

IGBT MODULE (F series)

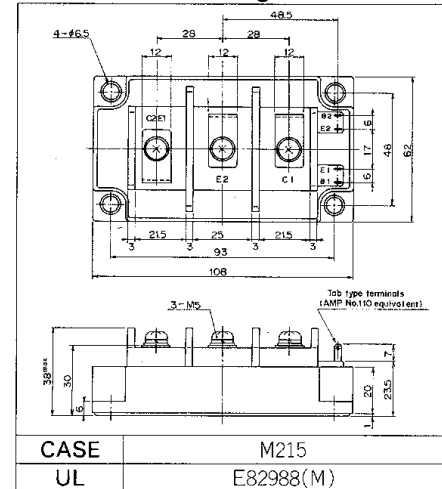
■ Features

- Low Saturation Voltage
- Voltage Drive
- Variety of Power Capacity Series

■ Applications

- Inverter for Motor Drive
- AC and DC Servo Drive Amplifier
- Uninterruptible Power Supply
- Industrial Machines, such as Welding Machines

■ Outline Drawings



■ Maximum Ratings and Characteristics

● Absolute Maximum Ratings

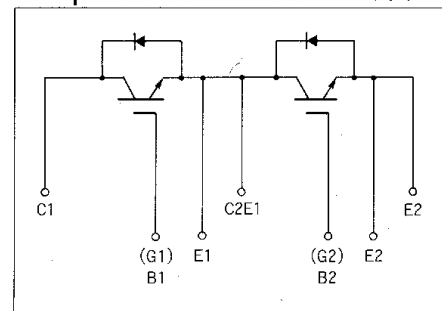
Items	Symbols	Ratings	Units
Collector-Emitter Voltage	V_{CES}	1200	V
Gate-Emitter Voltage	V_{GES}	± 20	V
Collector Current	Continuous	I_c	100
	1ms	$I_{c \text{ pulse}}$	200
	Continuous	$-I_c$	100
	1ms	$-I_{c \text{ pulse}}$	200
Max. Power Dissipation	P_c	720	W
Operating Temperature	T_j	+150	°C
Storage Temperature	T_{stg}	-40 to +125	°C
Net. Weight		400	g
Isolation Voltage	AC. 1min.	V_{isol}	2500
Screw Torque	Mounting *1	3.5 {35}	N · m
	Terminals *1	3.5 {35}	{kg · cm}

*1 Recommendable Value 2.5 to 3.5 N·m {25 to 35 kg·cm} (M5)

● Electrical Characteristics ($T_c=25^\circ\text{C}$)

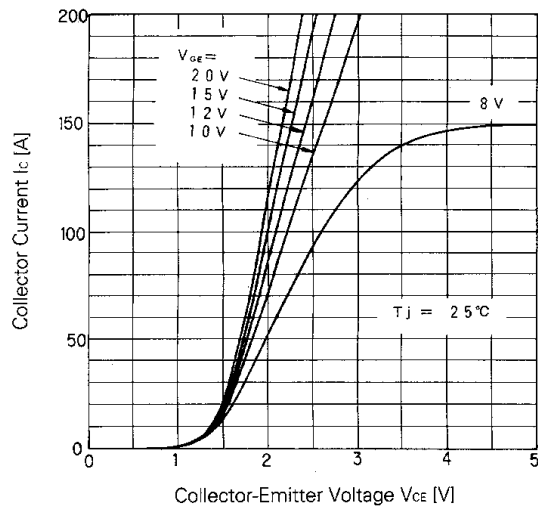
Items	Symbols	Test Conditions	Min.	Typ.	Max.	Units
Zero Gate Voltage Collector Current	I_{CES}	$V_{GE}=0V$ $V_{CE}=1200V$ $T_j=25^\circ\text{C}$			1.0	mA
		$V_{GE}=0V$ $V_{CE}=1200V$ $T_j=125^\circ\text{C}$			—	mA
Gate-Emitter Leakage Current	I_{GES}	$V_{CE}=0V$ $V_{GE}=\pm 20V$			200	nA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{CE}=20V$ $I_c=100mA$	3.0		6.0	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V$ $I_c=100A$			2.5	V
Input Capacitance	C_{ies}	$V_{GE}=0V$		18000		pF
Output Capacitance	C_{oes}	$V_{CE}=10V$		—		
Reverse Transfer Capacitance	C_{res}	$f=1MHz$		—		
Turn-on Time	t_{on}	$V_{CC}=600V$ $I_c=100A$ Resistive load			0.8	μs
	t_r				0.6	
Turn-off Time	t_{off}	$V_{GE}=\pm 15V$ $R_G=9.1\Omega$ Inductive load			1.5	
	t_f				1.0	
Diode Forward On-Voltage	V_F	$I_F=100A$ $V_{GE}=0V$			2.5	V
Reverse Recovery Time	t_{rr}	$I_F=100A$ $-di/dt=300A/\mu s$ $V_{GE}=-10V$			350	ns

