TOSHIBA GTR Module Silicon N Channel IGBT

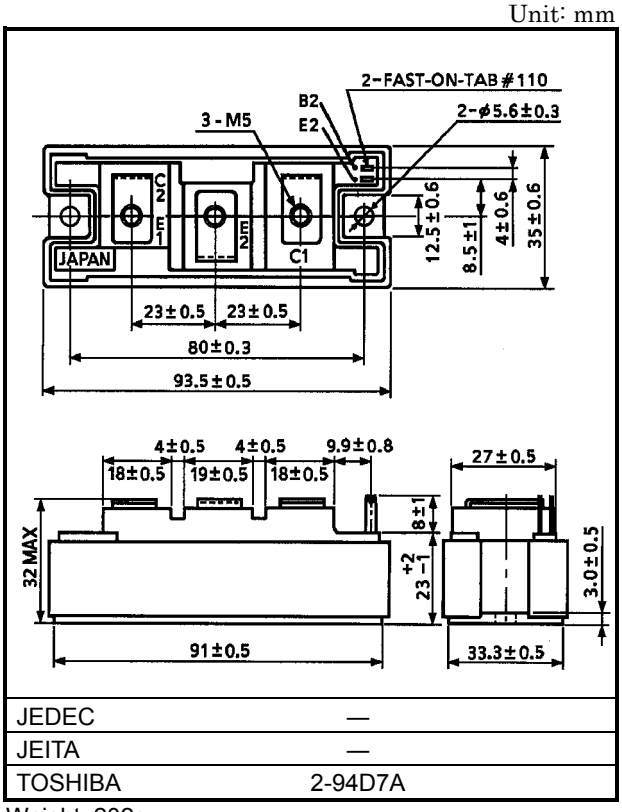
MG50Q1ZS50

High Power Switching Applications

Motor Control Applications

- High input impedance
- High speed : t_f = 0.3 μs (max) @Inductive load
- Low saturation voltage : $V_{CE\ (sat)}$ = 3.6 V (max)
- Enhancement-mode
- The electrodes are isolated from case.

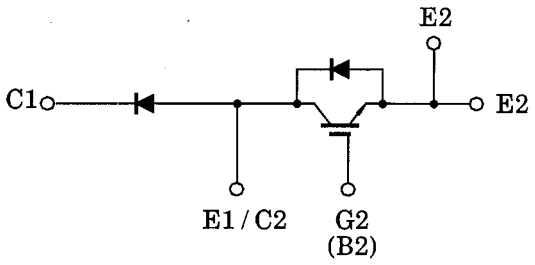
Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	2-94D7A

Weight: 202g

Equivalent Circuit



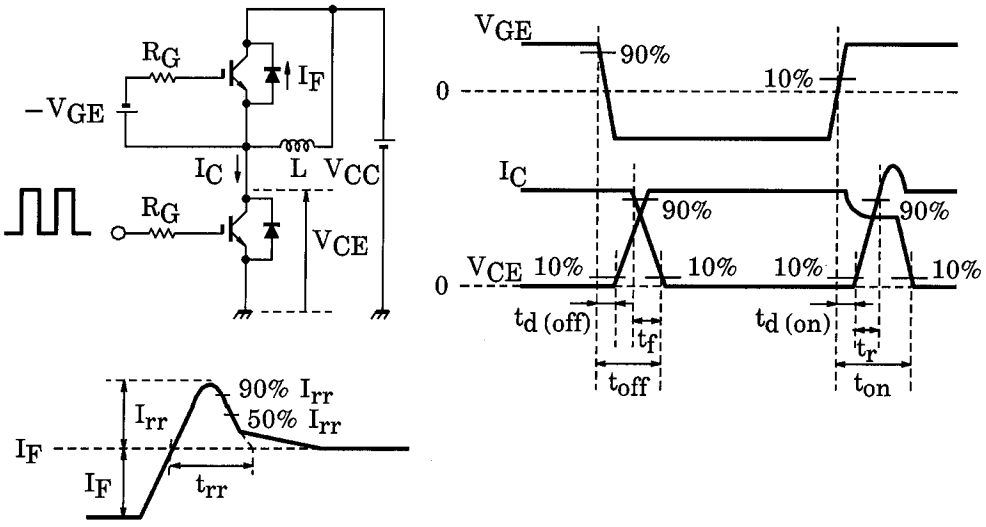
Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Collector-emitter voltage		V_{CES}	1200	V
Gate-emitter voltage		V_{GES}	±20	V
Reverse voltage		V_R	1200	V
Collector current	DC	I_C (25°C / 80°C)	78 / 50	A
	1ms	I_{CP} (25°C / 80°C)	156 / 100	
Forward current	DC	I_F	50	A
	1ms	I_{FM}	100	
Collector power dissipation (Tc = 25°C)		P_C	400	W
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−40 ~ 125	°C
Isolation voltage		V_{Isol}	2500 (AC 1 minute)	V
Screw torque (Terminal / mounting)		—	3 / 3	N·m

