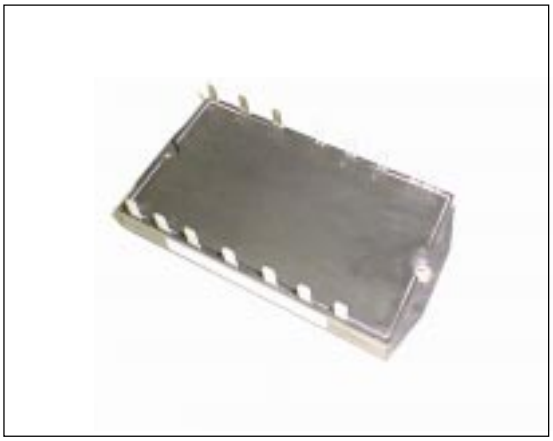
IGBT MODULE

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_{CES}		1200	V
	Gate-Emitter voltage	V_{GES}		±20	V
	Collector current	I_C	Continuous	15	A
		I_{CP}	1ms	30	A
		-I_C		15	A
	Collector power disspation	P_C	1 device	120	W
Brake	Collector-Emitter voltage	V_{CES}		1200	V
	Gate-Emitter voltage	V_{GES}		±20	V
	Collector current	I_C	Continuous	10	A
		I_{CP}	1ms	20	A
	Collector power disspation	P_C	1 device	88	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 minute	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)**

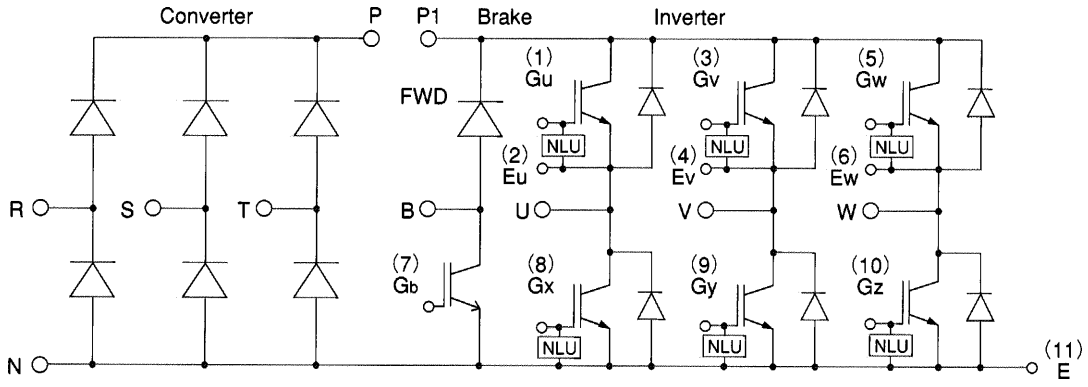
Item		Symbol	Condition	Characteristics			Unit
				Min.	Typ.	Max.	
Inverter (IGBT)	Zero gate voltage collector current	I_{CES}	V_{CE}=1200V, V_{GE}=0V			1.0	mA
	Gate-Emitter leakage current	I_{GES}	V_{CE}=0V, V_{GE}=±20V			20	μA
	Gate-Emitter threshold voltage	$V_{GE(th)}$	V_{CE}=20V, I_C=15mA	4.5		7.5	V
	Collector-Emitter saturation voltage	$V_{CE(sat)}$	V_{GE}=15V, Ic=15A			3.3	V
	Collector-Emitter voltage	-V_{CE}	-Ic=15A			3.0	V
	Input capacitance	C_{ies}	V_{GE}=0V, V_{CE}=10V, f=1MHz		2400		pF
	Switching time	t_{on}	V_{CC}=600V			1.2	μs
		t_r	I_C=15A			0.6	μs
		t_{off}	V_{GE}=±15V			1.5	μs
		t_f	R_G=82 ohm			0.5	μs
	Reverse recovery time of FRD	t_{rr}	I_F=15A			0.35	μs
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			0.1	μA
	Collector-Emitter saturation voltage	$V_{CE(sat)}$	I_C=10A, V_{GE}=15V			3.3	V
	Switching time	t_{on}	V_{CC}=600V			0.8	μs
		t_r	I_C=10A			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}	V_R=1200V			1	mA
	Reverse recovery time	t_{rr}				0.6	μs
Converter	Forward voltage	V_{FM}	I_F=25A			1.4	V
	Reverse current	I_{RRM}	V_R=1600V			1.0	mA

