

# SPECIFICATION

Device Name : IGBT Module

Type Name : 7MBR10SA060D-01

Spec. No. : MS6M 0540

Date : Jun. - 02 - 2000

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Matsumoto Factory

	DATE	NAME	APPROVED	<b>Fuji Electric Co., Ltd.</b>	
DRAWN	Jun. - 2 - '00	<i>T. Kobayashi</i>		<b>MS6M 0540</b>	1 / 10
CHECKED	June - 2 - 00	<i>S. Kitta</i>	<i>T. Miyasaka</i>		

# Revised Records

Date	Classi- fication	Ind.	Content	Applied date	Drawn	Checked	Approved
Jan - 2 - '99	enactment	—	—————	Issued date	—	S. Mytha	T. Myjaska

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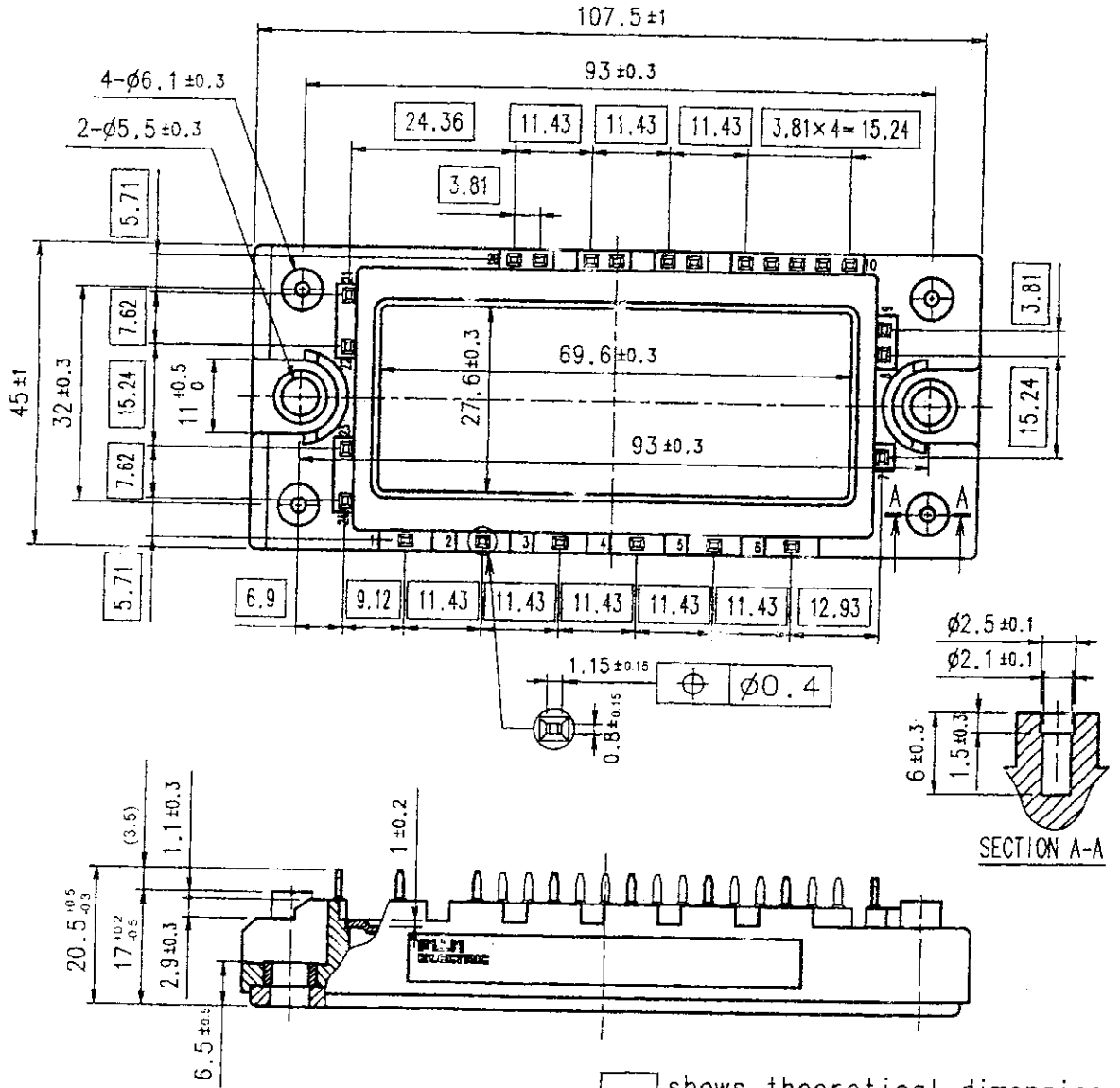
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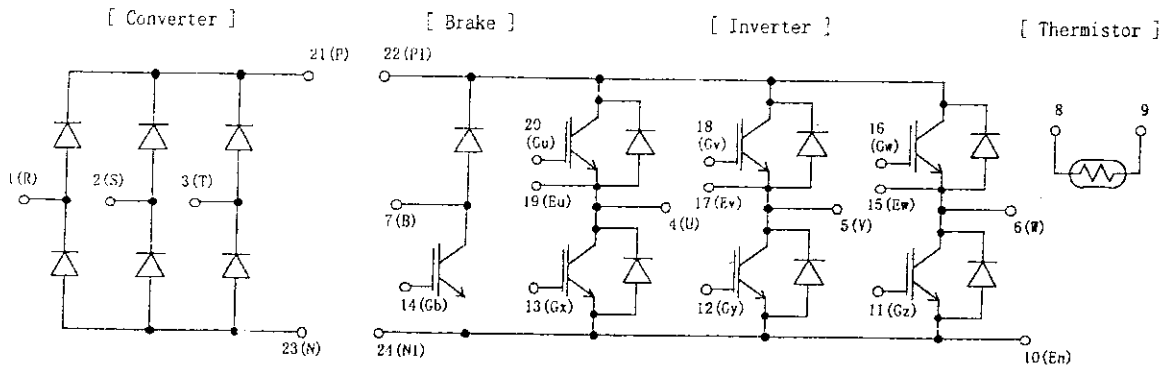

