

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	100	A
	1ms	I _{C pulse}	200	
	Continuous	− I _C	100	
	1ms	− I _{C pulse}	200	
Max. Power Dissipation		P _C	360	W
Operating Temperature		T _j	+150	°C
Storage Temperature		T _{stg}	−40 to +125	°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

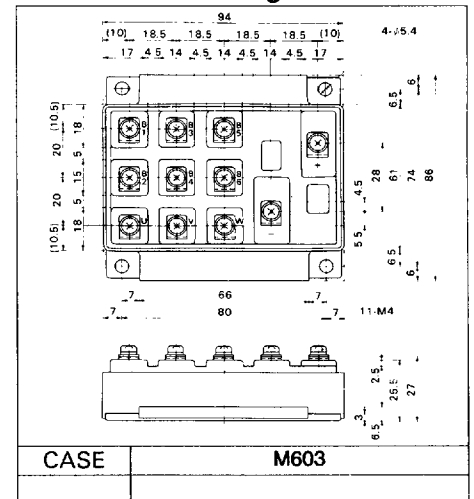
● Electrical Characteristics (T_c=25°C)

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 =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		9500		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 =100A			0.6	
Turn-off Time	t _{off}	V _{GE} =±15V			1.5	
	t _f	R _G =25Ω			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/μs V _{GE} =-10V			300	ns

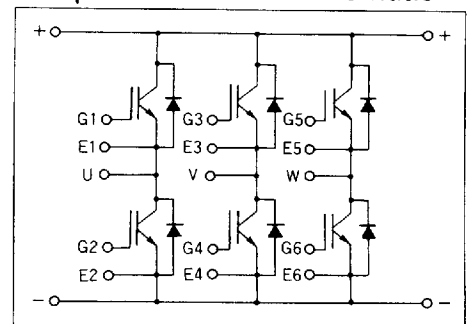
● Thermal Characteristics

Items	Symbols	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance	R _{th(j-c)}	IGBT			0.347	°C/W
	R _{th(j-c)}	Diode			0.666	
	R _{th(c-f)}	With Thermal compound		0.05		

■ Outline Drawings



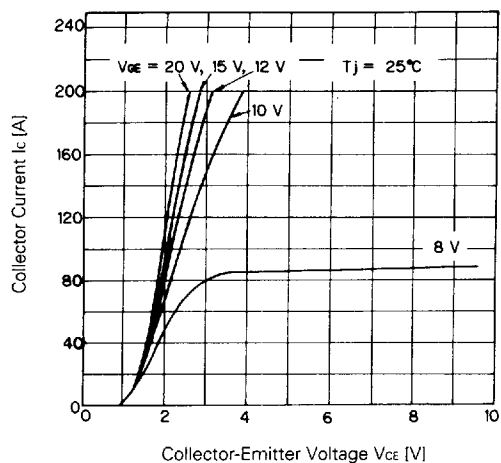
■ Equivalent Circuit Schematic



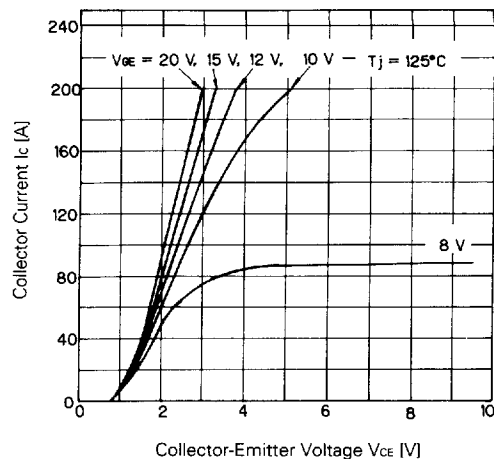
*1 Recommendable Value 2.5 to 3.5 N•m {25 to 35 kg•cm} (M5)

