

IGBT MODULE (F series)

■ Features

- Low Saturation Voltage
- Voltage Drive
- All Screw Terminals for Automated Assembly

■ 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	A
	1ms	I_C pulse	100	
	Continuous	$-I_C$	50	
	1ms	$-I_C$ 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	V
Screw Torque		Mounting *1	3.5 [35]	N · m
		Terminals *2	1.7 [17]	(kg · cm)

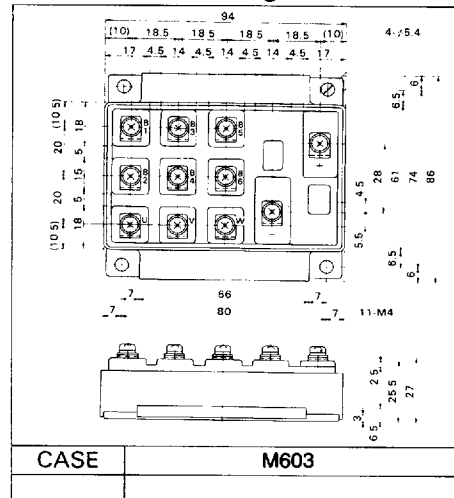
● Electrical Characteristics (T_c=25°C)

Items	Symbols	Test Conditions	Min.	Typ.	Max.	Units
Zero Gate Voltage Collector Current	I _{CES}	V _{GE} =0V V _{CE} =600V T _J =25°C			1.0	mA
		V _{GE} =0V V _{CE} =600V T _J =125°C			—	mA
Gate-Emitter Leakage Current	I _{GES}	V _{CE} =0V V _{GE} =±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 Resistive load	t _{on}	V _{CC} =300V			0.8	μs
	t _r	I _C =50A			0.6	
Turn-off Time Inductive load	t _{off}	V _{GE} =±15V			1.5	
	t _r	R _G =51Ω			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/μs V _{GE} =-10V			300	ns

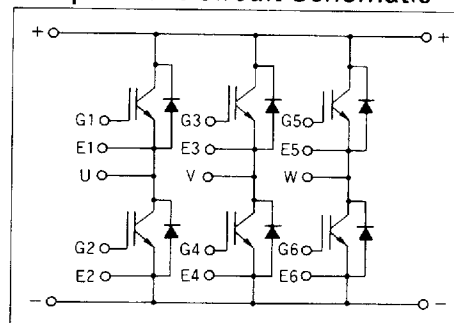
● Thermal Characteristics

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



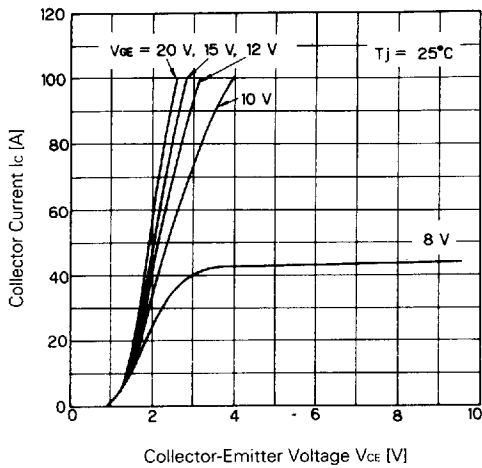
■ Equivalent Circuit Schematic



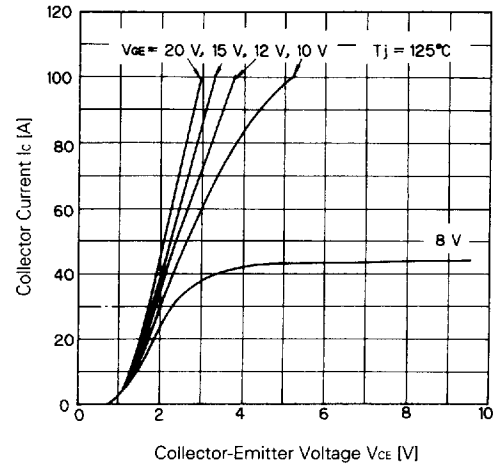
*1 Recommendable Value 2.5 to 3.5 N•m [25 to 35 kg•cm] (M5)

