

IGBT MODULE (N series)

n Features

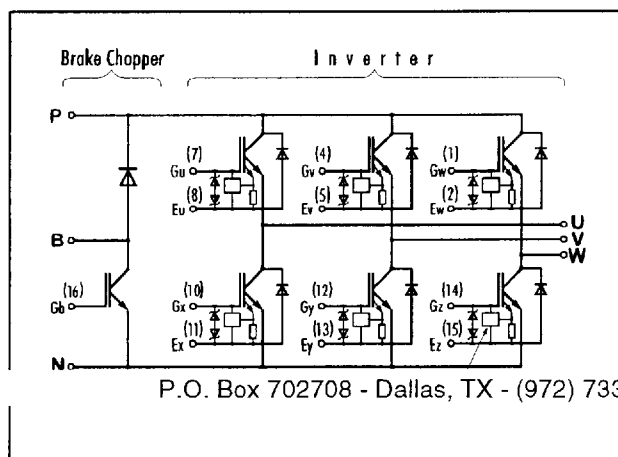
- Including Brake Chopper
- Square RBSOA
- Low Saturation Voltage

P.O. Box 702708 - Dallas, TX - (972) 733-1700 - (972) 381-9991 (fax)

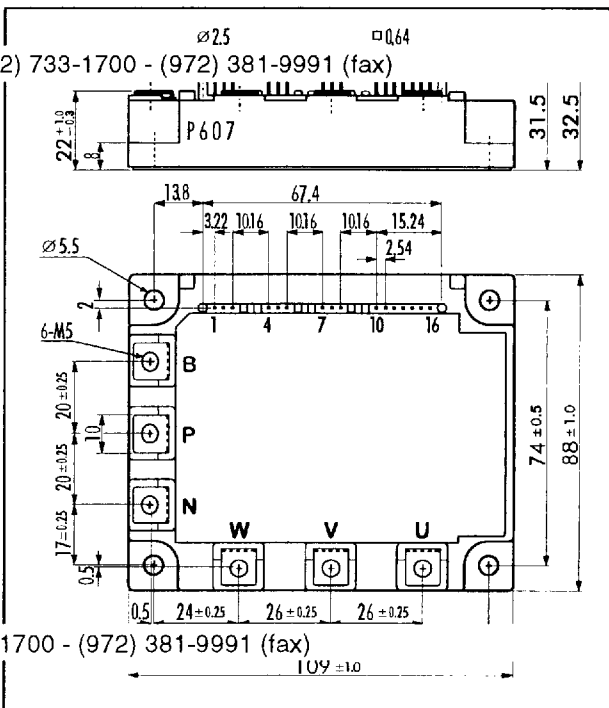
- Overcurrent Limiting Function

(~ 3 Times Rated Current)

n Equivalent Circuit



n Outline Drawing



n Absolute Maximum Ratings (T_c=25°C)

	Items	Symbols	Test Conditions	Ratings	Units
Inverter	Collector-Emitter Voltage	V _{CES}		600	V
	Gate -Emitter Voltage	V _{GES}		± 20	
	Collector Current	I _C	Continuous	75	A
		I _{C PULSE}	1ms	150	
		-I _{C PULSE}	Continuous	75	
	Collector Power Dissipation	P _C	1 device	320	W
Brake Chopper	Collector-Emitter Voltage	V _{CES}		600	V
	Gate -Emitter Voltage	V _{GES}		± 20	
	Collector Current	I _C	Continuous	50	A
		I _{C PULSE}	1ms	100	
	Collector Power Dissipation	P _C	1 device	200	W
	Repetitive Peak Reverse Voltage	V _{RRM}		600	V
	Average Forward Current	I _{F(AV)}		1	A
	Surge Current	I _{FSM}	10ms	50	
FWD	Operating Junction Temperature	T _J		+150	°C
	Storage Temperature	T _{Stg}		-40 ~ +125	
	Isolation Voltage	V _{ISO}	A.C. 1min.	2500	V
	Mounting Screw Torque *1			3.5	Nm
	Terminal Screw Torque *1			3.5	

