SPECIFICATION

Device Name : Power Integrated Module

Type Name : 7MBR20SA060

Spec. No. : MS6M 0470

Fuji Electric Co., Ltd.
Matsumoto Factory

	DATE	NAME	APPROVED
DRAWN	Jan.-25-'00	T. Satou	
CHECKED	Jan.-25-'00	S. Nyuhara	T. Hayaoka

Fuji Electric Co.,Ltd.

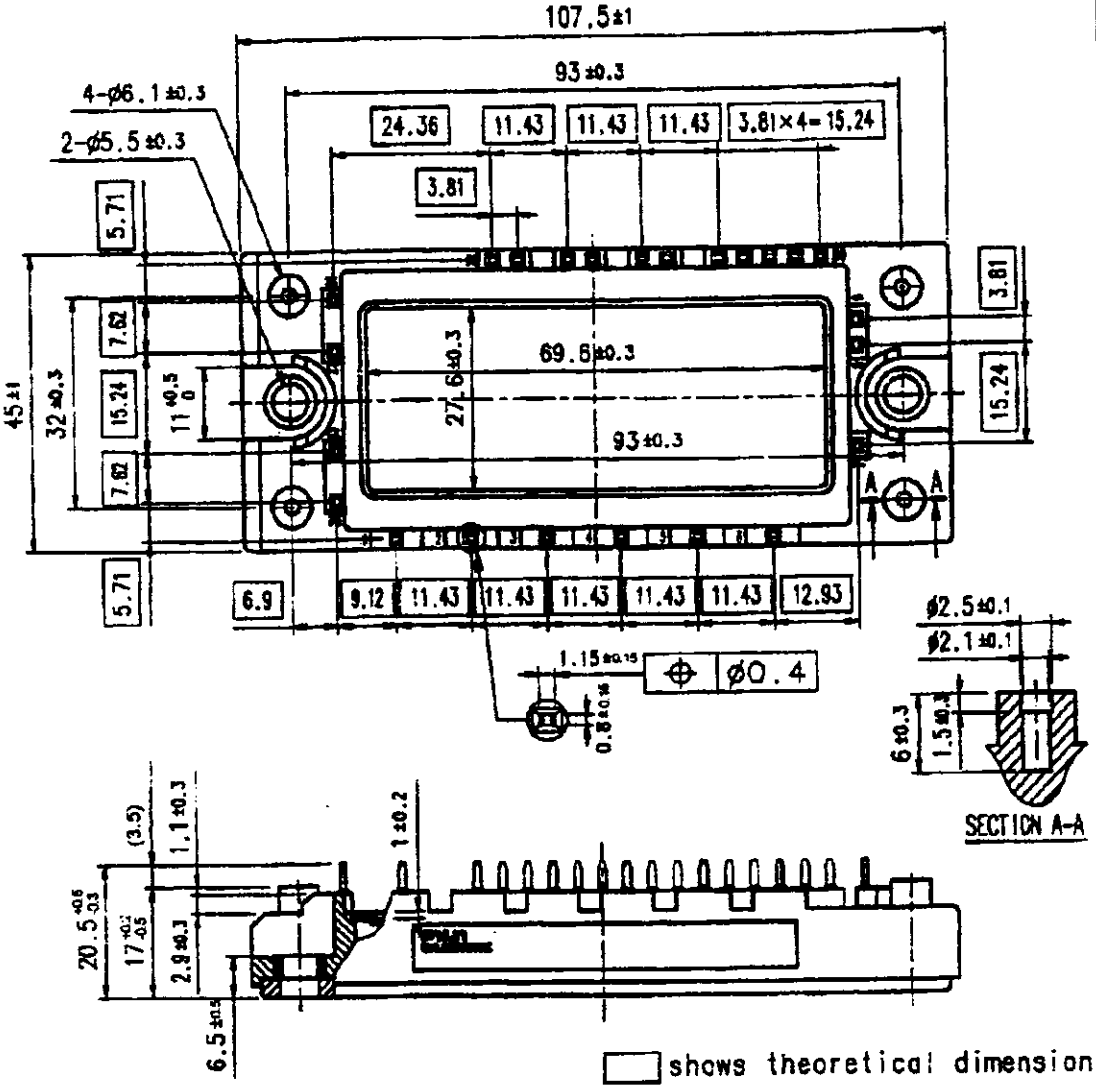
DWG.NO. MS6M 0470 1/10

Revised Records

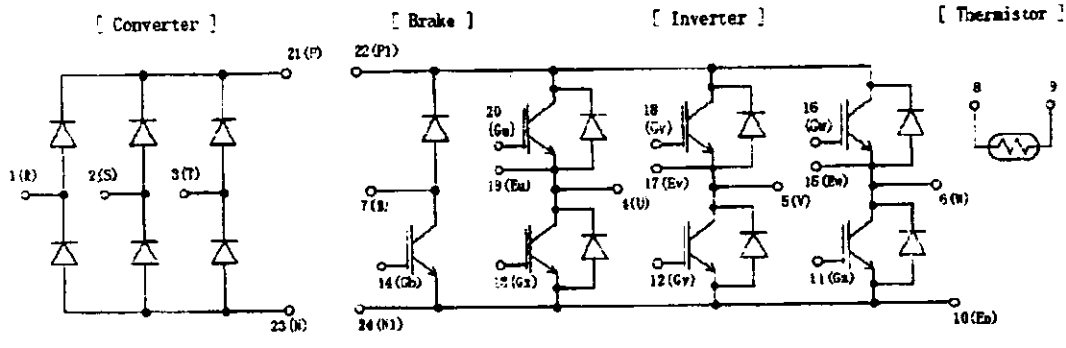
Date	Classi-fication	Ind.	Content	Applied dete	Drawn	Checked	Approved
Jan-5-'90	enactment	—	———	Issued date	—	N. Nakata	T. Miyata

7MBR20SA060

1. Outline Drawing (Unit : mm)



2. Equivalent circuit



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H04-004-03

3. Absolute Maximum Ratings (at Tc= 25℃ unless otherwise specified)

Items		Symbols	Conditions	Maximum Ratings	Units
Inverter	Collector-Emitter voltage	VCES		600	V
	Gate-Emitter voltage	VGES		±20	V
	Collector current	Ic	Continuous	20	A
		Icp	1ms	40	A
		-Ic		20	A
	Collector Power Dissipation	Pc	1 device	80	W
Brake	Collector-Emitter voltage	VCES		600	V
	Gate-Emitter voltage	VGES		±20	V
	Collector current	Ic	Continuous	20	A
		Icp	1ms	40	A
	Collector Power Dissipation	Pc	1 device	50	W
	Repetitive peak reverse Voltage(Diode)	VRRM		600	V
Converter	Repetitive peak reverse Voltage	VRRM		800	V
	Average Output Current	Io	50Hz/60Hz sine wave	20	A
	Surge Current (Non-Repetitive)	IFSM	Tj=150℃, 10ms half sine wave	210	A
	I^2t (Non-Repetitive)	I^2t		221	A^2s
Junction temperature		Tj		150	℃
Storage temperature		Tstg		-40～ +125	℃
Isolation voltage	between terminal and copper base (*1)	Viso	AC : 1min.	2500	V
	between thermistor and others (*2)			2500	V
Mounting Screw Torque (*3)				3.5	N・m

(*1) All terminals should be connected together when isolation test will be done.

(*2) Terminal 8 and 9 should be connected together. Terminal 1 to 7 and 10 to 24 should be connected together and shorted to copper base.

(*3) Recommendable Value : 2.5～3.5 N・m (M5)