*2 Recommendable Value	1.3 to 1.7 N•m	13 to 17 kg•cm	(M4)
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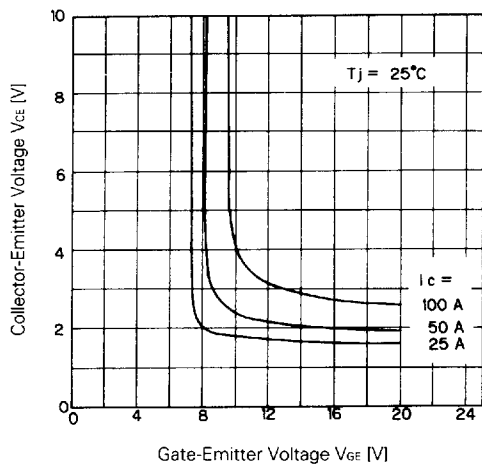
■ Characteristics



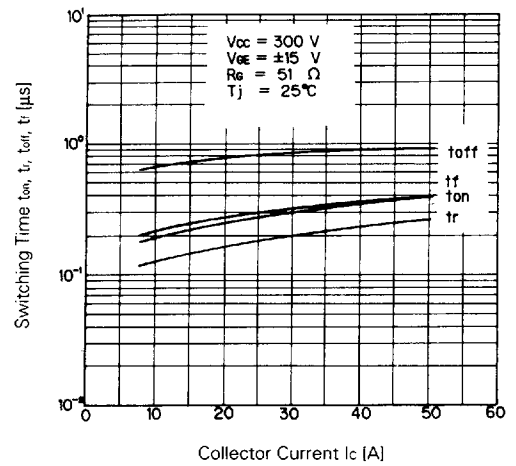
Collector Current vs. Collector-Emitter Voltage



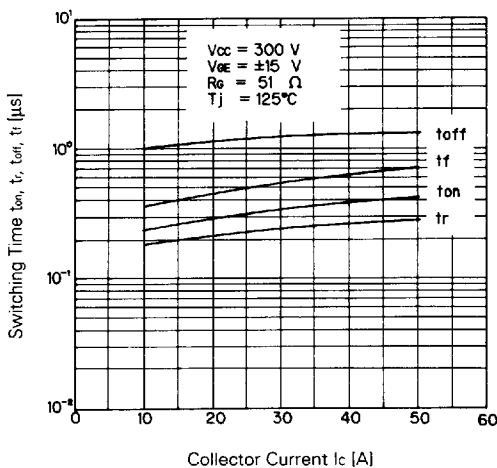
Collector Current vs. Collector-Emitter Voltage



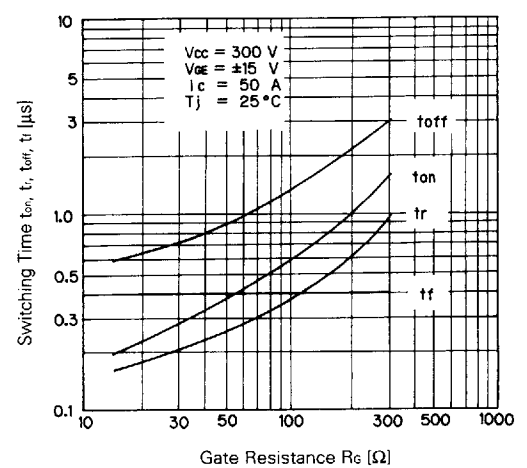
Collector-Emitter Voltage vs. Gate-Emitter Voltage



