GTR Module

Silicon N Channel IGBT

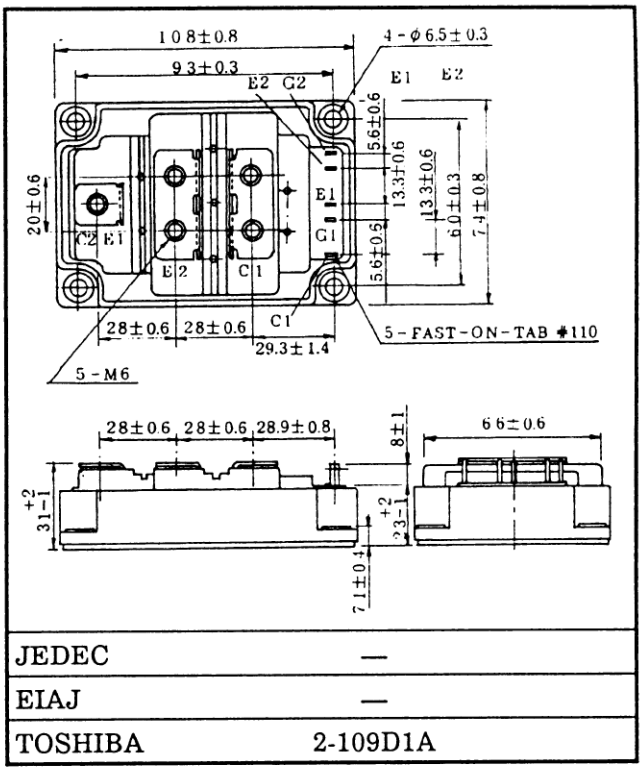
High Power Switching Applications

Motor Control Applications

Features

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

Unit in mm



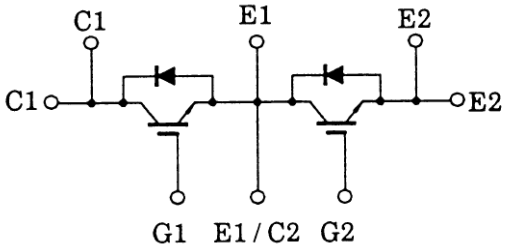
JEDEC	—
EIAJ	—
TOSHIBA	2-109D1A

Weight : 540g (TYP.)

Maximum Ratings (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Collector-Emitter Voltage		V_{CES}	600	V
Gate-Emitter Voltage		V_{GES}	± 20	V
Collector Current	DC	I_C	400	A
	1ms	I_{CP}	800	
Forward Current	DC	I_F	400	A
	1ms	I_{FM}	800	
Collector Power Dissipation (Tc = 25°C)		P_C	1800	W
Junction Temperature		T_j	150	°C
Storage Temperature Range		T_{stg}	-40 ~ 125	°C
Isolation Voltage		V_{Isol}	2500 (AC 1 min.)	V
Screw Torque (Terminal/Mounting)		—	3/3	N ¥ m

