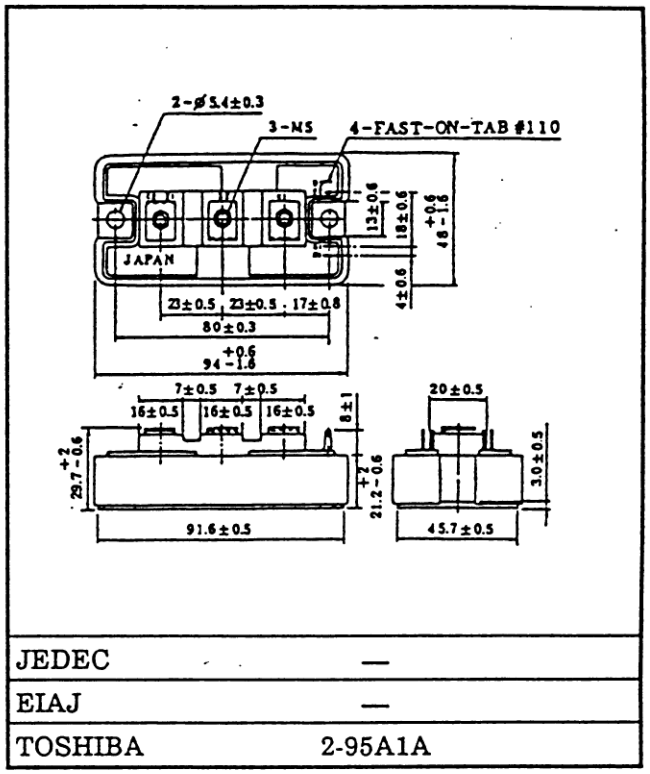
GTR Module

Silicon N Channel IGBT

High Power Switching Applications

Motor Control Applications

Unit in mm



JEDEC	—
EIAJ	—
TOSHIBA	2-95A1A

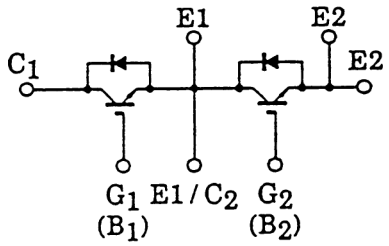
Features

- High input impedance
- High speed: t_f = 0.30μs (Max.) (I_C = 150A)
  t_{rr} = 0.15μs (Max.) (I_F = 150A)
- Low saturation voltage: V_{CE} = 2.70V(Max.) (I_C = 150A)
- Enhancement mode
- The electrodes are isolated from case
- Includes a complete half bridge card in one package

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	150	A
	1ms	I_{CP}	300	
Forward Current	DC	I_F	150	A
	1ms	I_{FM}	300	
Collector Power Dissipation (Tc = 25°C)		P_C	780	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

