

# SPECIFICATION

Device Name : IGBT module

Type Name : 2MBI200NT-120-02

Spec. No. : **MS5F3938**

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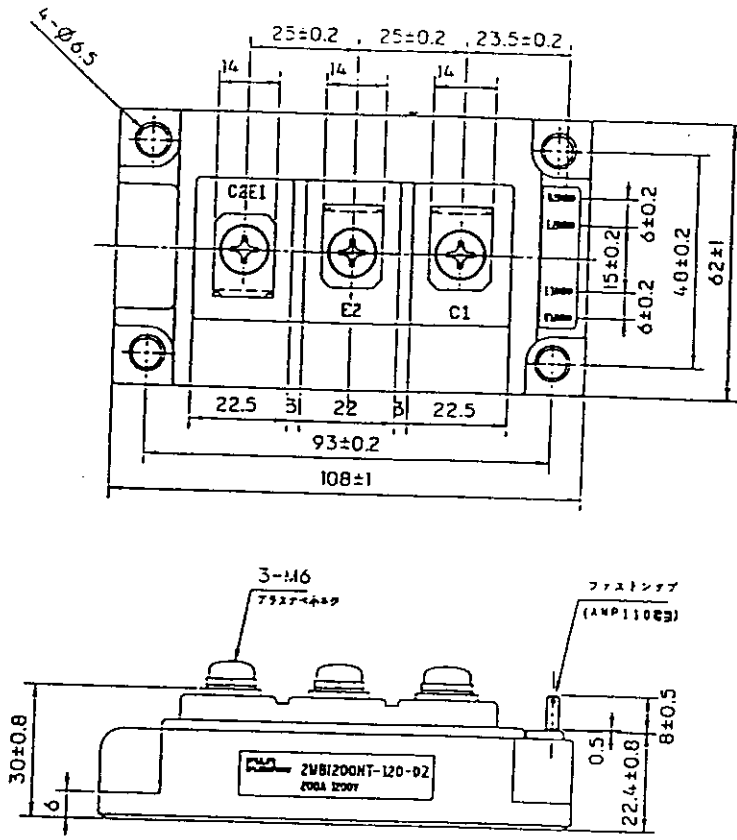
Fuji Electric Co., Ltd.  
Matsumoto Factory

	DATE	NAME	APPROVED	Fuji Electric Co., Ltd.	
DRAWN	Feb. -21-'97	<i>Z. Kobayashi</i>	<i>S.K</i>	<b>MS5F3938</b>	$\frac{1}{7}$
CHECKED	Feb. -21-'97	<i>S. Hiyasaka</i>			a



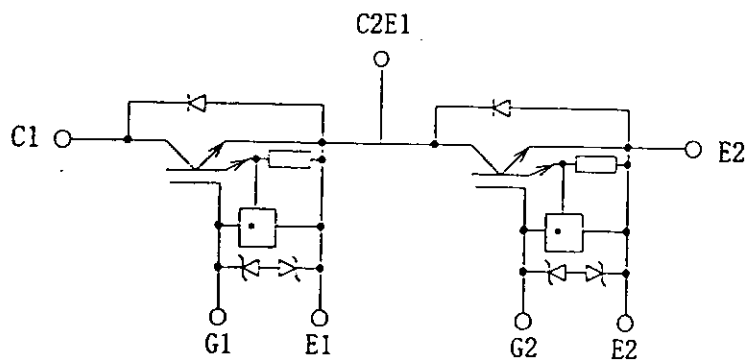
2MBI200NT-120-02

1. Outline Drawing  
Unit : mm



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2. Equivalent circuit



\* NLU (Over Current Limiting Circuit)

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

Items		Symbols	Ratings	Units
Collector-Emitter voltage		V <sub>CEs</sub>	1200	V
Gate-Emitter voltage		V <sub>GES</sub>	±20	V
Collector current	Continuous	I <sub>c</sub>	200	A
	1ms	I <sub>c</sub> pulse	400	
		-I <sub>c</sub>	200	
	1ms	-I <sub>c</sub> pulse	400	
Max. power dissipation		PC	1650	W
Operating temperature		T <sub>j</sub>	+150	°C
Storage temperature		T <sub>stg</sub>	-40~+125	°C
Isolation voltage		V <sub>is</sub>	AC 2500 (1min.)	V
Screw torque		Mounting *1	3.5	N·m
		Terminals *2	4.5	

Note : \*1 Recommendable value : 2.5~3.5 N·m (M5) or (M6)

\*2 Recommendable value : 3.5~4.5 N·m (M6)

