

IGBT MODULE (U series) 600V / 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}		600	V
	Gate-Emitter voltage	V _{GES}		±20	V
	Collector current	I _C	Continuous	50	A
		I _{CP}	1ms	100	
		-I _C		50	
		-I _C pulse	1ms	100	
Collector power dissipation	P _C	1 device	187	W	
Brake	Collector-Emitter voltage	V _{CES}		600	V
	Gate-Emitter voltage	V _{GES}		±20	V
	Collector current	I _C	Continuous	20	A
		I _{CP}	1ms	40	A
	Collector power dissipation	P _C	1 device	104	W
	Repetitive peak reverse voltage	V _{R_{RRM}}		600	V
Converter	Repetitive peak reverse voltage	V _{R_{RRM}}		800	V
	Average output current	I _O	50Hz/60Hz sine wave	50	A
	Surge current (Non-Repetitive)	I _{FSM}	T _J =150°C, 10ms	350	A
	I ² t (Non-Repetitive)	P _t	half sine wave	613	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)

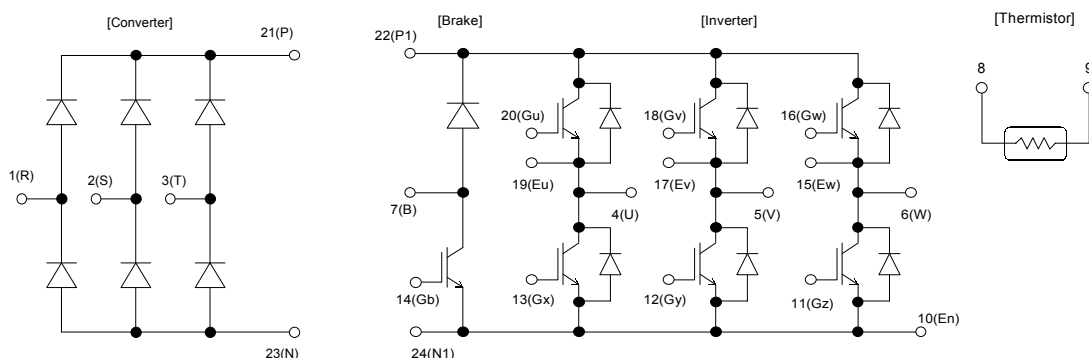
Item	Symbol	Condition	Characteristics			Unit
			Min.	Typ.	Max.	
Inverter	Zero gate voltage collector current	I _{CES}	V _{CE} =600V, V _{GE} =0V		1.0	mA
	Gate-Emitter leakage current	I _{GES}	V _{CE} =0V, V _{GE} =±20V		200	nA
	Gate-Emitter threshold voltage	V _{GE(th)}	V _{CE} =20V, I _C =50mA		6.2	V
	Collector-Emitter saturation voltage	V _{CE(sat)} (terminal) I _C =50A	T _J =25°C	2.25	2.55	V
			T _J =125°C	2.45	-	
			T _J =25°C	1.85	-	
			T _J =125°C	2.15	-	
	Input capacitance	C _{ies}	V _{GE} =0V, V _{CE} =10V, f=1MHz		3.6	nF
	Turn-on time	t _{on}	V _{CC} =300V		0.42	μs
		t _r	I _C =50A		0.24	
		t _{r(i)}	V _{GE} =±15V		0.05	
	Turn-off time	t _{off}	R _G =68Ω		0.42	μs
		t _f			0.03	
	Forward on voltage	V _F (terminal) I _F =50A	T _J =25°C	2.00	2.35	V
			T _J =125°C	2.05	-	
			T _J =25°C	1.60	-	
			T _J =125°C	1.65	-	
	Reverse recovery time	t _{rr}	I _F =50A		0.35	μs
Brake	Zero gate voltage collector current	I _{CES}	V _{CE} =600V, V _{GE} =0V		1.0	mA
	Gate-Emitter leakage current	I _{GES}	V _{CE} =0V, V _{GE} =±20V		200	nA
	Collector-Emitter saturation voltage	V _{CE(sat)} (terminal) I _C =20A V _{GE} =15V	T _J =25°C	1.85	2.15	V
			T _J =125°C	2.15	-	
			T _J =25°C	1.70	-	
			T _J =125°C	2.00	-	
	Turn-on time	t _{on}	V _{CC} =300V		0.45	μs
		t _r	I _C =20A		0.15	
	Turn-off time	t _{off}	V _{GE} =±15V		0.37	μs
		t _f	R _G =270Ω		0.04	
	Reverse current	I _{RRM}	V _R =600V		1.0	mA
Converter	Forward on voltage	V _{FM}	I _F =50A	terminal	1.20	V
			V _{GE} =0V	chip	1.10	
	Reverse current	I _{RRM}	V _R =800V		1.0	mA
Thermistor	Resistance	R	T=25°C		5000	Ω
			T=100°C		465	
	B value	B	T=25/50°C		3305	K

