

IGBT MODULE (U series) 1200V / 35A / 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	35	A
				T _C =80°C	25	
		I _{CP}	1ms	T _C =25°C	70	
				T _C =80°C	50	
		-I _C			35	
-I _C pulse	1ms		70			
Collector power dissipation	P _C	1 device		160	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	
Repetitive peak reverse voltage	V _{R_{RRM}}			1600	V	
Converter	Average output current	I _O	50Hz/60Hz sine wave		35	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)

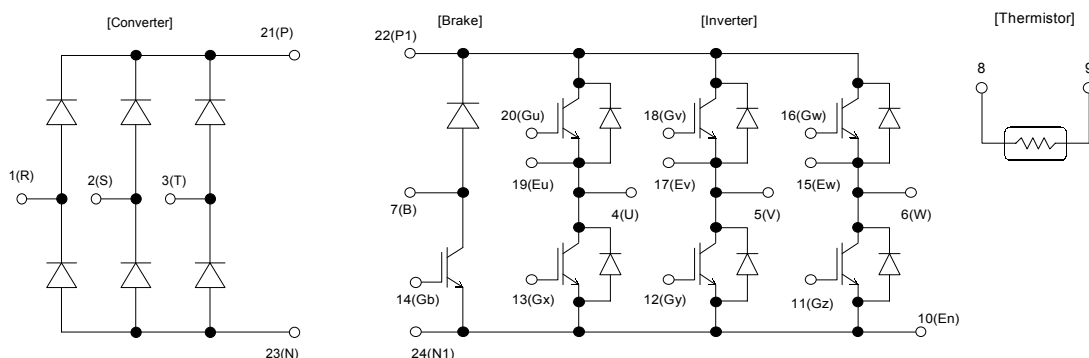
Item	Symbol	Condition	Characteristics			Unit
			Min.	Typ.	Max.	
Inverter	Zero gate voltage collector current	ICES	V _{CE} =1200V, V _{GE} =0V		1.0	mA
	Gate-Emitter leakage current	IGES	V _{CE} =0V, V _{GE} =±20V		200	nA
	Gate-Emitter threshold voltage	V _{GE(th)}	V _{CE} =20V, I _C =35mA		8.5	V
	Collector-Emitter saturation voltage	V _{CE(sat)} (terminal) V _{CE(sat)} (chip)	V _{GE} =15V I _C =35A	T _j =25°C	2.70	V
				T _j =125°C	-	
				T _j =25°C	2.40	
				T _j =125°C	-	
	Input capacitance	C _{ies}	V _{GE} =0V, V _{CE} =10V, f=1MHz		3	nF
	Turn-on time	t _{on}	V _{CC} =600V		1.20	μs
		t _r	I _C =35A		0.60	
		t _{r(i)}	V _{GE} =±15V		-	
	Turn-off time	t _{off}	R _G = 43 Ω		1.00	μs
		t _f			0.30	
Brake	Forward on voltage	V _F (terminal) V _F (chip)	V _{GE} = 0 V I _F =35A	T _j =25°C	2.40	V
				T _j =125°C	-	
				T _j =25°C	2.10	
				T _j =125°C	-	
	Reverse recovery time	t _{rr}	I _F =35A		0.35	μs
	Zero gate voltage collector current	ICES	V _{CE} =1200V, V _{GE} =0V		1.0	mA
	Gate-Emitter leakage current	IGES	V _{CE} =0V, V _{GE} =±20V		200	nA
	Collector-Emitter saturation voltage	V _{CE(sat)} (terminal) V _{CE(sat)} (chip)	I _C =25A V _{GE} =15V	T _j =25°C	2.90	V
				T _j =125°C	-	
				T _j =25°C	2.60	
				T _j =125°C	-	
	Turn-on time	t _{on}	V _{CC} =600V		1.20	μs
		t _r	I _C =25A		0.60	
		t _{off}	V _{GE} =±15V		1.00	
	Turn-off time	t _f	R _G = 68 Ω		0.30	μs
					0.07	
	Reverse current	I _{RRM}	V _R =1200V		1.0	mA
Converter	Forward on voltage	V _{FM}	I _F =35 A V _{GE} =0V	terminal	1.70	V
				chip	-	
	Reverse current	I _{RRM}	V _R =1600V		1.0	mA
Thermistor	Resistance	R	T=25°C		5000	Ω
			T=100°C		495	
	B value	B	T=25/50°C		3450	K

