

SPECIFICATION

Device Name : IGBT Module

Type Name : 7MBR20SA060D-01

Spec. No. : MS6M 0542

Date : Jun. - 02 - 2000

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Matsumoto Factory

	DATE	NAME	APPROVED	Fuji Electric Co., Ltd.		
DRAWN	Jun. - 2 - '00	<i>T. Kobayashi</i>	<i>T. Miyata</i>	DWG. NO.	MS6M 0542	1 / 10
CHECKED	June - 2 - '00	<i>S. Kikuchi</i>				

Revised Records

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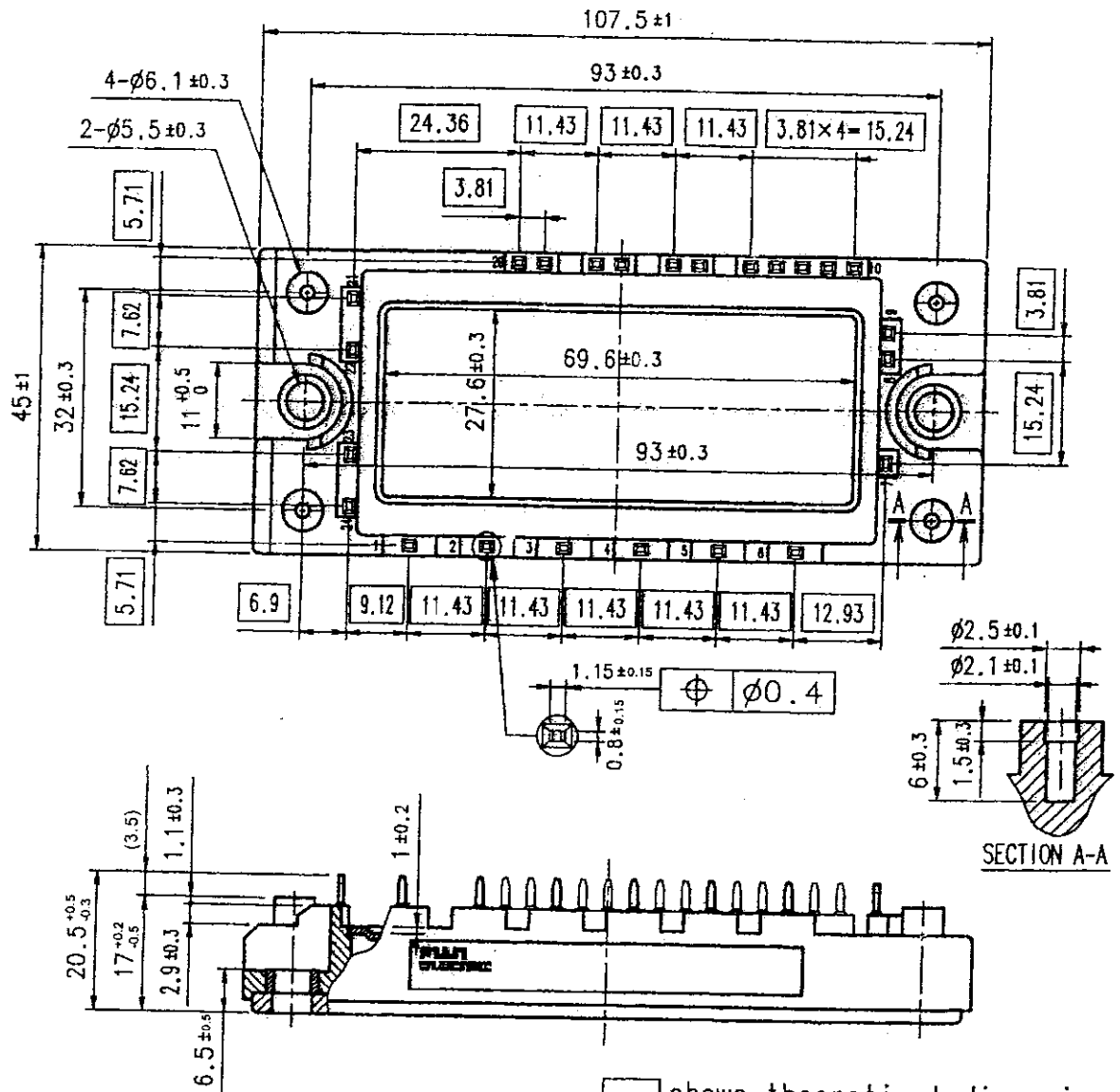
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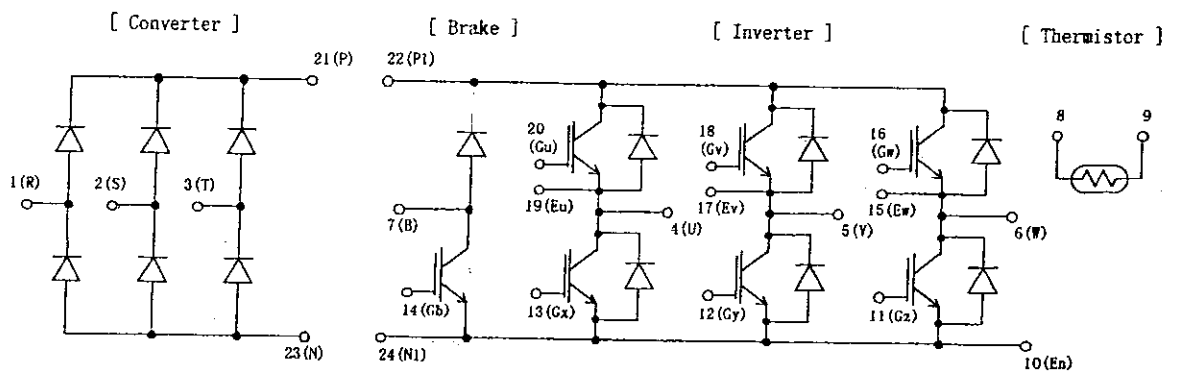
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1. Outline Drawing (Unit : mm)