● Thermal resistance Characteristics

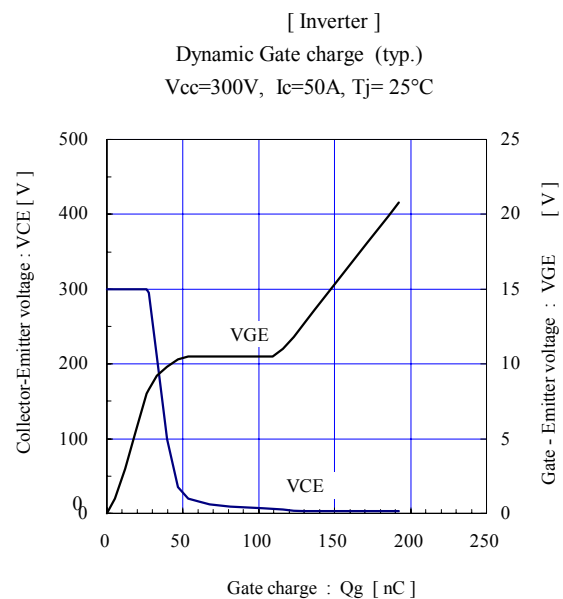
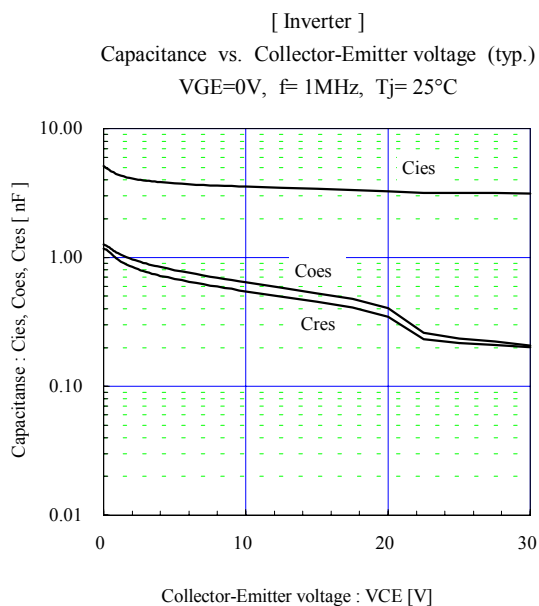
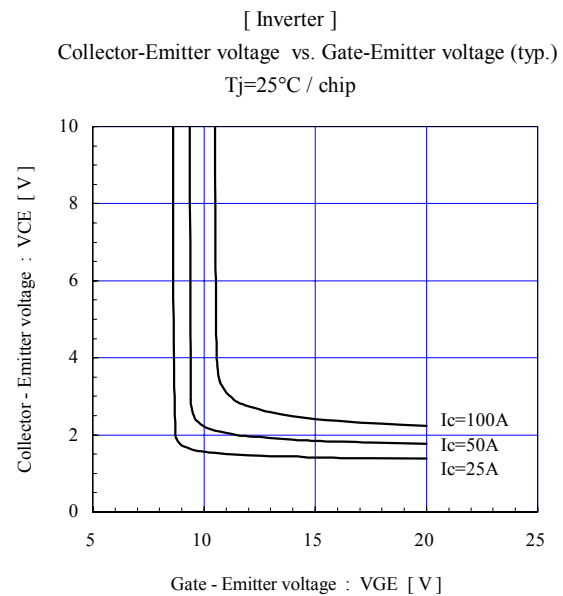
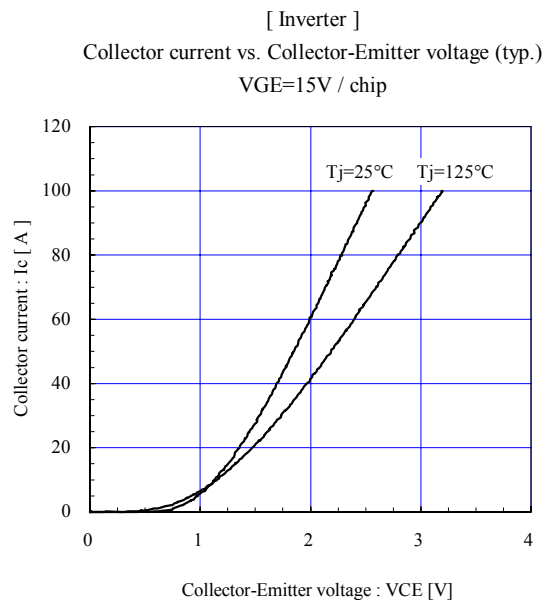
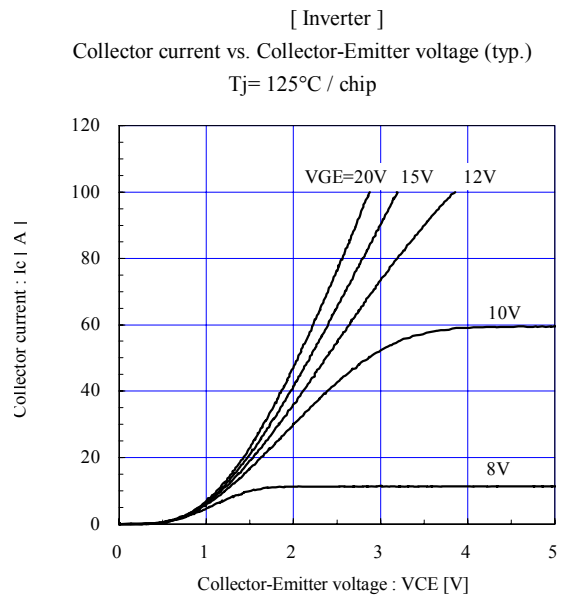
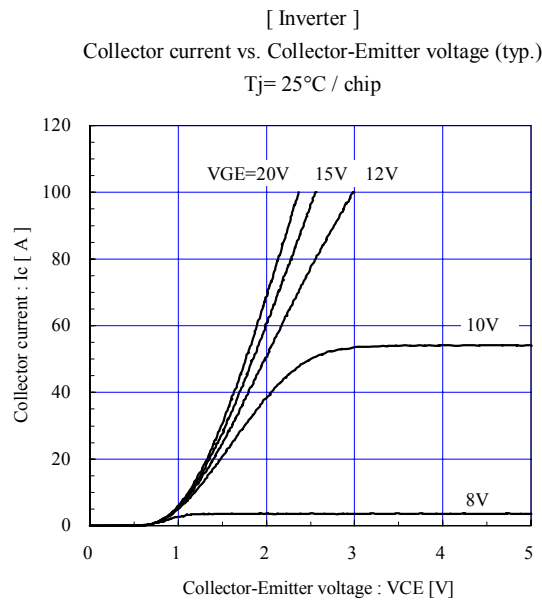
Item	Symbol	Condition	Characteristics			Unit
			Min.	Typ.	Max.	
Thermal resistance (1 device)	R _{th(j-c)}	Inverter IGBT	-	-	0.67	°C/W
		Inverter FWD	-	-	1.10	
		Brake IGBT	-	-	1.20	
		Converter Diode	-	-	0.82	
Contact thermal resistance *	R _{th(c-f)}	With thermal compound	-	0.05		

