FUJI ELECTRIC

7MBR 50NE-060

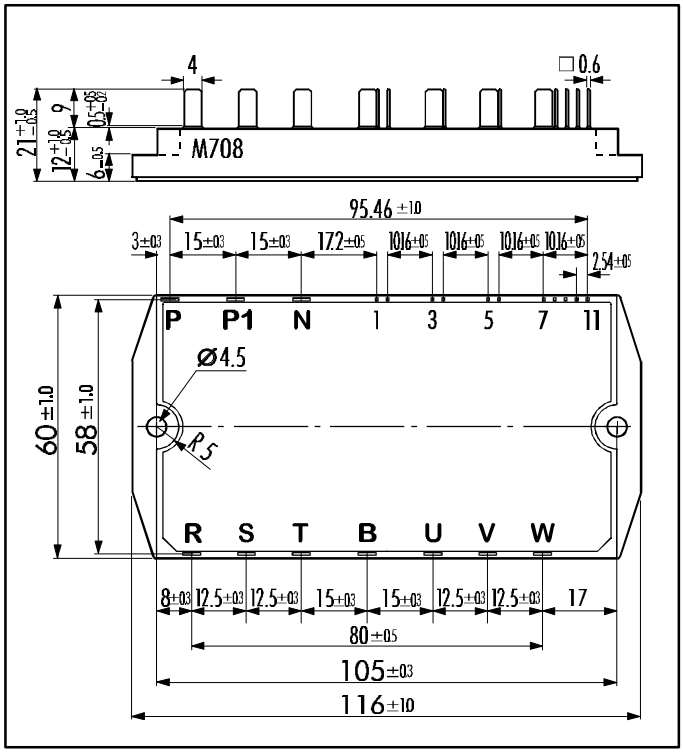
IGBT
600 V
50 A

Power Integrated Module (PIM)

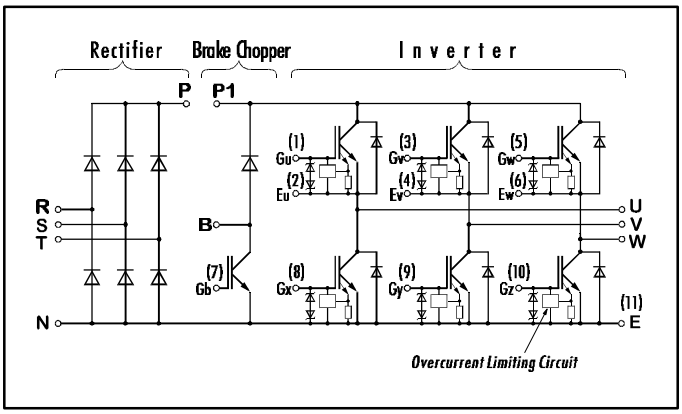
■ Features

- *Included Rectifier and Brake Chopper*
- *Square RBSOA*
- *Low Saturation Voltage*
- *Overcurrent Limiting Function (~ 3 Times Rated Current)*

■ Outline Drawing



■ Equivalent Circuit



■ 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	50	A
		$I_{C\ PULSE}$	1ms	100	
		$-I_{C\ PULSE}$	1ms	50	
	Collector Power Dissipation	P_C	1 device	200	W
Rectifier	Repetitive Peak Reverse Voltage	V_{RRM}		800	V
	Non Repetitive Peak Reverse Voltage	V_{RSM}		900	
	Average Output Current	I_O	50Hz/60Hz sin. wave	50	A
	Surge Current (Non Repetitive)	I_{FSM}	T_j=150°C, 10ms	350	
	I^2t (Non Repetitive)		T_j=150°C, 10ms	648	A^2s
Brake Chopper IGBT	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
FWD	Repetitive Peak Reverse Voltage	V_{RRM}		600	V
	Average Forward Current	$I_{F(AV)}$		1	A
	Surge Current	I_{FSM}	10ms	50	
	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			1.7	Nm

Note: *1:Recommendable Value; 1.3 ~ 1.7 Nm (M4)

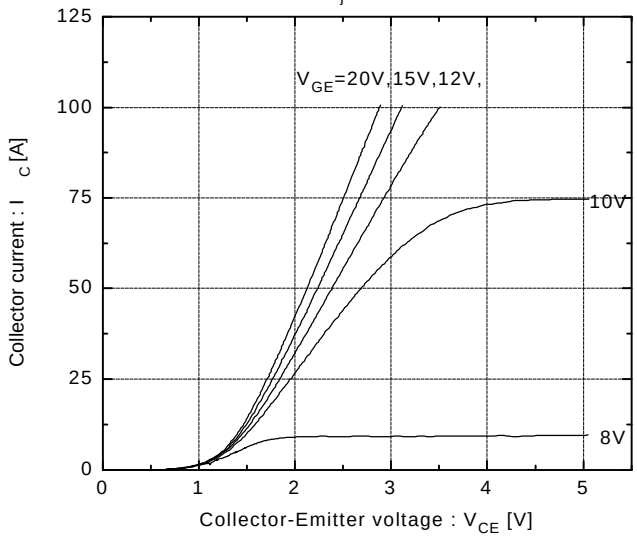
■ Electrical Characteristics(T_j=25°C)

