

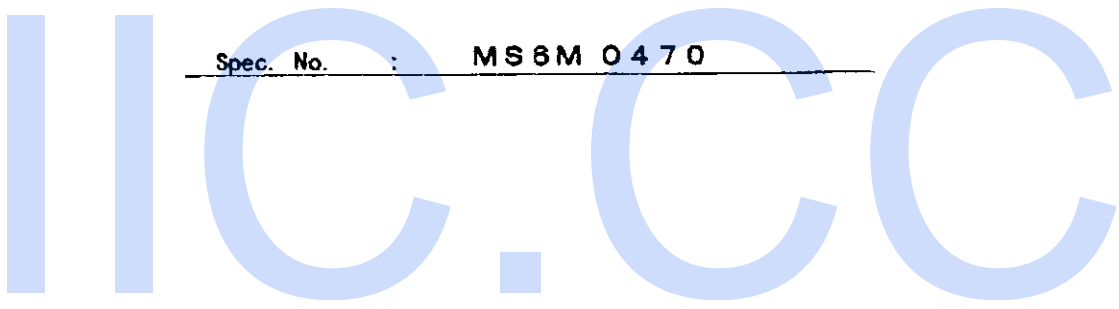
# SPECIFICATION

Device Name : Power Integrated Module

Type Name : 7MBR20SA060

Spec. No. : MS6M 0470

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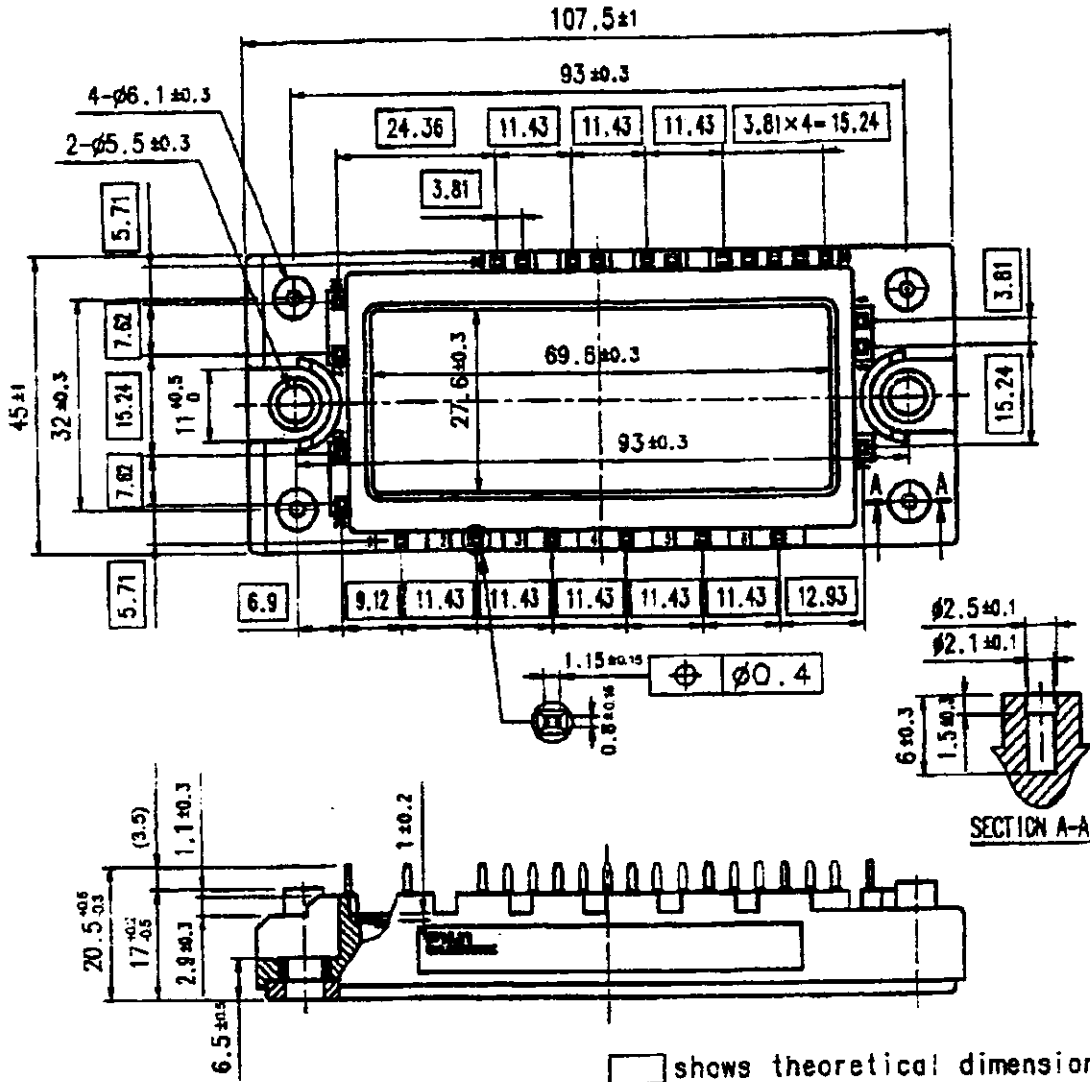
	DATE	NAME	APPROVED	Fuji Electric Co., Ltd.	
DRAWN	Jan -25-'00	T. Satou	<i>T. Satou</i>	MS6M 0470	1 / 10
CHECKED	Jan -25-'00	S. Nishida			

