

# SPECIFICATION

Device Name : IGBT Module

---

Type Name : 7MBR20SA060D-01

---

Spec. No. : MS6M 0542

---

Date : Jun. - 02 - 2000

---

This material and the information herein is the property of Fuji Electric Co., Ltd. They shall be neither reproduced, copied, lent, or disclosed in any way whatsoever for the use of any third party nor used for the manufacturing purposes without the express written consent of Fuji Electric Co., Ltd.

Fuji Electric Co., Ltd.  
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. Kato</i>				

H04-004-05

# Revised Records

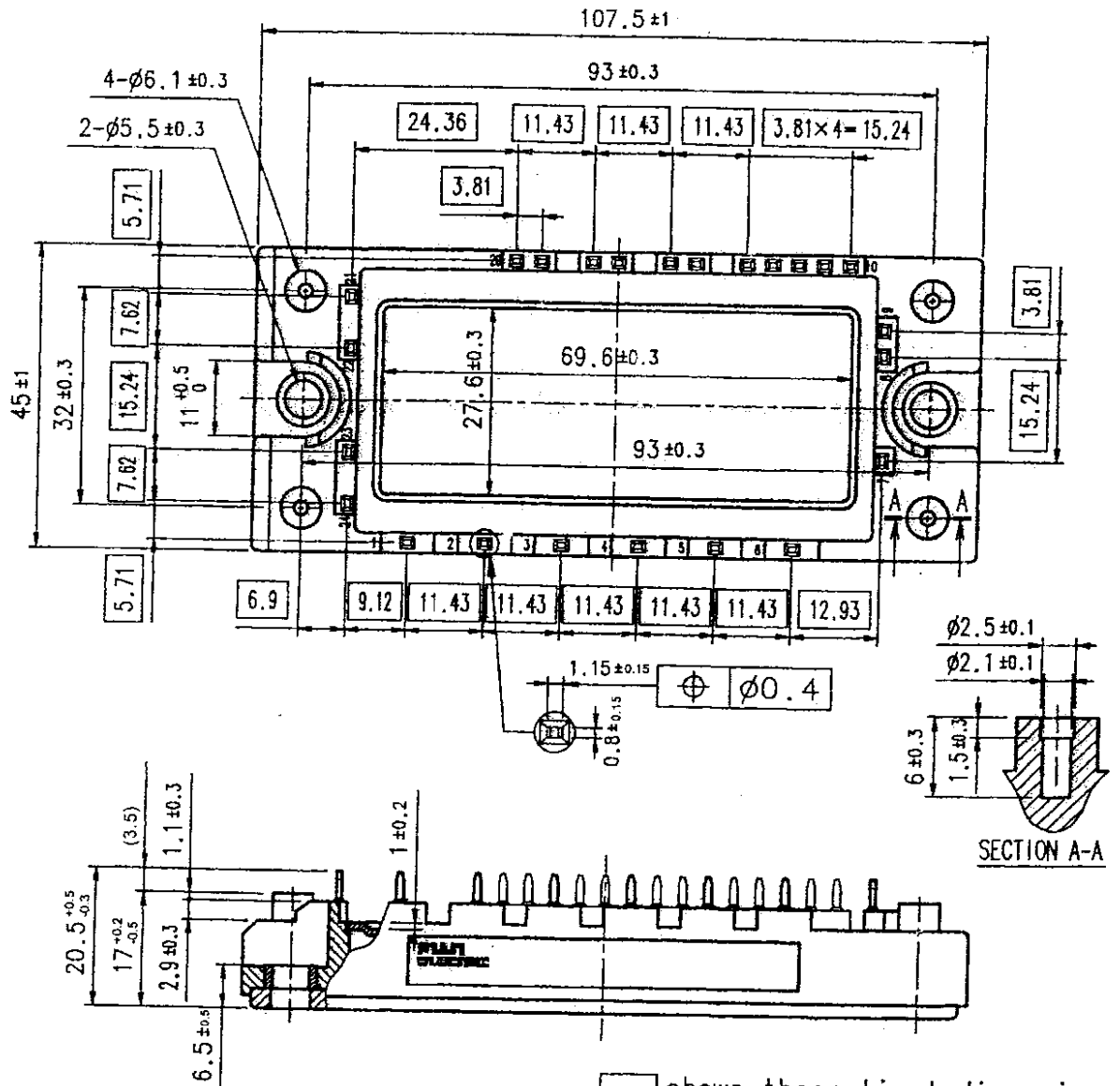
Date	Classi- fication	Ind.	Content	Applied date	Drawn	Checked	Approved
Jun - 2 - '00	enactment	—	—	Issued date	—	<i>S. Nitta</i>	<i>T. Nishida</i>

This material and the information herein is the property of Fuji Electric Co., Ltd. They shall be neither reproduced, copied, lent, or disclosed in any way whatsoever for the use of any third party nor used for the manufacturing purposes without the express written consent of Fuji Electric Co., Ltd.

