FUJI ELECTRIC

7MBR 50SB-120

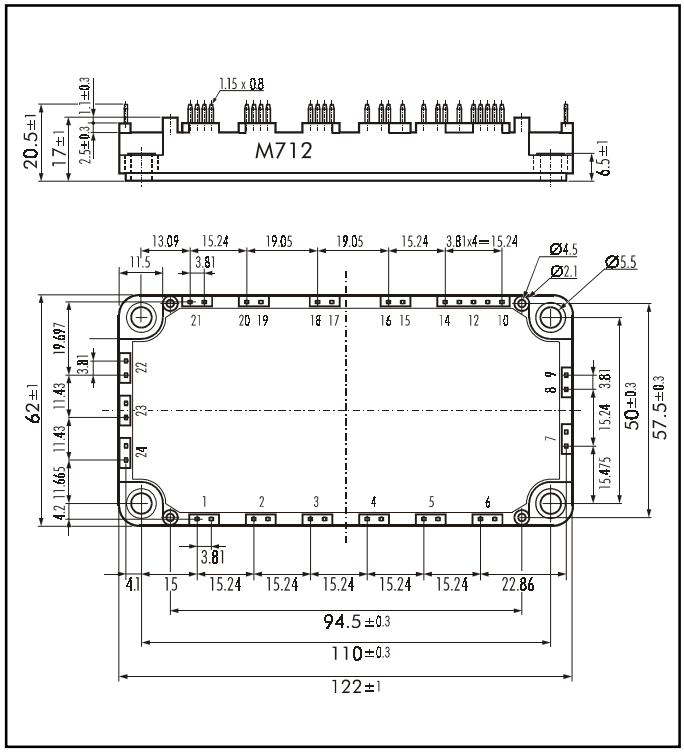
IGBT PIM
1200V
6x50A+Chopper

Power Integrated Module (PIM)

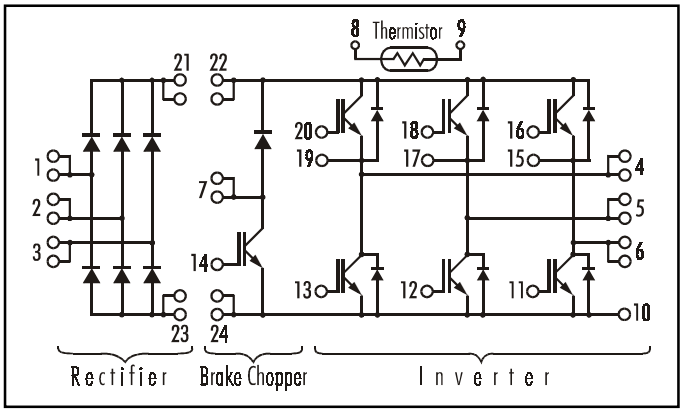
■ Features

- *NPT-Technology*
- *Solderable Package*
- *Square SC SOA at 10 x I_C*
- *High Short Circuit Withstand-Capability*
- *Small Temperature Dependence of the Turn-Off Switching Loss*
- *Low Losses And Soft Switching*

■ Outline Drawing



■ Equivalent Circuit

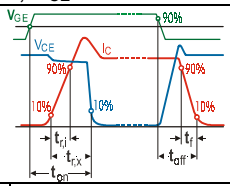


■ Absolute Maximum Ratings (T_c=25°C)

	Items	Symbols	Test Conditions		Ratings	Units
Inverter	Collector-Emitter Voltage	V_{CES}			1200	V
	Gate -Emitter Voltage	V_{GES}			± 20	
	Collector Current	I_C	Continuous	25°C / 80°C	75 / 50	A
		$I_{C\ PULSE}$	1ms	25°C / 80°C	150 / 100	
		$-I_{C\ PULSE}$			50	
	Collector Power Dissipation	P_C	1 device		360	W
Rectifier	Repetitive Peak Reverse Voltage	V_{RRM}			1600	V
	Average Output Current	I_O	50Hz/60Hz sinus wave		50	A
	Surge Current (Non Repetitive)	I_{FSM}	T_j=150°C, 10 ms, sinus wave		520	
	I^2t (Non Repetitive)				1352	A^2s
Brake Chopper	Collector-Emitter Voltage	V_{CES}			1200	V
	Gate –Emitter Voltage	V_{GES}			± 20	
	Collector Current	I_C	Continuous	25°C / 80°C	35 / 25	A
		$I_{C\ PULSE}$	1ms	25°C / 80°C	70 / 50	
	Collector Power Dissipation	P_C	1 device		180	W
	Repetitive Peak Reverse Voltage	V_{RRM}			1200	V
	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*				3.5	Nm

