

TOSHIBA GTR Module Silicon N Channel IGBT

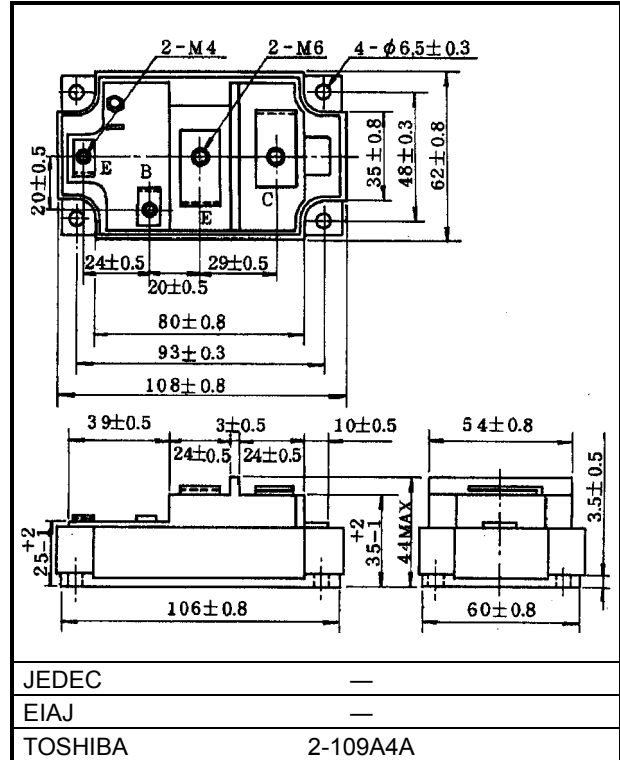
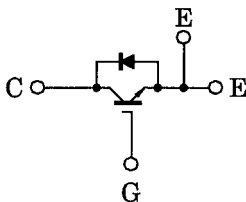
# MG400J1US51

High Power Switching Applications  
 Motor Control Applications

Unit: mm

- The electrodes are isolated from case.
- High input impedance
- Includes a complete half bridge in one package.
- Enhancement-mode
- High speed :  $t_f = 0.30\mu s$  (Max.) ( $I_C = 400A$ )  
 $t_{rr} = 0.15\mu s$  (Max.) ( $I_F = 400A$ )
- Low saturation voltage  
 :  $V_{CE(sat)} = 2.70V$  (Max.) ( $I_C = 400A$ )

## Equivalent Circuit



Weight: 465g (Typ.)

## Maximum Ratings ( $T_a = 25^\circ C$ )

Characteristic	Symbol	Rating	Unit
Collector-emitter voltage	$V_{CES}$	600	V
Gate-emitter voltage	$V_{GES}$	$\pm 20$	V
Collector current	DC	$I_C$	A
	1ms	$I_{CP}$	
Forward current	DC	$I_F$	A
	1ms	$I_{FM}$	
Collector power dissipation ( $T_c = 25^\circ C$ )	$P_C$	1500	W
Junction temperature	$T_j$	150	$^\circ C$
Storage temperature range	$T_{stg}$	-40 ~ 125	$^\circ C$
Isolation voltage	$V_{isol}$	2500 (AC 1 min.)	V
Screw torque (Terminal / M4 / M6 / mounting)	—	2 / 3 / 3	N·m