<b>Fuji Electric Co., Ltd</b>	DWG. NO.	<b>MS6M 0542</b>	2 / 10	
-------------------------------	----------	------------------	--------	--

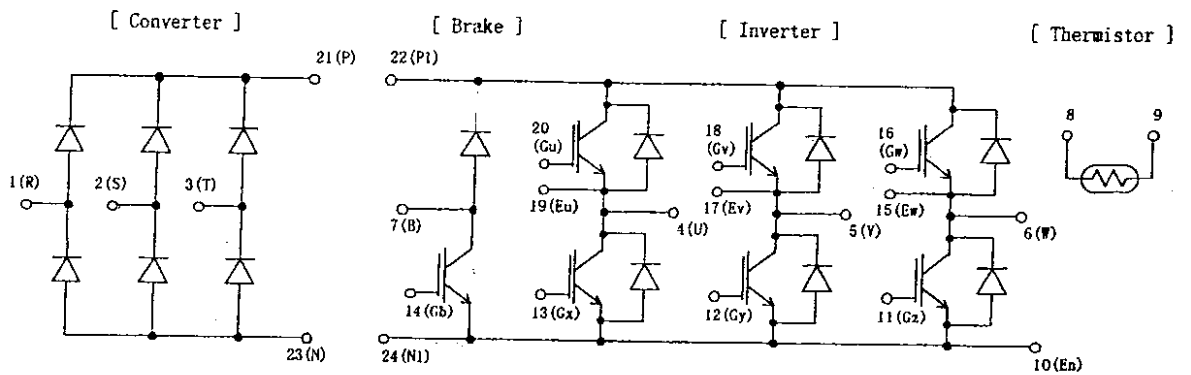
7MBR20SA060D-01

1. Outline Drawing ( Unit : mm )



This material and the information herein is the property of Fuji Electric Co. Ltd. They shall be neither reproduced, copied, lent, or disclosed in any way whatsoever for the use of any third party nor used for the manufacturing purposes without the express written consent of Fuji Electric Co., Ltd.

2. Equivalent circuit



Fuji Electric Co., Ltd.

DWG. NO.

MS6M 0542

3 / 10

H04-004-03

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
Converter	Repetitive peak reverse Voltage(Diode)	VRRM		600	V
	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
	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>(*)1</sup>	Viso	AC : 1min.	2500	V
	between thermistor and others <sup>(*)2</sup>			2500	V
Mounting Screw Torque <sup>(*)3</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)

This material and the information herein is the property of Fuji Electric Co., Ltd. They shall be neither reproduced, copied, lent, or disclosed in any way whatsoever for the use of any third party nor used for the manufacturing purposes without the express written consent of Fuji Electric Co., Ltd.

Fuji Electric Co., Ltd.

DWG. NO.

MS6M 0542

4 / 10

H04-004-03

4. Electrical characteristics ( at Tj= 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 terminal	1.8	1.95	2.4	V	
	Input capacitance	Cies VGE 0 V, VCE 10 V, f = 1 MHz		3000		pF		
	Turn-on time	ton	Vcc= 300 V, Ic = 20 A		0.45	1.2	us	
		tr	VGE +-15 V		0.25	0.6		
		tr(0)	RG = 120 ohm		0.08			
	Turn-off time	toff			0.40	1.0	us	
		tf			0.05	0.35		
	Forward on voltage	VF	IF = 20 A	chip terminal	1.8	1.95	2.6	V
	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 terminal	1.8	1.95	2.4	V	
Turn-on time		ton	Vcc= 300 V, Ic = 20 A		0.45	1.2	us	
		tr	VGE +-15 V		0.25	0.6		
Turn-off time		toff	RG = 120 ohm		0.40	1.0	us	
		tf			0.05	0.35		
Reverse current	IRRM	VR = 600 V			1.0	mA		
Converter	Forward on voltage	VFM IF = 20 A	chip terminal	1.0	1.1	1.5	V	
	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	

This material and the information herein is the property of Fuji Electric Co. Ltd. They shall be neither reproduced, copied, lent, or disclosed in any way whatsoever for the use of any third party nor used for the manufacturing purposes without the express written consent of Fuji Electric Co., Ltd.

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.

**Fuji Electric Co., Ltd.**

DWG. NO.