☐ shows theoretical dimension.

2. Equivalent circuit



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3. Absolute Maximum Ratings (at Tc= 25C 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	Hepetitive peak reverse Voltage	VRRM		800	V
	Average Output Current	Io	50Hz/60Hz sine wave	25	A
	Surge Current (Non-Repetitive)	IFSM	Tj=150C,10ms	260	A
	I²t (Non-Repetitive)	I²t	half sine wave	338	A²s
Junction temperature		Tj		150	C
Storage temperature		Tstg		-40~ +125	C
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	Nm

(*)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 Nm (M5)

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4. Electrical characteristics (at $T_J = 25^\circ\text{C}$ 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, chip Ic = 20 A terminal		1.8		V
	Input capacitance	Cies VGE 0 V, VCE 10 V f = 1 MHz		3000		pF
	Turn-on time	ton Vcc = 300 V		0.45	1.2	us
		tr Ic = 20 A		0.25	0.6	
		tr(f) VGE +15 V		0.08		
	Turn-off time	toff RG = 120 ohm		0.40	1.0	us
		tf		0.05	0.35	
	Forward on voltage	VF IF = 20 A chip terminal		1.8		V
	Reverse recovery time	ttr 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, chip Ic = 20 A terminal		1.8		V
	Turn-on time	ton Vcc = 300 V		0.45	1.2	us
		tr Ic = 20 A		0.25	0.6	
	Turn-off time	toff VGE +15 V		0.40	1.0	us
		tf RG = 120 ohm		0.05	0.35	
Converter	Reverse current	IRRM VR = 600 V			1.0	mA
	Forward on voltage	VFM IF = 20 A chip terminal		1.0		V
				1.1	1.5	
Thermistor	Reverse current	IRRM VR = 800 V			1.0	mA
	Resistance	R T = 25°C		5000		ohm
		T = 100°C	465	495	520	
	B value	B T = 25/50°C	3305	3375	3450	K

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			1.30	
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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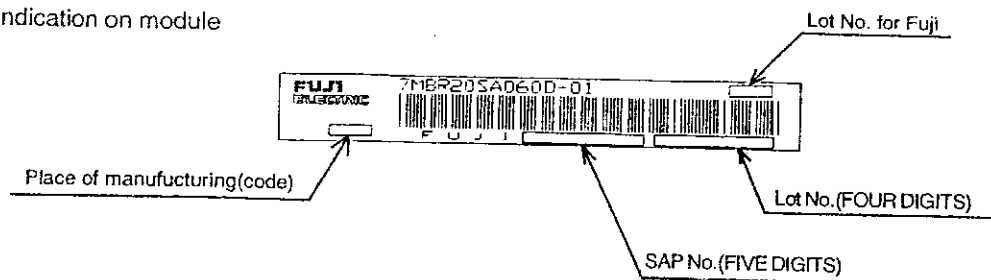
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6. Indication on module