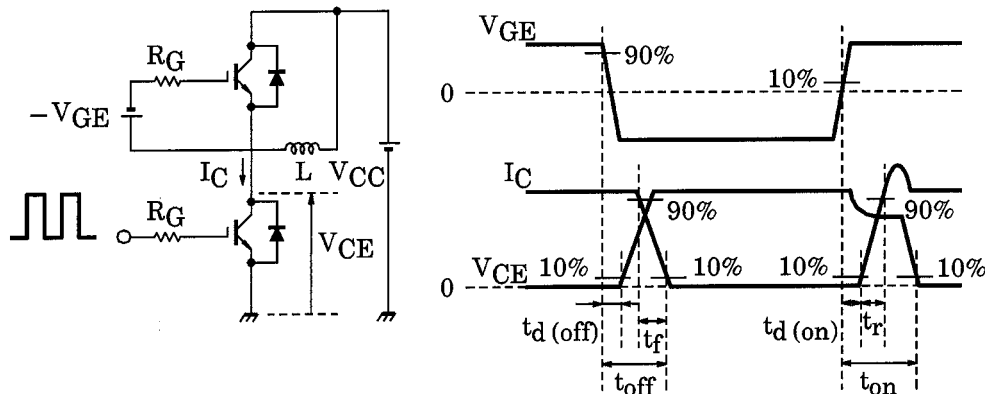
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## Electrical Characteristics (Ta = 25°C)