Note: *1:Recommendable Value; 2.5 ~ 3.5 Nm (M5)

n Electrical Characteristics ($T_j=25^{\circ}\text{C}$)

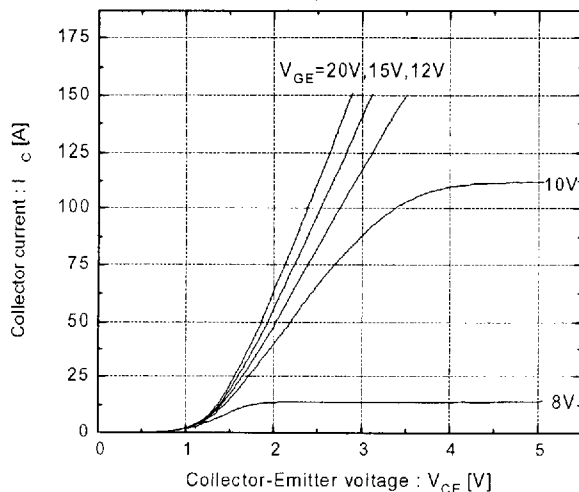
	Items	Symbols	Test Conditions	Min.	Max.	Units
Inverter IGBT	Zero Gate Voltage Collector Current	I_{CES}	$V_{GE}=0\text{V}$ $V_{CE}=600\text{V}$		3.0	mA
	Gate-Emitter Leakage Current	I_{GES}	$V_{CE}=0\text{V}$ $V_{GE}=\pm 20\text{V}$		15	μA
	Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=20\text{V}$ $I_C=75\text{mA}$	4.5	7.5	V
	Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15\text{V}$ $I_C=75\text{A}$		2.8	V
	Input capacitance	C_{ies}	$f=1\text{MHz}$, $V_{GE}=0\text{V}$, $V_{CE}=10\text{V}$	4950 (typ.)		pF
	Turn-on Time	t_{on}	$V_{CC}=300\text{V}$ $I_C = 75\text{A}$ $V_{GE}=\pm 15\text{V}$ $R_G = 33\Omega$		1.2	μs
	Turn-off Time	t_{off}			1.5	
		t_f			0.35	
	Diode Forward On-Voltage	V_F	$I_F=75\text{A}$ $V_{GE}=0\text{V}$		3.0	V
FWD	Reverse Recovery Time	t_{rr}	$I_F=75\text{A}$; $V_{GF}=-10\text{V}$; $\frac{di_F}{dt}=225 \frac{\text{A}}{\mu\text{s}}$		300	ns
Brake Chopper IGBT	Zero Gate Voltage Collector Current	I_{CES}	$V_{GE}=0\text{V}$ $V_{CE}=600\text{V}$		1.0	mA
	Gate-Emitter Leakage Current	I_{GES}	$V_{CE}=0\text{V}$ $V_{GE}=\pm 20\text{V}$		100	nA
	Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15\text{V}$ $I_C=50\text{A}$		2.8	V
	Turn-on Time	t_{on}	$V_{CC}=300\text{V}$ $I_C = 50\text{A}$ $V_{GE}=\pm 15\text{V}$ $R_G = 51\Omega$		1.2	μs
	Turn-off Time	t_{off}			1.5	
		t_f			0.35	
	Reverse Current	I_{RRM}	$V_R=600\text{V}$		1.0	mA
FWD	Reverse Recovery Time	t_{rr}			600	ns

n Thermal Characteristics

Items	Symbols	Test Conditions	Min.	Max.	Units
Thermal Resistance (1 device)	$R_{th(l-c)}$	Inverter IGBT		0.39	$^{\circ}\text{C/W}$
		Inverter FRD		0.90	
		Brake IGBT		0.63	
Contact Thermal Resistance	$R_{th(c-f)}$	With Thermal Compound	0.05 (typ.)		