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1. Outline Drawing ( Unit : mm )



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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	Repetitive 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
	I <sup>2</sup> t (Non-Repetitive)	I <sup>2</sup> t	half sine wave	338	A <sup>2</sup> s
Junction temperature	Tj		150	C	
Storage temperature	Tstg		-40~ +125	C	
Isolation voltage:	between terminal and copper base <sup>(*)</sup>	Viso	AC : 1min.	2500	V
	between thermistor and others <sup>(*)</sup>			2500	V
Mounting Screw Torque <sup>(*)</sup>				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  $T_j = 25C$  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		3000		pF	
	Turn-on time	ton	Vcc = 300 V			0.45	1.2	us
		tr	Ic = 20 A			0.25	0.6	
		tr(0)	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		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			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		
Reverse current	IRRM	VR = 600 V				1.0	mA	
Converter	Forward on voltage	VFM	IF = 20 A	chip		1.0	V	
				terminal		1.1		1.5
Reverse current	IRRM	VR = 800 V				1.0	mA	
Thermistor	Resistance	R	T = 25C		5000		ohm	
			T = 100C	465	495	520		
	B value	B	T = 25/50C	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.

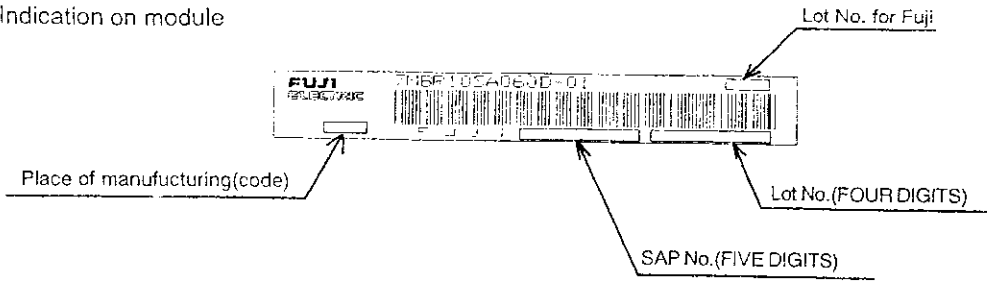
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6. Indication on module