4. Electrical characteristics (at Tj= 25℃ unless otherwise specified)

	Items	Symbols	Conditions		Characteristics min.	typ.	Max.	Units
Inverter	Zero gate voltage Collector current	ICES	VGE = 0 V, VCE = 600 V				1.0	mA
	Gate-Emitter leakage current	IGES	VCE = 0 V, VGE = ±20 V				200	nA
	Gate-Emitter threshold voltage	VGE(th)	VCE = 20 V, Ic = 20 mA		5.5	7.8	8.5	V
	Collector-Emitter saturation voltage	VCE(sat)	VGE = 15 V, Ic = 20 A	chip		1.8		V
				terminal		1.95	2.4	
	Input capacitance	Cies	VGE = 0 V, VCE = 10 V, f = 1 MHz			3000		pF
	Turn-on time	ton	Vcc= 300 V, Ic = 20 A, VGE = ±15 V, RG = 120 Ω			0.45	1.2	μs
		tr				0.25	0.6	
		tr(i)				0.08		
	Turn-off time	toff				0.40	1.0	
		tf				0.05	0.35	
	Forward on voltage	VF	IF = 20 A	chip		1.8		V
				terminal		1.95	2.6	
	Reverse recovery time	trr	IF = 20 A				300	ns
Brake	Zero gate voltage Collector current	ICES	VGE = 0 V, VCE = 600 V				1.0	mA
	Gate-Emitter leakage current	IGES	VCE = 0 V, VGE = ±20 V				200	nA
	Collector-Emitter saturation voltage	VCE(sat)	VGE = 15 V, Ic = 20 A	chip		1.8		V
				terminal		1.95	2.4	
	Turn-on time	ton	Vcc= 300 V, Ic = 20 A, VGE = ±15 V, RG = 120 Ω			0.45	1.2	μs
		tr				0.25	0.6	
	Turn-off time	toff				0.40	1.0	
		tf				0.05	0.35	
	Reverse current	IRRM	VR = 600 V				1.0	mA
Converter	Forward on voltage	VFM	IF = 20 A	chip		1.1		V
				terminal		1.2	1.5	
	Reverse current	IRRM	VR = 800 V				1.0	mA
Thermistor	Resistance	R	T = 25℃			5000		Ω
			T =100℃		465	495	520	
	B value	B	T = 25/50℃		3305	3375	3450	K

5. Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics min.	typ.	Max.	Units
Thermal resistance (1 device)	Rth(j-c)	Inverter IGBT			1.56	℃/W
		Inverter FWD			3.00	
		Brake IGBT			2.50	
		Converter Diode			2.00	
Contact Thermal resistance	Rth(c-f)	with Thermal Compound ※		0.05		℃/W

※ This is the value which is defined mounting on the additional cooling fin with thermal compound.

6. Indication on module (モジュール表示)

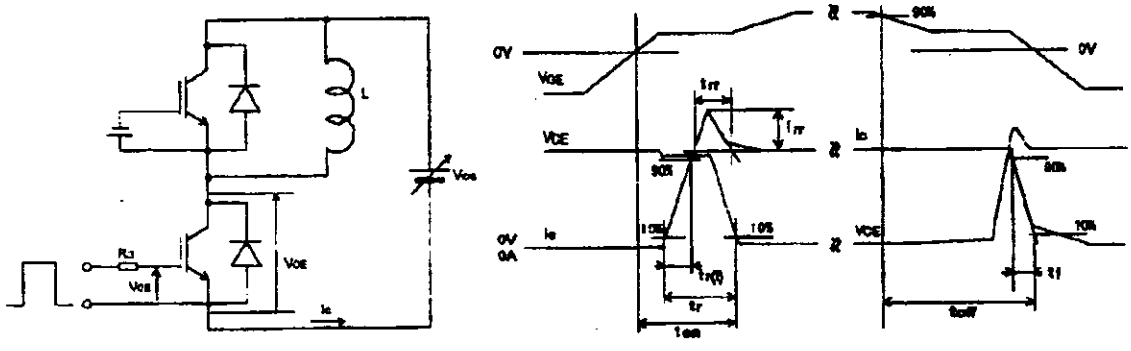
7. Applicable category (適用範囲)

This specification is applied to Power Integrated Module named 7MBR20SA060.
本納入仕様書はパワー集積モジュール 7MBR20SA060 に適用する。

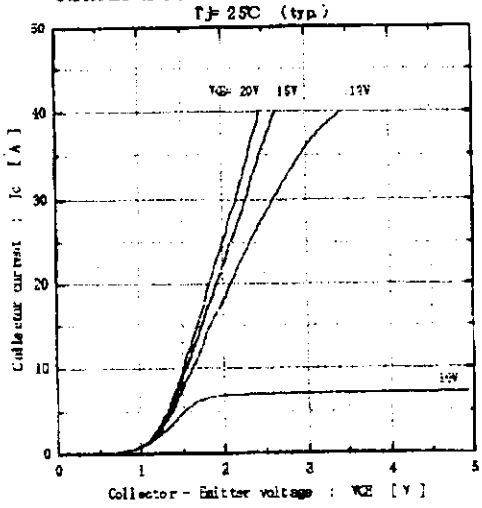
8. Storage and transportation notes (保管・運搬上の注意事項)

