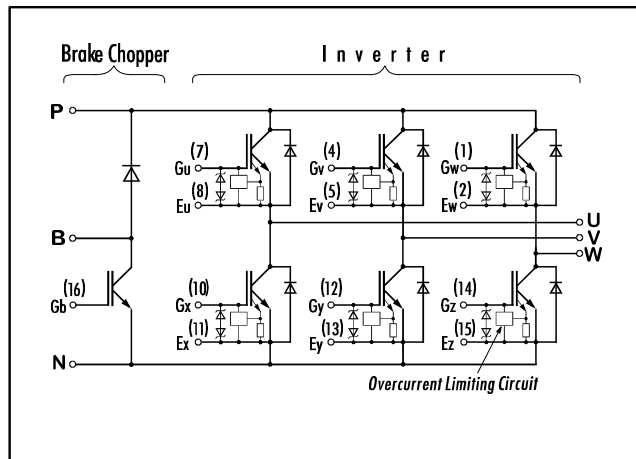


## IGBT MODULE ( N series )

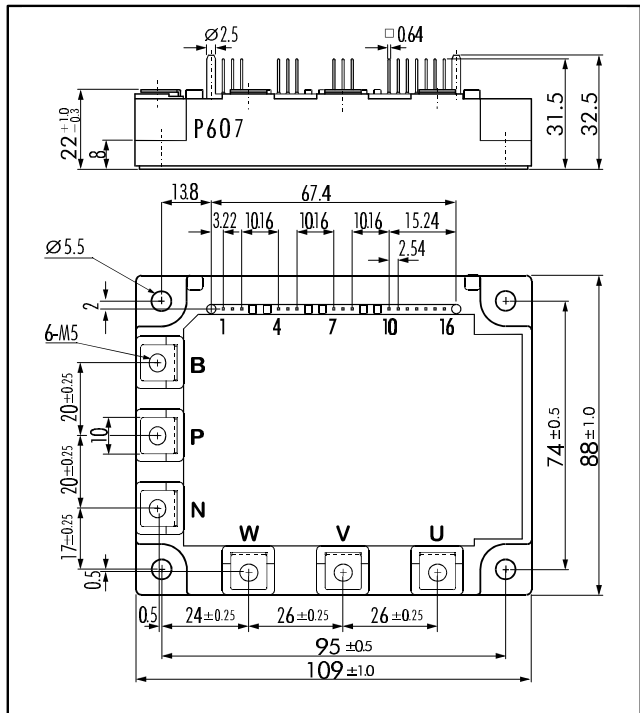
### ■ Features

- Including Brake Chopper
- Square RBSOA
- Low Saturation Voltage
- Overcurrent Limiting Function  
( ~ 3 Times Rated Current )

### ■ Equivalent Circuit



### ■ Outline Drawing



### ■ Absolute Maximum Ratings ( T<sub>c</sub>=25°C )

	Items	Symbols	Test Conditions	Ratings	Units	
Inverter	Collector-Emitter Voltage	V <sub>CES</sub>		600	V	
	Gate -Emitter Voltage	V <sub>GES</sub>		± 20		
	Collector Current	I <sub>C</sub>	Continuous	100	A	
		I <sub>C PULSE</sub>	1ms	200		
		-I <sub>C PULSE</sub>	Continuous	150		
Collector Power Dissipation	P <sub>C</sub>	1 device	400	W		
Brake Chopper	Collector-Emitter Voltage	V <sub>CES</sub>		600	V	
	Gate -Emitter Voltage	V <sub>GES</sub>		± 20		
	Collector Current	I <sub>C</sub>	Continuous	50		
		I <sub>C PULSE</sub>	1ms	100		
	Collector Power Dissipation	P <sub>C</sub>	1 device	200	W	
	FWD	Repetitive Peak Reverse Voltage	V <sub>R RM</sub>		600	V
		Average Forward Current	I <sub>F(AV)</sub>		1	
Surge Current		I <sub>FSM</sub>	10ms	50		
	Operating Junction Temperature	T <sub>J</sub>		+150		
	Storage Temperature	T <sub>Stg</sub>		-40 ~ +125		
	Isolation Voltage	V <sub>ISO</sub>	A.C. 1min.	2500	V	
	Mounting Screw Torque *1			3.5		
	Terminal Screw Torque *1			3.5		