● Thermal resistance Characteristics

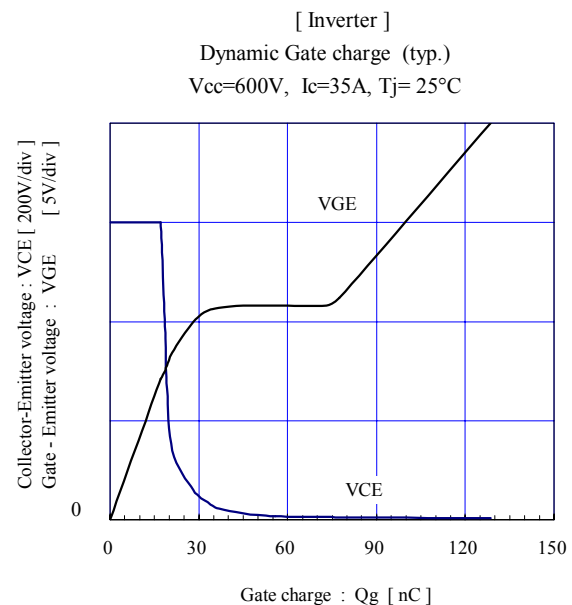
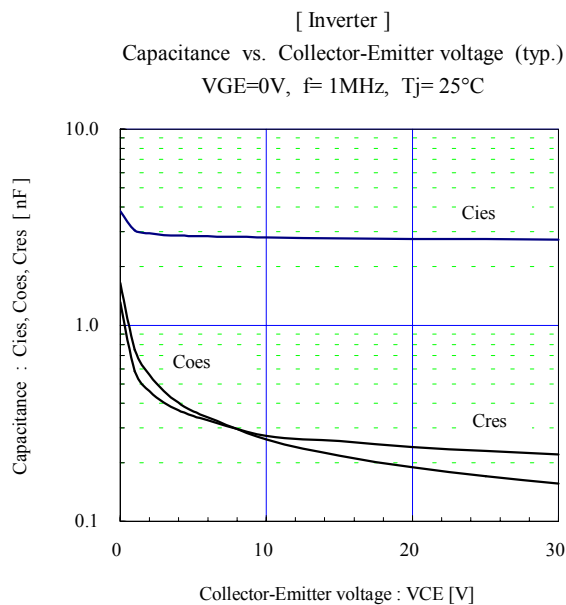
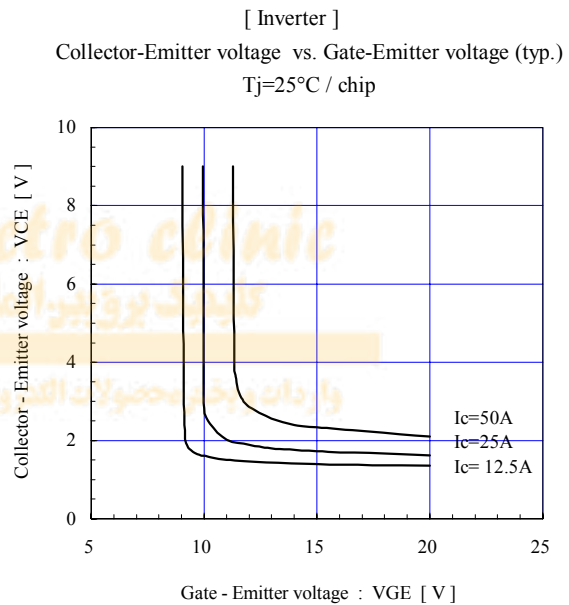
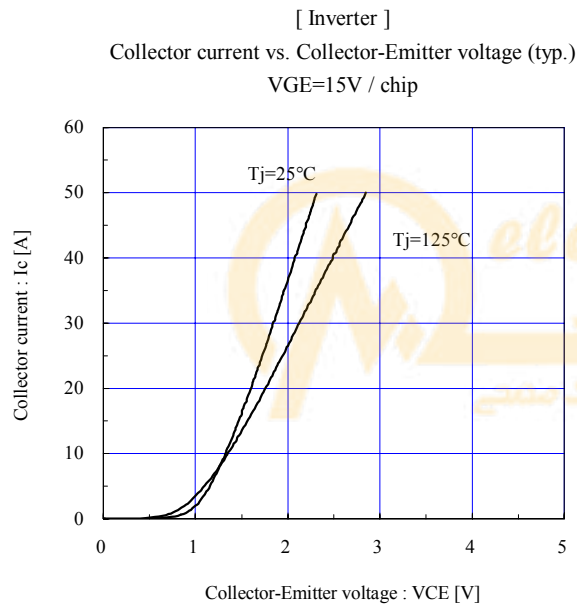
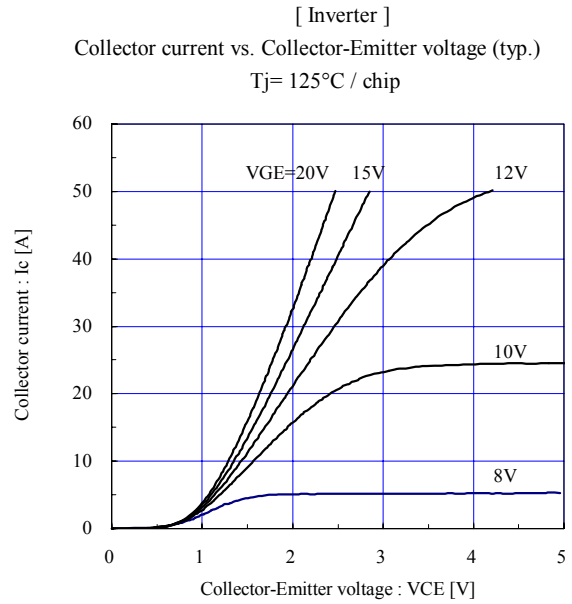
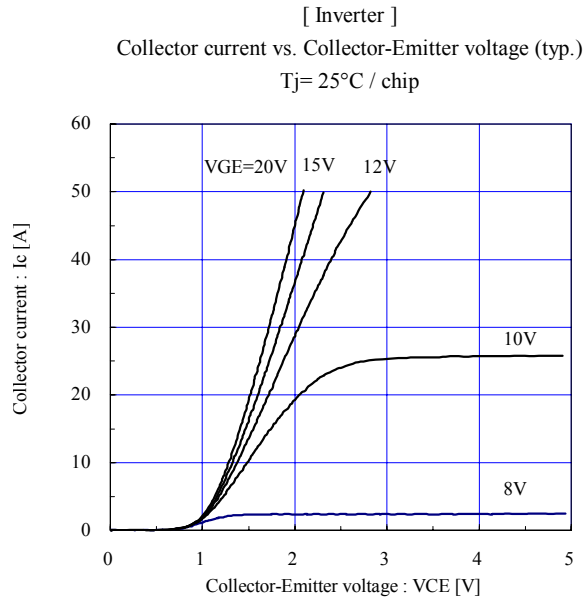
Item	Symbol	Condition	Characteristics			Unit
			Min.	Typ.	Max.	
Thermal resistance (1 device)	R _{th(j-c)}	Inverter IGBT	-	-	0.76	°C/W
		Inverter FWD	-	-	1.19	
		Brake IGBT	-	-	1.07	
		Converter Diode	-	-	0.90	
			-	-	-	
Contact thermal resistance *	R _{th(c-f)}	With thermal compound	-	0.05	-	

