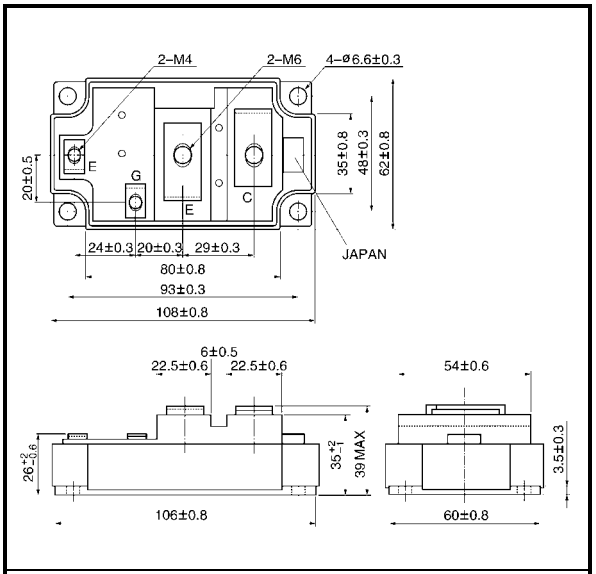
TOSHIBA IGBT Module Silicon N Channel IGBT

MG400Q1US65H

High Power & High Speed Switching Applications

- High input impedance
- Enhancement-mode
- The electrodes are isolated from case.

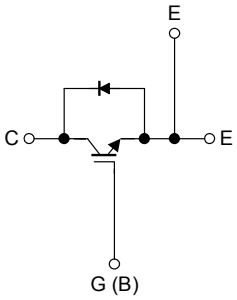
Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	2-109F1A

Weight: 465 g (typ.)

Equivalent Circuit



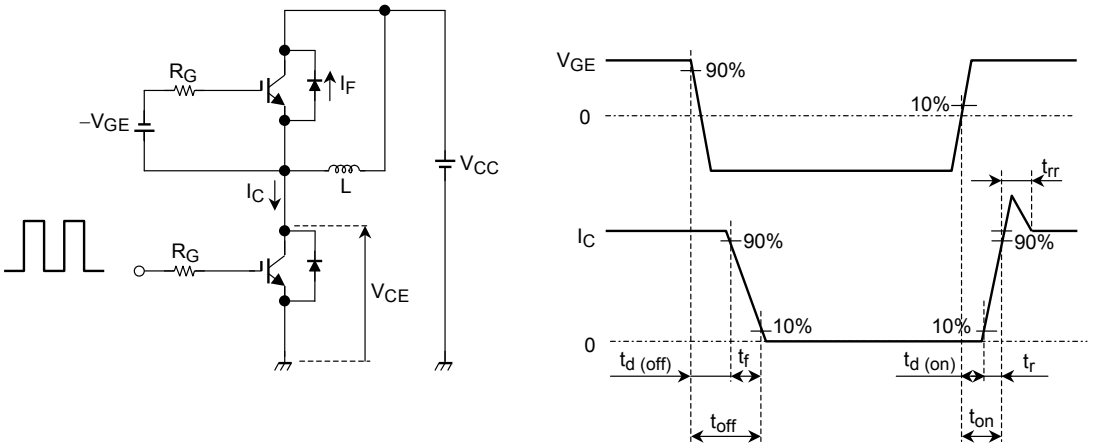
Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Collector-emitter voltage		V_{CES}	1200	V
Gate-emitter voltage		V_{GES}	±20	V
Collector current	DC	I_C	400	A
	1 ms	I_{CP}	800	
Forward current	DC	I_F	400	A
	1 ms	I_{FM}	800	
Collector power dissipation (Tc = 25°C)		P_C	2650	W
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−40 to 125	°C
Isolation voltage		V_{Isol}	2500 (AC 1 minute)	V
Screw torque	Terminal	—	3	N·m
	Mounting	—	3	

