

# SPECIFICATION

Device Name : IGBT Module

Type Name : 1MB1600PX-120-03

Spec. No. : MS5F4504

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Matsumoto Factory

	DATE	NAME	APPROVED	Fuji Electric Co., Ltd.	
DRAWN	Jan. - 21 - '99	J. Hayasune	J. Isono	MS5F4504	1/8
CHECKED	Jan. - 22 - '99	J. Isono			

H04-004-07

# Revised Records

Date	Classi- fication	Ind.	Content	Applied date	Drawn	Checked	Approved
Jan.-21-'99	enactment	—	—	Issued date	—	Y. Isono	Y. Isono
Feb.-01-'99	Revision	a	Definition of solder void under DBCs is changed. (5/8 page.)	Feb.-01-'99	J. Hogaume	S. Kobayashi	S.K

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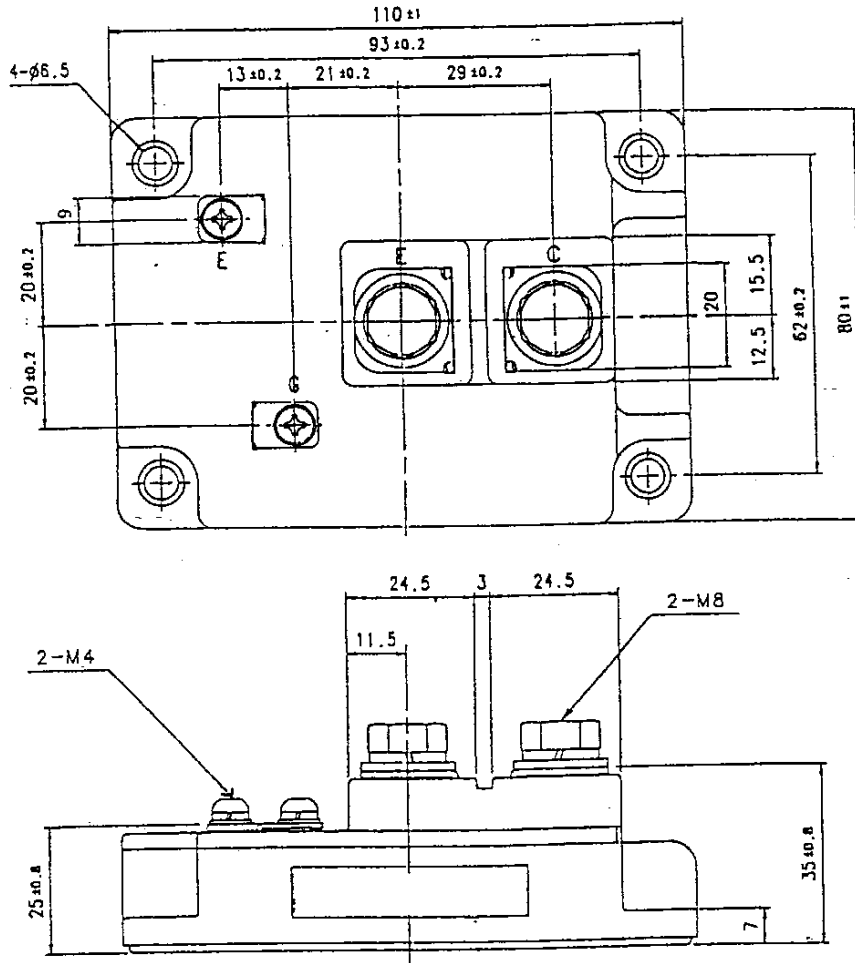
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2/8

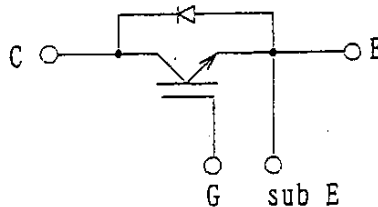
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1MBI600PX-120-03

