Preliminary TOSHIBA GTR Module Silicon N-Channel IGBT

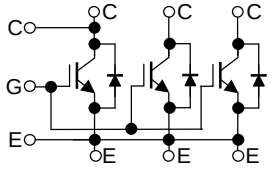
MG1200FXF1US51

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°C)

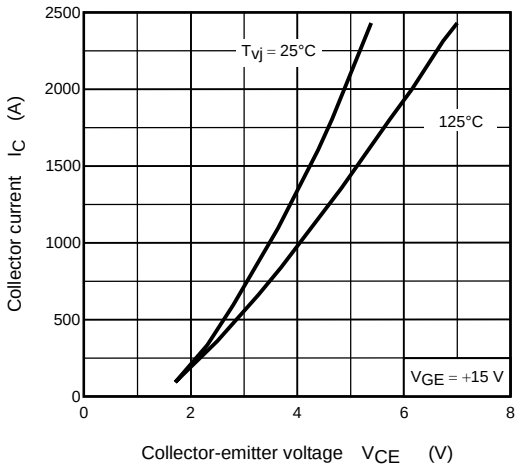
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GES}	V_{GE} = ±20 V, V_{CE} = 0 V	—	—	±50	nA
Collector cut-off current		I_{CES}	V_{CE} = 3300 V, V_{GE} = 0 V	—	75	100	mA
Gate-emitter cut-off voltage		$V_{GE\ (off)}$	V_{CE} = 5 V, I_C = 1.2 A	—	4.4	—	V
Collector-emitter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

Thermal Resistance (Tc = 25°C)

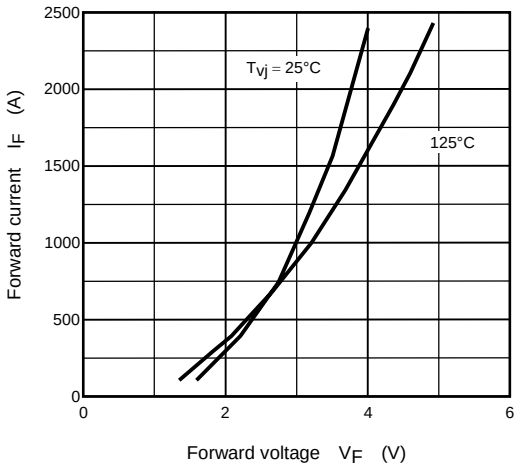
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Thermal Resistance	$R_{th\ (j-c)}$	Transistor (IGBT) stage	—	—	8.0	°C/kW
		Diode stage	—	—	16.0	
	$R_{th\ (c-f)}$	Per module (Note 1)	—	6.0	—	

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.

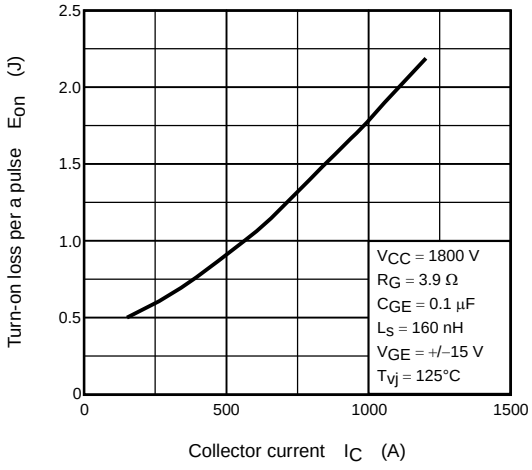
$I_C - V_{CE}$ (typ.)



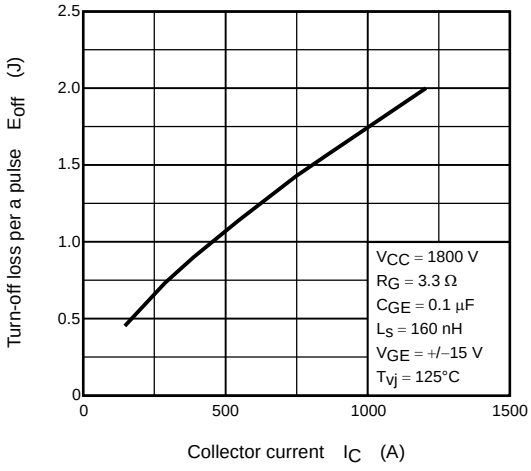
$I_F - V_F$ (typ.)



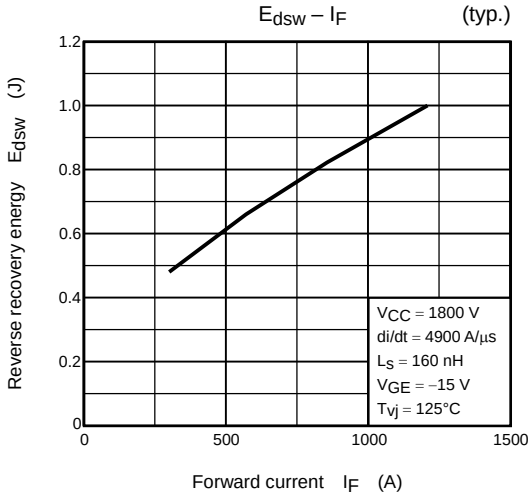
$E_{on} - I_C$ (typ.)