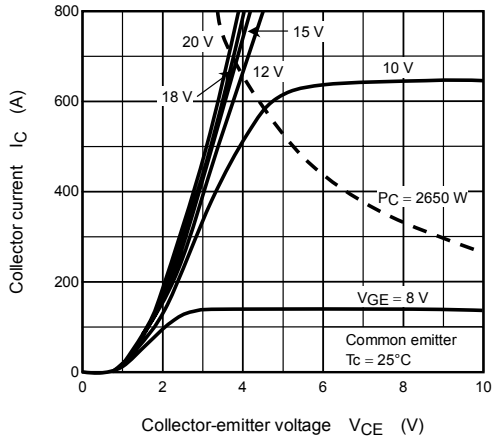
Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition		Min	Typ.	Max	Unit
Gate leakage current		I_{GES}	V_{GE} = ±20 V, V_{CE} = 0		—	—	±500	nA
Collector cut-off current		I_{CES}	V_{CE} = 1200 V, V_{GE} = 0		—	—	4.0	mA
Gate-emitter cut-off voltage		$V_{GE\ (off)}$	I_C = 400 mA, V_{CE} = 5 V		4.0	—	7.0	V
Collector-emitter saturation voltage		$V_{CE\ (sat)}$	I_C = 400 A, V_{GE} = 15 V	Tc = 25°C	—	3.0	4.0	V
				Tc = 125°C	—	3.6	—	
Input capacitance		C_{ies}	V_{CE} = 10 V, V_{GE} = 0, f = 1 MHz		—	34000	—	pF
Switching time	Turn-on delay time	$t_{d\ (on)}$	Inductive load V_{CC} = 600 V, I_C = 400 A V_{GE} = ±15 V, R_G = 2.4 Ω		—	0.05	—	μs
	Rise time	t_r			—	0.05	—	
	Turn-on time	t_{on}			—	0.10	—	
	Turn-off delay time	$t_{d\ (off)}$			—	0.55	—	
	Fall time	t_f			—	0.05	0.15	
	Turn-off time	t_{off}			—	0.60	—	
Forward voltage		V_F	I_F = 400 A, V_{GE} = 0		—	2.4	3.5	V
Reverse recovery time		t_{rr}	I_F = 400 A, V_{GE} = −10 V		—	0.25	—	μs
Thermal resistance		$R_{th\ (j-c)}$	Transistor stage		—	—	0.047	°C/W
			Diode stage		—	—	0.1	
Switching loss	Turn-on	E_{on}	Inductive load V_{CC} = 600 V, I_C = 400 A V_{GE} = ±15 V, R_G = 2.4 Ω Tc = 125°C		—	40	—	mJ
	Turn-off	E_{off}			—	40	—	

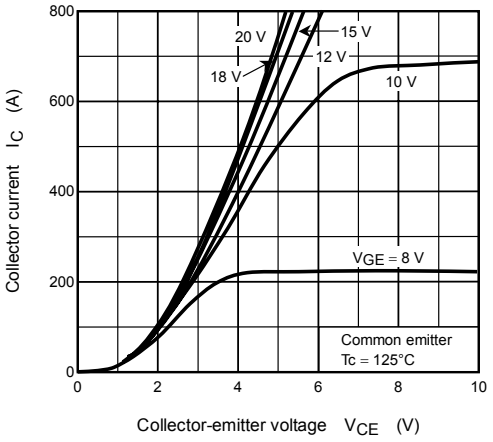
Note: Switching time measurement circuit and input/output waveforms