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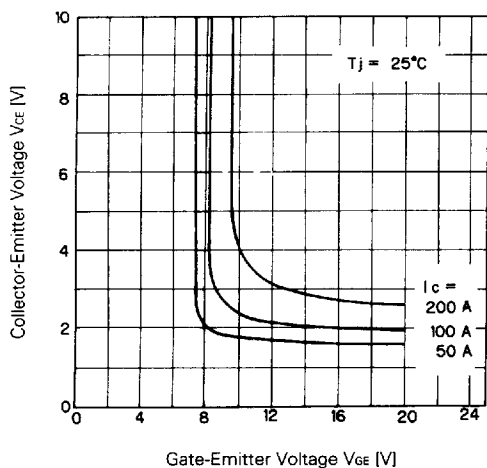
■ Characteristics



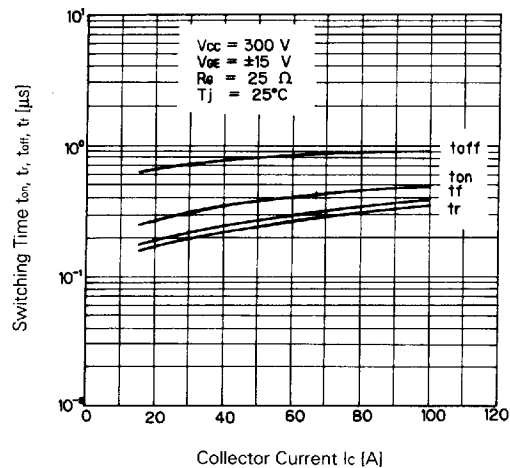
Collector Current vs. Collector-Emitter Voltage



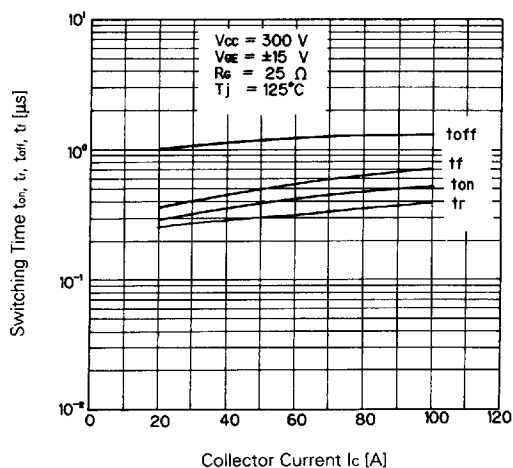
Collector Current vs. Collector-Emitter Voltage



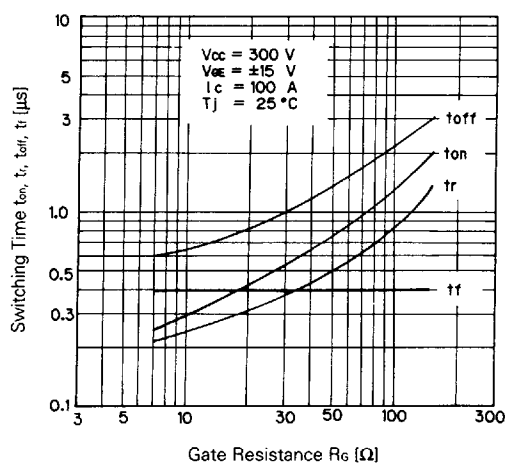
Collector-Emitter Voltage vs. Gate-Emitter Voltage