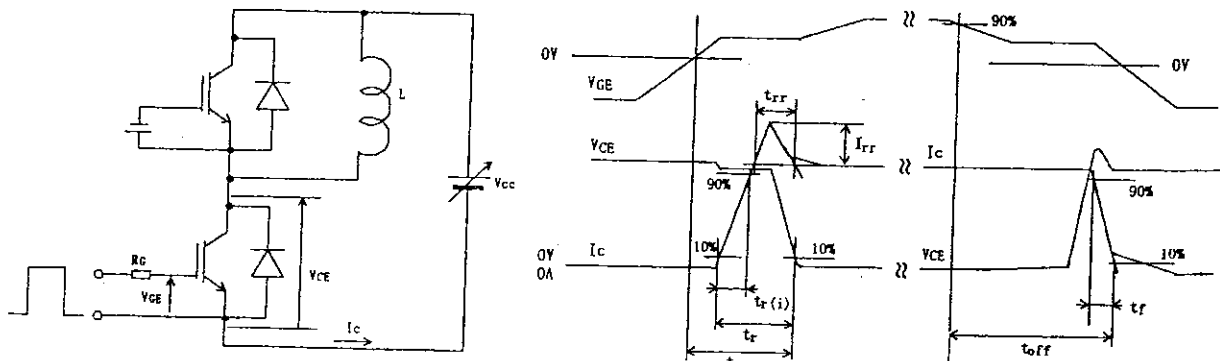
7. Applicable category

This specification is applied to Power Integrated Module named 7MBR20SA060D-01.

8. Storage and transportation notes

- The module should be stored at a standard temperature of 5 to 35°C and humidity of 45 to 75%.
- Store modules in a place with few temperature changes in order to avoid condensation on the module surface.
- Avoid exposure to corrosive gases and dust.
- Avoid excessive external force on the module.
- Store modules with unprocessed terminals.
- Do not drop or otherwise shock the modules when transporting.
- Please connect adequate fuse or protector of circuit between three-phase line and this product to prevent the equipment from causing secondary destruction.

9. Definitions of switching time



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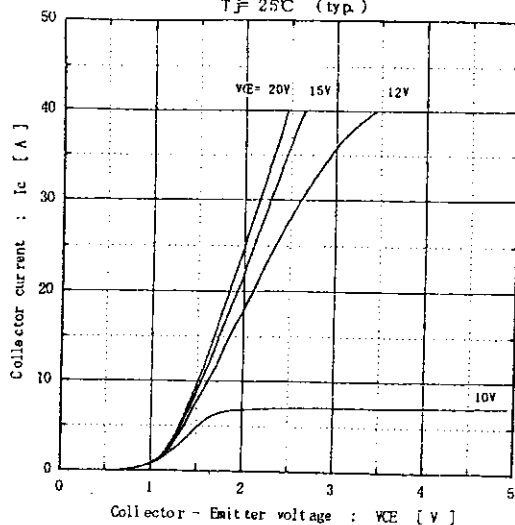
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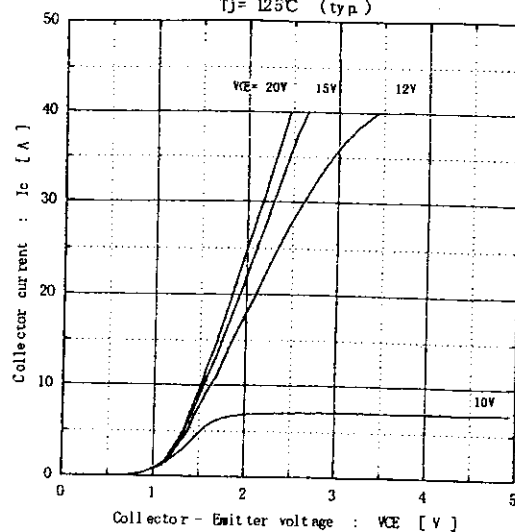
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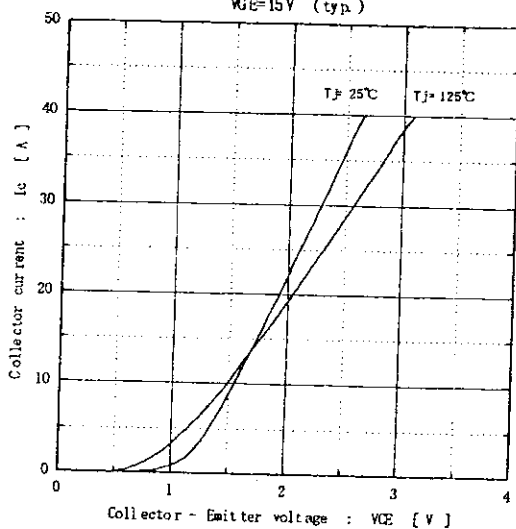
[Inverter]
Collector current vs. Collector-Emitter voltage
 $T_J = 25^\circ\text{C}$ (typ.)