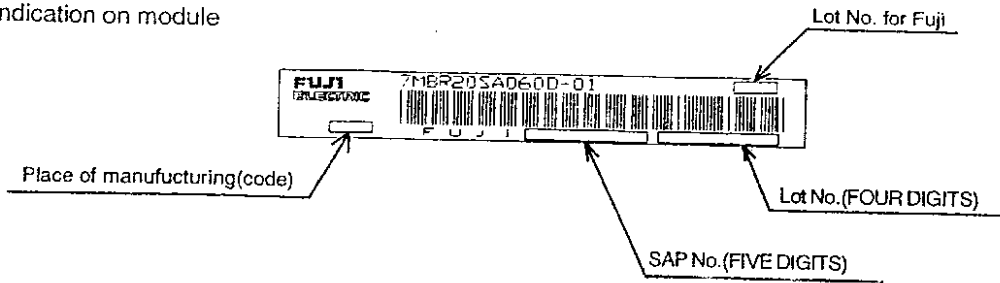
**MS6M 0542**

5 / 10

H04-004-03

This material and the information herein is the property of Fuji Electric Co. Ltd. They shall be neither reproduced, copied, lent, or disclosed in any way whatsoever for the use of any third party nor used for the manufacturing purposes without the express written consent of Fuji Electric Co. Ltd.