4. Electrical characteristics ( at T<sub>j</sub>=25°C unless otherwise specified)

Items	Symbols	Characteristics			Conditions	Units
		min.	typ.	max.		
Zero gate voltage Collector current	I <sub>CEs</sub>			2.0	V <sub>GE</sub> =0V, V <sub>CE</sub> =1200V	mA
Gate-Emitter leakage current	I <sub>GES</sub>			30	V <sub>CE</sub> =0V, V <sub>GE</sub> =±20V	μA
Gate-Emitter threshold voltage	V <sub>GE(th)</sub>	4.5		7.5	V <sub>CE</sub> =20V, I <sub>c</sub> =200mA	V
Collector-Emitter saturation voltage	V <sub>CE(sat)</sub>			3.5	V <sub>GE</sub> =15V, I <sub>c</sub> =200A	V
Input capacitance	C <sub>ies</sub>		32000		V <sub>GE</sub> =0V	pF
Output capacitance	C <sub>oes</sub>		15000		V <sub>CE</sub> =10V	
Reverse transfer capacitance	C <sub>res</sub>		12500		f=1MHz	
Turn-on time	t <sub>on</sub>		0.65	1.2	V <sub>cc</sub> =600V	μs
	t <sub>r</sub>		0.25	0.6	I <sub>c</sub> =200A	
Turn-off time	t <sub>off</sub>		0.85	1.5	V <sub>GE</sub> =±15V	μs
	t <sub>f</sub>		0.35	0.5	R <sub>G</sub> =4.7Ω	
Diode forward on voltage	V <sub>F</sub>			3.4	I <sub>F</sub> =200A, V <sub>GE</sub> =0V	V
Reverse recovery time	t <sub>rr</sub>			350	I <sub>F</sub> =200A	ns
Short-circuit withstand capability	P <sub>w</sub>	10			V <sub>cc</sub> =800V, V <sub>GE</sub> =-15V R <sub>G</sub> =1.8Ω	μs

5. Thermal resistance characteristics

Items	Symbols	Characteristics			Conditions	Units
		min.	typ.	max.		
Thermal resistance	R <sub>th(j-c)</sub>			0.077	IGBT	°C/W
	R <sub>th(j-c)</sub>			0.20	Diode	
	※		0.025		the base to cooling	
	R <sub>th(c-f)</sub>				fin	

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

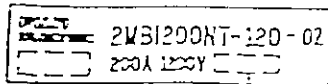
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104-C04-03



Lot No.

Place of manufacturing (code)

7. Applicable category (適用範囲)

This specification is applied to IGBT module named 2MBI200NT-120-02.  
 本納入仕様書は、IGBTモジュール 2MBI200NT-120-02 に適用する。

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

- The IGBT module should be stored at a standard temperature of 5 to 35°C and humidity of 45 to 75%.  
 常温保管が望ましい。(5~35°C、45~75%)
- Store modules in a place with few temperature changes in order to avoid condensation on the module surface.  
 急激な温度変化の無きこと。(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。

9. Heat sink mounting notes (ヒートシンク取り付け上の注意事項)

- The mounting surface of the heat sink should be finished to a roughness of 10 $\mu$ m or less and a warp between screw holes of 100 $\mu$ m or less.  
 本モジュールを取り付ける冷却体の取付面の仕上げは、粗さ10 $\mu$ m以下、取付ネジ間で平坦度100 $\mu$ m以下とする。
- Each mounting screw should be fastened using a specified torque after pre-fastening using a 1/3 specified torque.  
 取付けネジは、規定の1/3のトルクで仮締を行った後、規定のトルクで本締を行って下さい。
- If the above notes are not met, it has a possibility to break the insulation between the IGBT module's chips and metal base.  
 上記注意事項の範囲外で御適用した場合、IGBTモジュールのチップと金属ベース間の絶縁破壊を生ずる可能性があります。

⑩ Revers gate bias voltage (ゲート逆バイアス電圧)

- ① Recommendable value of the revers gate bias voltage : -7V(typ.), -5V(min.)  $R_G=4.7\Omega$   
 ゲート逆バイアス電圧の推奨値 : -7V(typ.), -5V(min.)  $R_G=4.7\Omega$
- ② The revers gate bias voltage means the voltage between the gate terminal and the auxiliary emitter terminal of the modules.  
 ゲート逆バイアス電圧は、モジュールのゲート端子と補助エミッタ端子間の電圧である。