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

■ Equivalent Circuit Schematic

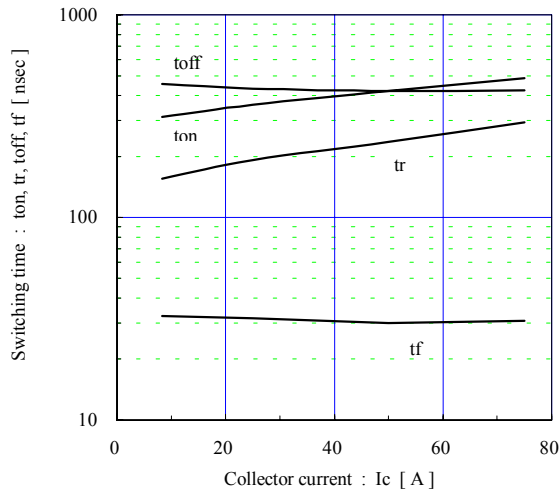


■ Characteristics (Representative)



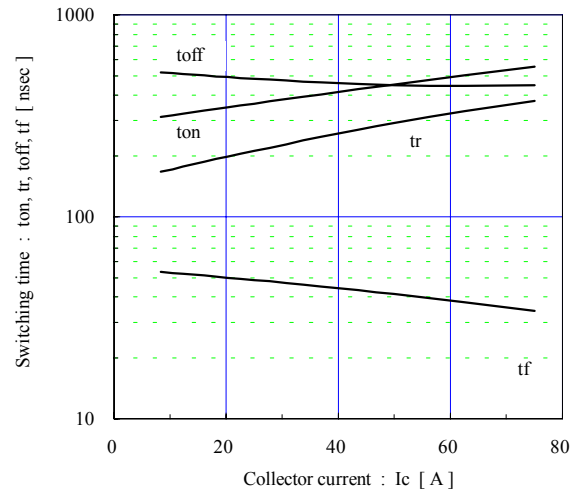
[Inverter]

Switching time vs. Collector current (typ.)
 $V_{cc}=300V$, $V_{GE}=\pm 15V$, $R_g=68\Omega$, $T_j=25^\circ C$



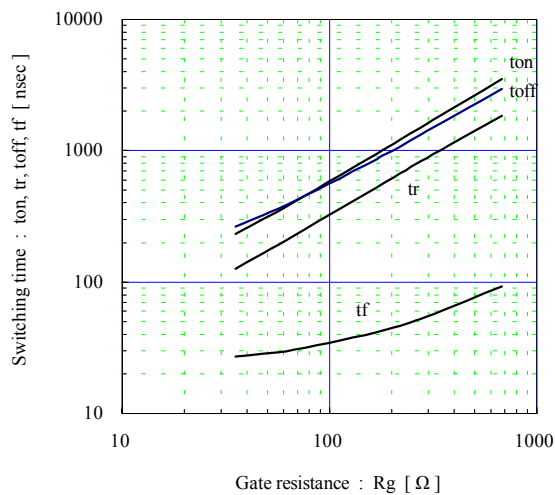
[Inverter]

Switching time vs. Collector current (typ.)
 $V_{cc}=300V$, $V_{GE}=\pm 15V$, $R_g=68\Omega$, $T_j=125^\circ C$



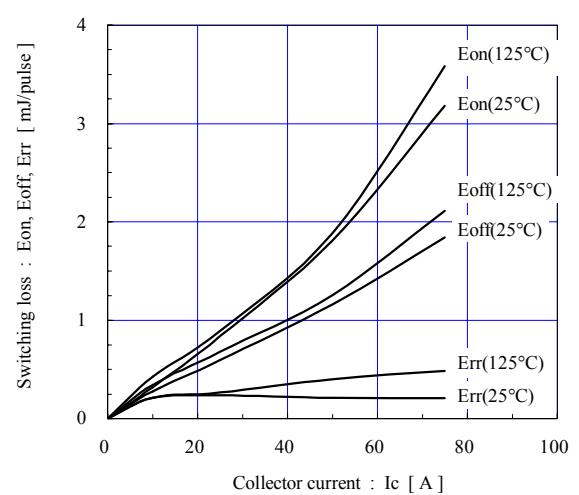
[Inverter]

Switching time vs. Gate resistance (typ.)
 $V_{cc}=300V$, $I_c=50A$, $V_{GE}=\pm 15V$, $T_j=25^\circ C$



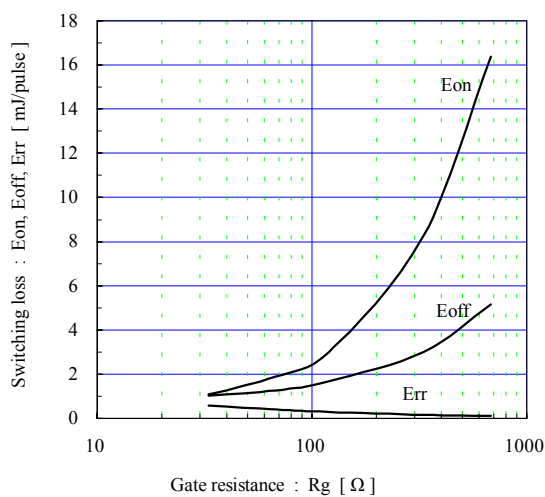
[Inverter]