● **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			1.43	
		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

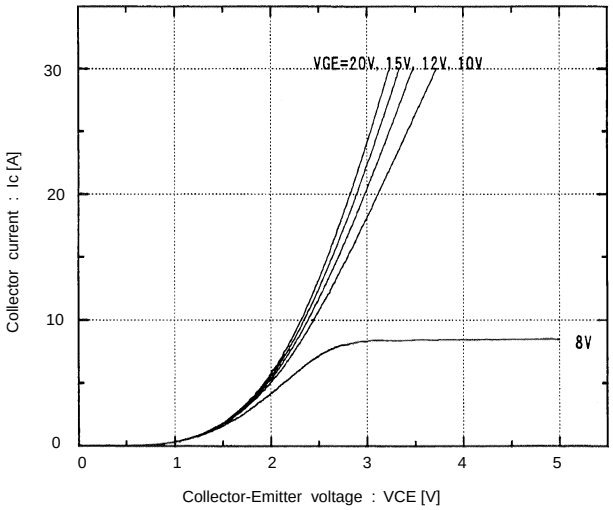


* NLU (Over current Limiting circuit)

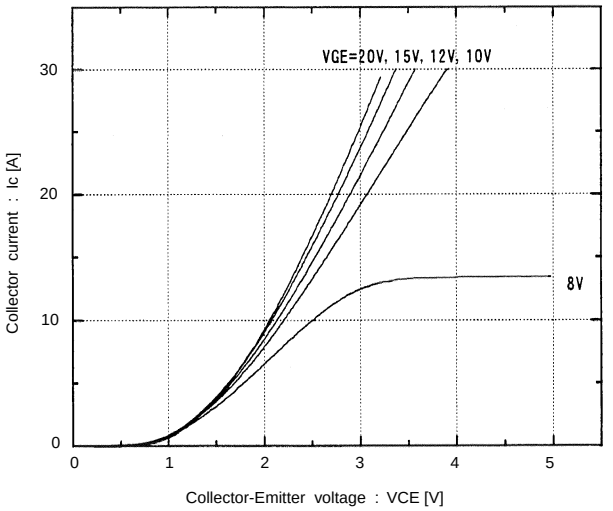
■ Characteristics (Representative)

● Inverter

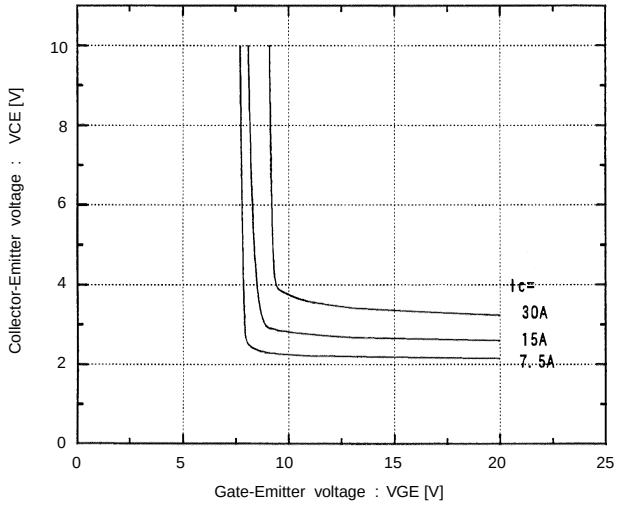
Collector current vs. Collector-Emitter voltage
Tj=25°C



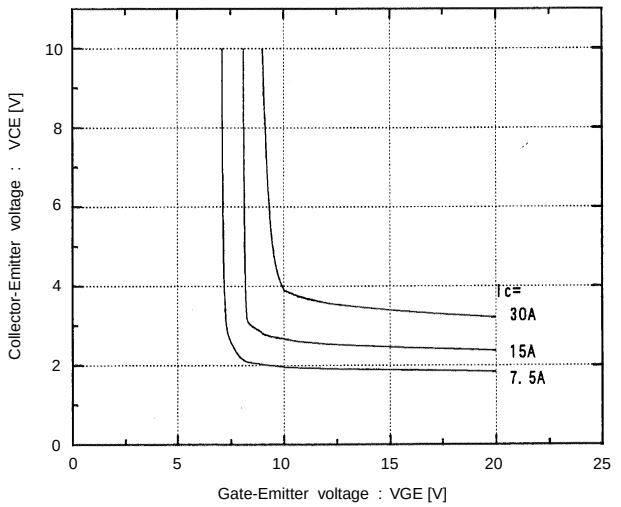
Collector current vs. Collector-Emitter voltage
Tj=125°C



