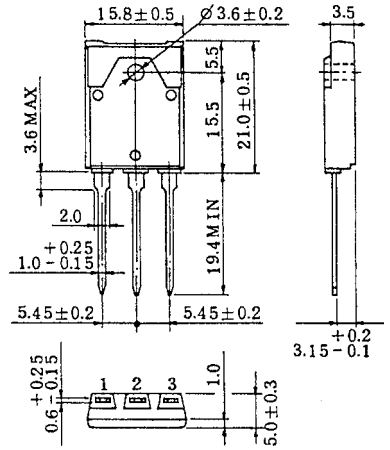
TOSHIBA INSULATED GATE BIPOLAR TRANSISTOR SILICON N−CHANNEL IGBT

GT40M101

HIGH POWER SWITCHING APPLICATIONS

- High Input Impedance
- High Speed : t_f = 0.4μs (Max.)
- Low Saturation Voltage : $V_{CE(sat)}$ = 3.4V (Max.)
- Enhancement−Mode

Unit: mm



1. GATE
2. COLLECTOR
3. EMITTER

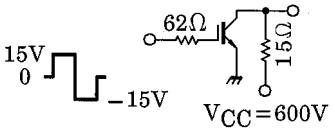
JEDEC	—
JEITA	—
TOSHIBA	2−16F

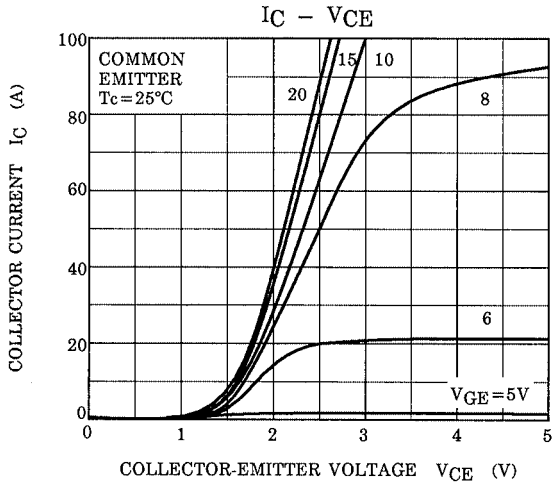
Weight: 5.8g

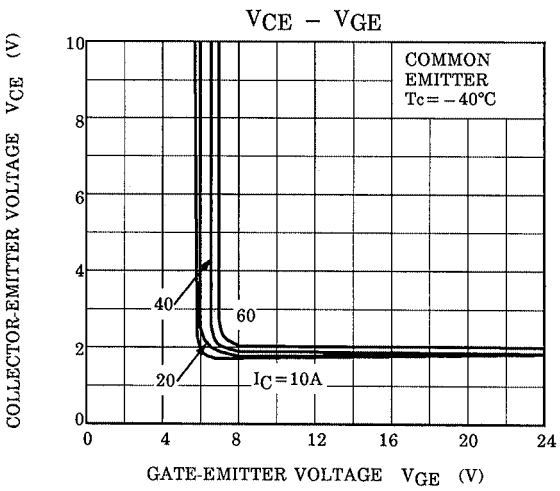
MAXIMUM RATINGS (Ta = 25°C)

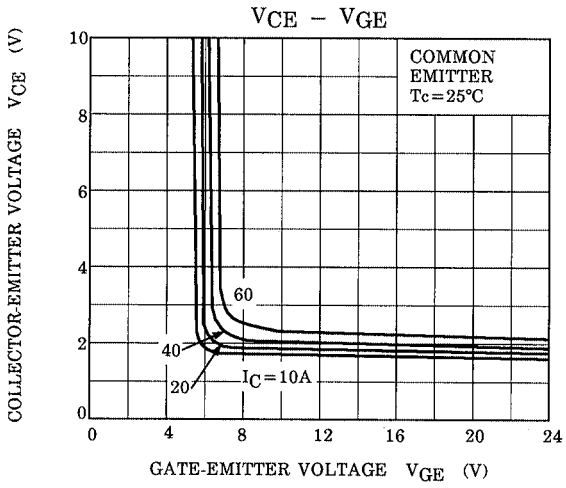
CHARACTERISTIC		SYMBOL	RATING	UNIT
Collector−Emitter Voltage		V_{CES}	900	V
Gate−Emitter Voltage		V_{GES}	±25	V
Collector Current	DC	I_C	40	A
	1ms	I_{CP}	80	
Collector Power Dissipation (Tc = 25°C)		P_C	90	W
Junction Temperature		T_j	150	°C
Storage Temperature Range		T_{stg}	−55~150	°C
Screw Torque		—	0.8	N·m

