

IGBT MODULE (P-Series)

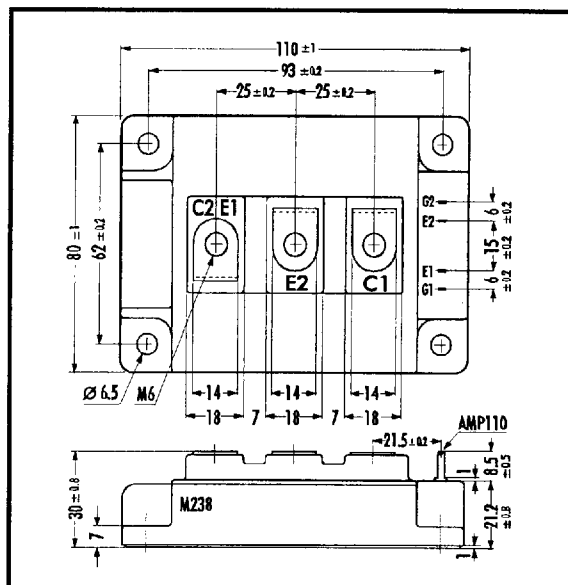
n Features

- Square SC SOA at $10 \times I_C$
- Simplified Parallel Connection
- Narrow Distribution of Characteristics
- High Short Circuit Withstand-Capability

n Applications

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

n Outline Drawing



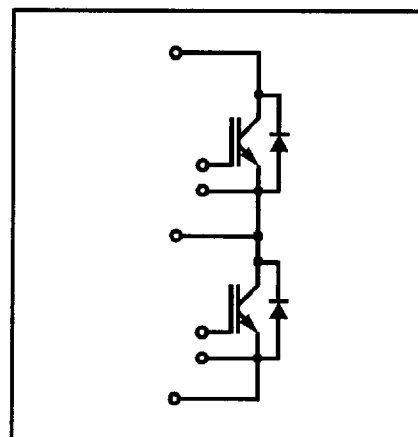
n Maximum Ratings and Characteristics

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

Items	Symbols	Ratings	Units
Collector-Emitter Voltage	V_{CES}	1400	V
Gate -Emitter Voltage	V_{GES}	± 20	V
Collector Current	Continuous $T_c=25^\circ\text{C}$	I_C	400
	Continuous $T_c=80^\circ\text{C}$		300
	1ms $T_c=25^\circ\text{C}$	I_{CPULSE}	800
	1ms $T_c=80^\circ\text{C}$		600
	1ms	$-I_C$	300
Max. Power Dissipation	P_C	2500	W
Operating Temperature	T_j	$+150$	$^\circ\text{C}$
Storage Temperature	T_{stg}	$-40 \sim +125$	$^\circ\text{C}$
Isolation Voltage	A.C. 1min. V_{is}	2500	V
Screw Torque	Mounting *1	3.5	Nm
	Terminals *2	4.5	

Note: *1:Recommendable Value, 2.5 ~ 3.5 Nm (M5) or (M6)
 *2:Recommendable Value, 3.5 ~ 4.5 Nm (M6)

n Equivalent Circuit



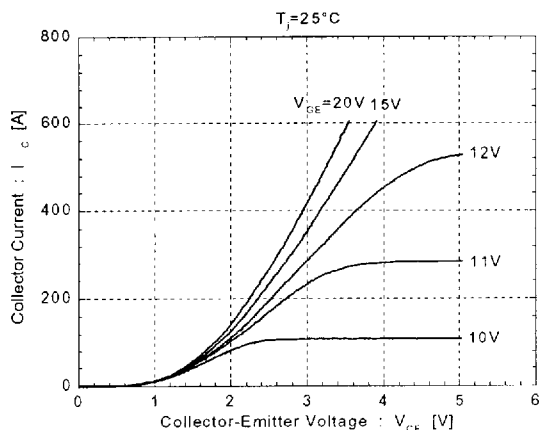
• Electrical Characteristics (at $T_j=25^\circ\text{C}$)

Items	Symbols	Test Conditions	Min.	Typ.	Max.	Units
Zero Gate Voltage Collector Current	I_{CES}	$V_{GE}=0V$ $V_{CE}=1400V$			3.0	mA
Gate-Emitter Leakage Current	I_{GES}	$V_{CE}=0V$ $V_{GE}=\pm 20V$			600	μA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=20V$ $I_C=300\text{mA}$	6.0	8.0	9.0	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$T_j=25^\circ\text{C}$ $V_{GE}=15V$ $I_C=300A$		2.7	3.0	V
		$T_j=125^\circ\text{C}$ $V_{GE}=15V$ $I_C=300A$		3.3		
Input capacitance	C_{ies}	$V_{GE}=0V$		30000		pF
Output capacitance	C_{oes}	$V_{CE}=10V$		4500		
Reverse Transfer capacitance	C_{res}	$f=1\text{MHz}$		2000		
Turn-on Time	t_{ON}	$V_{CC}=600V$			1.2	μs
	t_r	$I_C=300A$			0.6	
Turn-off Time	t_{OFF}	$V_{GE}=\pm 15V$			1.0	
	t_i	$R_G=2.7\Omega$			0.3	
Diode Forward On-Voltage	V_F	$I_F=300A$ $V_{GE}=0V$		2.4	3.3	V
Reverse Recovery Time	t_{rr}	$I_F=300A$			350	ns