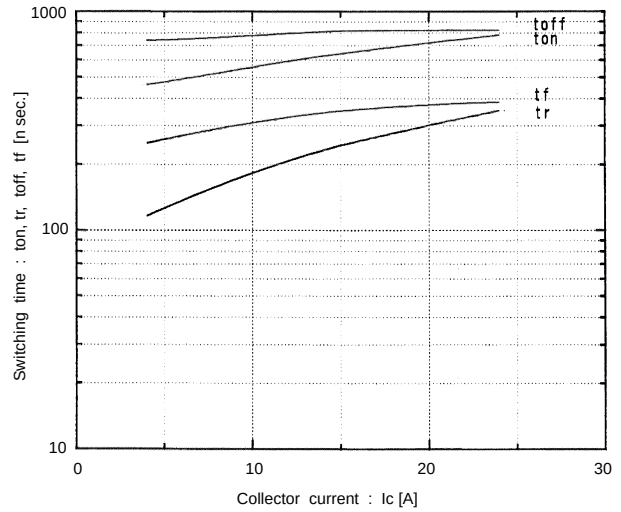
Collector-Emitter vs. Gate-Emitter voltage
Tj=25°C



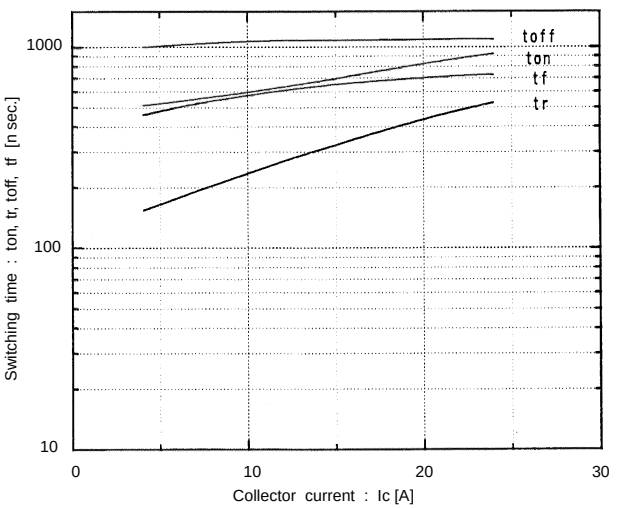
Collector-Emitter vs. Gate-Emitter voltage
Tj=125°C



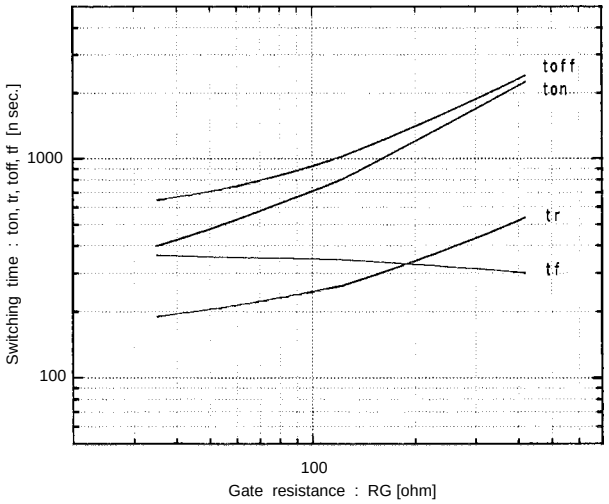
Switching time vs. Collector current
Vcc=600V, RG=82 ohm, VGE=±15V, Tj=25°C