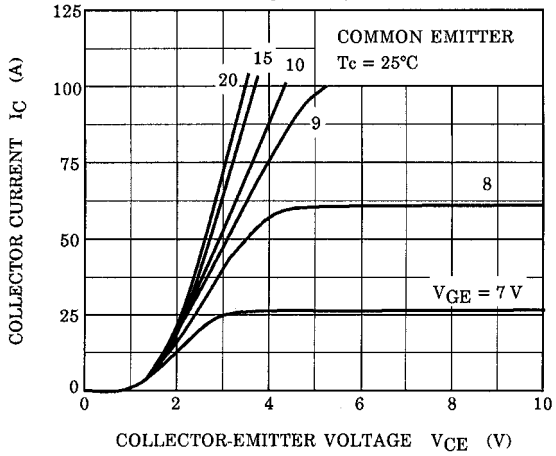
Electrical Characteristics (Ta = 25°C)

Characteristics		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} = 1200V, V_{GE} = 0		—	—	1.0	mA
Gate-emitter cut-off voltage		$V_{GE\ (off)}$	I_C = 50mA, V_{CE} = 5V		3.0	—	6.0	V
Collector-emitter saturation voltage		$V_{CE\ (sat)}$	I_C = 50A, V_{GE} = 15V	T_j = 25°C	—	2.8	3.6	V
				T_j = 125°C	—	3.1	4.0	
Input capacitance		C_{ies}	V_{CE} = 10V, V_{GE} = 0, f = 1MHz		—	6.0	—	nF
Switching time	Turn-on delay time	$t_{d\ (on)}$	Inductive load V_{CC} = 600 V I_C = 50 A V_{GE} = ±15 V R_G = 24 Ω (Note 1)		—	0.05	—	μs
	Rise time	t_r			—	0.05	—	
	Turn-on time	t_{on}			—	0.2	—	
	Turn-off delay time	$t_{d\ (off)}$			—	0.5	—	
	Fall time	t_f			—	0.1	0.3	
	Turn-off time	t_{off}			—	0.6	—	
Reverse current		I_R	V_R = 1200 V		—	—	1.0	mA
Forward voltage		V_F	I_F = 50 A, V_{GE} = 0		—	2.4	3.5	V
Reverse recovery time		t_{rr}	I_F = 50 A, V_{GE} = −10 V, di / dt = 700 A / μs (Note 1)		—	0.1	0.25	μs
Thermal resistance		$R_{th\ (j-c)}$	Transistor stage		—	—	0.31	°C / W
			Diode stage		—	—	0.94	

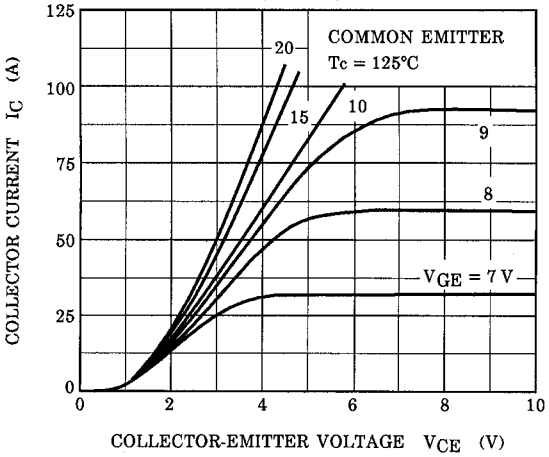
Note 1: Switching time and reverse recovery time test circuit & timing chart