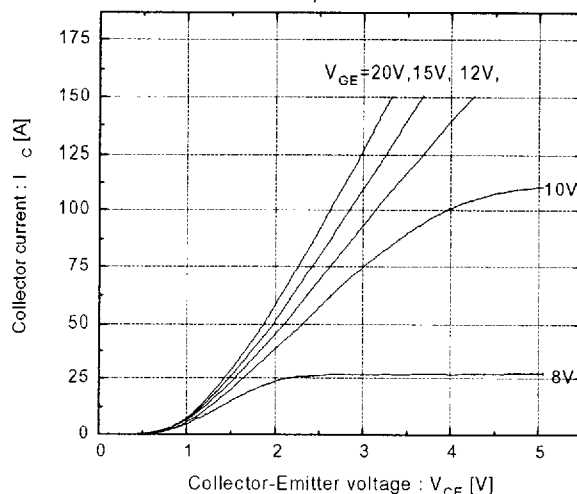
Collector current vs. Collector-Emittor voltage

$T_j = 25^\circ\text{C}$



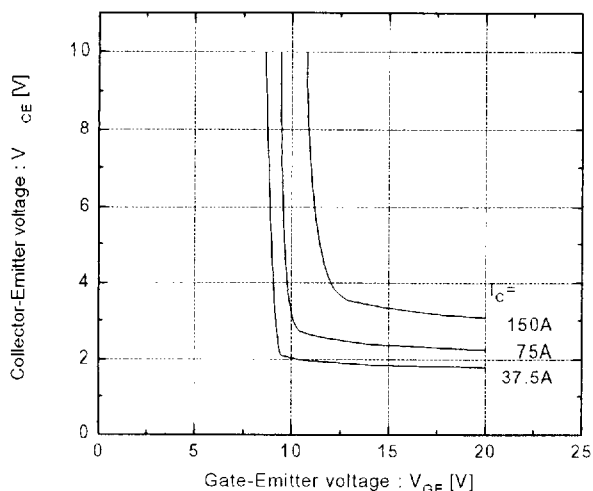
Collector current vs. Collector-Emittor voltage

$T_j = 125^\circ\text{C}$



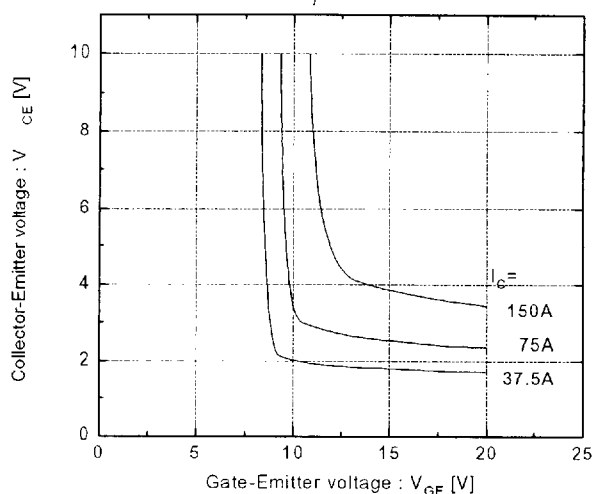
Collector-Emittor vs. Gate-Emittor voltage

$T_j = 25^\circ\text{C}$



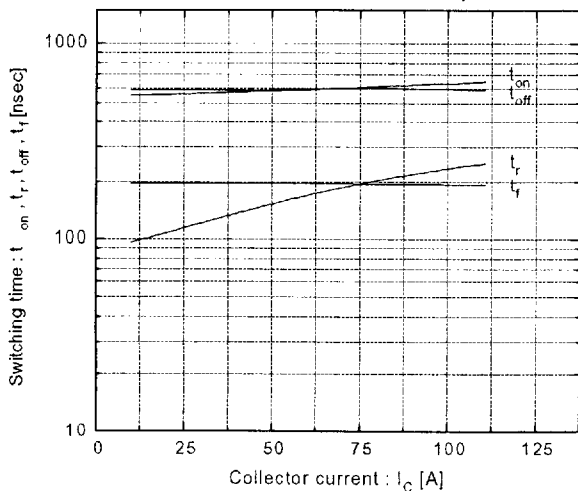
Collector-Emittor vs. Gate-Emittor voltage