■ Equivalent Circuit Schematic

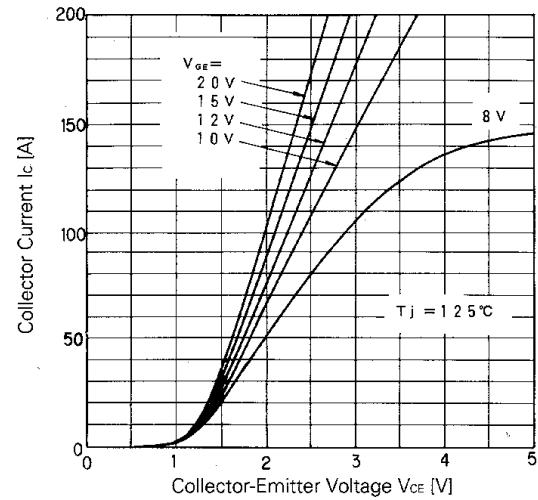


● Thermal Characteristics

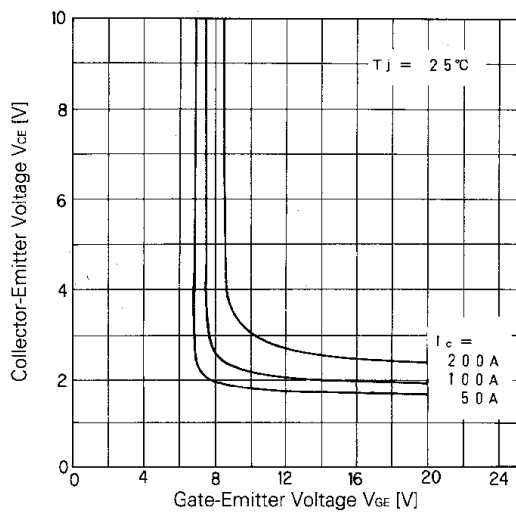
Items	Symbols	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance	$R_{th(j-c)}$	IGBT			0.174	°C/W
	$R_{th(j-e)}$	Diode			0.333	
	$R_{th(c-f)}$	With Thermal compound		0.025		



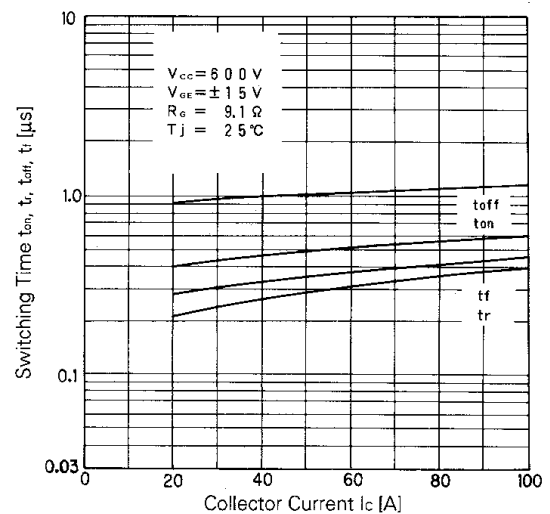
Collector Current vs. Collector-Emitter Voltage