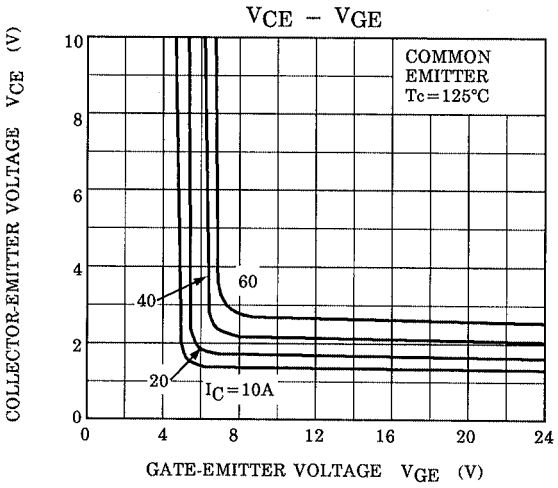
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

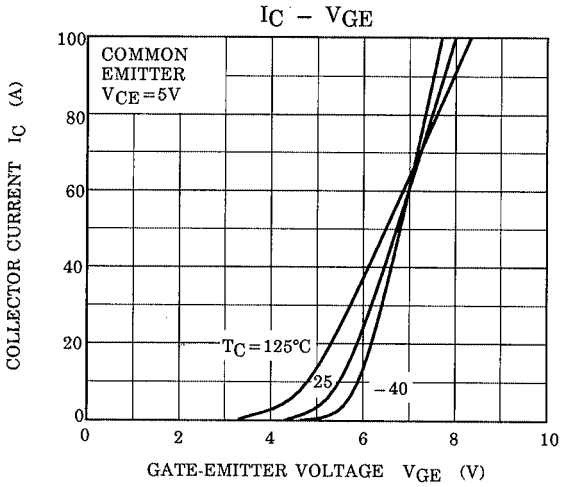
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Gate Leakage Current		I_{GES}	V_{GE} = ±25V, V_{CE} = 0	—	—	±500	nA
Collector Cut−off Current		I_{CES}	V_{CE} = 900V, V_{GE} = 0	—	—	1.0	mA
Gate−Emitter Cut−off Voltage		$V_{GE(OFF)}$	I_C = 40mA, V_{CE} = 5V	3.0	—	6.0	V
Collector−Emitter Saturation Voltage		$V_{CE(sat)}$	I_C = 40A, V_{GE} = 15V	—	2.1	3.4	V
Input Capacitance		C_{ies}	V_{CE} = 30V, V_{GE} = 0, f = 1MHz	—	2100	—	pF
Switching Time	Rise Time	t_r		—	0.30	—	μs
	Turn−On Time	t_{on}		—	0.40	—	
	Fall Time	t_f		—	0.25	0.40	
	Turn−Off Time	t_{off}		—	0.60	—	
Thermal Resistance		$R_{th(j-c)}$	—	—	—	1.39	°C / W

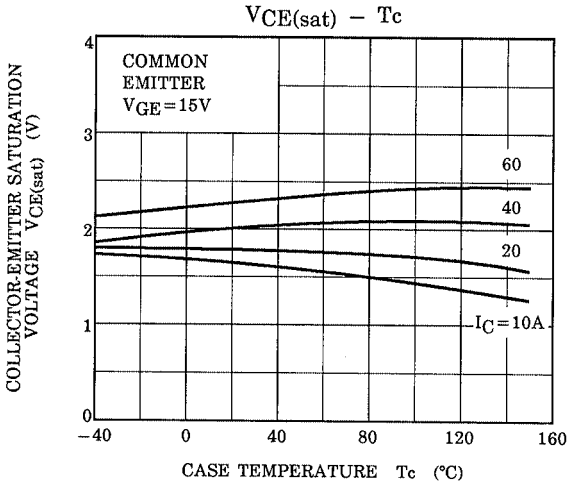

I_C – V_{CE}
COMMON EMITTER
Tc = 25°C
20
15
10
8
6
V_{GE} = 5V
COLLECTOR CURRENT I_C (A)
COLLECTOR-EMITTER VOLTAGE V_{CE} (V)