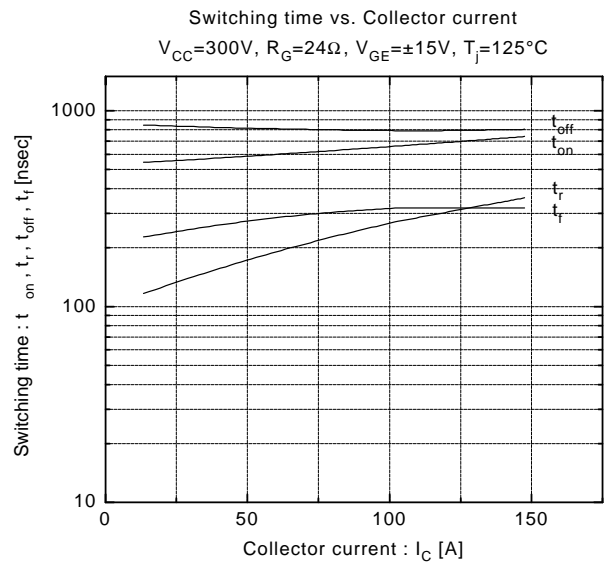
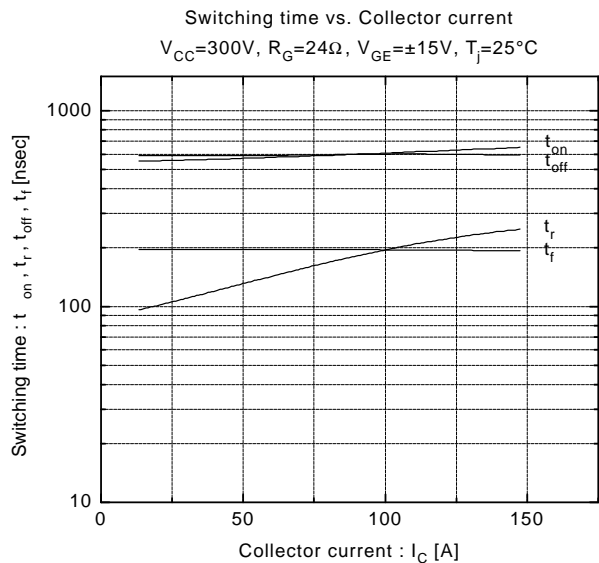
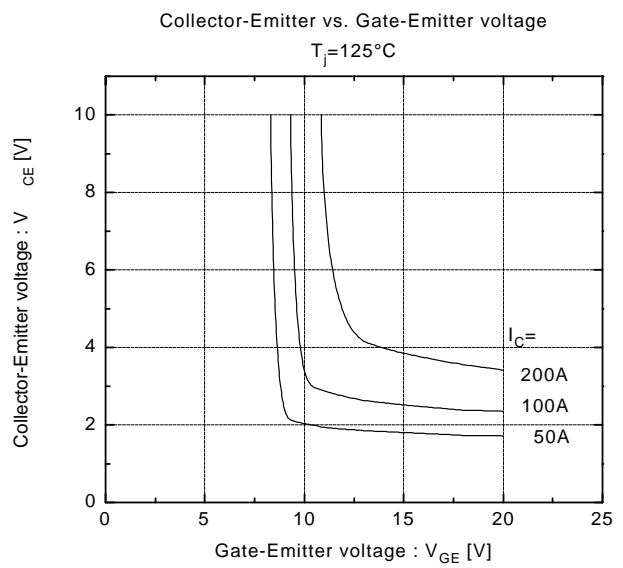
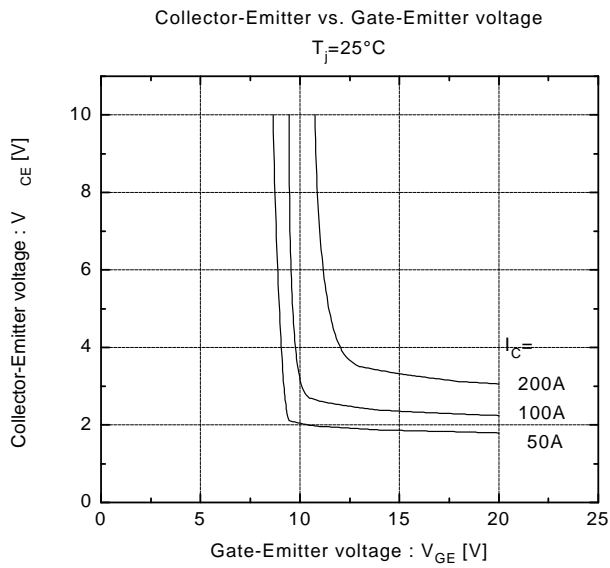
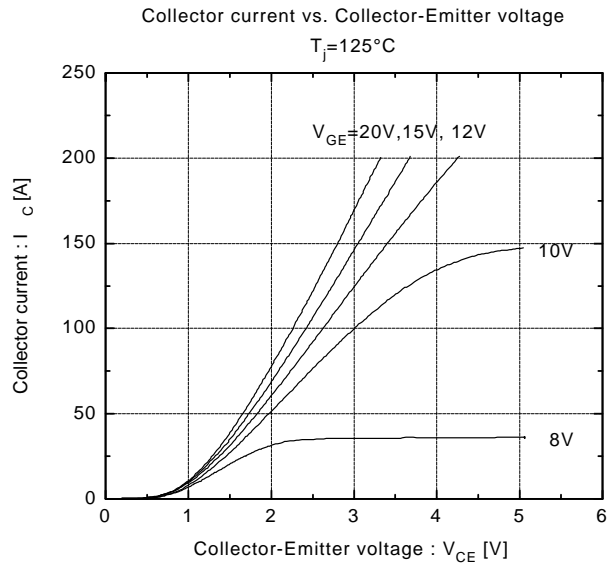
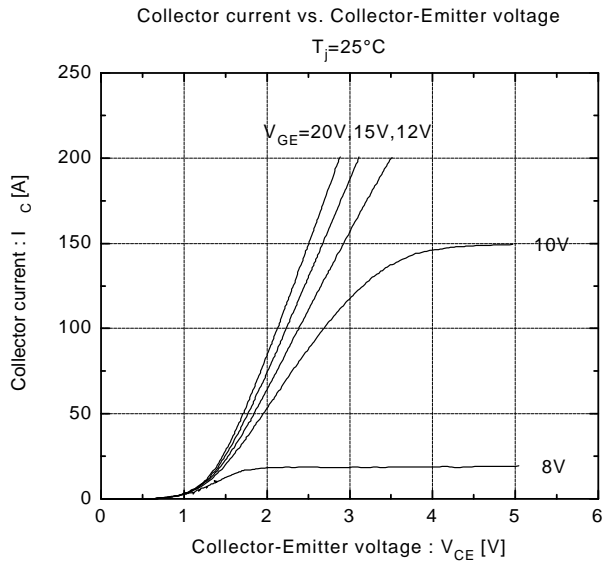
Note: \*1:Recommendable Value; 2.5 ~ 3.5 Nm (M5)