1. Outline Drawing  
Unit : mm



2. Equivalent circuit



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3/8

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H04-004-03

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	Tc=25°C	I <sub>c</sub>	800	
		Tc=80°C		600	
	1ms	Tc=25°C	I <sub>c</sub> pulse	1600	A
		Tc=80°C		1200	
			-I <sub>c</sub>	600	
1ms		-I <sub>c</sub> pulse	1200		
Max. power dissipation		PC	4100	W	
Operating temperature		T <sub>j</sub>	+150	°C	
Storage temperature		T <sub>stg</sub>	-40~+125	°C	
Isolation voltage (rms) #4		V <sub>is</sub>	AC 2500 (1min.)	V	
Screw torque		Mounting #1	4.5	N·m	
		Terminals #2	11.0		
		Terminals #3	1.7		

Note : #1 Recommendable value : 4.0±0.5 N·m (M6) #4: All terminals should be connected together when isolation test will be done.  
 Note : #2 Recommendable value : 10.0±1.0 N·m (M8)  
 Note : #3 Recommendable value : 1.50±0.2 N·m (M4)

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

Items	Symbols	Characteristics			Conditions	Units
		min.	typ.	max.		
Zero gate voltage Collector current	I <sub>CEs</sub>	—	—	0.5	V <sub>GE</sub> =0V, V <sub>CE</sub> =1200V	mA
Gate-Emitter leakage current	I <sub>GES</sub>	—	—	±0.5	V <sub>CE</sub> =0V, V <sub>GE</sub> =±20V	μA
Gate-Emitter threshold voltage	V <sub>GE(th)</sub>	6.0	8.0	9.0	V <sub>CE</sub> =20V, I <sub>c</sub> =600mA	V
Collector-Emitter saturation voltage	V <sub>CE(sat)</sub>	—	2.85	3.2	V <sub>GE</sub> =15V, I <sub>c</sub> =600A	V
Input capacitance	C <sub>ies</sub>	—	60	—	V <sub>GE</sub> =0V	nF
Output capacitance	C <sub>oes</sub>	—	9	—	V <sub>CE</sub> =10V	
Reverse transfer capacitance	C <sub>res</sub>	—	4	—	f=1MHz	
Turn-on time	t <sub>on</sub>	—	750	1200	V <sub>cc</sub> =600V	ns
	t <sub>r</sub>	—	200	600	I <sub>c</sub> =600A	
Turn-off time	t <sub>off</sub>	—	650	1000	V <sub>GE</sub> =±15V	ns
	t <sub>f</sub>	—	100	300	R <sub>G</sub> =2.0Ω	
Diode forward on voltage	V <sub>F</sub>	—	—	3.4	I <sub>F</sub> =600A, V <sub>GE</sub> =0V	V
Reverse recovery time	t <sub>rr</sub>	—	—	350	I <sub>F</sub> =600A	ns

5. Thermal resistance characteristics

Items	Symbols	Characteristics			Conditions	Units
		min.	typ.	max.		
Thermal resistance	R <sub>th(j-c)</sub>	—	—	0.03	IGBT	°C/W
	R <sub>th(j-c)</sub>	—	—	0.06	Diode	
	※	—	0.0063	—	the base to cooling fin	
	R <sub>th(c-f)</sub>	—	—	—	—	

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

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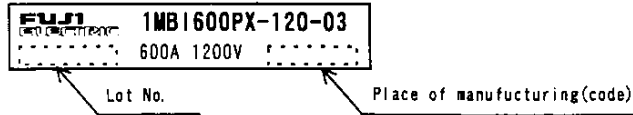
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MS5F4504

4/8

H04-004-03

6. Indication module (モジュール表示)



7. Applicable category (適用範囲)

This specification is applied to IGBT module named 1MBI600PX-120-03.  
 本納入仕様書は、IGBTモジュール 1MBI600PX-120-03 に適用する。

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

- This IGBT module should be stored at a standard temperature of 5 to 35°C and humidity of 45% to 75%.  
 常温保存が望ましい。
- 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. Specification of solder void. (半田ボイドの仕様)

- Under chips. (チップ下) : ≤5% (5%以下)
- Under DBCs of chip area. (チップ直下の範囲のDBC下) : ≤10% (10%以下)
- Under DBCs ~~except chip area~~. (チップ直下以外の範囲のDBC下) : ≤10% (10%以下)

10. Specification of Soldering.

- Vacuum soldering.