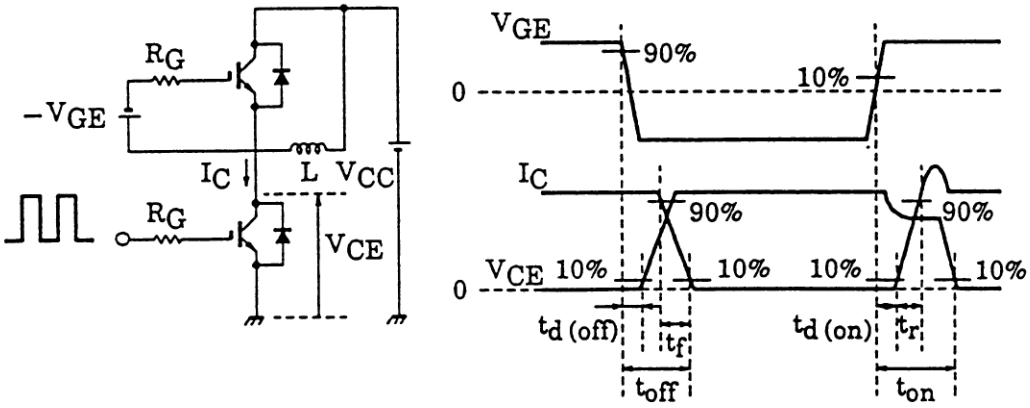
Equivalent Circuit



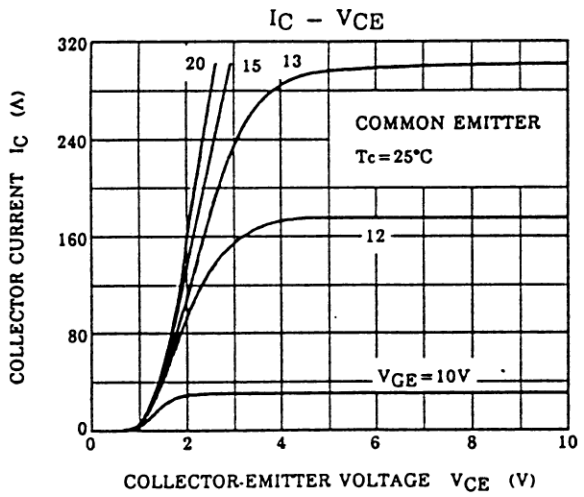
Electrical Characteristics (Ta = 25°C)

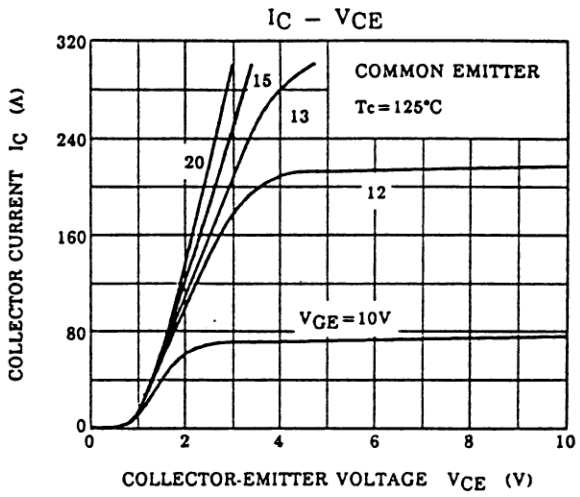
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GES}	V_{GE} = ± 20V, V_{CE} = 0	—	—	± 500	nA
Collector Cut-off Current		I_{CES}	V_{CE} = 600V, V_{GE} = 0	—	—	2.0	mA
Gate-Emitter Cut-off Voltage		$V_{GE\ (off)}$	I_C = 15mA, V_{CE} = 5V	5.0	7.0	8.0	V
Collector-Emitter Saturation Voltage		$V_{CE\ (sat)}$	I_C = 150A, V_{GE} = 15V	—	2.10	2.70	V
Input Capacitance		C_{ies}	V_{CE} = 10V, V_{GE} = 0, f = 1MHz	—	14200	—	pF
Switching Time	Turn-on Delay Time	$t_{d\ (on)}$	Inductive Load V_{CC} = 300V I_C = 150A V_{GE} = ± 15V R_G = 6.2Ω (Note 1)	—	0.15	0.30	µs
	Rise Time	t_r		—	0.15	0.30	
	Turn-on Time	t_{on}		—	0.50	1.00	
	Turn-off Delay Time	$t_{d\ (off)}$		—	0.20	0.40	
	Fall Time	t_f		—	0.15	0.30	
	Turn-off Time	t_{off}		—	0.50	1.00	
Forward Voltage		V_F	I_F = 150A, V_{GE} = 0	—	2.30	3.00	V
Reverse Recovery Time		t_{rr}	I_F = 150A, V_{GE} = -10V di/dt = 200A/µs	—	0.08	0.15	µs
Thermal Resistance		$R_{th\ (j-c)}$	Transistor	—	—	0.16	°C/W
			Diode	—	—	0.35	

