

## IGBT MODULE ( S-Series )

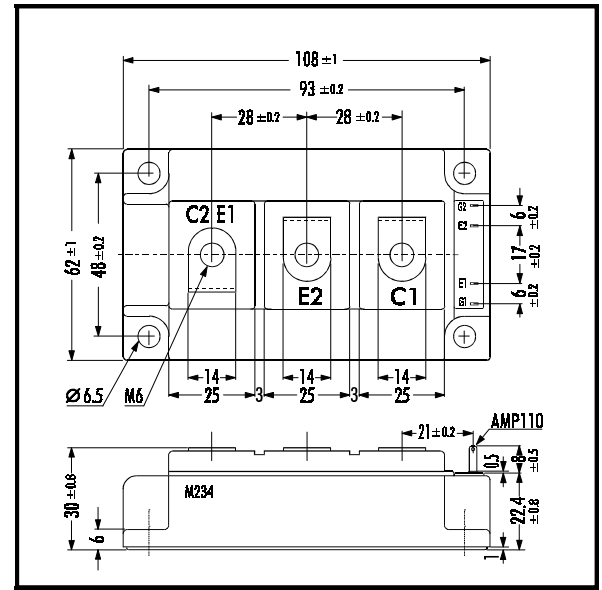
### ■ Features

- NPT-Technology
- Square SC SOA at  $10 \times I_C$
- High Short Circuit Withstand-Capability
- Small Temperature Dependence of the Turn-Off Switching Loss
- Low Losses And Soft Switching

### ■ Applications

- High Power Switching
- A.C. Motor Controls
- D.C. Motor Controls
- Uninterruptible Power Supply

### ■ Outline Drawing



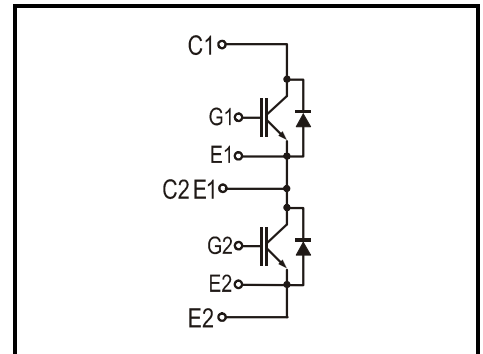
### ■ Maximum Ratings and Characteristics

#### • Absolute Maximum Ratings ( $T_c=25^\circ\text{C}$ )

Items	Symbols	Ratings	Units	
Collector-Emitter Voltage	$V_{CES}$	1200	V	
Gate -Emitter Voltage	$V_{GES}$	$\pm 20$		
Collector Current	Continuous	$I_C$	200 / 150	
	1ms	$I_{C\text{ PULSE}}$	400 / 300	
	Continuous	$-I_C$	150	
	1ms	$-I_{C\text{ PULSE}}$	300	
Max. Power Dissipation	$P_C$	1000	W	
Operating Temperature	$T_j$	+150	$^\circ\text{C}$	
Storage Temperature	$T_{stg}$	-40 ~ +125		
Isolation Voltage *1	A.C. 1min.	$V_{is}$	2500	V
Screw Torque	Mounting *2	3.5	Nm	
	Terminals *2	4.5		

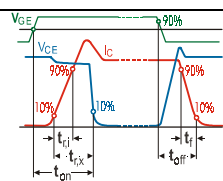
Note: 1\*: All Terminals should be connected together when isolation test will be done.  
2\*: Recommendable Value; Mounting 2.5 ~ 3.5 Nm (M5 or M6), Terminal 3.5~4.5 (M6)