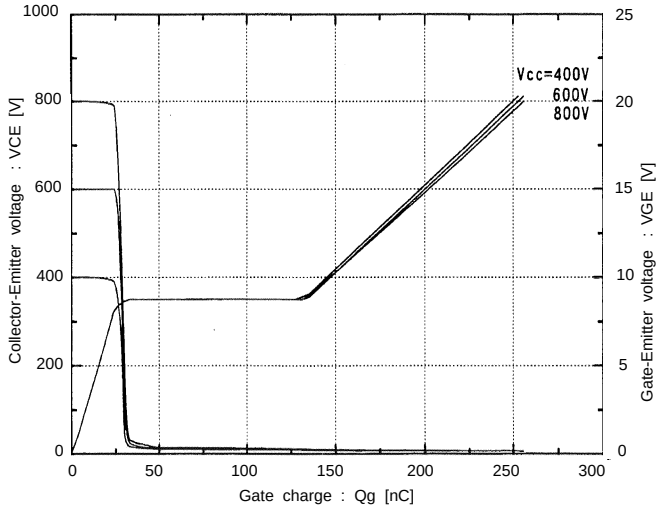
Switching time vs. Collector current
Vcc=600V, RG=82 ohm, VGE=±15V, Tj=125°C



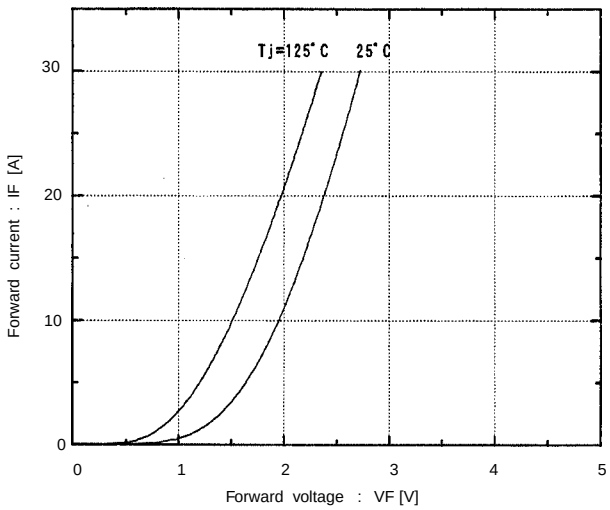
Switching time vs. RG
Vcc=600V, Ic=15A, VGE=±15V, Tj=25°C



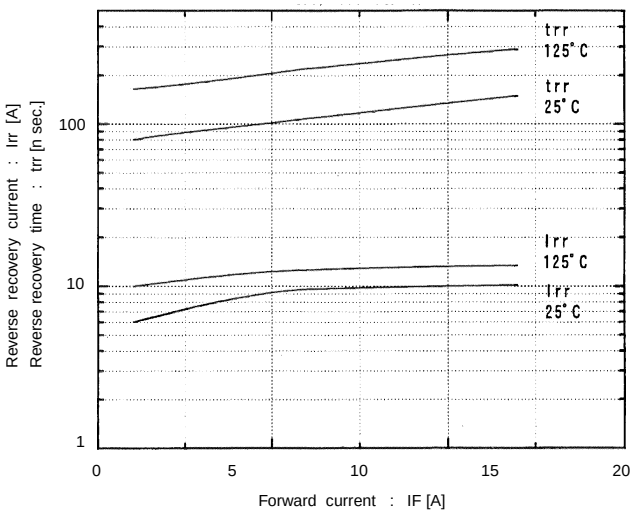
Dynamic input characteristics
Tj=25°C



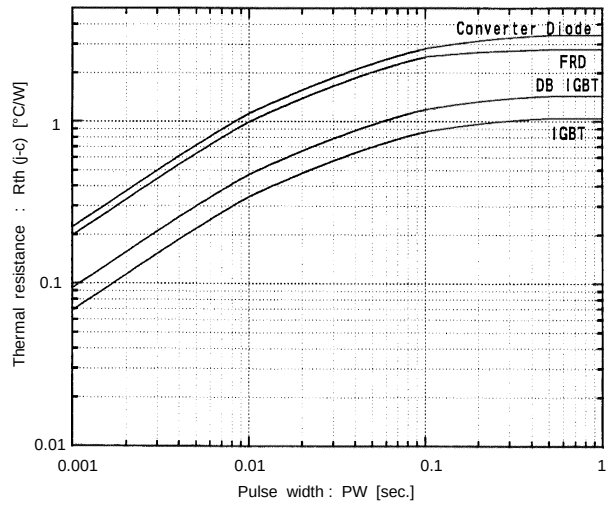
Forward current vs. Forward voltage
VGE=0V