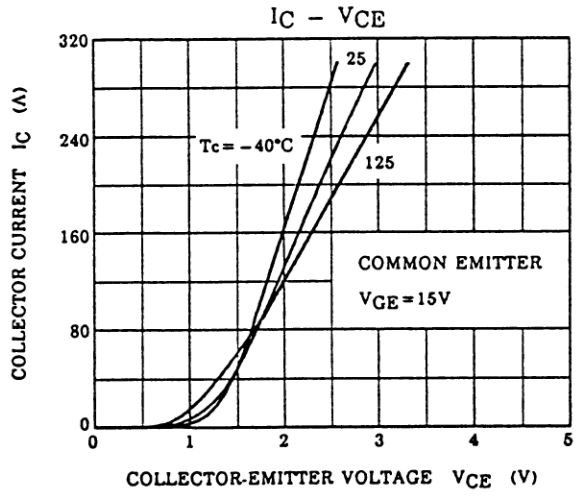
Note 1 Switching Time Test Circuit & Timing Chart.

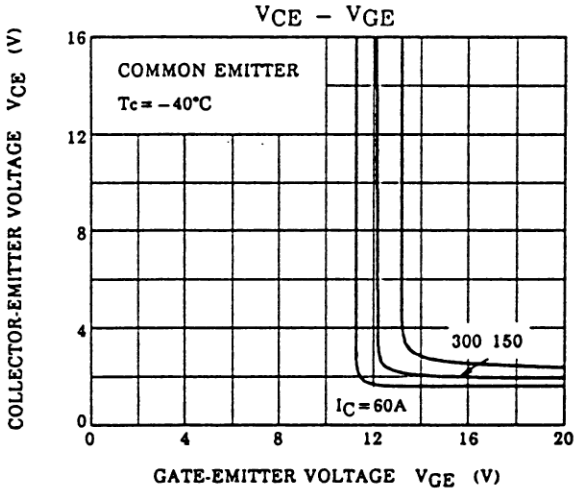


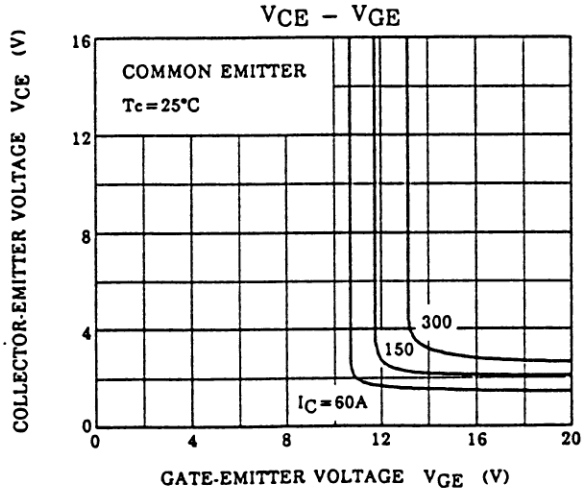
Note 2 Silicone Grease is Applied.

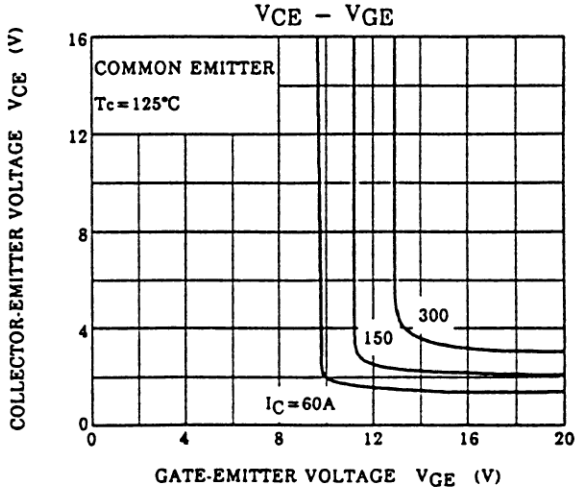

I_C – V_{CE}
COMMON EMITTER
Tc=25°C
20
15
13
12
V_{GE}=10V
COLLECTOR CURRENT I_C (A)
COLLECTOR-EMITTER VOLTAGE V_{CE} (V)