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

■ Equivalent Circuit Schematic

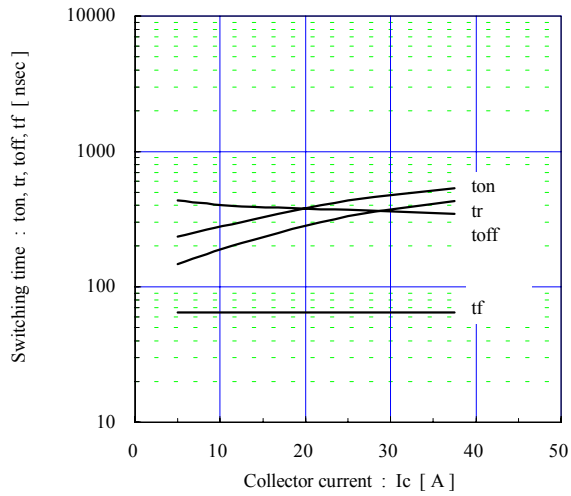


■ Characteristics (Representative)



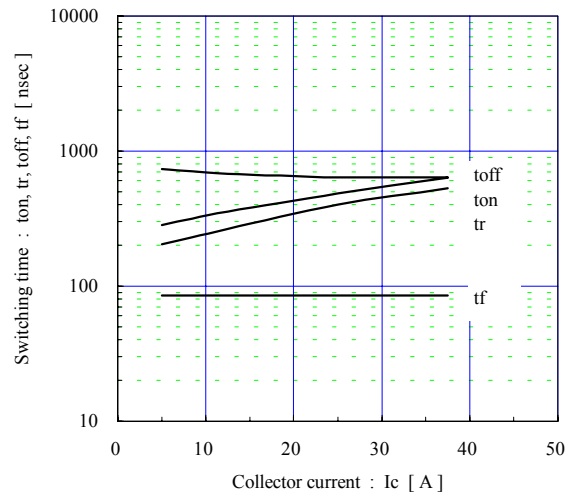
[Inverter]

Switching time vs. Collector current (typ.)
 $V_{cc}=600V$, $V_{GE}=\pm 15V$, $R_g=43\Omega$, $T_j=25^\circ C$



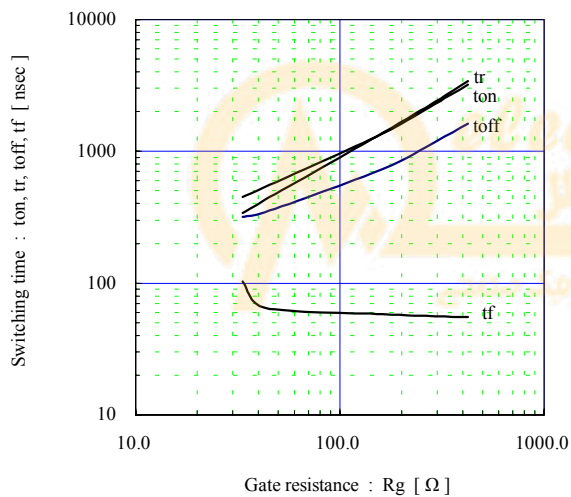
[Inverter]

Switching time vs. Collector current (typ.)
 $V_{cc}=600V$, $V_{GE}=\pm 15V$, $R_g=43\Omega$, $T_j=125^\circ C$



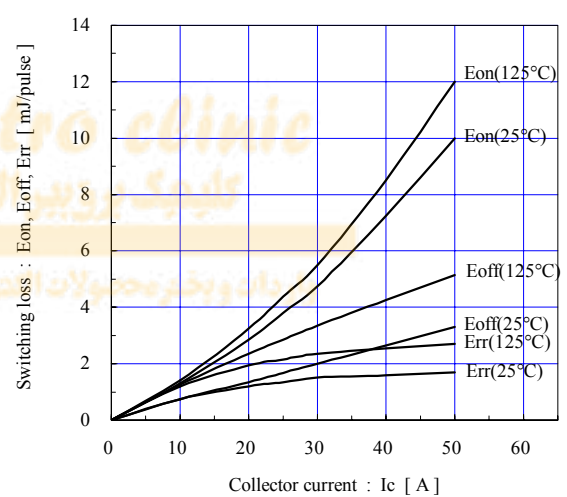
[Inverter]