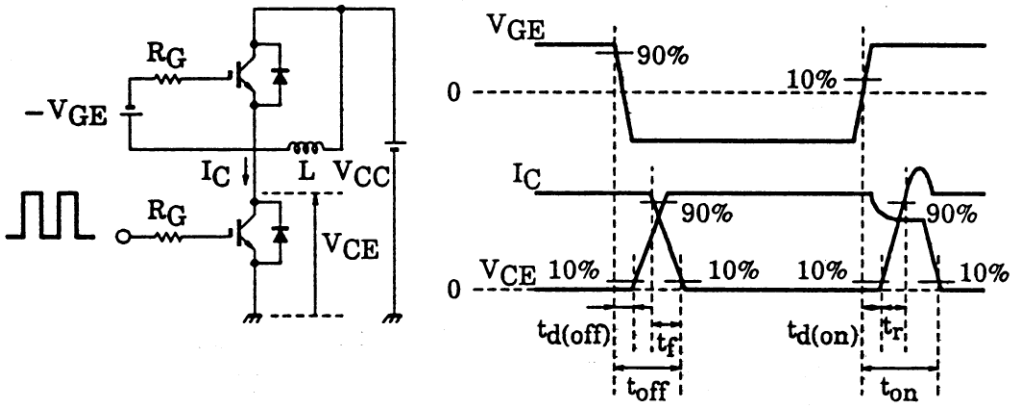
Equivalent Circuit



Electrical Characteristics (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GES}	V_{GE} = ± 20V, V_{CE} = 0	—	—	± 500	nA
Collector Cut-off Current		I_{CES}	V_{CE} = 600V, V_{GE} = 0	—	—	3.0	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	—	46500	—	pF
Switching Time	Turn-on Delay Time	$t_{d\ (on)}$	Inductive Load V_{CC} = 300V I_C = 400A V_{GE} = ± 15V R_G = 2.4Ω (Note 1)	—	0.25	0.50	µs
	Rise Time	t_r		—	0.12	0.24	
	Turn-on Time	t_{on}		—	0.40	0.80	
	Turn-off Delay Time	$t_{d\ (off)}$		—	0.30	0.60	
	Fall Time	t_f		—	0.15	0.30	
	Turn-off Time	t_{off}		—	0.50	1.00	
Forward Voltage		V_F	I_F = 400A, V_{GE} = 0	—	2.30	3.00	V
Reverse Recovery Time		t_{rr}	I_F = 400A, V_{GE} = -10V di/dt = 400A/µs	—	0.08	0.15	µs
Thermal Resistance		$R_{th\ (j - c)}$	Transistor Stage	—	—	0.069	°C/W
			Diode Stage	—	—	0.17	
		$R_{th\ (c - f)}$	Case to Fin (Note 2)	—	—	0.10	

Note 1 Switching Time Test Circuit & Timing Chart.



Note 2 Silicone Grease is Applied.

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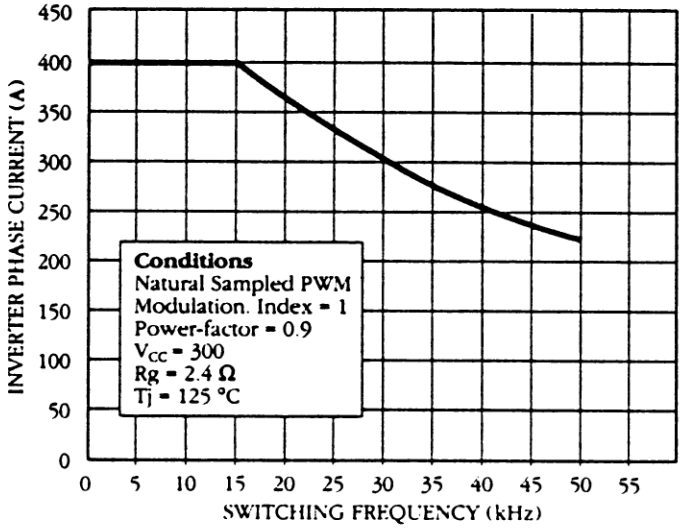
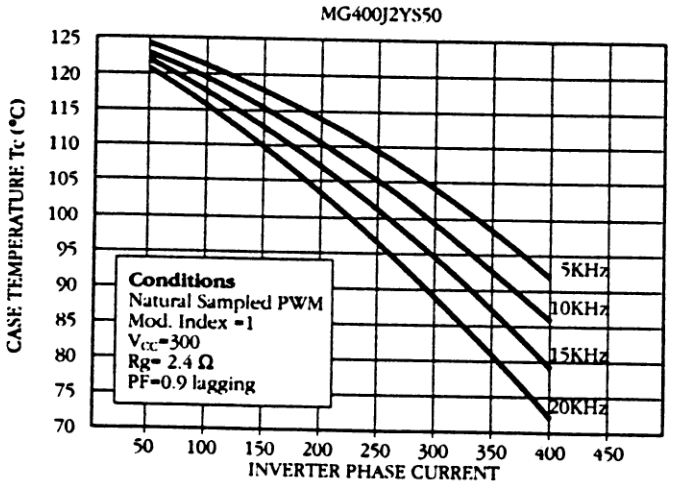
TYPICAL INVERTER PHASE CURRENT AT TCASE = 80 °C