- The module should be stored at a standard temperature of 5 to 35℃ and humidity of 45 to 75%.
  常温・常湿保存が望ましい。(5～35℃, 45～75%)
- Store modules in a place with few temperature changes in order to avoid condensation on the module surface.
  急激な温度変化のなきこと。(モジュール表面が結露しないこと)
- Avoid exposure to corrosive gases and dust.
  腐蝕性ガスの発生場所, 塵埃の多い場所は避けること。
- Avoid excessive external force on the module.
  製品に荷重がかからないように 十分注意すること。
- Store modules with unprocessed terminals.
  モジュールの端子は未加工の状態で保管すること。
- Do not drop or otherwise shock the modules when transporting.
  製品の運搬時に衝撃を与えたり、落下させたりしないこと。
- Please connect adequate fuse or protector of circuit between three-phase line and this product to prevent the equipment from causing secondary destruction.
  万一の不慮の事故で素子が破壊した場合を考慮し、商用電源と本製品の間に適切な容量のヒューズ又はブレーカーを必ず付けて2次破壊を防いでください。

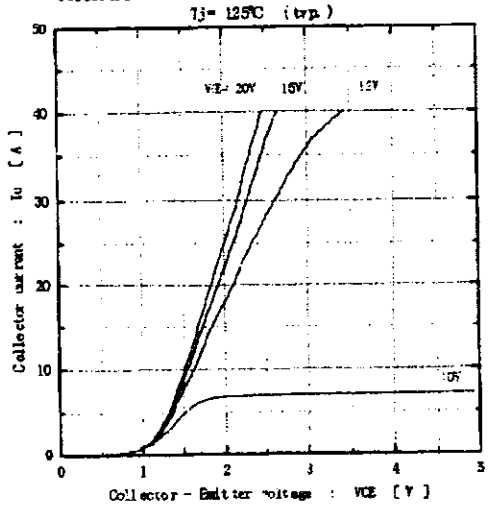
9. Definitions of switching time (スイッチング時間の定義)



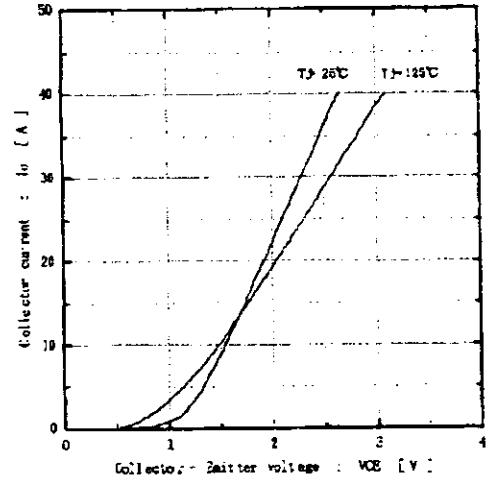
[Inverter]
Collector current vs. Collector-Emitter voltage
Tj= 25℃ (typ.)



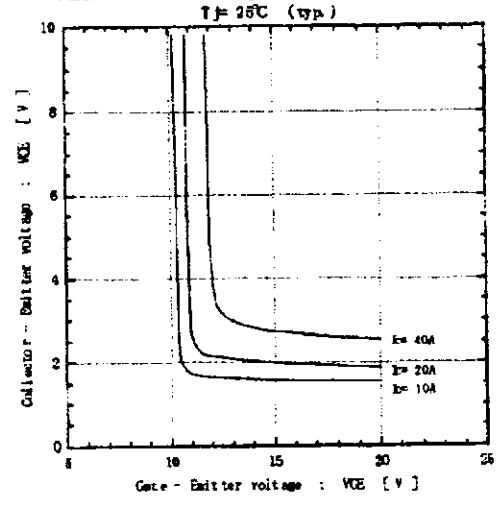
[Inverter]
Collector current vs. Collector-Emitter voltage
Tj= 125℃ (typ.)