		Items	Symbols	Test Conditions	Min.	Max.	Units
Inverter	IGBT	Zero Gate Voltage Collector Current	I_{CES}	V_{GE}=0V V_{CE}=600V		1.0	mA
		Gate-Emitter Leackage Current	I_{GES}	V_{CE}=0V V_{GE}=± 20V		20	μA
		Gate-Emitter Threshold Voltage	$V_{GE(th)}$	V_{GE}=20V I_C=50mA	4.5	7.5	V
		Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE}=15V I_C=50A		2.9	
		Input capacitance	C_{ies}	f=1MHz, V_{GE}=0V, V_{CE}=10V	3300 (typ.)		pF
		Turn-on Time	t_{on}	V_{CC} = 300V		1.2	μs
			t_r	I_C = 50A		0.6	
		Turn-off Time	t_{off}	V_{GE} = ±15V		1.0	
			t_f	R_G = 51Ω		0.35	
	FWD	Diode Forward On-Voltage	V_F	I_F=50A V_{GE}=0V		3.1	V
		Reverse Recovery Time	t_{rr}	I_F=50A		350	ns
Rectif.		Forward Voltage	V_{FM}	I_F = 50A		1.55	V
		Reverse Current	I_{RRM}	V_R =800V		1.0	mA
Brake Chopper	IGBT	Zero Gate Voltage Collector Current	I_{CES}	V_{GE}=0V V_{CE}=600V		1.0	mA
		Gate-Emitter Leackage Current	I_{GES}	V_{CE}=0V V_{GE}=± 20V		100	nA
		Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE}=15V I_C=50A		2.8	V
		Turn-on Time	t_{on}	V_{CC} = 300V		0.8	μs
			t_r	I_C = 50A		0.6	
		Turn-off Time	t_{off}	V_{GE} = ±15V		1.0	
			t_f	R_G = 51Ω		0.35	
	FWD	Reverse Current	I_{RRM}	V_R=600V		1.0	mA
		Reverse Recovery Time	t_{rr}			600	ns

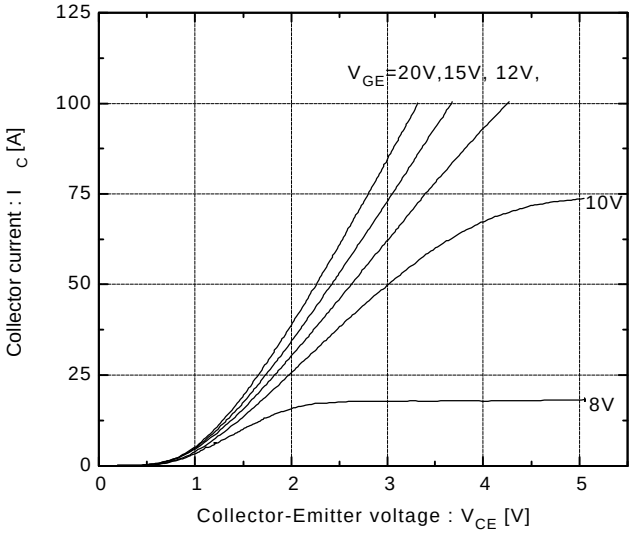
■ Thermal Characteristics

Items	Symbols	Test Conditions	Min.	Max.	Units
Thermal Resistance (1 device)	$R_{th(j-c)}$	Inverter IGBT		0.63	°C/W
		Inverter FRD		1.60	
		Brake IGBT		0.63	
		Converter Diode		2.10	
Contact Thermal Resistance	$R_{th(c-f)}$	With Thermal Compound	0.05 (typ.)		

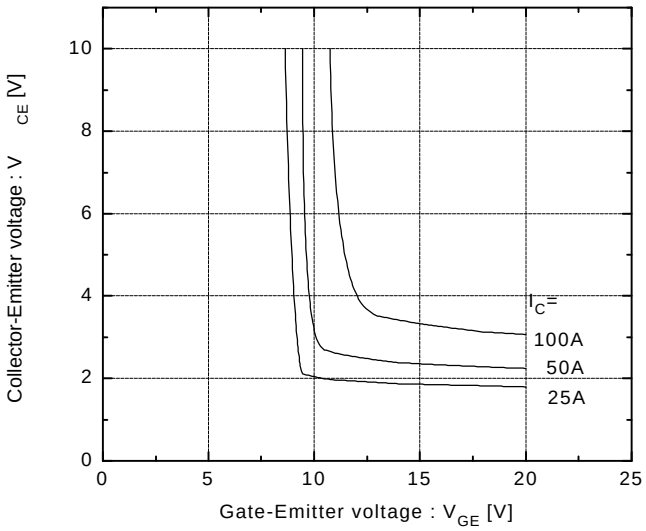
Collector current vs. Collector-Emitter voltage
T_j=25°C