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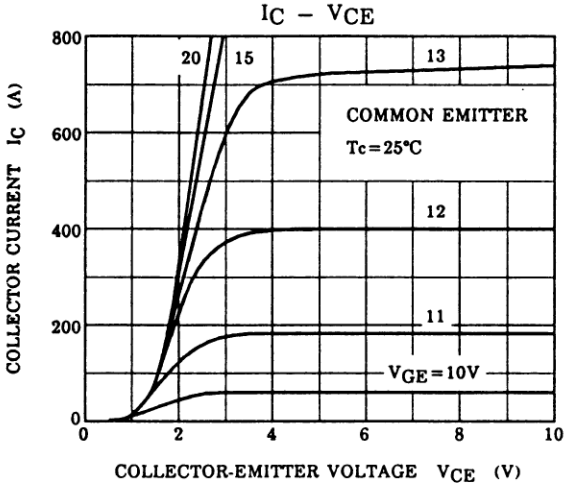
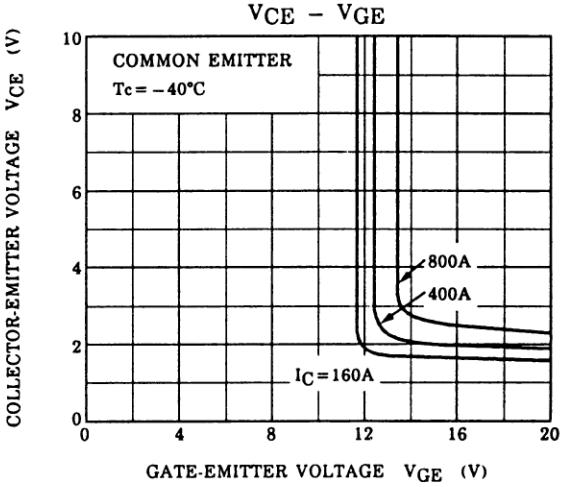
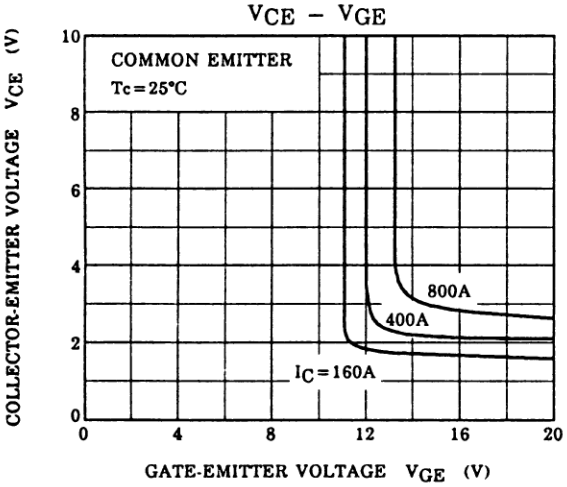
I_C – V_{CE}