### 6. Indication on module



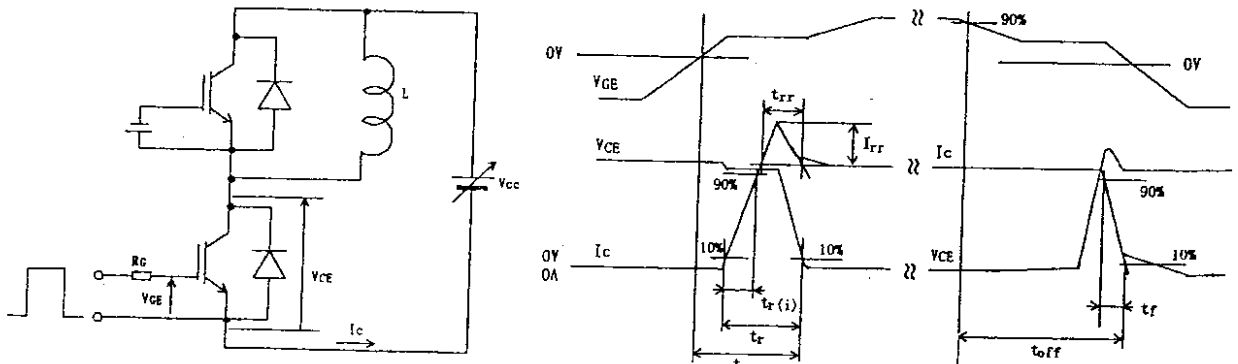
### 7. Applicable category

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



**Fuji Electric Co.,Ltd**

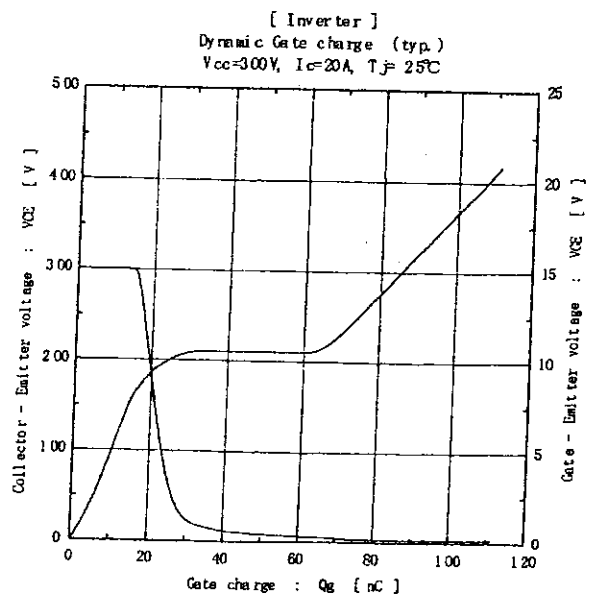
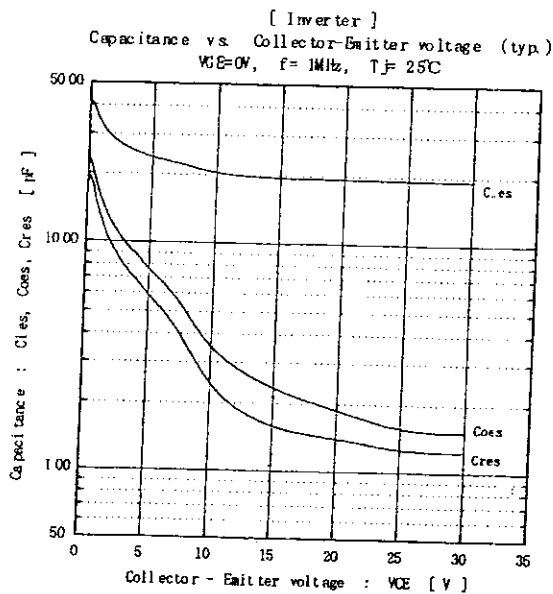
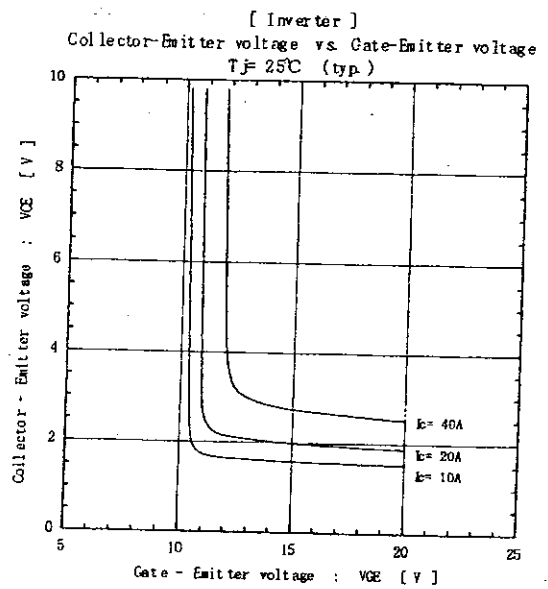
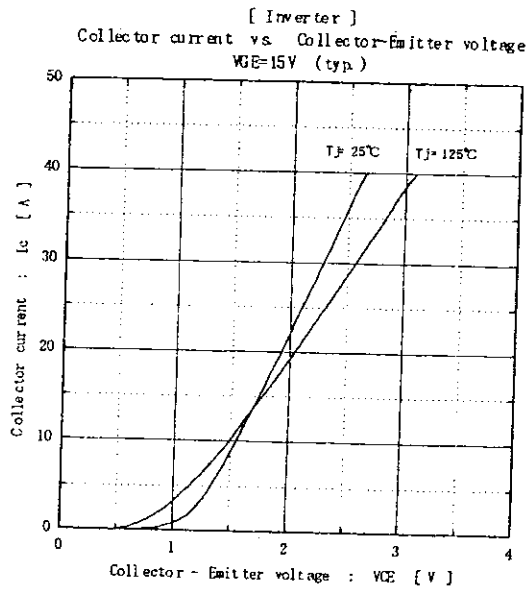
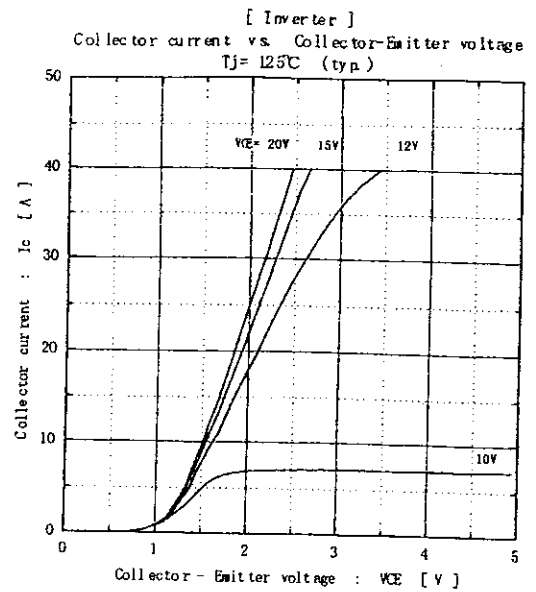
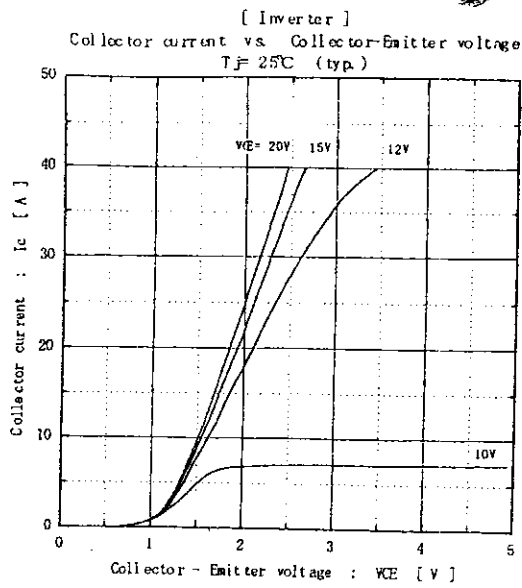
DWG.NO.

MS6M 0542

6 / 10

H04-004-03

This material and the information herein is the property of Fuji Electric Co., Ltd. They shall be neither reproduced, copied, lent, or disclosed in any way whatsoever for the use of any third party nor used for the manufacturing purposes without the express written consent of Fuji Electric Co., Ltd.



Fuji Electric Co., Ltd.