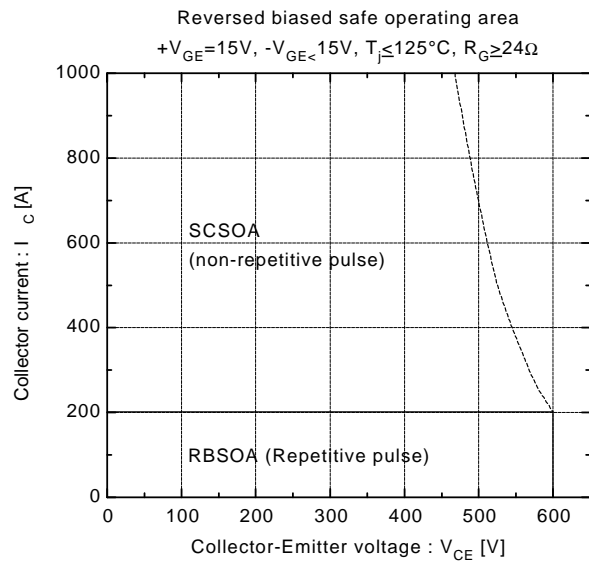
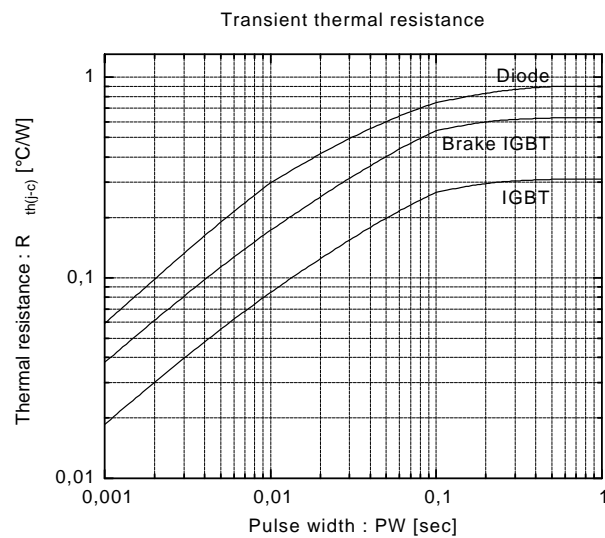
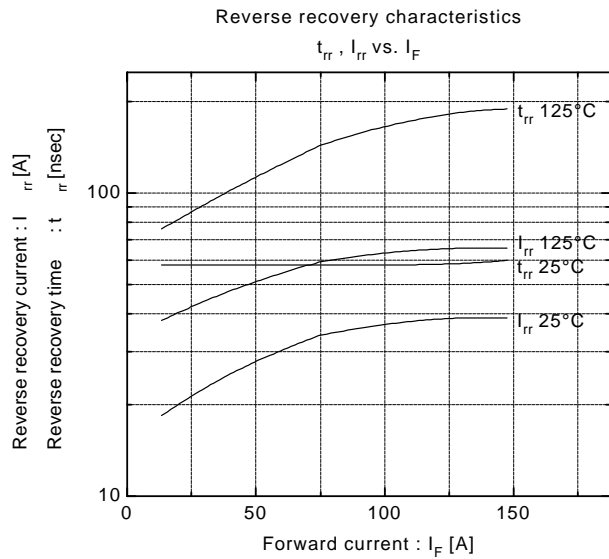
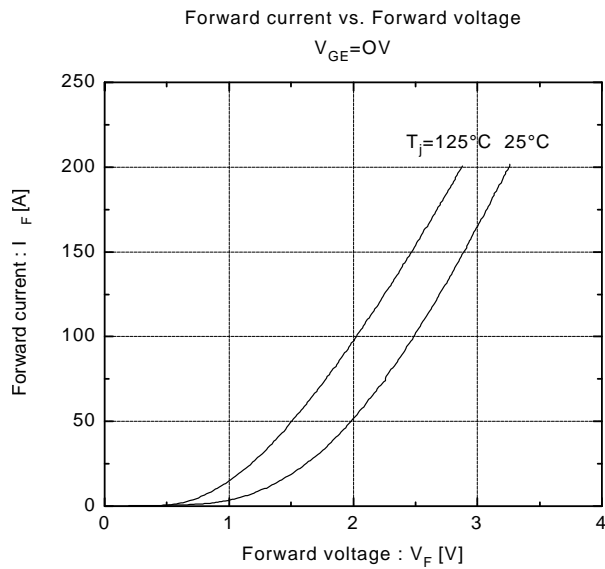
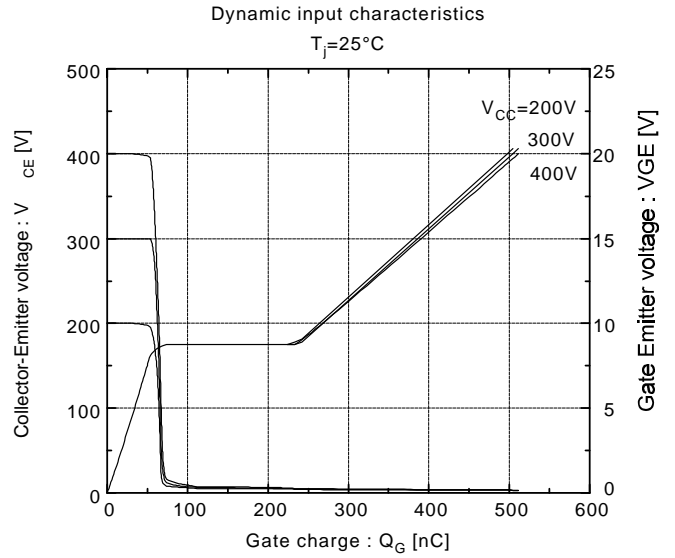
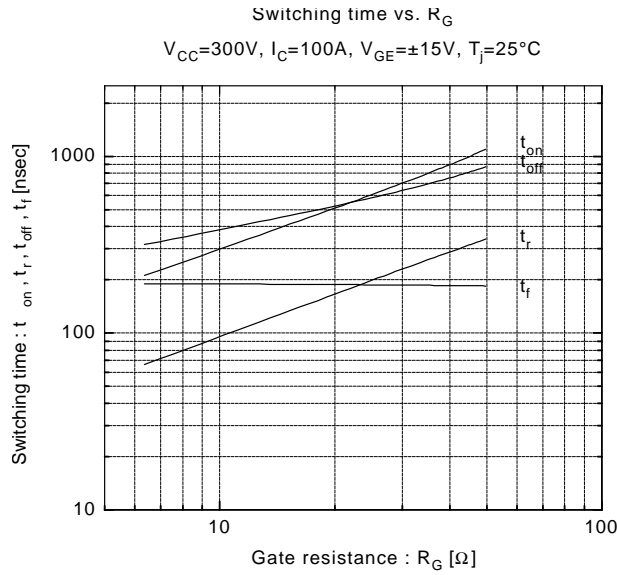
## ■ Electrical Characteristics (T<sub>j</sub>=25°C)

