

# SPECIFICATION

Device Name : IGBT module

Type Name : 2MBI150NT-120-01

Spec. No. : **MS5F3937**

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Matsumoto Factory

	DATE	NAME	APPROVED	Fuji Electric Co., Ltd.	
DRAWN	Feb -21-97	J. Kobayashi	S.K.	DWG. NO.	<b>MS5F3937</b>
CHECKED	Feb -21-97	S. Miyajima			
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# Revised Records

Date	Classi- fication	Ind.	Content	Applied date	Drawn	Checked	Approved
Feb. 21. '97	enactment	—	—————	Issued date	—	J. Miyazaki	S. K.
Apr. 18. '97	Revision	a	P5/7 Revers gate bias voltage		J. Kobayashi	A. Miyazaki	S. K.

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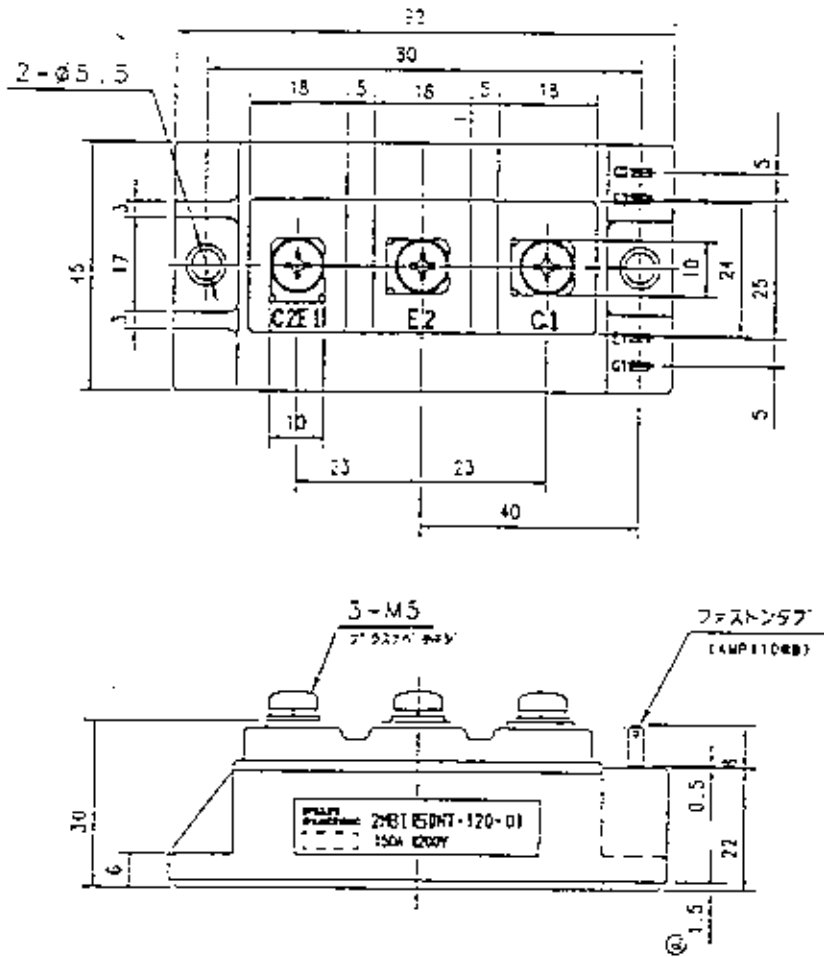
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2MBI150NT-120-01

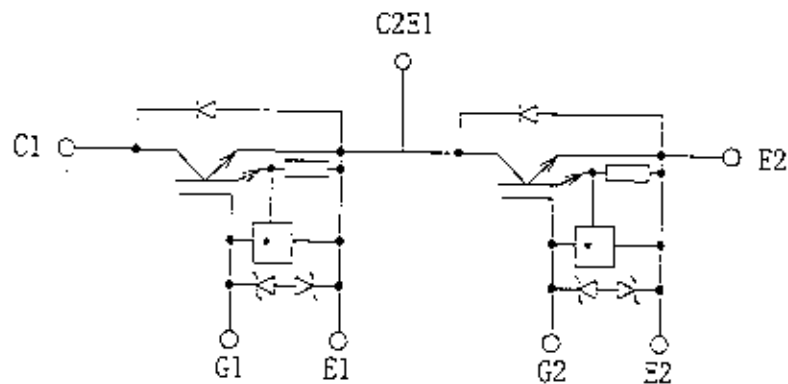
1. Outline Drawing

Unit : mm



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2. Equivalent circuit



\* NLU (Over Current Limiting Circuit)