I_C – V_{CE}
COMMON EMITTER
Tc=125°C
15
13
20
12
V_{GE}=10V
COLLECTOR CURRENT I_C (A)
COLLECTOR-EMITTER VOLTAGE V_{CE} (V)

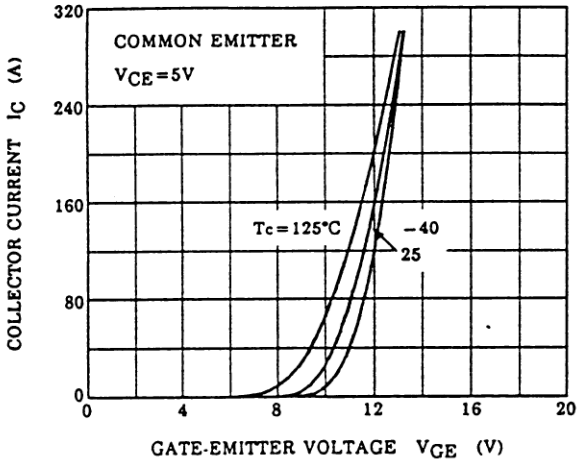

I_C – V_{CE}
25
Tc=–40°C
125
COMMON EMITTER
V_{GE}=15V
COLLECTOR CURRENT I_C (A)
COLLECTOR-EMITTER VOLTAGE V_{CE} (V)


V_{CE} – V_{GE}
COMMON EMITTER
Tc=–40°C
300
150
I_C=60A
COLLECTOR-EMITTER VOLTAGE V_{CE} (V)
GATE-EMITTER VOLTAGE V_{GE} (V)

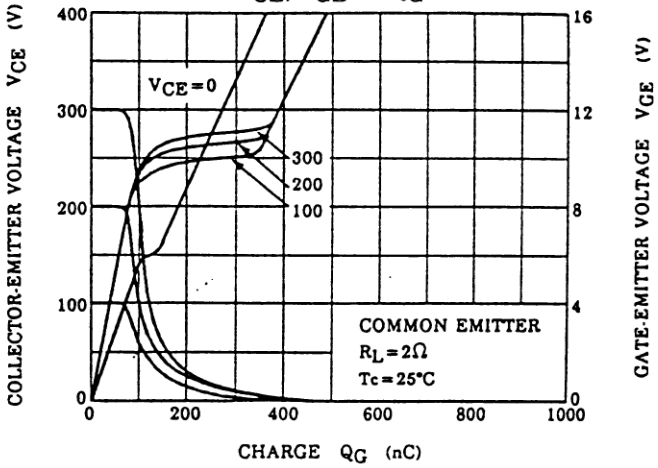

V_{CE} – V_{GE}
COMMON EMITTER
Tc=25°C
300
150
I_C=60A
COLLECTOR-EMITTER VOLTAGE V_{CE} (V)
GATE-EMITTER VOLTAGE V_{GE} (V)


V_{CE} – V_{GE}
COMMON EMITTER
Tc=125°C
300
150
I_C=60A
COLLECTOR-EMITTER VOLTAGE V_{CE} (V)
GATE-EMITTER VOLTAGE V_{GE} (V)

