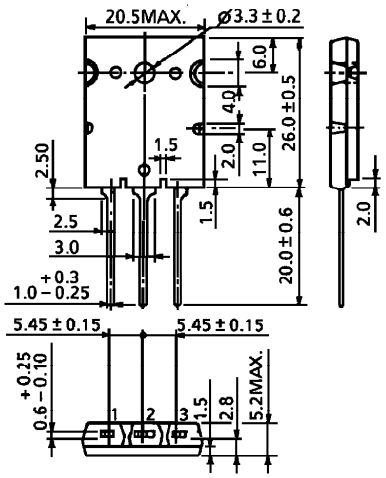
TOSHIBA INSULATED GATE BIPOLAR TRANSISTOR SILICON N CHANNEL MOS TYPE

GT60M302

HIGH POWER SWITCHING APPLICATIONS

- The 3rd Generation
- FRD Included Between Emitter and Collector
- Enhancement-Mode
- High Speed IGBT : $t_f = 0.22\mu s$ (TYP.)
  FRD : $t_{rr} = 0.7\mu s$ (TYP.)
- Low Saturation Voltage : $V_{CE\ (sat)} = 3.3V$ (MAX.)

Unit in mm



1. GATE
2. COLLECTOR (HEAT SINK)
3. EMITTER

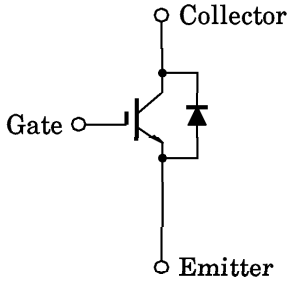
JEDEC	—
EIAJ	—
TOSHIBA	2-21F2C

Weight : 9.75g

MAXIMUM RATINGS (Ta = 25°C)

CARACTERISTICS		SYMBOL	RATINGS	UNIT
Collector-Emitter Voltage		V_{CES}	900	V
Gate-Emitter Voltage		V_{GES}	±25	V
Collector Current	DC	I_C	60	A
	1ms	I_{CP}	120	
Emitter-Collector Foward Current	DC	I_{ECF}	15	A
	1ms	I_{ECFP}	120	
Collector Power Dissipation (Tc = 25°C)		P_C	200	W
Junction Temperature		T_j	150	°C
Storage Temperature Range		T_{stg}	−55~150	°C
Screw Torque		—	0.8	N·m

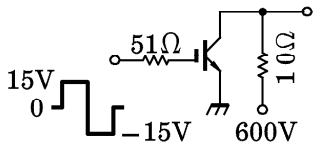
EQUIVALENT CIRCUIT



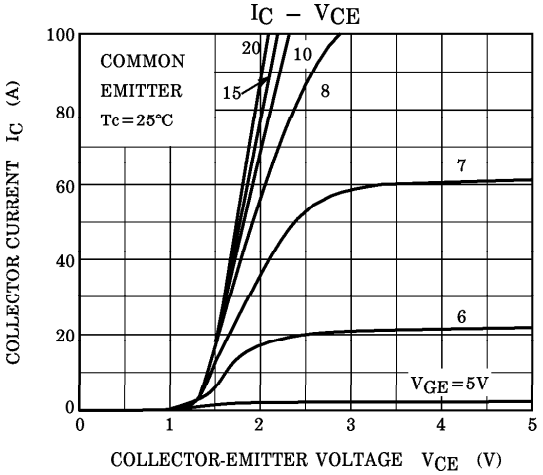
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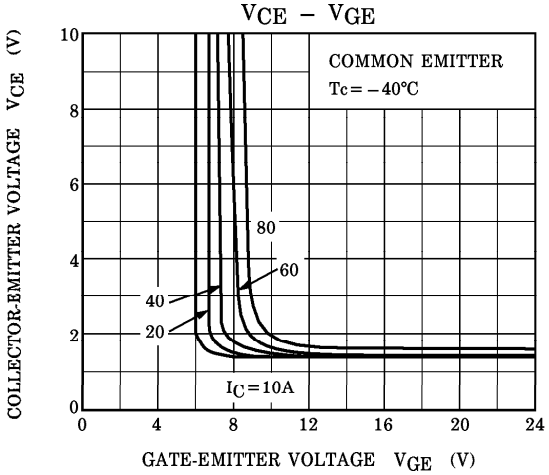
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GES}	$V_{GE} = \pm 25V$, $V_{CE} = 0$	—	—	±500	nA
Collector Cut-off Current		I_{CES}	$V_{CE} = 900V$, $V_{GE} = 0$	—	—	1.0	mA
Gate-Emitter Cut-off Voltage		$V_{GE\ (OFF)}$	$I_C = 60mA$, $V_{CE} = 5V$	3.0	—	6.0	V
Collector-Emitter Saturation Voltage		$V_{CE\ (sat)}$ (1)	$I_C = 10A$, $V_{GE} = 15V$	—	1.6	2.4	V
Collector-Emitter Saturation Voltage		$V_{CE\ (sat)}$ (2)	$I_C = 60A$, $V_{GE} = 15V$	—	2.2	3.3	V
Input Capacitance		C_{ies}	$V_{CE} = 30V$, $V_{GE} = 0$ $f = 1MHz$	—	4400	—	pF
Switching Time	Rise Time	t_r		—	0.25	0.60	μs
	Turn-on Time	t_{on}		—	0.35	0.80	
	Fall Time	t_f		—	0.22	0.37	
	Turn-off Time	t_{off}		—	0.50	1.00	
Emitter-Collector Forward Voltage		V_{ECF}	$I_{ECF} = 15A$, $V_{GE} = 0$	—	1.5	2.0	V
Reverse Recovery Time		t_{rr}	$I_{ECF} = 15A$, $V_{GE} = 0$ $di/dt = -20A/\mu s$	—	0.7	2.5	μs
Thermal Resistance		$R_{th\ (j\text{-}c)}$	IGBT	—	—	0.625	°C / W
Thermal Resistance		$R_{th\ (j\text{-}c)}$	Diode	—	—	4.0	°C / W