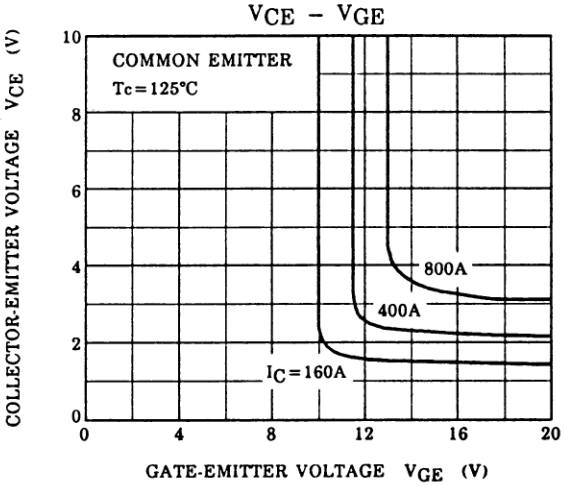
V_{CE} – V_{GE}



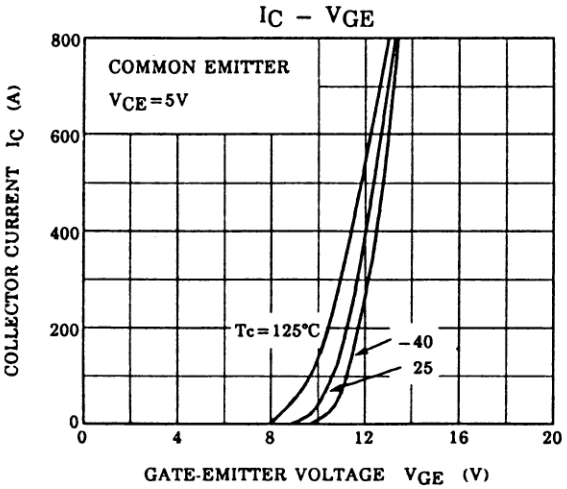
V_{CE} – V_{GE}



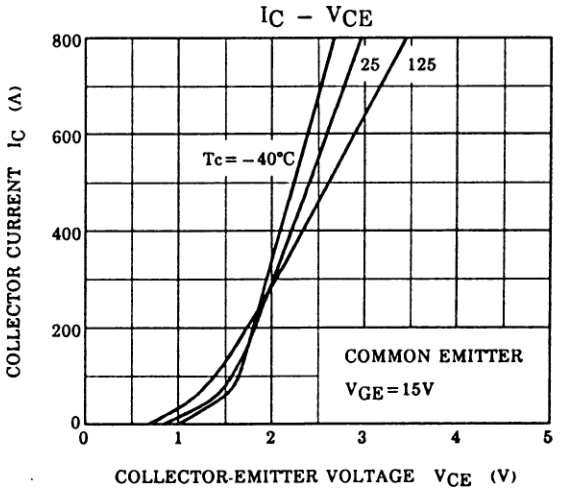
V_{CE} – V_{GE}



I_C – V_{GE}



I_C – V_{CE}



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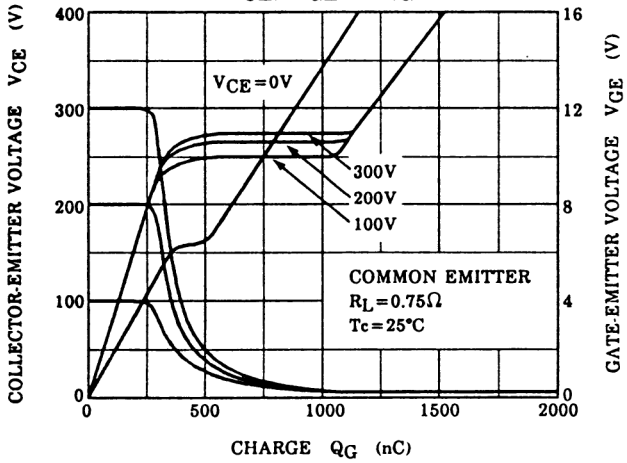
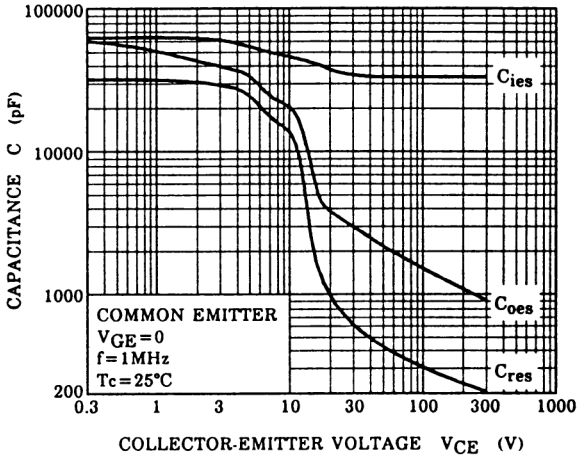
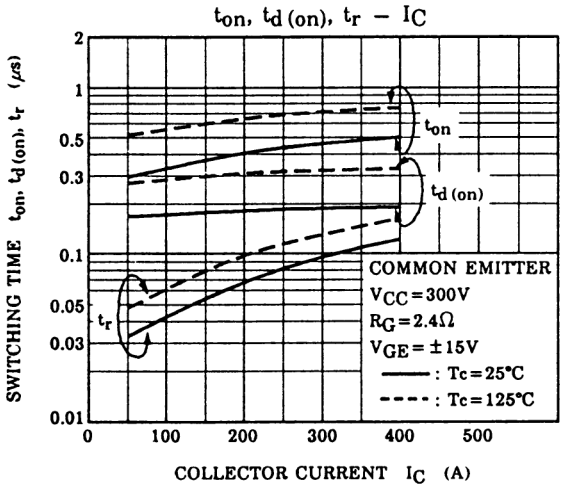
V_{CE}, V_{GE} – Q_G