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

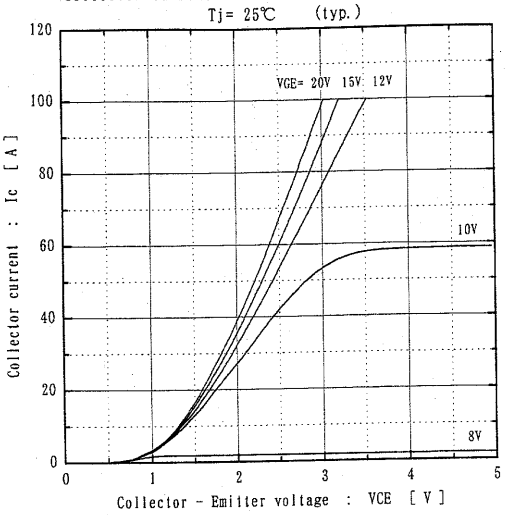
■ Electrical Characteristics(T_j=25°C)

	Items	Symbols	Test Conditions		Min.	Typ.	Max.	Units
Inverter IGBT	Zero Gate Voltage Collector Current	I_{CES}	V_{GE}=0V V_{CE}=1200V				1.0	mA
	Gate-Emitter Leackage Current	I_{GES}	V_{CE}=0V V_{GE}=± 20V				200	nA
	Gate-Emitter Threshold Voltage	$V_{GE(th)}$	V_{GE}=20V I_C=50mA		5.5	7.2	8.5	V
	Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE}=15V	Chip		2.1		
			I_C = 50A	Terminal		2.3		
	Input Capacitance	C_{ies}	f=1MHz, V_{GE}=0V, V_{CE}=10V			6000		pF
	Turn-on Time	t_{on}	V_{CC} = 600V I_C = 50A V_{GE} = ±15V R_G = 24Ω Inductive Load			0.35	1.2	µs
		$t_{r,x}$				0.25	0.6	
		$t_{r,i}$				0.10		
	Turn-off Time	t_{off}				0.45	1.0	
		t_f				0.08	0.3	
FRD	Diode Forward On-Voltage	V_F	I_F=50A	Chip		2.3		V
				Terminal		2.5	3.3	
	Reverse Recovery Time	t_{rr}	I_F=50A				350	ns
Rectifier	Forward Voltage	V_{FM}	I_F=50A	Chip		1.1		V
				Terminal		1.2	1.5	
	Reverse Current	I_{RRM}	V_R =1600V				1.0	mA
Brake Chopper	Zero Gate Voltage Collector Current	I_{CES}	V_{GE}=0V V_{CE}=1200V				1.0	mA
	Gate-Emitter Leackage Current	I_{GES}	V_{CE}=0V V_{GE}=± 20V				200	nA
	Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE}=15V	Chip		2.10		V
			I_C=50A	Terminal		2.25	2.7	
	Turn-on Time	t_{on}	V_{CC} = 600V I_C = 15A V_{GE} = ±15V R_G = 51Ω			0.35	1.2	µs
		$t_{r,x}$				0.25	0.6	
	Turn-off Time	t_{off}				0.45	1.0	
		t_f				0.08	0.3	
	Reverse Current	I_{RRM}	V_R=1200V				1.0	mA
NTC	Resistance	R	T= 25°C			5000		Ω
			T=100°C		465	495	520	
	B Value	B	T=25 / 50°C		3305	3375	3450	K