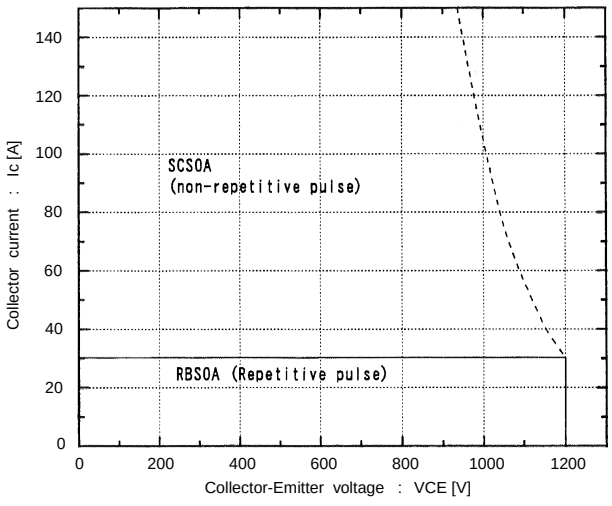
Reverse recovery characteristics
trr, Irr, vs. IF



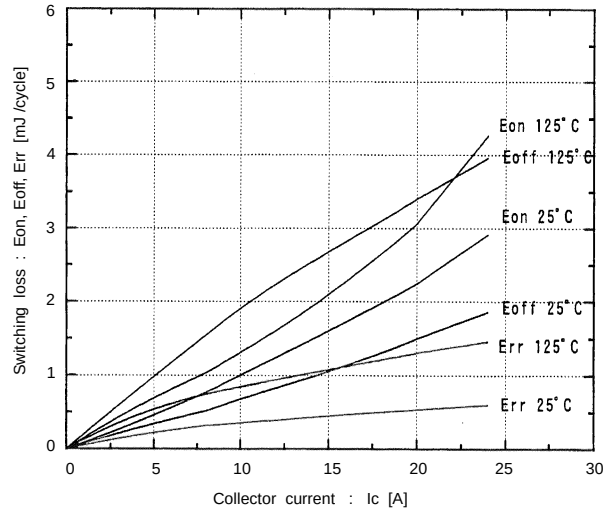
Transient thermal resistance



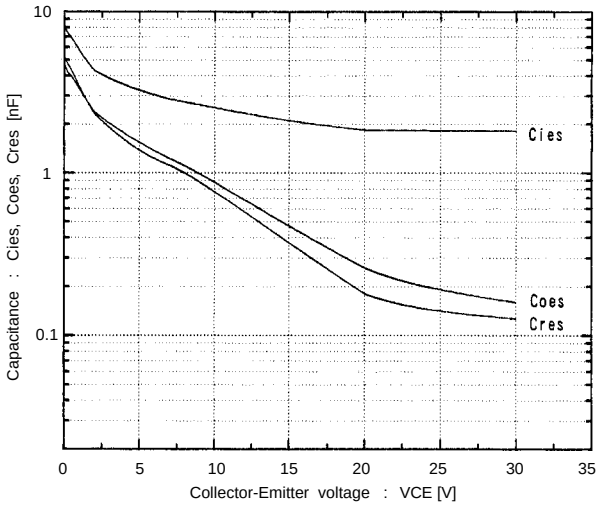
Reversed biased safe operating area
+VGE=15V, -VGE ≦ 15V, Tj ≦ 125°C, RG ≧ 82 ohm



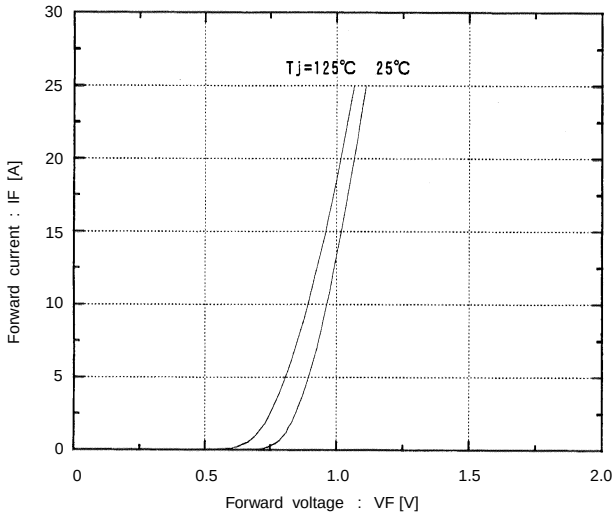
Switching loss vs. Collector current
Vcc=600V, RG=82 ohm, VGE=±15V