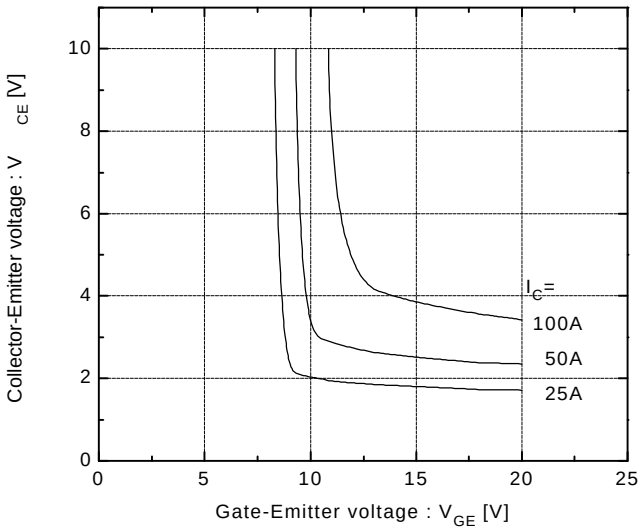
Collector current vs. Collector-Emitter voltage
T_j=125°C



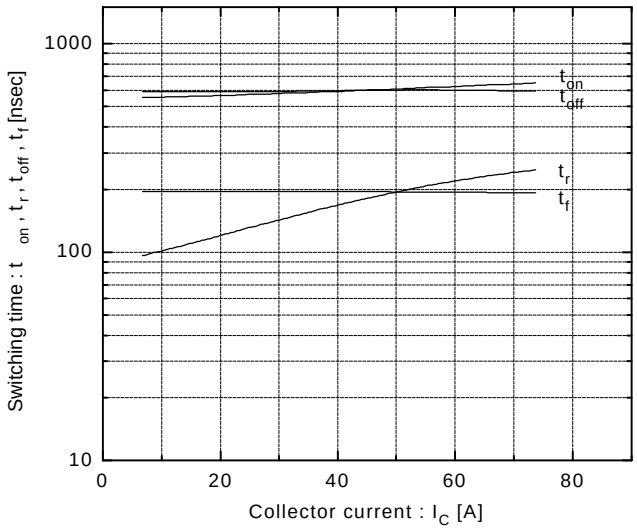
Collector-Emitter vs. Gate-Emitter voltage
T_j=25°C



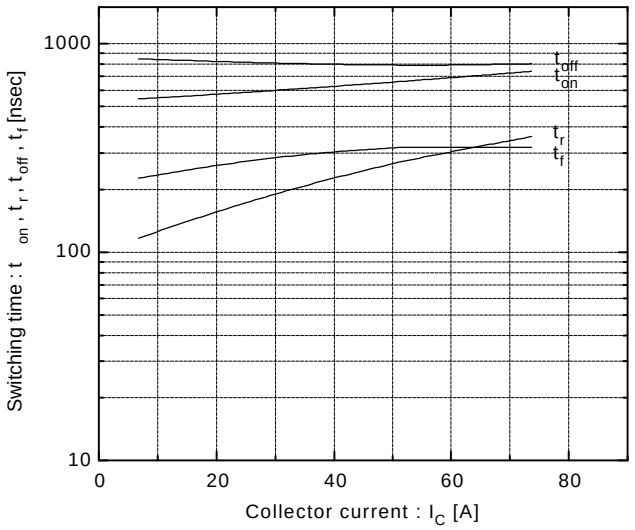
Collector-Emitter vs. Gate-Emitter voltage
T_j=125°C



Switching time vs. Collector current
V_{CC}=300V, R_G=51$_W$, V_{GE}=±15V, T_j=25°C

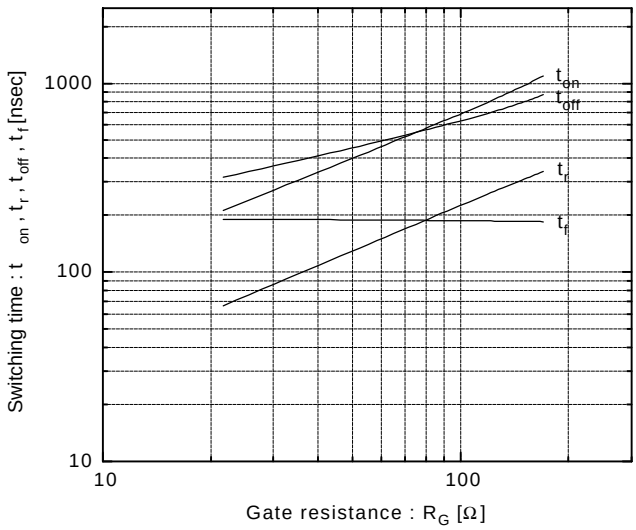


Switching time vs. Collector current
V_{CC}=300V, R_G=51Ω, V_{GE}=±15V, T_j=125°C



