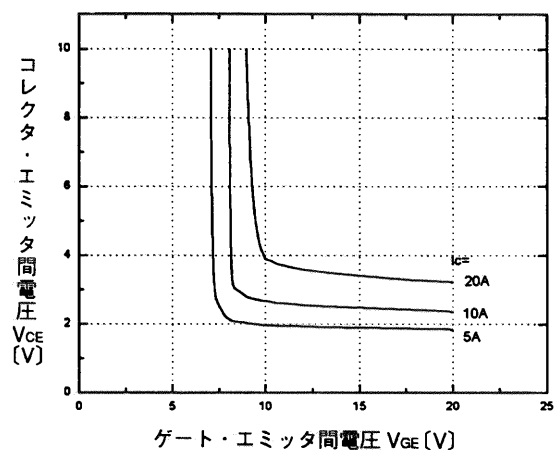
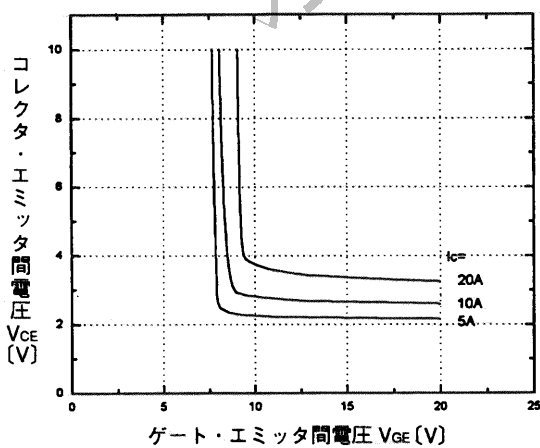
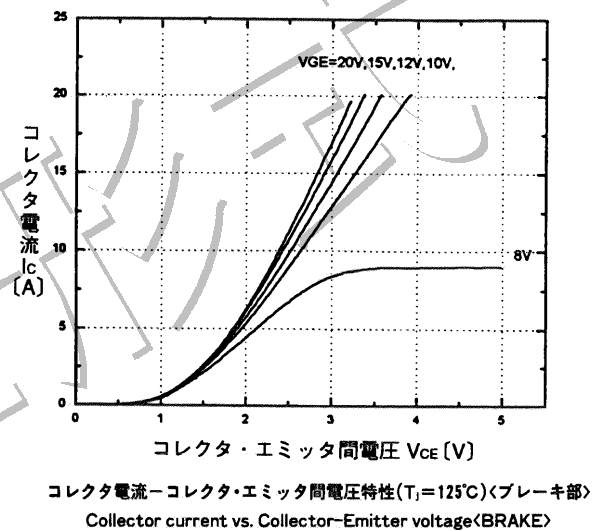
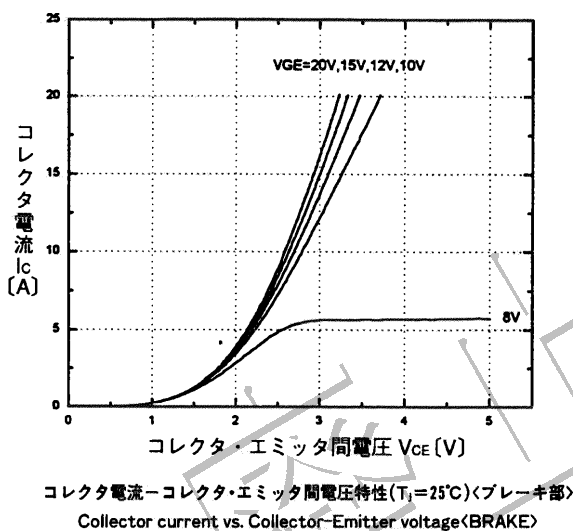
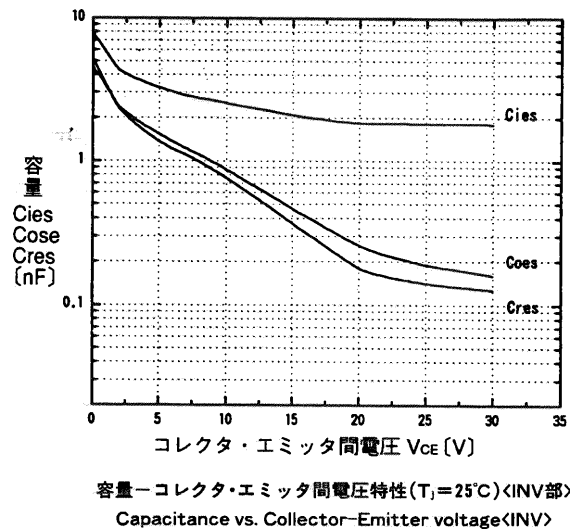
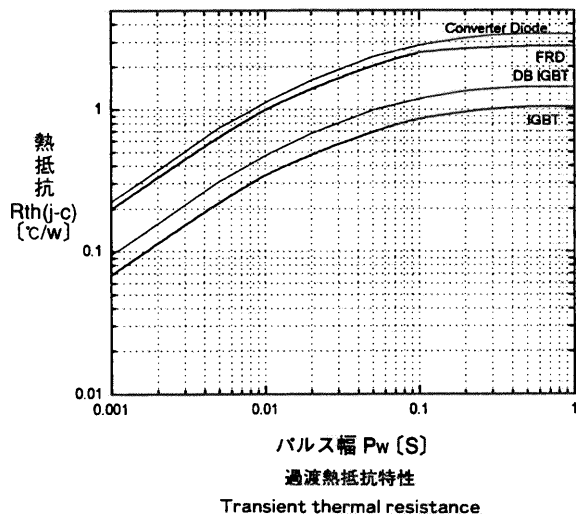
$T_{rr}$ ,  $I_{rr}$ - $I_F$ 特性 <INV部>  
 $T_{rr}$ ,  $I_{rr}$ - $I_F$  <INV>