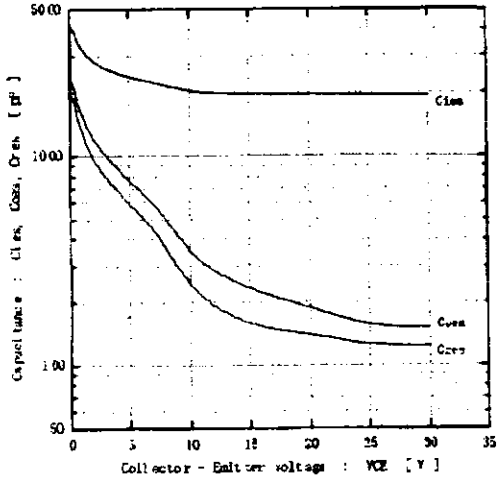
[Inverter]
Collector current vs. Collector-Emitter voltage
VGE=15V (typ.)



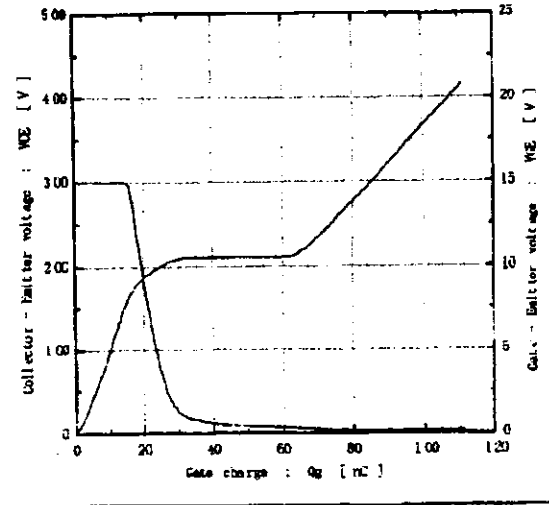
[Inverter]
Collector-Emitter voltage vs. Gate-Emitter voltage
Tj= 25℃ (typ.)



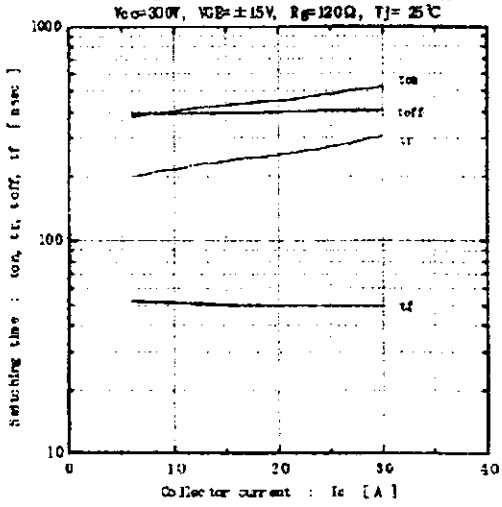
[Inverter]
Capacitance vs. Collector-Emitter voltage (typ.)
VGE=0V, f= 1MHz, Tj= 25℃



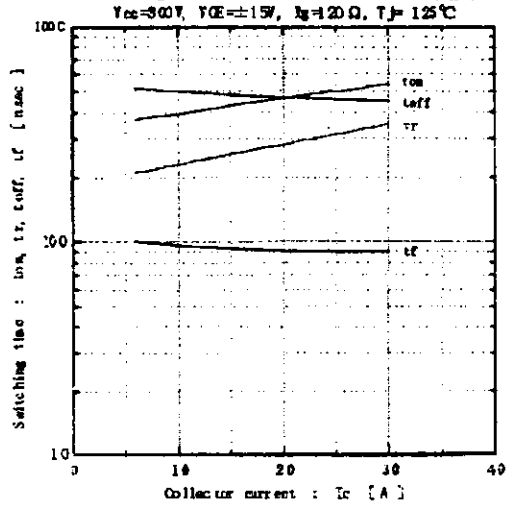
[Inverter]
Dynamic Gate charge (typ.)
Vcc=300V, Ic=20A, Tj= 25℃



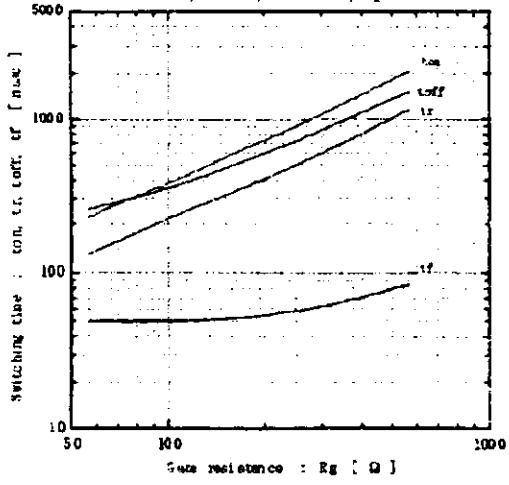
[Inverter]
Switching time vs. Collector current (typ.)
Vcc=300V, VGE=±15V, Rg=120Ω, Tj= 25℃



