

## IGBT MODULE ( S-Series )

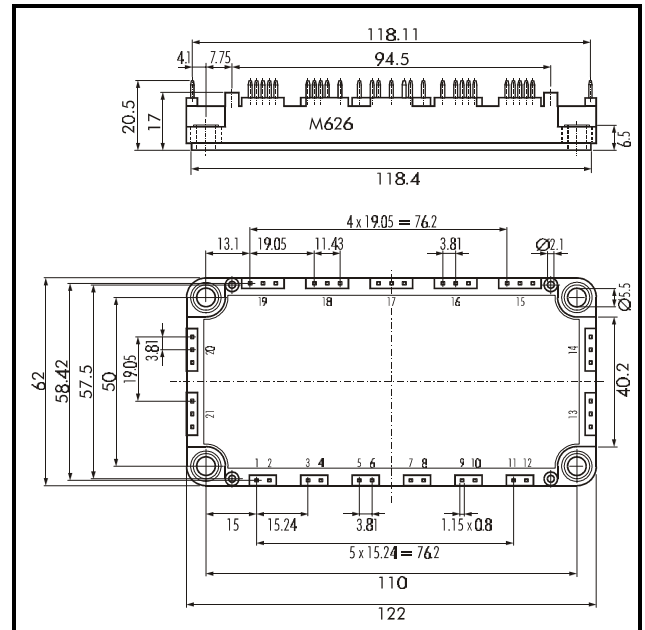
## ■ Outline Drawing

### ■ Features

- NPT-Technology
- Solderable Package
- 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



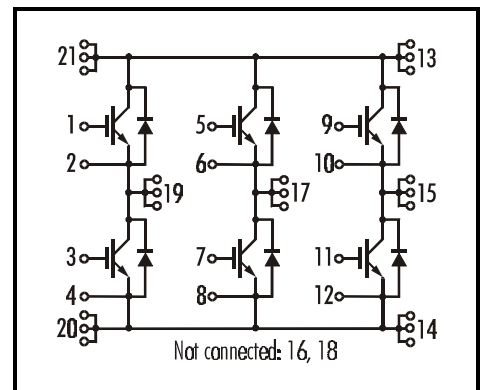
## ■ Maximum Ratings and Characteristics

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

Items	Symbols	Rated Values	Units
Collector-Emitter Voltage	$V_{CES}$	1200	V
Gate -Emitter Voltage	$V_{GES}$	$\pm 20$	
Collector Current	Continuous	$25^\circ\text{C} / 80^\circ\text{C}$	$I_C$ 150 / 100
		$1\text{ms}$ $25^\circ\text{C} / 80^\circ\text{C}$	$I_{C\text{PULSE}}$ 300 / 200
	Continuous		$-I_C$ 100
		$1\text{ms}$	$-I_{C\text{PULSE}}$ 200
Max. Power Dissipation	$P_C$	700	W
Operating Temperature	$T_j$	+150	$^\circ\text{C}$
Storage Temperature	$T_{\text{stg}}$	-40 ~ +125	
Isolation Voltage	$V_{\text{is}}$	2500	V
Screw Torque	Mounting*	3.5	Nm

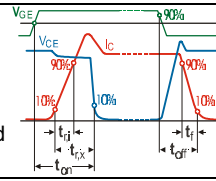
Note: \*Recommendable Value; 2.5 – 3.5 Nm (M5)