	Items	Symbols	Test Conditions	Min.	Max.	Units
Inverter IGBT	Zero Gate Voltage Collector Current	I <sub>CES</sub>	V <sub>GE</sub> =0V V <sub>CE</sub> =600V		3.0	mA
	Gate-Emitter Leakage Current	I <sub>GES</sub>	V <sub>CE</sub> =0V V <sub>GE</sub> =± 20V		15	μA
	Gate-Emitter Threshold Voltage	V <sub>GE(th)</sub>	V <sub>GE</sub> =20V I <sub>C</sub> =100mA	4.5	7.5	V
	Collector-Emitter Saturation Voltage	V <sub>CE(sat)</sub>	V <sub>GE</sub> =15V I <sub>C</sub> =100A		2.8	
	Input capacitance	C <sub>ies</sub>	f=1MHz, V <sub>GE</sub> =0V, V <sub>CE</sub> =10V	6600 (typ.)		pF
	Turn-on Time	t <sub>on</sub>	V <sub>CC</sub> =300V I <sub>C</sub> = 100A		1.2	
	Turn-off Time	t <sub>off</sub>	V <sub>GE</sub> =±15V R <sub>G</sub> = 24Ω		1.5	
FWD	Diode Forward On-Voltage	V <sub>F</sub>	I <sub>F</sub> =100A V <sub>GE</sub> =0V		3.3	V
	Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> =100A; V <sub>GE</sub> =-10V; <sup>-di</sup> t <sub>di</sub> =300 A/μs		300	ns
Brake Chopper IGBT	Zero Gate Voltage Collector Current	I <sub>CES</sub>	V <sub>GE</sub> =0V V <sub>CE</sub> =600V		1.0	mA
	Gate-Emitter Leakage Current	I <sub>GES</sub>	V <sub>CE</sub> =0V V <sub>GE</sub> =± 20V		100	nA
	Collector-Emitter Saturation Voltage	V <sub>CE(sat)</sub>	V <sub>GE</sub> =15V I <sub>C</sub> =50A		2.8	V
	Turn-on Time	t <sub>on</sub>	V <sub>CC</sub> =300V I <sub>C</sub> = 50A		1.2	
	Turn-off Time	t <sub>off</sub>	V <sub>GE</sub> =±15V R <sub>G</sub> = 51Ω		1.5	
		t <sub>f</sub>			0.35	
FWD	Reverse Current	I <sub>RRM</sub>	V <sub>R</sub> =600V		1.0	mA
	Reverse Recovery Time	t <sub>rr</sub>			600	ns

