TOSHIBA GTR Module Silicon N Channel IGBT

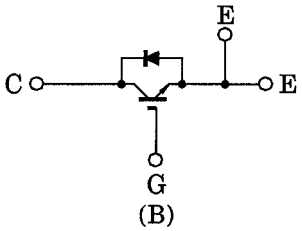
MG240V1US41

High Power Switching Applications

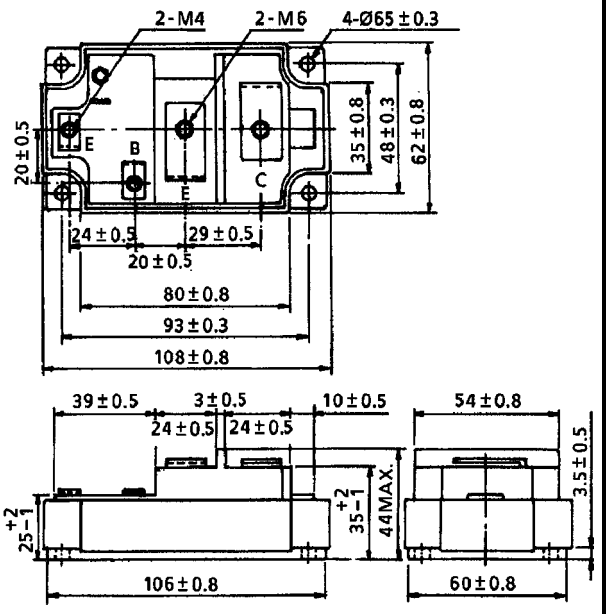
Motor Control Applications

- The electrodes are isolated from case
- High input impedance
- Enhancement-mode
- High speed : t_f = 1.5μs (Max.)(I_C = 240A)
  t_{rr} = 0.6μs (Max.)(I_F = 240A)

Equivalent Circuit



Unit: mm



JEDEC	—
EIAJ	—
TOSHIBA	2-109A4A

Weight: 465g(Typ.)

Maximum Ratings (Ta = 25°C)

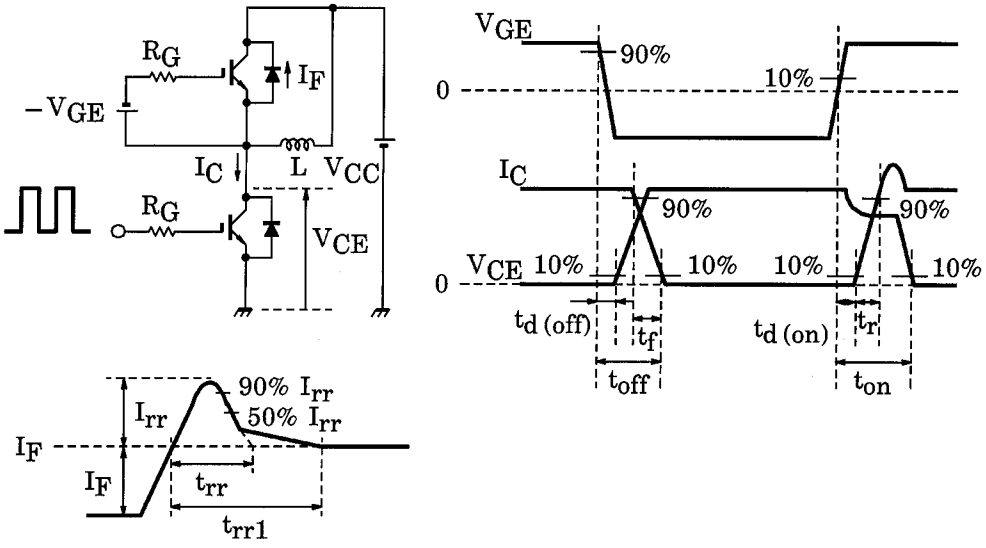
Characteristic		Symbol	Rating	Unit
Collector-emitter voltage		V_{CES}	1700	V
Gate-emitter voltage		V_{GES}	±20	V
Collector current	DC	I_C	240	A
	1ms	I_{CP}	480	
Forward current	DC	I_F	240	A
	1ms	I_{FM}	480	
Collector power dissipation (Tc = 25°C)		P_C	2400	W
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−40 ~ 125	°C
Isolation voltage		V_{Isol}	4000 (AC 1 min.)	V
Screw torque (M4/M6 / mounting)		—	2 / 3 / 3	N·m