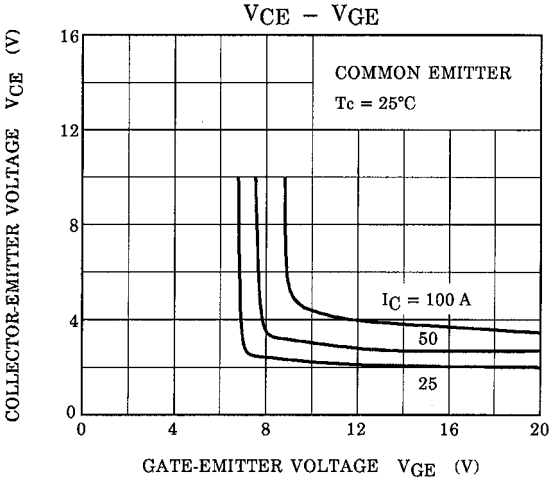
I_C – V_{CE}



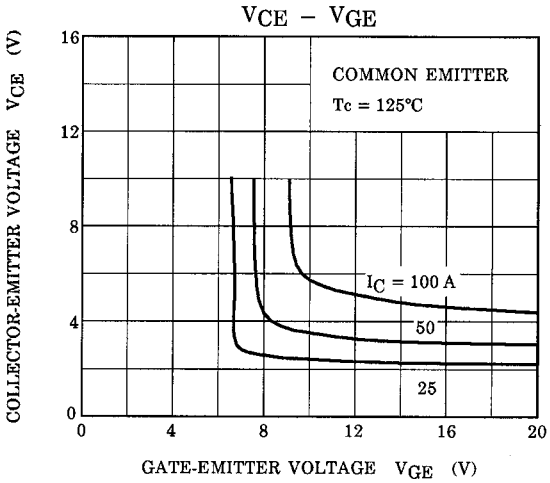
I_C – V_{CE}



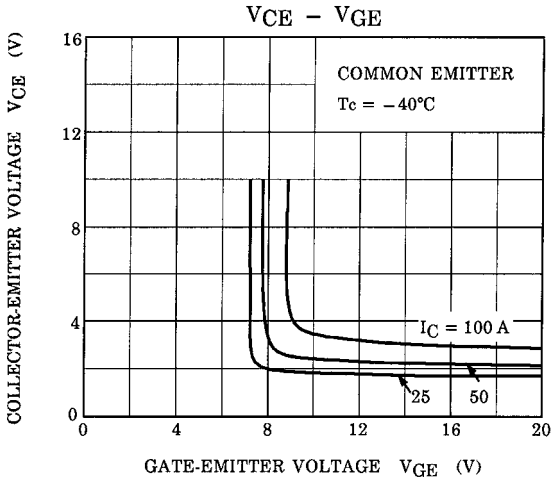
V_{CE} – V_{GE}



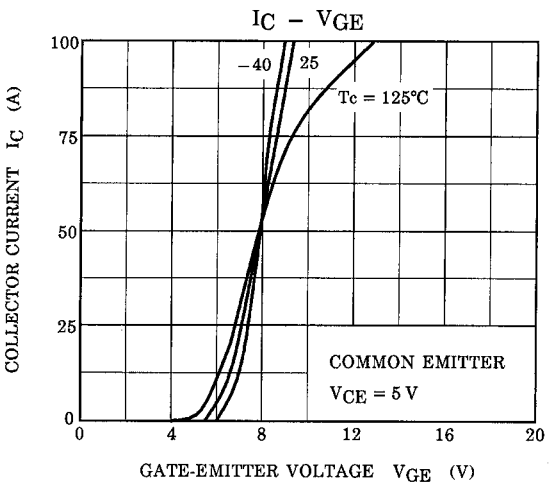
V_{CE} – V_{GE}



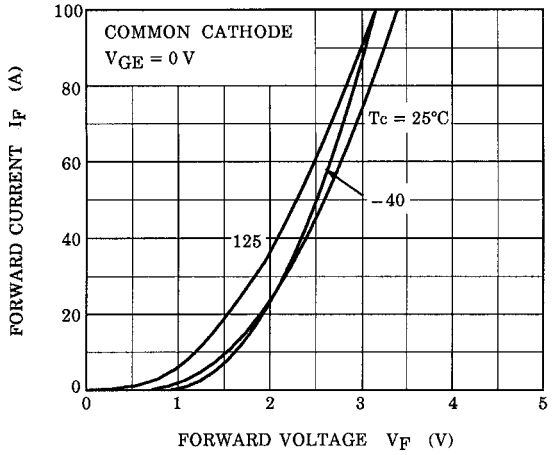