Switching loss vs. Collector current (typ.)
 $V_{cc}=300V$, $V_{GE}=\pm 15V$, $R_g=68\Omega$



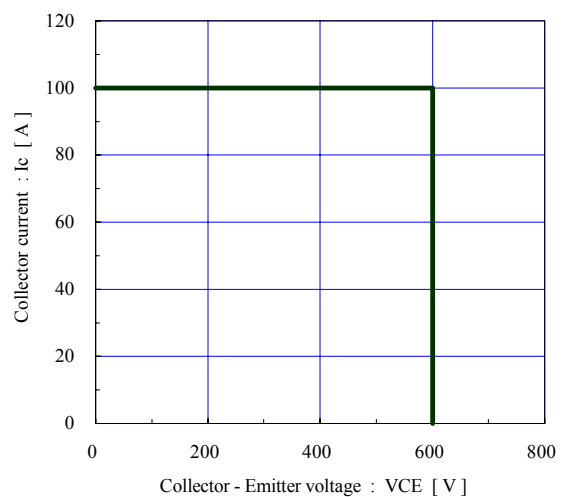
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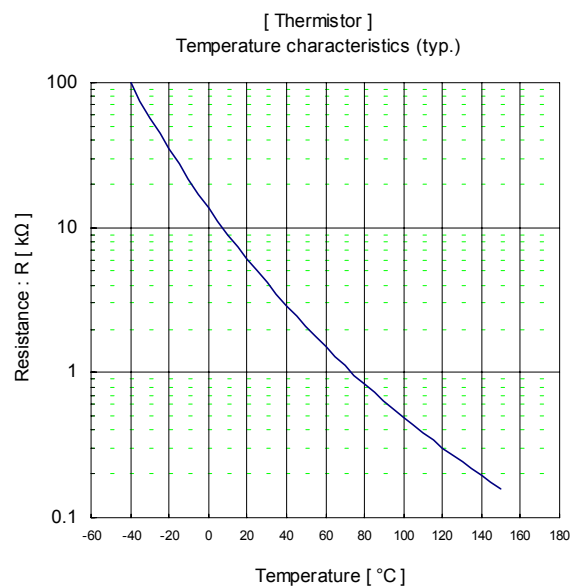