000707EAA2

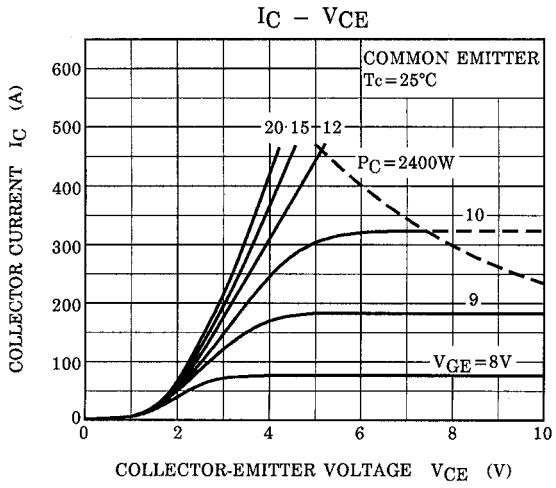
Electrical Characteristics (Ta = 25°C)

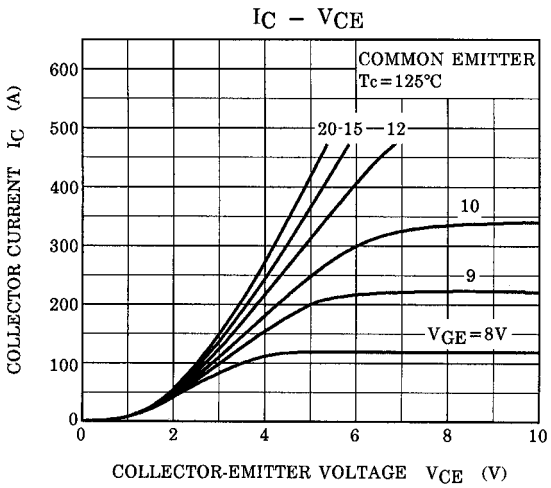
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GES}	V_{GE} = ±20V, V_{CE} = 0	—	—	±200	nA
Collector cut-off current		I_{CES}	V_{CE} = 1700V, V_{GE} = 0	—	—	2.0	mA
Gate-emitter cut-off voltage		$V_{GE\ (off)}$	I_C = 240mA, V_{CE} = 5V	4.0	—	8.0	V
Collector-emitter saturation voltage		$V_{CE\ (sat)}$	I_C = 240A,V_{GE} = 15V	—	3.2	4.5	V
Input capacitance		C_{ies}	V_{CE} = 10V, V_{GE} = 0, f = 1MHz	—	32800	—	pF
Switching time	Turn-on delay time	$t_{d\ (on)}$	Inductive load V_{CC} = 900V I_C = 240A V_{GE} = ±15V R_G = 2.4Ω (Note 1)	—	0.1	—	μs
	Rise time	t_r		—	0.1	—	
	Turn-on time	t_{on}		—	0.5	—	
	Turn-off delay time	$t_{d\ (off)}$		—	0.4	—	
	Fall time	t_f		—	0.5	1.5	
	Turn-off time	t_{off}		—	1.0	—	
Forward voltage		V_F	I_F = 240A, V_{GE} = 0	—	3.7	5.0	V
Reverse recovery time		t_{rr}	I_F = 240A, V_{GE} = −15V di / dt = 1000A / μs (Note 1)	—	0.3	0.6	μs
Thermal resistance		$R_{th\ (j-c)}$	Transistor stage	—	—	0.052	°C / W
			Diode stage	—	—	0.2	

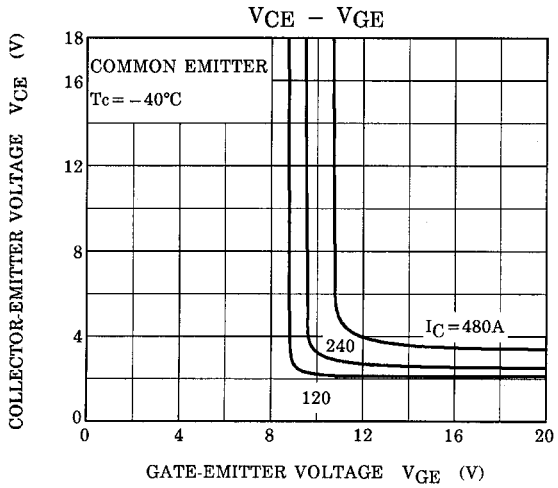
Note 1: Switching time and reverse recovery time test circuit & timing chart