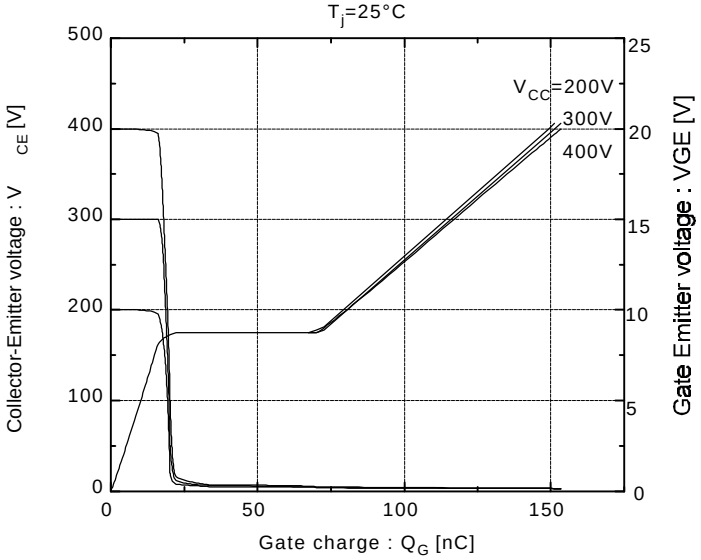
Switching time vs. R_G

V_{CC}=300V, I_C=30A, V_{GE}=±15V, T_j=25°C



Dynamic input characteristics

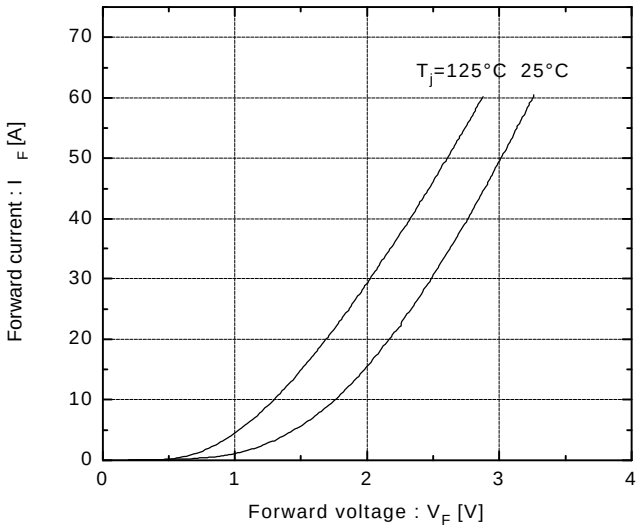
T_j=25°C



FRD

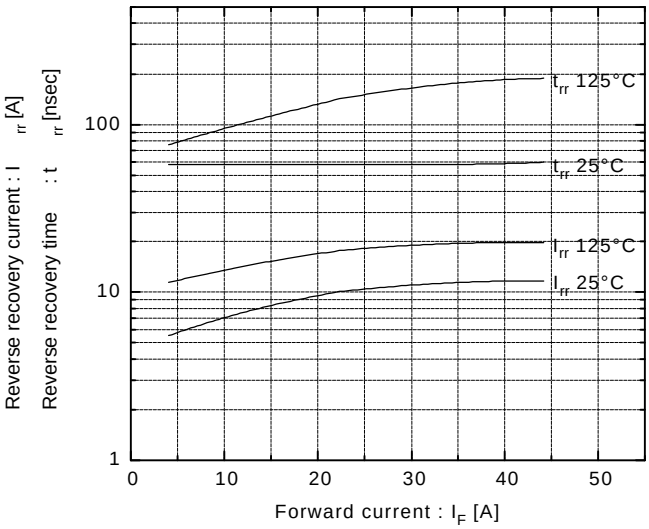
Forward current vs. Forward voltage

V_{GE}=OV

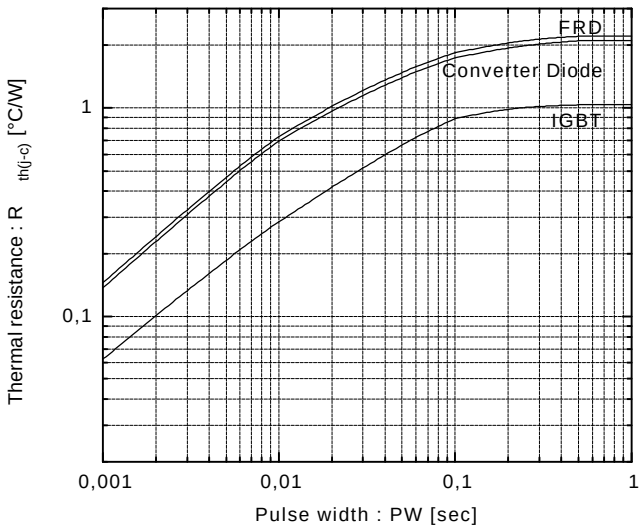


Reverse recovery characteristics