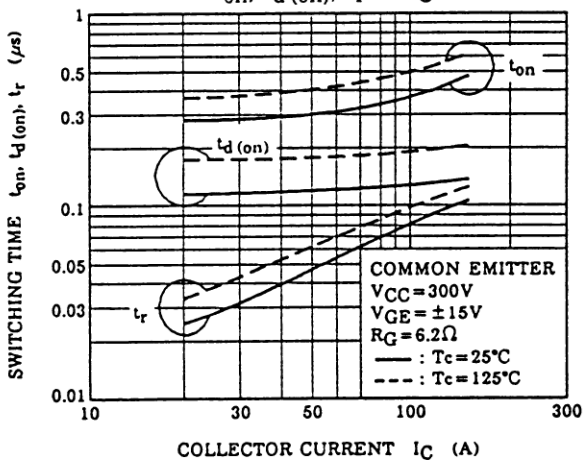
$I_C - V_{GE}$



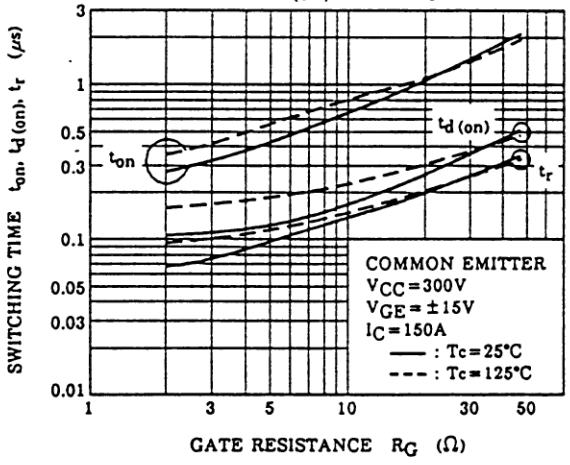
$V_{CE}, V_{GE} - Q_G$



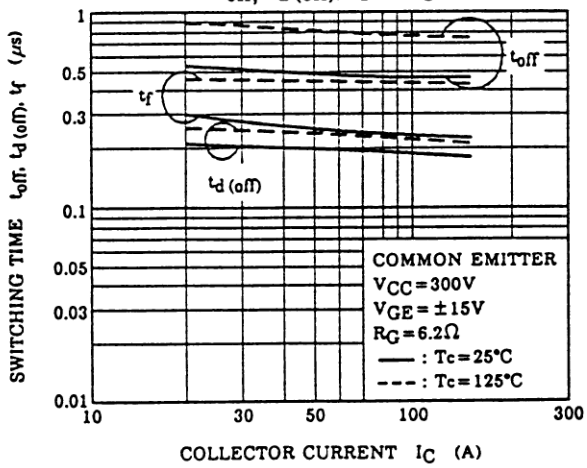
$t_{on}, t_{d(on)}, t_r - I_C$



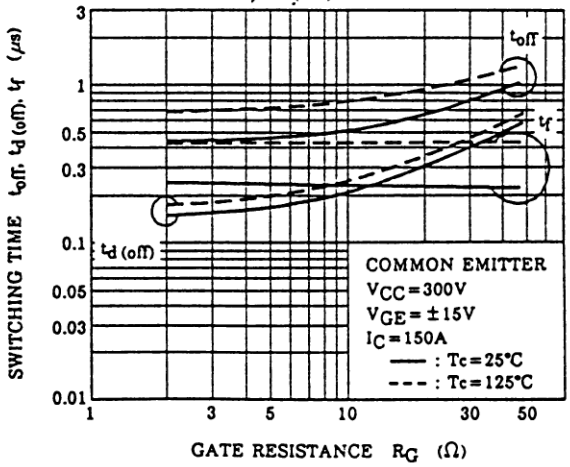
$t_{on}, t_{d(on)}, t_r - R_G$



