

**Preliminary**

TOSHIBA GTR Module Silicon N-Channel IGBT

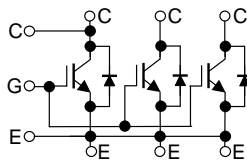
# MG1200FXF1US51

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		$V_{GES}$	$\pm 20$	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.

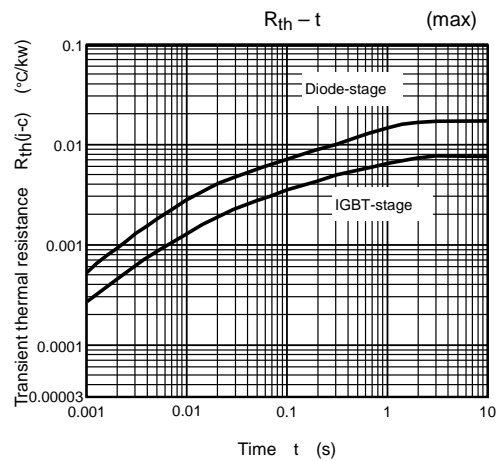
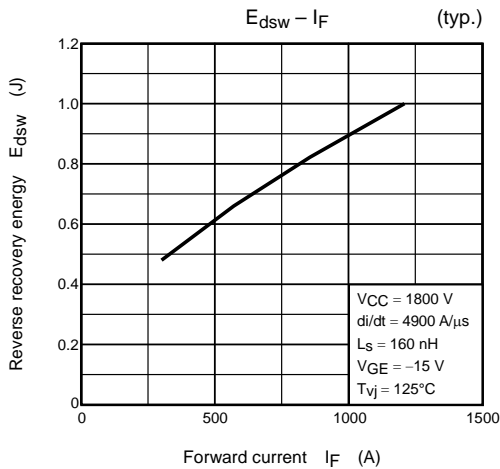
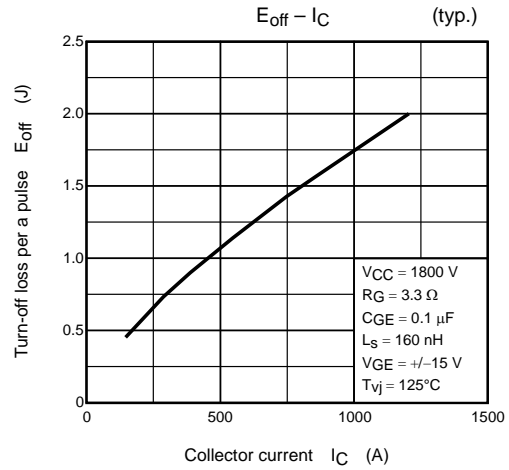
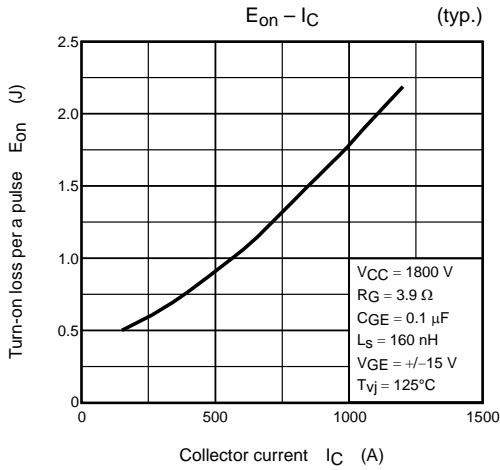
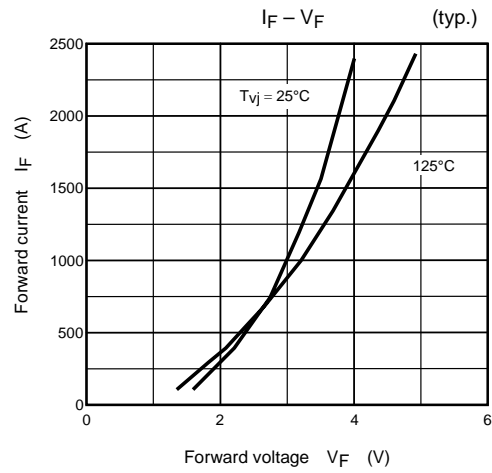
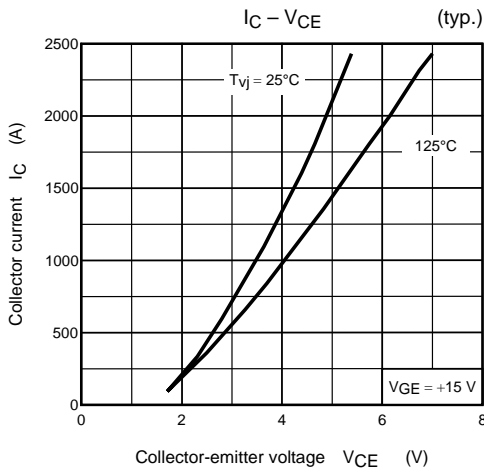
## Electrical Characteristics (T<sub>vj</sub> = 125°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I <sub>GES</sub>	V <sub>GE</sub> = ±20 V, V <sub>CE</sub> = 0 V	—	—	±50	nA
Collector cut-off current		I <sub>CES</sub>	V <sub>CE</sub> = 3300 V, V <sub>GE</sub> = 0 V	—	75	100	mA
Gate-emitter cut-off voltage		V <sub>GE (off)</sub>	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 1.2 A	—	4.4	—	V
Collector-emitter saturation voltage		V <sub>CE (sat)</sub>	I <sub>C</sub> = 1200 A, V <sub>GE</sub> = 15 V	—	4.6	5.3	V
Input capacitance		C <sub>ies</sub>	V <sub>CE</sub> = 10 V, V <sub>GE</sub> = 0 V, f = 100 kHz	—	230	—	nF
Switching time	Rise time	t <sub>r</sub>	V <sub>CC</sub> = 1800 V, I <sub>C</sub> = 1200 A,	—	2.1	—	μs
	Turn-on time	t <sub>on</sub>	V <sub>GG</sub> = ±15 V, C <sub>GE</sub> = 0.1 μF,	—	0.3	—	μs
	Fall time	t <sub>f</sub>	RG (on)/(off) = 3.9/3.3 Ω	—	4.0	—	μs
	Turn-off time	t <sub>off</sub>	(di <sub>C</sub> /dt (on) ≈ 4900 A/μs) (Inductive load, L <sub>S</sub> ≈ 160 nH)	—	1.8	—	μs
Forward voltage of diode		V <sub>F</sub>	I <sub>F</sub> = 1200 A, V <sub>GE</sub> = 0 V	—	3.5	4.0	V
Reverse recovery charge		Q <sub>rr</sub>	I <sub>F</sub> = 1200 A, V <sub>GG</sub> = -15 V, di <sub>F</sub> /dt ≈ -4900 A/μs,	—	1000	—	μC
Peak reverse recovery current		I <sub>rr</sub>	V <sub>CC</sub> = 1800 V	—	1500	—	A
Switching dissipation	turn-on loss	E <sub>on</sub>	V <sub>CC</sub> = 1800 V, I <sub>C</sub> = 1200 A, V <sub>GG</sub> = ±15 V, C <sub>GE</sub> = 0.1 μF, RG (on)/(off) = 3.9/3.3 Ω	—	2.2	2.8	J
	turn-off loss	E <sub>off</sub>	(di <sub>C</sub> /dt (on) ≈ 4900 A/μs) (Inductive load, L <sub>S</sub> ≈ 160 nH)	—	2.0	3.0	J
	Diode reverse recovery loss	E <sub>dsw</sub>	I <sub>F</sub> = 1200 A, V <sub>GG</sub> = -15 V, di <sub>F</sub> /dt ≈ -4900 A/μs, V <sub>CC</sub> = 1800 V	—	1.0	1.5	J