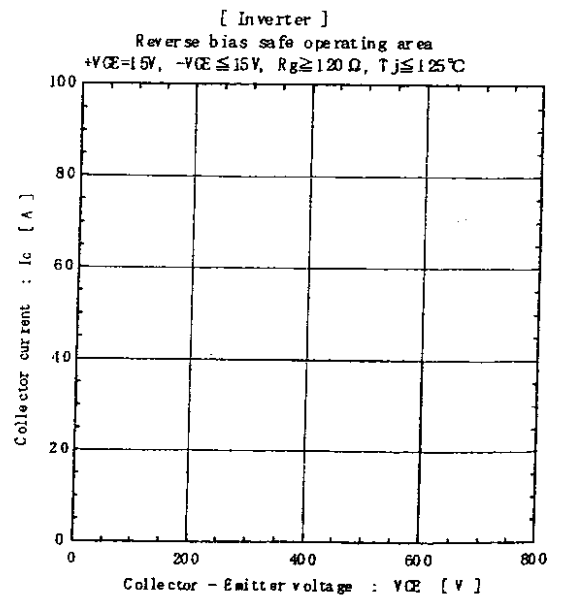
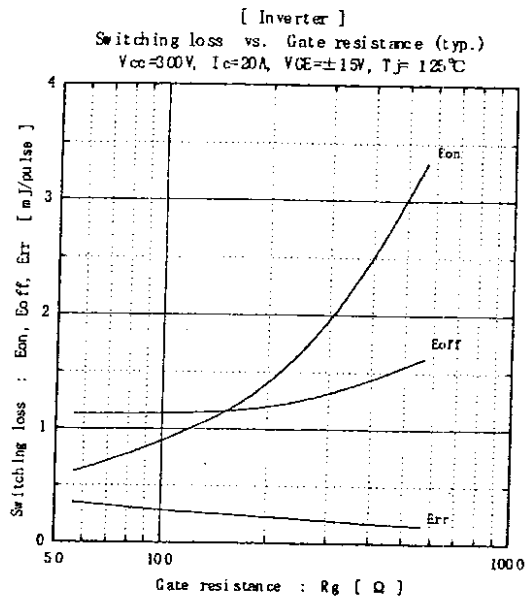
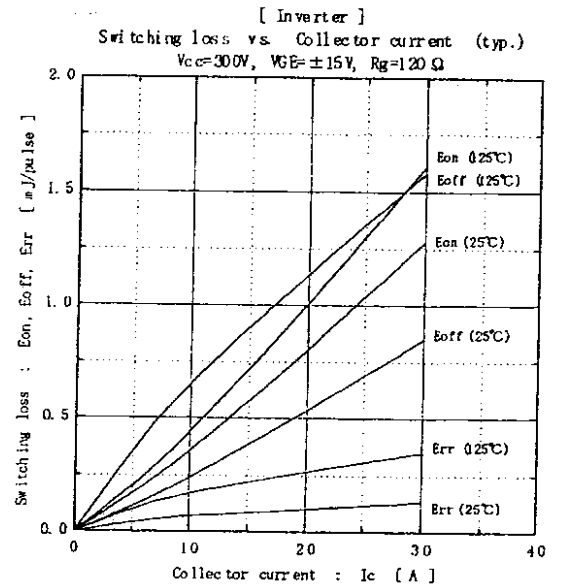
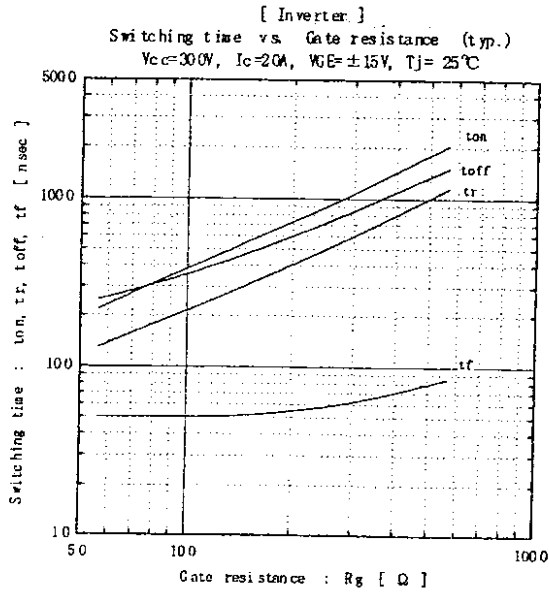
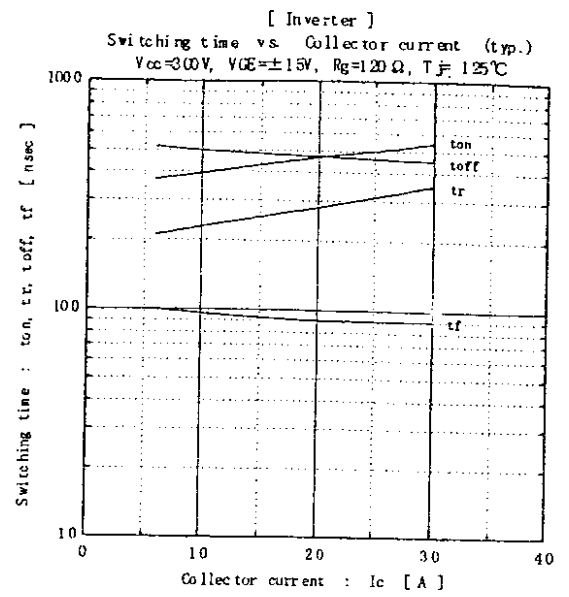
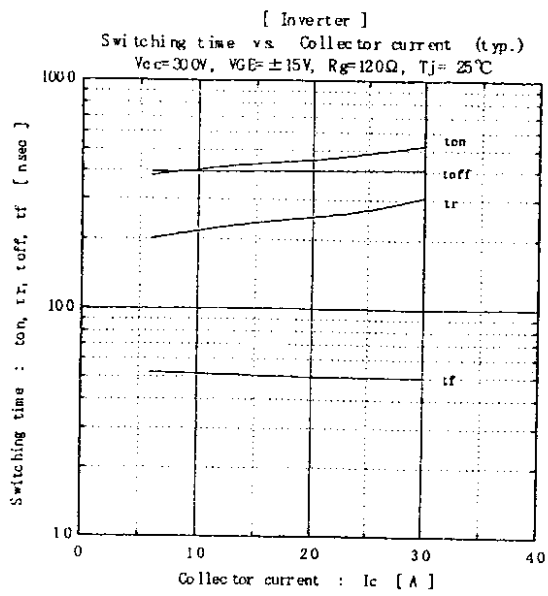
DWG. NO.