7. Applicable category

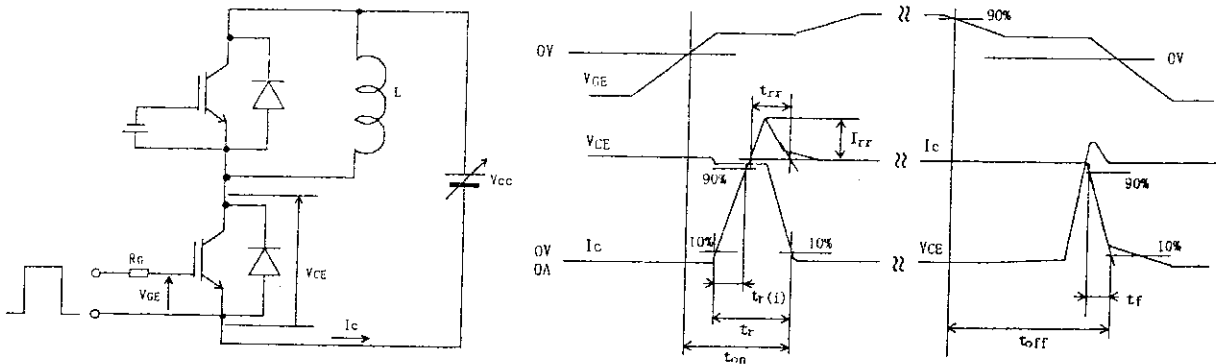
This specification is applied to Power Integrated Module named 7MBR10SA060D-01.

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.

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9. Definitions of switching time