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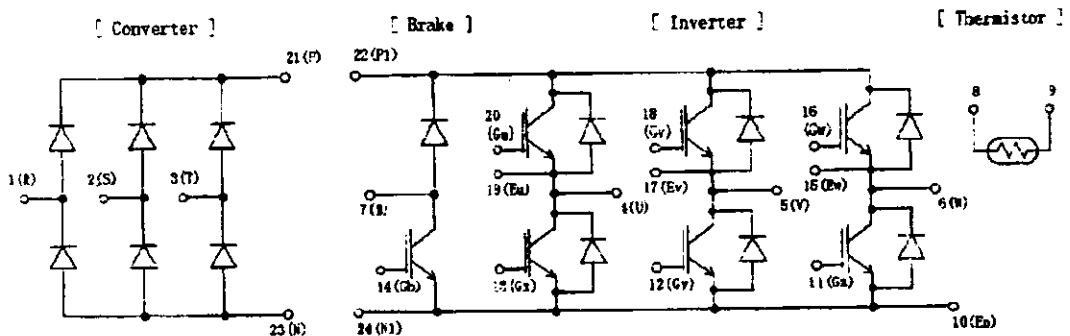
7MBR20SA060

1. Outline Drawing ( Unit : mm )



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2. Equivalent circuit



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

Items		Symbols	Conditions	Maximum Ratings	Units
Inverter	Collector-Emitter voltage	V <sub>CE</sub>		600	V
	Gate-Emitter voltage	V <sub>GE</sub>		±20	V
	Collector current	I <sub>c</sub>	Continuous	20	A
		I <sub>cp</sub>	1ms	40	A
		-I <sub>c</sub>		20	A
Collector Power Dissipation	P <sub>c</sub>	1 device	80	W	
Brake	Collector-Emitter voltage	V <sub>CE</sub>		600	V
	Gate-Emitter voltage	V <sub>GE</sub>		±20	V
	Collector current	I <sub>c</sub>	Continuous	20	A
		I <sub>cp</sub>	1ms	40	A
	Collector Power Dissipation	P <sub>c</sub>	1 device	50	W
Converter	Repetitive peak reverse Voltage(Diode)	V <sub>RRM</sub>		600	V
	Repetitive peak reverse Voltage	V <sub>RRM</sub>		800	V
	Average Output Current	I <sub>o</sub>	50Hz/60Hz sine wave	20	A
	Surge Current (Non-Repetitive)	I <sub>PSM</sub>	T <sub>j</sub> =150°C, 10ms	210	A
	I <sup>2</sup> t (Non-Repetitive)	I <sup>2</sup> t	half sine wave	221	A <sup>2</sup> s
Junction temperature	T <sub>j</sub>		150	°C	
Storage temperature	T <sub>stg</sub>		-40~ +125	°C	
Isolation voltage	between terminal and copper base <sup>(*)1</sup>	Viso	AC : 1min.	2500	V
	between thermistor and others <sup>(*)2</sup>			2500	V
Mounting Screw Torque <sup>(*)3</sup>				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)