MS6M 0542

7 / 10

H04-004-03

This material and the information herein is the property of Fuji Electric Co., Ltd. They shall be neither reproduced, copied, lent, or disclosed in any way whatsoever for the use of any third party nor used for the manufacturing purposes without the express written consent of Fuji Electric Co., Ltd.



Fuji Electric Co., Ltd.

DWG. NO.

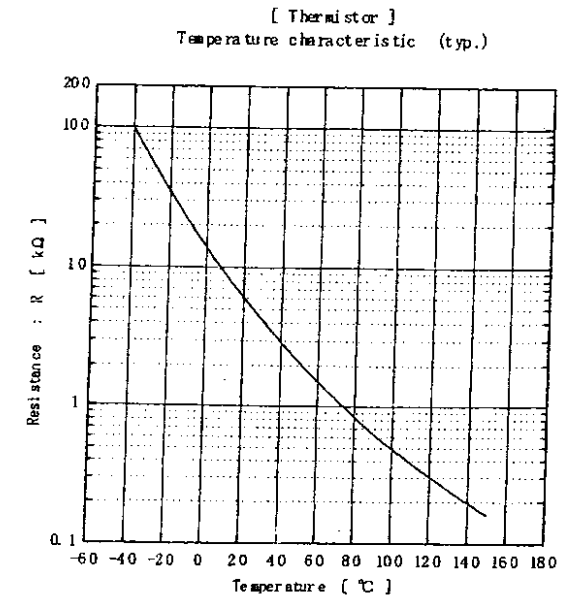
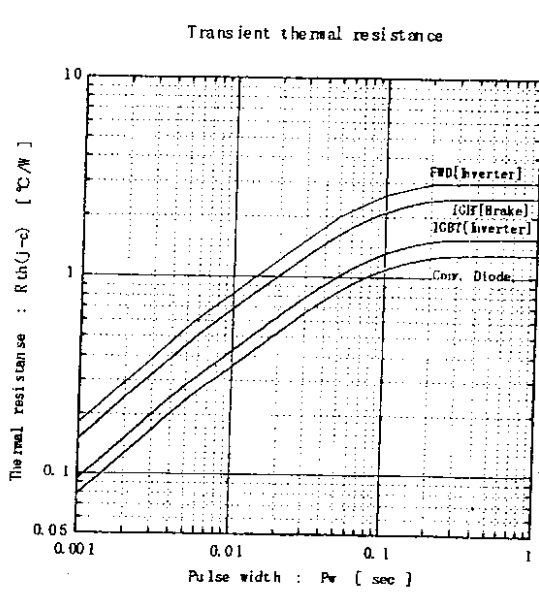
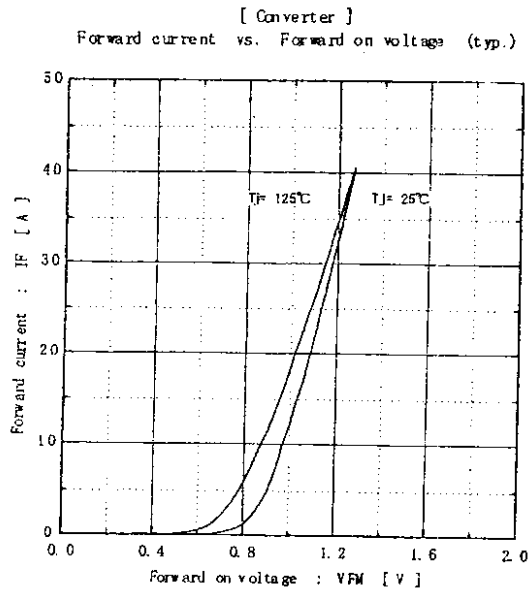
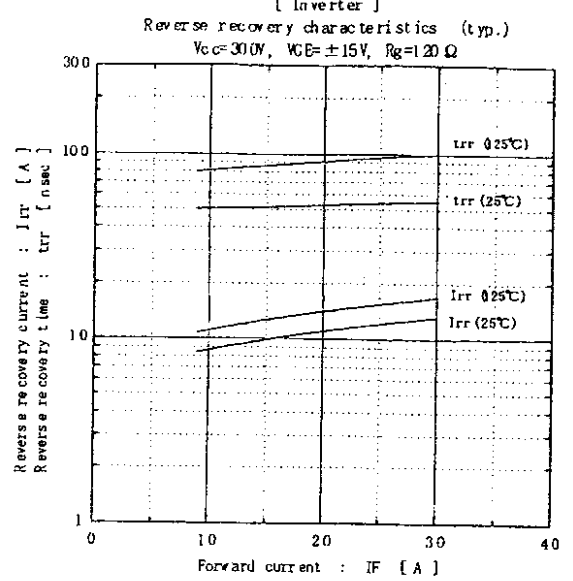
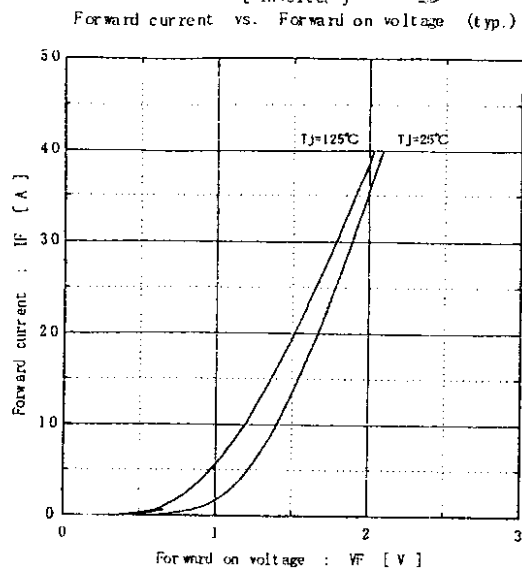
MS6M 0542