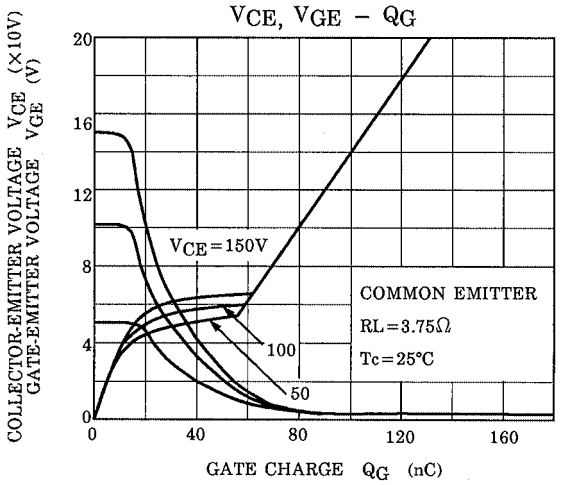

V_{CE} – V_{GE}
COMMON EMITTER
Tc = –40°C
40
60
20
I_C = 10A
COLLECTOR-EMITTER VOLTAGE V_{CE} (V)
GATE-EMITTER VOLTAGE V_{GE} (V)

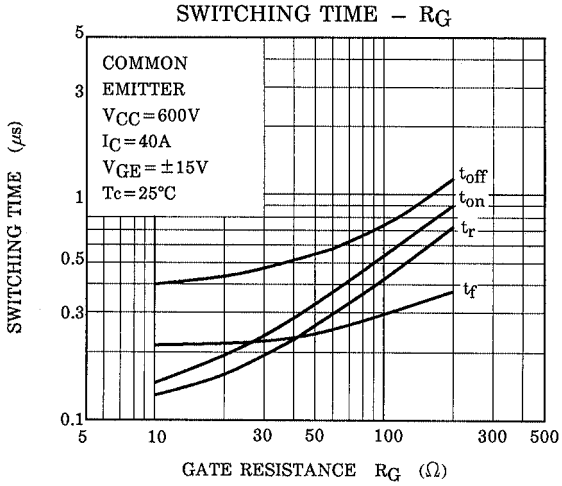

V_{CE} – V_{GE}
COMMON EMITTER
Tc = 25°C
60
40
20
I_C = 10A
COLLECTOR-EMITTER VOLTAGE V_{CE} (V)
GATE-EMITTER VOLTAGE V_{GE} (V)

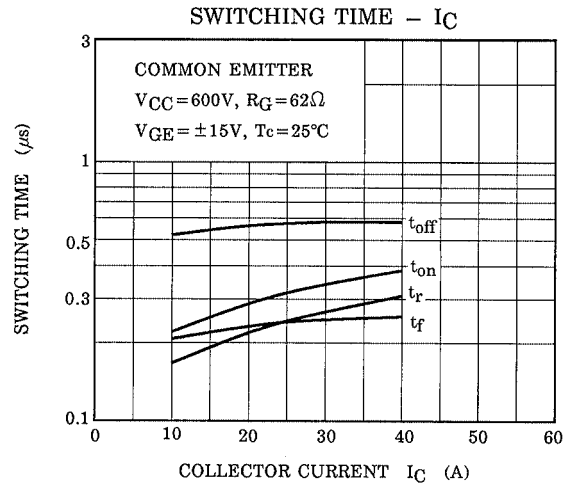

V_{CE} – V_{GE}
COMMON EMITTER
Tc = 125°C
60
40
20
I_C = 10A
COLLECTOR-EMITTER VOLTAGE V_{CE} (V)
GATE-EMITTER VOLTAGE V_{GE} (V)

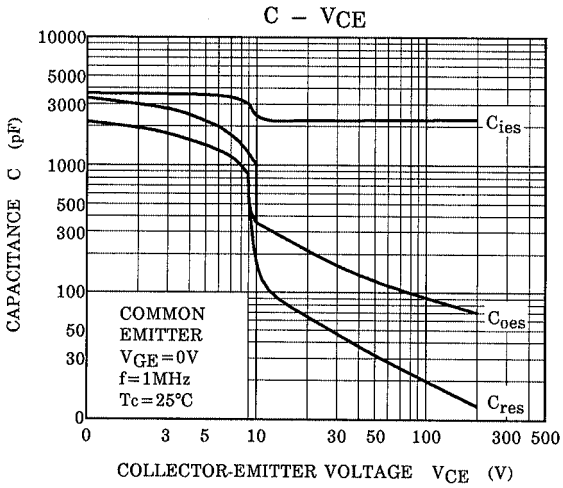

I_C – V_{GE}
COMMON EMITTER
V_{CE} = 5V
T_C = 125°C
25
–40
COLLECTOR CURRENT I_C (A)
GATE-EMITTER VOLTAGE V_{GE} (V)