## ■ Thermal Characteristics

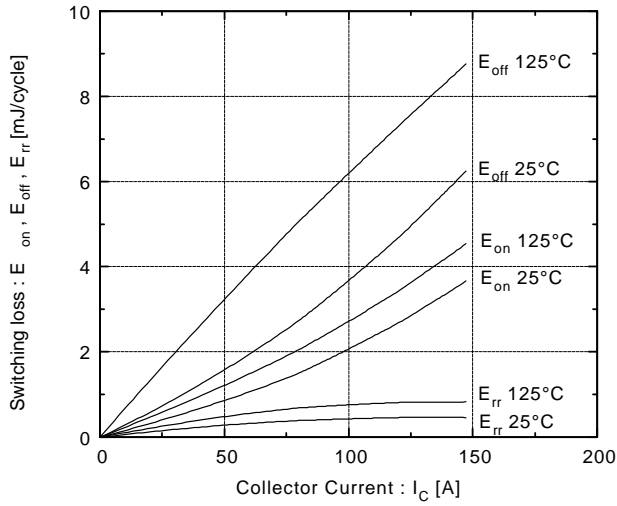
Items	Symbols	Test Conditions	Min.	Max.	Units
Thermal Resistance (1 device)	R <sub>th(j-c)</sub>	Inverter IGBT		0.31	°C/W
		Inverter FRD		0.90	
		Brake IGBT		0.63	
Contact Thermal Resistance	R <sub>th(c-f)</sub>	With Thermal Compound	0.05 (typ.)		