8 / 10

H04-004-03



This material and the information herein is the property of Fuji Electric Co., Ltd. They shall be neither reproduced, copied, lent, or disclosed in any way whatsoever for the use of any third party nor used for the manufacturing purposes without the express written consent of Fuji Electric Co., Ltd.



Fuji Electric Co., Ltd.

DWG. NO.

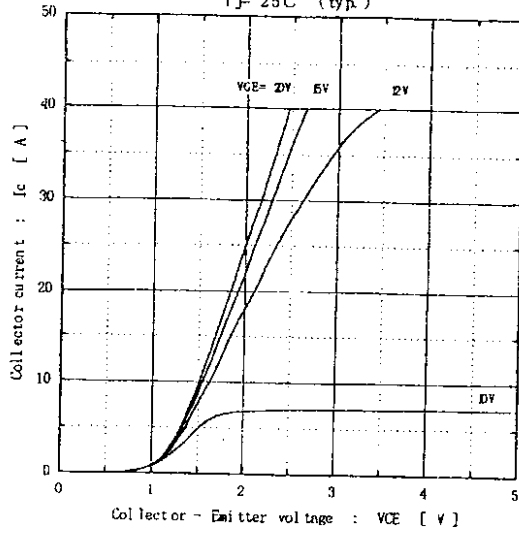
MS6M 0542

9/10

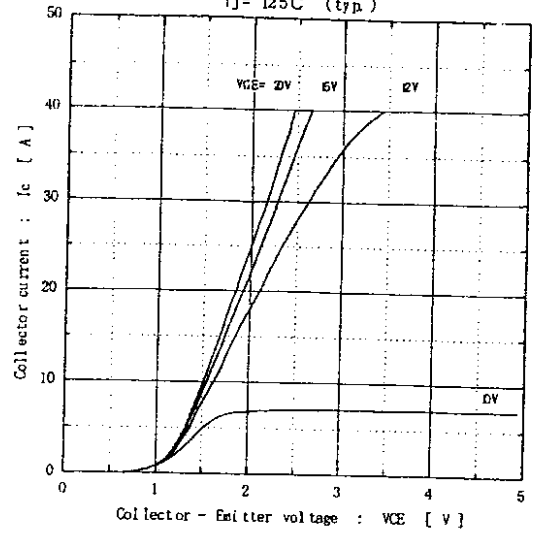
H04-004-03

This material and the information herein is the property of Fuji Electric Co., Ltd. They shall be neither reproduced, copied, lent, or disclosed in any way whatsoever for the use of any third party nor used for the manufacturing purposes without the express written consent of Fuji Electric Co., Ltd.