Switching time vs. Gate resistance (typ.)
 $V_{cc}=600V$, $I_c=35A$, $V_{GE}=\pm 15V$, $T_j=25^\circ C$



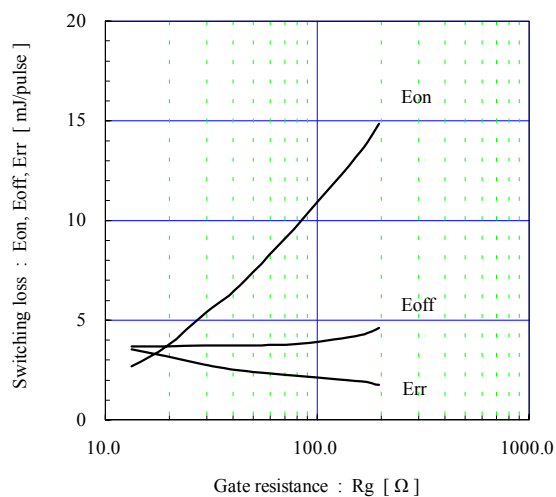
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Switching loss vs. Collector current (typ.)
 $V_{cc}=600V$, $V_{GE}=\pm 15V$, $R_g=43\Omega$



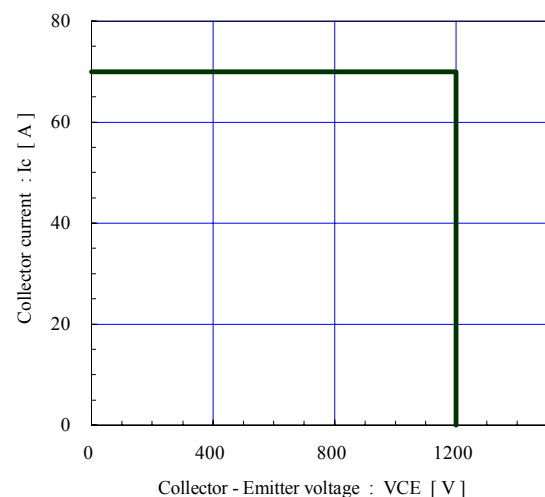