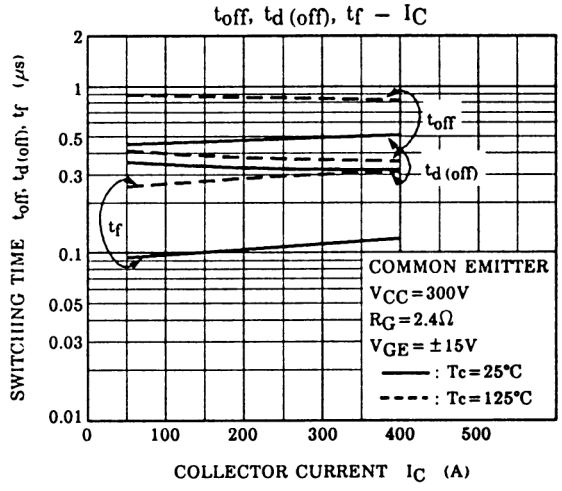
C – V_{CE}



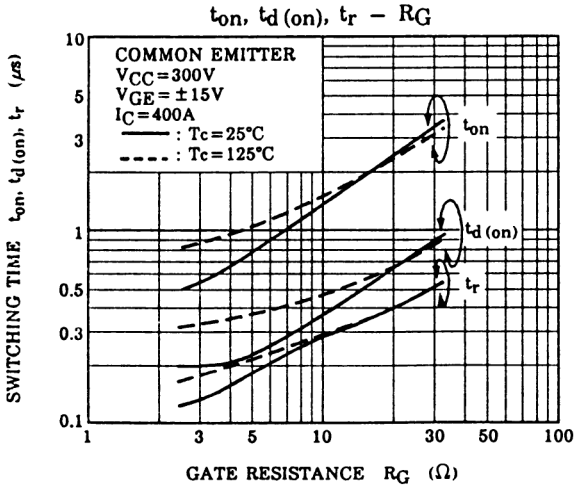
t_{on}, $t_{d(on)}$, t_r – I_C



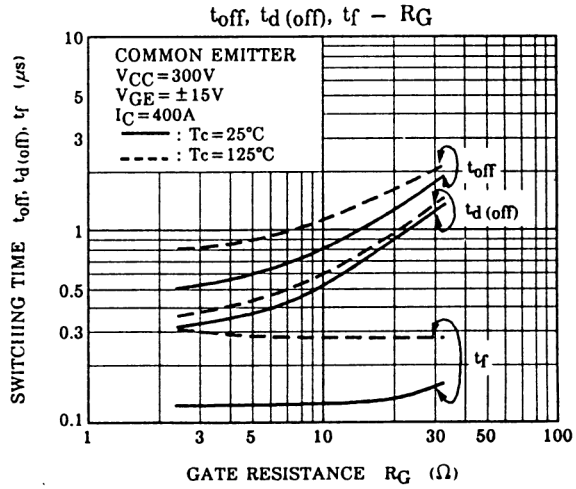
t_{off}, $t_{d(off)}$, t_f – I_C



t_{on}, $t_{d(on)}$, t_r – R_G



t_{off}, $t_{d(off)}$, t_f – R_G



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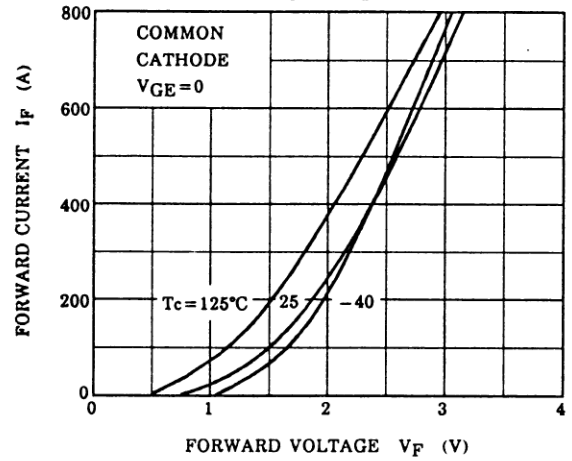
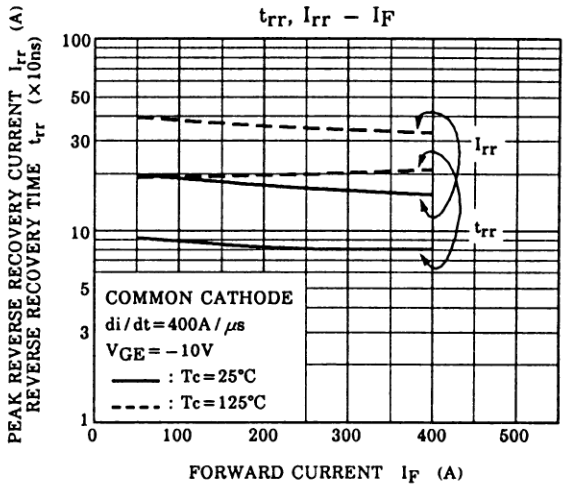
$I_F - V_F$



$t_{rr}, I_{rr} - I_F$



$R_{th(t)} - t_w$