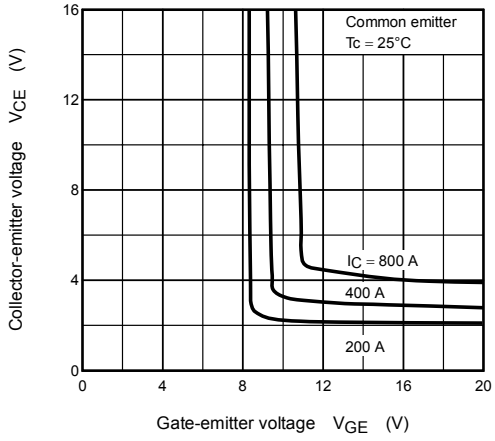
$I_C - V_{CE\ (sat)}$



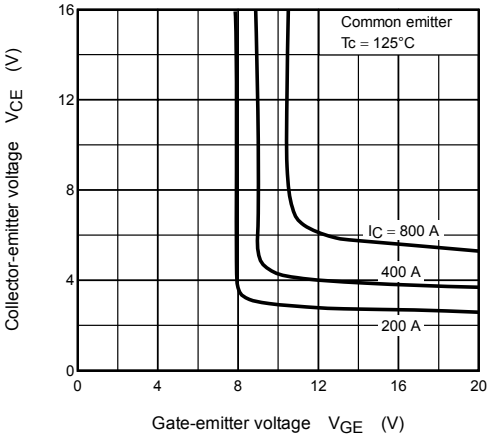
$I_C - V_{CE\ (sat)}$



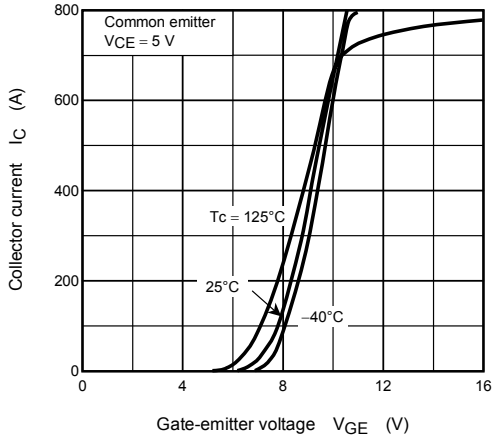
$V_{CE} - V_{GE}$



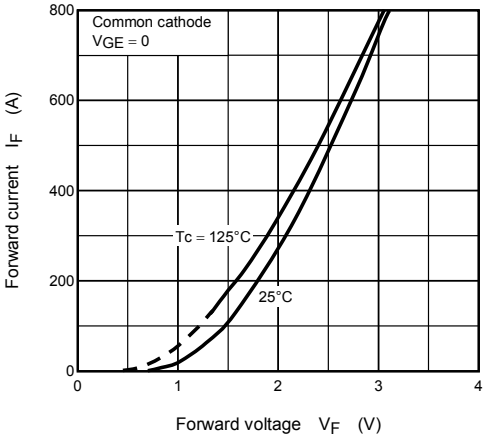
$V_{CE} - V_{GE}$



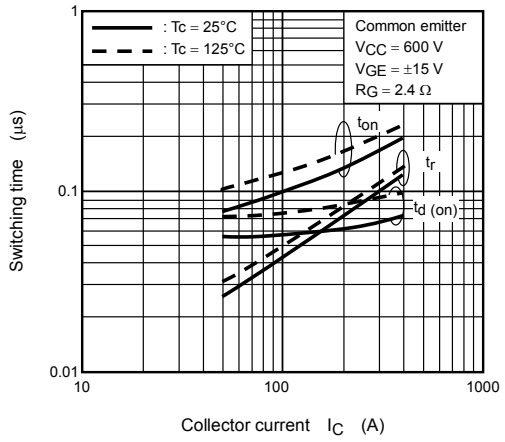
$I_C - V_{GE}$



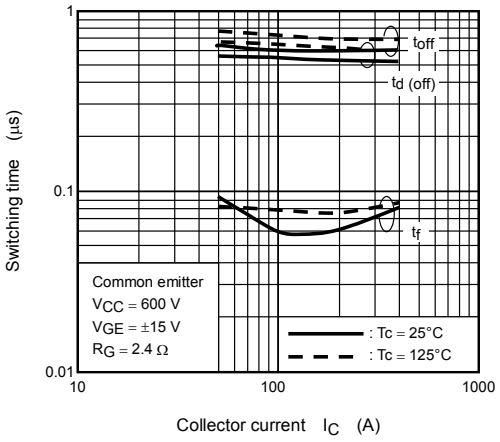
$I_F - V_F$



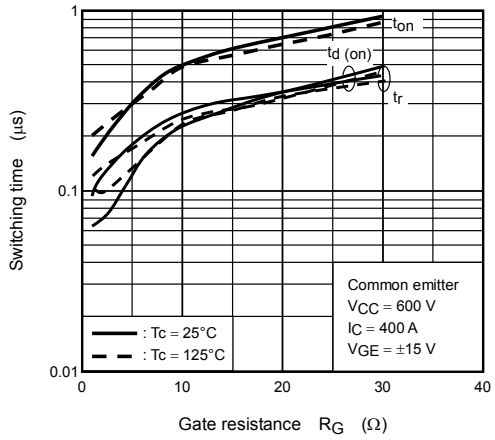
Switching time – I_C



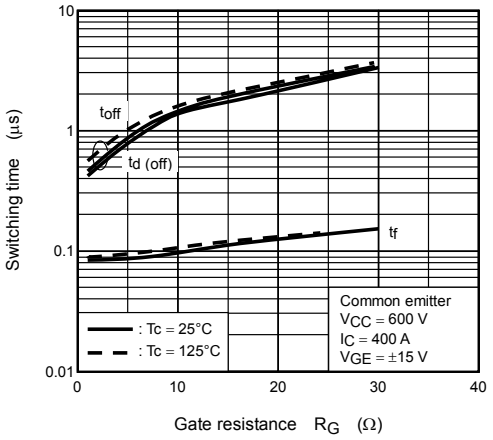
Switching time – I_C



