

IGBT MODULE (F series)

■ Features

- Low Saturation Voltage
- Voltage Drive
- Isolated Package

■ Applications

- Ideal for Shunt Regulator Application
 - AC and DC Servo Drive Supply
 - Uninterruptible Power Supply
 - Industrial Machines, such as Welding Machines
- #### ■ Maximum Ratings and Characteristics

● Absolute Maximum Ratings

Items	Symbols	Ratings	Units
Collector-Emitter Voltage	V_{CES}	600	V
Gate-Emitter Voltage	V_{GES}	± 20	V
Collector Current	Continuous	I_C	50
	1ms	$I_{C \text{ pulse}}$	100
	Duty = 75%	$-I_C$	50
	1ms	$-I_{C \text{ pulse}}$	100
Max. Power Dissipation	P_C	220	W
Operating Temperature	T_J	+150	$^{\circ}\text{C}$
Storage Temperature	T_{stg}	-40 to +125	$^{\circ}\text{C}$
Isolation Voltage	AC. 1min.	V_{is}	2500
Screw Torque	Mounting *1	3.5	N · m
	Terminals *1	3.5	

*1 Recommendable Value 2.5 to 3.5 N·m (M5)

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

Items	Symbols	Test Conditions	Min.	Typ.	Max.	Units
Zero Gate Voltage Collector Current	I_{CES}	$V_{GE}=0V$ $V_{CE}=600V$ $T_J=25^{\circ}\text{C}$			1.0	mA
		$V_{GE}=0V$ $V_{CE}=600V$ $T_J=125^{\circ}\text{C}$			—	mA
Gate-Emitter Leakage Current	I_{GES}	$V_{CE}=0V$ $V_{GE}=\pm 20V$			100	nA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{CE}=20V$ $I_C=50mA$	3.0		6.0	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V$ $I_C=50A$			2.5	V
Input Capacitance	C_{ies}	$V_{GE}=0V$		4750		pF
Output Capacitance	C_{oes}	$V_{CE}=10V$		—		
Reverse Transfer Capacitance	C_{res}	$f=1MHz$		—		
Turn-on Time *2	t_{on}	$V_{CC}=300V$			0.8	μs
	t_r	$I_C=50A$			0.6	
Turn-off Time *3	t_{off}	$V_{GE}=\pm 15V$			1.5	
	t_f	$R_G=51\Omega$			1.0	
Diode Forward On-Voltage	V_F	$I_F=50A$, $V_{GE}=0V$			2.5	V
Reverse Recovery Time	t_{rr}	$I_F=50A$, $-di/dt=150A/\mu s$ $V_{GE}=-10V$			300	ns

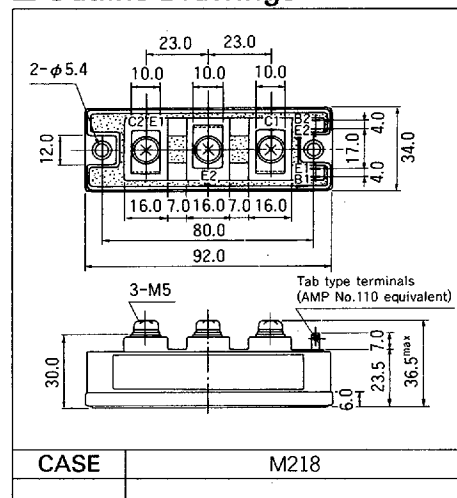
*2 Resistive load

*3 Inductive load

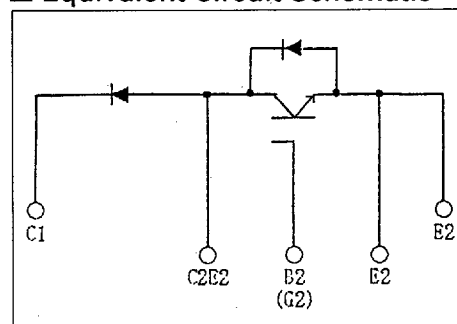
● Thermal Characteristics

Items	Symbols	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance	$R_{th(j-c)}$	IGBT			0.568	$^{\circ}\text{C/W}$
	$R_{th(j-c)}$	Diode			1.33	
	$R_{th(c-f)}$	With Thermal compound		0.05		