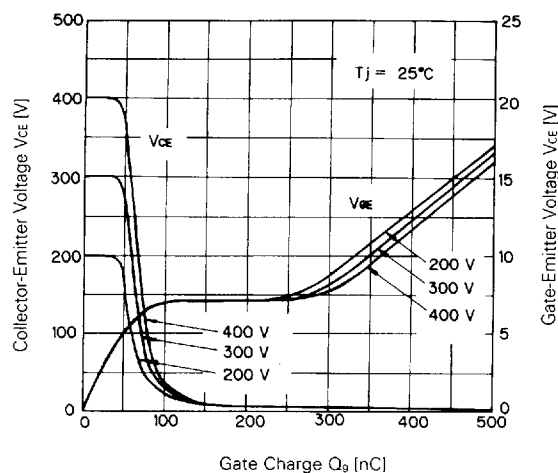
Switching Time



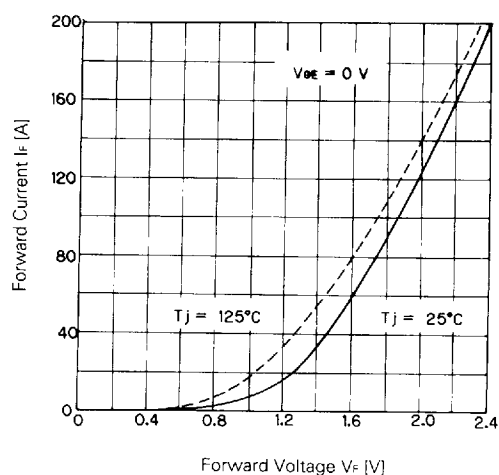
Switching Time



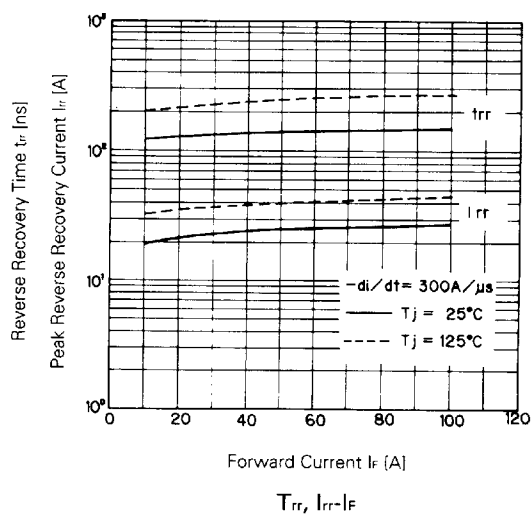
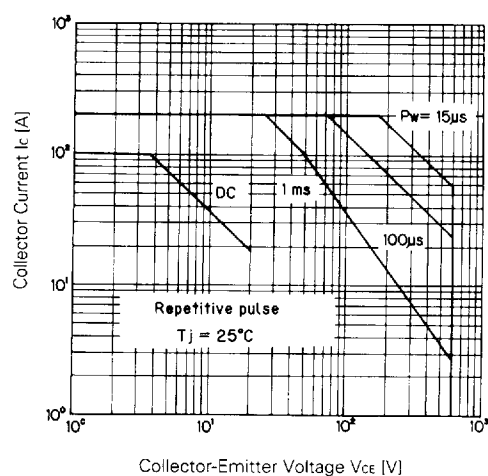
Switching Time-Gate Resistance



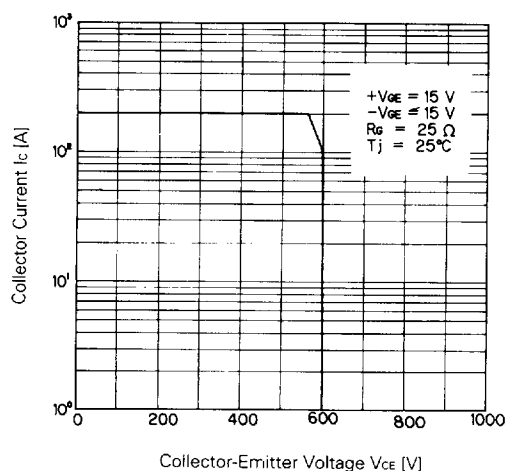
Dynamic Input Characteristic



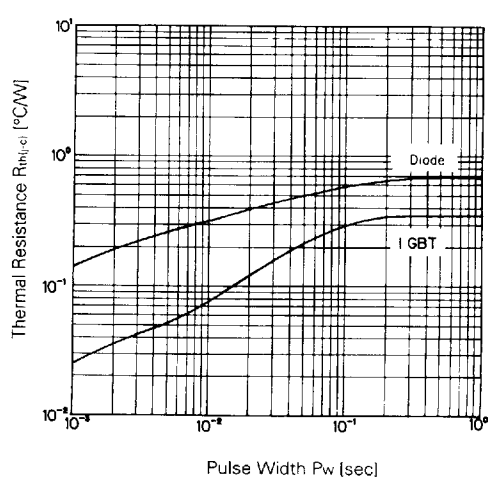
Forward Voltage of Free Wheel Diode

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

Safe Operating Area



Reverse Biased Safe Operating Area



Transient Thermal Resistance