Capacitance vs. Collector-Emitter voltage
Tj=25°C

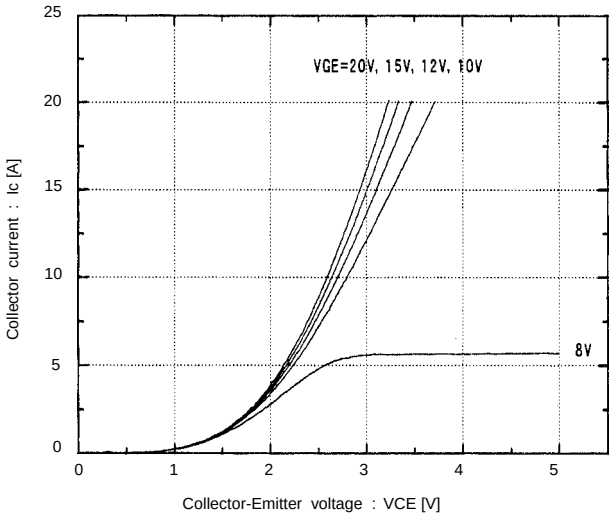


Converter Diode
Forward current vs. Forward voltage

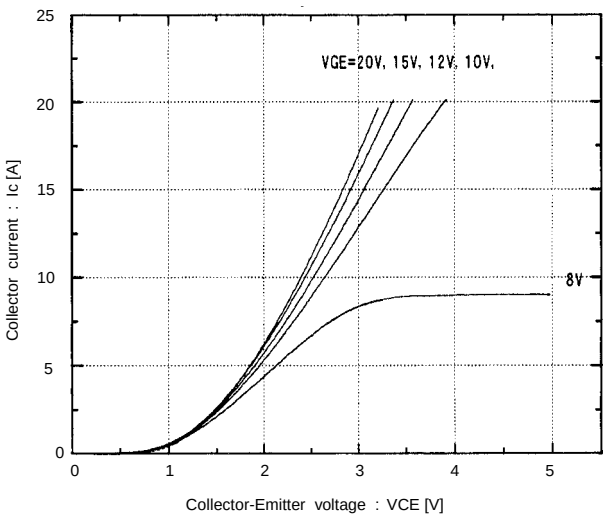


● **Brake**

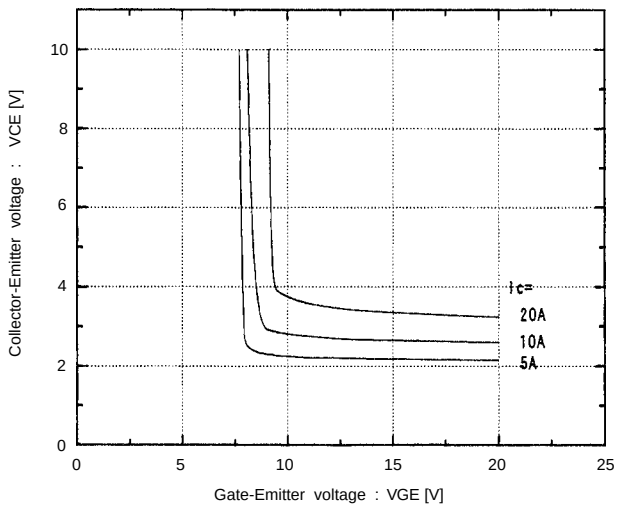
Collector current vs. Collector-Emitter voltage
Tj=25°C



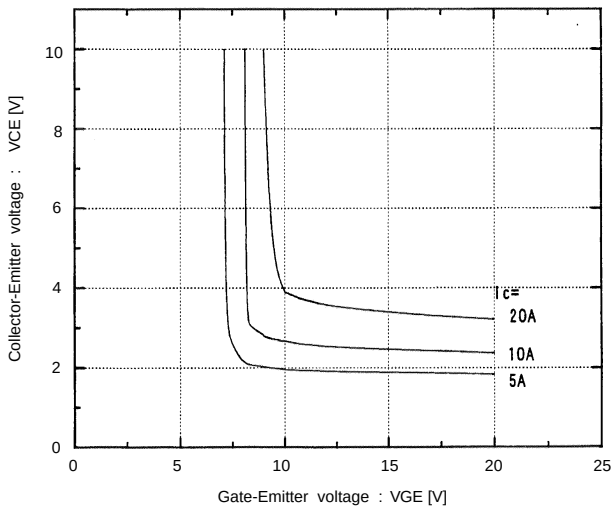
Collector current vs. Collector-Emitter voltage
Tj=125°C