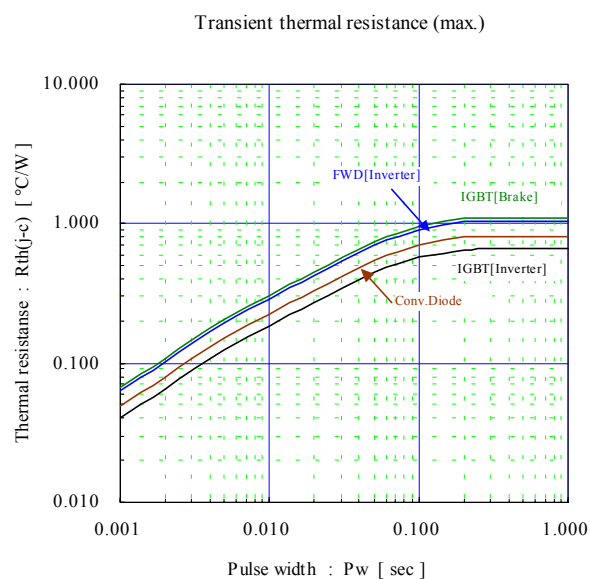
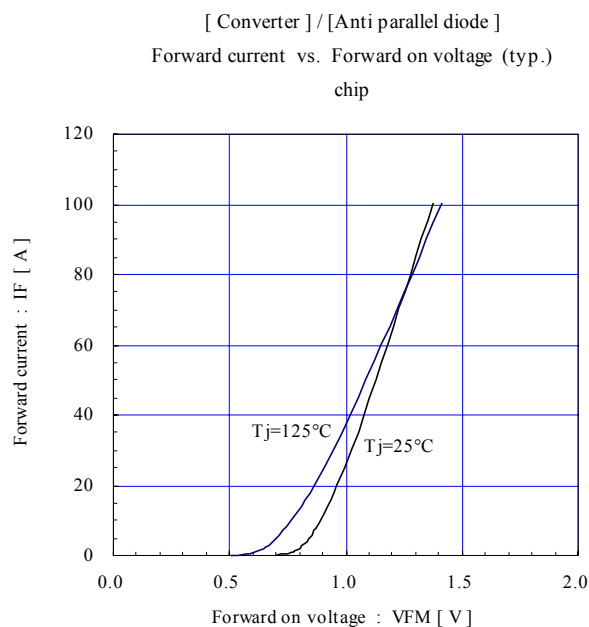
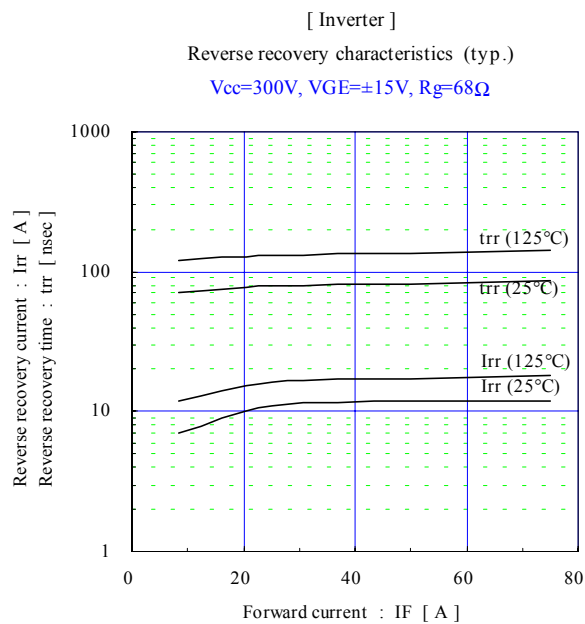
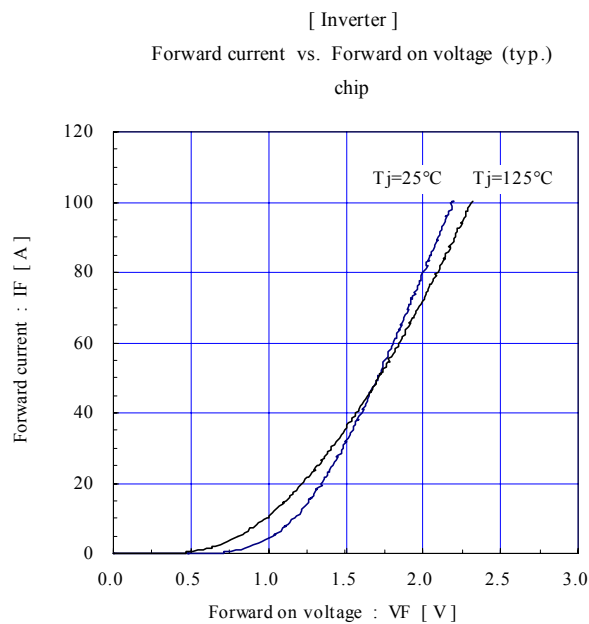
Switching loss vs. Gate resistance (typ.)
 $V_{cc}=300V$, $I_c=50A$, $V_{GE}=\pm 15V$, $T_j=125^\circ C$