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3. Absolute Maximum Ratings ( at  $T_c=25^{\circ}\text{C}$  unless otherwise specified )

Items	Symbols	Ratings	Units
Collector-Emitter voltage	$V_{CES}$	1200	V
Gate-Emitter voltage	$V_{GES}$	$\pm 20$	V
Collector current	Continuous	$I_c$	150
	1ms	$I_c$ pulse	300
		$-I_c$	150
	1ms	$-I_c$ pulse	300
Max. power dissipation	PC	1210	W
Operating temperature	$T_j$	+150	$^{\circ}\text{C}$
Storage temperature	$T_{stg}$	-40~+125	$^{\circ}\text{C}$
Isolation voltage	$V_{is}$	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  $T_j=25^{\circ}\text{C}$  unless otherwise specified)

Items	Symbols	Characteristics			Conditions	Units
		min.	typ.	max.		
Zero gate voltage Collector current	$I_{CES}$			2.0	$V_{GE}=0\text{V}, V_{CE}=1200\text{V}$	mA
Gate-Emitter leakage current	$I_{GES}$			30	$V_{CE}=0\text{V}, V_{GE}=\pm 20\text{V}$	$\mu\text{A}$
Gate-Emitter threshold voltage	$V_{GE(th)}$	4.5		7.5	$V_{CE}=20\text{V}, I_c=150\text{mA}$	V
Collector-Emitter saturation voltage	$V_{CE(sat)}$			3.5	$V_{GE}=15\text{V}, I_c=150\text{A}$	V
Input capacitance	$C_{ies}$		27000		$V_{GE}=0\text{V}$	$\mu\text{F}$
Output capacitance	$C_{oes}$		12500		$V_{CE}=10\text{V}$	
Reverse transfer capacitance	$C_{res}$		10000		$f=1\text{MHz}$	
Turn-on time	$t_{on}$		0.65	1.2	$V_{cc}=600\text{V}$ $I_c=150\text{A}$	$\mu\text{s}$
	$t_r$		0.25	0.6		
Turn-off time	$t_{off}$		0.85	1.5	$V_{GE}=\pm 15\text{V}$ $R_G=5.6\Omega$	
	$t_f$		0.35	0.5		
Diode forward on voltage	$V_F$			3.4	$I_F=150\text{A}, V_{GE}=0\text{V}$	V
Reverse recovery time	$t_{rr}$			350	$I_F=150\text{A}$	ns
Short-circuit withstand capability	$P_w$	10			$V_{cc}=800\text{V}, V_{GE}=-15\text{V}$ $R_G=2.7\Omega$	$\mu\text{s}$

5. Thermal resistance characteristics

Items	Symbols	Characteristics			Conditions	Units
		min.	typ.	max.		
Thermal resistance	$R_{th(j-c)}$			0.10	IGBT	$^{\circ}\text{C/W}$
	$R_{th(j-c)}$			0.30	Diode	
	※		0.025		the base to cooling	
	$R_{th(c-f)}$				fin	

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

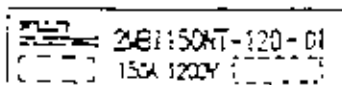
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7. Applicable category (適用範囲)

This specification is applied to IGBT module named 2MBI150NT-120-01.  
 本納入仕様書は、IGBTモジュール2MBI150NT-120-01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卻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運用した場合、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。