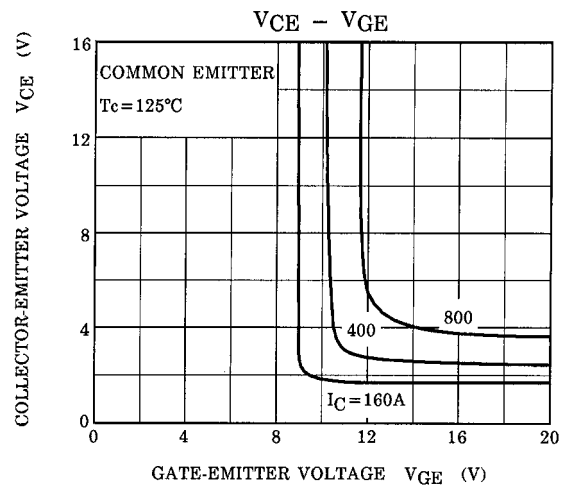
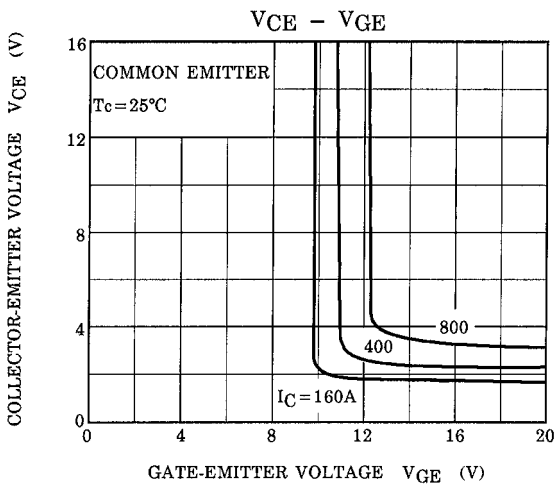
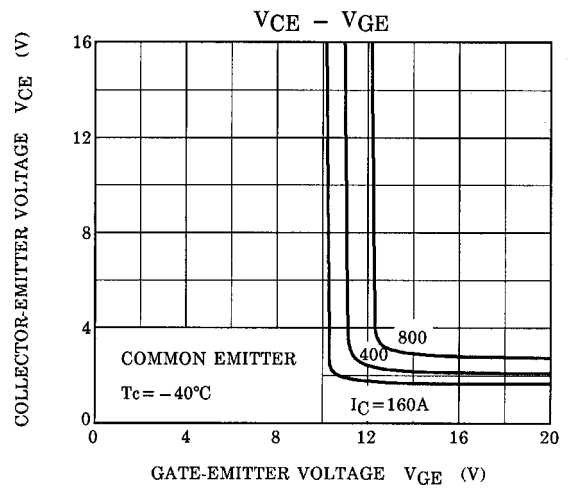
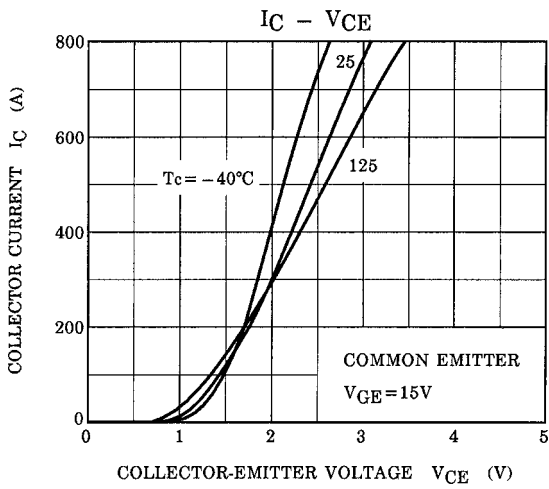
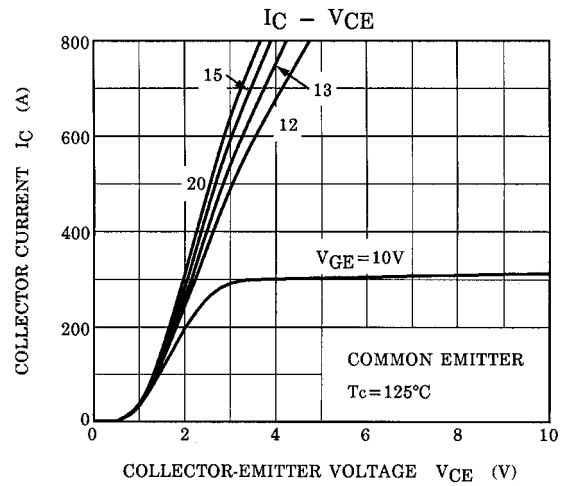
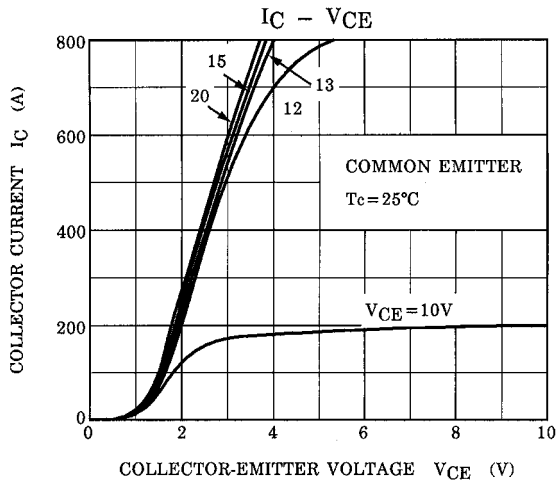
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		$I_{GES}$	$V_{GE} = \pm 20V, V_{CE} = 0$	—	—	$\pm 500$	nA
Collector cut-off current		$I_{CES}$	$V_{CE} = 600V, V_{GE} = 0$	—	—	4.0	mA
Gate-emitter cut-off voltage		$V_{GE (off)}$	$I_C = 40mA, V_{CE} = 5V$	5.0	7.0	8.0	V
Collector-emitter saturation voltage		$V_{CE (sat)}$	$I_C = 400A, V_{GE} = 15V$	—	2.10	2.70	V
Input capacitance		$C_{ies}$	$V_{CE} = 10V, V_{GE} = 0, f = 1MHz$	—	36000	—	pF
Switching time	Turn-on delay time	$t_{d (on)}$	Inductive load $V_{CC} = 300V$ $I_C = 400A$ $V_{GE} = \pm 15V$ $R_G = 2\Omega$  (Note 1)	—	0.20	0.40	$\mu s$
	Rise time	$t_r$		—	0.15	0.30	
	Turn-on time	$t_{on}$		—	0.60	1.20	
	Turn-off delay time	$t_{d (off)}$		—	0.20	0.40	
	Fall time	$t_f$		—	0.15	0.30	
	Turn-off time	$t_{off}$		—	0.50	1.00	
Forward voltage		$V_F$	$I_F = 400 A, V_{GE} = 0$	—	2.30	3.00	V
Reverse recovery time		$t_{rr}$	$I_F = 400 A, V_{GE} = -10 V,$ $di / dt = 400 A / \mu s$	—	0.08	0.15	$\mu s$
Thermal resistance		$R_{th (j-c)}$	Transistor stage	—	—	0.083	$^{\circ}C / W$
			Diode stage	—	—	0.20	