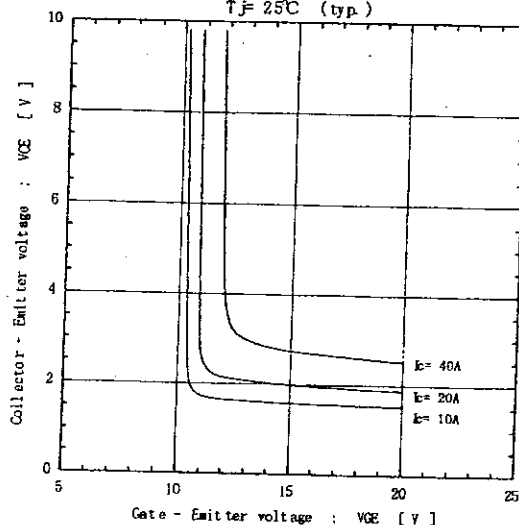
[Inverter]
Collector current vs. Collector-Emitter voltage
 $T_J = 125^\circ\text{C}$ (typ.)



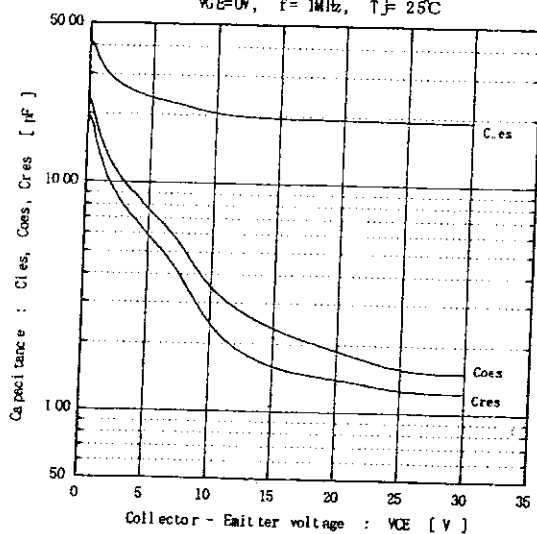
[Inverter]
Collector current vs. Collector-Emitter voltage
 $V_{CE} = 15\text{V}$ (typ.)



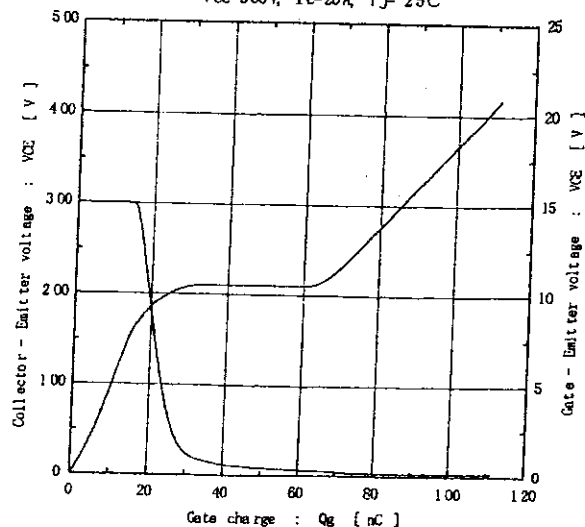
[Inverter]
Collector-Emitter voltage vs. Gate-Emitter voltage
 $T_J = 25^\circ\text{C}$ (typ.)



