

IGBT MODULE (U series) 1200V / 50A / PIM



■ Features

- Low $V_{CE(sat)}$
- Compact Package
- P.C. Board Mount Module
- 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 ($T_c=25^\circ\text{C}$ unless otherwise 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	T _C =25°C	50	A	
				T _C =80°C	35		
		I _{CP}	1ms	T _C =25°C	100		
				T _C =80°C	70		
		-I _C	Duty=70%		50		
		-I _C pulse	1ms		100		
Collector power dissipation		P _C	1 device		205	W	
Brake	Collector-Emitter voltage		V _{CES}		1200	V	
	Gate-Emitter voltage		V _{GES}		±20	V	
	Collector current	I _C	Continuous	T _C =25°C	25	A	
				T _C =80°C	15		
		I _{CP}	1ms	T _C =25°C	50		
				T _C =80°C	30		
	Collector power dissipation		P _C	1 device		115	W
	Repetitive peak reverse voltage		V _{R_{RRM}}		1200	V	
Converter	Repetitive peak reverse voltage		V _{R_{RRM}}		1600	V	
	Average output current		I _O		50Hz/60Hz sine wave	50	A
	Surge current (Non-Repetitive)		I _{FSM}		T _J =150°C, 10ms	260	A
	I ² t (Non-Repetitive)		P _t		half sine wave	338	A ² s
	Operating junction temperature		T _J		+150	°C	
Storage temperature		T _{slg}		-40 to +125	°C		
Isolation voltage	between terminal and copper base *2	V _{iso}	AC : 1 minute		AC 2500	V	
	between thermistor and others *3				AC 2500		
Mounting screw torque				3.5 *1	N·m		

*1 Recommendable value : 2.5 to 3.5 N·m (M5)

*2 All terminals should be connected together when isolation test will be done.

*3 Two thermistor terminals should be connected together, each other terminals should be connected together and shorted to base plate when isolation test will be done.

● Electrical characteristics (T_J=25°C unless otherwise specified)

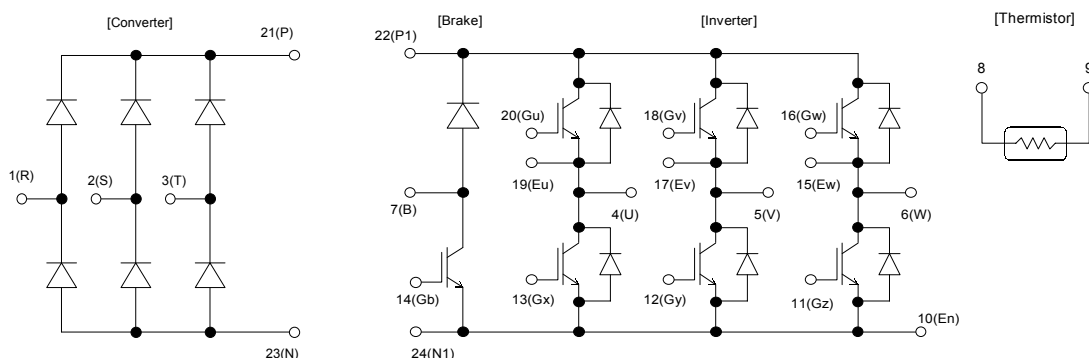
Item		Symbol	Condition		Characteristics			Unit
					Min.	Typ.	Max.	
Inverter	Zero gate voltage collector current	ICES	VCE=1200V, VGE=0V				1.0	mA
	Gate-Emitter leakage current	IGES	VCE=0V, VGE=±20V				200	nA
	Gate-Emitter threshold voltage	VGE(th)	VCE=20V, Ic=50mA		4.5	6.5	8.5	V
	Collector-Emitter saturation voltage	VCE(sat) (terminal)	VGE=15V Ic=50A	Tj=25°C		2.40	2.80	V
				Tj=125°C		2.75		
		VCE(sat) (chip)	Tj=25°C		2.00	2.40		
			Tj=125°C		2.35			
	Input capacitance	Cies	VGE=0V, VCE=10V, f=1MHz			4		nF
	Turn-on time	ton	VCC=600V			0.53	1.20	µs
		tr	Ic=50A			0.43	0.60	
		tr(i)	VGE=±15V			0.03		
	Turn-off time	toff	RG= 33 Ω			0.37	1.00	
		tf				0.07	0.30	
	Forward on voltage	VF (terminal)	VGE= 0 V IF=50A	Tj=25°C		2.40	2.80	V
Tj=125°C					2.65			
VF (chip)		Tj=25°C		2.00	2.40			
		Tj=125°C		2.25				
Reverse recovery time	trr	IF=50A				0.35	µs	
Brake	Zero gate voltage collector current	ICES	VCE=1200V, VGE=0V				1.0	mA
	Gate-Emitter leakage current	IGES	VCE=0V, VGE=±20V				200	nA
	Collector-Emitter saturation voltage	VCE(sat) (terminal)	Ic=25A VGE=15V	Tj=25°C		2.30	2.80	V
				Tj=125°C		2.75		
		VCE(sat) (chip)	Tj=25°C		2.10	2.60		
			Tj=125°C		2.55			
	Turn-on time	ton	VCC=600V			0.53	1.20	µs
		tr	Ic=25A			0.43	0.60	
	Turn-off time	toff	VGE=±15V			0.37	1.00	
		tf	RG= 68 Ω			0.07	0.30	
	Reverse current	IRRM	VR=1200V				1.0	mA
Converter	Forward on voltage	VFM	IF=50 A	terminal	1.55	1.90	V	
			VGE=0V	chip	1.40			
	Reverse current	IRRM	VR=1600V				1.0	mA
Thermistor	Resistance	R	T=25°C			5000	Ω	
			T=100°C		465	495		520
	B value	B	T=25/50°C		3305	3375	3450	K