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

- ④ • Recommendable value of the revers gate bias voltage : -7V(typ.), -5V(min.) R $\theta$ =5.6 $\Omega$   
 ゲート逆バイアス電圧の推奨値 : -7V(typ.), -5V(min.) R $\theta$ =5.6 $\Omega$
- ④ • 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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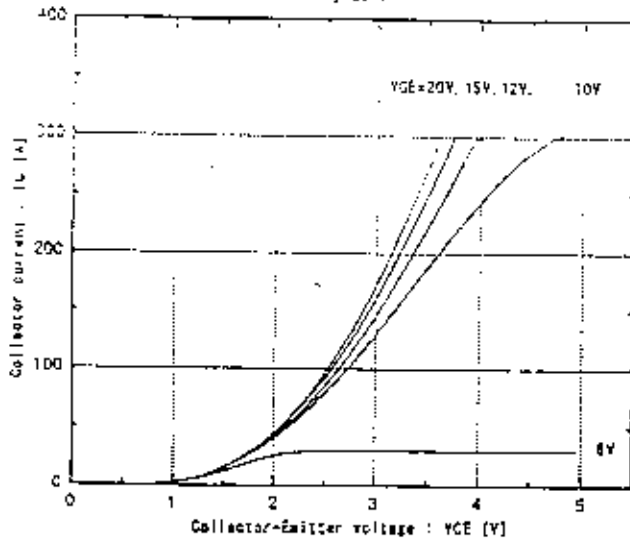
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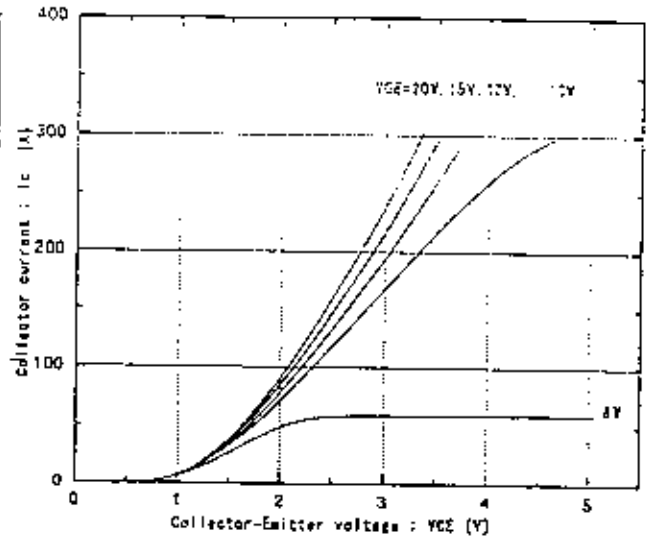
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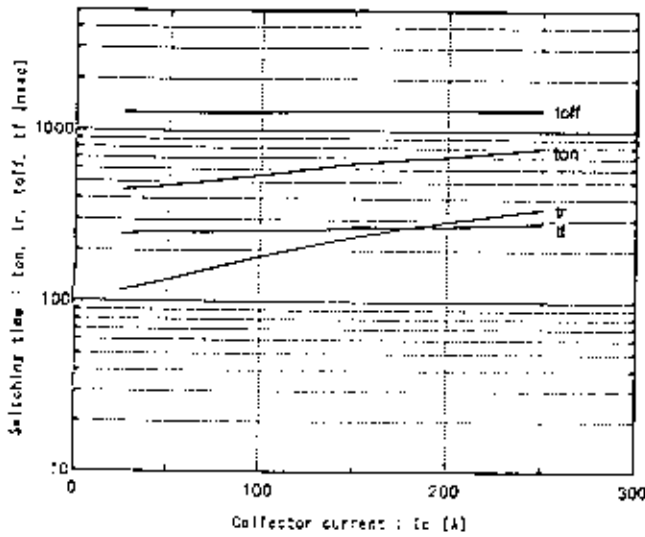
Collector current vs. Collector-Emitter voltage  
Tj=25°C



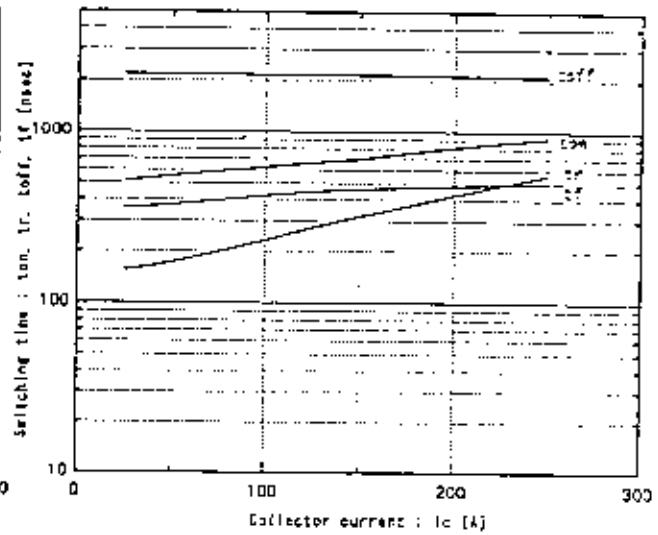
Collector current vs. Collector-Emitter voltage  
Tj=135°C



