TOSHIBA INSULATED GATE BIPOLAR TRANSISTOR SILICON N CHANNEL IGBT

## GT10J312, GT10J312(SM)

# HIGH POWER SWITCHING APPLICATIONS MOTOR CONTROL APPLICATIONS

Third-generation IGBT

• Enhancement mode type

• High speed :  $t_f = 0.30 \mu s$  (Max.) • Low saturation voltage : VCE (sat) = 2.7V (Max.)

• FRD included between emitter and collector

### Absolute Maximum Ratings (Ta = 25°C)

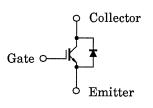
CHARACTERISTIC		SYMBOL	RATING	UNIT	
Collector-Emitter Voltage		V <sub>CES</sub>	600	V	
Gate-Emitter Voltage		V <sub>GES</sub>	±20	V	
Collector Current	DC	IC	10	Α	
	1ms	I <sub>CP</sub>	20	Α	
Emitter-Collector Forward Current	DC	lF	10	Α	
	1ms	I <sub>FM</sub>	20	Α	
Collector Power Dissipation (Tc = 25°C)		P <sub>C</sub>	60	W	
Junction Temperature		Tj	150	°C	
Storage Temperature Range		T <sub>stg</sub>	-55~150	°C	

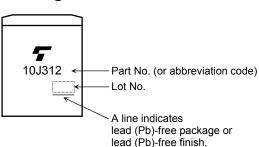
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

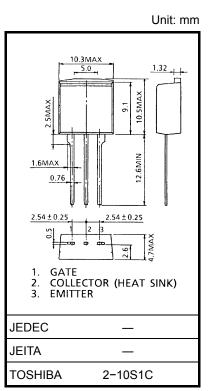
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Marking

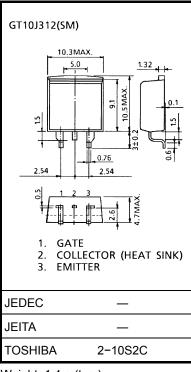
## **Equivalent Circuit**







Weight: 1.5 g (typ.)



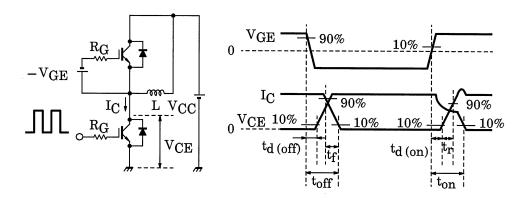
Weight: 1.4 g (typ.)



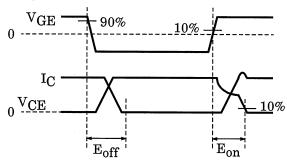
### **Electrical Characteristics (Ta = 25°C)**

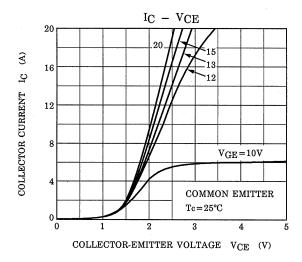
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Gate Leakage Current		I <sub>GES</sub>	V <sub>GE</sub> = ±20V, V <sub>CE</sub> = 0	_	_	±500	nA
Collector Cut-Off Current		I <sub>CES</sub>	V <sub>CE</sub> = 600V, V <sub>GE</sub> = 0	_	_	1.0	mA
Gate-Emitter Cut-Off Voltage		V <sub>GE</sub> (OFF)	I <sub>C</sub> = 1mA, V <sub>CE</sub> = 5V	5.0	_	8.0	V
Collector-Emitter S	Saturation Voltage	V <sub>CE</sub> (sat)	I <sub>C</sub> = 10A, V <sub>GE</sub> = 15V	_	2.1	2.7	V
Input Capacitance		C <sub>ies</sub>	V <sub>CE</sub> = 20V, V <sub>GE</sub> = 0, f = 1MHz	_	720	_	pF
Switching Time	Rise Time	t <sub>r</sub>	Inductive Load $V_{CC}$ = 300V, $I_{C}$ = 10A $V_{GG}$ = ±15V, $R_{G}$ = 100 $\Omega$ (Note 1)	_	0.12	_	μs
	Turn-On Time	t <sub>on</sub>		_	0.40	_	
	Fall Time	t <sub>f</sub>		_	0.15	0.30	
	Turn-Off Time	t <sub>off</sub>		_	0.40	_	
Peak Forward Voltage		V <sub>F</sub>	I <sub>F</sub> = 10A, V <sub>GE</sub> = 0	_	_	2.0	V
Reverse Recovery Time		t <sub>rr</sub>	I <sub>F</sub> = 10A, di / dt = -100A / μs	_	_	200	ns
Thermal Resistance (IGBT) Rt		R <sub>th (j-c)</sub>	_	_	_	2.08	°C / W
Thermal Resistance (Diode) Rt		R <sub>th (j-c)</sub>	_	_	_	3.76	°C / W

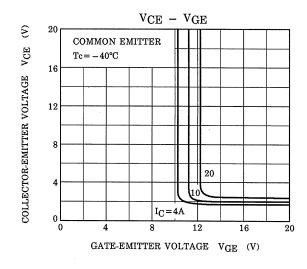
Note 1: Switching time measurement circuit and input / output waveforms