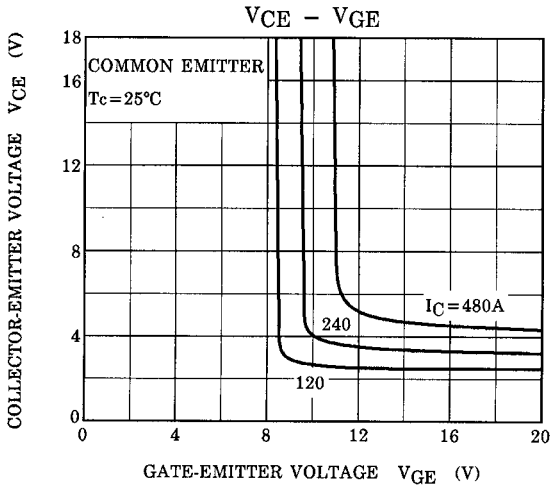


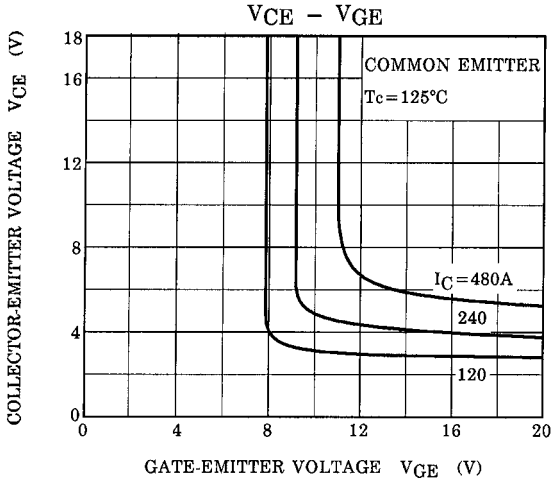
000707EAA2

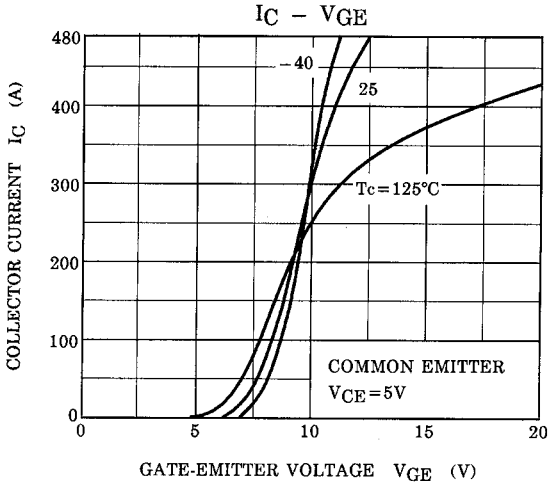

I_C – V_{CE}
COMMON EMITTER
Tc = 25°C
20
15
12
P_C = 2400W
10
9
V_{GE} = 8V
COLLECTOR CURRENT I_C (A)
COLLECTOR-EMITTER VOLTAGE V_{CE} (V)


I_C – V_{CE}
COMMON EMITTER
Tc = 125°C
20
15
12
10
9
V_{GE} = 8V
COLLECTOR CURRENT I_C (A)
COLLECTOR-EMITTER VOLTAGE V_{CE} (V)

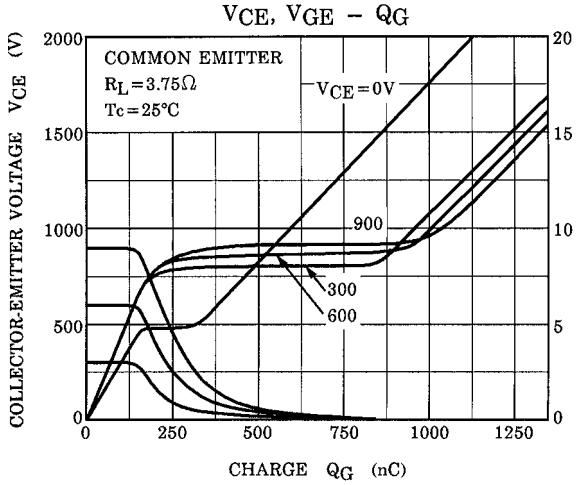

V_{CE} – V_{GE}
COMMON EMITTER
Tc = –40°C
I_C = 480A
240
120
COLLECTOR-EMITTER VOLTAGE V_{CE} (V)
GATE-EMITTER VOLTAGE V_{GE} (V)


V_{CE} – V_{GE}
COMMON EMITTER
Tc = 25°C
I_C = 480A
240
120
COLLECTOR-EMITTER VOLTAGE V_{CE} (V)
GATE-EMITTER VOLTAGE V_{GE} (V)