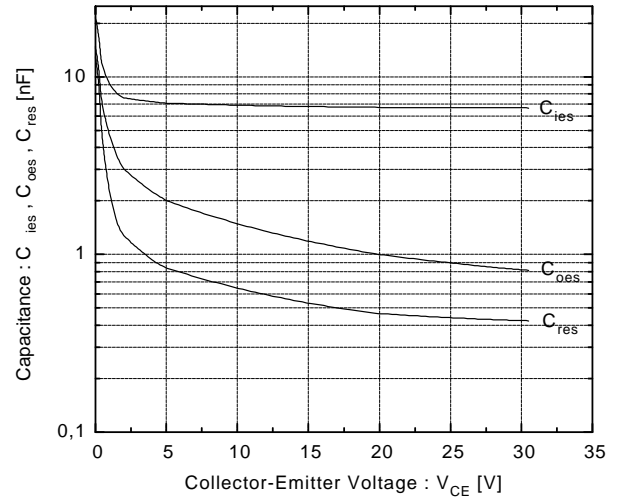
Switching loss vs. Collector current

$V_{CC}=300V, R_G=24\Omega, V_{GE}=\pm 15V$

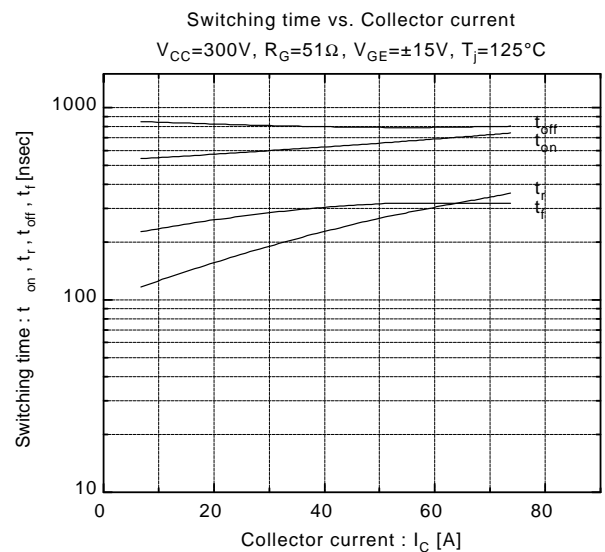
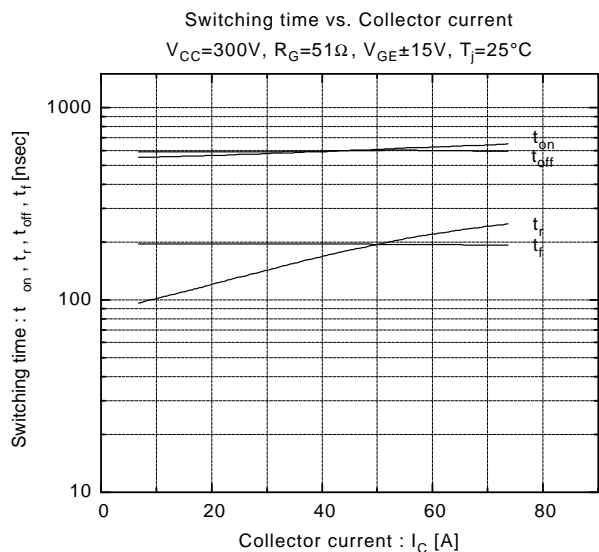