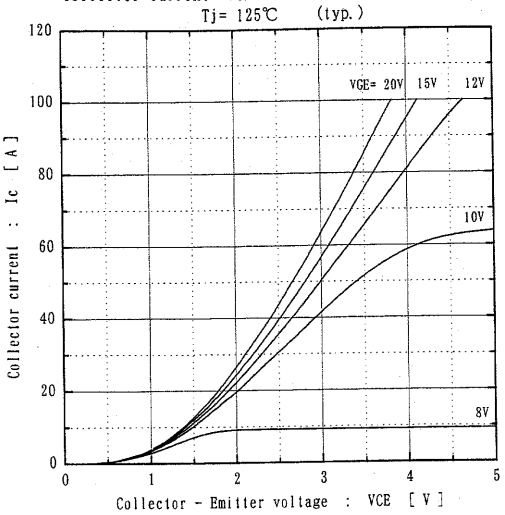
■ Thermal Characteristics

Items	Symbols	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance (1 device)	$R_{th(j-c)}$	Inverter IGBT			0.35	°C/W
		Inverter FRD			0.75	
		Brake IGBT			0.69	
		Rectifier Diode			0.50	
Contact Thermal Resistance	$R_{th(c-f)}$	With Thermal Compound		0.05		

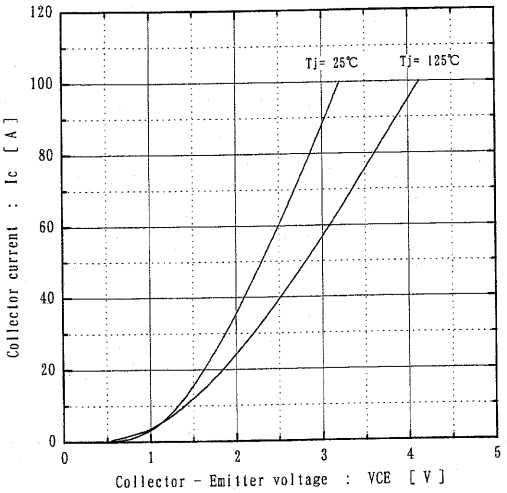
[Inverter]
Collector current vs. Collector-Emiiter voltage
Tj= 25℃ (typ.)



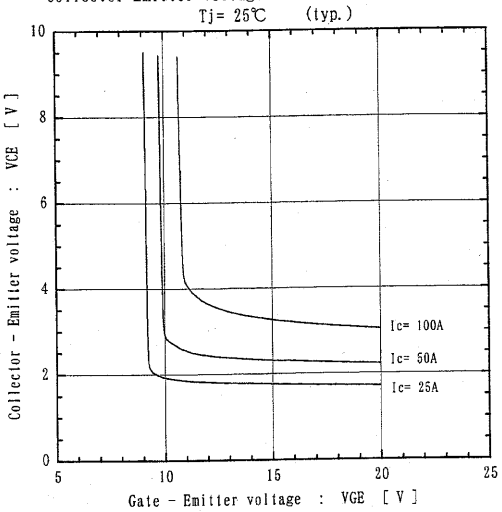
[Inverter]
Collector current vs. Collector-Emiiter voltage
Tj= 125℃ (typ.)



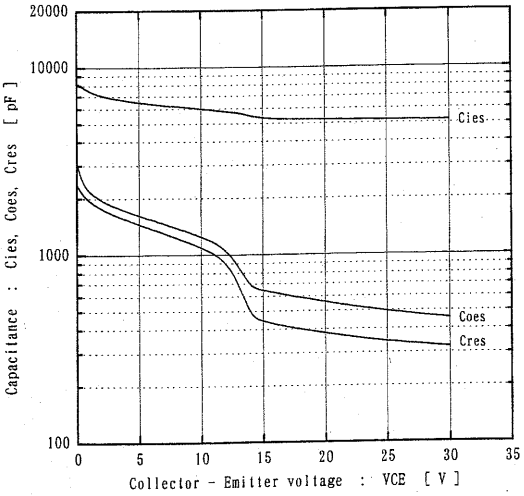
[Inverter]
Collector current vs. Collector-Emiiter voltage
VGE=15V (typ.)