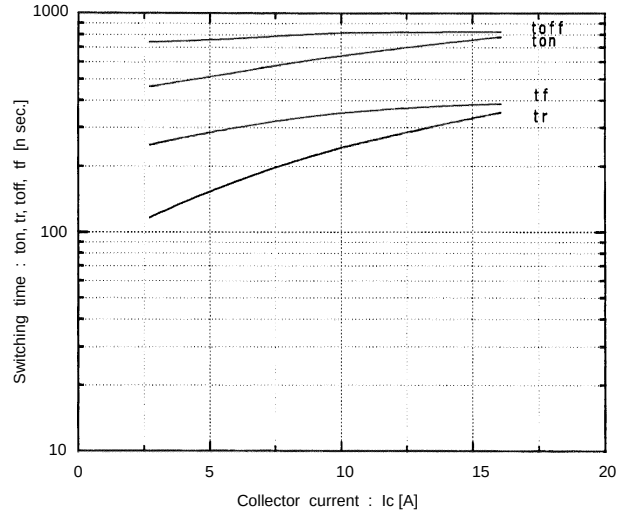
Collector-Emitter vs. Gate-Emitter voltage
Tj=25°C



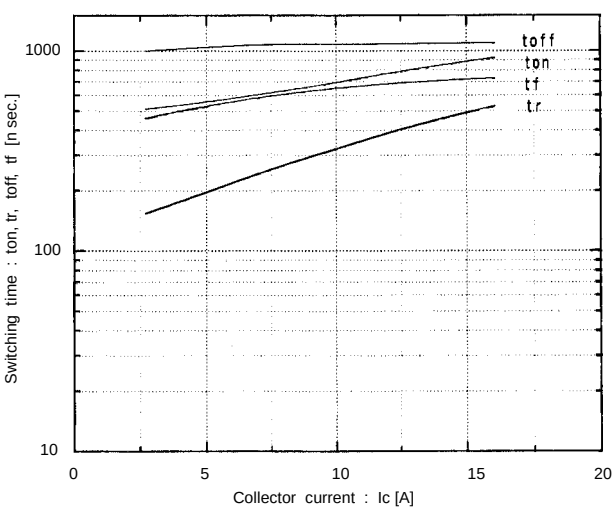
Collector-Emitter vs. Gate-Emitter voltage
Tj=125°C



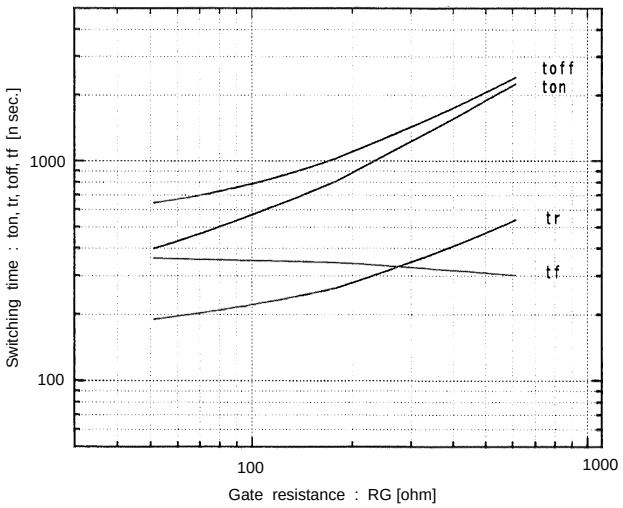
Switching time vs. Collector current
Vcc=600V, RG=120 ohm, VGE=±15V, Tj=25°C