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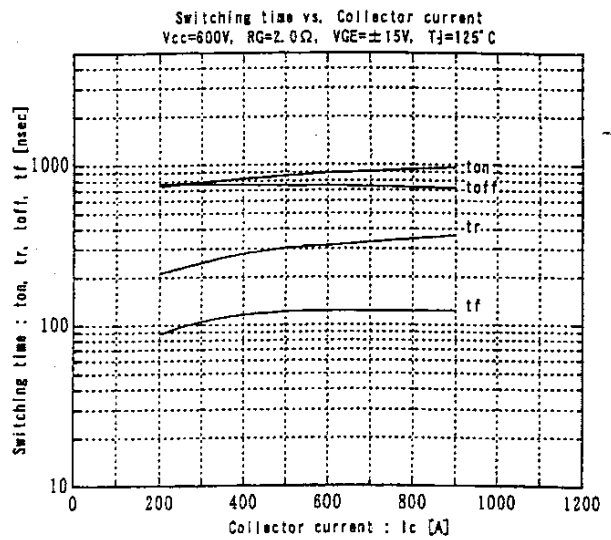
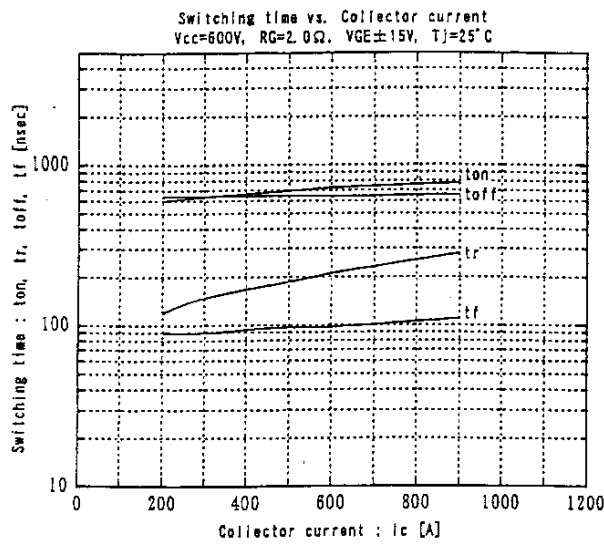
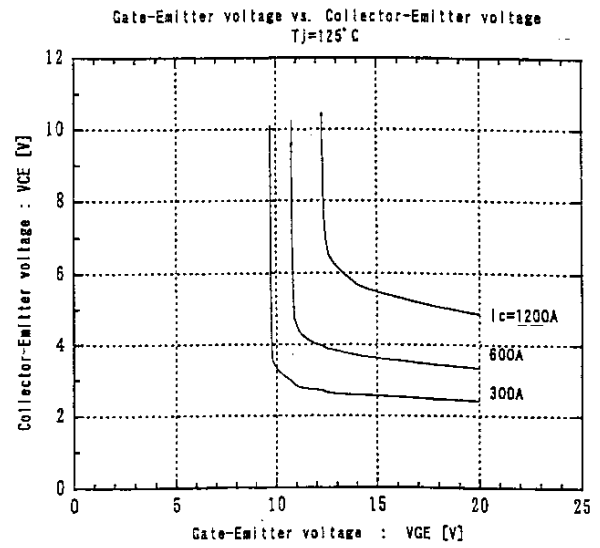
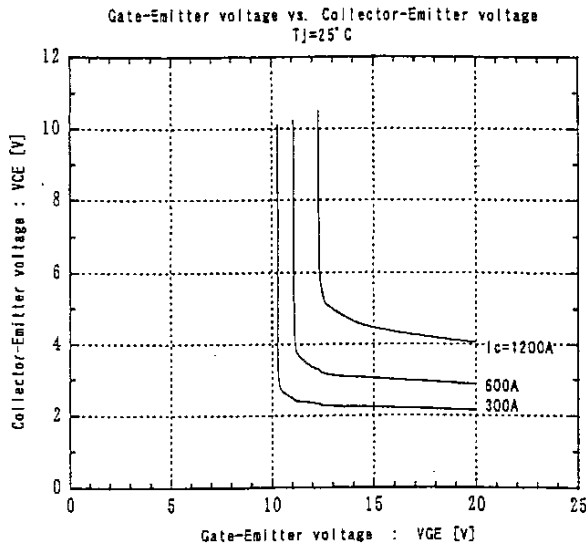
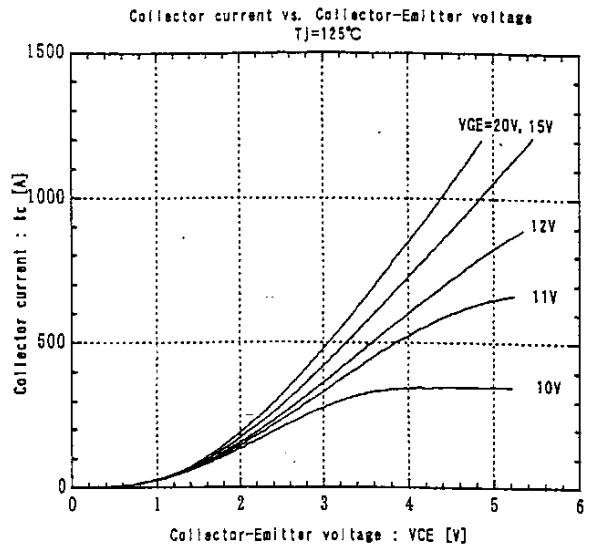
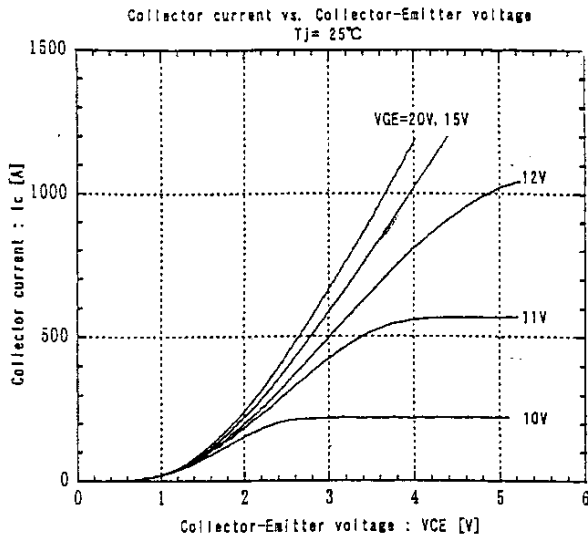
