

Preliminary

TOSHIBA GTR Module Silicon N-Channel IGBT

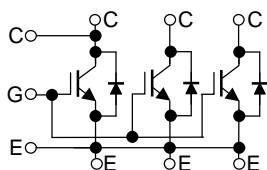
MG1200FXF1US51

High Power Switching Applications

Motor Control Applications

- High input impedance
- Enhancement mode
- Electrodes are isolated from case.

Equivalent Circuit



Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Collector-emitter voltage		V_{CES}	3300	V
Gate-emitter voltage		V_{GES}	± 20	V
Collector current	DC	I_C	1200	A
	1 ms	I_{CP}	2400	A
Peak 1 cycle surge current	10 ms (half sine)	I_{FSM}	10	kA
Operating junction temperature		T_j	-40~125	°C
Storage temperature range		T_{stg}	-40~125	°C
Isolation voltage		V_{Isol}	6000 (AC 1 min)	V
Screw torque	Terminal: M4/M8	—	2/7	Nm
	Mounting		4	

Caution: MG1200FXF1US51 has no short-circuit capability.

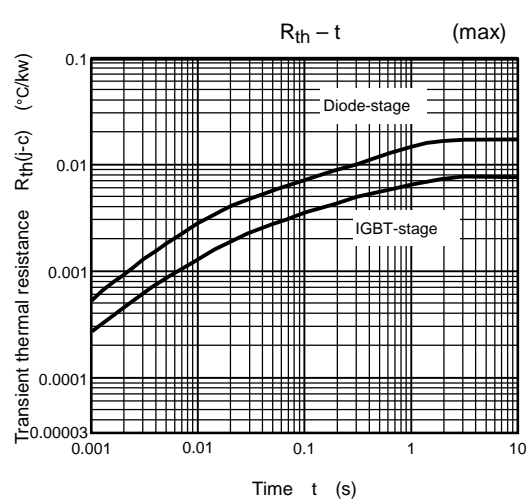
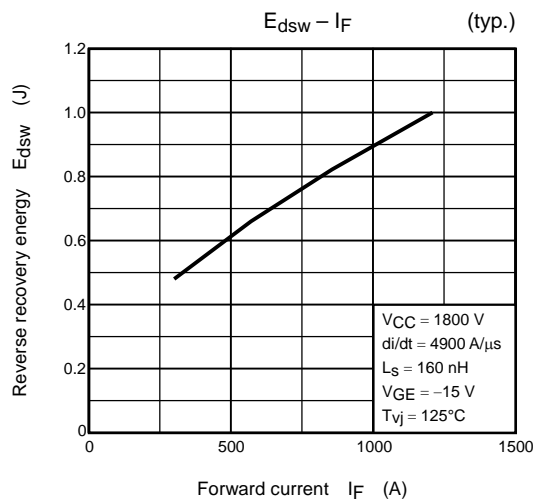
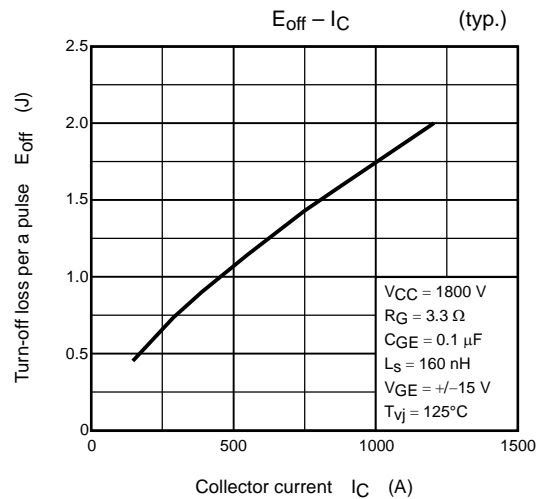
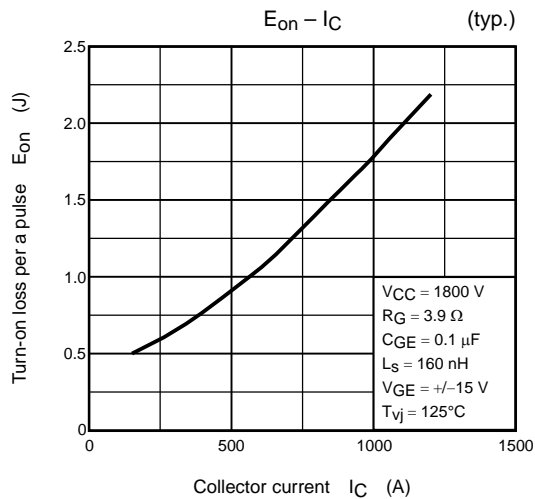
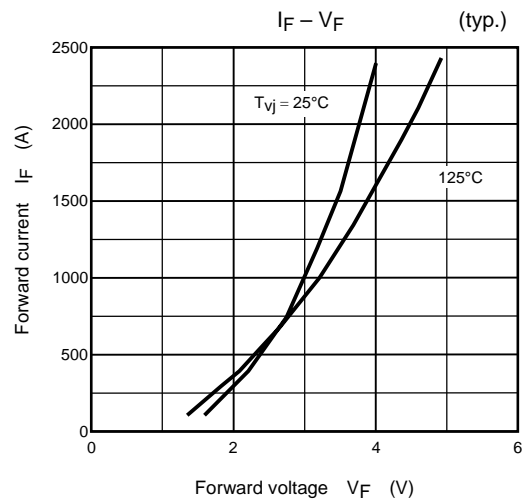
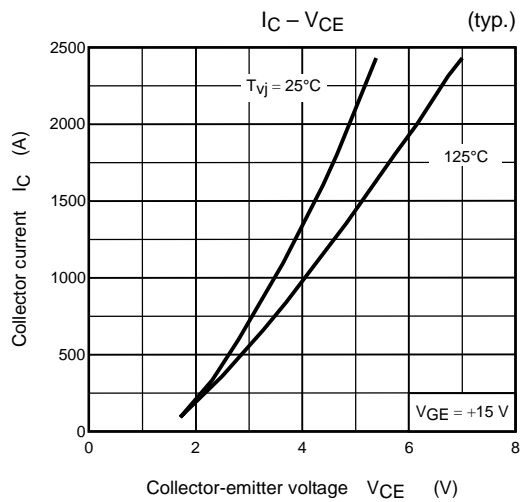
Electrical Characteristics ($T_{vj} = 125^{\circ}\text{C}$)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GES}	$V_{GE} = \pm 20 \text{ V}, V_{CE} = 0 \text{ V}$	—	—	± 50	nA
Collector cut-off current		I_{CES}	$V_{CE} = 3300 \text{ V}, V_{GE} = 0 \text{ V}$	—	75	100	mA
Gate-emitter cut-off voltage		$V_{GE} \text{ (off)}$	$V_{CE} = 5 \text{ V}, I_C = 1.2 \text{ A}$	—	4.4	—	V