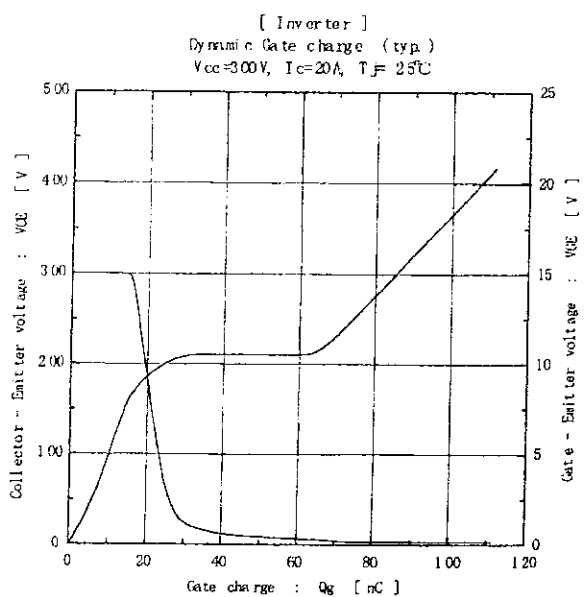
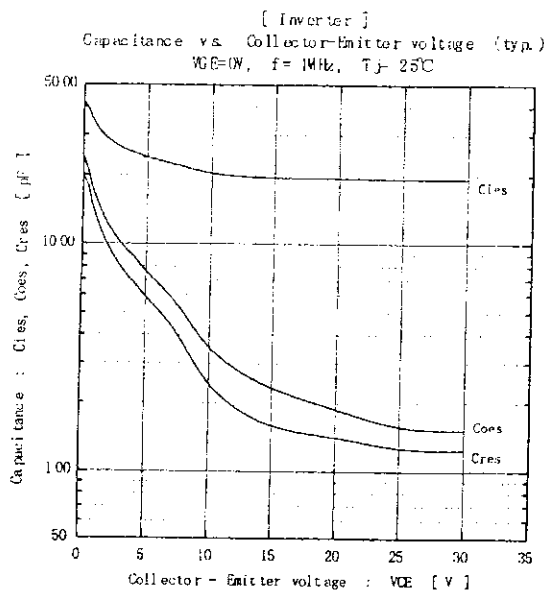
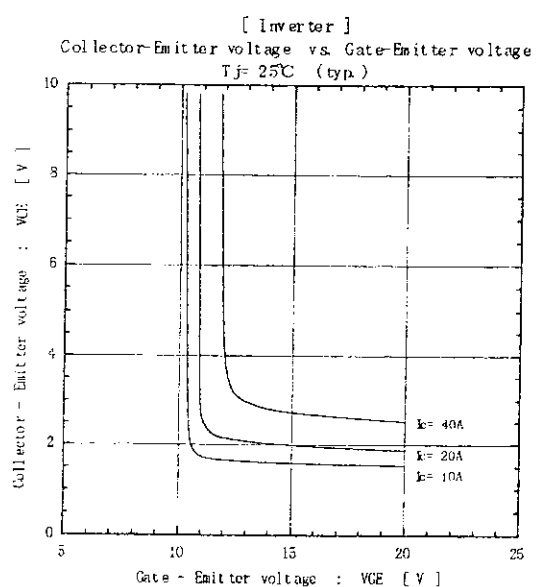
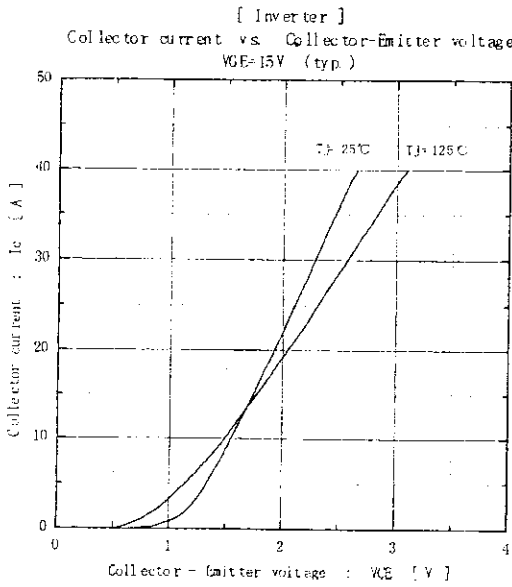
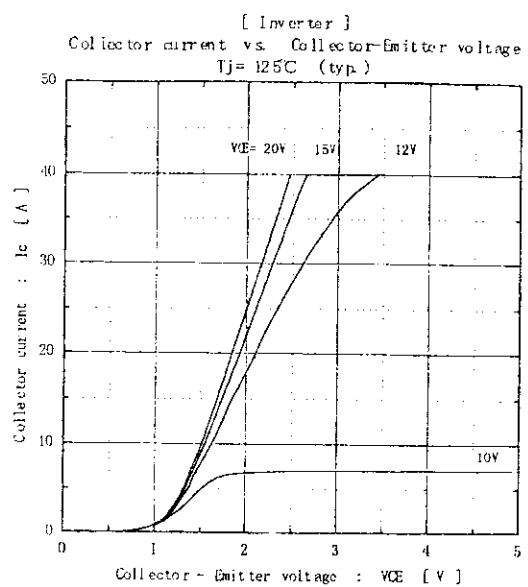
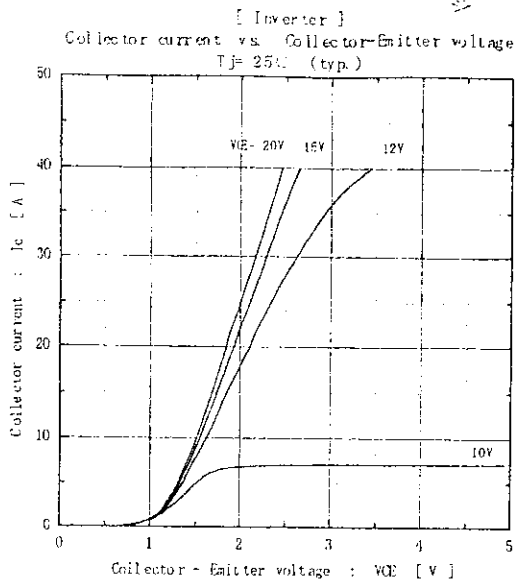
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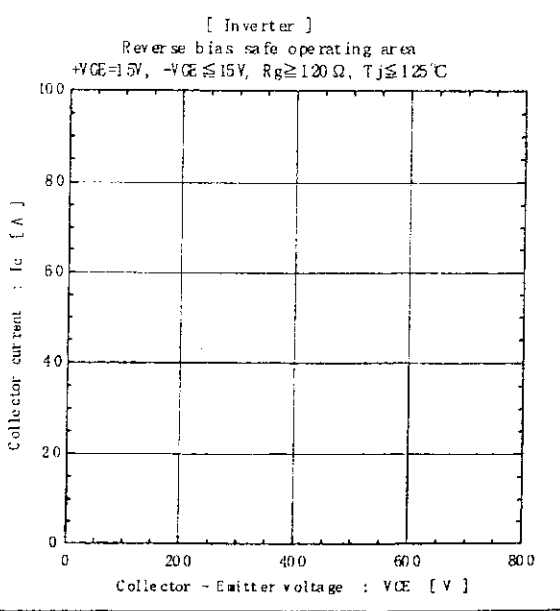
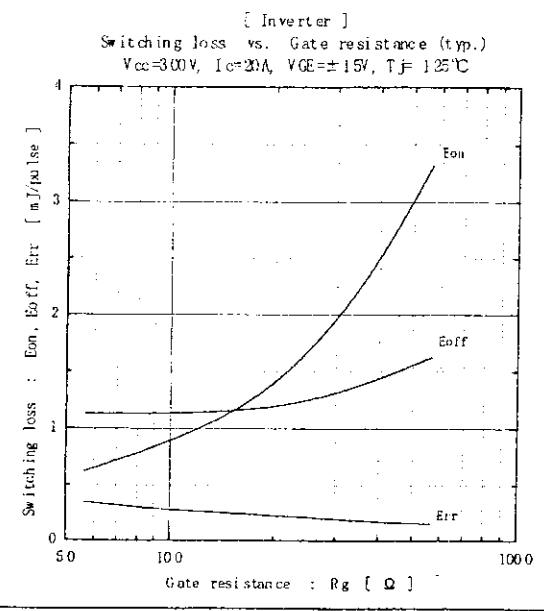