V_{CE} – V_{GE}



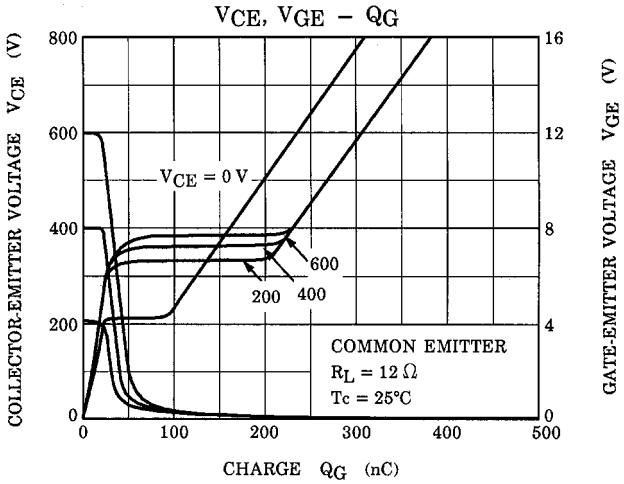
I_C – V_{GE}



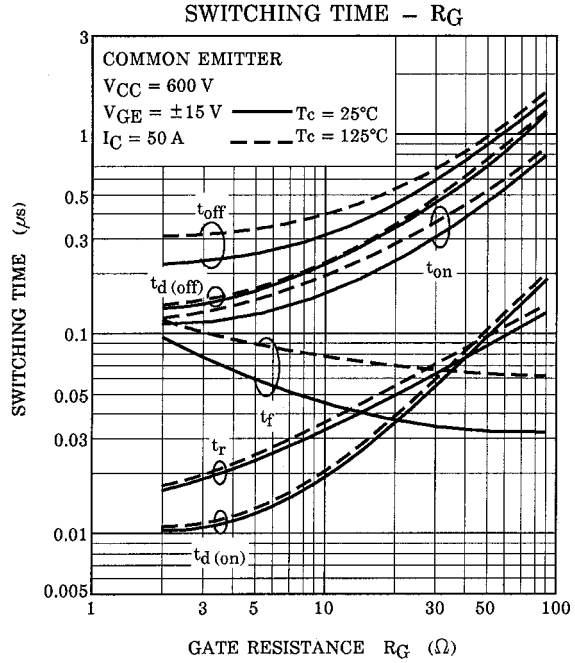
I_F – V_F



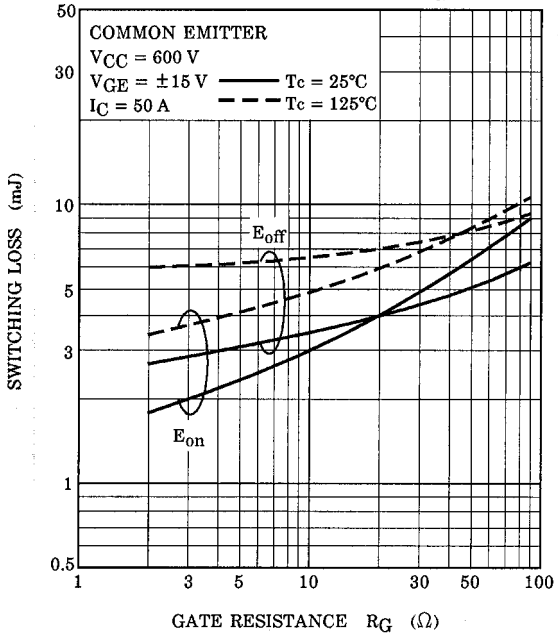
V_{CE}, V_{GE} – Q_G



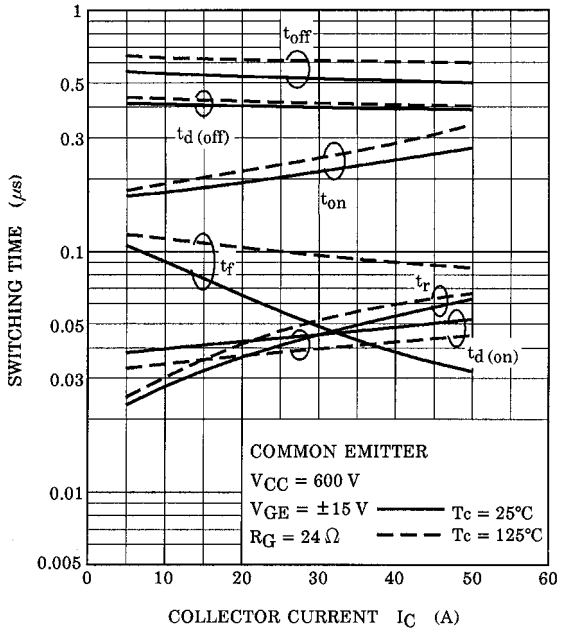
SWITCHING TIME – R_G



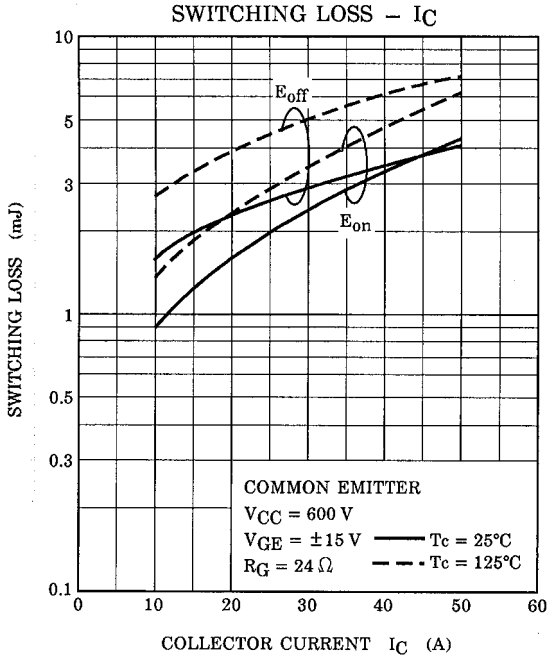