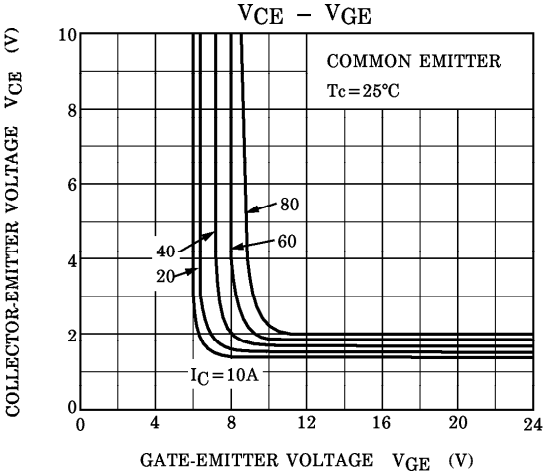
I_C – V_{CE}



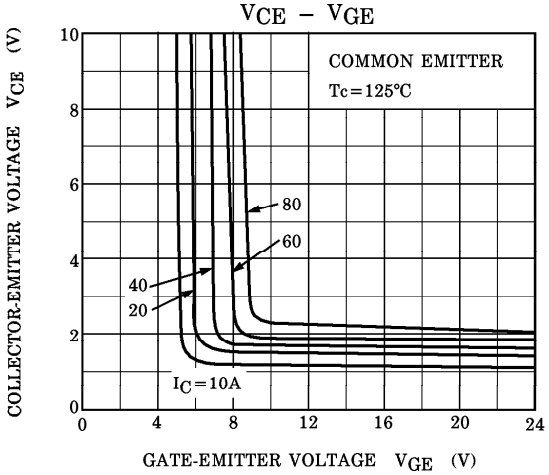
V_{CE} – V_{GE}



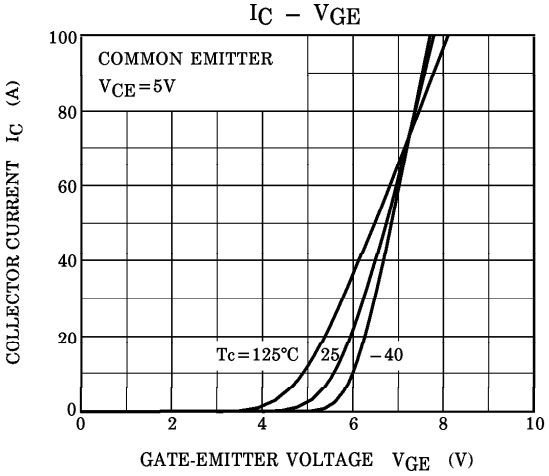
V_{CE} – V_{GE}



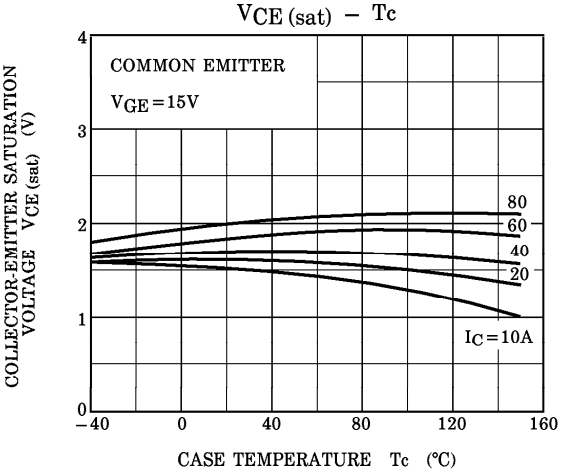
V_{CE} – V_{GE}



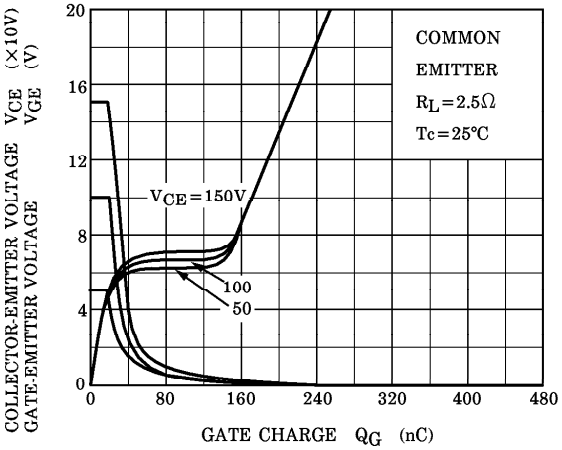
I_C – V_{GE}