● Thermal resistance Characteristics

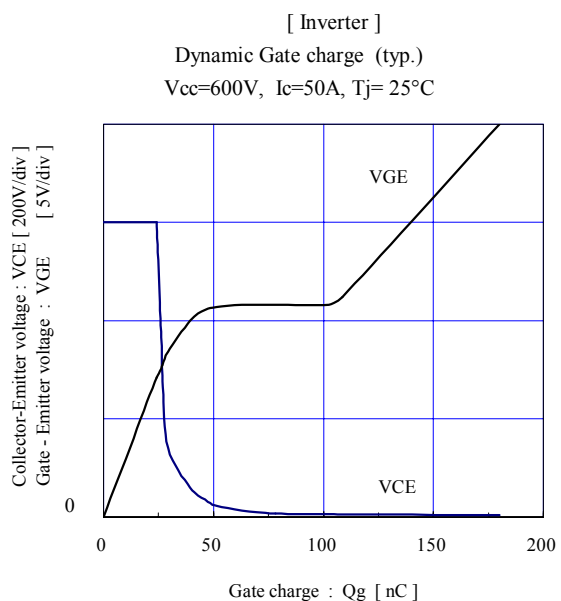
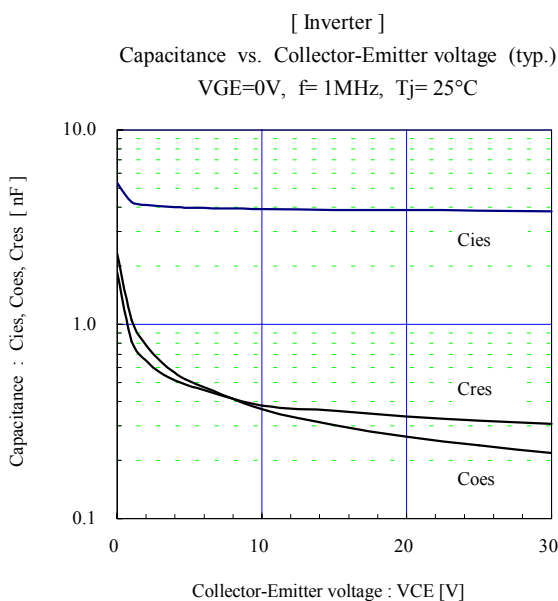
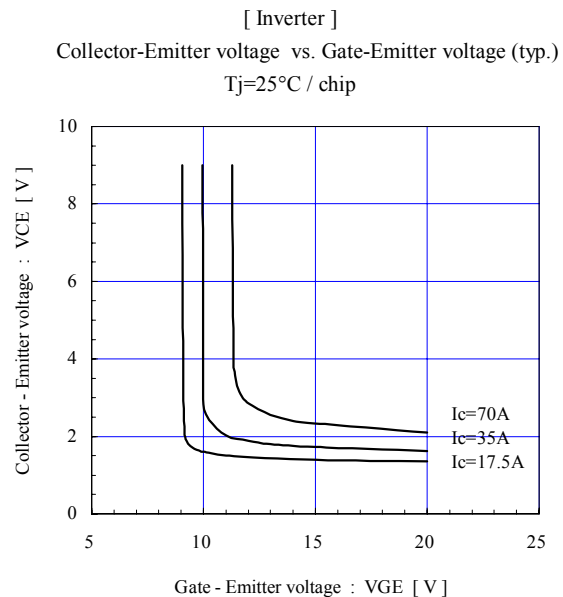
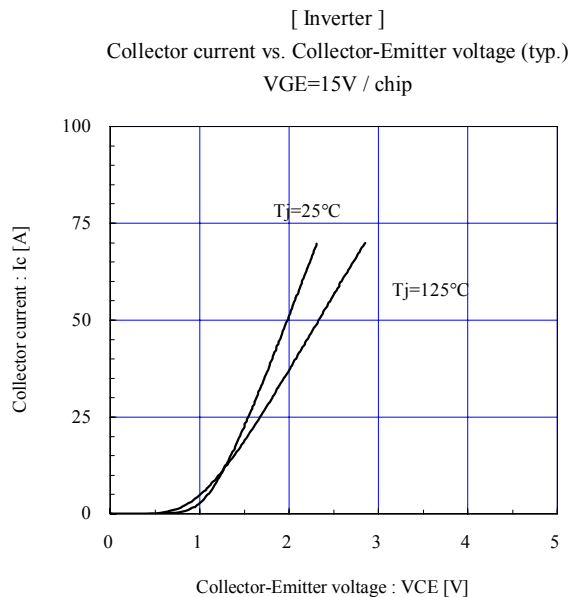
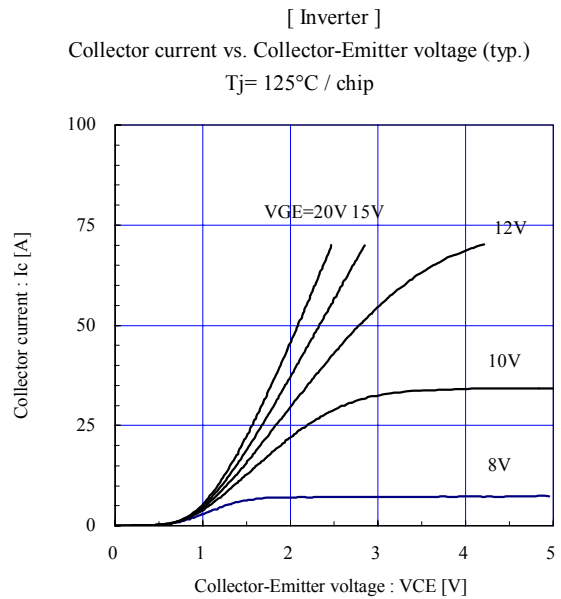
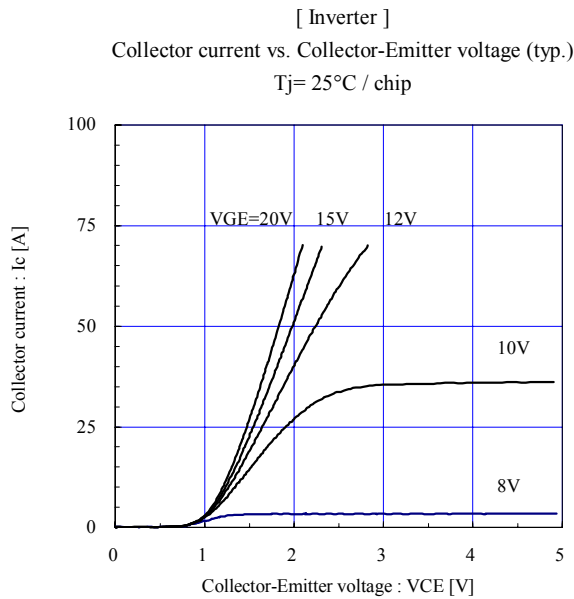
Item	Symbol	Condition	Characteristics			Unit
			Min.	Typ.	Max.	
Thermal resistance (1 device)	R _{th(j-c)}	Inverter IGBT			0.60	°C/W
		Inverter FWD			0.95	
		Brake IGBT			1.07	
		Converter Diode			0.90	
Contact thermal resistance *	R _{th(c-f)}	With thermal compound		0.05		