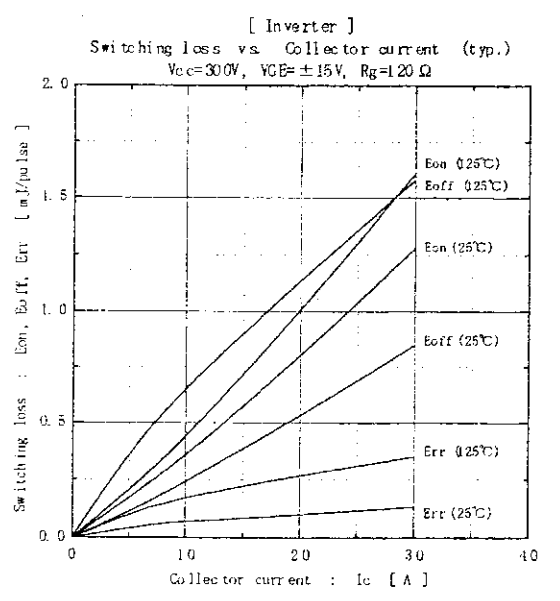
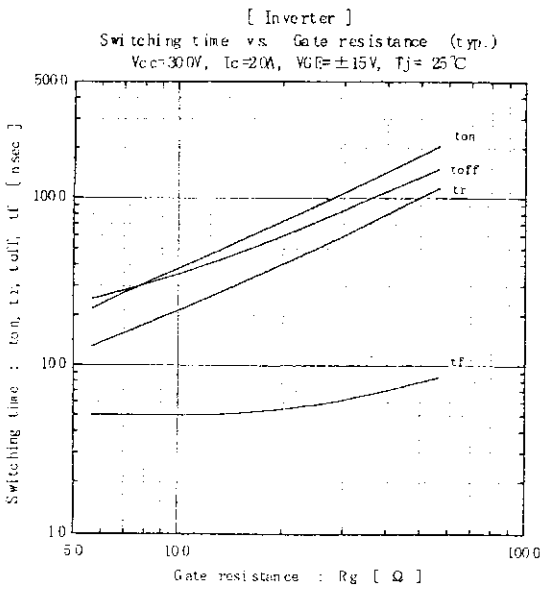
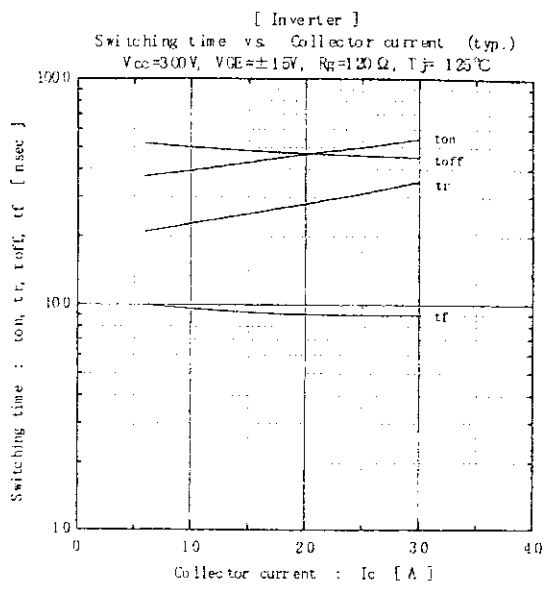
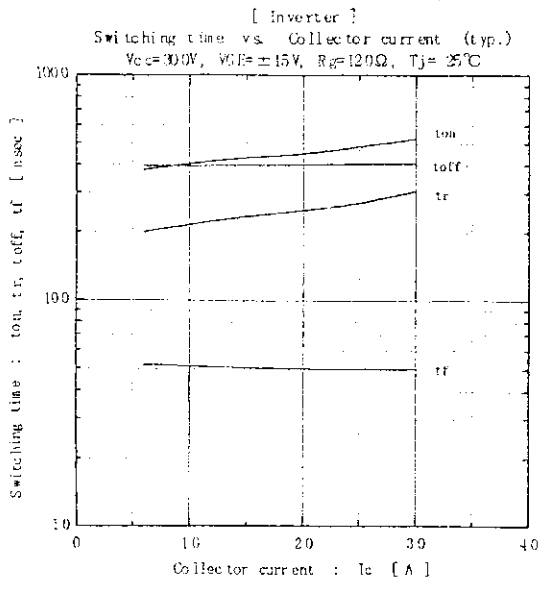
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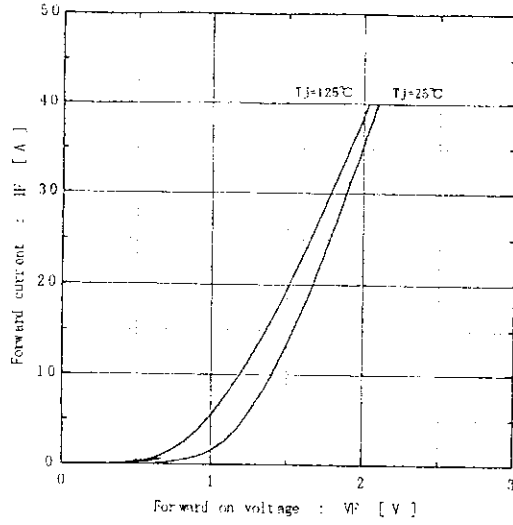
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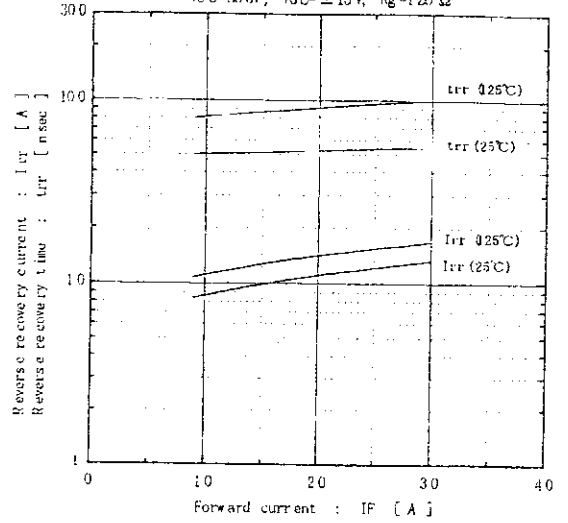