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

Items	Symbols	Conditions	Characteristics			Units		
			min.	typ.	Max.			
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		3600		pF	
	Turn-on time	ton	Vcc= 300 V Ic = 20 A		0.45	1.2	μs	
		tr			0.25	0.6		
		tr(1)	VGE = ±15 V		0.08			
	Turn-off time	toff	RG = 120 Ω		0.40	1.0	μs	
tf				0.05	0.35			
Forward on voltage	VF	IF = 20 A	chip		1.8		V	
			terminal		1.95	2.5		
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		0.45	1.2	μs	
		tr			0.25	0.6		
		toff	VGE = ±15 V		0.40	1.0		
	Turn-off time	toff	RG = 120 Ω		0.05	0.35	μs	
		tf						
	Reverse current	IRRM	VR = 800 V			1.0	mA	
Converter	Forward on voltage	VF	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°C		5000		Ω	
			T = 100°C	465	495	520		
	B value	B	T = 25/50°C	3305	3375	3450	K	

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5. Thermal resistance characteristics

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

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

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6. Indication on module (モジュール表示)



7. Applicable category (適用範囲)

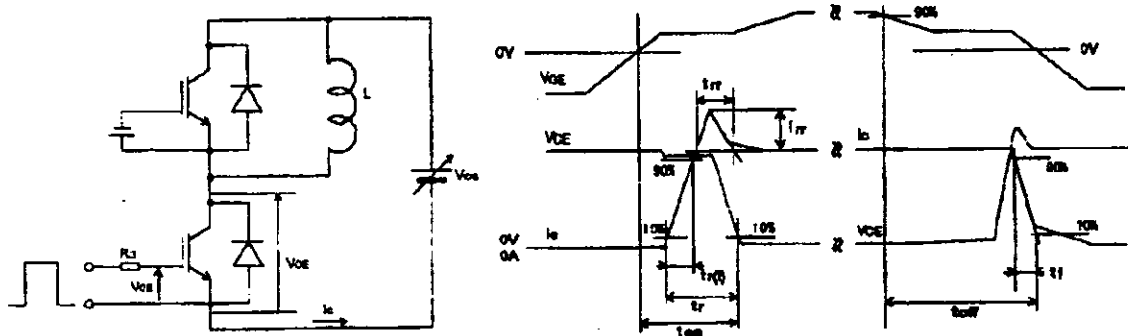
This specification is applied to Power Integrated Module named 7MBR20SA060.  
 本納入仕様書は、パワー集積モジュール 7MBR20SA060 に適用する。

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°C and humidity of 45 to 75%.  
 常温・常湿保存が望ましい。(5~35°C, 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。

