

IGBT MODULE (S-Series)

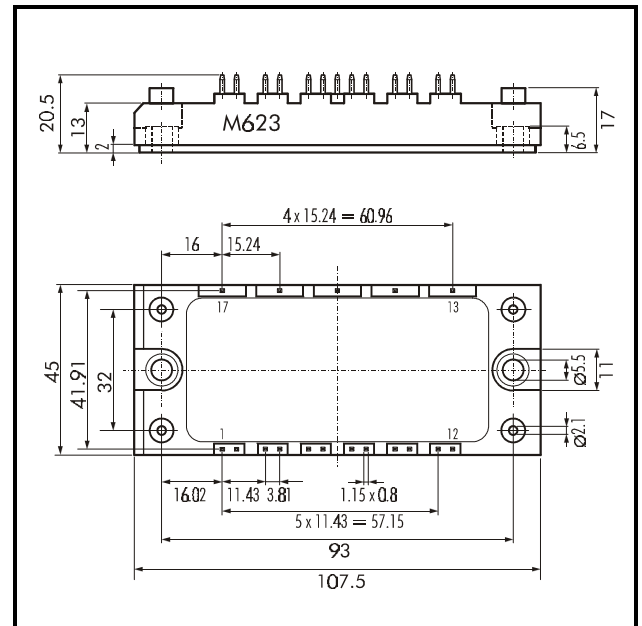
■ Features

- 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

■ Outline Drawing



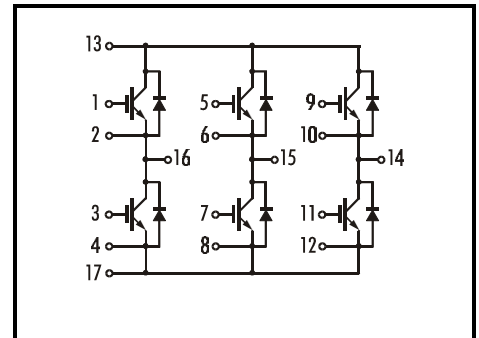
■ Maximum Ratings and Characteristics

• 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}	± 20	
Collector Current	Continuous	I_C	35 / 25
	1ms	$I_{C PULSE}$	70 / 50
	Continuous	$-I_C$	25
	1ms	$-I_{C PULSE}$	50
Max. Power Dissipation	P_C	180	W
Operating Temperature	T_j	+150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-40 ~ +125	
Isolation Voltage	V_{is}	2500	V
Screw Torque	Mounting*	3.5	Nm

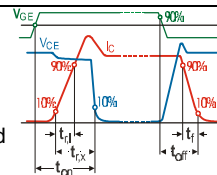
Note: *:Recommendable Value; 2.5 - 3.5 Nm (M5)

■ Equivalent Circuit



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

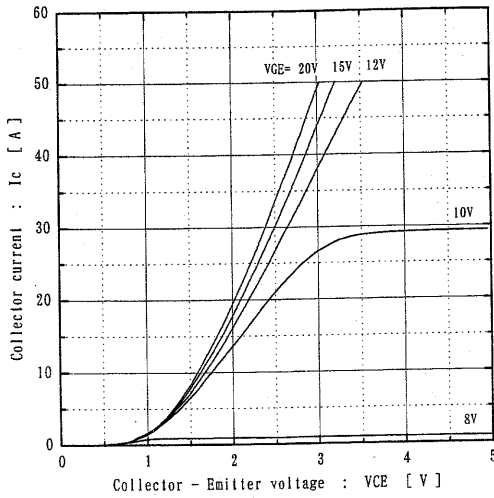
Items	Symbols	Test Conditions	Min.	Typ.	Max.	Units
Zero Gate Voltage Collector Current	I_{CES}	$V_{GE}=0V$ $V_{CE}=1200V$			1.0	mA
Gate-Emitter Leakage Current	I_{GES}	$V_{CE}=0V$ $V_{GE}=\pm 20V$			200	nA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=20V$ $I_C=25mA$	5.5	7.2	8.5	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V$ $I_C=25A$; $T_j = 25^\circ\text{C}$		2.3	2.6	
		$V_{GE}=15V$ $I_C=25A$; $T_j = 125^\circ\text{C}$		2.8		
Input Capacitance	C_{ies}	$V_{GE}=0V$		3000		pF
Output Capacitance	C_{oes}	$V_{CE}=10V$		625		
Reverse Transfer Capacitance	C_{res}	$f=1MHz$		550		
Turn-on Time	t_{ON}	$V_{CC}=600V$		0.35	1.2	μs
	$t_{r,x}$	$I_C=25A$		0.25	0.6	
	$t_{r,i}$	$V_{GE}=\pm 15V$		0.10		
Turn-off Time	t_{OFF}	$R_G=51\Omega$		0.45	1.0	μs
	t_f	Inductive Load		0.08	0.3	
Diode Forward On-Voltage	V_F	$I_F=25A$; $V_{GE}=0V$; $T_j = 25^\circ\text{C}$		2.5	3.3	V
		$I_F=25A$; $V_{GE}=0V$; $T_j = 125^\circ\text{C}$		2.0		
Reverse Recovery Time	t_{rr}	$I_F=25A$			350	ns