### ■ Equivalent Circuit



#### • Electrical Characteristics ( at $T_j=25^\circ\text{C}$ )

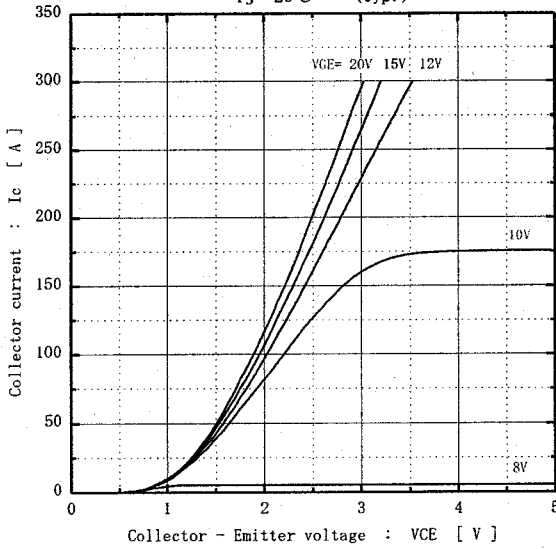
Items	Symbols	Test Conditions	Min.	Typ.	Max.	Units
Zero Gate Voltage Collector Current	$I_{CES}$	$V_{GE}=0V$ $V_{CE}=1200V$			2.0	mA
Gate-Emitter Leakage Current	$I_{GES}$	$V_{CE}=0V$ $V_{GE}=\pm 20V$			400	nA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=20V$ $I_C=150mA$	5.5	7.2	8.5	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V$ $I_C=150A$		2.3	2.6	
Input Capacitance	$C_{ies}$	$V_{GE}=0V$		18'000		pF
Output Capacitance	$C_{oes}$	$V_{CE}=10V$		3'750		
Reverse Transfer Capacitance	$C_{res}$	$f=1MHz$		3'300		
Turn-on Time	$t_{ON}$	$V_{CC}=600V$		0.35	1.2	$\mu\text{s}$
	$t_{r,x}$	$I_C=150A$		0.25	0.6	
	$t_{r,i}$	$V_{GE}=\pm 15V$		0.10		
Turn-off Time	$t_{OFF}$	$R_G=5.6\Omega$		0.45	1.0	
	$t_f$	Inductive Load		0.08	0.3	
Diode Forward On-Voltage	$V_F$	$I_F=150A$ ; $V_{GE}=0V$	$T_j=25^\circ\text{C}$	2.3	3.0	V
			$T_j=125^\circ\text{C}$	2.0		
Reverse Recovery Time	$t_{rr}$	$I_F=150A$			350	ns



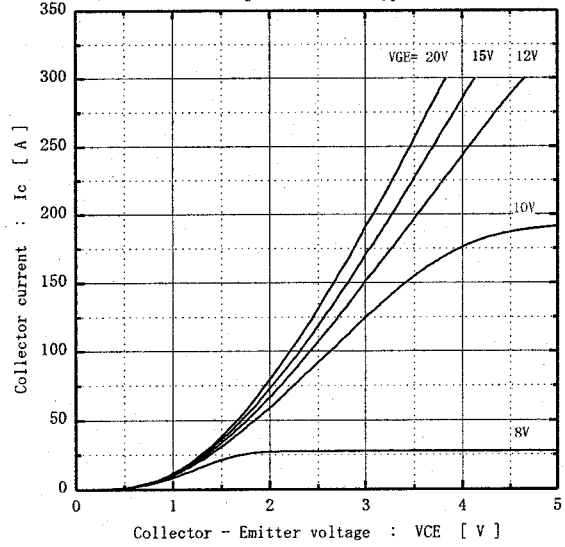
#### • Thermal Characteristics

Items	Symbols	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance	$R_{th(j-c)}$	IGBT			0.125	$^\circ\text{C/W}$
	$R_{th(j-c)}$	Diode			0.260	
	$R_{th(c-f)}$	With Thermal Compound		0.025		

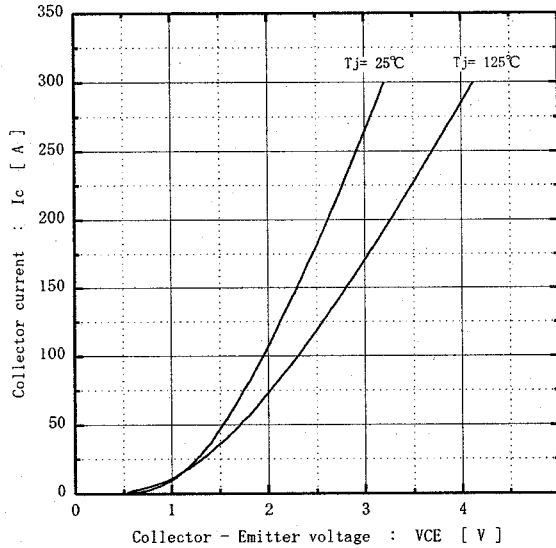
Collector current vs. Collector-Emiiter voltage  
T<sub>j</sub>= 25°C (typ.)