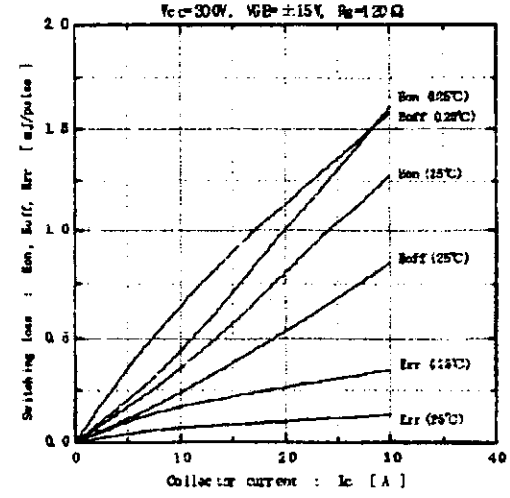
[Inverter]
Switching time vs. Collector current (typ.)
Vcc=300V, VGE=±15V, Rg=120Ω, Tj= 125℃



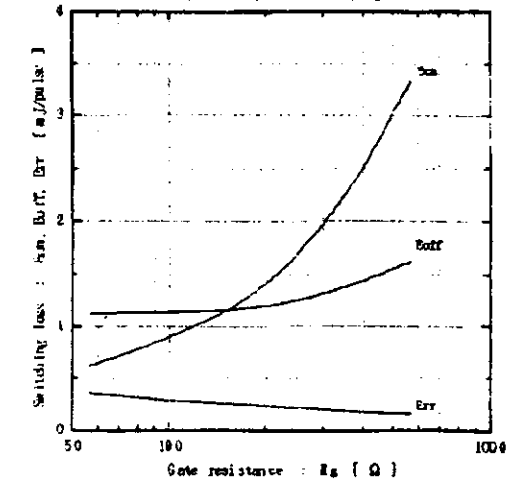
[Inverter]
Switching time vs. Gate resistance (typ.)
Vcc=300V, Ic=20A, VGE=±15V, Tj= 25℃



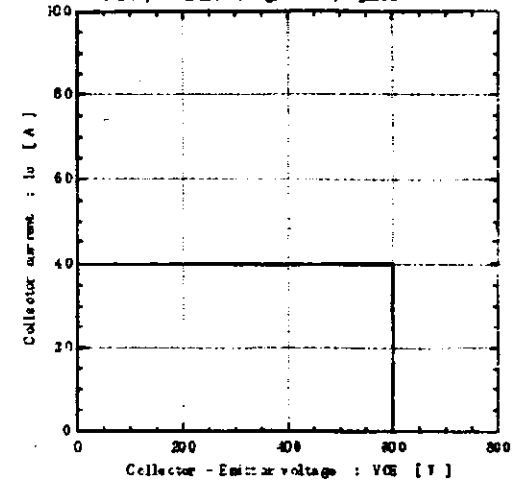
[Inverter]
Switching loss vs. Collector current (typ.)
Vcc=300V, VGE=±15V, Rg=120Ω



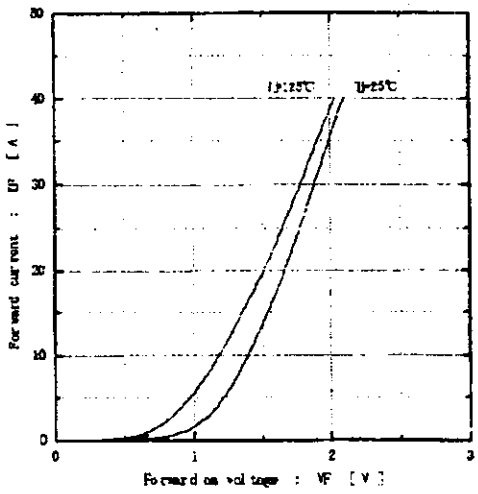
[Inverter]
Switching loss vs. Gate resistance (typ.)
Vcc=300V, Ic=20A, VGE=±15V, Tj= 125℃