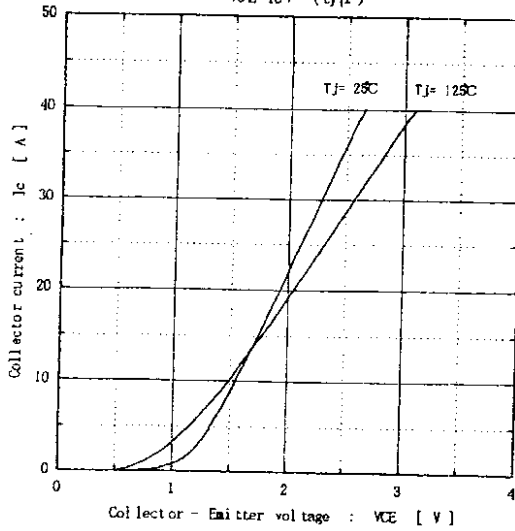
[ Brake ]  
Collector current vs. Collector-Emitter voltage  
 $T_j = 25^\circ\text{C}$  (typ.)



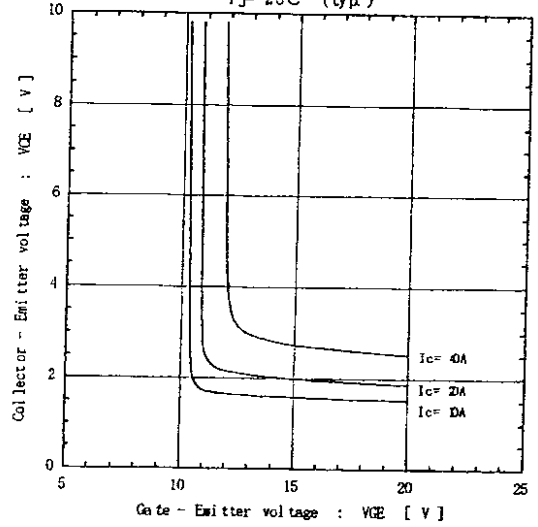
[ Brake ]  
Collector current vs. Collector-Emitter voltage  
 $T_j = 125^\circ\text{C}$  (typ.)



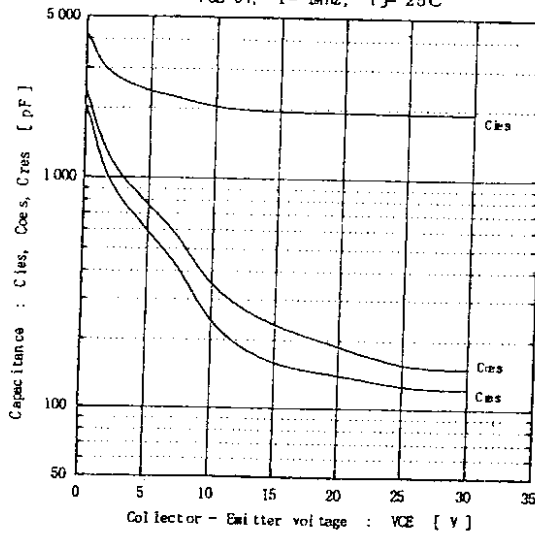
[ Brake ]  
Collector current vs. Collector-Emitter voltage  
 $V_{GE} = 15\text{V}$  (typ.)



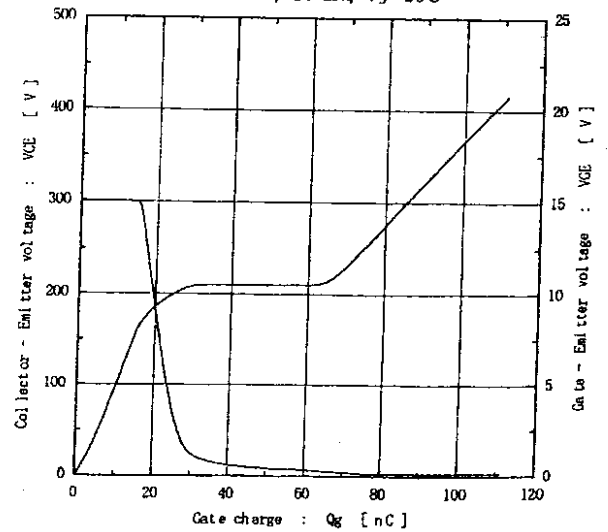
[ Brake ]  
Collector-Emitter voltage vs. Gate-Emitter voltage  
 $T_j = 25^\circ\text{C}$  (typ.)



[ 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.)  
 $V_c = 300\text{V}$ ,  $I_c = 20\text{A}$ ,  $T_j = 25^\circ\text{C}$



Fuji Electric Co., Ltd.

DWG. NO.

MS6M 0542

10/10

H04-004-03