## ■ Equivalent Circuit



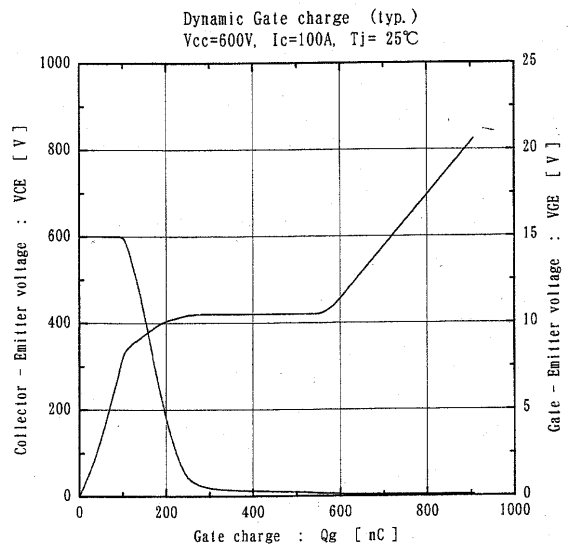
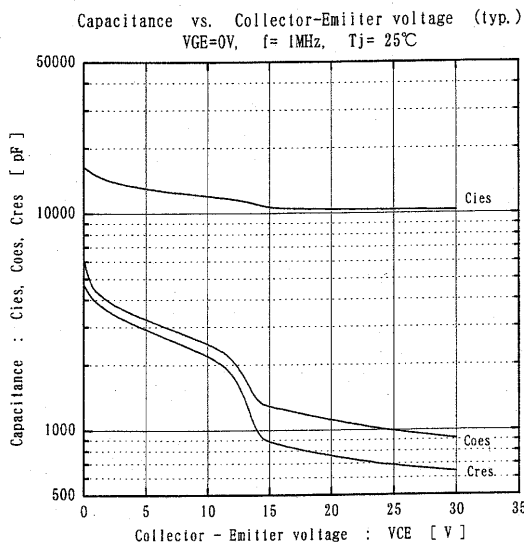
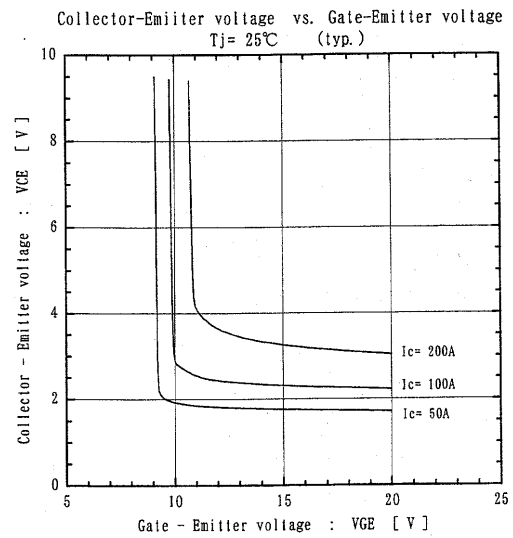
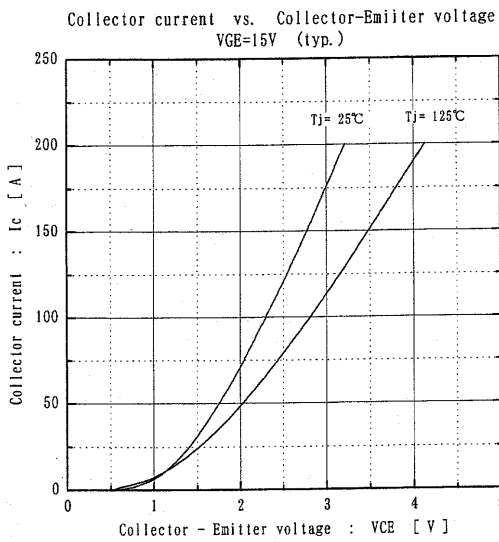
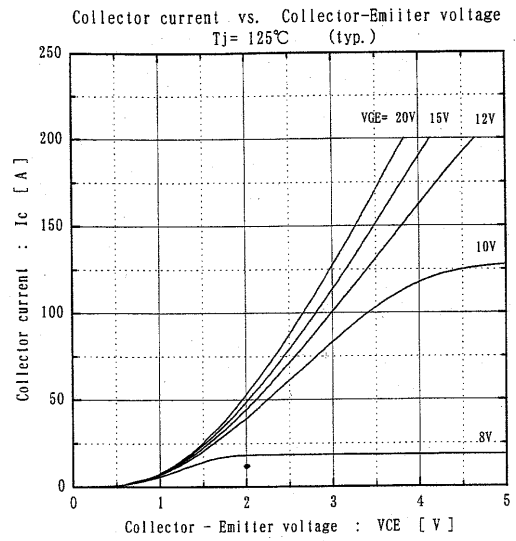
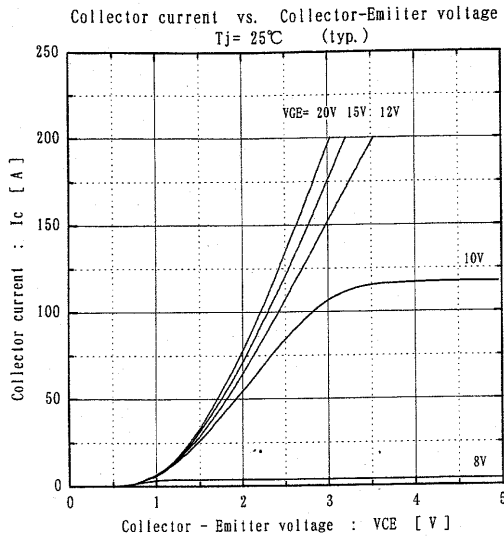
### • Electrical Characteristics ( at $T_j=25^\circ\text{C}$ )