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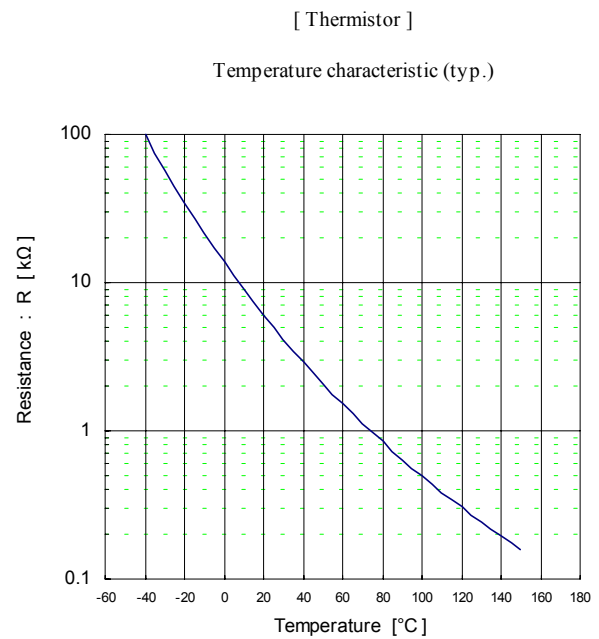
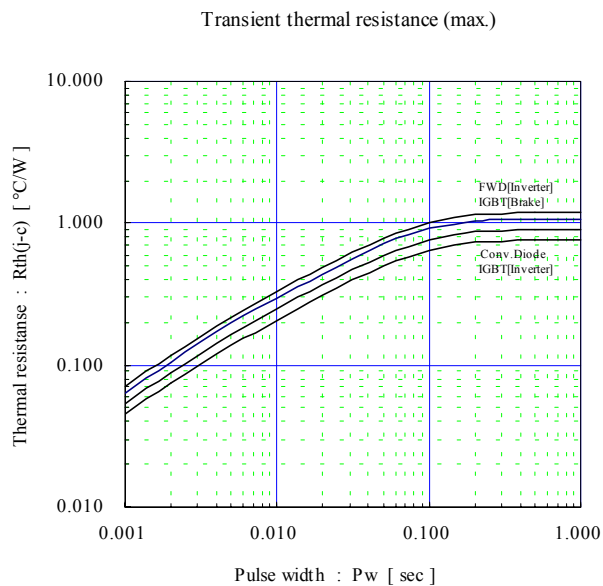
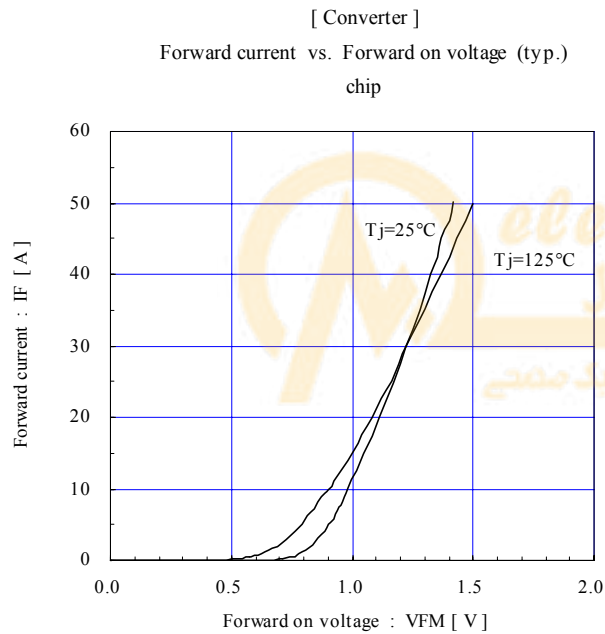
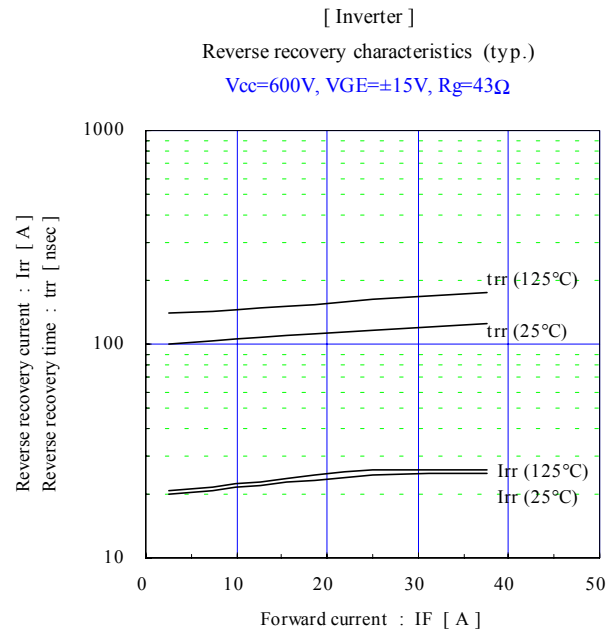
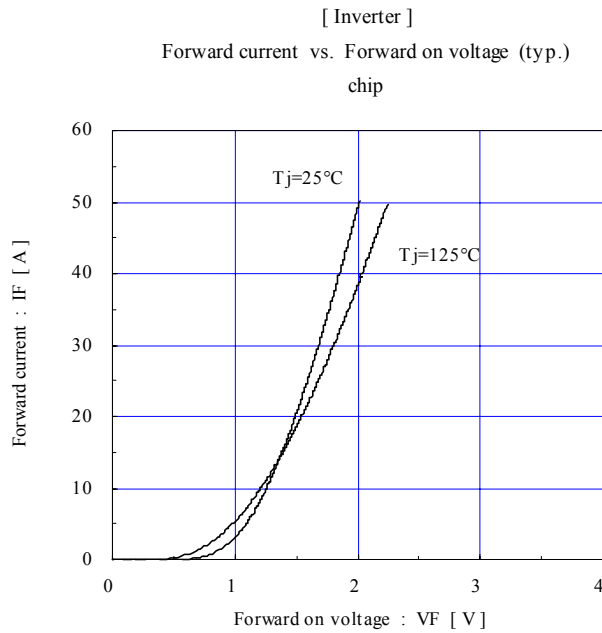
Switching loss vs. Gate resistance (typ.)
 $V_{cc}=600V$, $I_c=35A$, $V_{GE}=\pm 15V$, $T_j=125^\circ C$