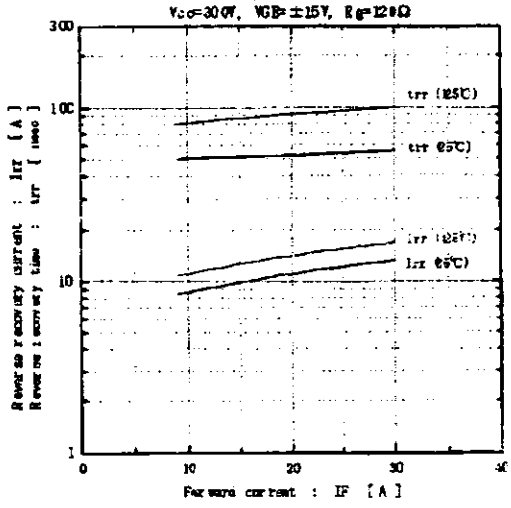
[Inverter]
Reverse bias safe operating area
+VGE=15V, -VGE≤15V, Rg≥120Ω, Tj≤125℃



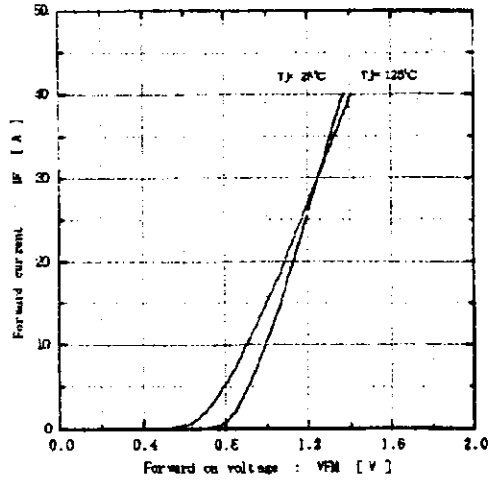
[Inverter]
Forward current vs. Forward on voltage (typ.)



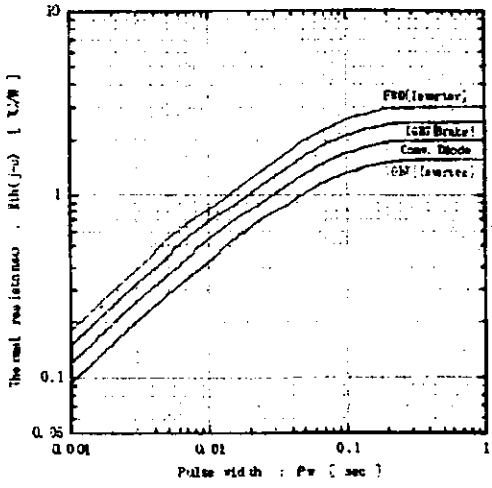
[Inverter]
Reverse recovery characteristics (typ.)
Vcc=300V, VGE=±15V, Rg=12Ω



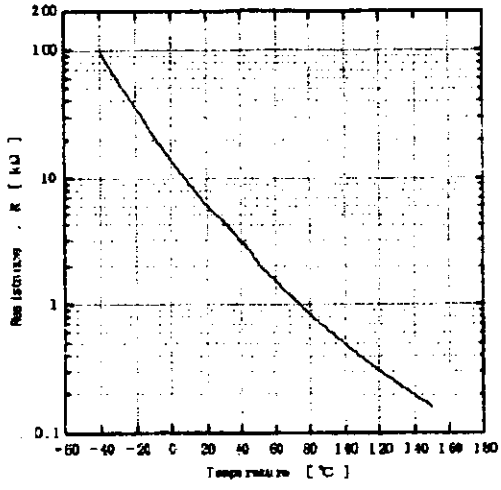
[Converter]
Forward current vs. Forward on voltage (typ.)