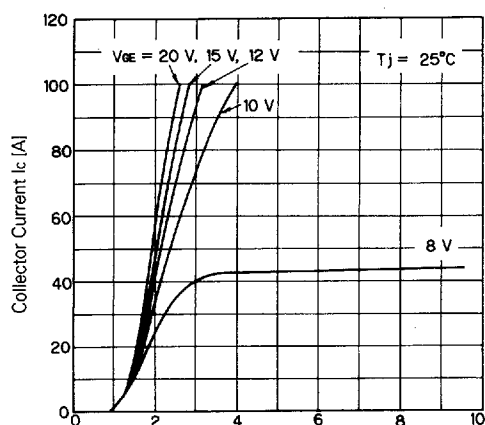
■ Outline Drawings



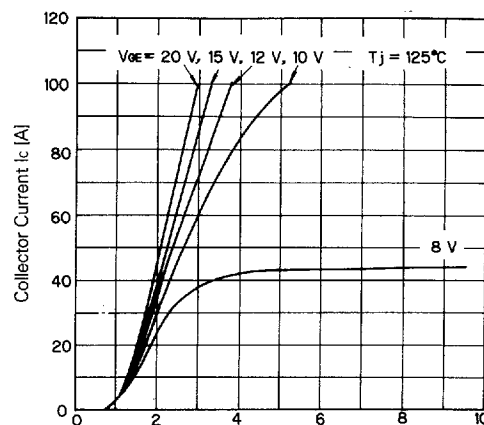
■ Equivalent Circuit Schematic



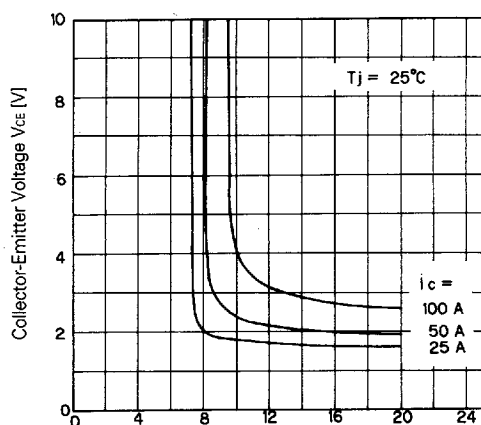
■ Characteristics



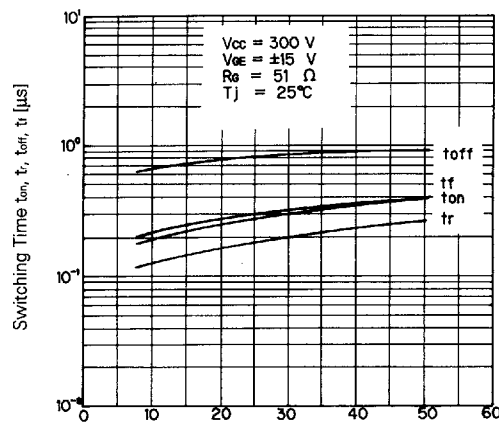
Collector Current vs. Collector-Emitter Voltage



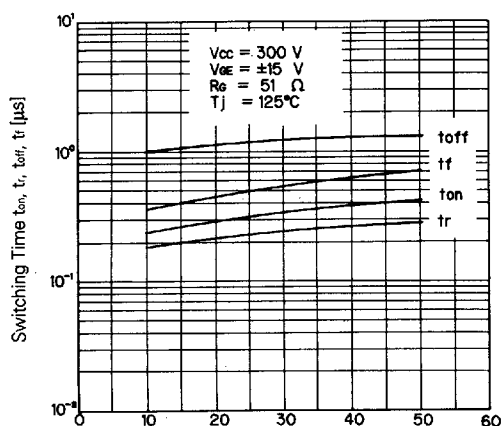
Collector Current vs. Collector-Emitter Voltage



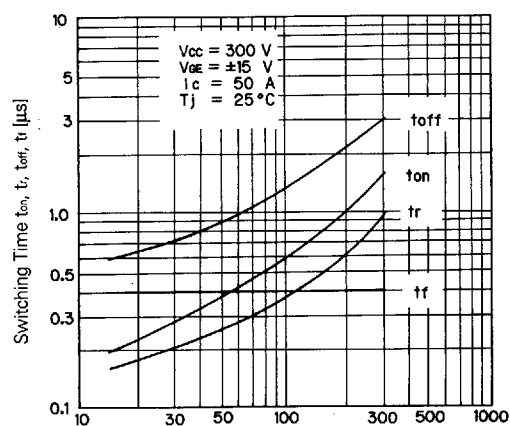
Collector-Emitter Voltage vs. Gate-Emitter Voltage