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



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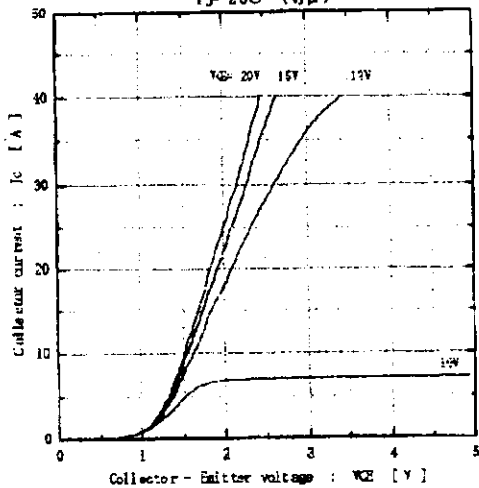
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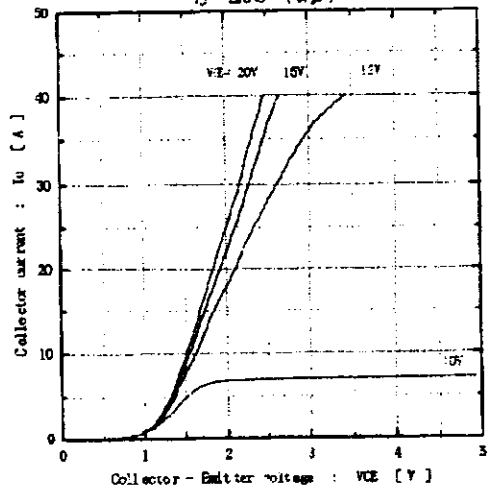
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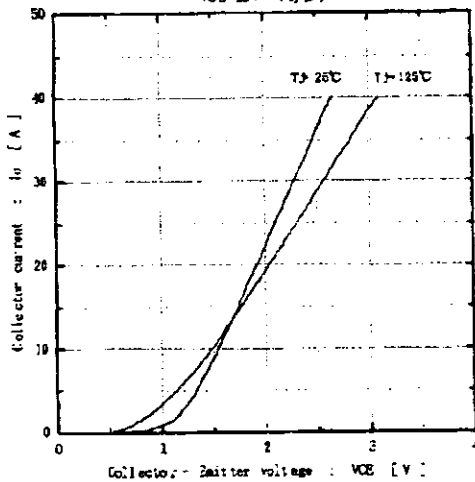
[ Inverter ]  
Collector current vs. Collector-Emitter voltage  
 $T_j = 25^\circ\text{C}$  (typ)



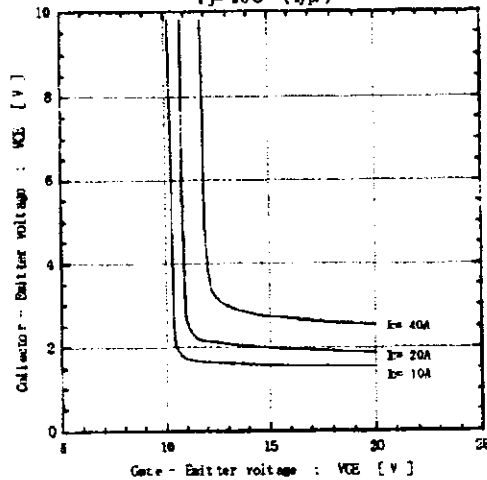
[ Inverter ]  
Collector current vs. Collector-Emitter voltage  
 $T_j = 125^\circ\text{C}$  (typ)



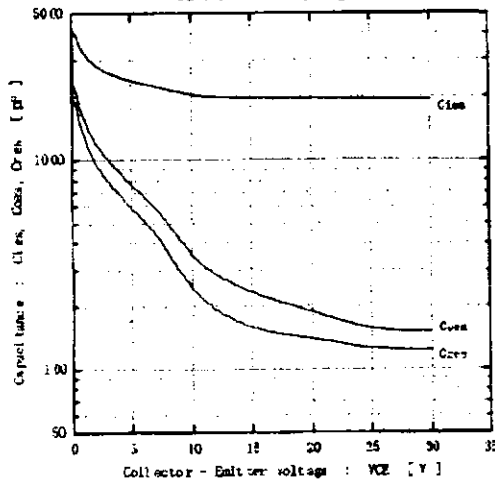
[ Inverter ]  
Collector current vs. Collector-Emitter voltage  
 $V_{GE} = 15\text{V}$  (typ)



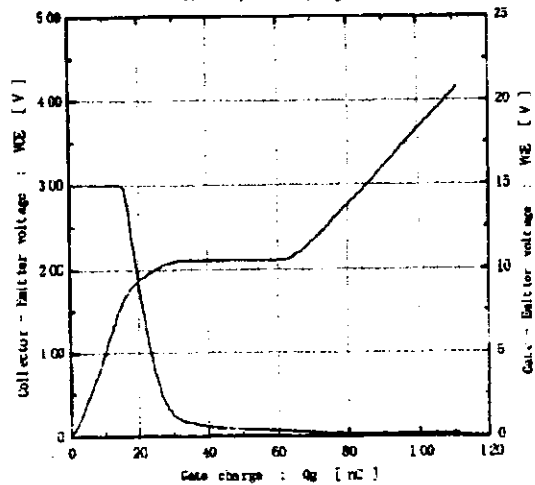
[ Inverter ]  
Collector-Emitter voltage vs. Gate-Emitter voltage  
 $T_j = 25^\circ\text{C}$  (typ)