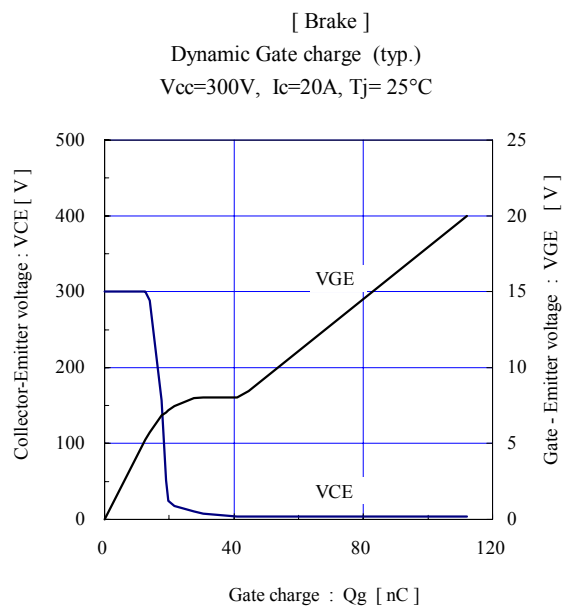
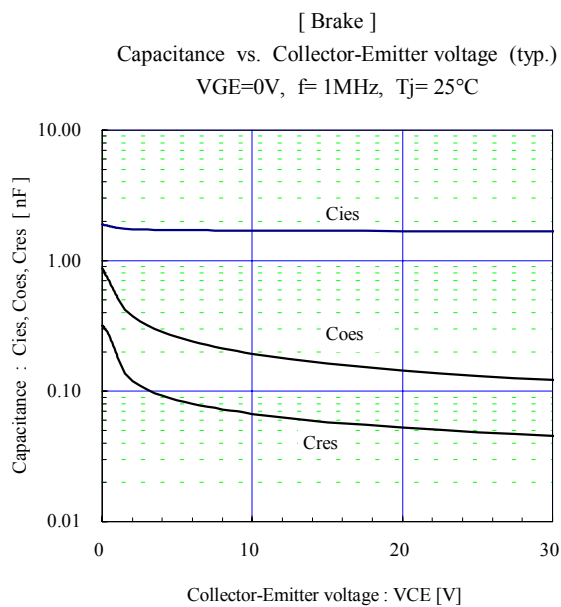
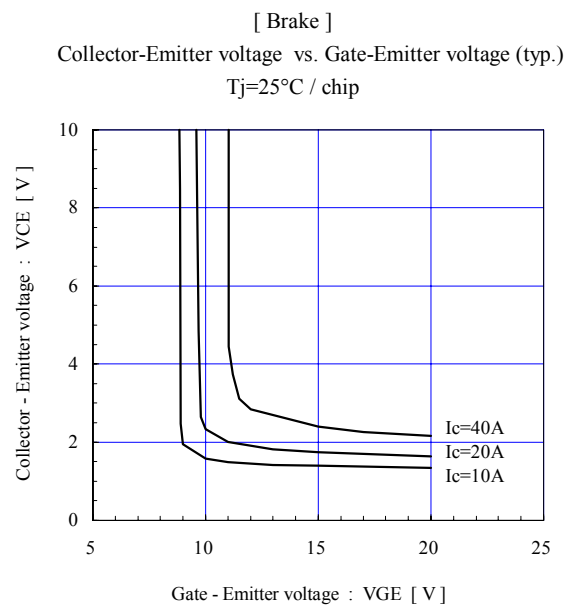
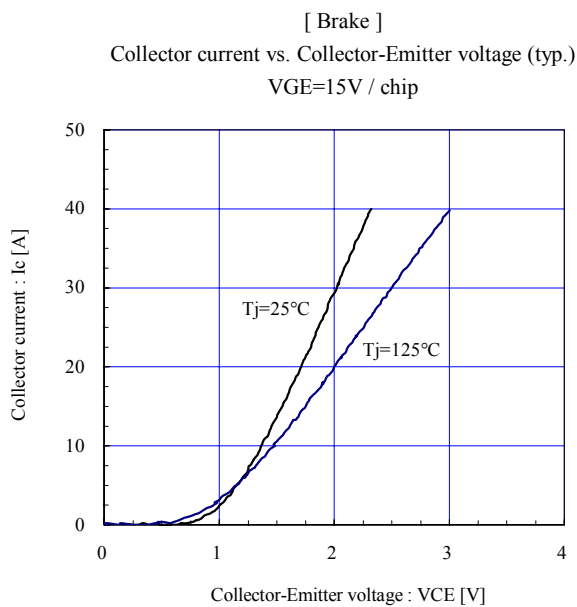
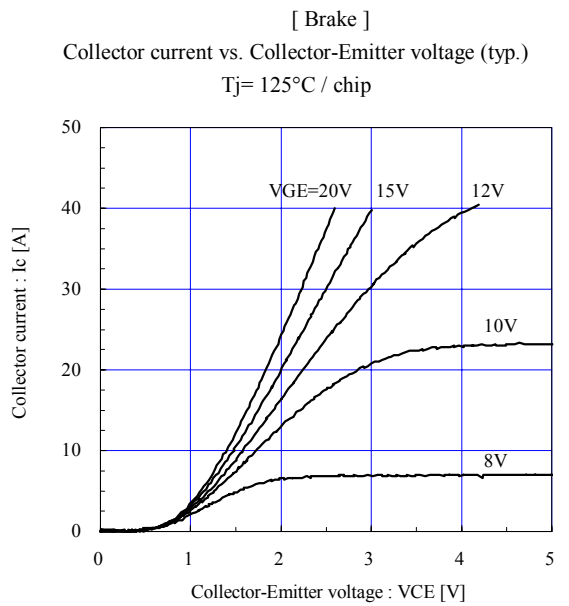
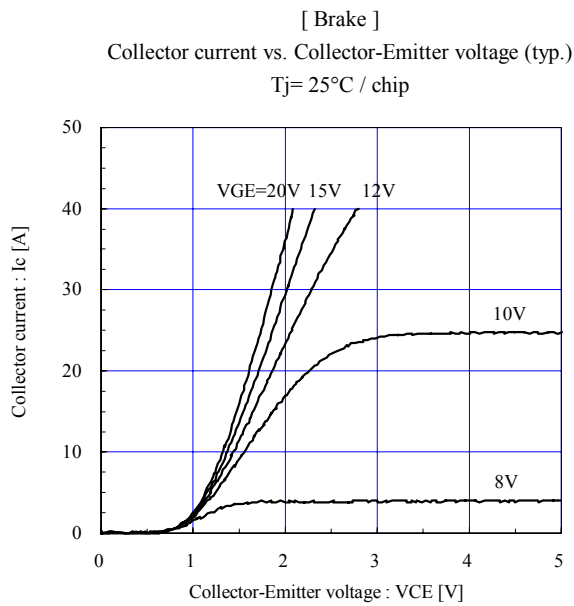