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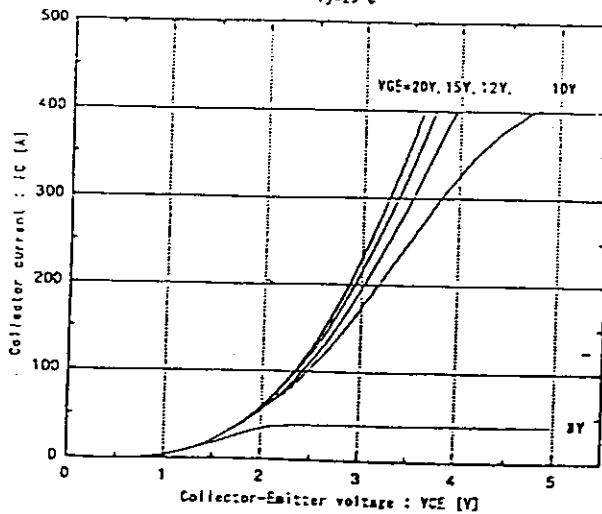
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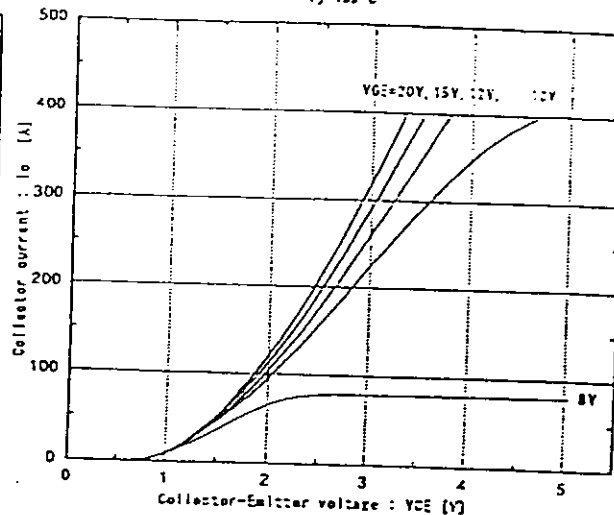
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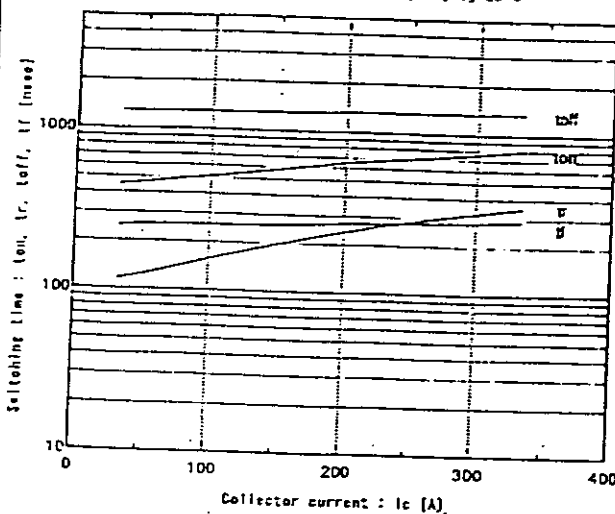
Collector current vs. Collector-Emitter voltage  
Tj=25°C



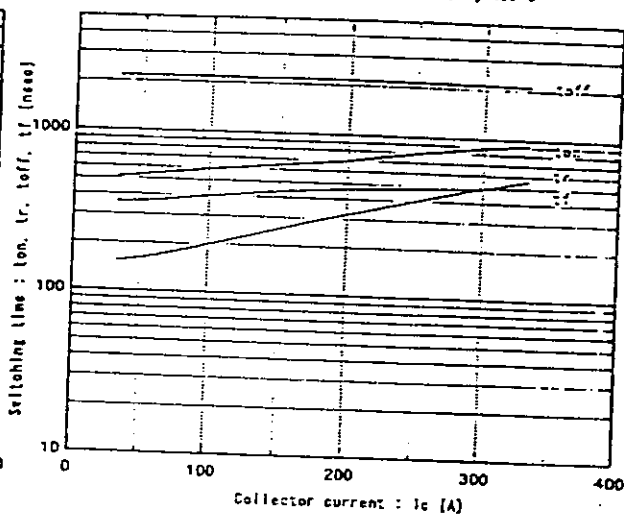
Collector current vs. Collector-Emitter voltage  
Tj=135°C