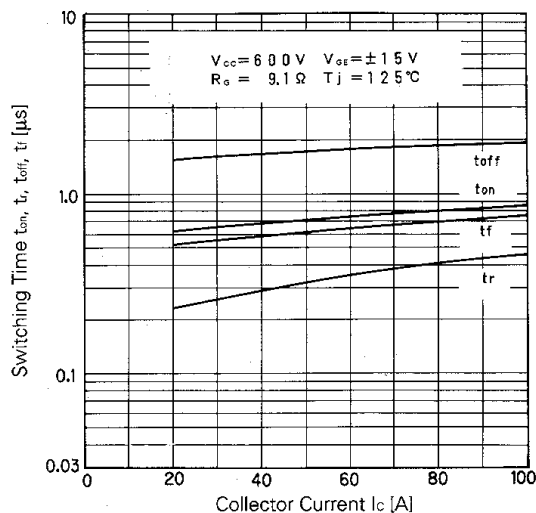
Collector Current vs. Collector-Emitter Voltage



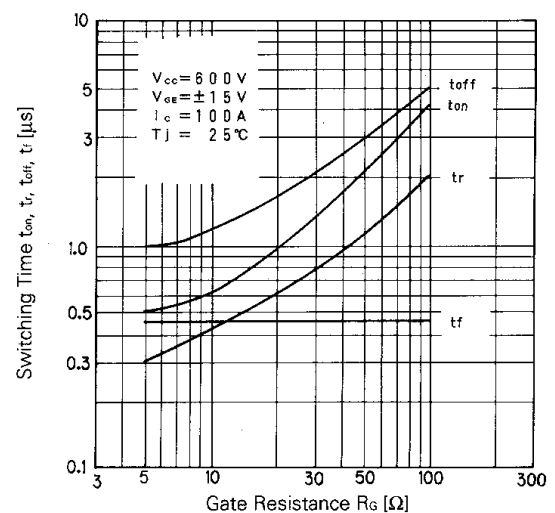
Collector-Emitter Voltage vs. Gate-Emitter Voltage