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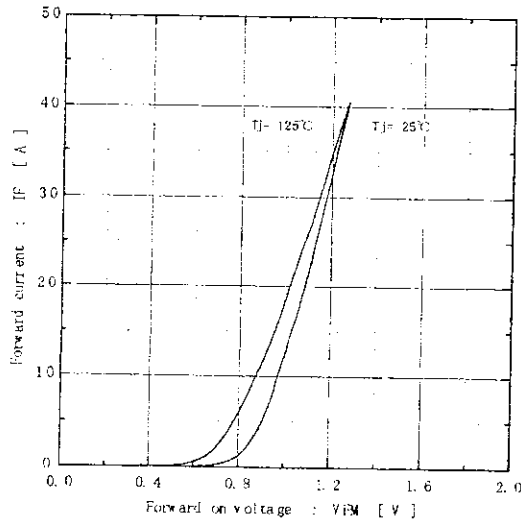
[ Inverter ]  
Forward current vs. Forward on voltage (Typ.)



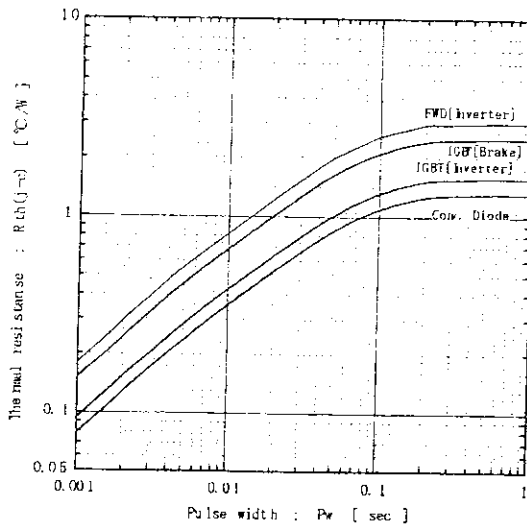
[ Inverter ]  
Reverse recovery characteristics (Typ.)  
 $V_{ce}=300V, V_{GE}=\pm 15V, R_g=120\Omega$