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

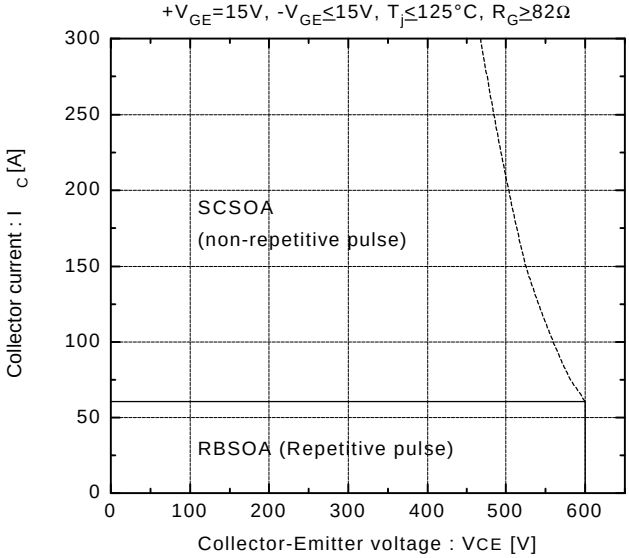


Transient thermal resistance



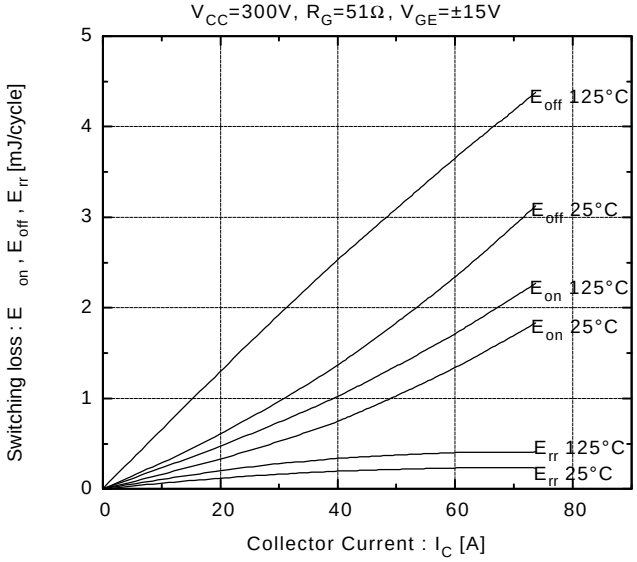
Reversed biased safe operating area

+V_{GE}=15V, -V_{GE}≤15V, T_j≤125°C, R_G≥82Ω



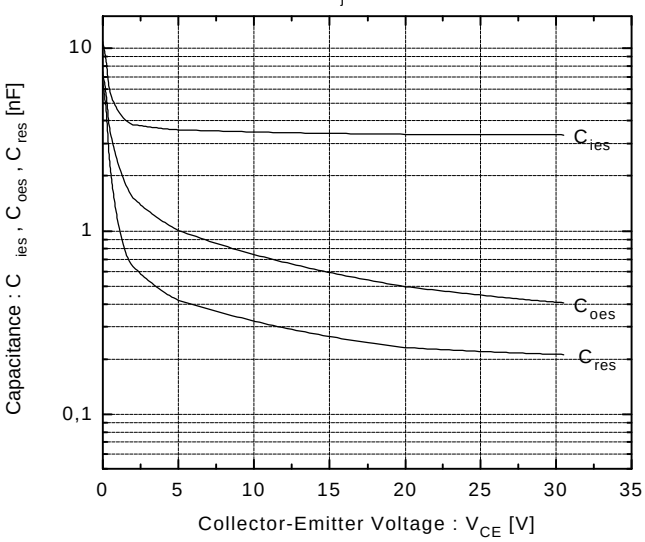
Switching loss vs. Collector current

V_{CC}=300V, R_G=51Ω, V_{GE}=±15V