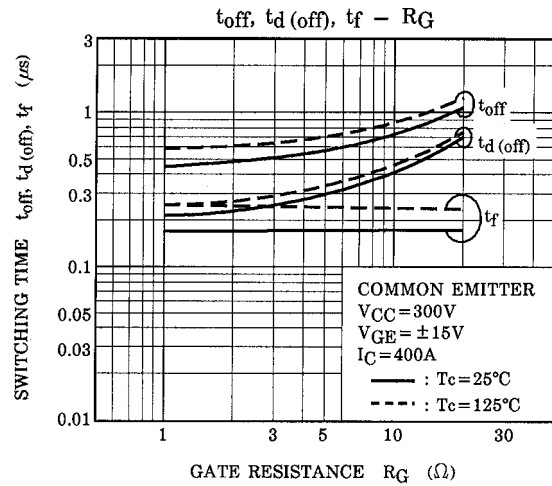
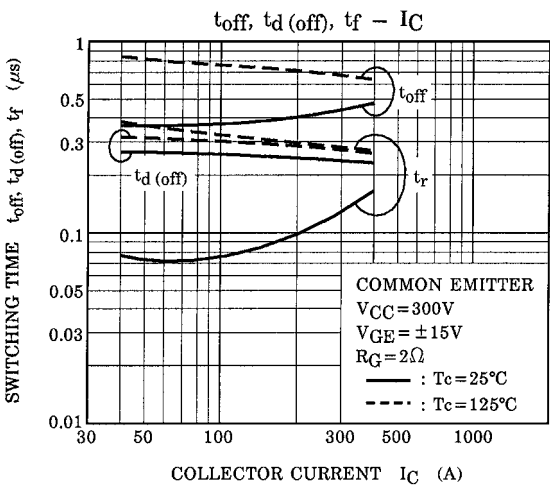
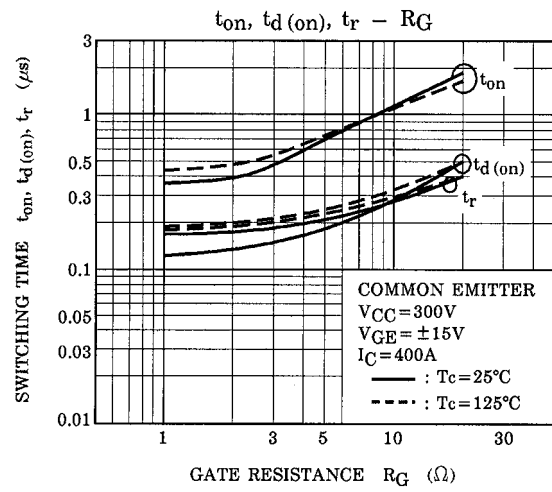
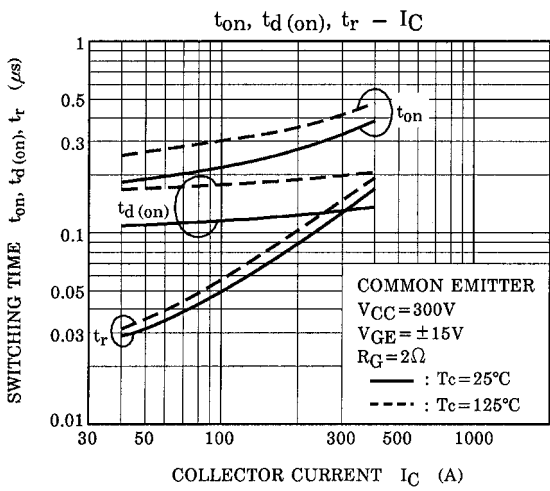
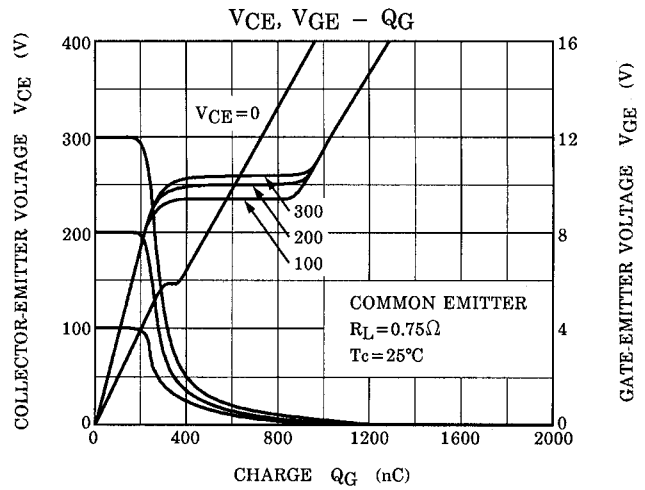
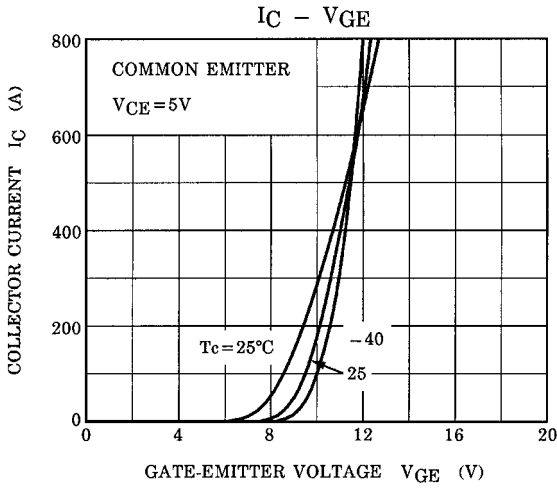
Note 1: Switching time test circuit & timing chart