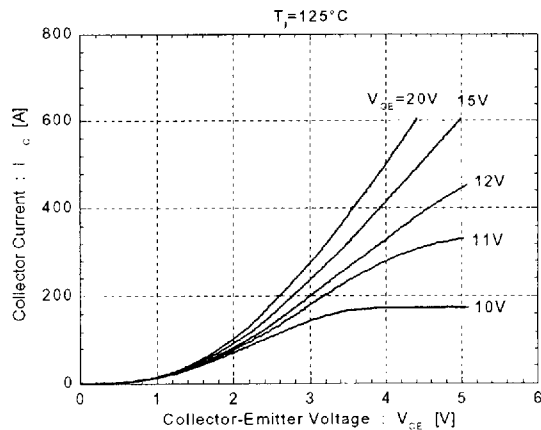
• Thermal Characteristics

Items	Symbols	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance	$R_{th(j-c)}$	IGBT			0.05	$^\circ\text{C/W}$
	$R_{th(j-e)}$	Diode			0.10	
	$R_{th(c-f)}$	With Thermal Compound		0.0167		

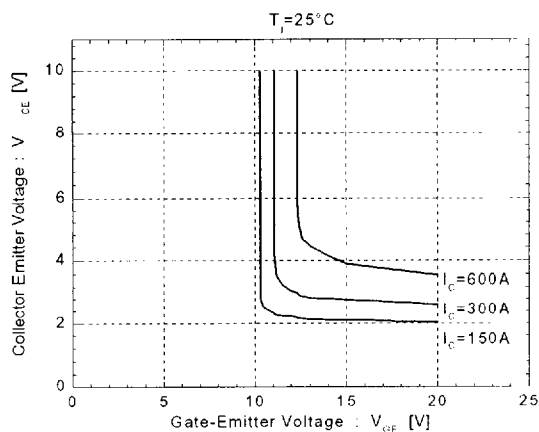
Collector Current vs. Collector-Emitter Voltage



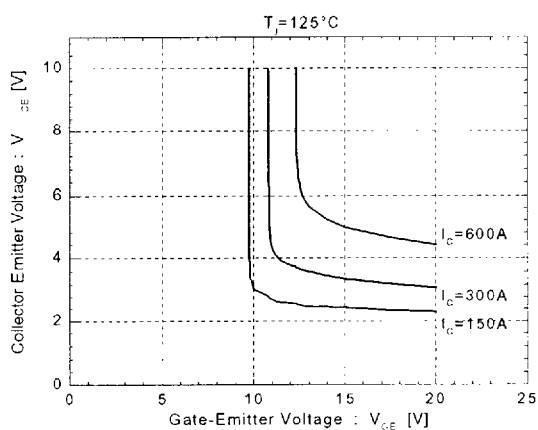
Collector Current vs. Collector-Emitter Voltage



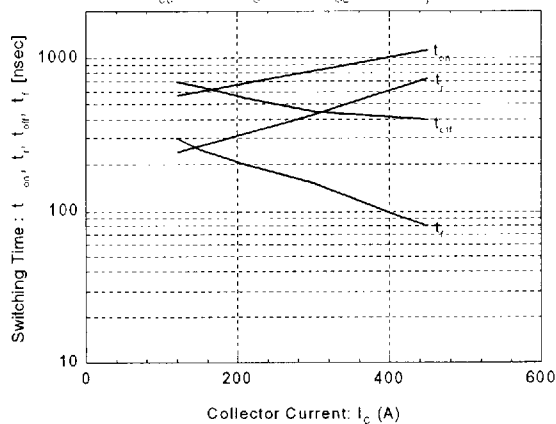
Collector-Emitter vs. Gate-Emitter Voltage



Collector-Emitter vs. Gate-Emitter Voltage



Switching Time vs. Collector Current
 $V_{cc} = 600V, R_g = 2.7\Omega, V_{ge} = \pm 15V, T_J = 25^\circ\text{C}$



Switching Time vs. Collector Current
 $V_{cc} = 600V, R_g = 2.7\Omega, V_{ge} = \pm 15V, T_J = 125^\circ\text{C}$