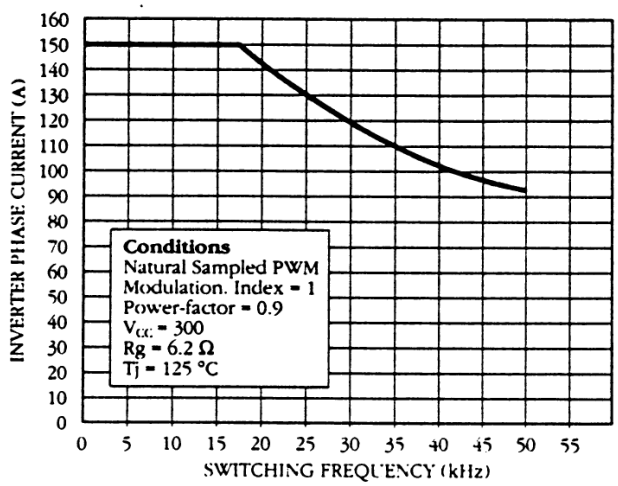
$t_{off}, t_{d(off)}, t_f - I_C$

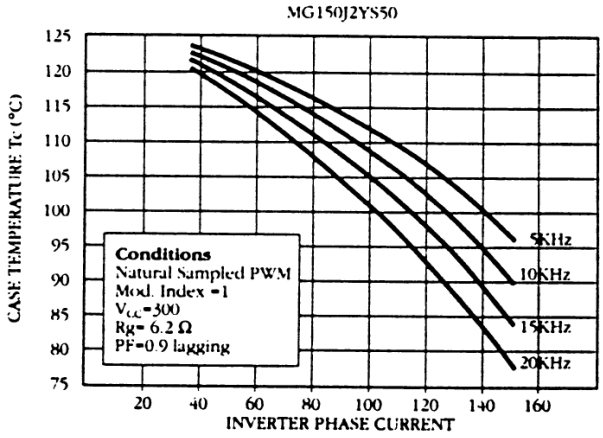


$t_{off}, t_{d(off)}, t_f - R_G$

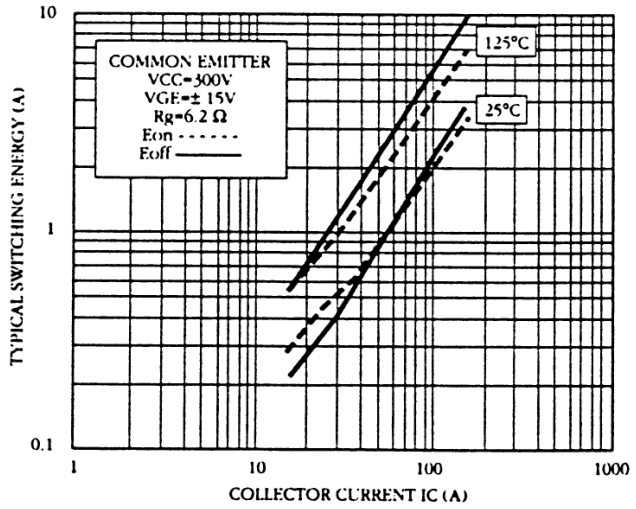


TYPICAL INVERTER PHASE CURRENT AT TCASE = 80 °C

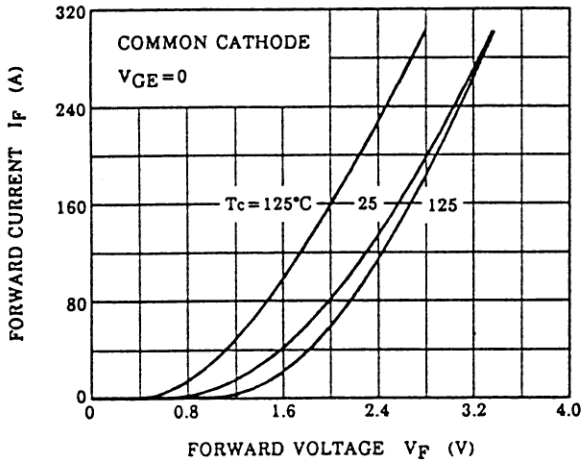




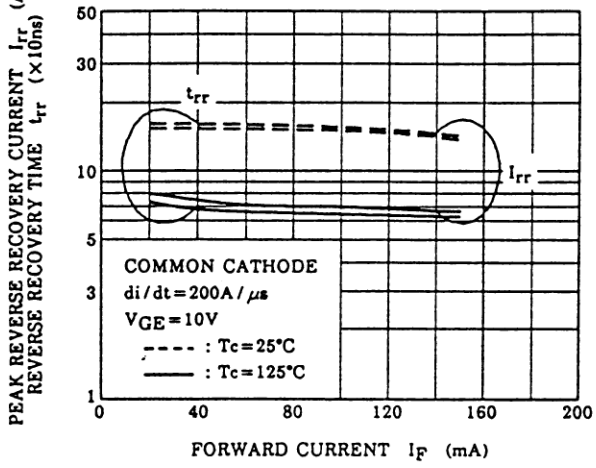