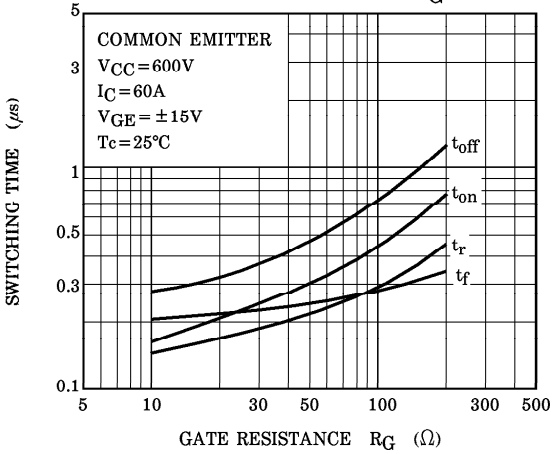
$V_{CE\,(sat)}$ – Tc



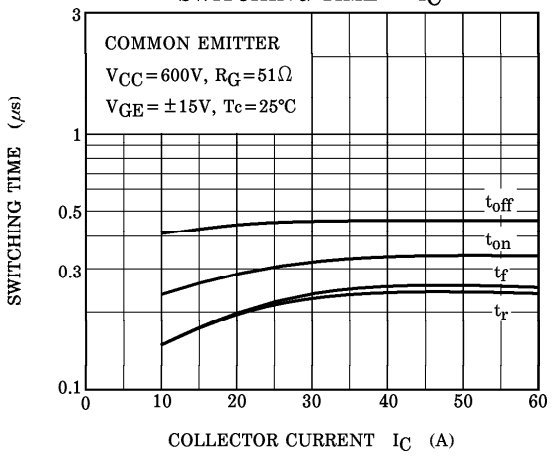
V_{CE}, V_{GE} – Q_G



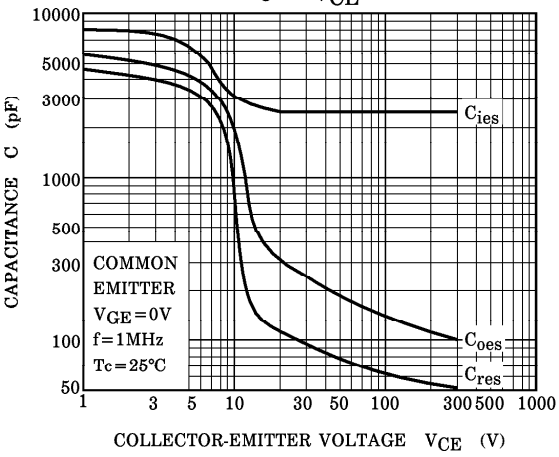
SWITCHING TIME – R_G



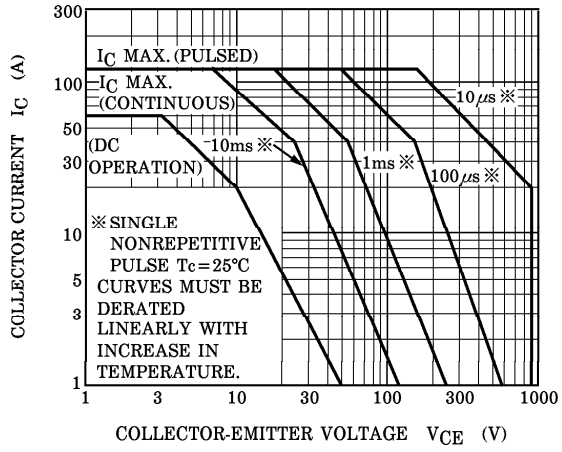
SWITCHING TIME – I_C



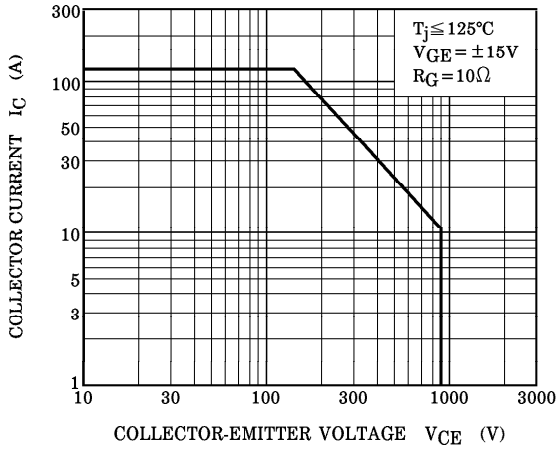