[ Inverter ]  
Capacitance vs. Collector-Emitter voltage (typ.)  
 $V_{GE} = 0\text{V}$ ,  $f = 1\text{MHz}$ ,  $T_j = 25^\circ\text{C}$



[ Inverter ]  
Dynamic Gate charge (typ.)  
 $V_{CC} = 30\text{V}$ ,  $I_c = 20\text{A}$ ,  $T_j = 25^\circ\text{C}$



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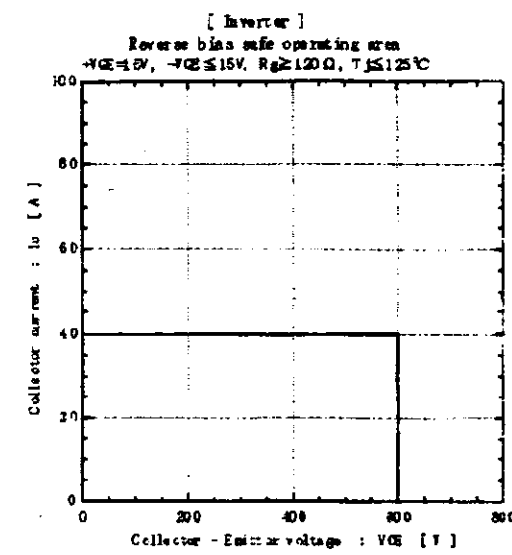
