

IGBT MODULE (S-Series)

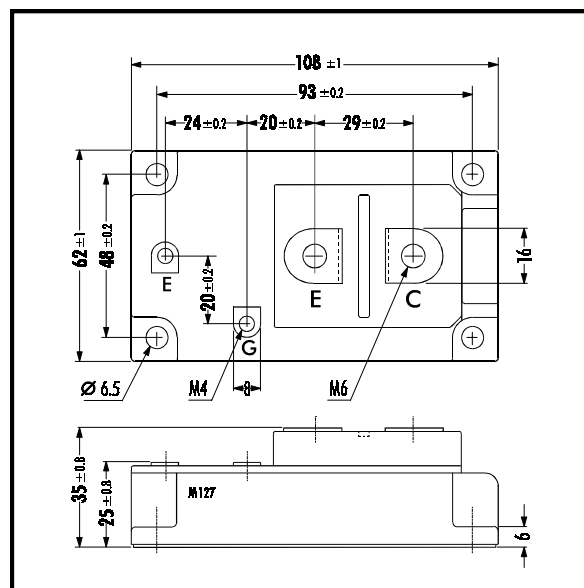
■ Outline Drawing

■ 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



■ Maximum Ratings and Characteristics

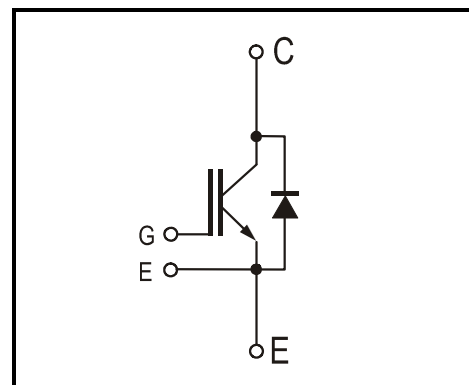
■ Equivalent Circuit

• 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}	± 20	
Collector Current	Continuous	I_C	600 / 400
	1ms	$I_C \text{ PULSE}$	1200 / 800
	Continuous	$-I_C$	400
	1ms	$-I_C \text{ PULSE}$	800
Max. Power Dissipation	P_C	3100	W
Operating Temperature	T_j	+150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-40 ~ +125	
Isolation Voltage *1	A.C. 1min.	V_{is}	2500
Screw Torque	Mounting *2	3.5	Nm
	Terminals *2	4.5	
	Terminals *2	1.7	

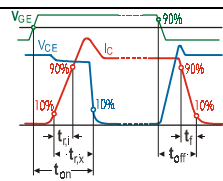
Note: 1*: All Terminals should be connected together when isolation test will be done.

2*: Recommendable Value: Mounting 2.5 ~ 3.5 Nm (M5) or (M6); Terminal 3.5 ~ 4.5 Nm (M6), 1.3 ~ 1.7 Nm (M4)