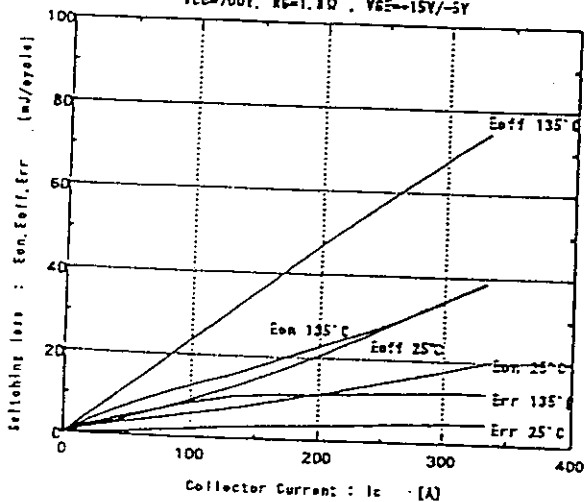
Switching time vs. Collector current  
Vcc=700V, Rθ=1.8Ω, VGE=15V/-5V, Tj=25°C



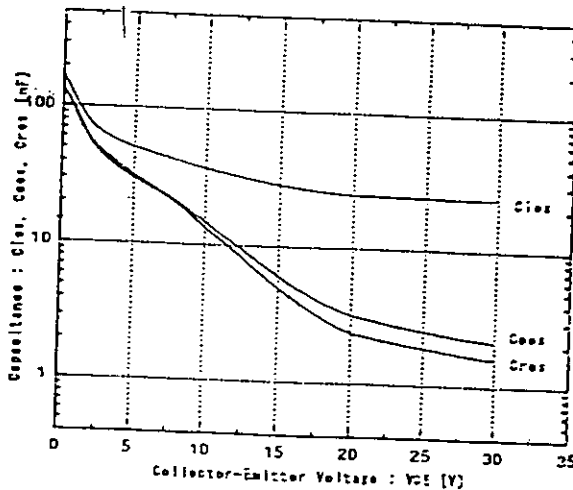
Switching time vs. Collector current  
Vcc=700V, Rθ=1.8Ω, VGE=15V/-5V, Tj=135°C



Switching loss vs. Collector current  
Vcc=700V, Rθ=1.8Ω, VGE=15V/-5V



Capacitance vs. Collector-Emitter voltage  
Tj=25°C



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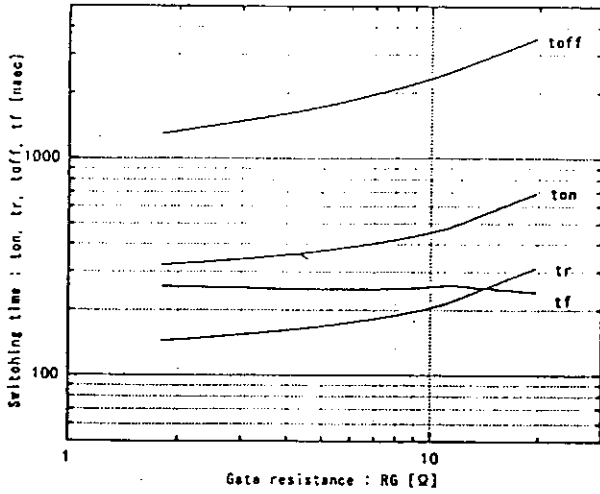
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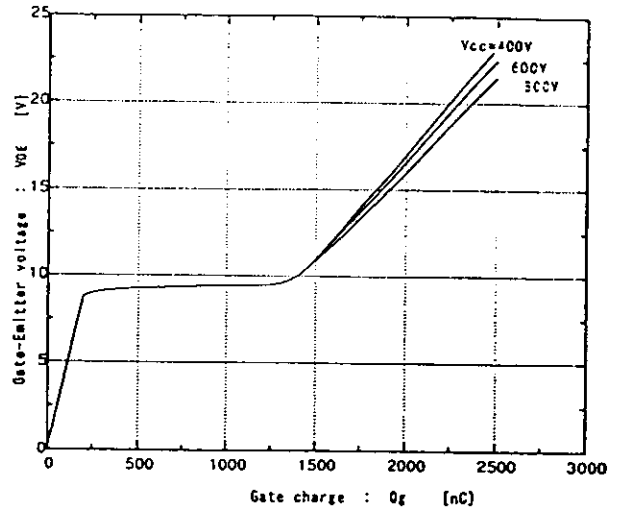
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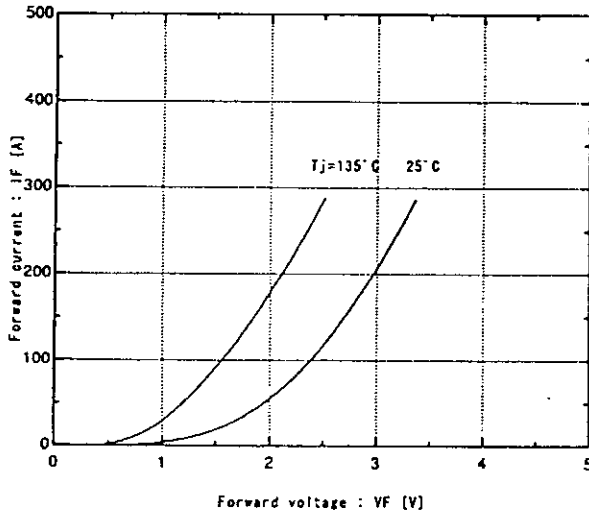
Switching time vs.  $R_G$   
 $V_{CC}=700V, I_C=200A, V_{GE}=-15V/-5V, T_J=25^\circ C$