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



[Inverter]
Dynamic Gate charge (typ.)
 $V_{CC} = 300\text{V}$, $I_C = 20\text{A}$, $T_J = 25^\circ\text{C}$



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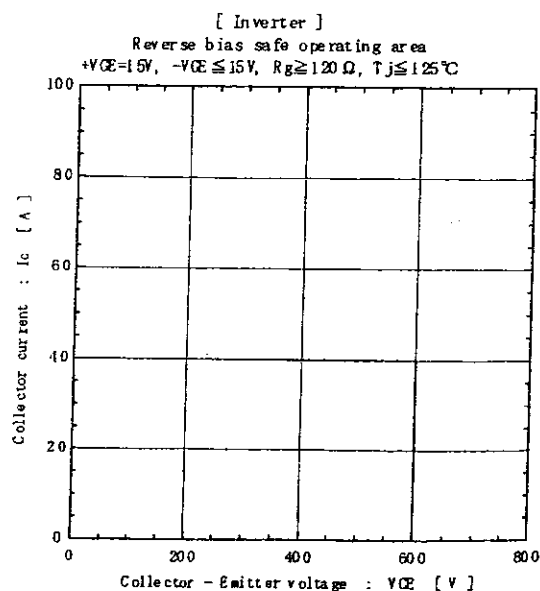
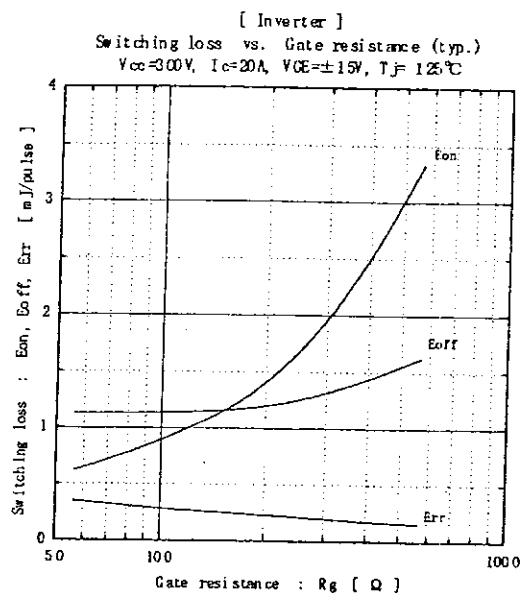
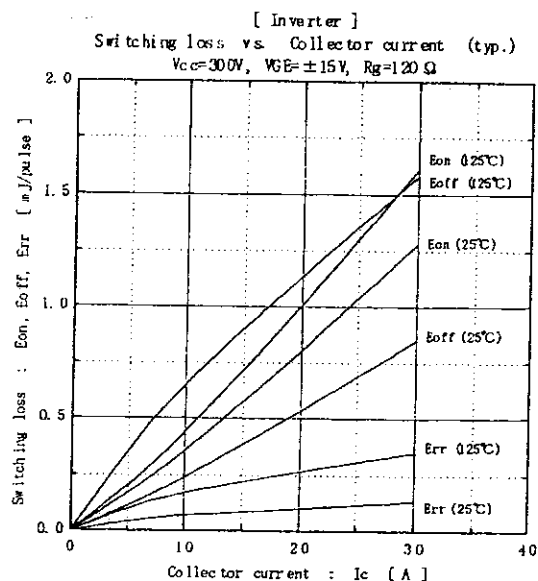
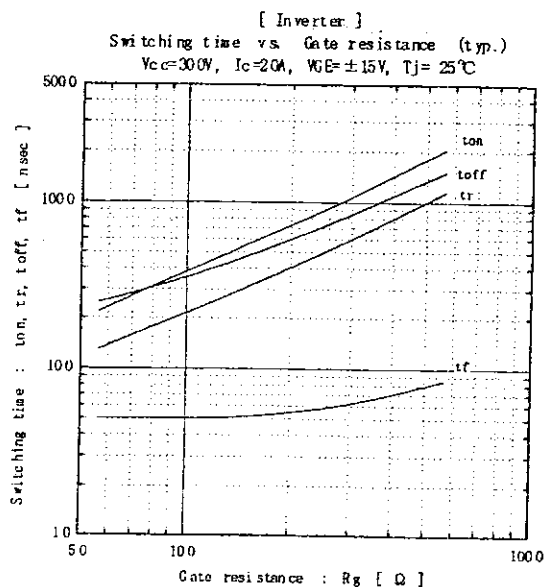