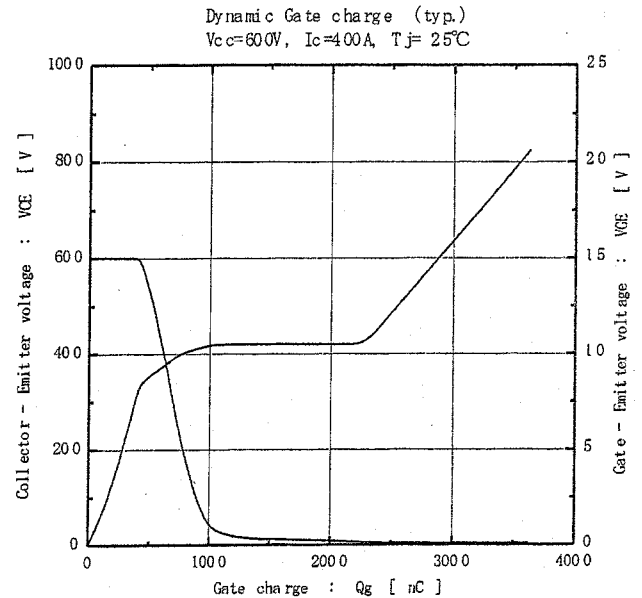
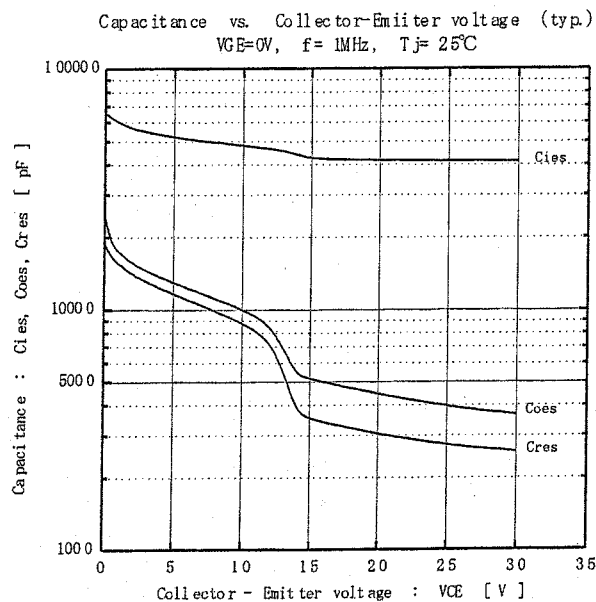
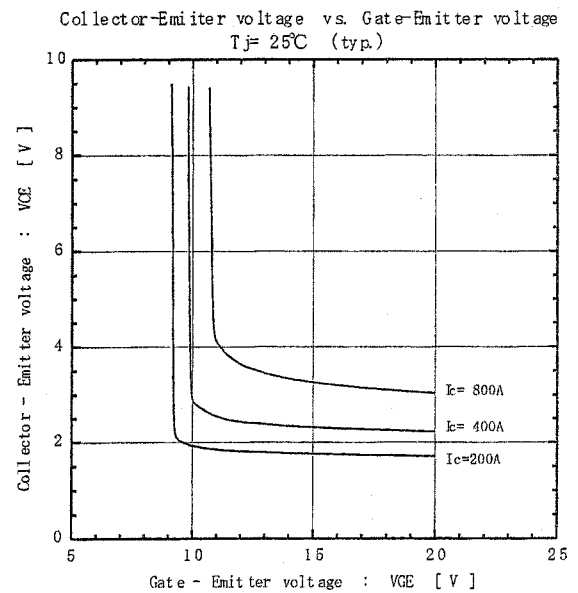
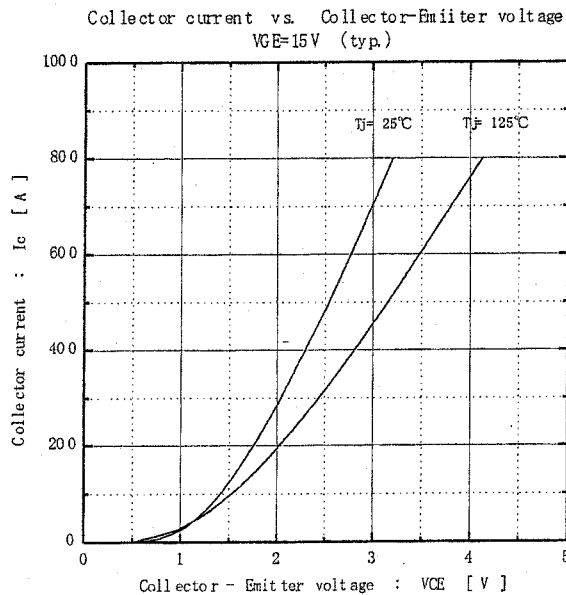
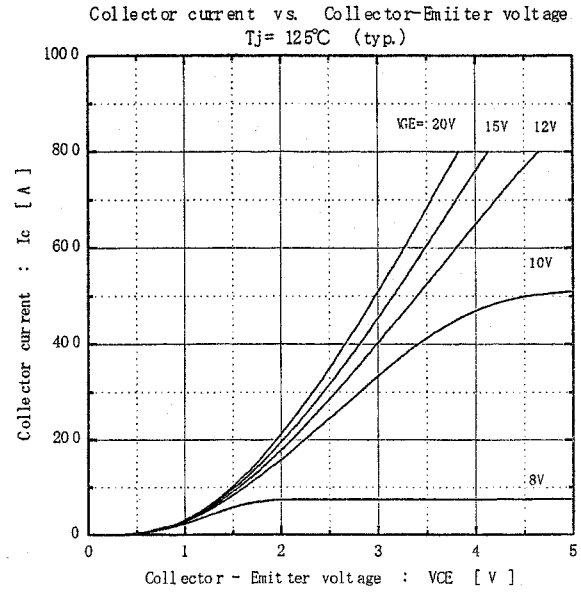
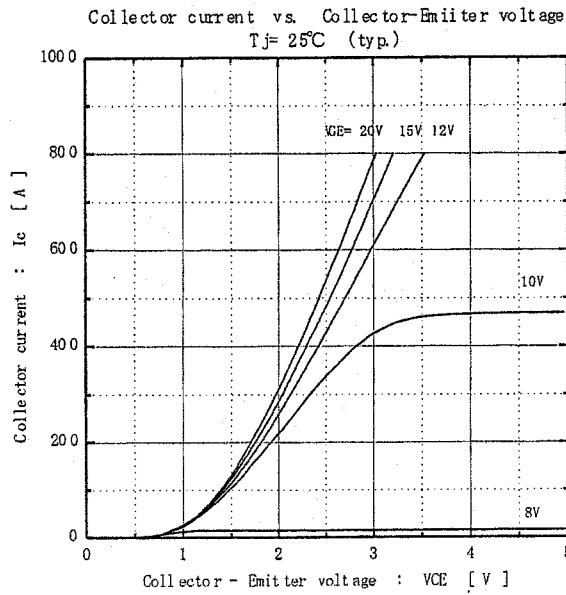
• Electrical Characteristics (at $T_j=25^\circ\text{C}$)