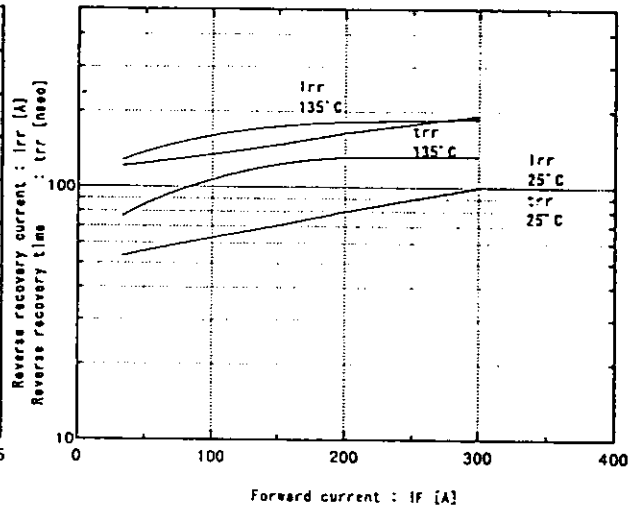
Dynamic input characteristics  
 $T_J=25^\circ C$



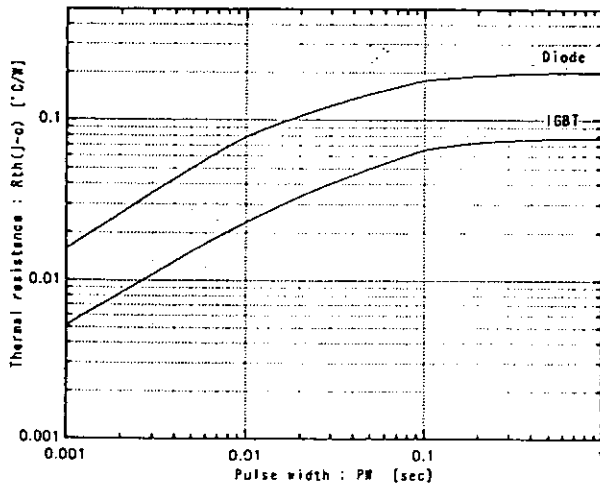
Forward current vs. Forward voltage  
 $V_{GE}=0V$



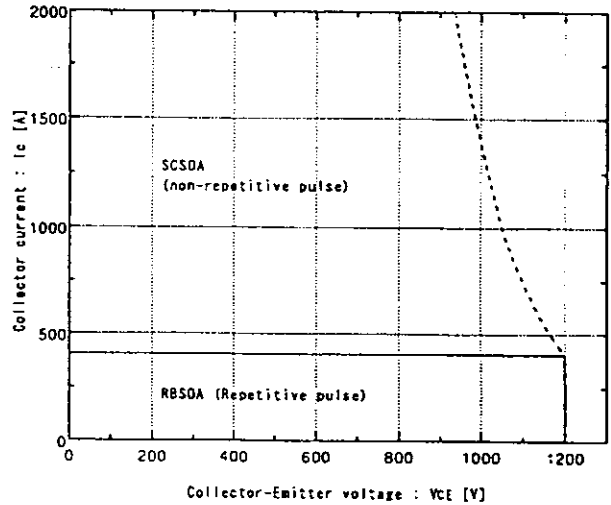
Reverse recovery characteristics  
 $t_{rr}, I_{rr}$  vs.  $I_F$



Transient thermal resistance



Reversed biased safe operating area  
 $-V_{GE}=15V, -V_{GE} \leq 15V, T_J \leq 135^\circ C, R_G \geq 1.8\Omega$



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