$T_j = 125^\circ\text{C}$



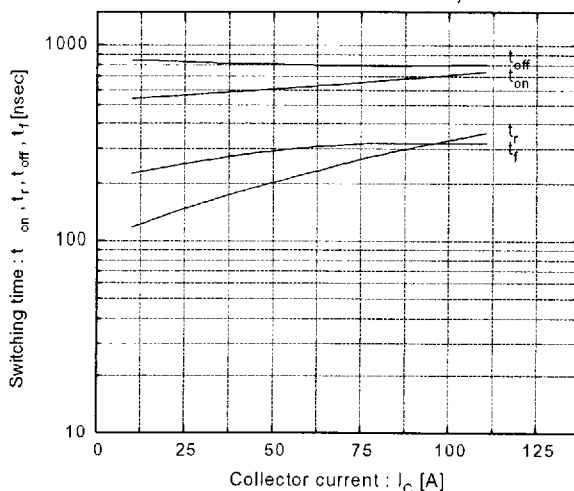
Switching time vs. Collector current

$V_{CC} = 300\text{V}$, $R_G = 33\Omega$, $V_{GE} = \pm 15\text{V}$, $T_j = 25^\circ\text{C}$



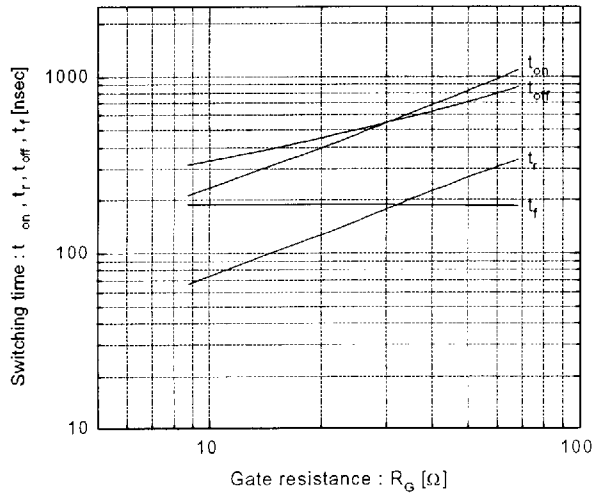
Switching time vs. Collector current

$V_{CC} = 300\text{V}$, $R_G = 33\Omega$, $V_{GE} = \pm 15\text{V}$, $T_j = 125^\circ\text{C}$