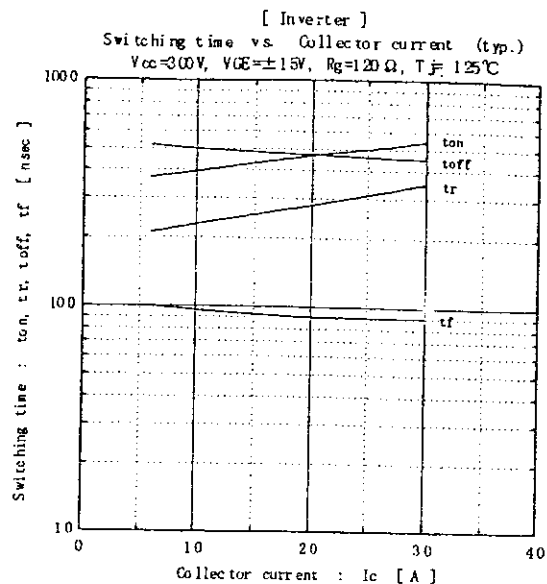
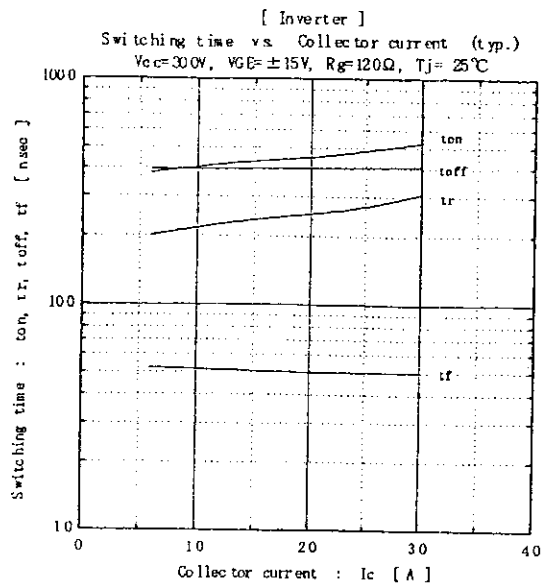
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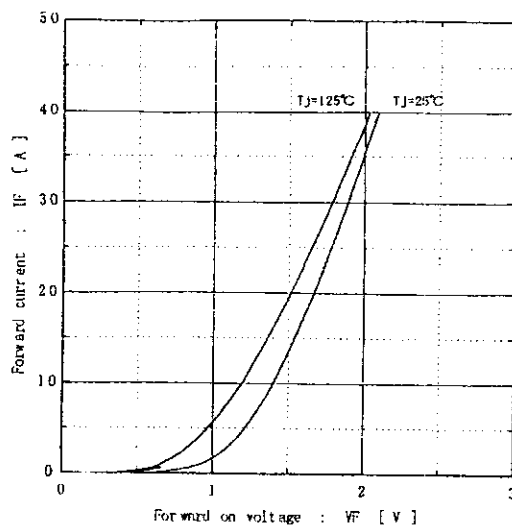
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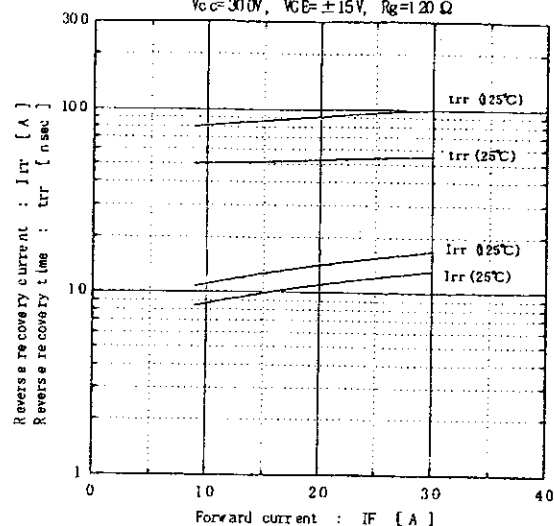
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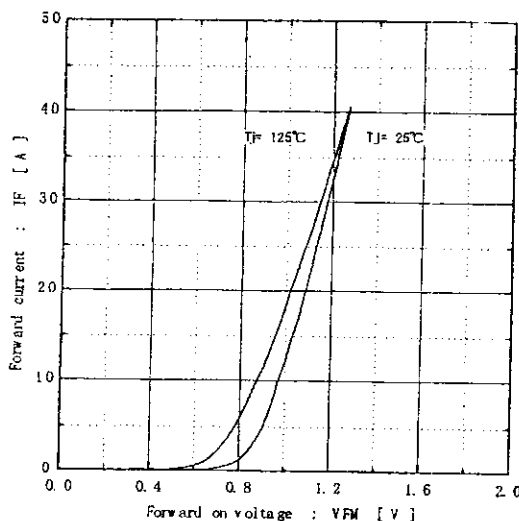
[Inverter]
Forward current vs. Forward on voltage (typ.)