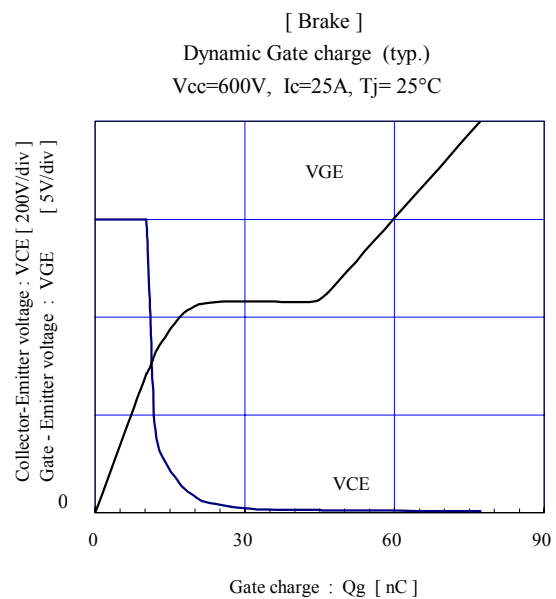
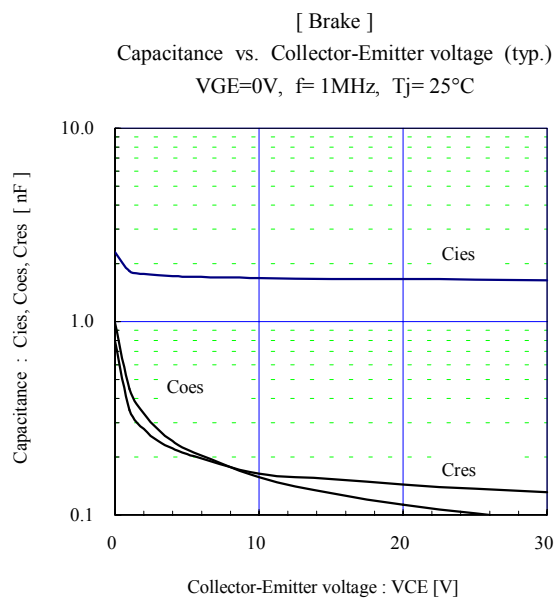
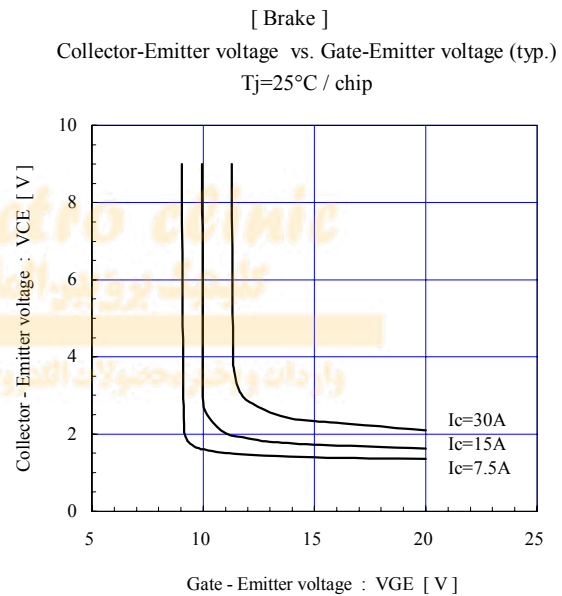
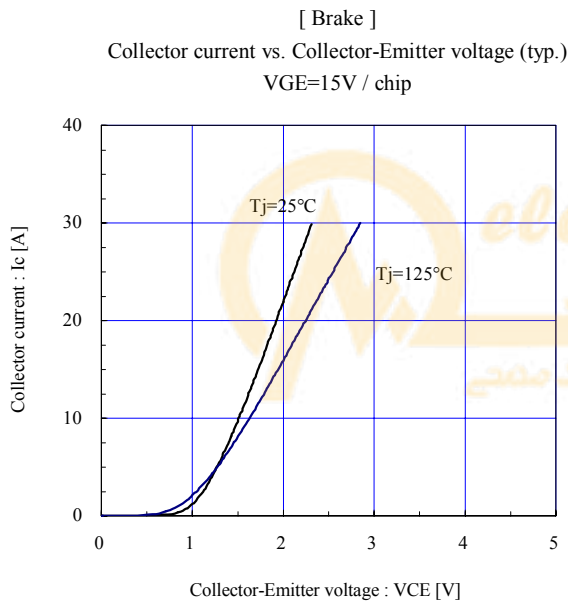
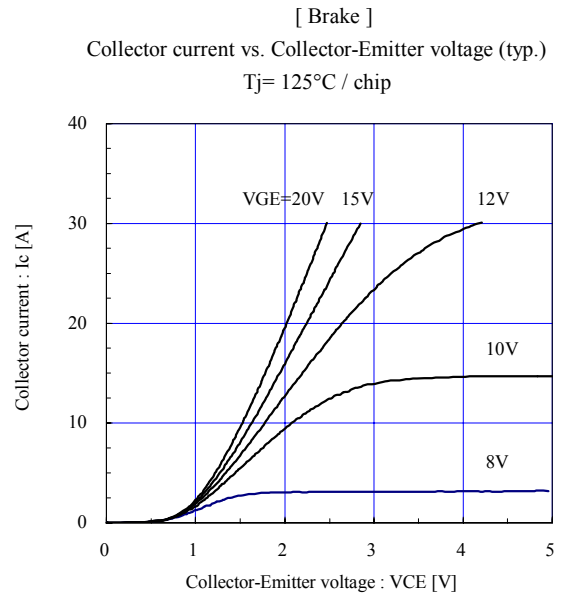