Capacitance vs. Collector-Emitter voltage

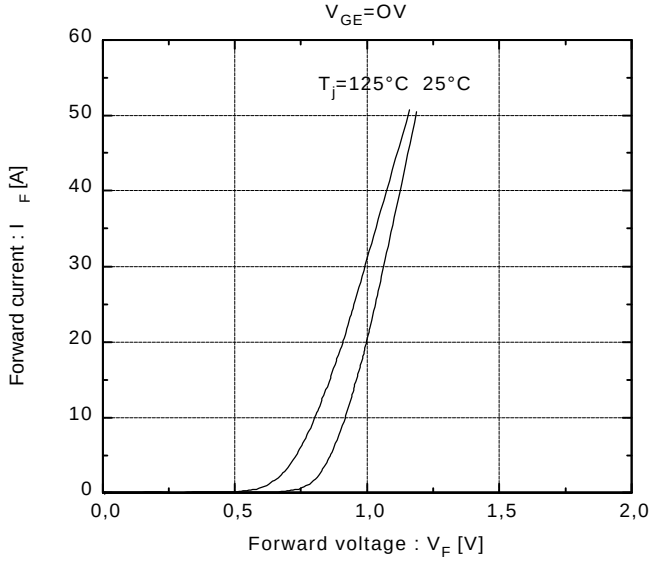
T_j=25°C



Converter Diode

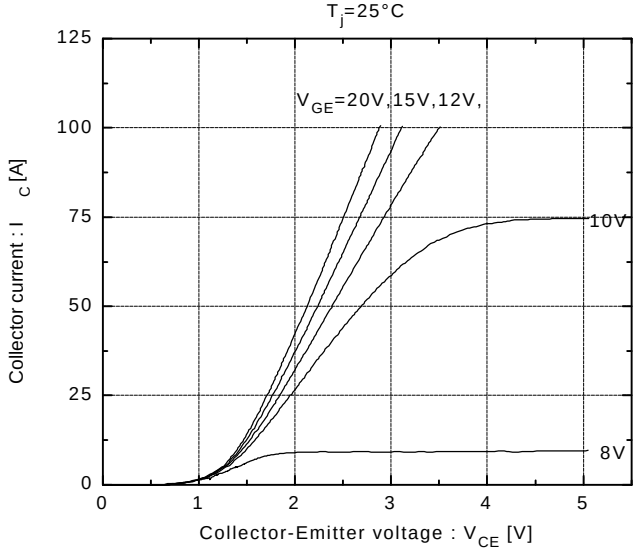
Forward current vs. Forward voltage

V_{GE}=OV

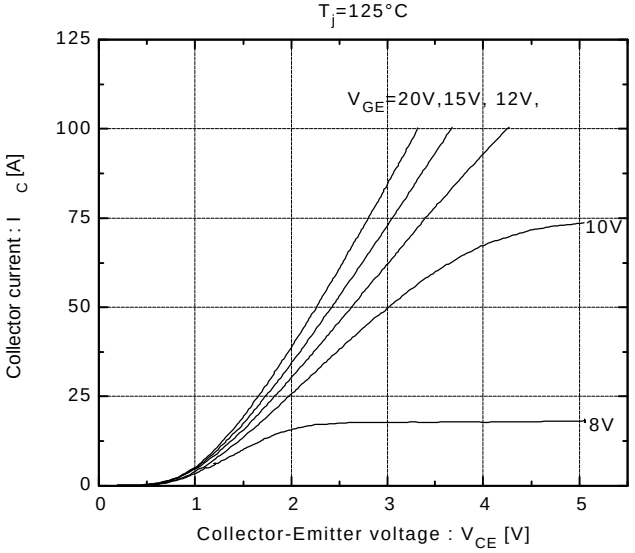


Brake Chopper IGBT

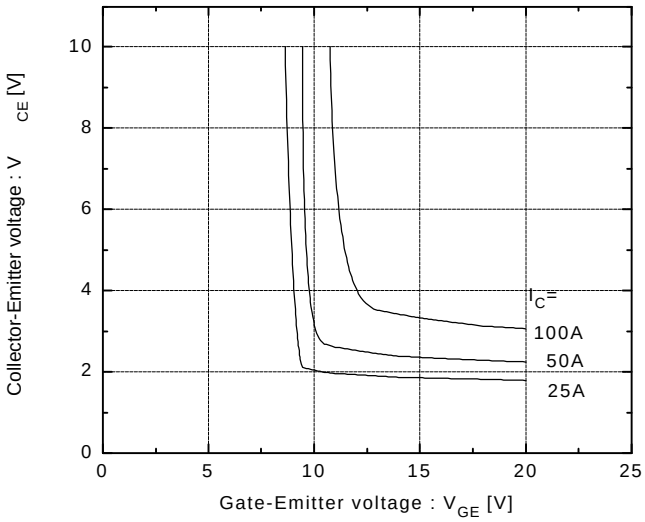
Collector current vs. Collector-Emitter voltage
T_j=25°C