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

■ Equivalent Circuit Schematic

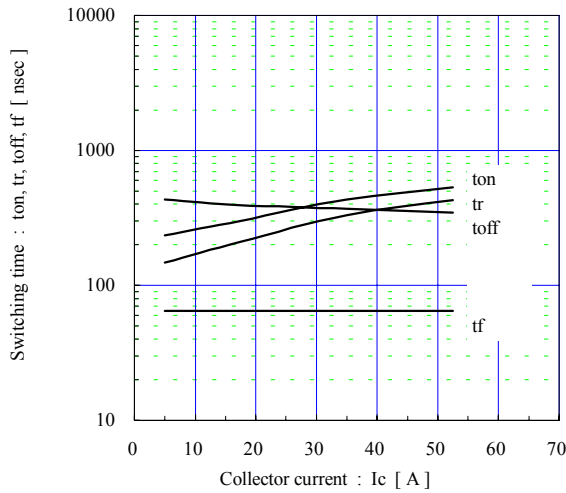


■ Characteristics (Representative)



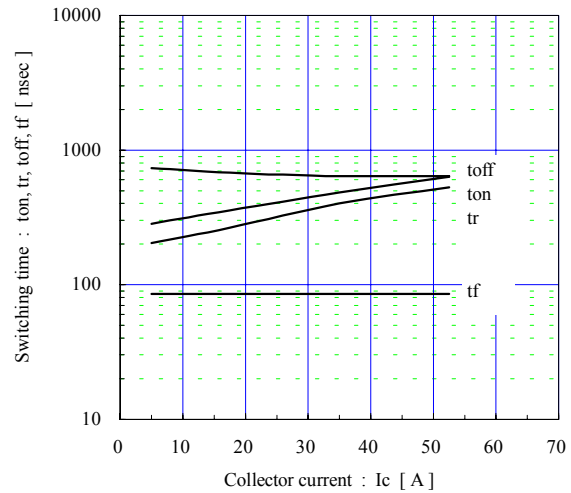
[Inverter]

Switching time vs. Collector current (typ.)

 $V_{cc}=600V$, $V_{GE}=\pm 15V$, $R_g=33\Omega$, $T_j=25^\circ C$ 

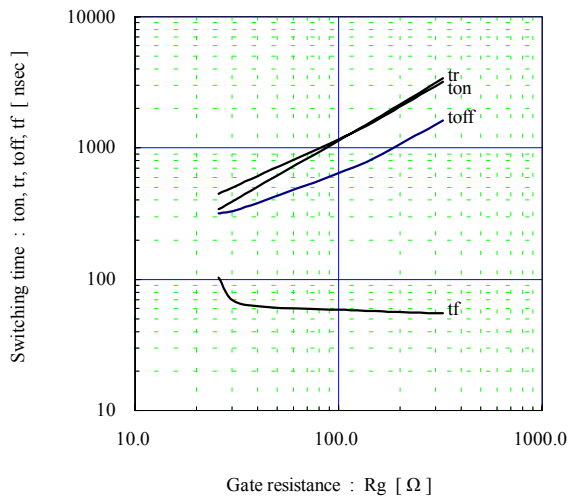
[Inverter]

Switching time vs. Collector current (typ.)

 $V_{cc}=600V$, $V_{GE}=\pm 15V$, $R_g=33\Omega$, $T_j=125^\circ C$ 

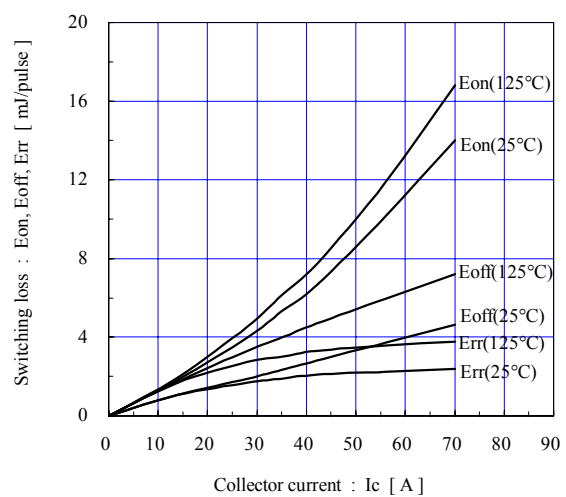
[Inverter]

Switching time vs. Gate resistance (typ.)