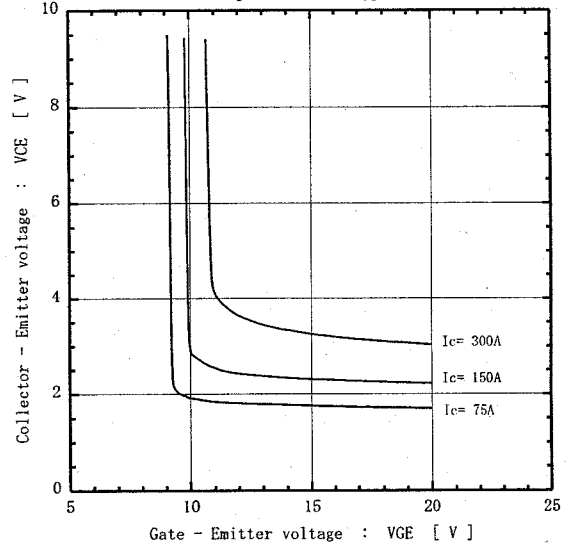
Collector current vs. Collector-Emiiter voltage  
T<sub>j</sub>= 125°C (typ.)



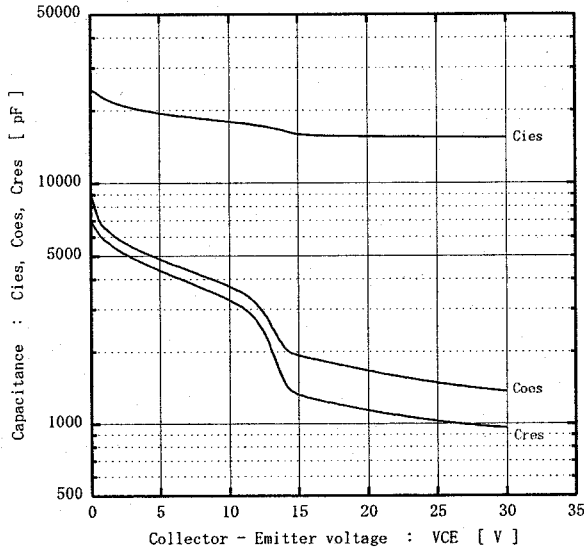
Collector current vs. Collector-Emiiter voltage  
VGE=15V (typ.)



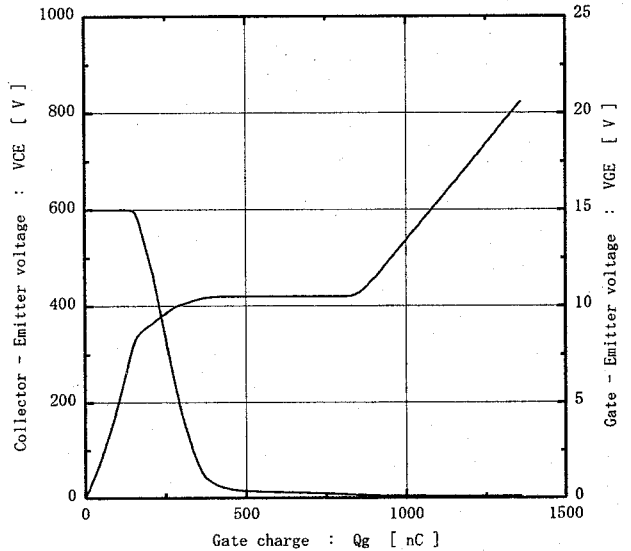
Collector-Emiiter voltage vs. Gate-Emiiter voltage  
T<sub>j</sub>= 25°C (typ.)