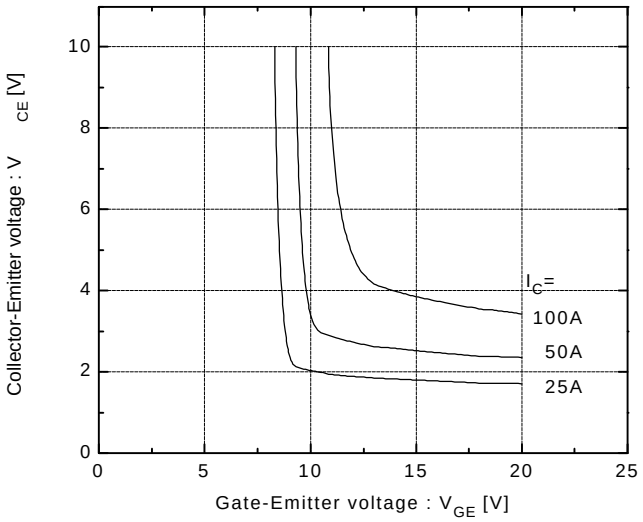
Collector current vs. Collector-Emitter voltage
T_j=125°C



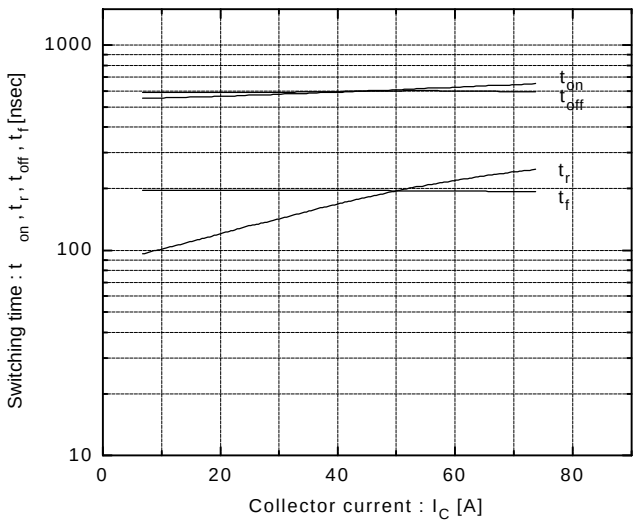
Collector-Emitter vs. Gate-Emitter voltage
T_j=25°C



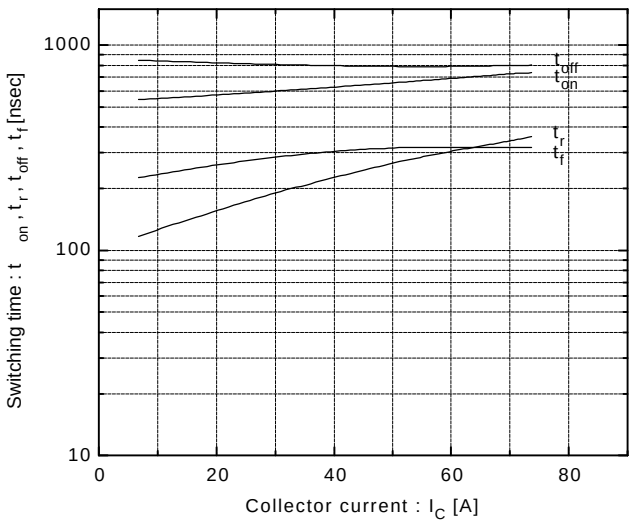
Collector-Emitter vs. Gate-Emitter voltage
T_j=125°C



Switching time vs. Collector current
V_{CC}=300V, R_G=51$_W$, V_{GE}=±15V, T_j=25°C



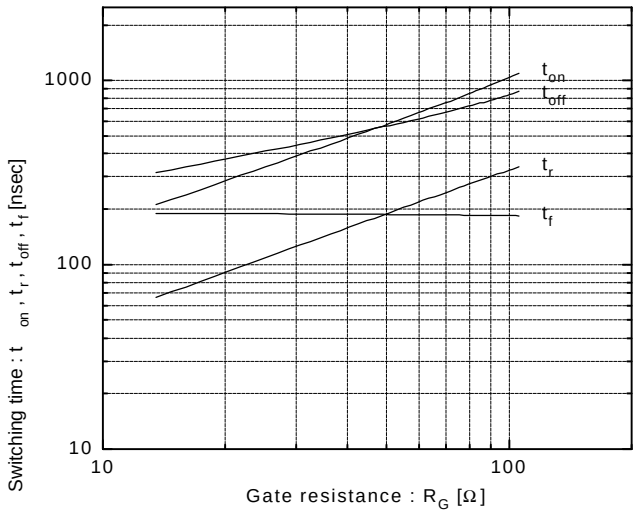
Switching time vs. Collector current
V_{CC}=300V, R_G=51Ω, V_{GE}=±15V, T_j=125°C