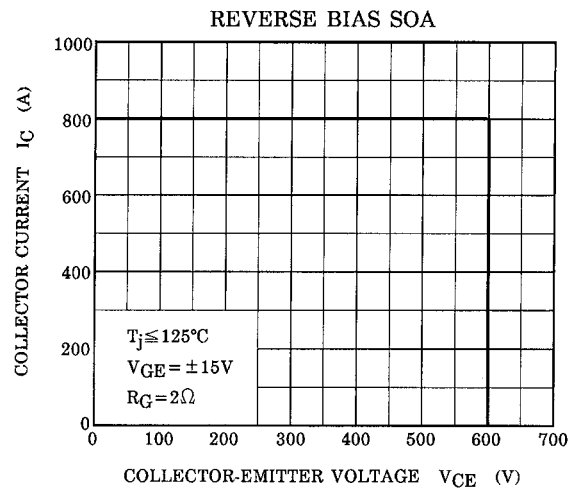
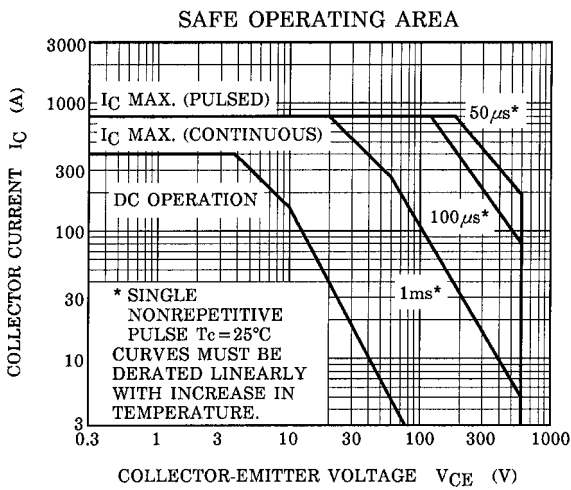
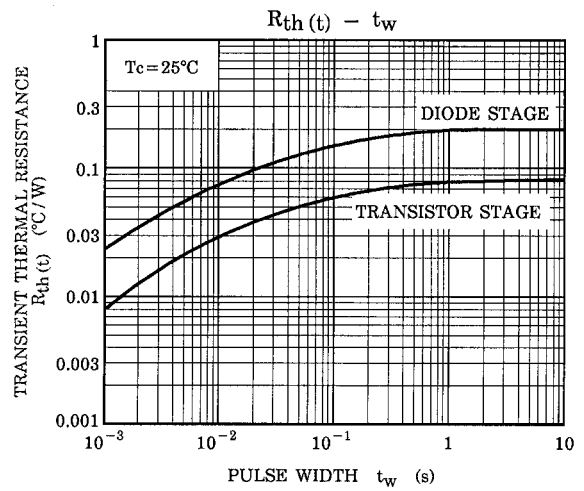
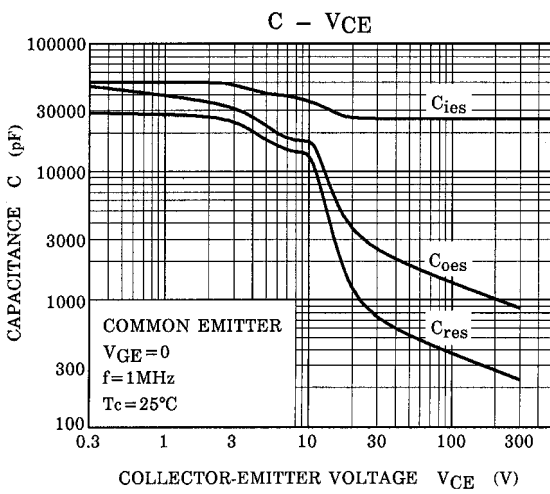
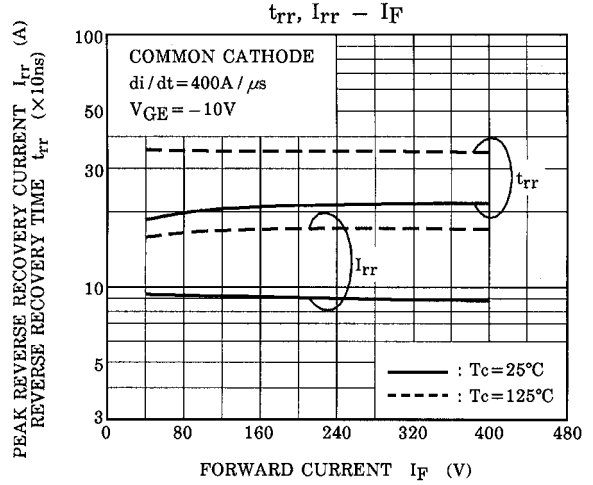
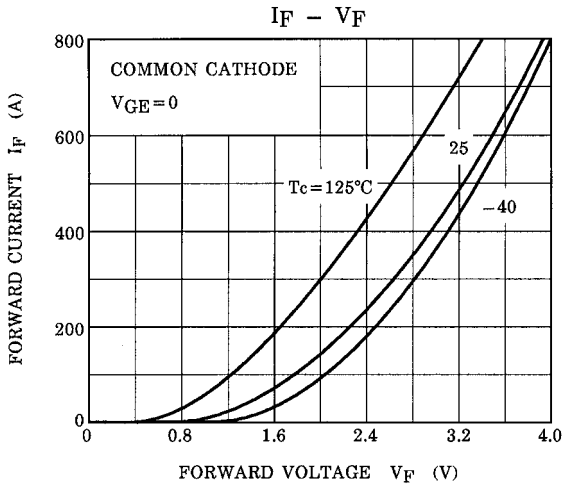


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