 $V_{cc}=600V$, $I_c=50A$, $V_{GE}=\pm 15V$, $T_j=25^\circ C$ 

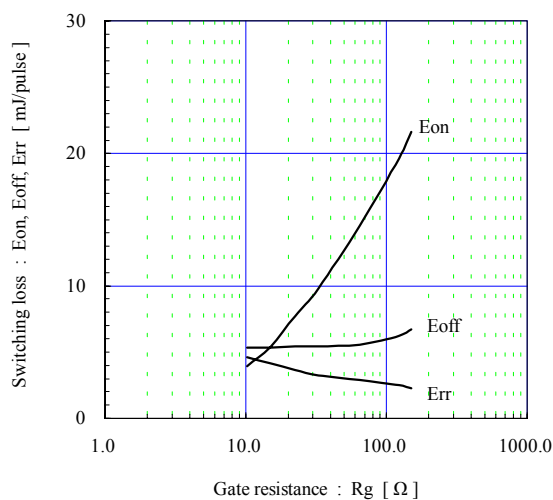
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Switching loss vs. Collector current (typ.)

 $V_{cc}=600V$, $V_{GE}=\pm 15V$, $R_g=33\Omega$ 

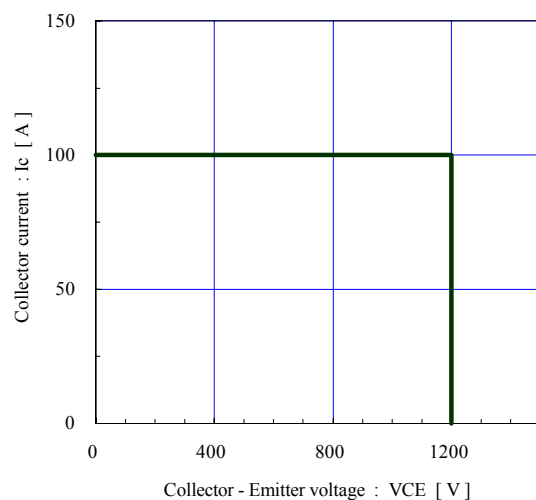