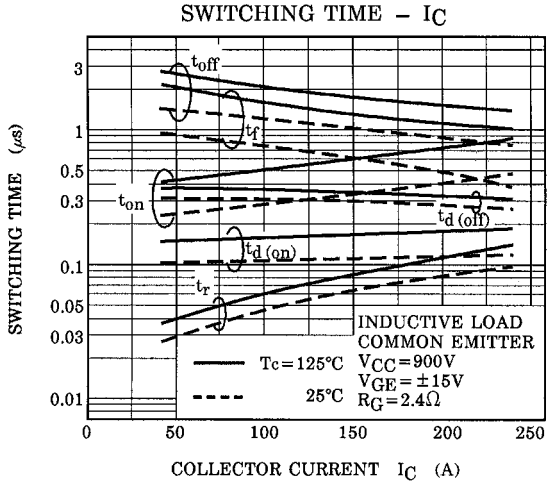

V_{CE} – V_{GE}
COMMON EMITTER
Tc = 125°C
I_C = 480A
240
120
COLLECTOR-EMITTER VOLTAGE V_{CE} (V)
GATE-EMITTER VOLTAGE V_{GE} (V)


I_C – V_{GE}
–40
25
Tc = 125°C
COMMON EMITTER
V_{CE} = 5V
COLLECTOR CURRENT I_C (A)
GATE-EMITTER VOLTAGE V_{GE} (V)