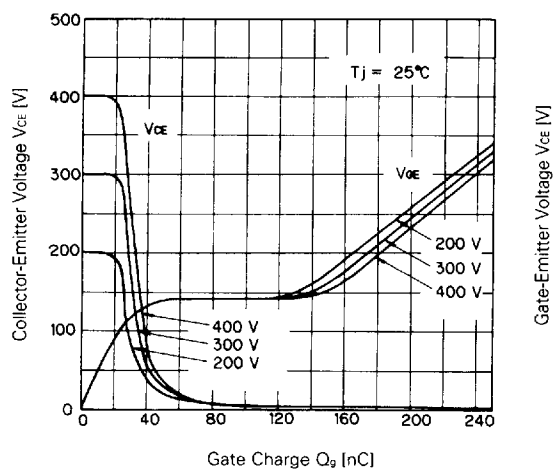
Switching Time



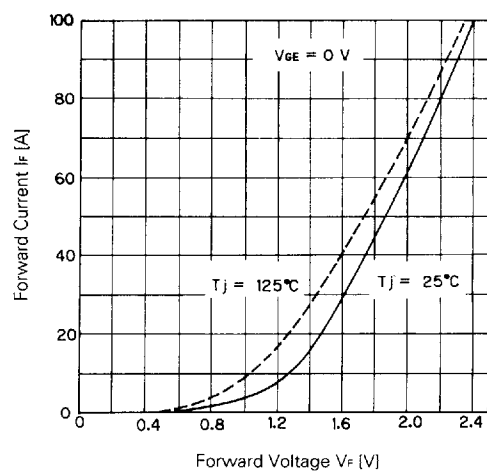
Switching Time



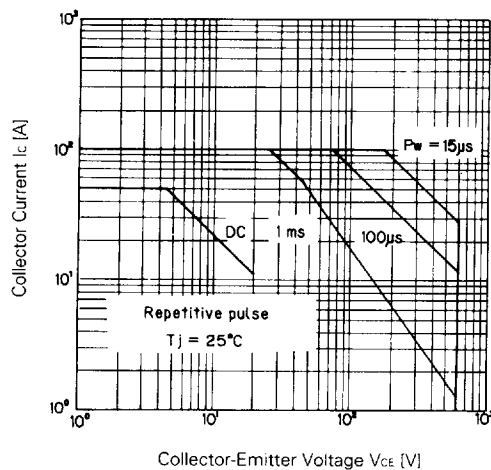
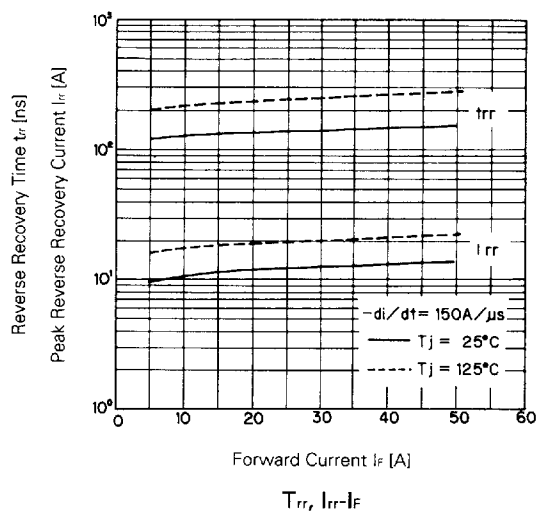
Switching Time-Gate Resistance



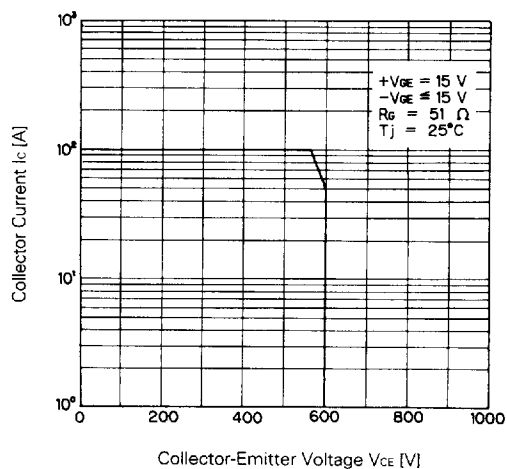
Dynamic Input Characteristic



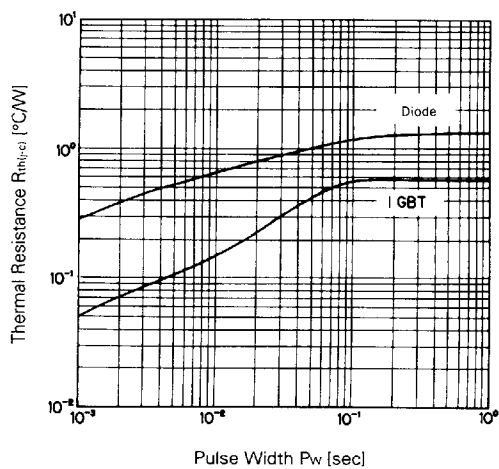
Forward Voltage of Free Wheel Diode



Safe Operating Area



Reverse Biased Safe Operating Area



Transient Thermal Resistance