Collector-emitter saturation voltage		$V_{CE} \text{ (sat)}$	$I_C = 1200 \text{ A}, V_{GE} = 15 \text{ V}$	—	4.6	5.3	V
Input capacitance		C_{ies}	$V_{CE} = 10 \text{ V}, V_{GE} = 0 \text{ V}, f = 100 \text{ kHz}$	—	230	—	nF
Switching time	Rise time	t_r	$V_{CC} = 1800 \text{ V}, I_C = 1200 \text{ A},$ $V_{GG} = \pm 15 \text{ V}, C_{GE} = 0.1 \mu\text{F},$ $R_G \text{ (on)/(off)} = 3.9/3.3 \Omega$	—	2.1	—	μs
	Turn-on time	t_{on}		—	0.3	—	μs
	Fall time	t_f	$(di_F/dt \text{ (on)} \approx 4900 \text{ A}/\mu\text{s})$	—	4.0	—	μs
	Turn-off time	t_{off}	$(\text{Inductive load}, L_S \approx 160 \text{ nH})$	—	1.8	—	μs
Forward voltage of diode		V_F	$I_F = 1200 \text{ A}, V_{GE} = 0 \text{ V}$	—	3.5	4.0	V
Reverse recovery charge		Q_{rr}	$I_F = 1200 \text{ A}, V_{GG} = -15 \text{ V},$ $di_F/dt \approx -4900 \text{ A}/\mu\text{s},$	—	1000	—	μC
Peak reverse recovery current		I_{rr}	$V_{CC} = 1800 \text{ V}$	—	1500	—	A
Switching dissipation	turn-on loss	E_{on}	$V_{CC} = 1800 \text{ V}, I_C = 1200 \text{ A},$ $V_{GG} = \pm 15 \text{ V}, C_{GE} = 0.1 \mu\text{F},$ $R_G \text{ (on)/(off)} = 3.9/3.3 \Omega$	—	2.2	2.8	J
	turn-off loss	E_{off}	$(di_F/dt \text{ (on)} \approx 4900 \text{ A}/\mu\text{s})$ $(\text{Inductive load}, L_S \approx 160 \text{ nH})$	—	2.0	3.0	J
	Diode reverse recovery loss	E_{dsw}	$I_F = 1200 \text{ A}, V_{GG} = -15 \text{ V},$ $di_F/dt \approx -4900 \text{ A}/\mu\text{s},$ $V_{CC} = 1800 \text{ V}$	—	1.0	1.5	J

