

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

■ 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
	Continuous	$-I_C$	50
	1ms	$-I_{C \text{ pulse}}$	100
Max. Power Dissipation	P_C	220	W
Operating Temperature	T_J	+150	°C
Storage Temperature	T_{stg}	-40 to +125	°C
Net. Weight		510	g
Isolation Voltage	AC. 1min.	V_{isol}	2500
Screw Torque	Mounting *1	3.5 {35}	N · m
	Terminals *2	1.7 {17}	{kg · cm}

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

*2 Recommendable Value 1.3 to 1.7 N·m {13 to 17 kg·cm} (M4)

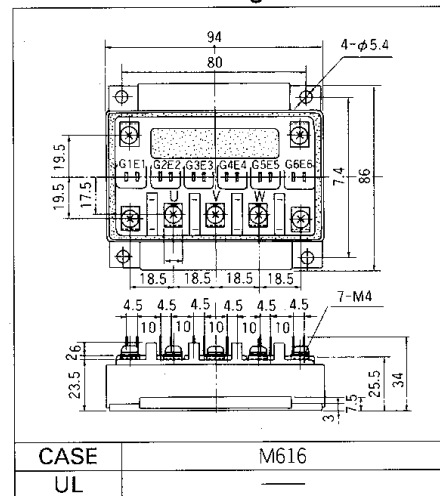
● Electrical Characteristics ($T_c=25^\circ\text{C}$)

Items	Symbols	Test Conditions	Min.	Typ.	Max.	Units
Zero Gate Voltage Collector Current	I_{CES}	$V_{GE}=0V$ $V_{CE}=600V$ $T_J=25^\circ\text{C}$			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	t_{on}	$V_{CC}=300V$			0.8	μs
	t_r	$I_C=50A$			0.6	
Turn-off Time	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

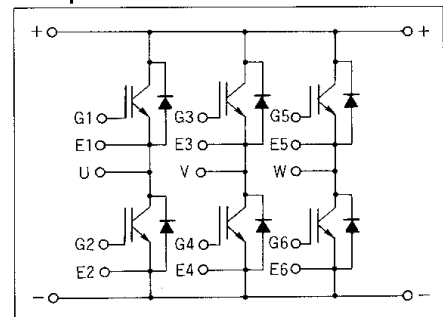
● Thermal Characteristics

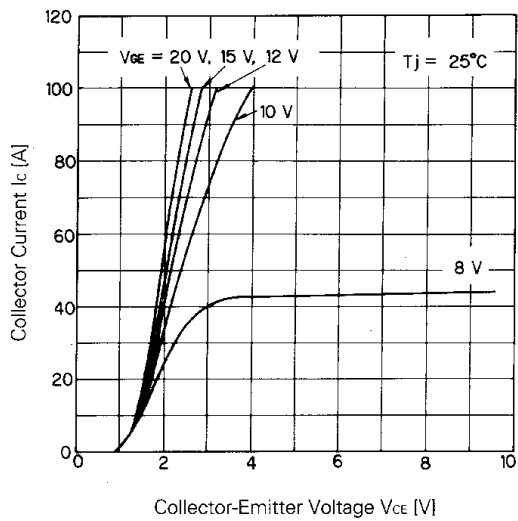
Items	Symbols	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance	$R_{th(j-c)}$	IGBT			0.568	°C/W
	$R_{th(j-c)}$	Diode			1.33	
	$R_{th(c-f)}$	With Thermal compound		0.05		