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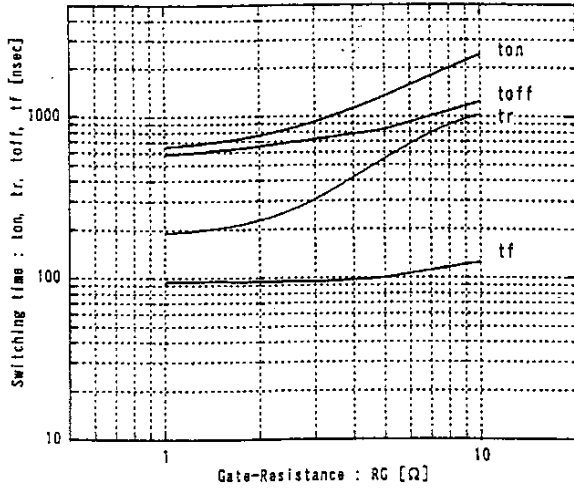
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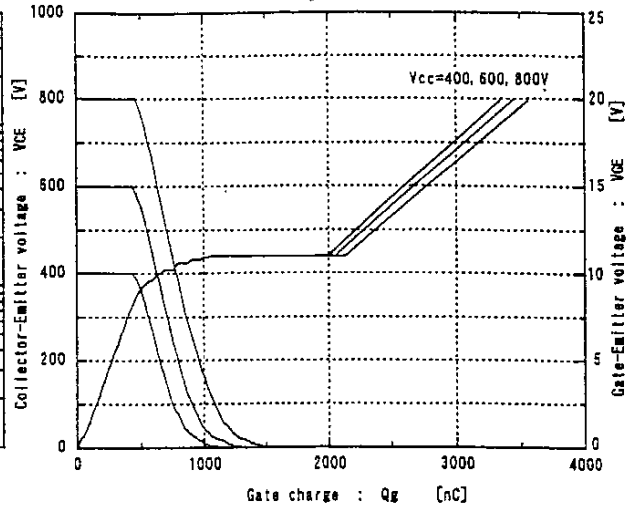
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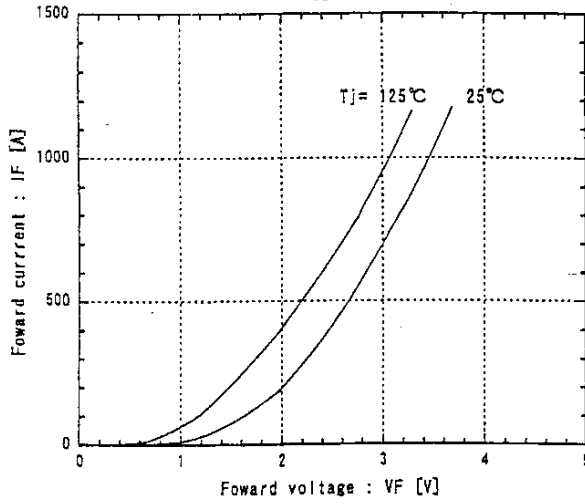
Switching time vs. Gate-Resistance  
 $V_{cc}=600V, I_c=600A, V_{GE} \pm 15V, T_j=25^\circ C$