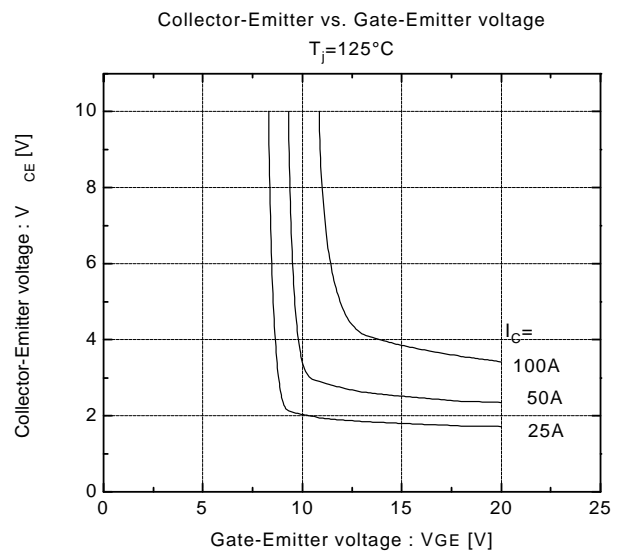
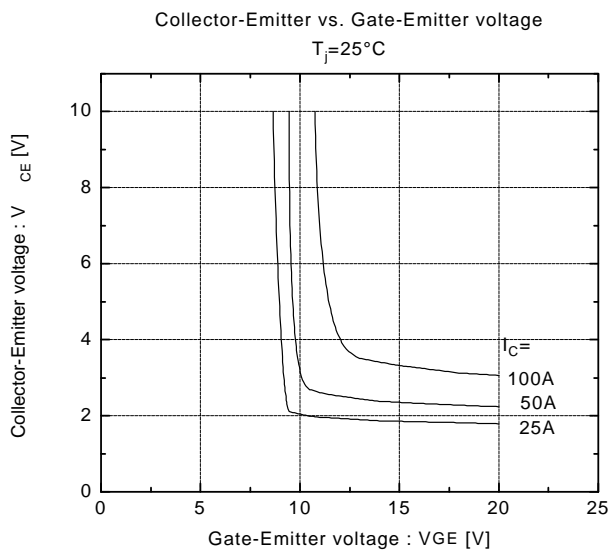
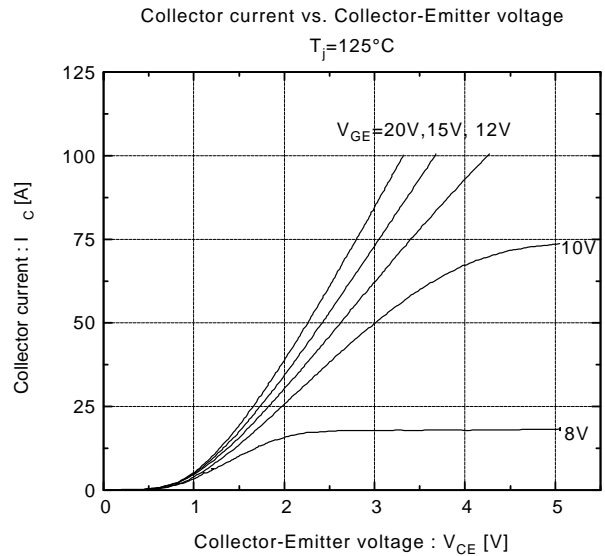
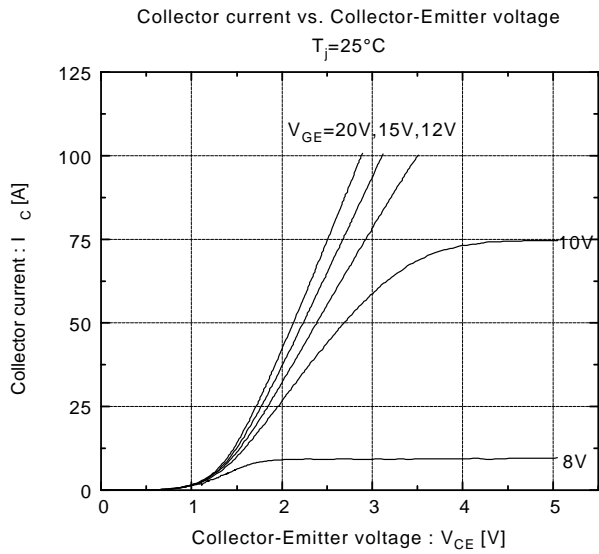