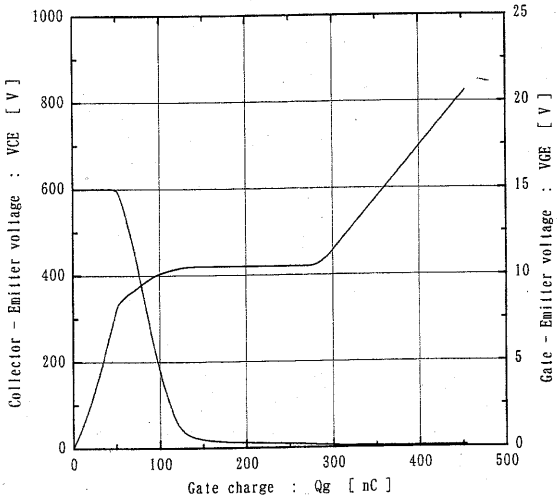
[Inverter]
Collector-Emiiter voltage vs. Gate-Emitter voltage
Tj= 25℃ (typ.)



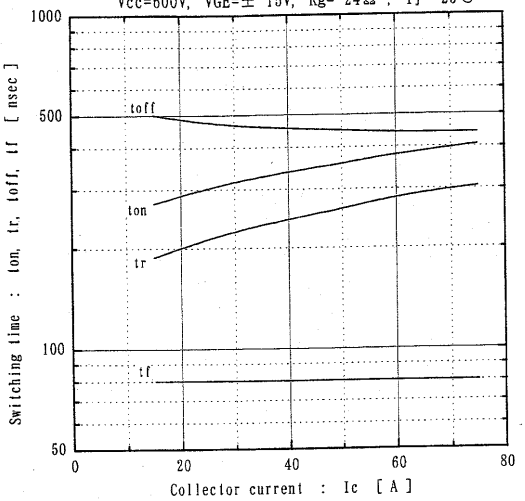
[Inverter]
Capacitance vs. Collector-Emiiter voltage (typ.)
VGE=0V, f= 1MHz, Tj= 25℃



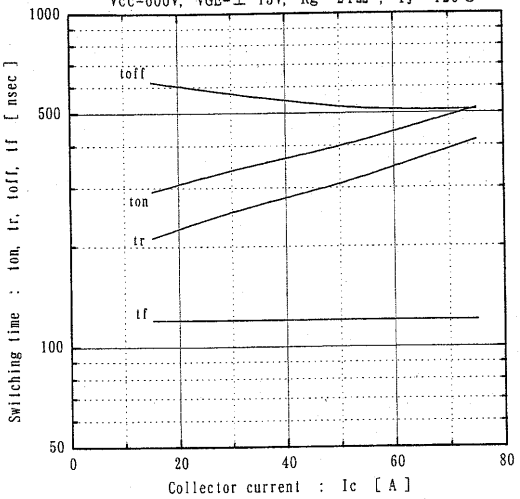
[Inverter]
Dynamic Gate charge (typ.)
Vcc=600V, Ic=50A, Tj= 25℃



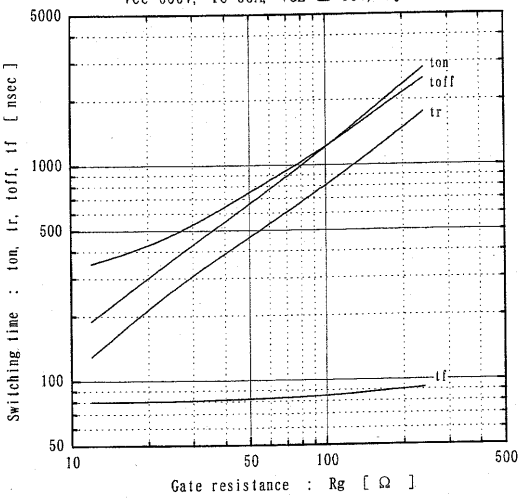
[Inverter]
Switching time vs. Collector current (typ.)
Vcc=600V, VGE=± 15V, Rg= 24Ω , Tj= 25℃



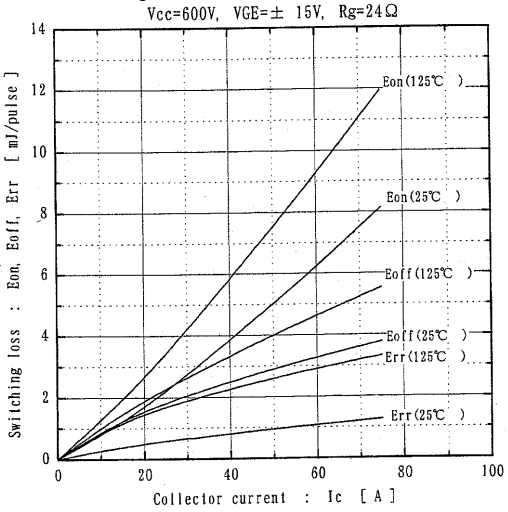
[Inverter]
Switching time vs. Collector current (typ.)
Vcc=600V, VGE=± 15V, Rg= 24Ω , Tj= 125℃