SWITCHING LOSS – R_G



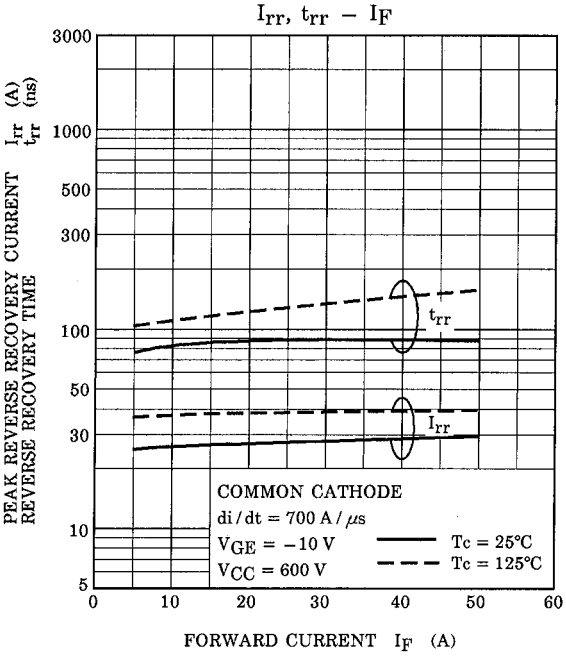
SWITCHING TIME – I_C



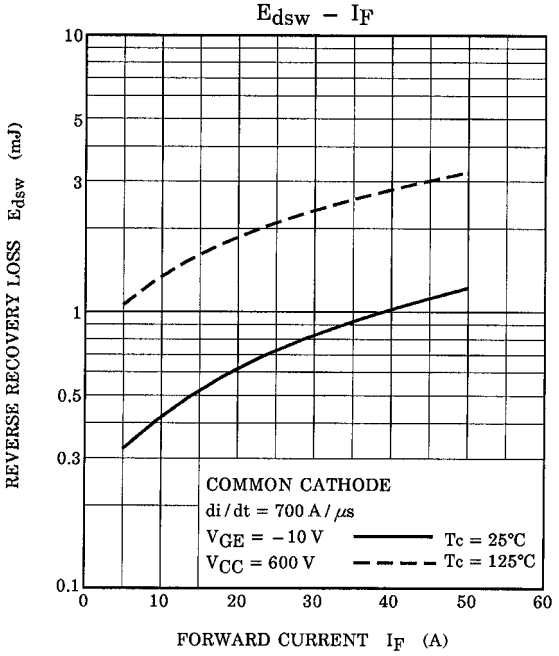
SWITCHING LOSS – I_C



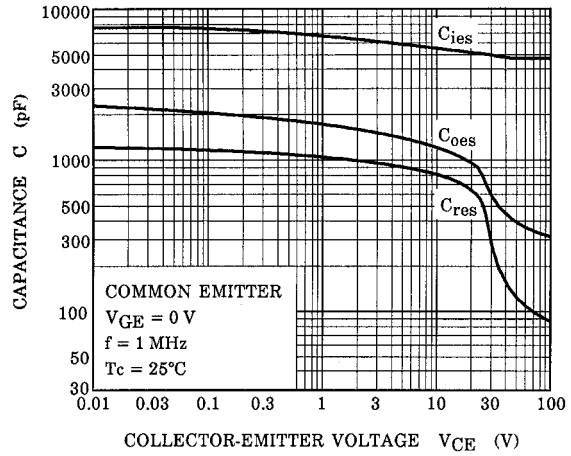
I_{rr}, t_{rr} – I_F



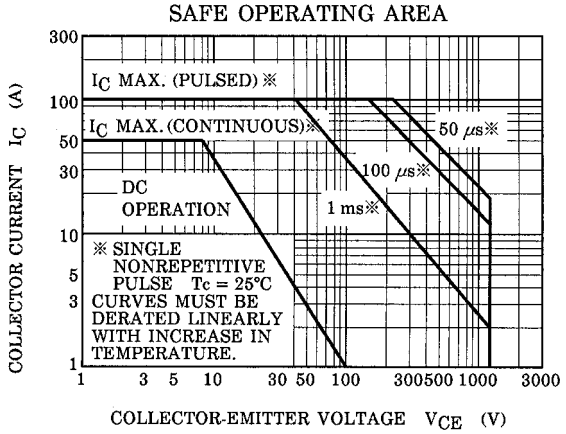
E_{dsw} – I_F