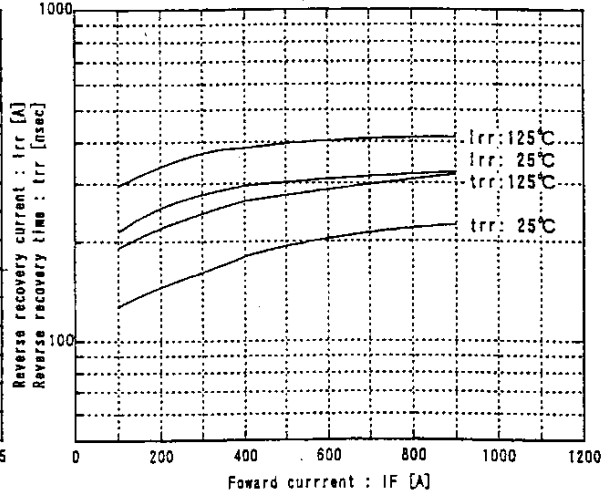
Dynamic input characteristics  
 $T_j=25^\circ C$



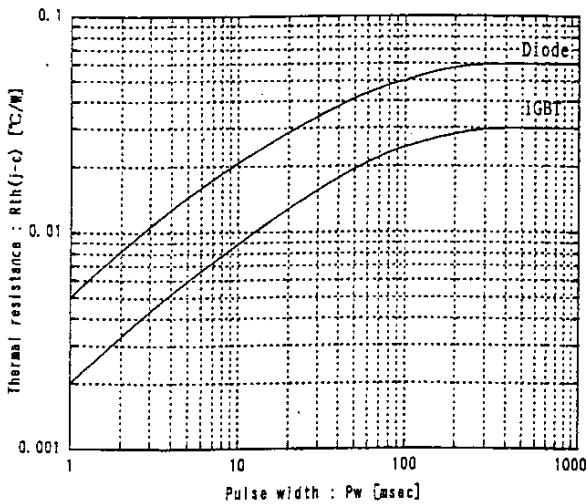
Forward current vs. Forward voltage  
 $V_{GE}=0V$