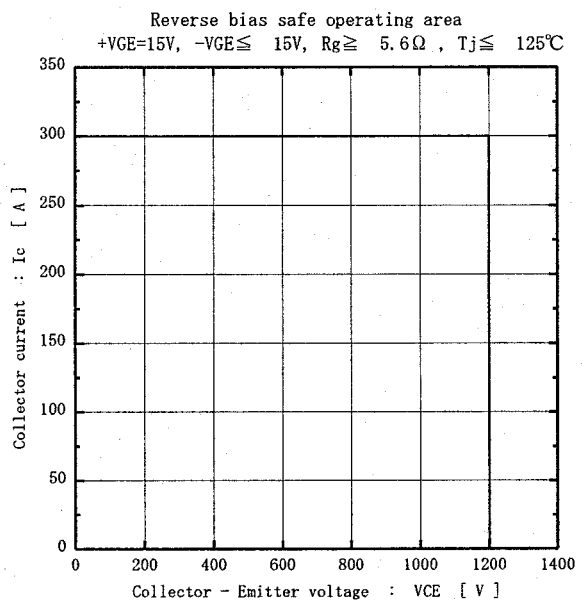
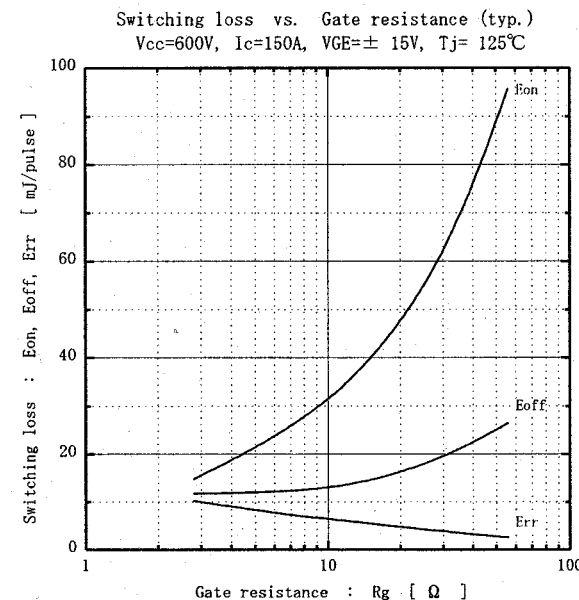
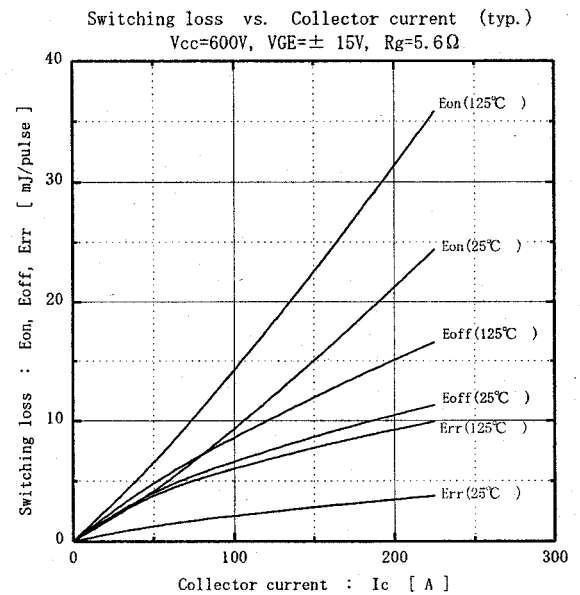
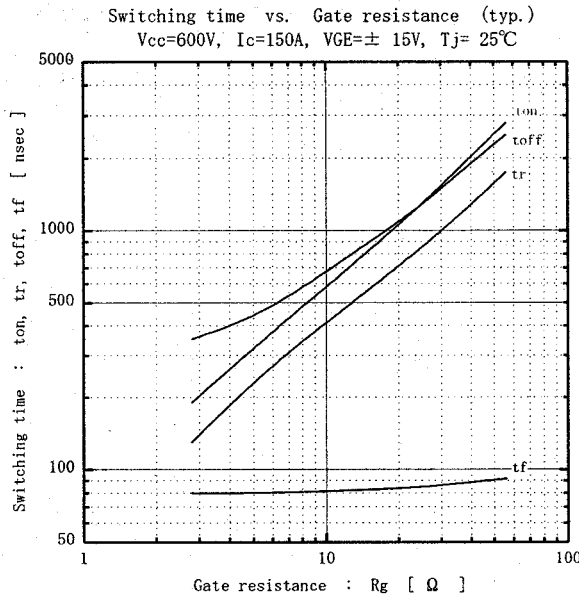
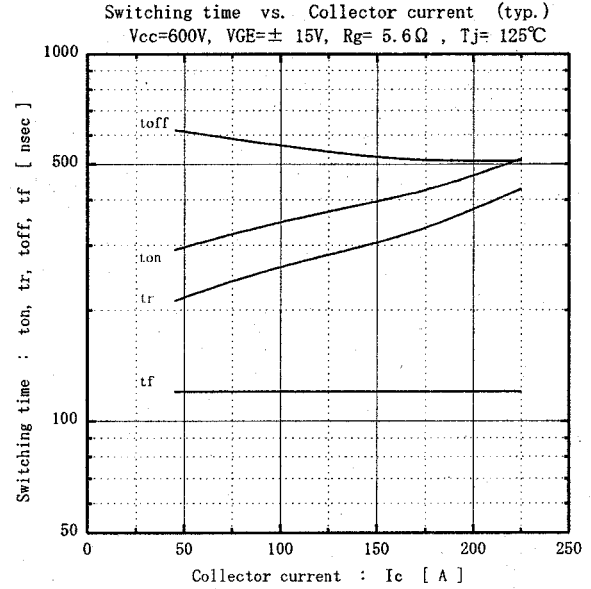
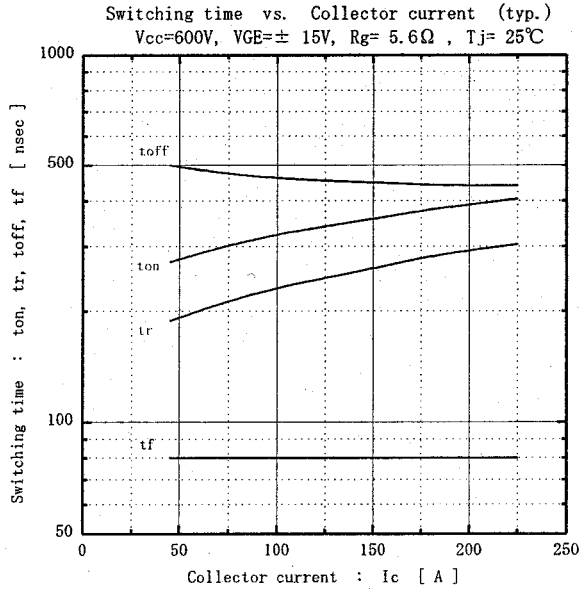