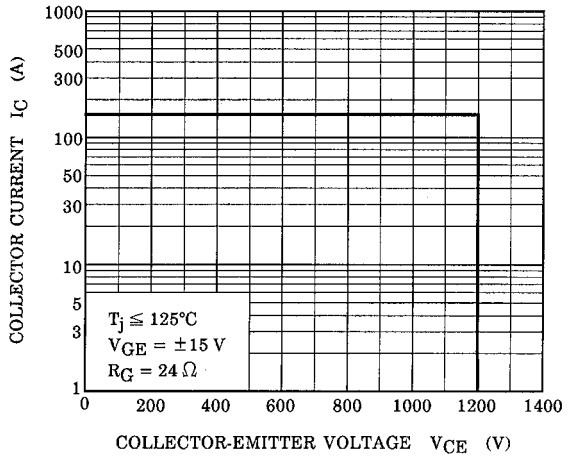
C – V_{CE}



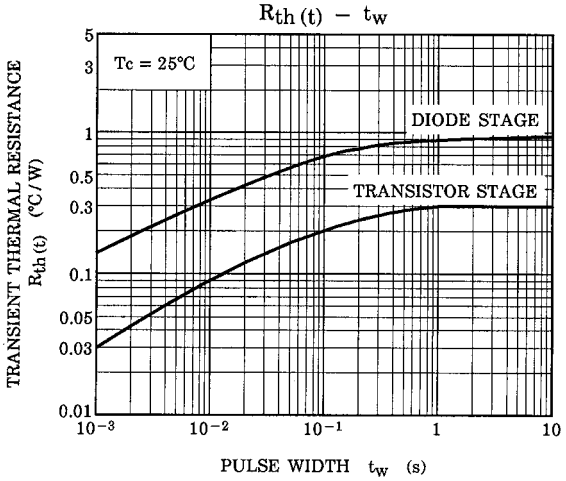
SAFE OPERATING AREA



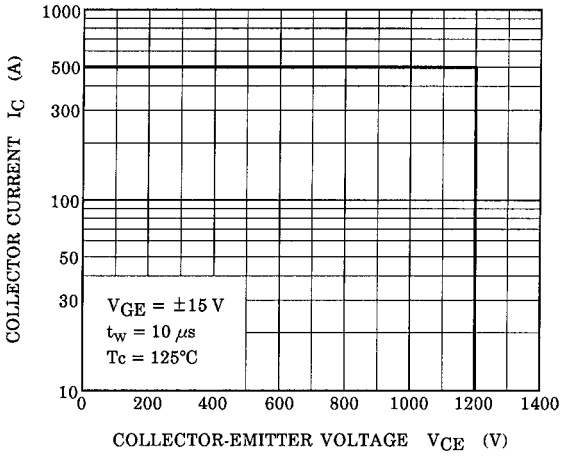
REVERSE BIAS SOA



R_{th} (t) – t_w



SHORT CIRCUIT SOA



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