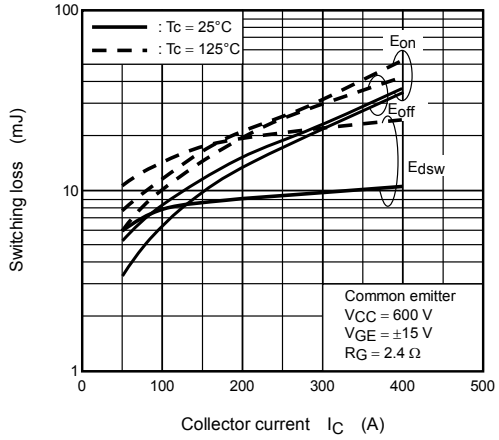
Switching time – R_G



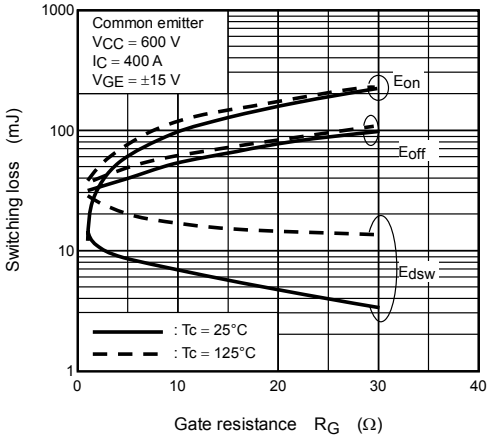
Switching time – R_G



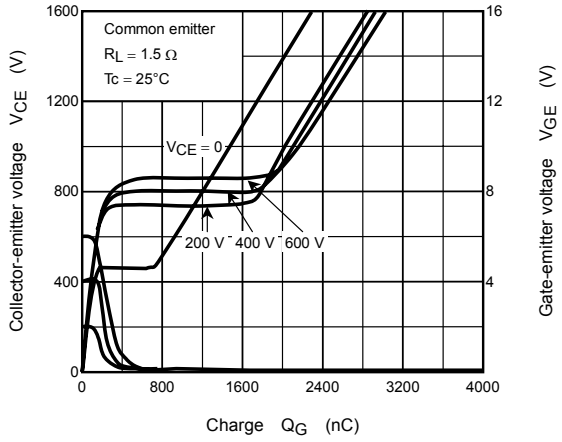
Switching loss – I_C



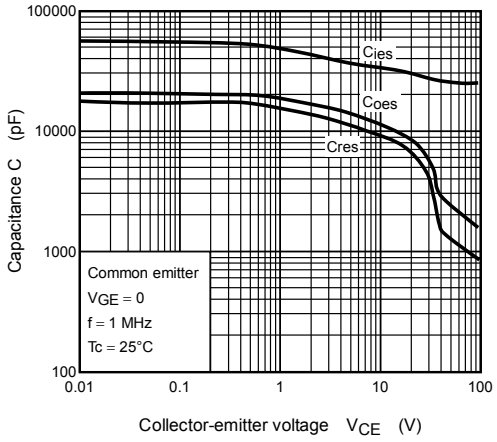
Switching loss – R_G



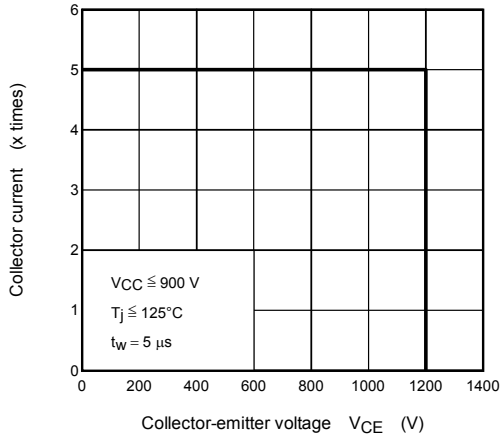
V_{CE}, V_{GE} – Q_G



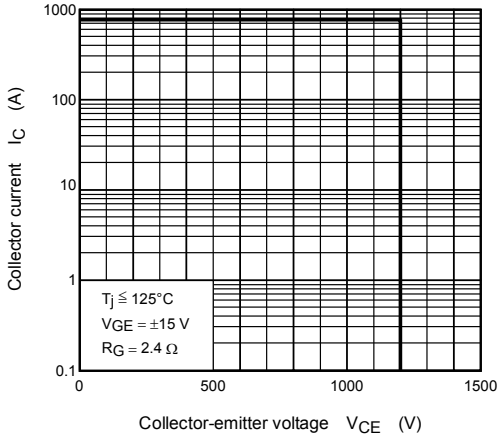
C – V_{CE}



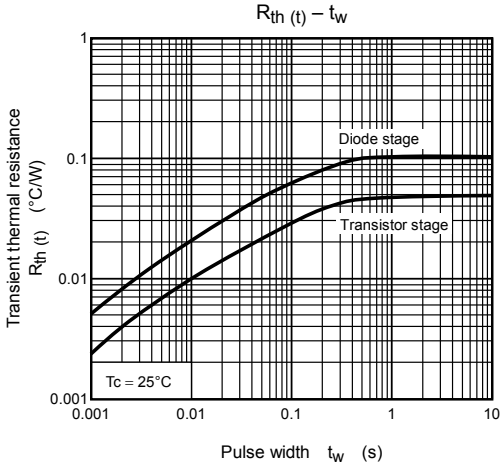
Short circuit SOA



Reverse bias SOA



$R_{th\ (t)}$ – t_w



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