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

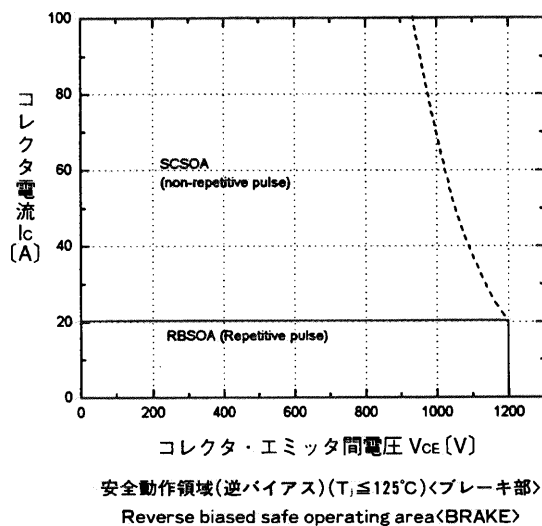
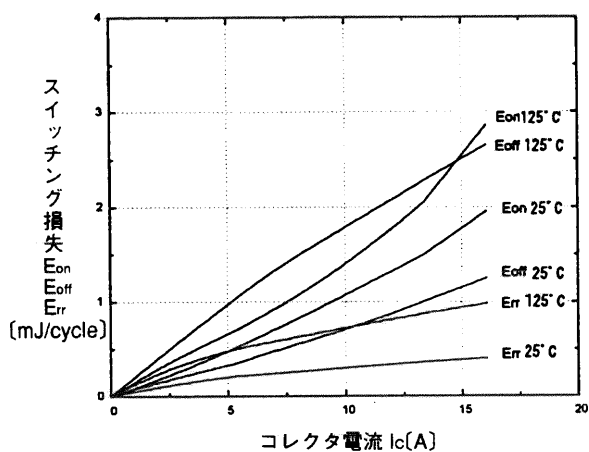
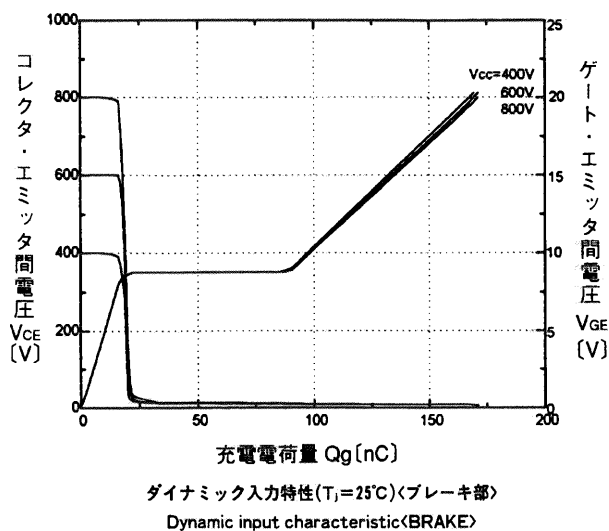
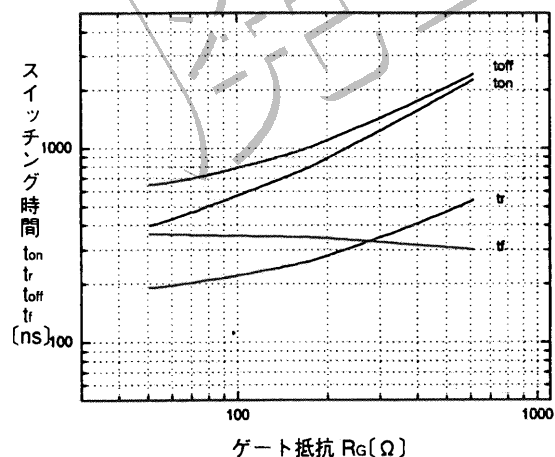
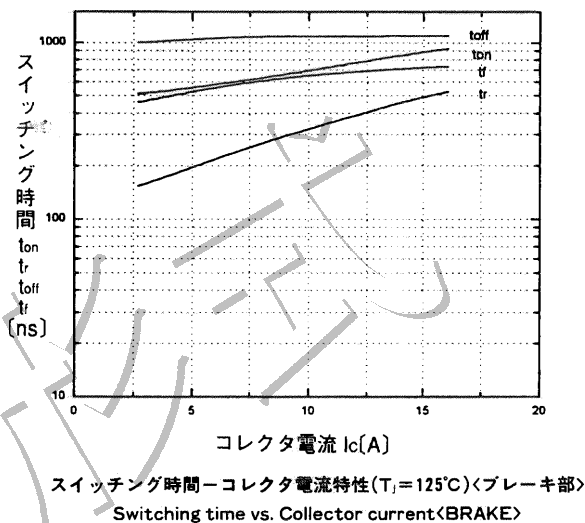
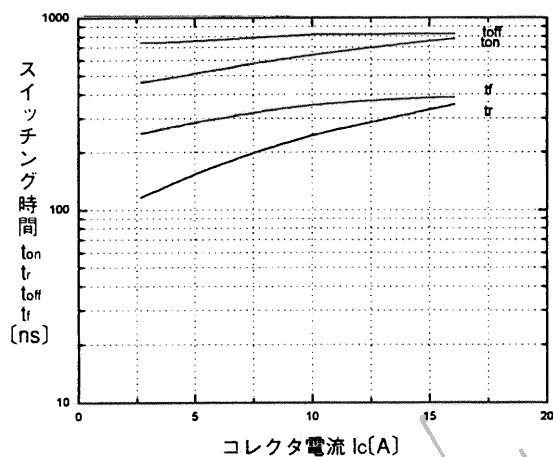