[Inverter]

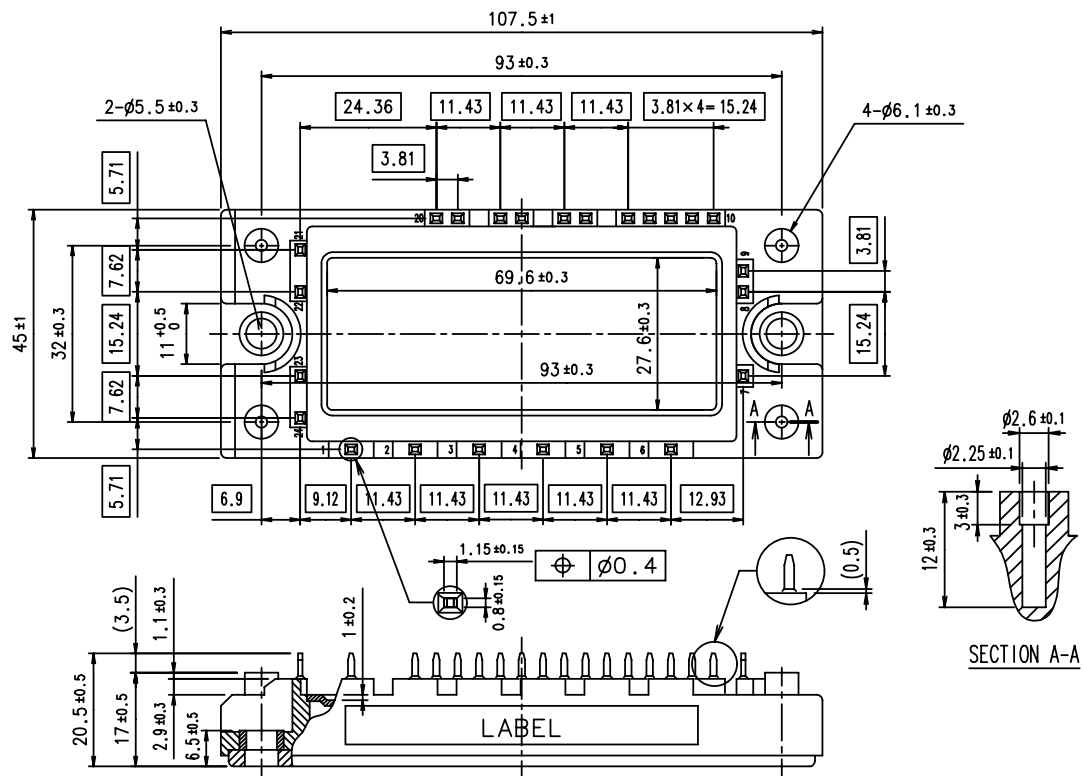
Reverse bias safe operating area (max.)
 $+V_{GE}=15V$, $-V_{GE} \leq 15V$, $R_g \geq 68\Omega$, $T_j \leq 125^\circ C$







■ Outline Drawings, mm



□ shows theoretical dimension.
() shows reference dimension.