■ Outline Drawings

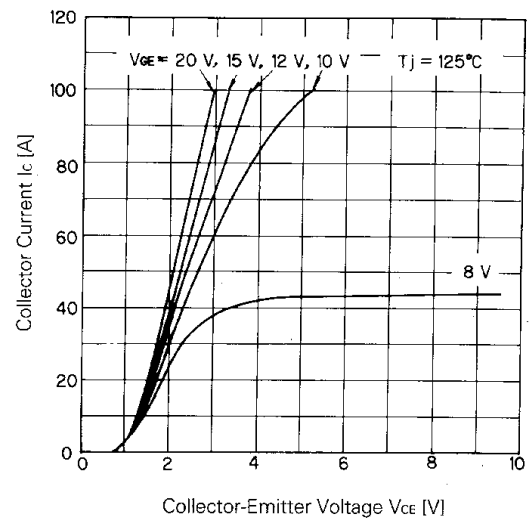


■ Equivalent Circuit Schematic

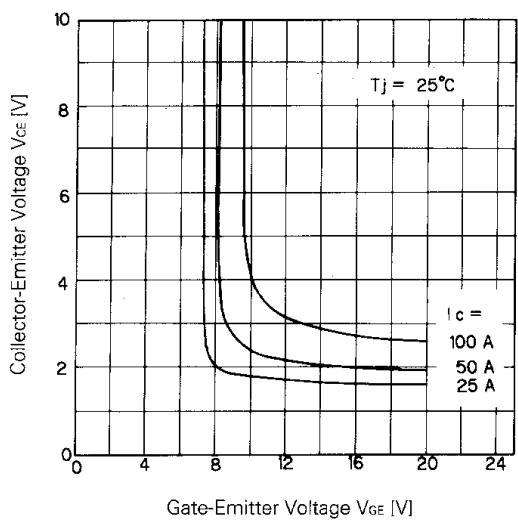




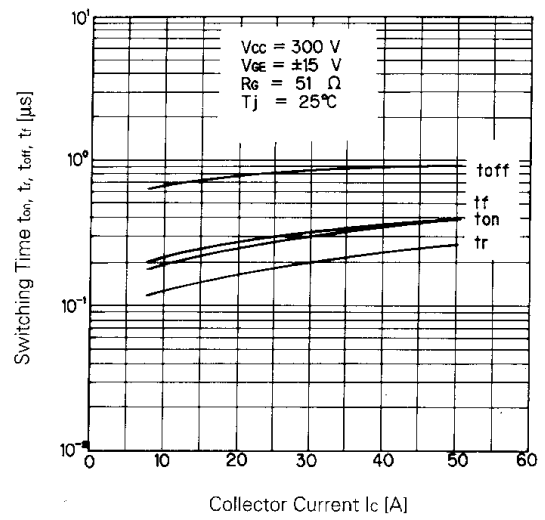
Collector Current vs. Collector-Emitter Voltage



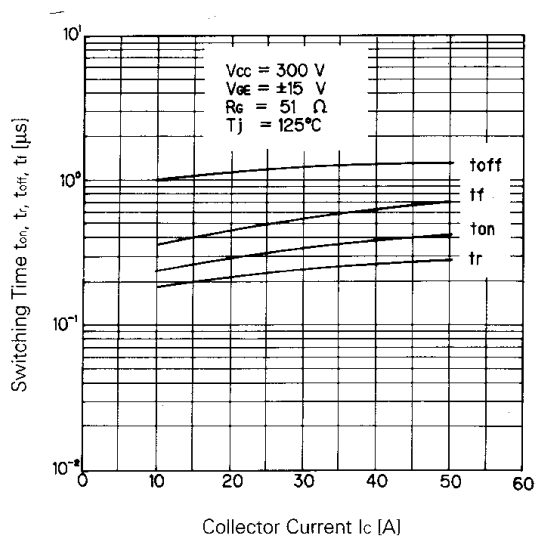
Collector Current vs. Collector-Emitter Voltage



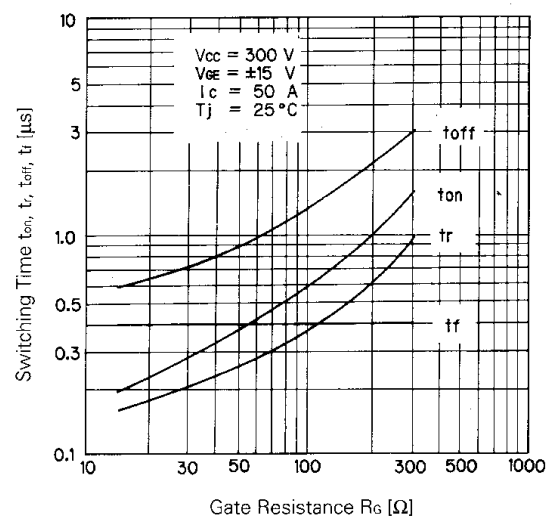
Collector-Emitter Voltage vs. Gate-Emitter Voltage