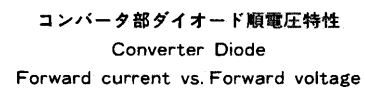
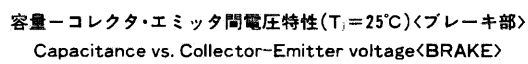
安全動作領域(逆バイアス) ( $T_j \leq 125^\circ\text{C}$ ) <INV部>  
Reverse biased safe operating area <INV>



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>





Technical drawing of a rectangular metal plate with dimensions and features:

- Overall Dimensions:**
  - Length:  $95.45 \pm 1$
  - Width:  $60 \pm 1$
  - Height:  $58 \pm 1$
- Top Surface Features:**
  - Top edge dimensions:  $3 \pm 0.3$ ,  $15 \pm 0.3$ ,  $15 \pm 0.3$ ,  $17.2 \pm 0.5$ ,  $10.16 \pm 0.5$ ,  $10.16 \pm 0.5$ ,  $10.16 \pm 0.5$ ,  $10.16 \pm 0.5$  (6.54)
  - Top edge hole dimensions:  $2.54 \pm 0.5$ ,  $2.54 \pm 0.5$ ,  $2.54 \pm 0.5$ ,  $2.54 \pm 0.5$
  - Top edge hole diameter:  $\phi 0.6$
  - Top edge hole positions: P, P1, N, 1, 3, 5, 7, 11
- Bottom Surface Features:**
  - Bottom edge dimensions:  $8 \pm 0.3$ ,  $12.5 \pm 0.3$ ,  $12.5 \pm 0.3$ ,  $15 \pm 0.3$ ,  $15 \pm 0.3$ ,  $12.5 \pm 0.3$ ,  $12.5 \pm 0.3$  (17)
  - Bottom edge dimensions:  $80 \pm 0.5$ ,  $105 \pm 0.3$ ,  $116 \pm 1$
  - Bottom edge hole dimensions:  $4$
  - Bottom edge hole positions: R, S, T, B, U, V, W
- Side Features:**
  - Side edge dimensions:  $6 \pm 0.5$ ,  $9$ ,  $12^{+1.0}_{-0.5}$ ,  $21^{+1.0}_{-0.5}$
  - Side edge hole diameter:  $\phi 0.3 \pm 0.15$
  - Side edge hole position: 1.5
- Internal Features:**
  - Internal hole diameter:  $2 - \phi 4.5$  (内径)
  - Internal hole radius:  $R5$
- Other Features:**
  - Internal hole diameter:  $\phi 0.6$
  - Internal hole position: JAPAN