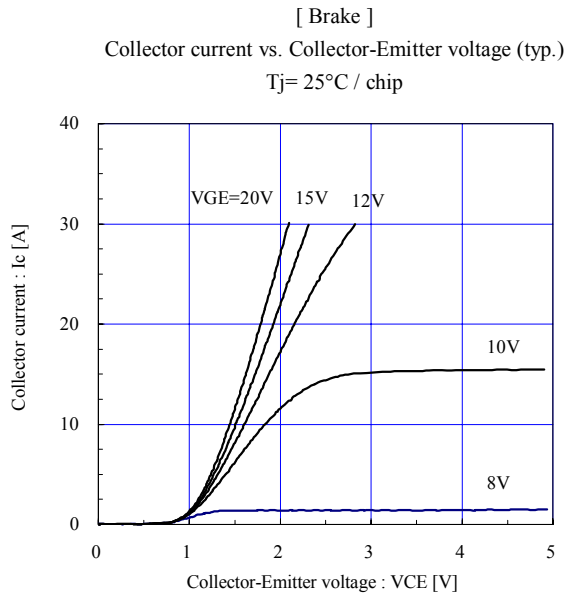


[Inverter]

Reverse bias safe operating area (max.)
 $+V_{GE}=15V$, $-V_{GE} \leq 15V$, $R_g \geq 43\Omega$, $T_j \leq 125^\circ C$







■ Outline Drawings, mm