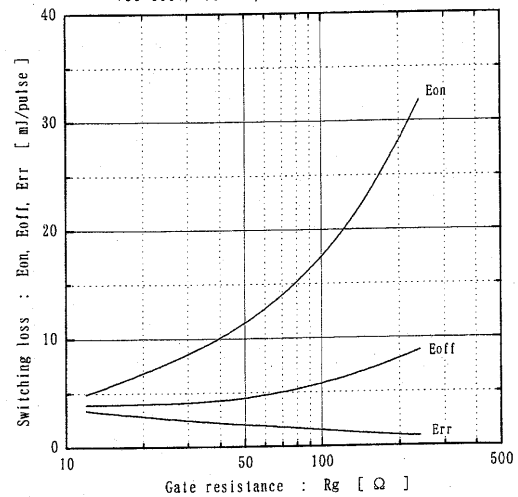
[Inverter]
Switching time vs. Gate resistance (typ.)
Vcc=600V, Ic=50A, VGE=± 15V, Tj= 25℃



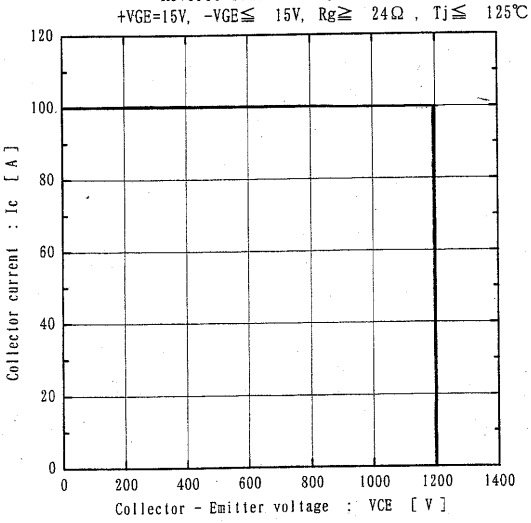
[Inverter]
Switching loss vs. Collector current (typ.)
Vcc=600V, VGE=± 15V, Rg=24Ω



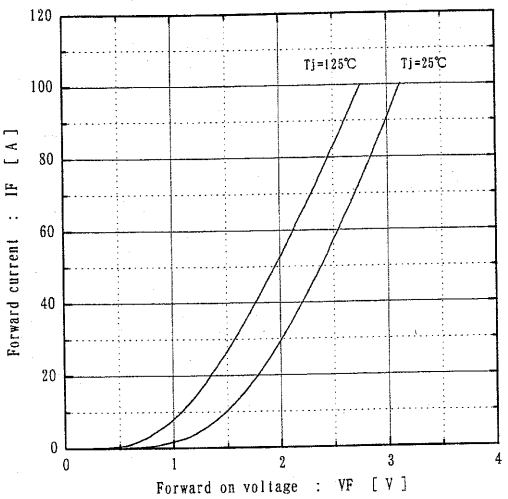
[Inverter]
Switching loss vs. Gate resistance (typ.)
Vcc=600V, Ic=50A, VGE=± 15V, Tj= 125℃



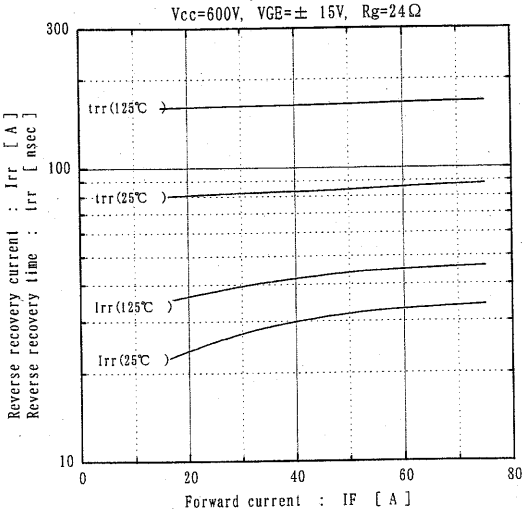
[Inverter]
Reverse bias safe operating area
+VGE=15V, -VGE≦ 15V, Rg≧ 24Ω , Tj≦ 125℃