Capacitance vs. Collector-Emitter voltage

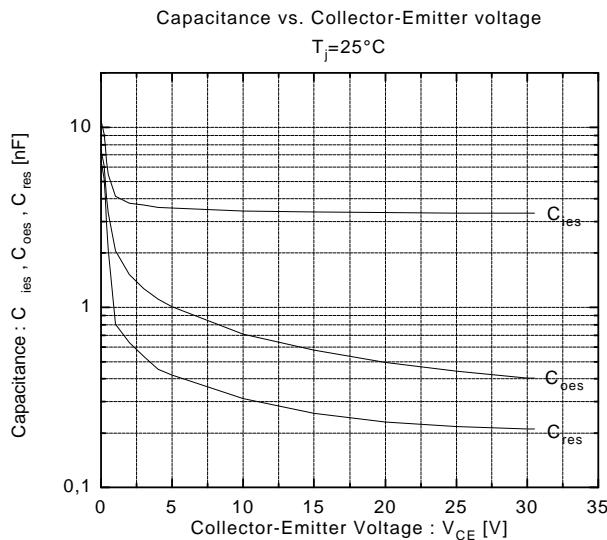
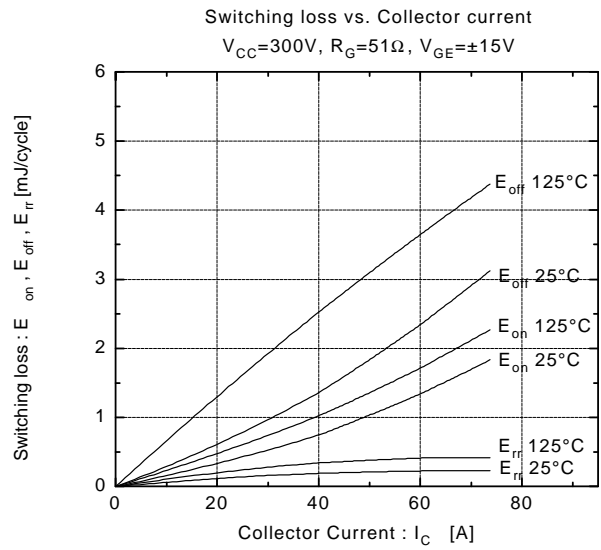
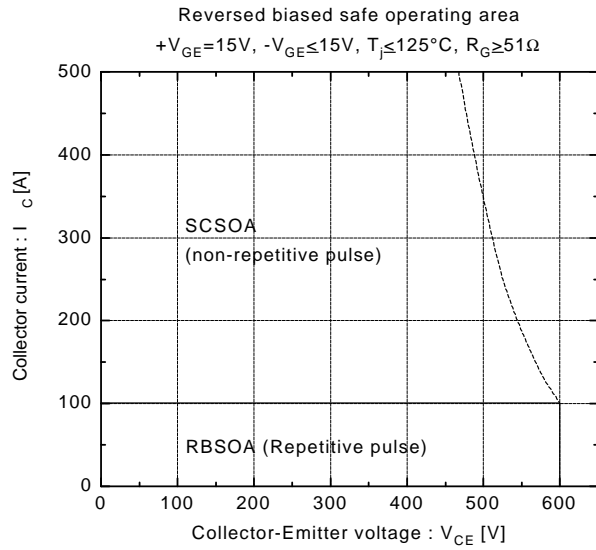
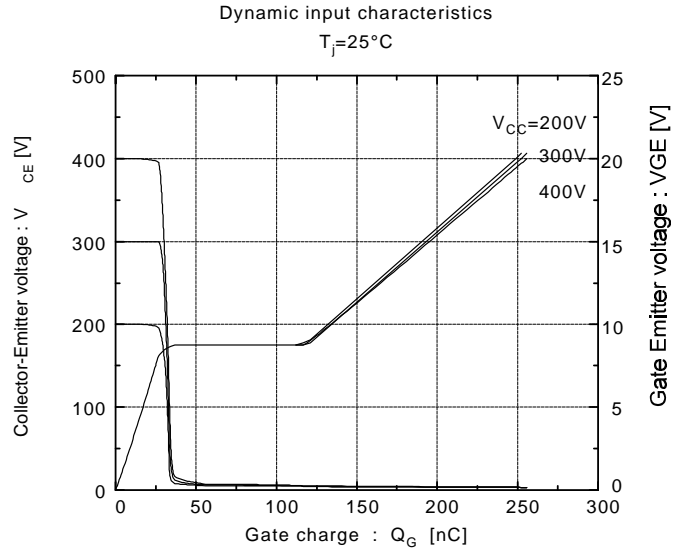
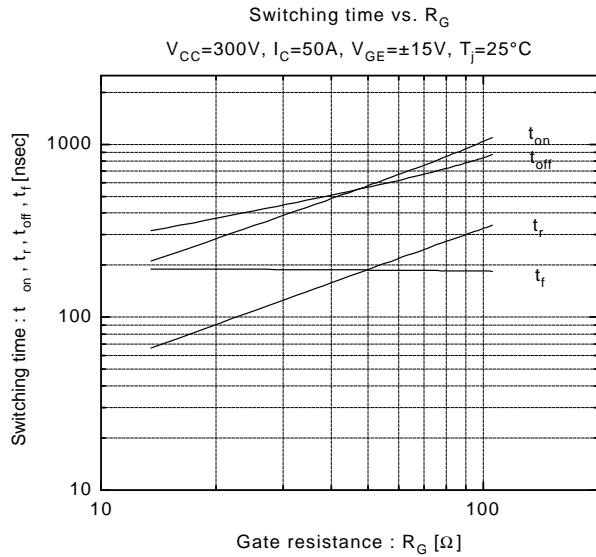
$T_J=25^\circ C$



## Brake Chopper IGBT



## Brake Chopper IGBT



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