Brake Chopper IGBT

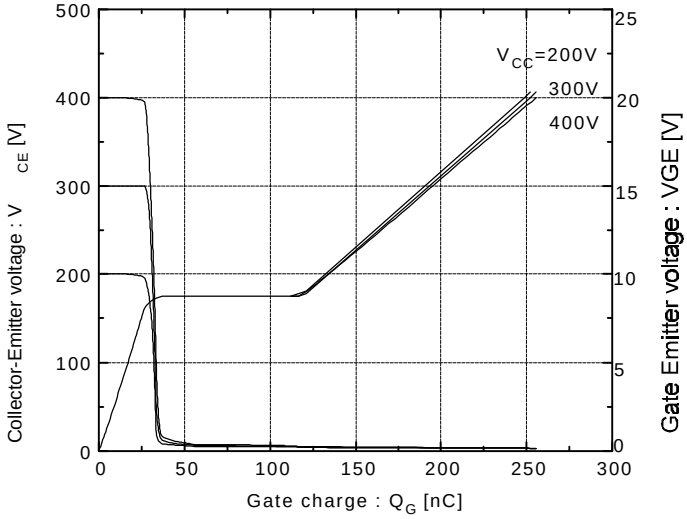
Switching time vs. R_G

V_{CC}=300V, I_C=50A, V_{GE}=±15V, T_j=25°C



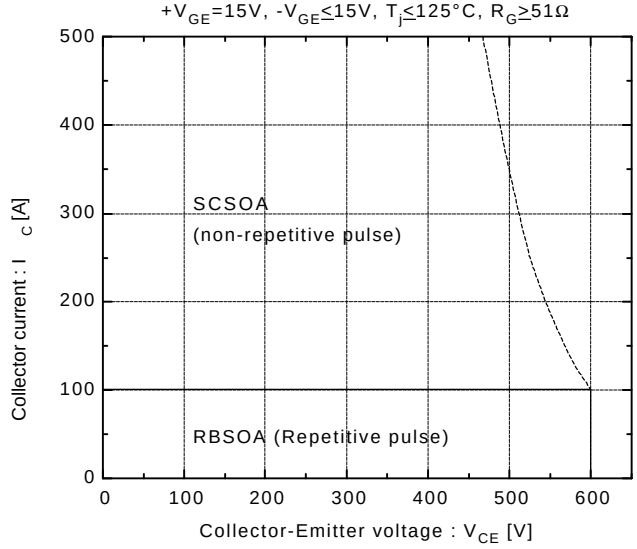
Dynamic input characteristics

T_j=25°C



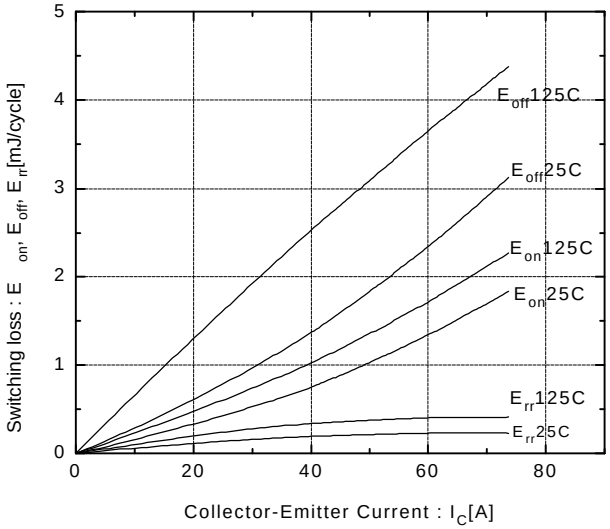
Reversed biased safe operating area

$+V_{GE}$=15V, $-V_{GE}$≤15V, T_j≤125°C, R_G≥51Ω



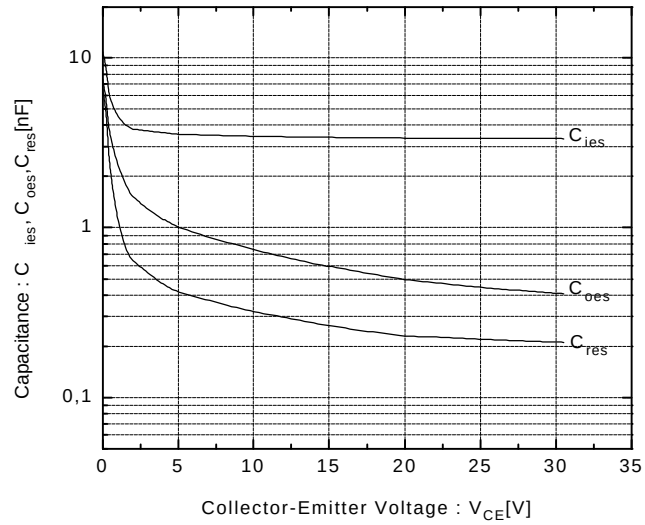
Switching loss vs. Collector current

V_{CC}=300V, R_G=51Ω, V_{GE}=±15V



Capacitance vs. Collector-Emitter Voltage

Tj=25C



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