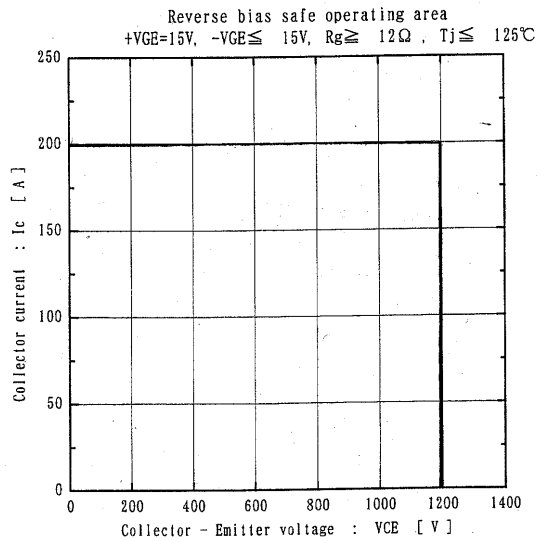
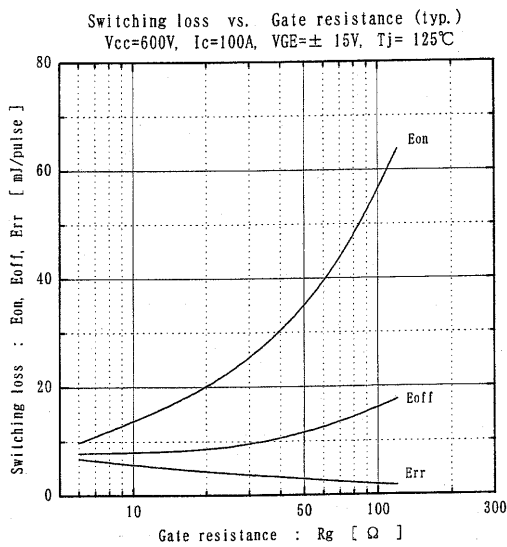
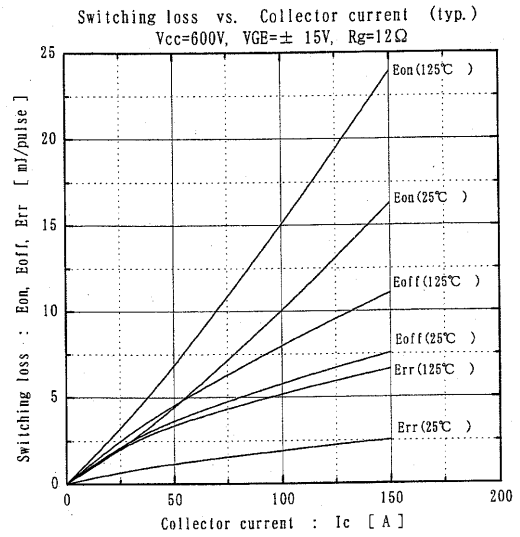
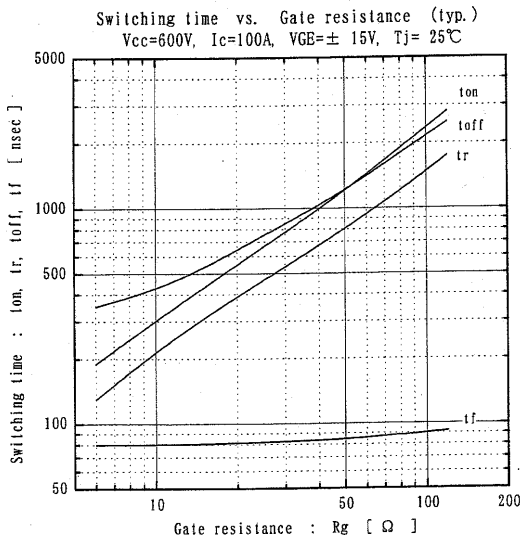
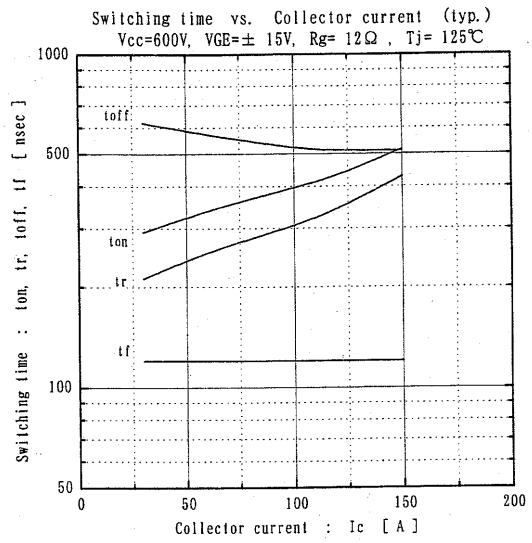
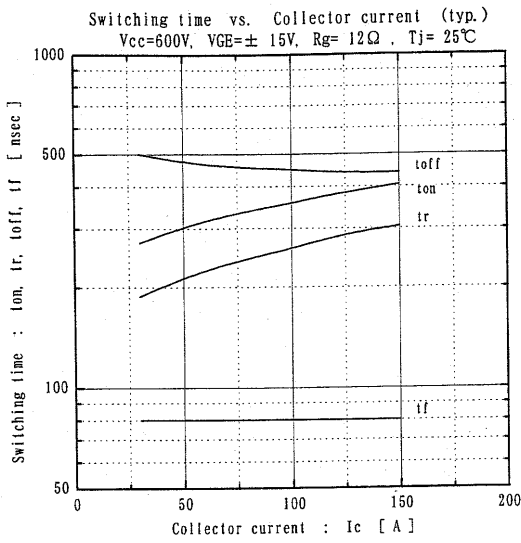
Items	Symbols	Test Conditions	Min.	Typ.	Max.	Units
Zero Gate Voltage Collector Current	$I_{CES}$	$V_{GE}=0\text{V}$ $V_{CE}=1200\text{V}$			1.0	mA
Gate-Emitter Leakage Current	$I_{GES}$	$V_{CE}=0\text{V}$ $V_{GE}=\pm 20\text{V}$			200	nA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=20\text{V}$ $I_C=100\text{mA}$	5.5	7.2	8.5	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15\text{V}$ $I_C=100\text{A}$ ; $T_j = 25^\circ\text{C}$		2.3	2.6	
		$V_{GE}=15\text{V}$ $I_C=100\text{A}$ ; $T_j = 125^\circ\text{C}$		2.8		
Input Capacitance	$C_{ies}$	$V_{GE}=0\text{V}$		12000		pF
Output Capacitance	$C_{oes}$	$V_{CE}=10\text{V}$		2500		
Reverse Transfer Capacitance	$C_{res}$	$f=1\text{MHz}$		2200		
Turn-on Time	$t_{ON}$	$V_{CC}=600\text{V}$		0.35	1.2	$\mu\text{s}$
	$t_{r,x}$	$I_C=100\text{A}$		0.25	0.6	
	$t_{r,i}$	$V_{GE}=\pm 15\text{V}$		0.10		
Turn-off Time	$t_{OFF}$	$R_G=12\Omega$		0.45	1.0	$\mu\text{s}$
	$t_f$	Inductive Load		0.08	0.3	
Diode Forward On-Voltage	$V_F$	$I_F=100\text{A}$ ; $V_{GE}=0\text{V}$ ; $T_j = 25^\circ\text{C}$		2.5	3.3	V
		$I_F=100\text{A}$ ; $V_{GE}=0\text{V}$ ; $T_j = 125^\circ\text{C}$		2.0		
Reverse Recovery Time	$t_{rr}$	$I_F=100\text{A}$			350	ns