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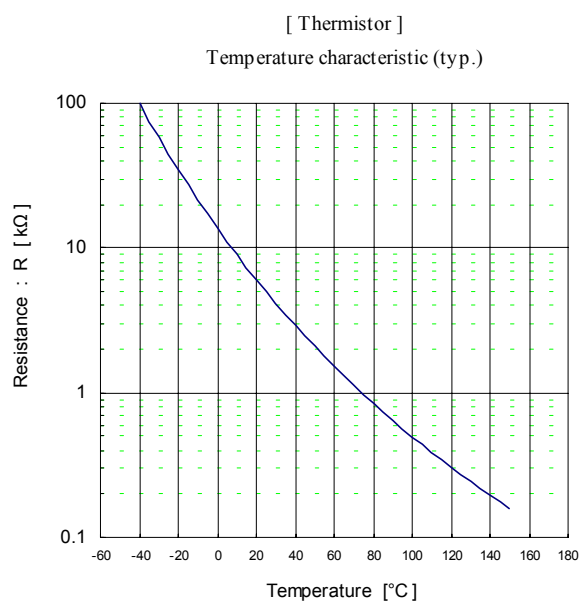
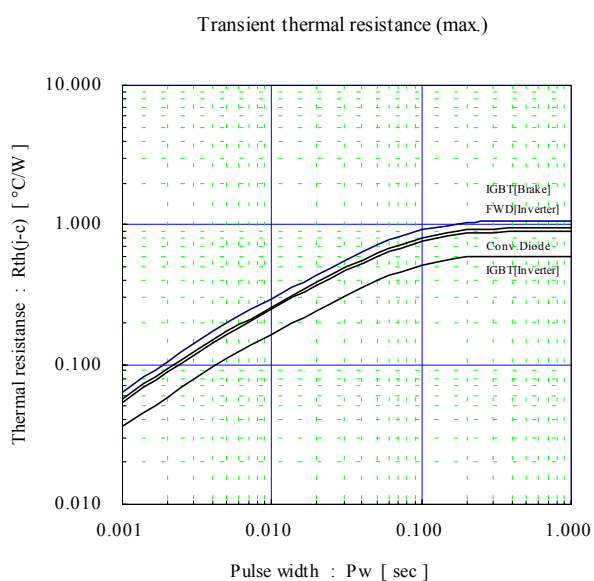
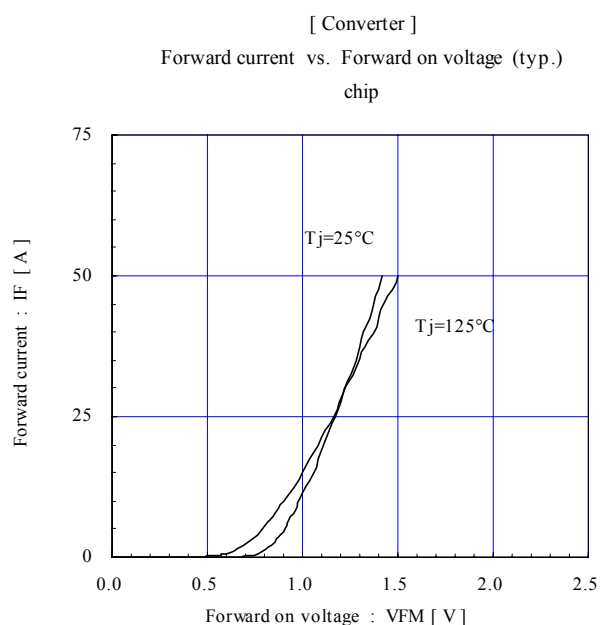
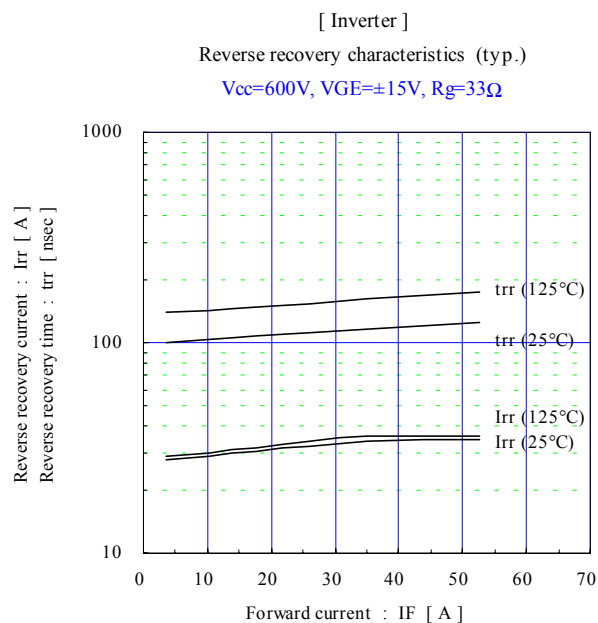
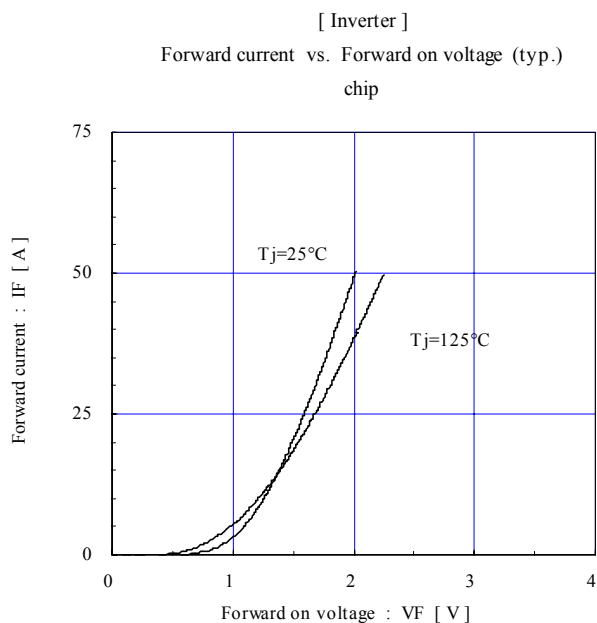
Switching loss vs. Gate resistance (typ.)