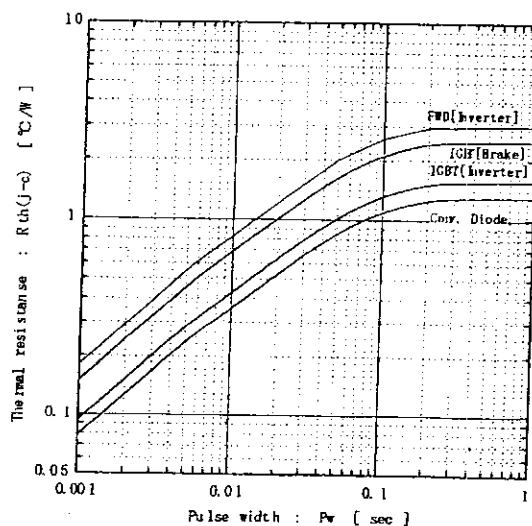
[Inverter]
Reverse recovery characteristics (typ.)
 $V_C = 300V$, $V_{GE} = \pm 15V$, $R_g = 120\Omega$



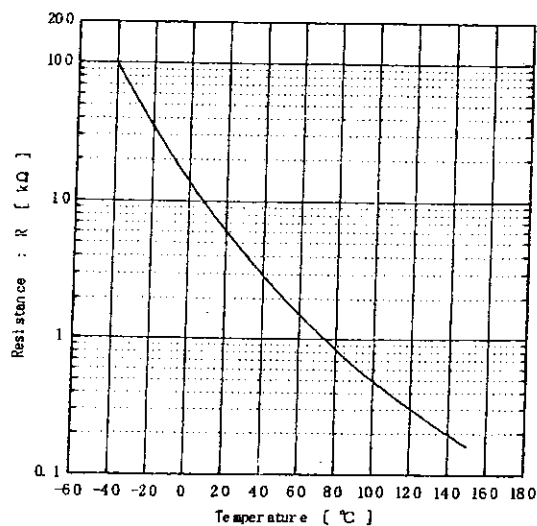
[Converter]
Forward current vs. Forward on voltage (typ.)



Transient thermal resistance



[Thermistor]
Temperature characteristic (typ.)