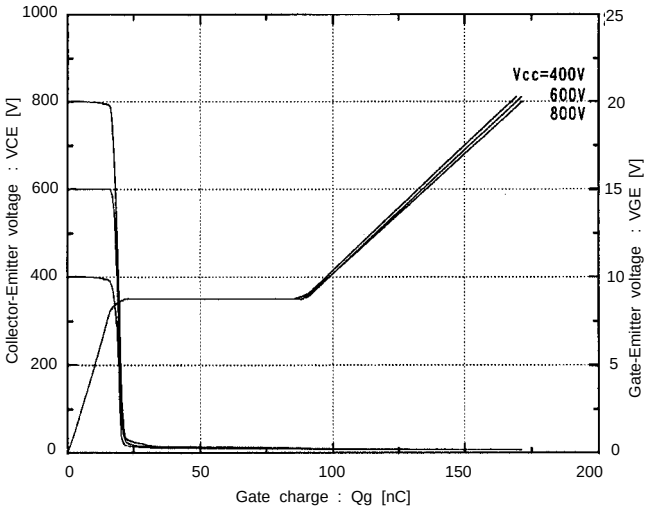
Switching time vs. Collector current
Vcc=600V, RG=120 ohm, VGE=±15V, Tj=125°C



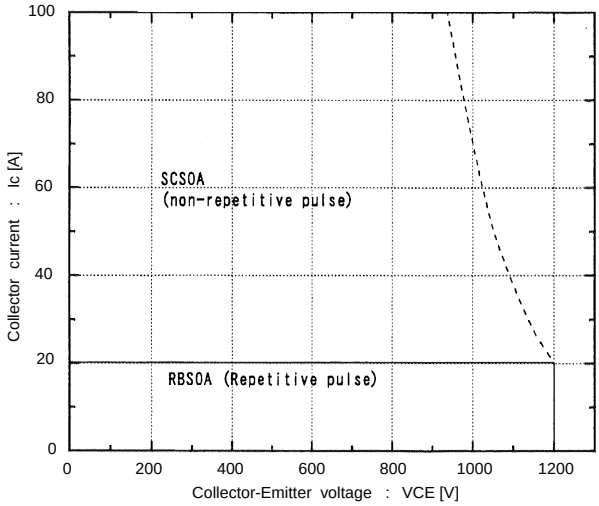
Switching time vs. RG
Vcc=600V, Ic=10A, VGE=±15V, Tj=25°C



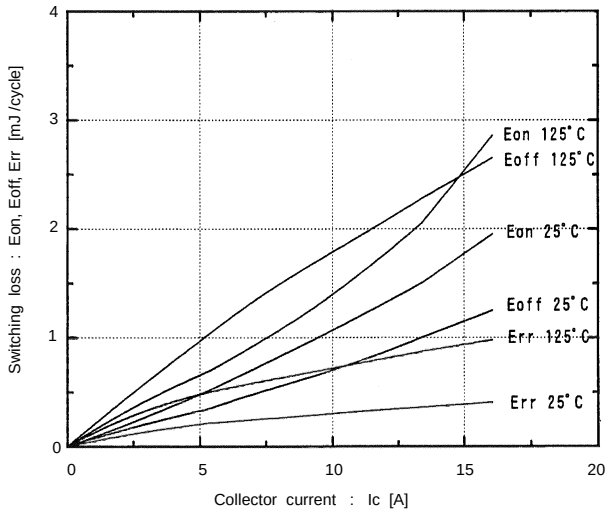
Dynamic input characteristics
Tj=25°C



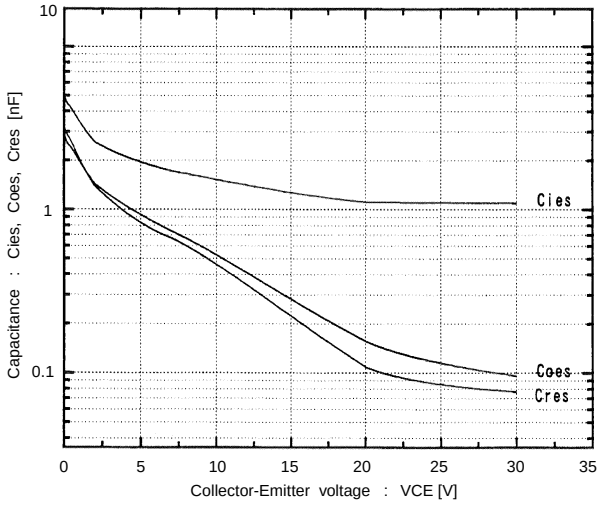
Reversed biased safe operating area
+VGE=15V, -VGE ≦ 15V, Tj ≦ 125°C, RG ≧ 120 ohm



Switching loss vs. Collector current
Vcc=600V, RG=120 ohm, VGE=±15V



Capacitance vs. Collector-Emitter voltage
Tj=25°C



■ Outline Drawings, mm