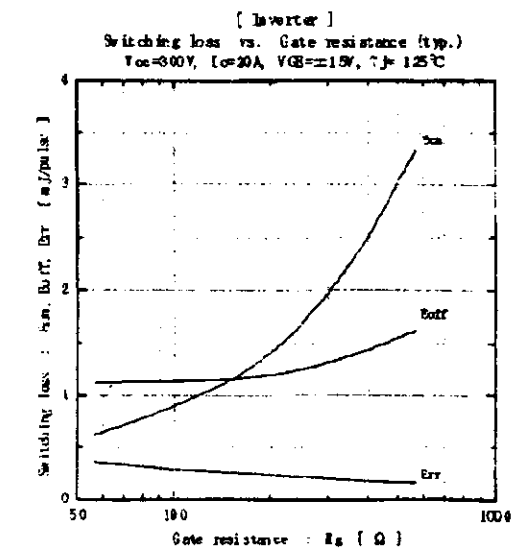
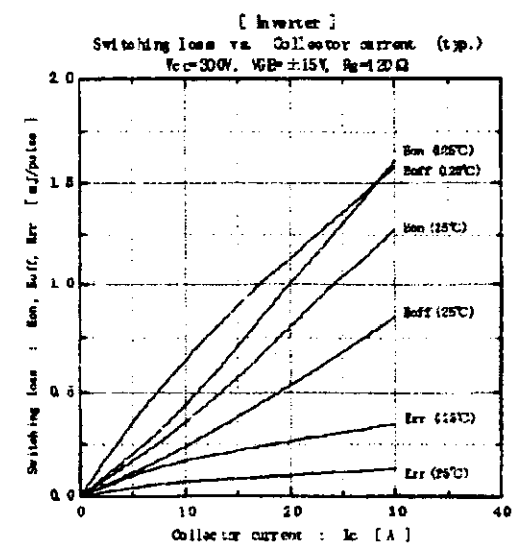
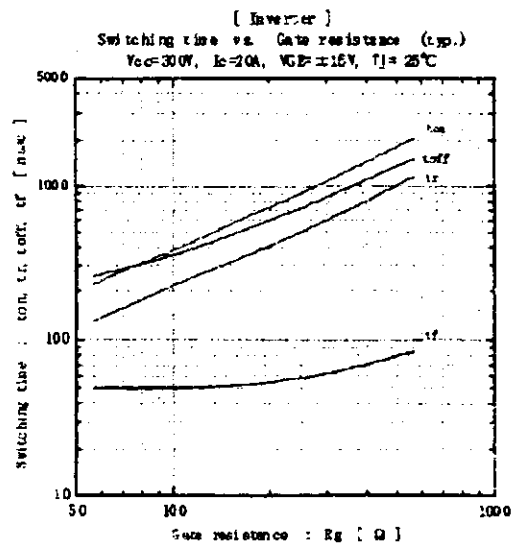
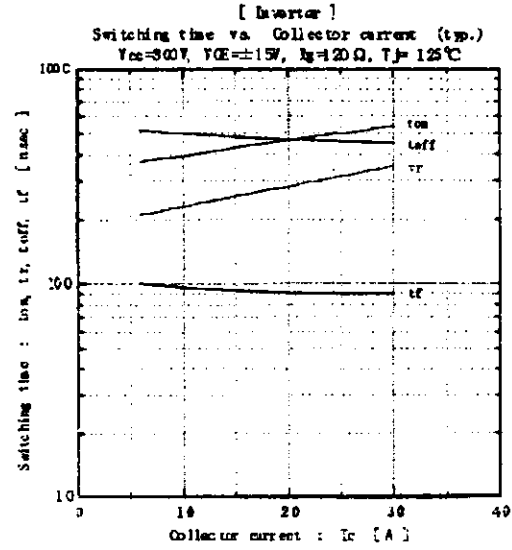
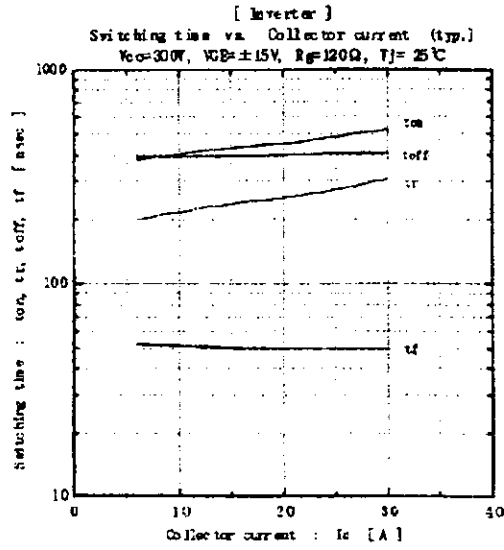
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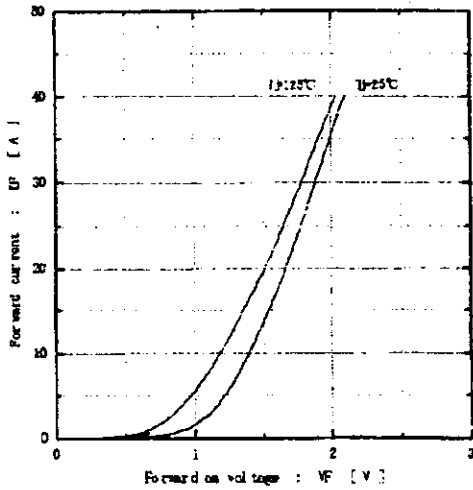
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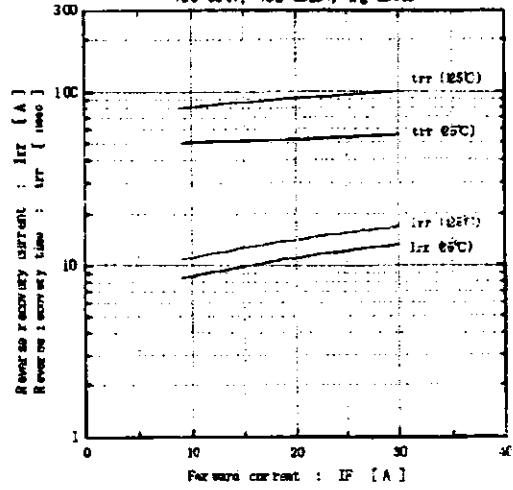