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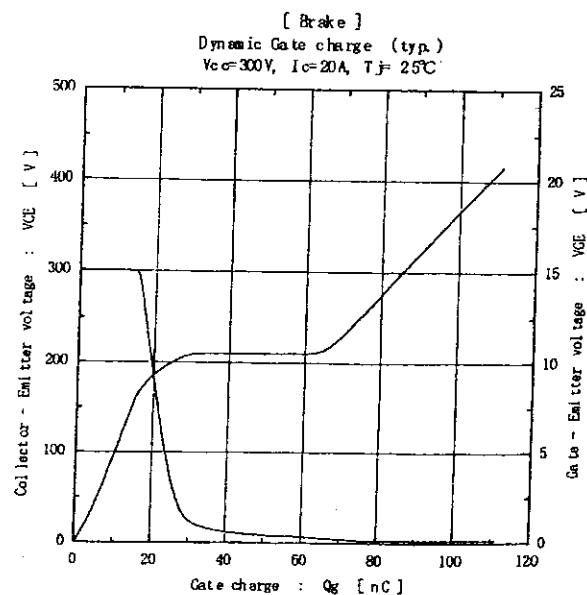
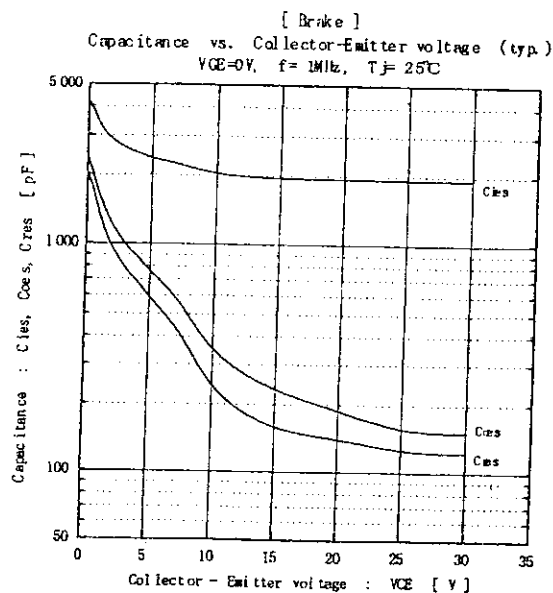
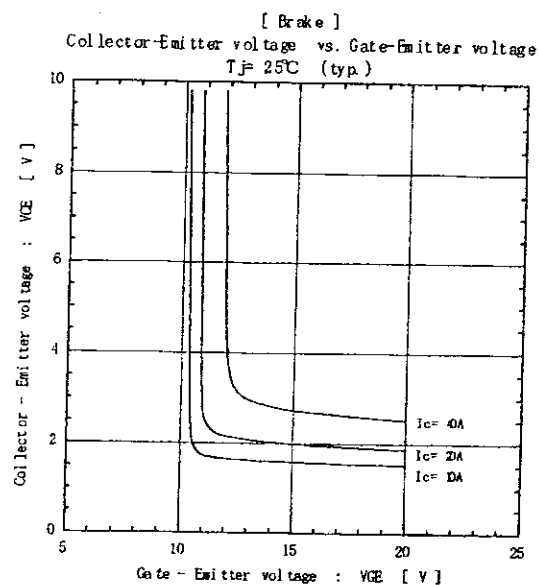
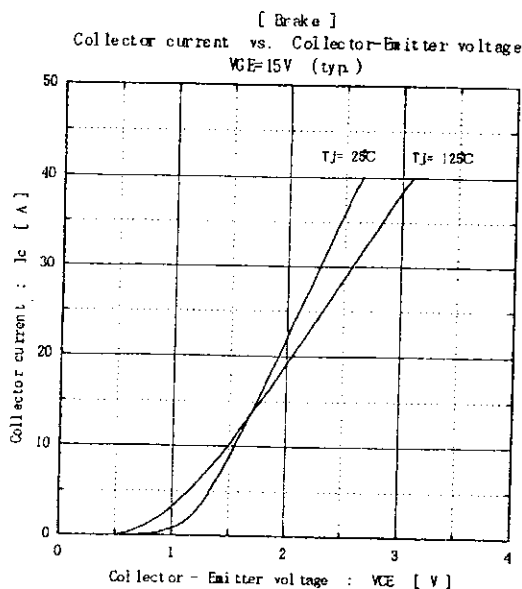
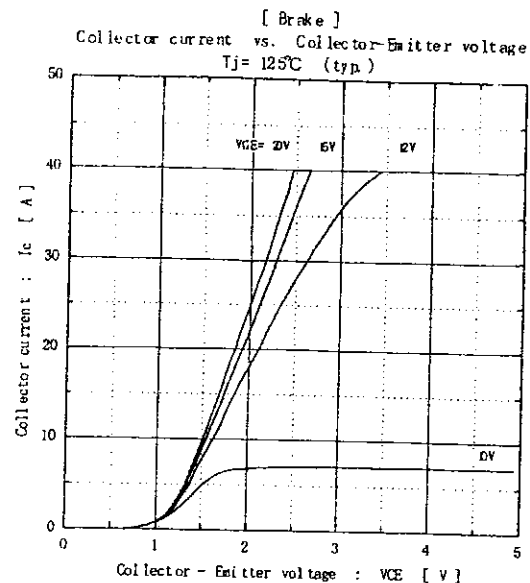
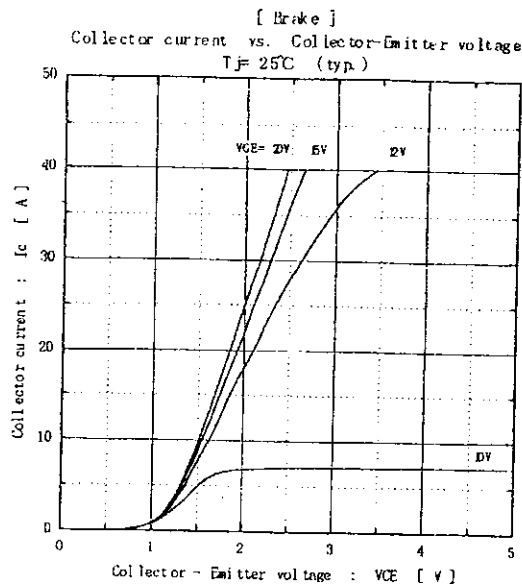
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