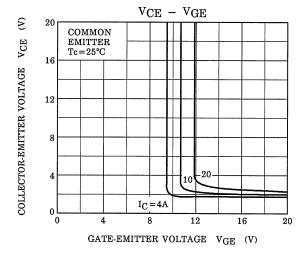


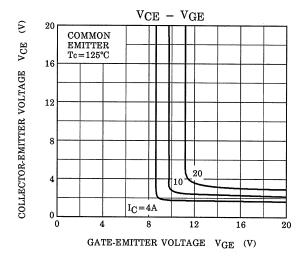
Switching loss measurement waveforms

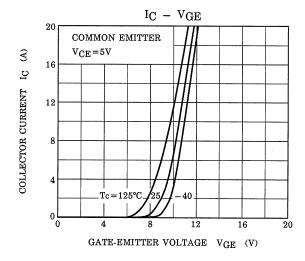


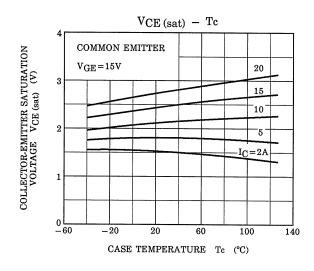


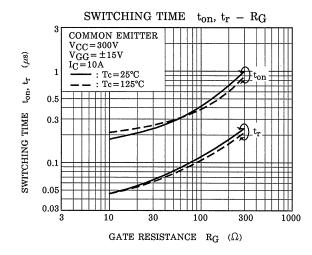


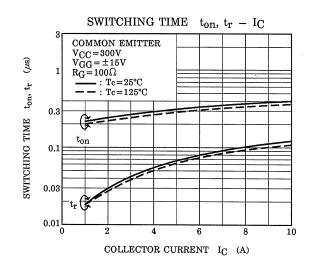


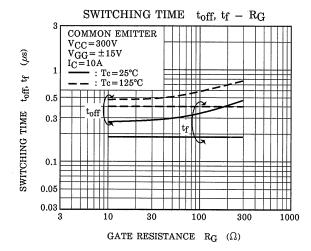


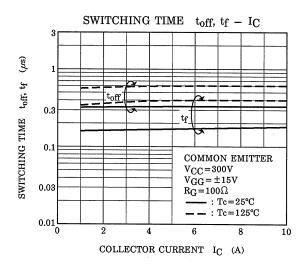


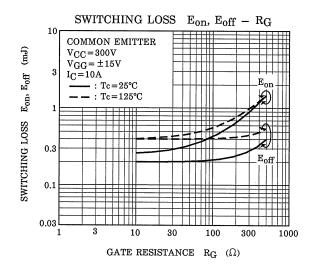


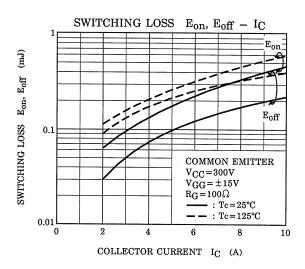


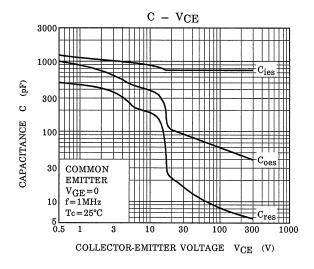


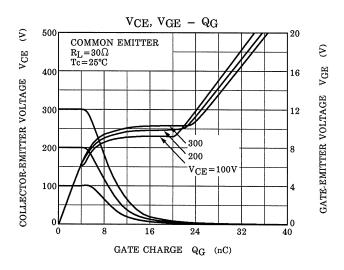


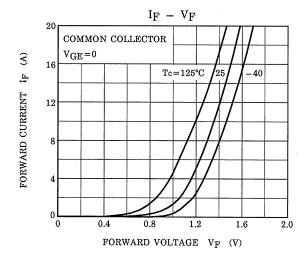


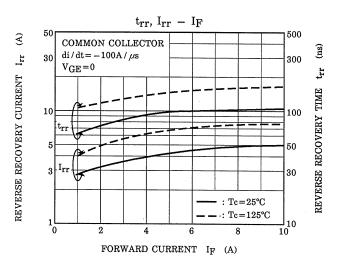


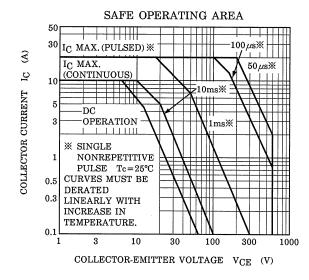


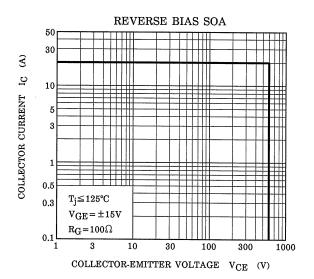




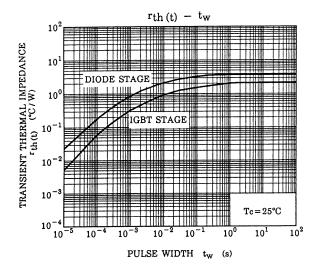








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