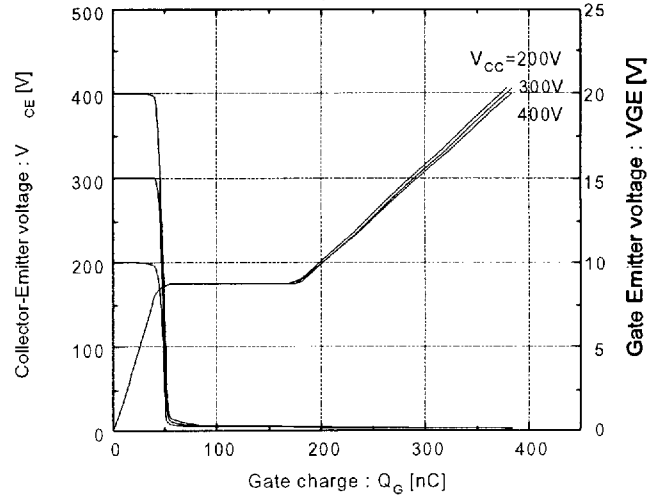
Switching time vs. R_G

$V_{CC}=300V$, $I_C=75A$, $V_{GE}=\pm 15V$, $T_J=25^\circ C$



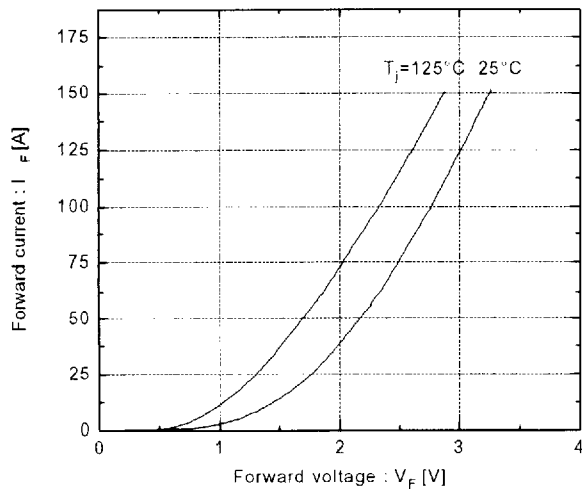
Dynamic input characteristics

$T_J=25^\circ C$



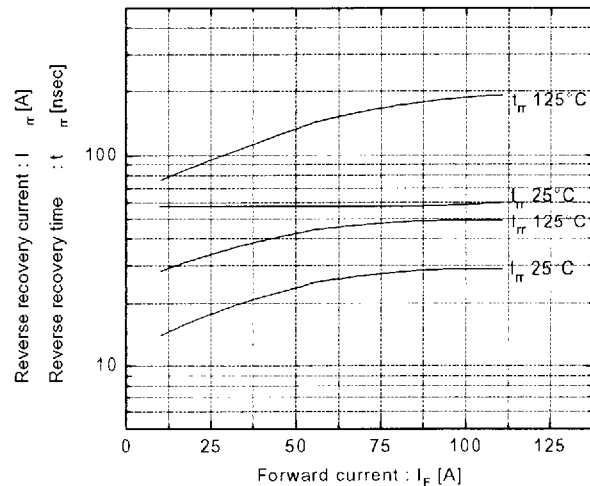
Forward current vs. Forward voltage

$V_{GE}=0V$

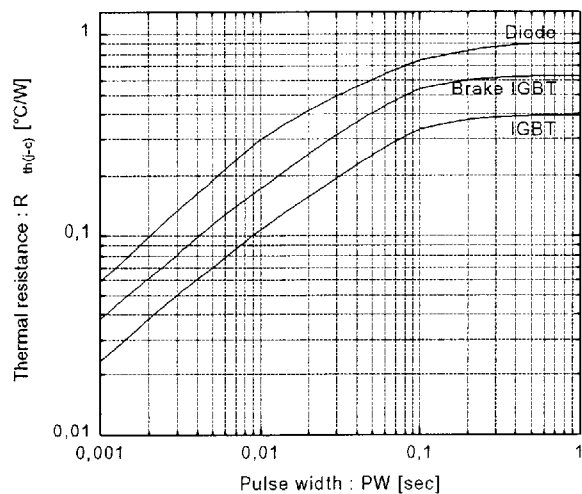


Reverse recovery characteristics

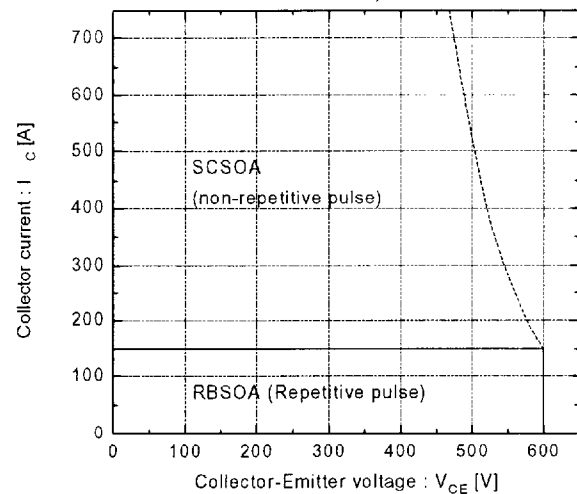
t_{rr} , I_{rr} vs. I_F



Transient thermal resistance

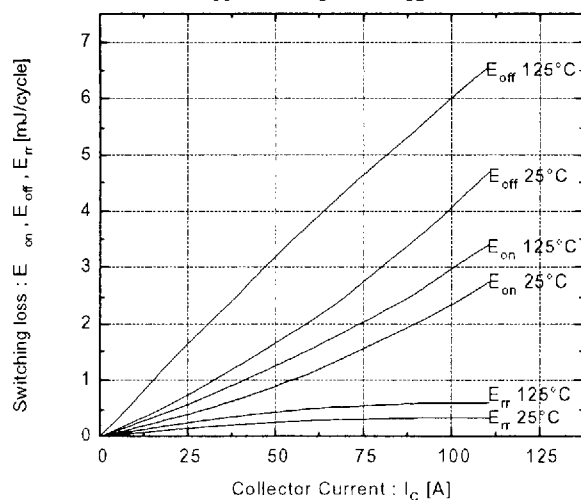


Reversed biased safe operating area
 $+V_{GE}=15V$, $-V_{GE}\leq 15V$, $T_J\leq 125^\circ C$, $R_G\geq 33\Omega$