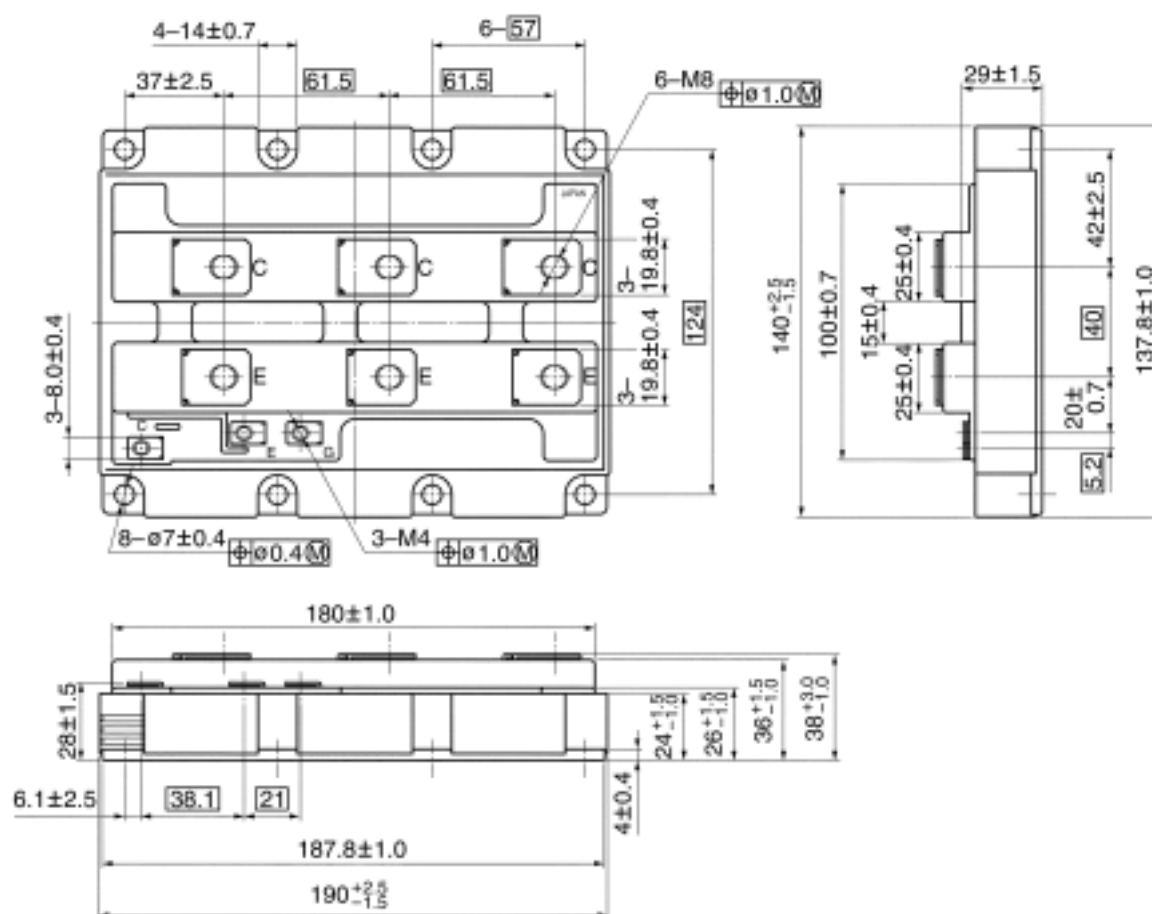
Thermal Resistance ($T_c = 25^{\circ}\text{C}$)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Thermal Resistance	$R_{th} \text{ (j-c)}$	Transistor (IGBT) stage	—	—	8.0	$^{\circ}\text{C}/\text{kW}$
		Diode stage	—	—	16.0	
	$R_{th} \text{ (c-f)}$	Per module (Note 1)	—	6.0	—	

Note 1: Toshiba silicone's YG6260 heat radiation grease is recommended for use with semiconductor devices.
Apply a thin, even (100-to-200- μm) coating of grease.



Unit: mm



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