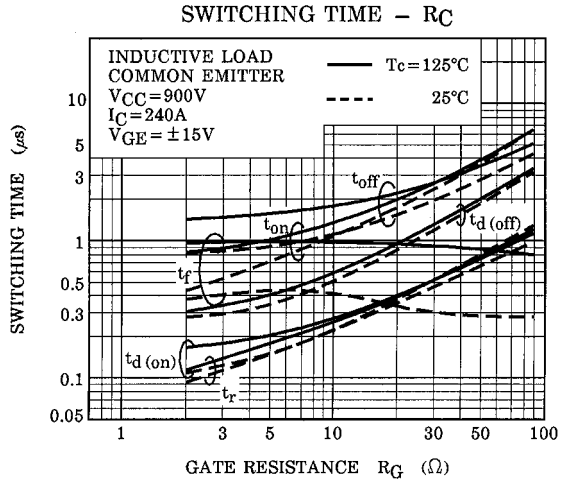
V_{CE}, V_{GE} – Q_G



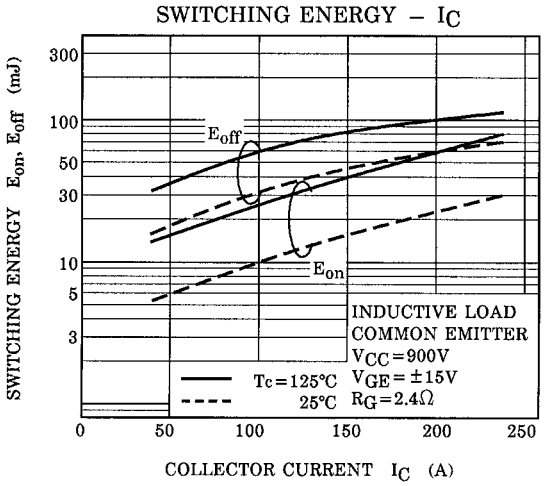
SWITCHING TIME – I_C



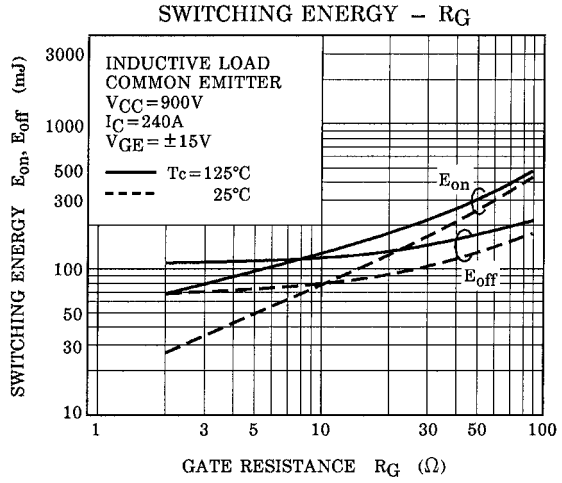
SWITCHING TIME – R_C



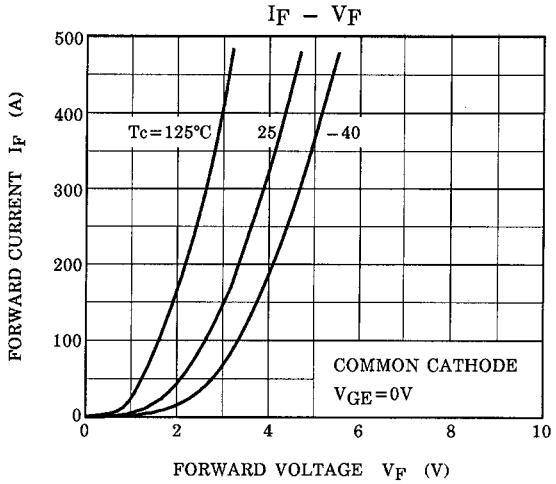
SWITCHING ENERGY – I_C



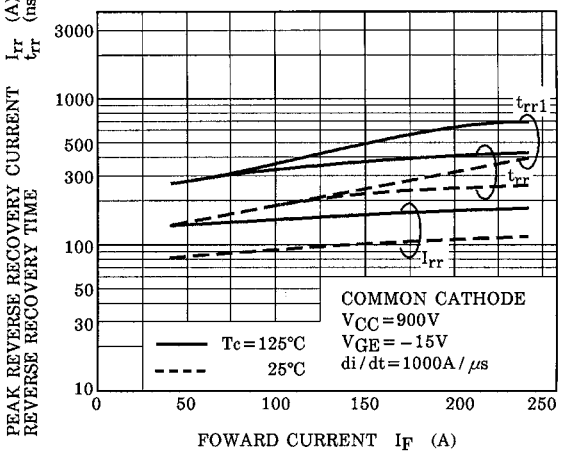
SWITCHING ENERGY – R_G



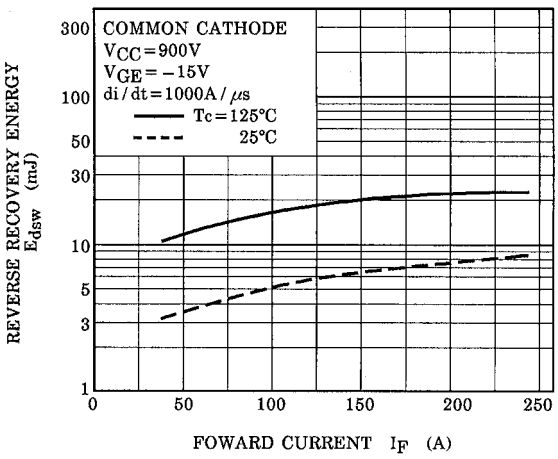
I_F – V_F



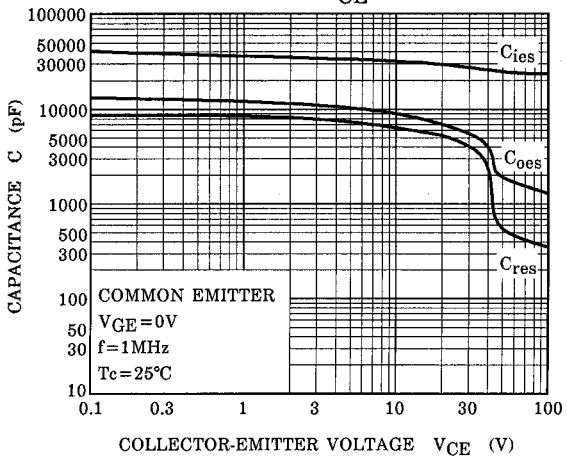
t_{rr}, I_{rr} – I_F



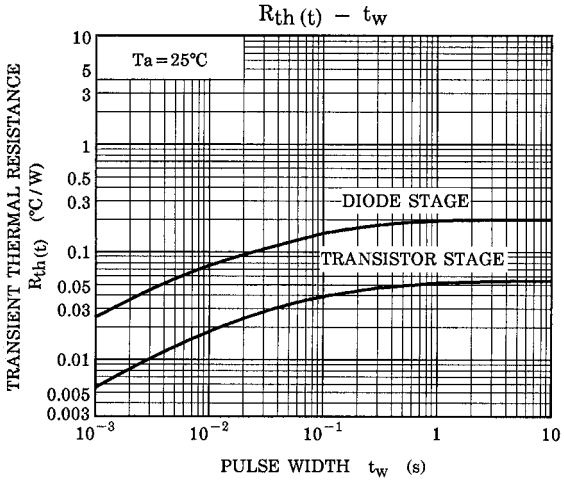
REVERSE RECOVERY ENERGY – I_F



C – V_{CE}



R_{th} (t) – t_w



REVERSE BIAS SOA