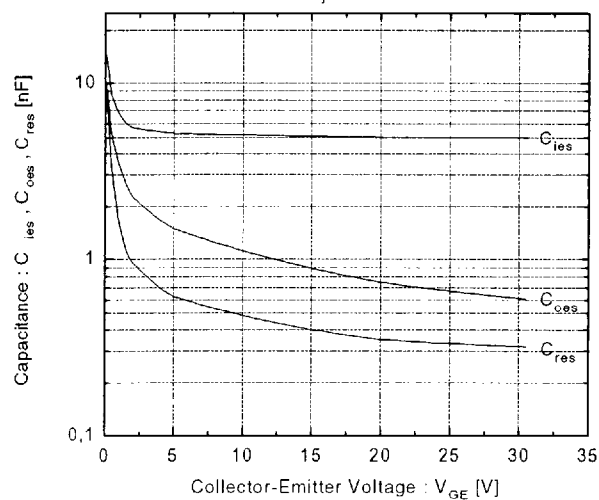
Switching loss vs. Collector current

$V_{CC}=300V$, $R_G=33\Omega$, $V_{GE}=\pm 15V$



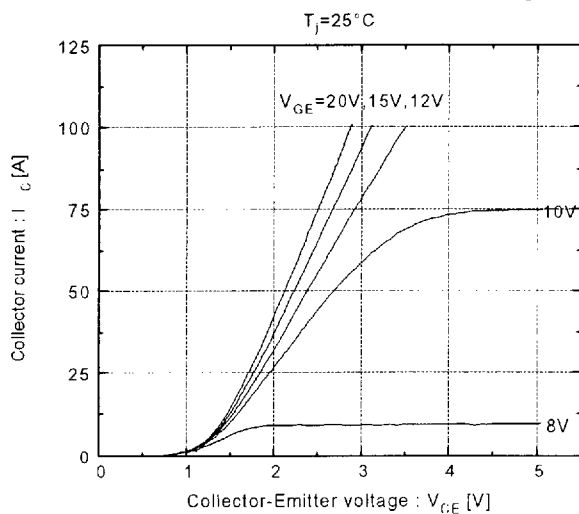
Capacitance vs. Collector-Emitter voltage