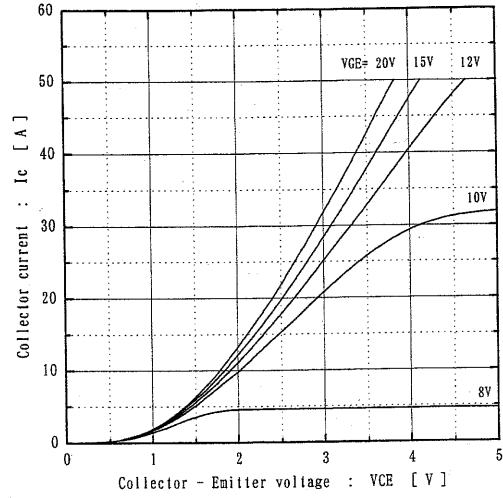
• Thermal Characteristics

Items	Symbols	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance	$R_{th(j-c)}$	IGBT			0.69	$^\circ\text{C/W}$
	$R_{th(j-d)}$	Diode			1.30	
	$R_{th(c-f)}$	With Thermal Compound		0.05		

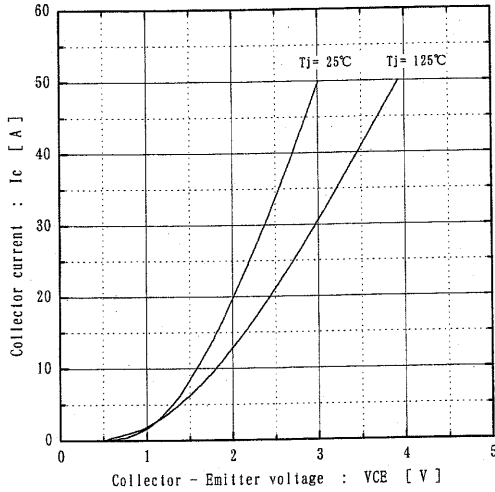
Collector current vs. Collector-Emiiter voltage
 $T_j = 25^\circ\text{C}$ (typ.)



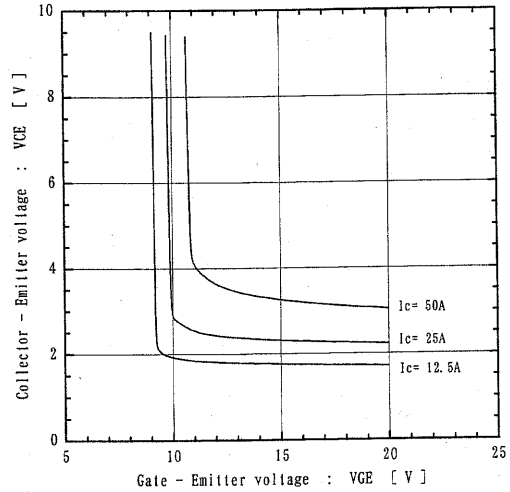
Collector current vs. Collector-Emiiter voltage
 $T_j = 125^\circ\text{C}$ (typ.)



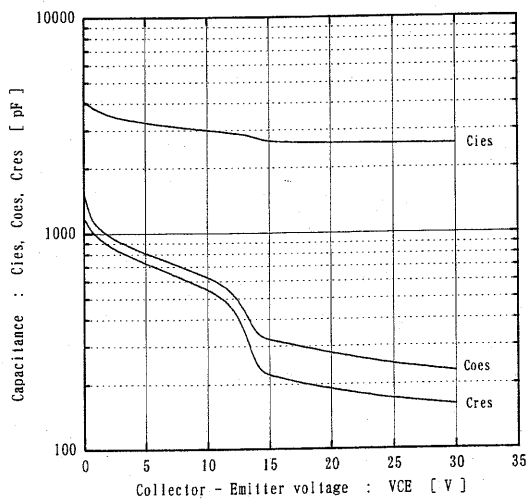
Collector current vs. Collector-Emiiter voltage
 $V_{GE} = 15\text{V}$ (typ.)