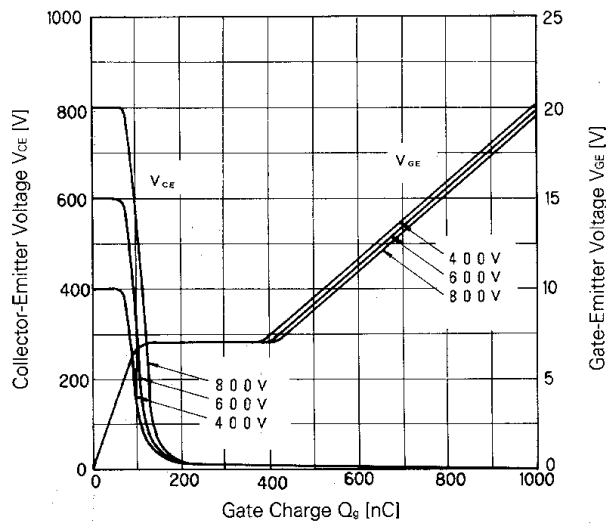
Switching Time



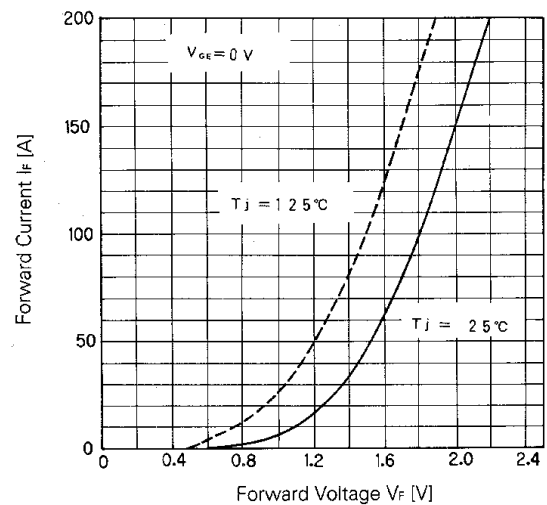
Switching Time



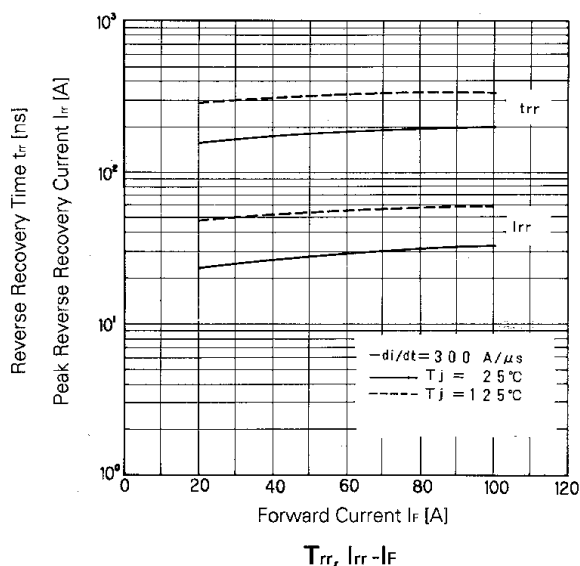
Switching Time-Gate Resistance



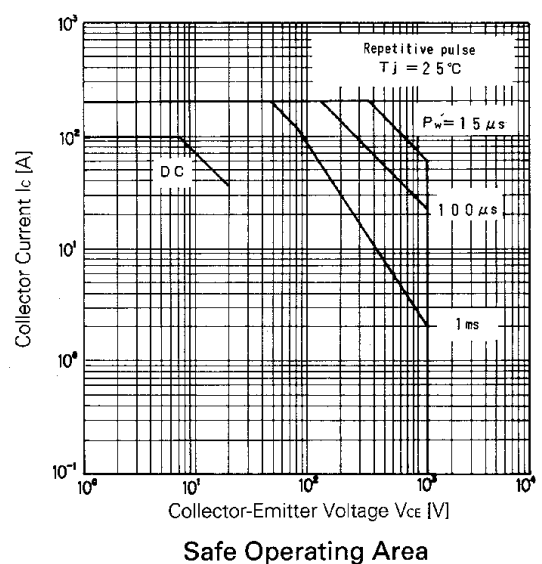
Dynamic Input Characteristic



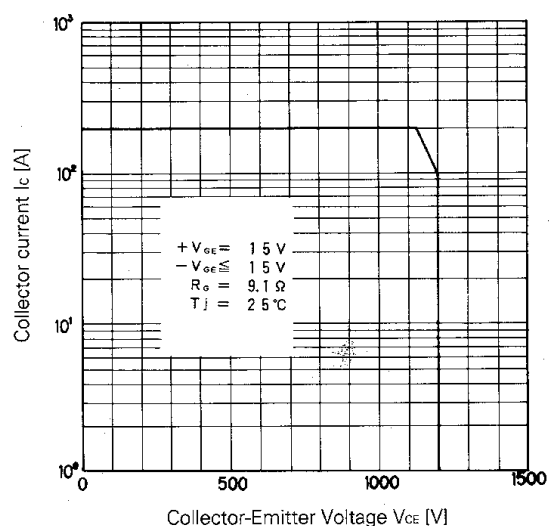
Forward Voltage of Free Wheel Diode



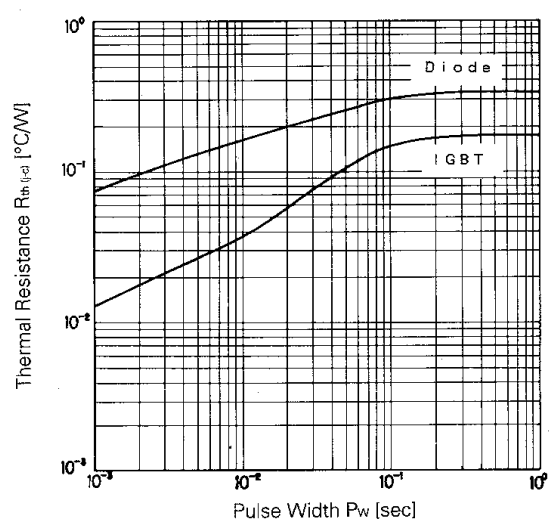
$T_{rr}, I_{rr} - I_F$



Safe Operating Area



Reverse Biased Safe Operating Area



Transient Thermal Resistance