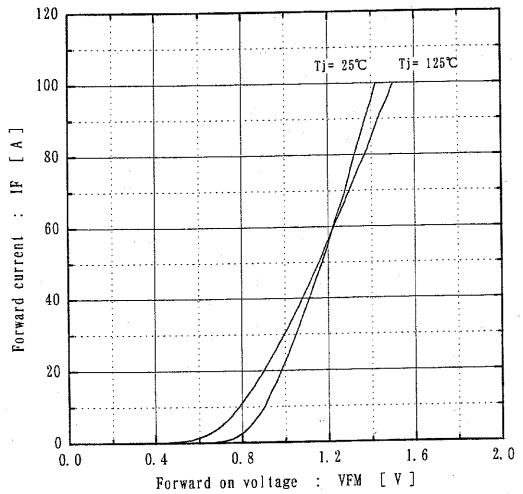
[Inverter]
Forward current vs. Forward on voltage (typ.)



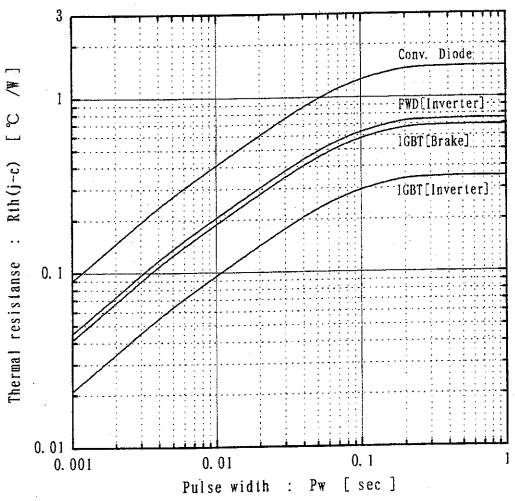
[Inverter]
Reverse recovery characteristics (typ.)
Vcc=600V, VGB=± 15V, Rg=24Ω



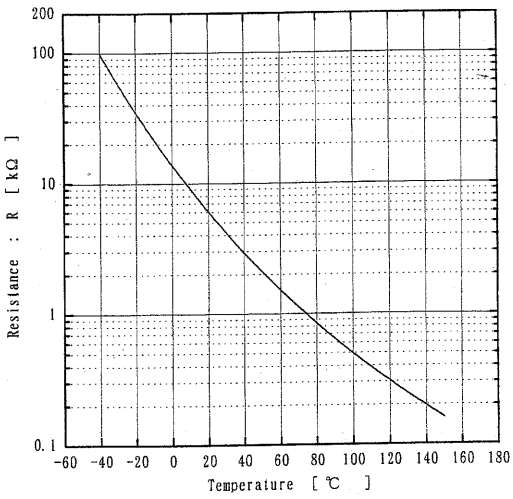
[Converter]
Forward current vs. Forward on voltage (typ.)