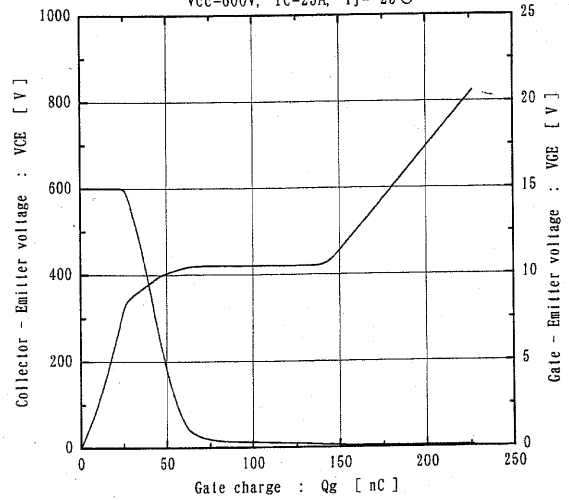
Collector-Emiiter voltage vs. Gate-Emiiter voltage
 $T_j = 25^\circ\text{C}$ (typ.)

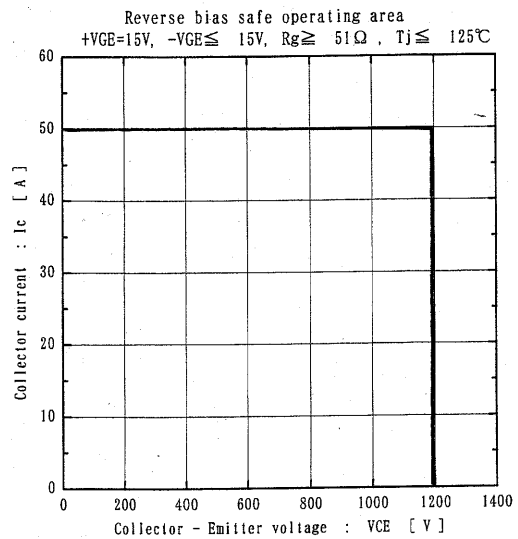
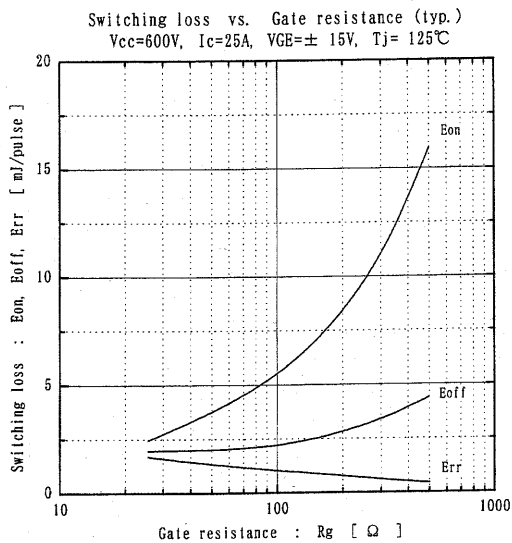
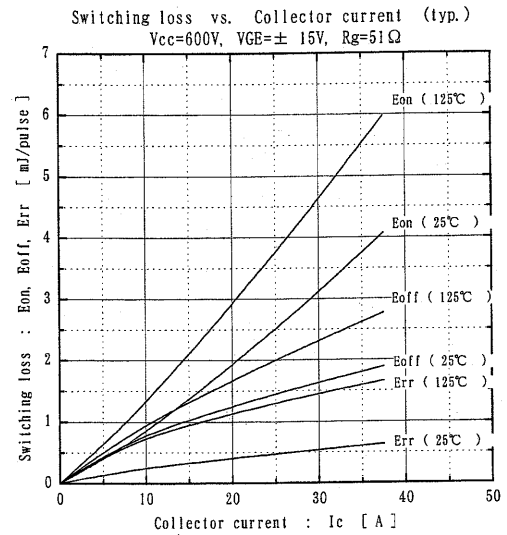
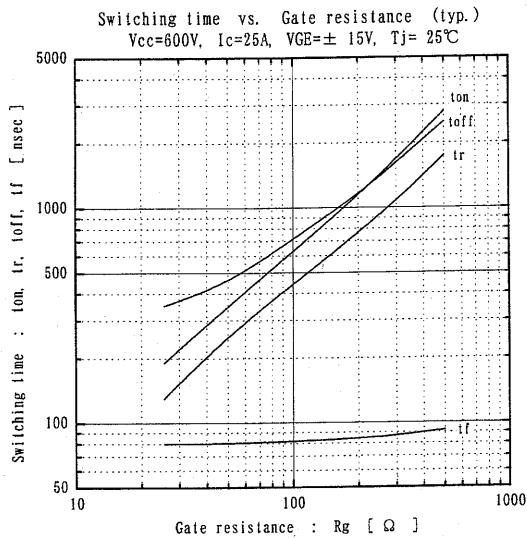
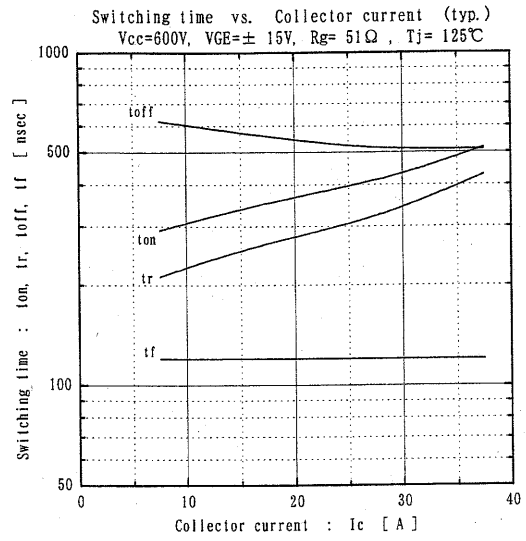
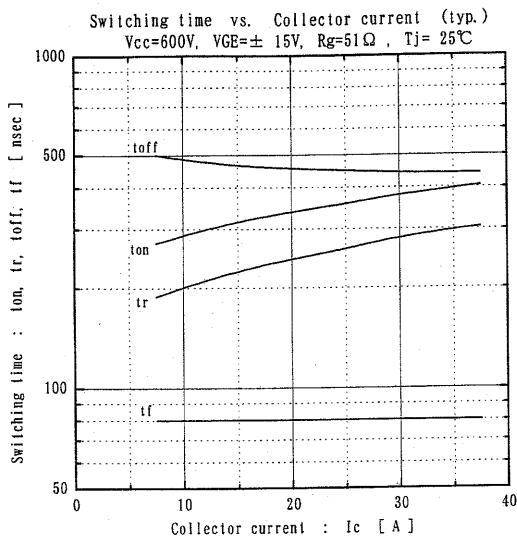