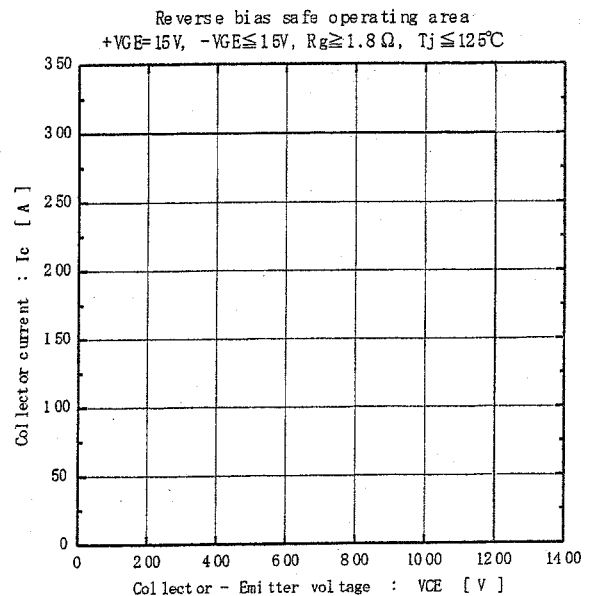
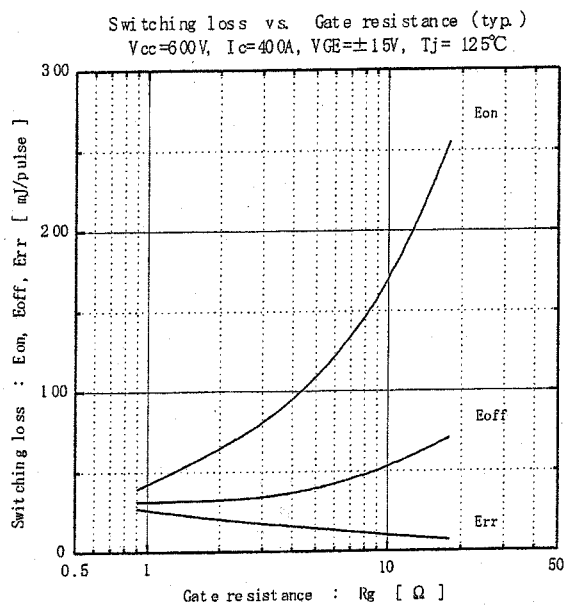
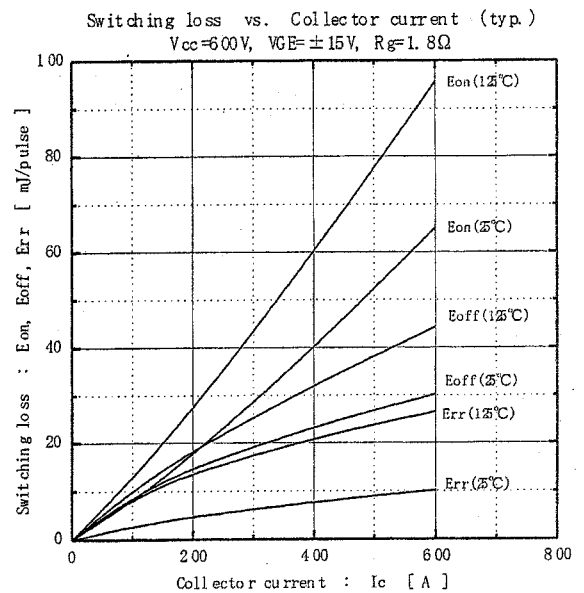
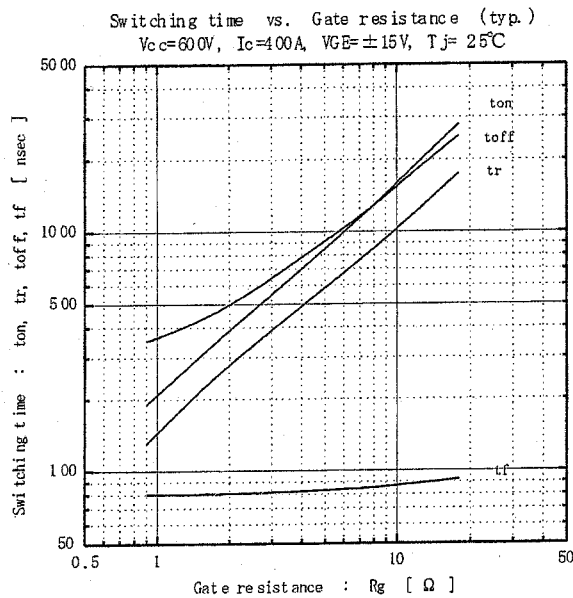
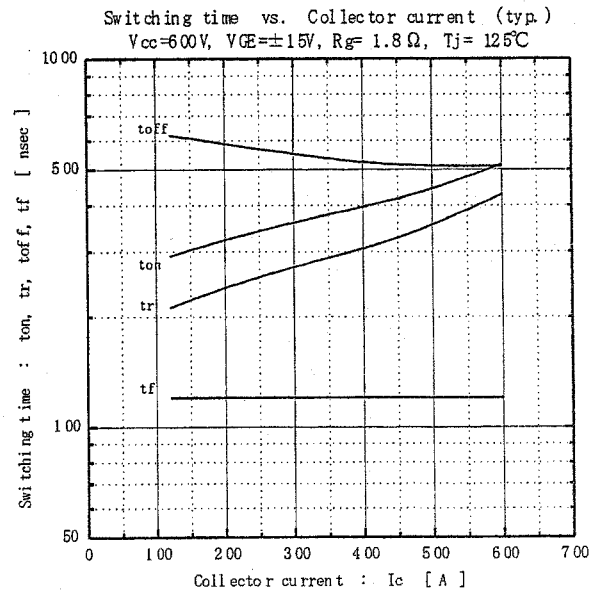
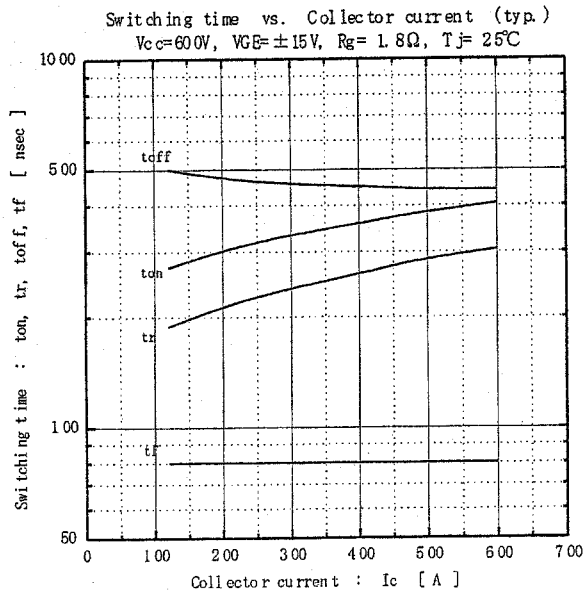
Items	Symbols	Test Conditions	Min.	Typ.	Max.	Units
Zero Gate Voltage Collector Current	I_{CES}	$V_{GE}=0V$ $V_{CE}=1200V$			4.0	mA
Gate-Emitter Leakage Current	I_{GES}	$V_{CE}=0V$ $V_{GE}=\pm 20V$			800	nA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=20V$ $I_C=400mA$	5.5	7.2	8.5	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V$ $I_C=400A$		2.3	2.6	
Input Capacitance	C_{ies}	$V_{GE}=0V$		48'000		pF
Output Capacitance	C_{oes}	$V_{CE}=10V$		10'000		
Reverse Transfer Capacitance	C_{res}	$f=1MHz$		8'800		
Turn-on Time	t_{ON}	$V_{CC}=600V$		0.35	1.2	μs
	$t_{r,x}$	$I_C=400A$		0.25	0.6	
	$t_{r,i}$	$V_{GE}=\pm 15V$		0.10		
Turn-off Time	t_{OFF}	$R_G=1.8\Omega$		0.45	1.0	
	t_f	Inductive Load		0.08	0.3	
Diode Forward On-Voltage	V_F	$I_F=400A$; $V_{GE}=0V$	$T_j=25^\circ\text{C}$	2.3	3.0	V
			$T_j=125^\circ\text{C}$	2.0		
Reverse Recovery Time	t_{rr}	$I_F=400A$			350	ns