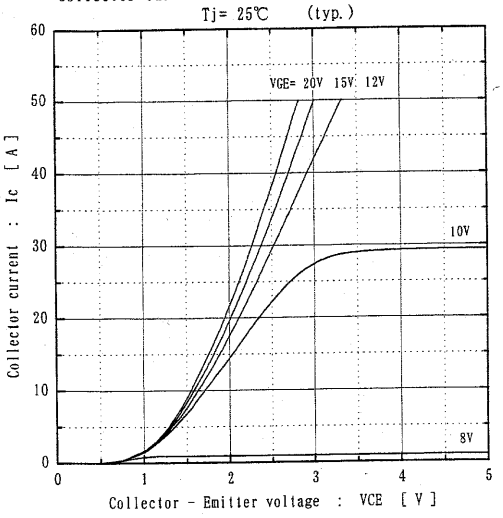
Transient thermal resistance



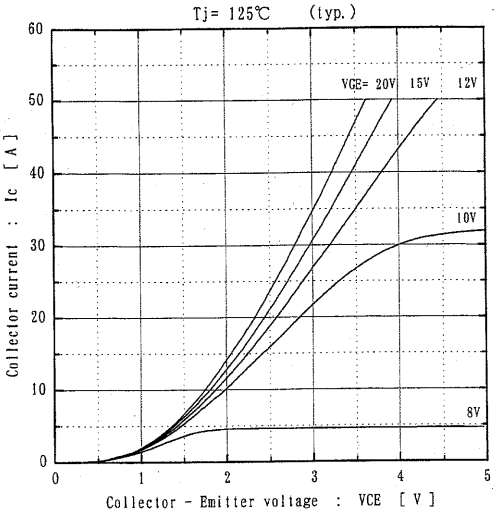
[Thermistor]
Temperature characteristic (typ.)



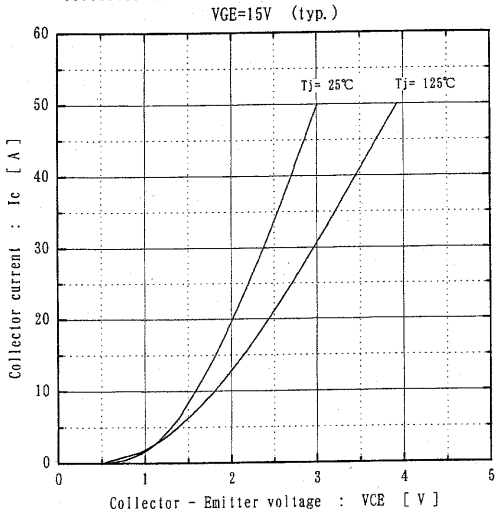
[Brake]
Collector current vs. Collector-Emiiter voltage
Tj= 25℃ (typ.)



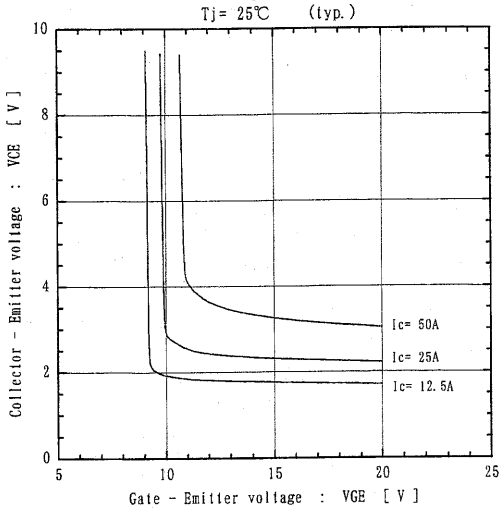
[Brake]
Collector current vs. Collector-Emiiter voltage
Tj= 125℃ (typ.)



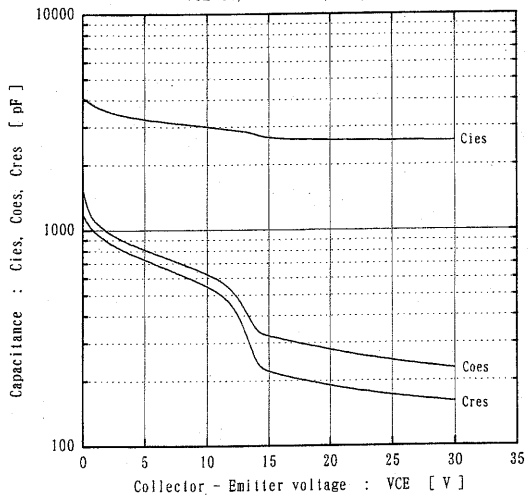
[Brake]
Collector current vs. Collector-Emiiter voltage
VGE=15V (typ.)



[Brake]
Collector-Emiiter voltage vs. Gate-Emitter voltage
Tj= 25℃ (typ.)



[Brake]
Capacitance vs. Collector-Emiiter voltage (typ.)
VGE=0V, f= 1MHz, Tj= 25℃



[Brake]
Dynamic Gate charge (typ.)
Vcc=600V, Ic=25A, Tj= 25℃