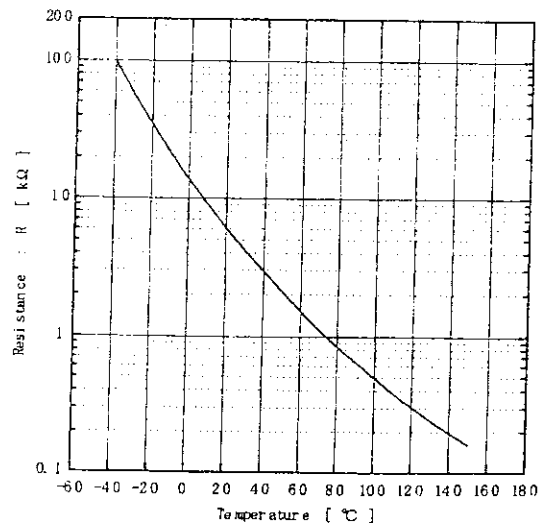
[ Converter ]  
Forward current vs. Forward on voltage (Typ.)



Transient thermal resistance



[ Thermistor ]  
Temperature characteristic (Typ.)



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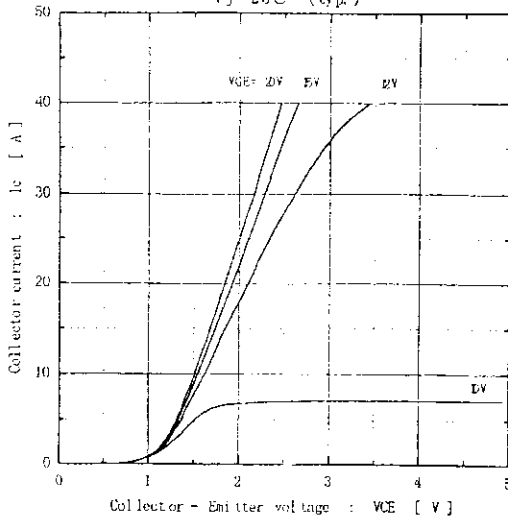
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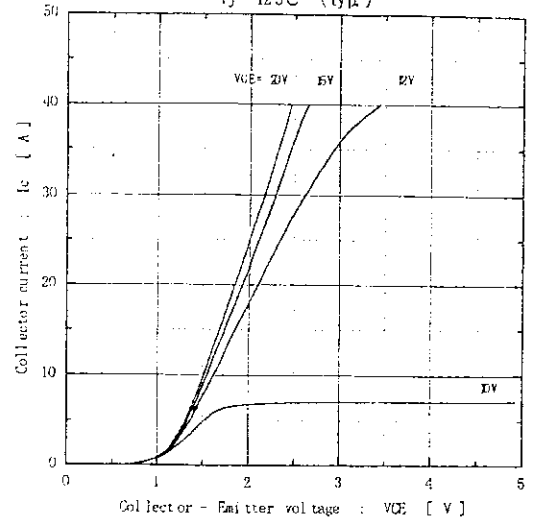
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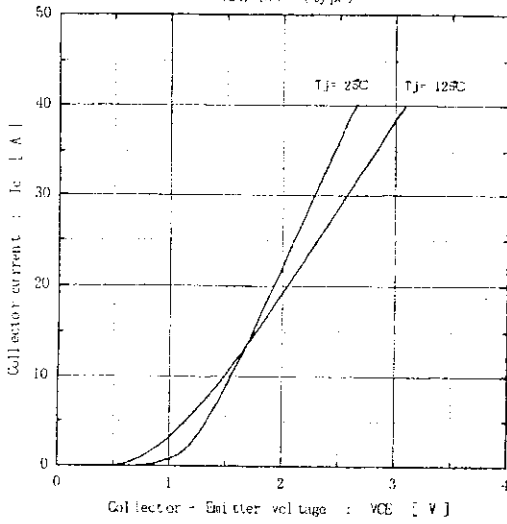
[ Brake ]  
Collector current vs. Collector-Emitter voltage  
 $T_j = 25^\circ\text{C}$  (typ.)