C – V_{CE}



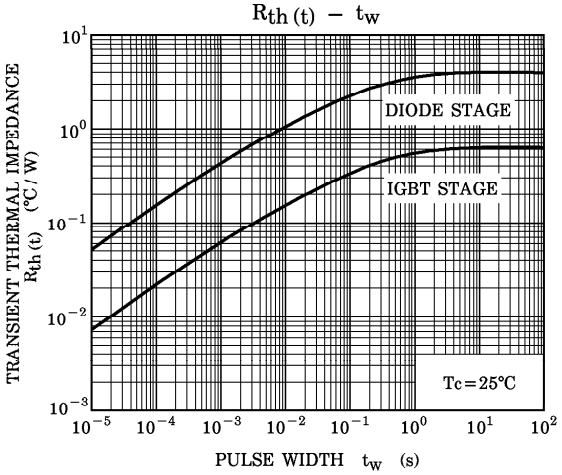
SAFE OPERATING AREA



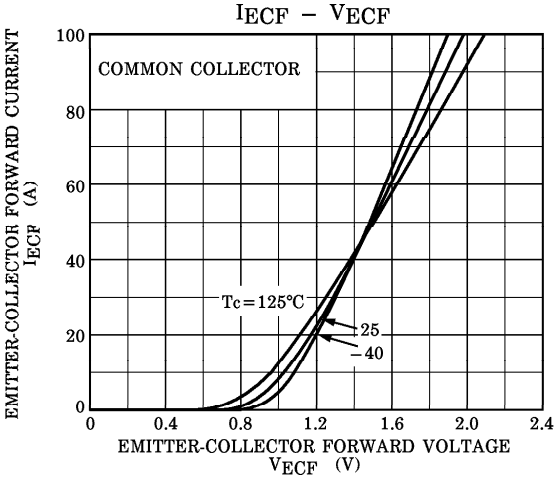
REVERSE BIAS SOA



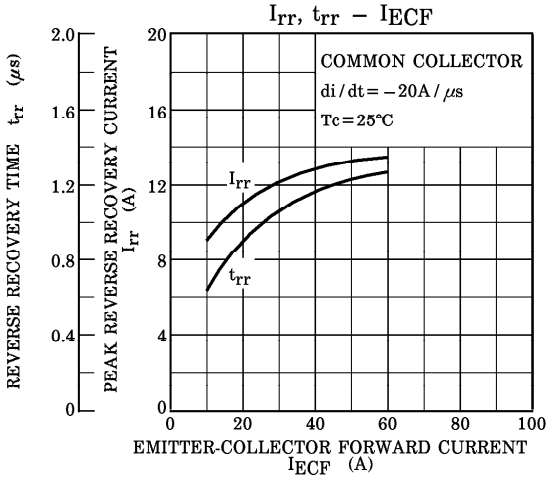
$R_{th}(t) - t_w$



$I_{ECF} - V_{ECF}$



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



$I_{rr}, t_{rr} - di/dt$