Capacitance vs. Collector-Emiiter voltage (typ.)
 $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$, $T_j = 25^\circ\text{C}$

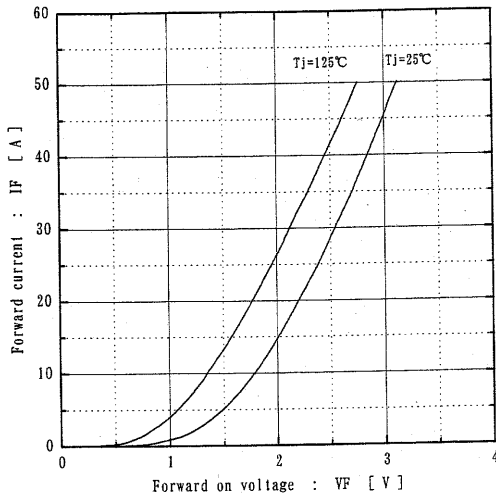


Dynamic Gate charge (typ.)
 $V_{CC} = 600\text{V}$, $I_c = 25\text{A}$, $T_j = 25^\circ\text{C}$

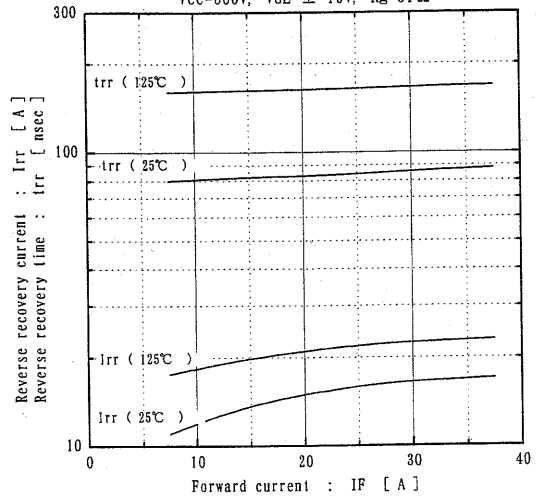




Forward current vs. Forward on voltage (typ.)



Reverse recovery characteristics (typ.)
Vcc=600V, VGE=± 15V, Rg=51Ω



Transient thermal resistance