$T_J=25^\circ C$

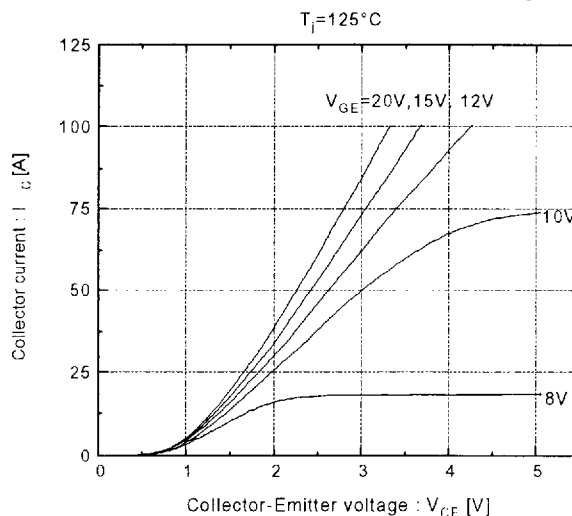


Brake Chopper IGBT

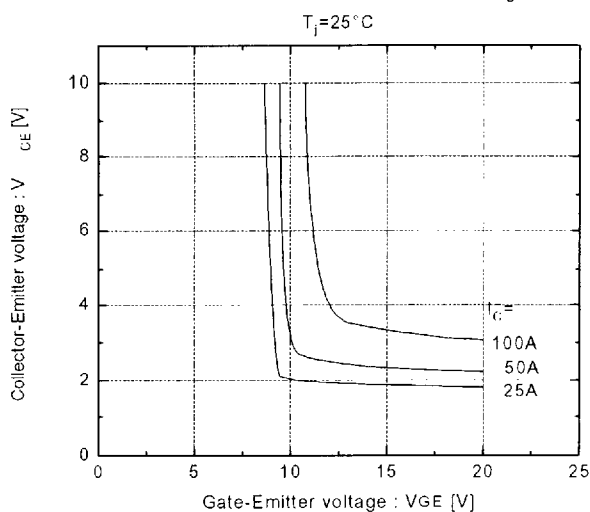
Collector current vs. Collector-Emmitter voltage



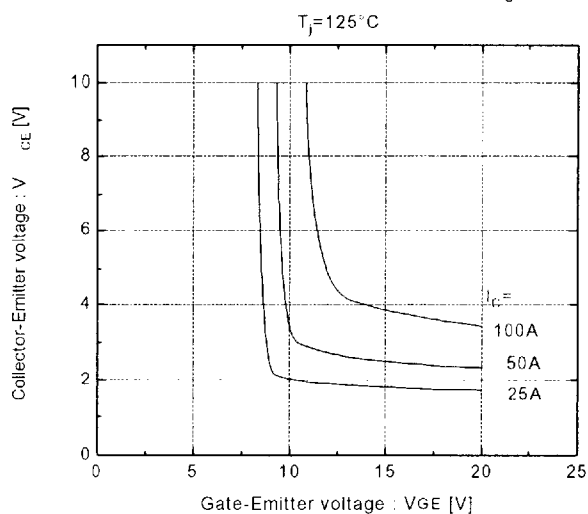
Collector current vs. Collector-Emmitter voltage



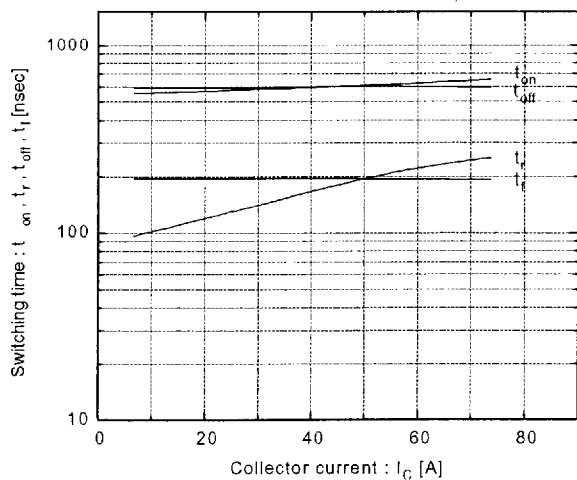
Collector-Emmitter vs. Gate-Emmitter voltage



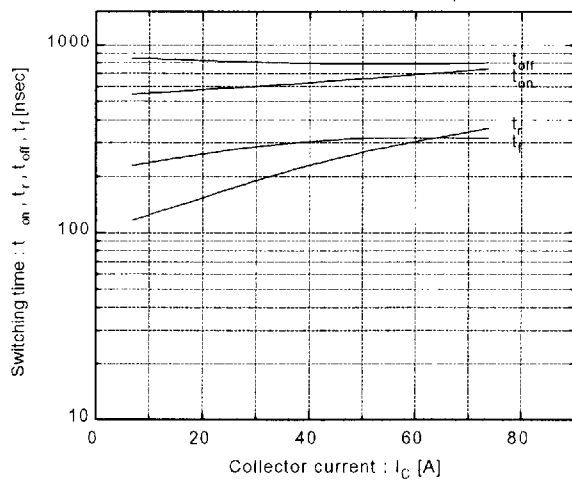
Collector-Emmitter vs. Gate-Emmitter voltage



Switching time vs. Collector current
 $V_{CC} = 300V, R_G = 51\Omega, V_{GE} = \pm 15V, T_J = 25^\circ\text{C}$



Switching time vs. Collector current
 $V_{CC} = 300V, R_G = 51\Omega, V_{GE} = \pm 15V, T_J = 125^\circ\text{C}$



Brake Chopper IGBT