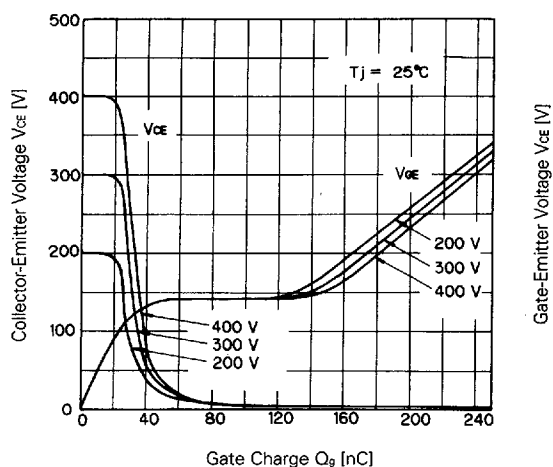
Switching Time



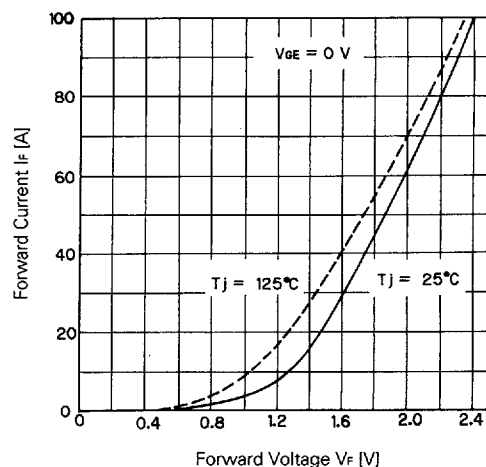
Switching Time



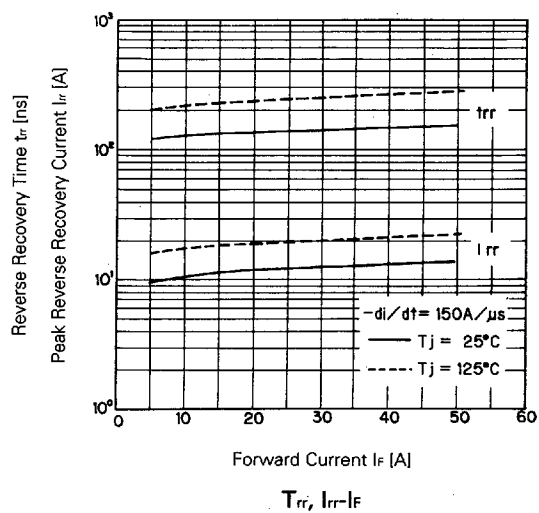
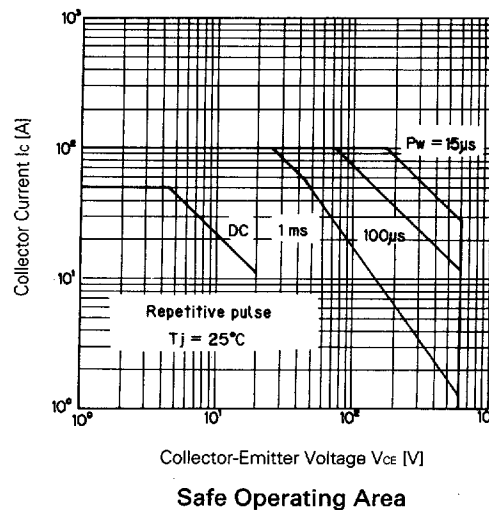
Switching Time-Gate Resistance



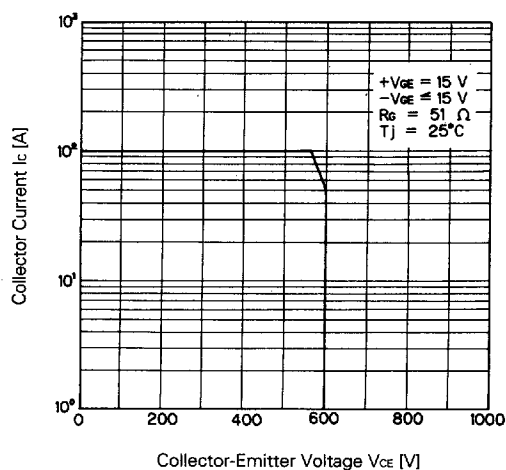
Dynamic Input Characteristic



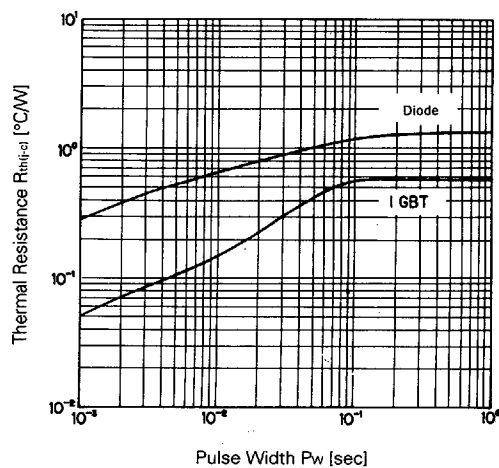
Forward Voltage of Free Wheel Diode

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

Safe Operating Area



Reverse Biased Safe Operating Area



Transient Thermal Resistance