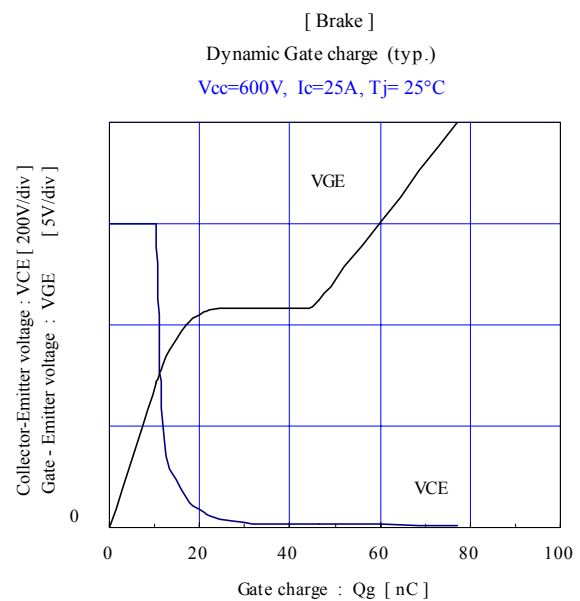
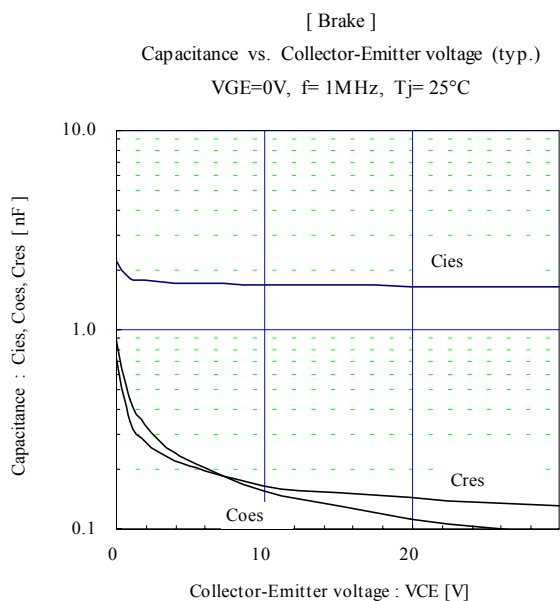
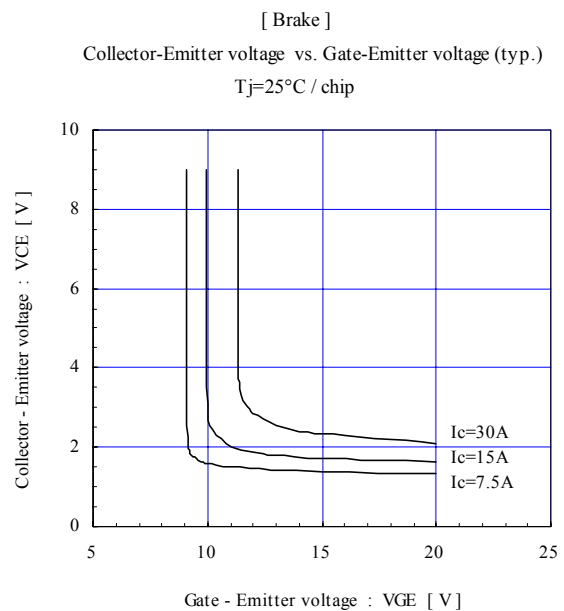
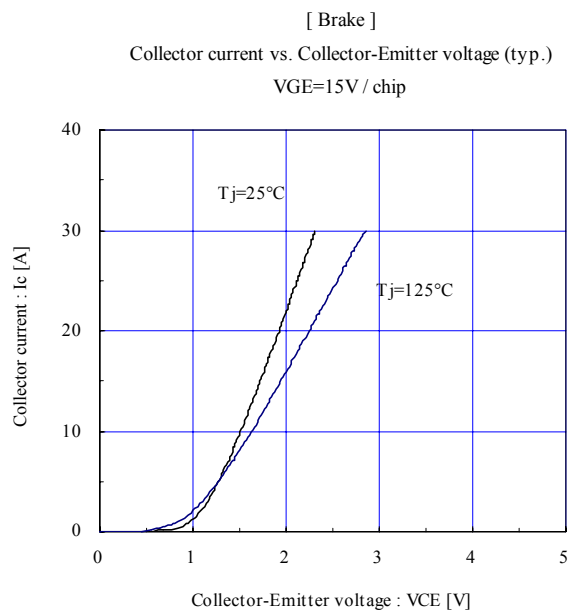
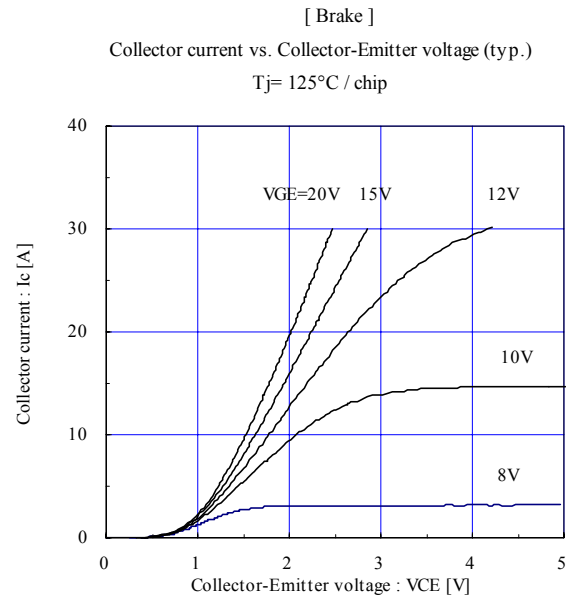
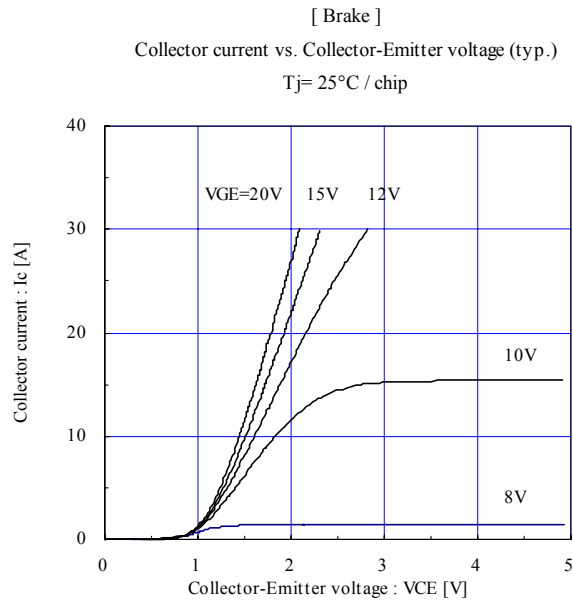
 $V_{cc}=600V$, $I_c=50A$, $V_{GE}=\pm 15V$, $T_j=125^\circ C$ 