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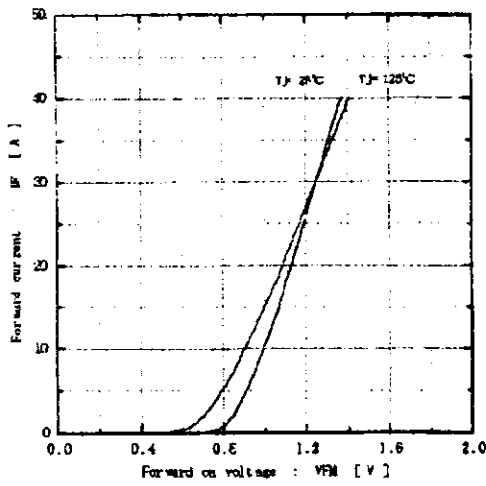
[ Inverter ]  
Forward current vs. Forward on voltage (typ.)



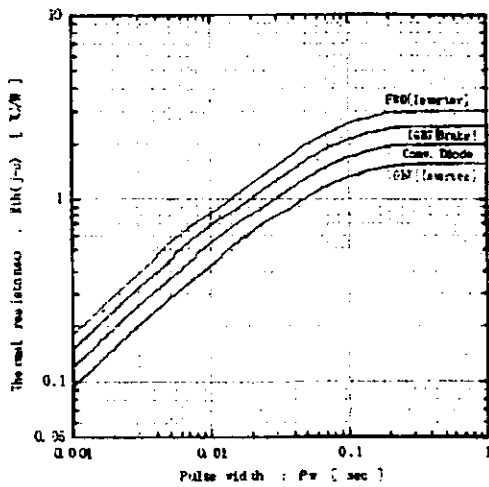
[ Inverter ]  
Reverse recovery characteristics (typ.)  
 $V_C = 300V, V_{GB} = \pm 15V, R_g = 120\Omega$



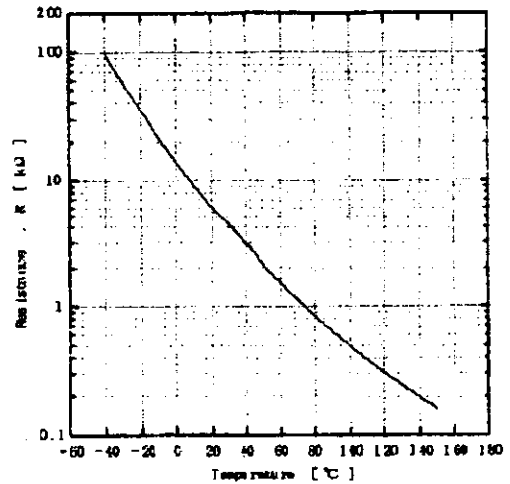
[ Converter ]  
Forward current vs. Forward on voltage (typ.)



Transient thermal resistance



[ Thermistor ]  
Temperature characteristic (typ.)