## Thermal Resistance (T<sub>c</sub> = 25°C)

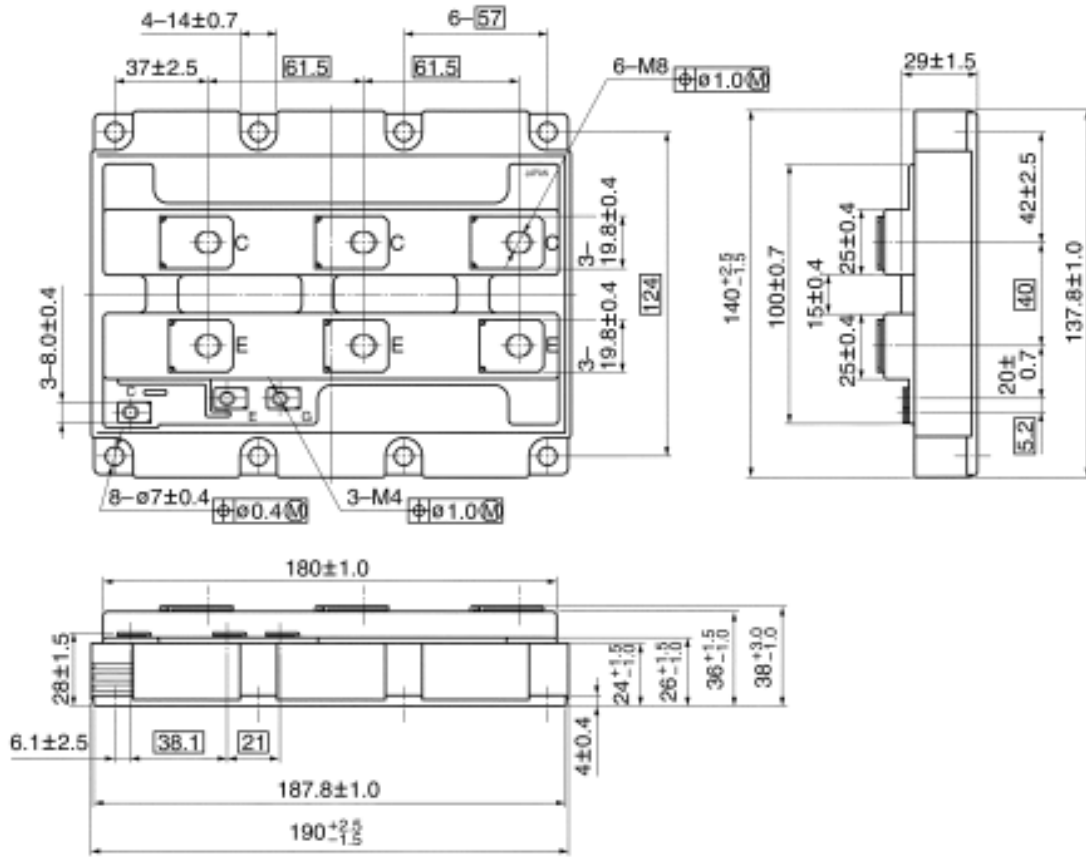
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Thermal Resistance	R <sub>th (j-c)</sub>	Transistor (IGBT) stage		—	—	8.0	°C/kW
		Diode stage		—	—	16.0	
	R <sub>th (c-f)</sub>	Per module (Note 1)		—	6.0	—	

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.



Package Dimensions: 2-193A1A

Unit: mm



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