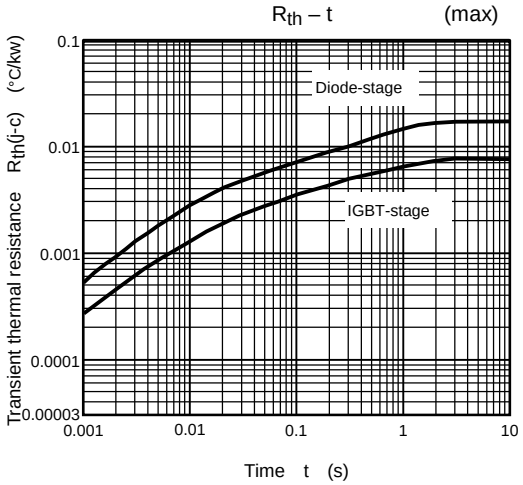
$E_{off} - I_C$ (typ.)



$E_{dsw} - I_F$ (typ.)

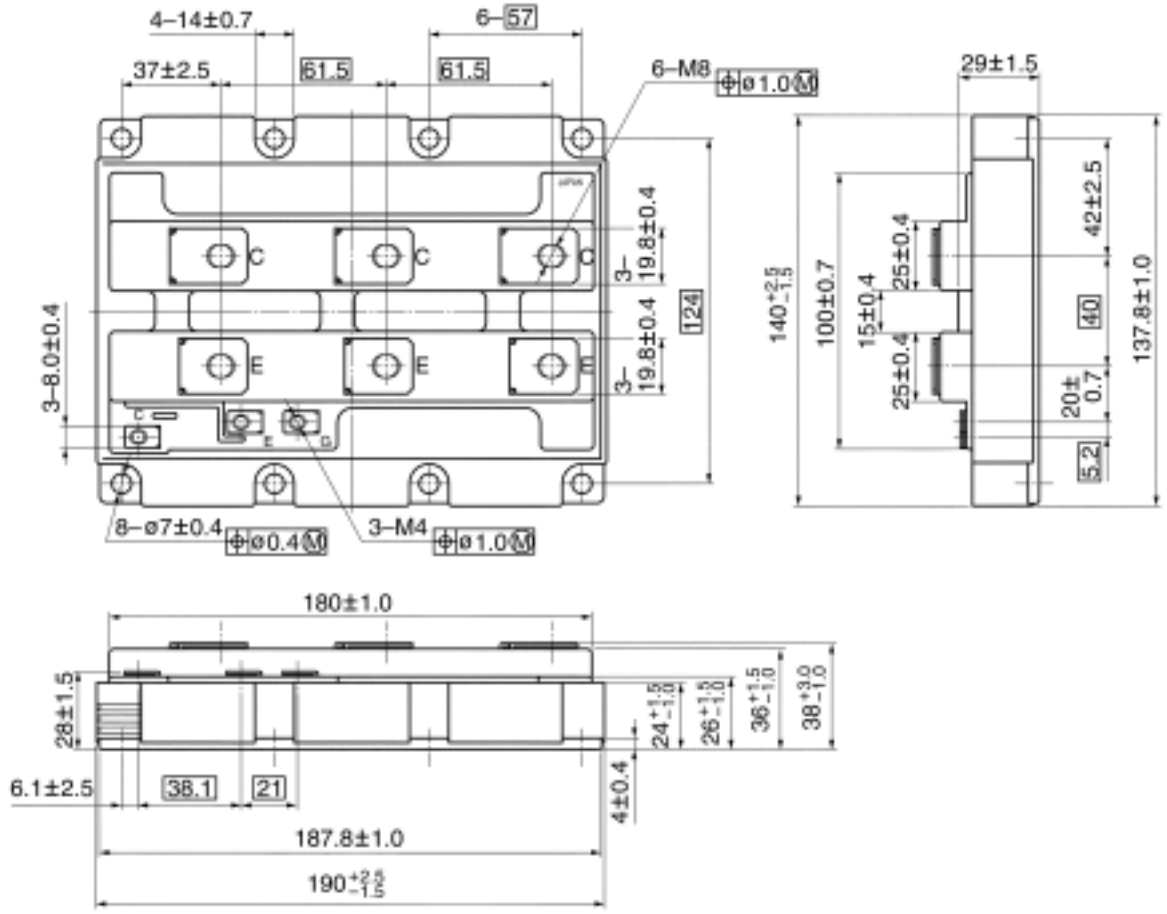


$R_{th} - t$ (max)



Package Dimensions: 2-193A1A

Unit: mm



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