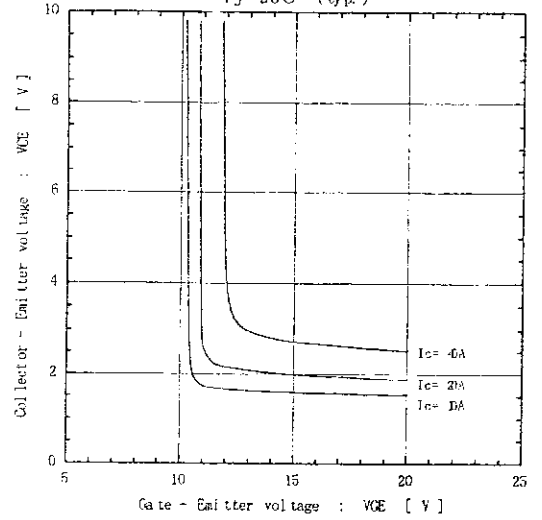
[ Brake ]  
Collector current vs. Collector-Emitter voltage  
 $T_j = 125^\circ\text{C}$  (typ.)



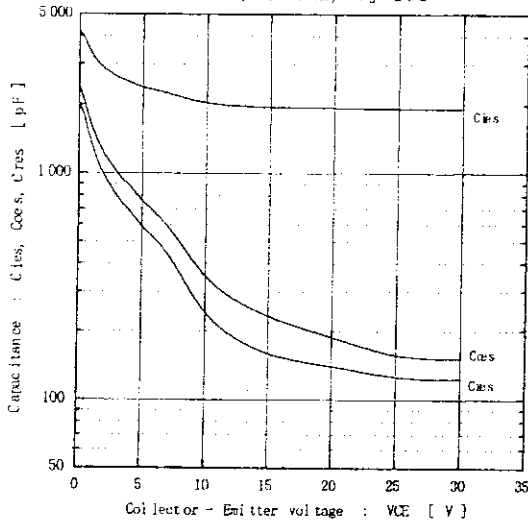
[ Brake ]  
Collector current vs. Collector-Emitter voltage  
 $V_{GE} = 15\text{V}$  (typ.)



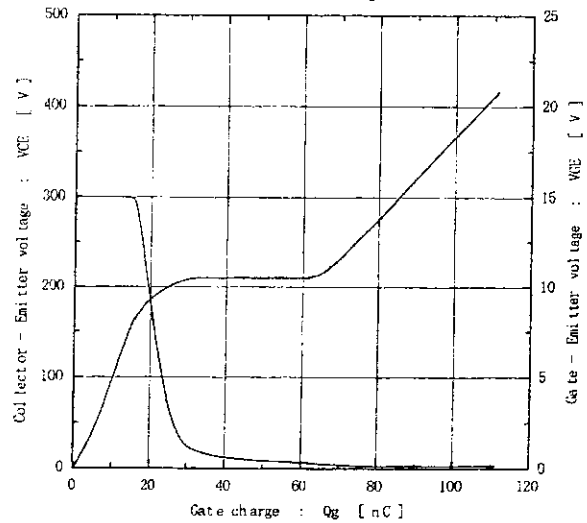
[ Brake ]  
Collector-Emitter voltage vs. Gate-Emitter voltage  
 $T_j = 25^\circ\text{C}$  (typ.)



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



[ Brake ]  
Dynamic Gate charge (typ.)  
 $V_{ce} = 300\text{V}$ ,  $I_c = 20\text{A}$ ,  $T_j = 25^\circ\text{C}$



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