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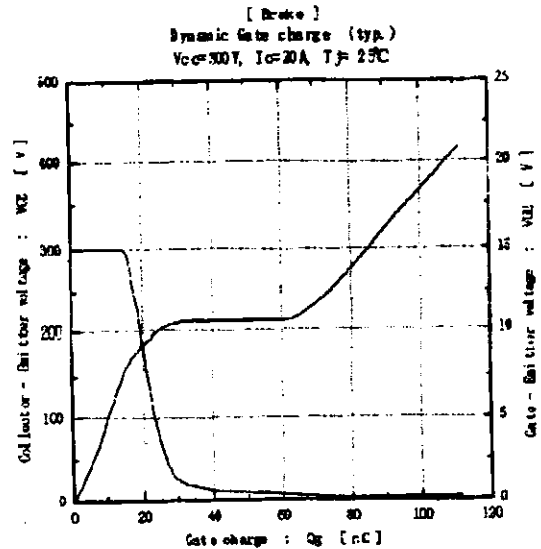
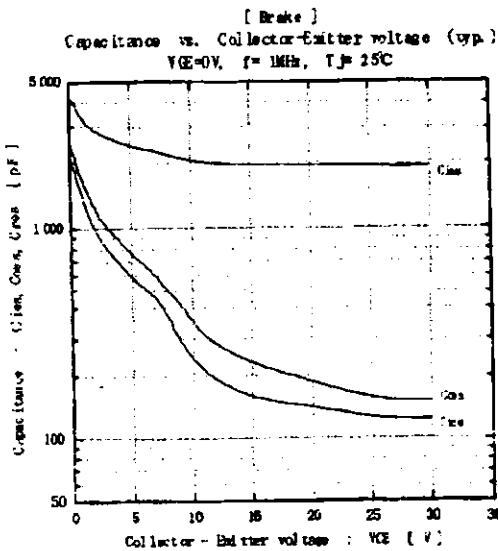
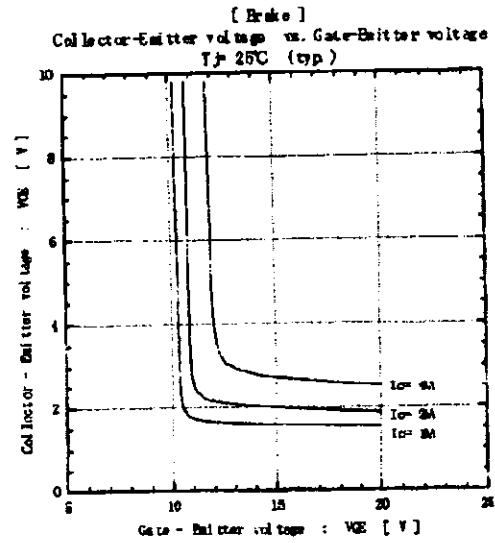
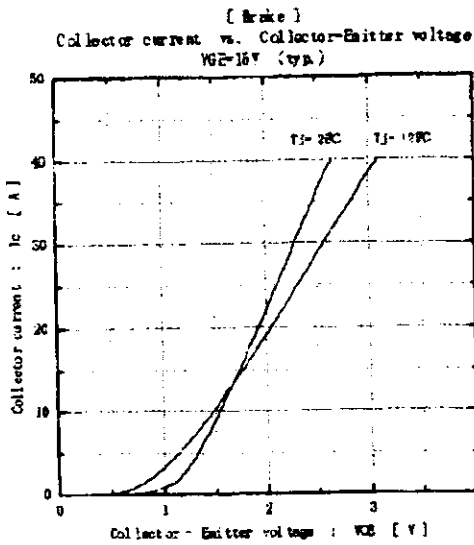
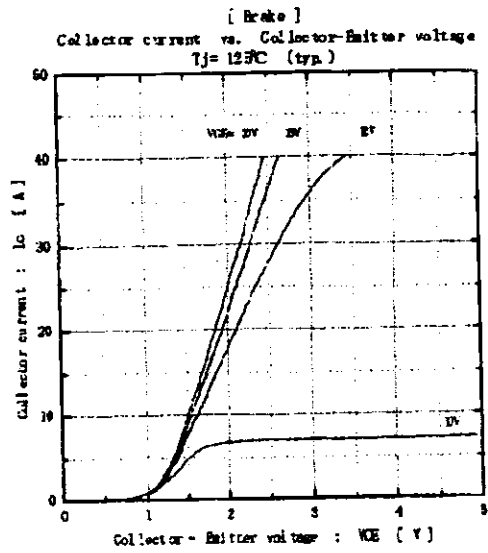
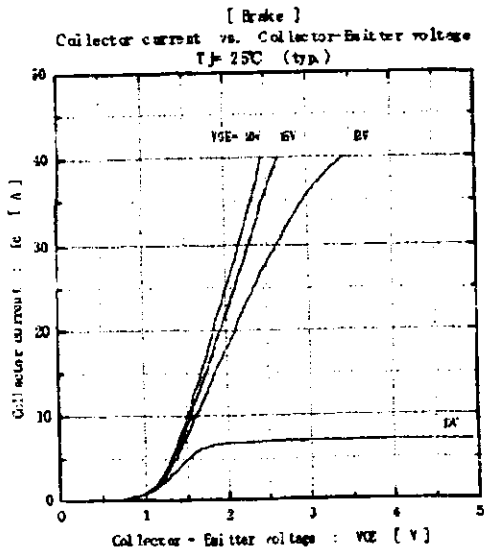
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