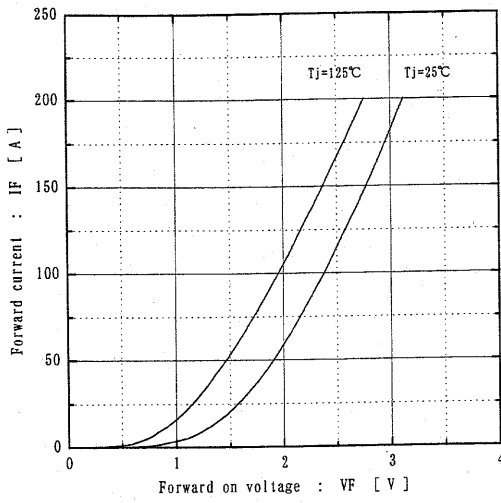
### • Thermal Characteristics

Items	Symbols	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance	$R_{th(f-c)}$	IGBT			0.18	$^\circ\text{C/W}$
	$R_{th(f-c)}$	Diode			0.36	
	$R_{th(c-f)}$	With Thermal Compound		0.05		

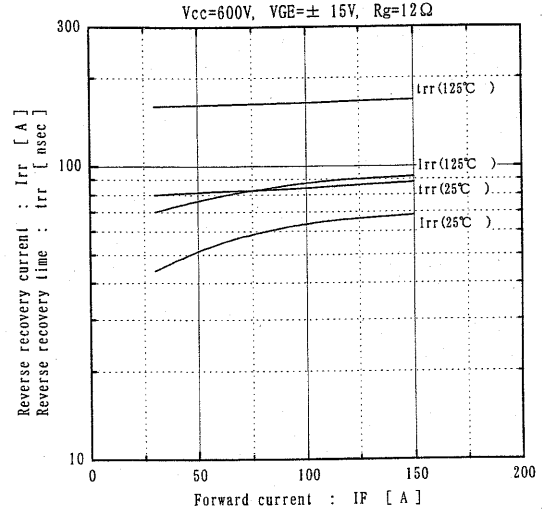




Forward current vs. Forward on voltage (typ.)



Reverse recovery characteristics (typ.)



Transient thermal resistance