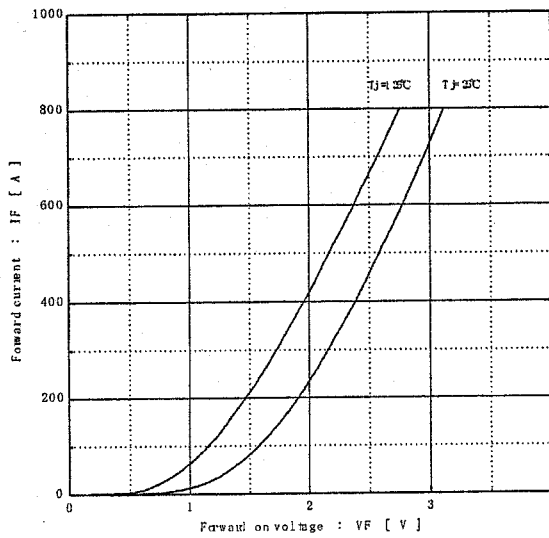
• Thermal Characteristics

Items	Symbols	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance	$R_{th(j-c)}$	IGBT			0.04	$^\circ\text{C/W}$
	$R_{th(j-c)}$	Diode			0.12	
	$R_{th(c-f)}$	With Thermal Compound		0.0125		

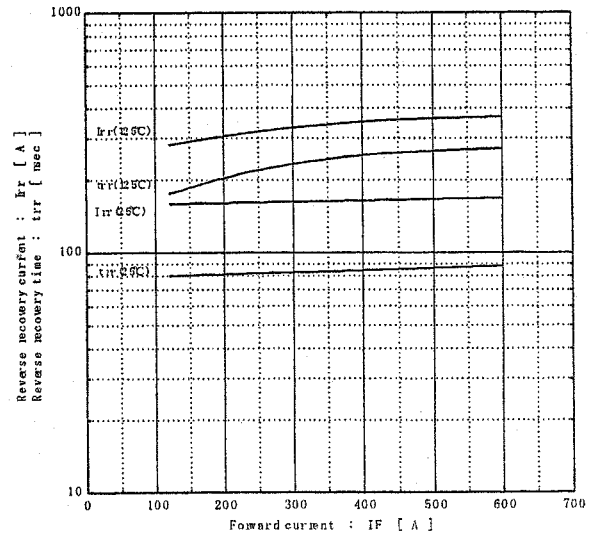




Forward current vs Forward on voltage (typ)



Reverse recovery characteristics (typ)
Vcc=600V, VGE±15V, Rg=1.8Ω



Transient thermal resistance