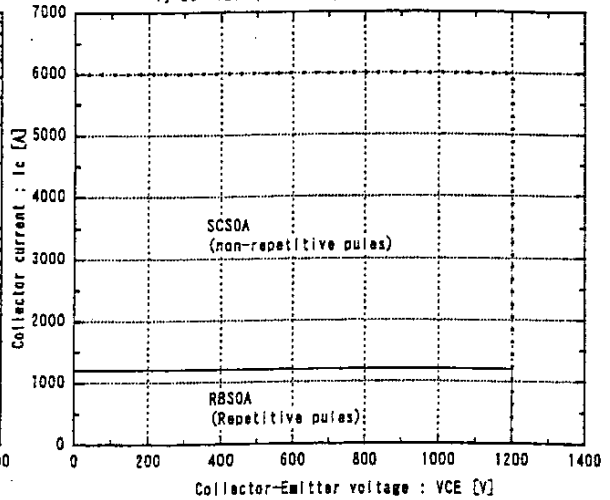
Reverse recovery characteristics ( $t_{rr}, t_{rr}$  vs.  $I_F$ )  
 $V_{cc}=600V, V_{GE}=\pm 15V, R_G=2.0\Omega$



Transient thermal resistance



Reverse biased safety operating area  
 $T_j=25\sim 125^\circ C, +V_{GE}=15V, -V_{GE}\le 15V, R_G\ge 2.0\Omega$



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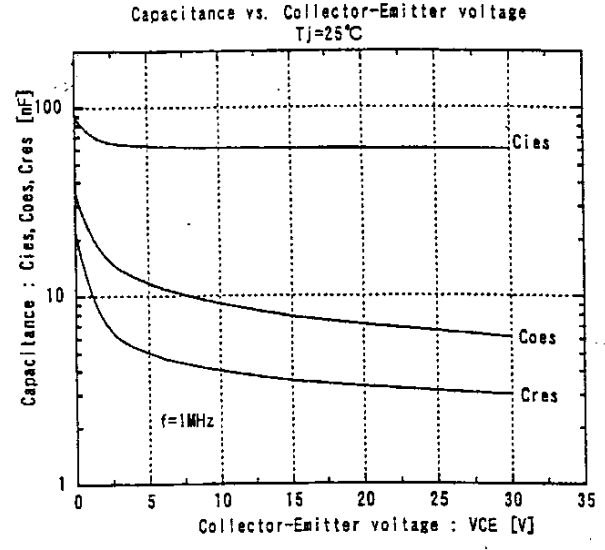
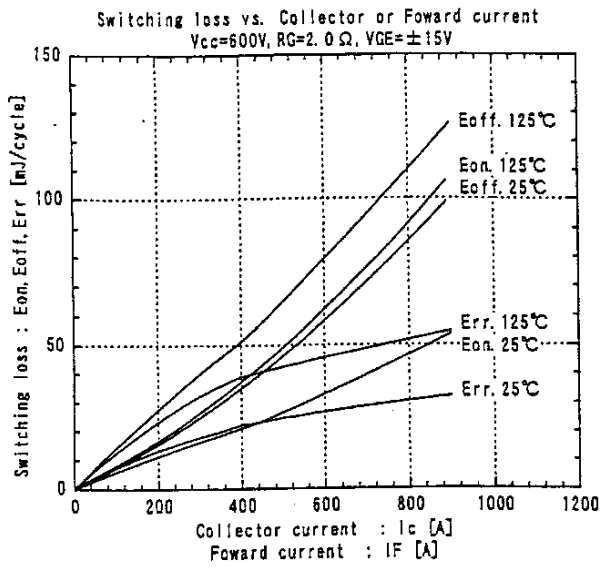
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7/8

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