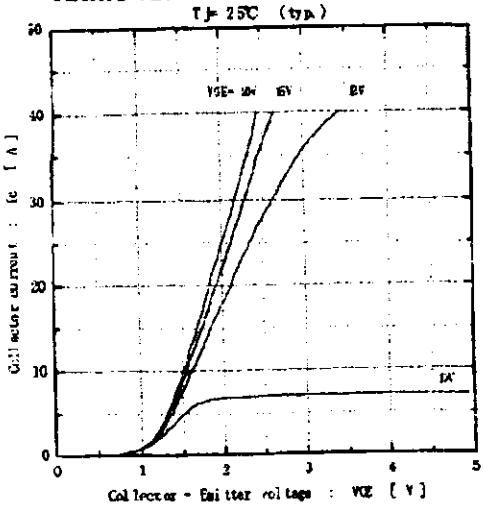
Transient thermal resistance



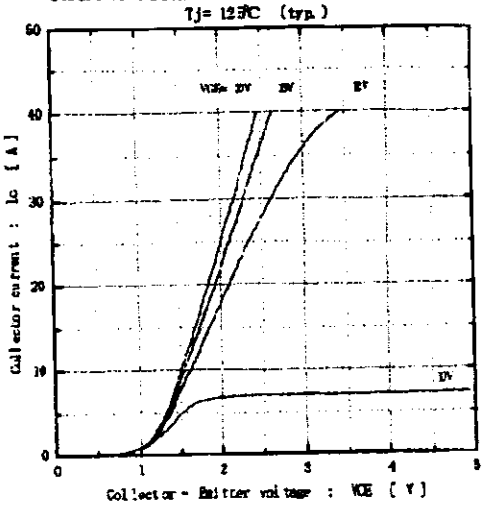
[Thermistor]
Temperature characteristic (typ.)



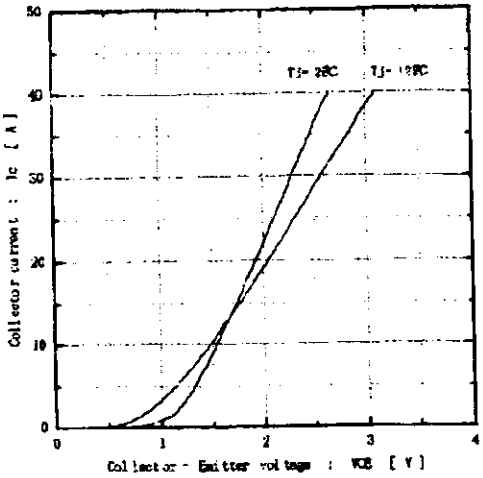
[Brake]
Collector current vs. Collector-Emitter voltage
Tj= 25℃ (typ.)



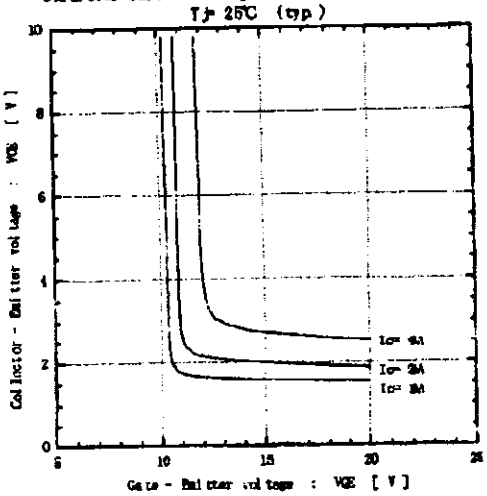
[Brake]
Collector current vs. Collector-Emitter voltage
Tj= 125℃ (typ.)



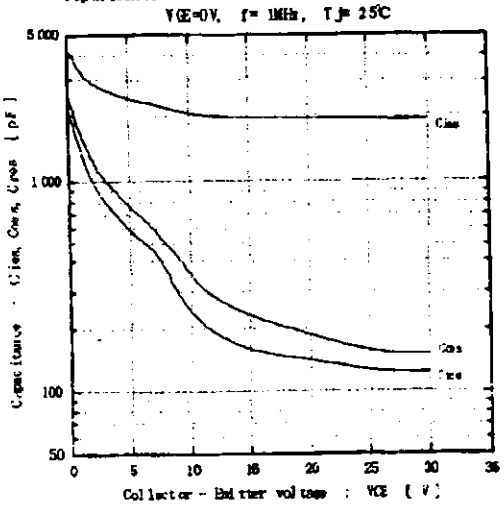
[Brake]
Collector current vs. Collector-Emitter voltage
VGE=15V (typ.)



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



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



[Brake]
Dynamic Gate charge (typ.)
Vcc=300V, Ic=20A, Tj= 25℃