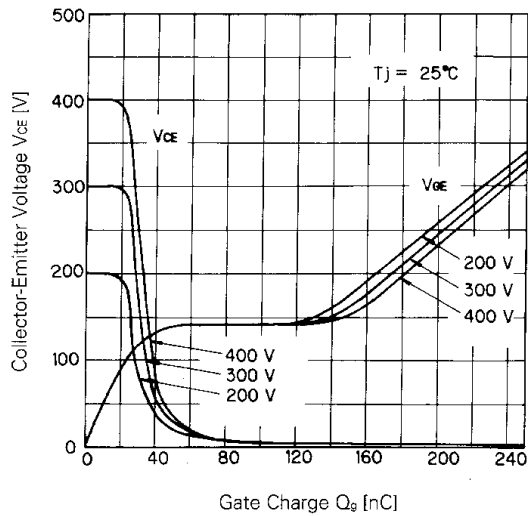
Switching Time



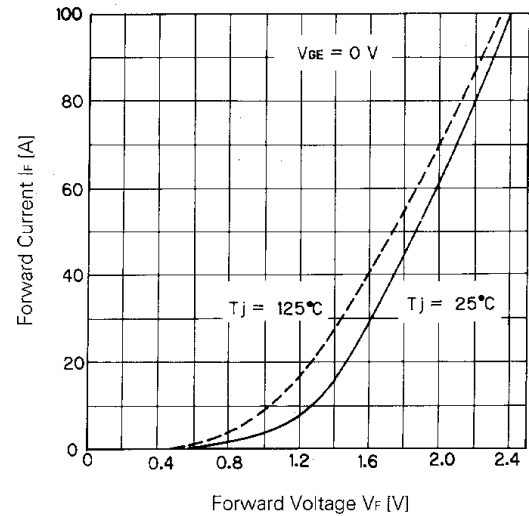
Switching Time



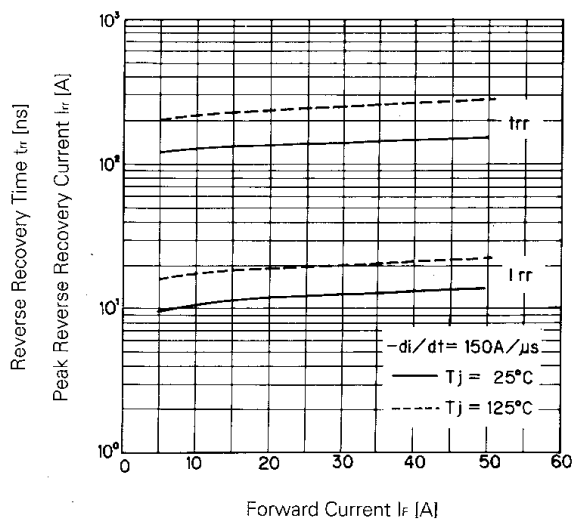
Switching Time-Gate Resistance



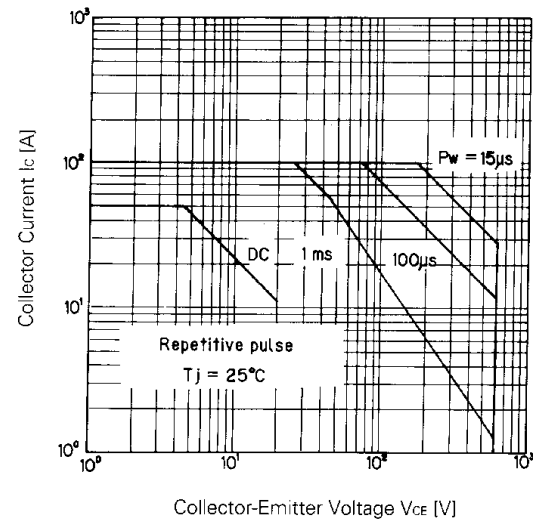
Dynamic Input Characteristic



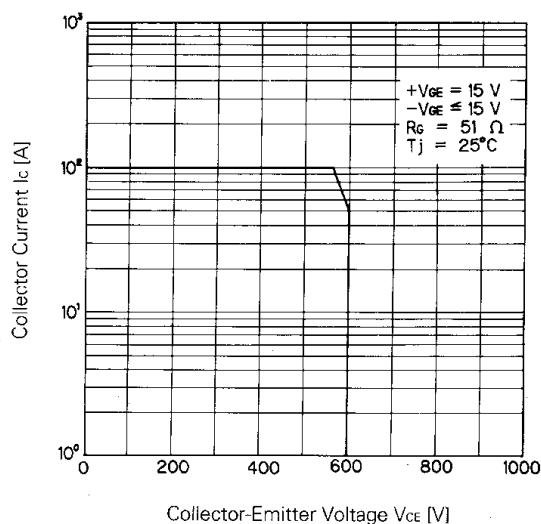
Forward Voltage of Free Wheel Diode



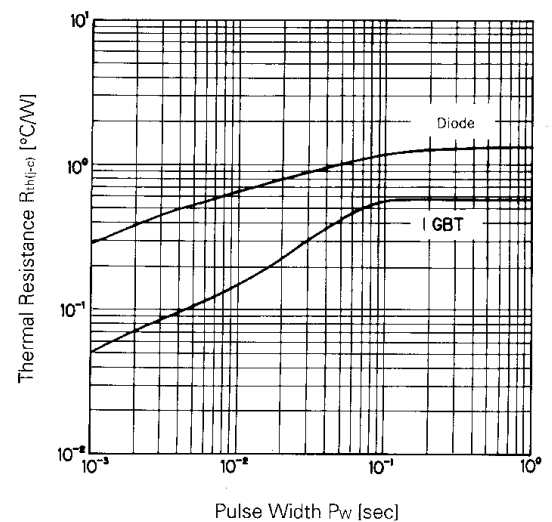
T_{rr} , I_{rr} - I_f



Safe Operating Area



Reverse Biased Safe Operating Area



Transient Thermal Resistance