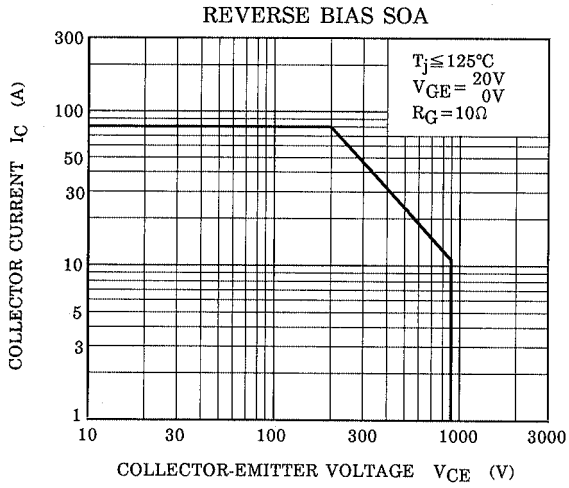

$V_{CE(sat)}$ – Tc
COMMON EMITTER
V_{GE} = 15V
60
40
20
I_C = 10A
COLLECTOR-EMITTER SATURATION VOLTAGE $V_{CE(sat)}$ (V)
CASE TEMPERATURE Tc (°C)

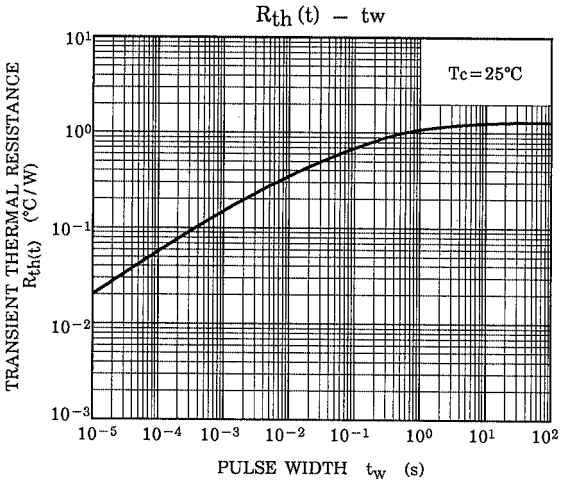

VCE, VGE – QG
COLLECTOR-EMITTER VOLTAGE VCE (×10V)
GATE-EMITTER VOLTAGE VGE (V)
VCE=150V
100
50
COMMON EMITTER
RL=3.75Ω
Tc=25°C
GATE CHARGE QG (nC)


SWITCHING TIME – RG
COMMON
EMITTER
VCC=600V
IC=40A
VGE=±15V
Tc=25°C
toff
ton
tr
tf
SWITCHING TIME (μs)
GATE RESIDISTANCE RG (Ω)

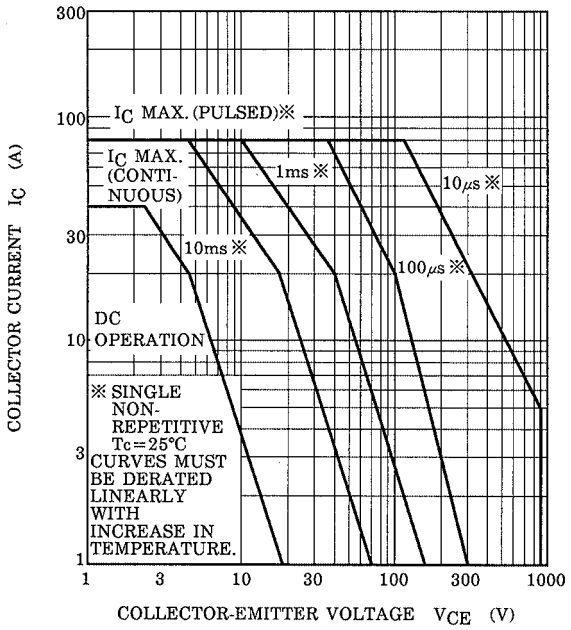

SWITCHING TIME – IC
COMMON EMITTER
VCC=600V, RG=62Ω
VGE=±15V, Tc=25°C
toff
ton
tr
tf
SWITCHING TIME (μs)
COLLECTOR CURRENT IC (A)


C – VCE
Cies
Coes
Cres
COMMON
EMITTER
VGE=0V
f=1MHz
Tc=25°C
CAPACITANCE C (pF)
COLLECTOR-EMITTER VOLTAGE VCE (V)


REVERSE BIAS SOA
Tj≦125°C
VGE= 20V
0V
RG=10Ω
COLLECTOR CURRENT IC (A)
COLLECTOR-EMITTER VOLTAGE VCE (V)


Rth (t) – tw
Tc=25°C
TRANSIENT THERMAL RESISTANCE Rth(t) (°C/W)
PULSE WIDTH tw (s)

SAFE OPERATING AREA



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