[Inverter]

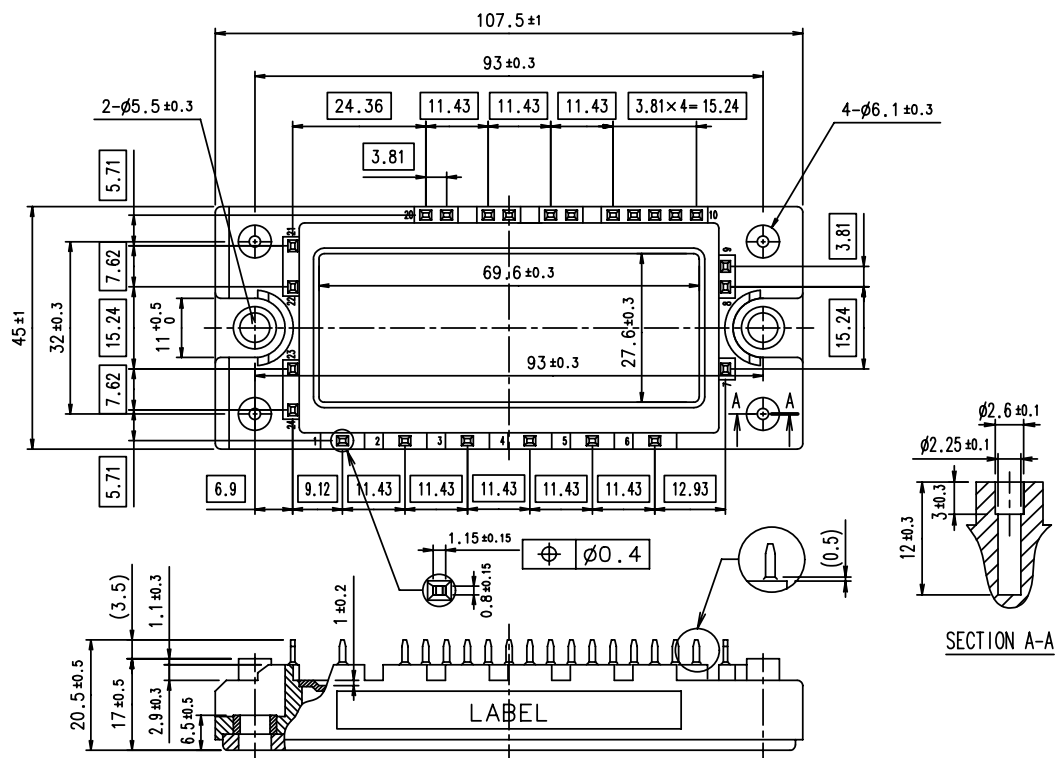
Reverse bias safe operating area (max.)

 $+V_{GE}=15V, -V_{GE} \leq 15V, R_g \geq 33\Omega, T_j \leq 125^\circ C$ 





■ Outline Drawings, mm



☐ shows theoretical dimension.
 () shows reference dimension.