TYPICAL SWITCHING ENERGY (IC)



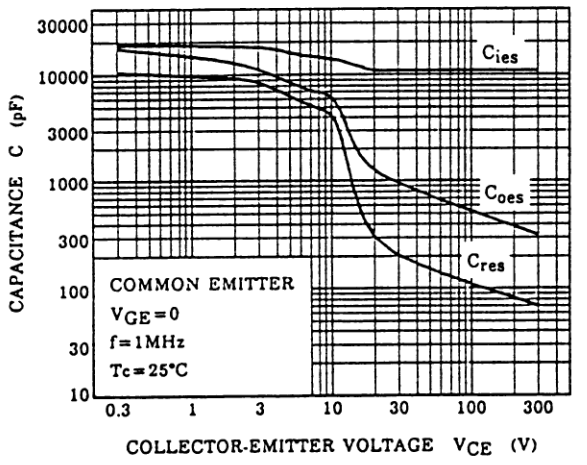
$I_F - V_F$



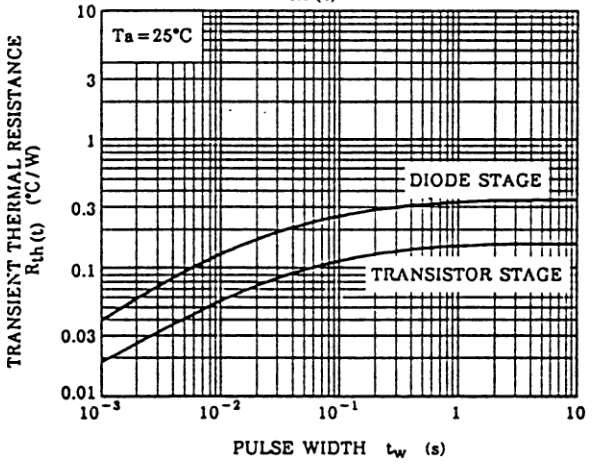
$t_{rr}, I_{rr} - I_F$



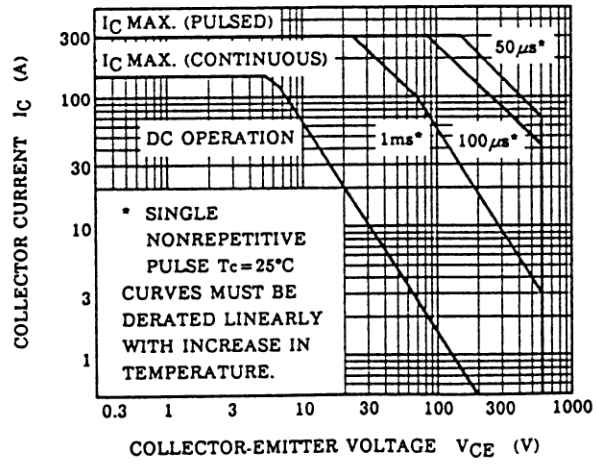
$C - V_{CE}$



$R_{th(t)} - t_w$



SAFE OPERATING AREA



REVERSE BIAS SOA