Capacitance vs. Collector-Emiiter voltage (typ.)  
VGE=0V, f= 1MHz, Tj= 25°C

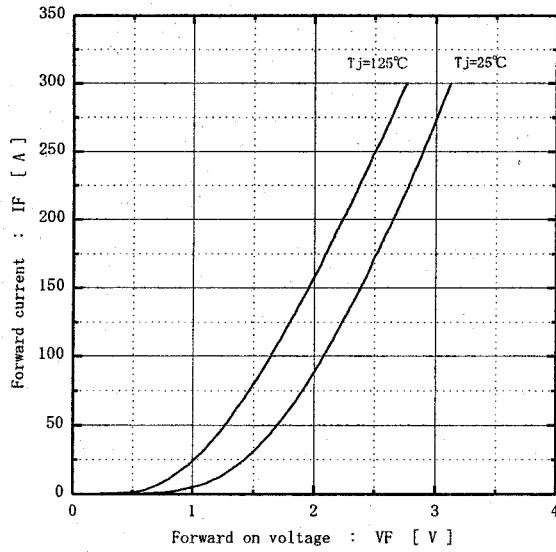


Dynamic Gate charge (typ.)  
Vcc=600V, Ic=150A, Tj= 25°C



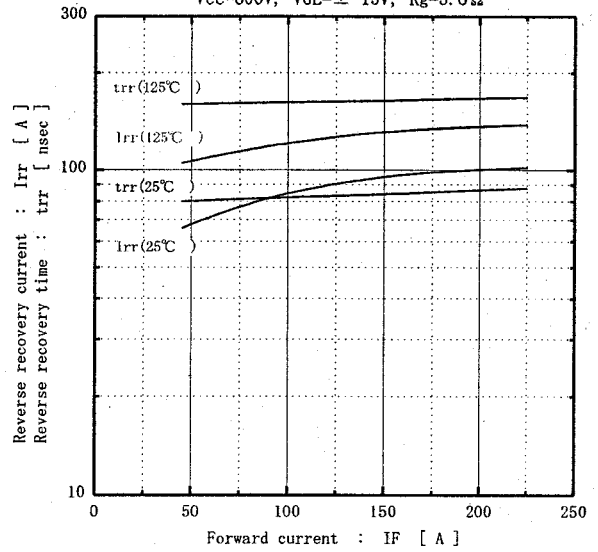


Forward current vs. Forward on voltage (typ.)



Reverse recovery characteristics (typ.)

Vcc=600V, VGE=± 15V, Rg=5.6Ω



Transient thermal resistance