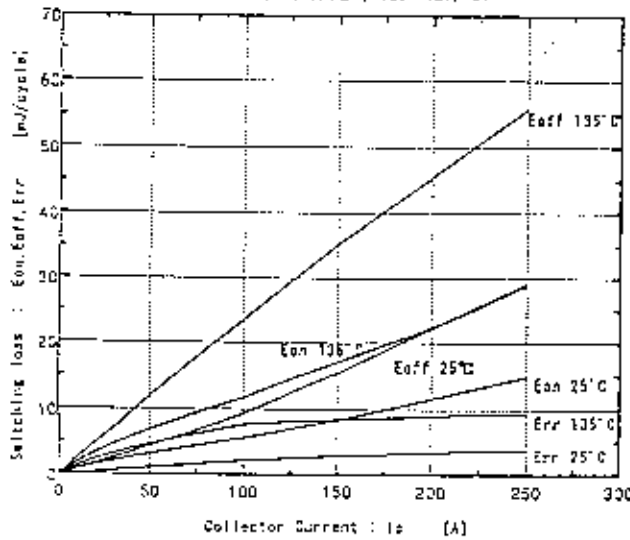
Switching time vs. Collector current  
Vcc=700V, Rθ=5.6Ω, VGE=15V/-5V, Tj=25°C



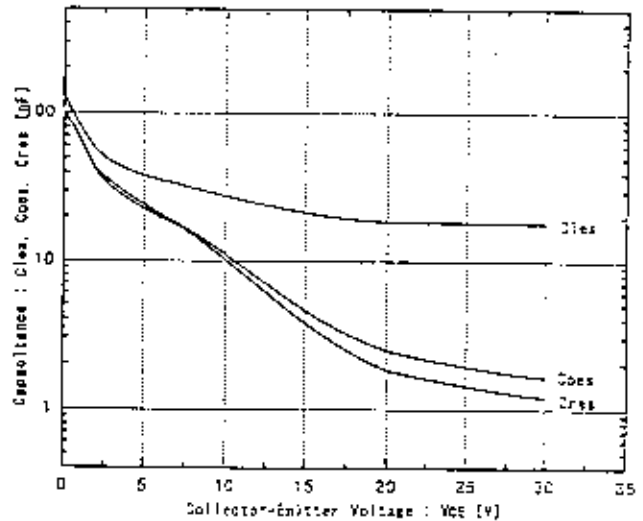
Switching time vs. Collector current  
Vcc=700V, Rθ=5.6Ω, VGE=15V/-5V, Tj=135°C



Switching loss vs. Collector current  
Vcc=700V, Rθ=5.6Ω, VGE=15V/-5V



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



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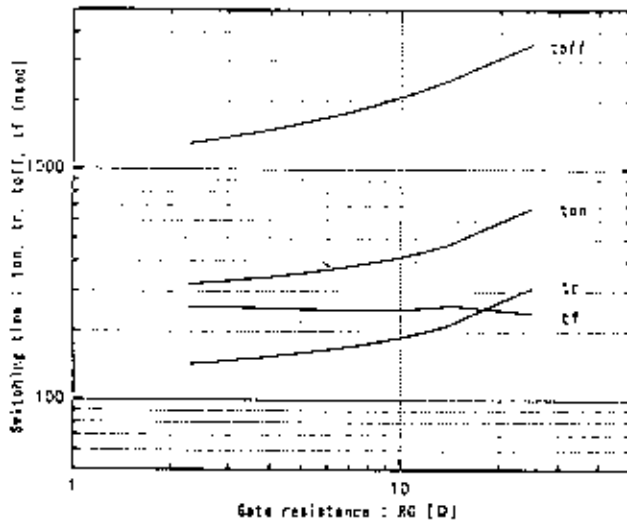
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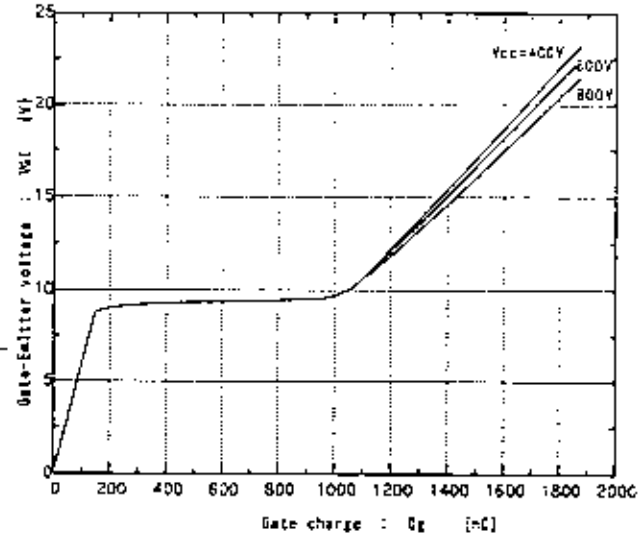
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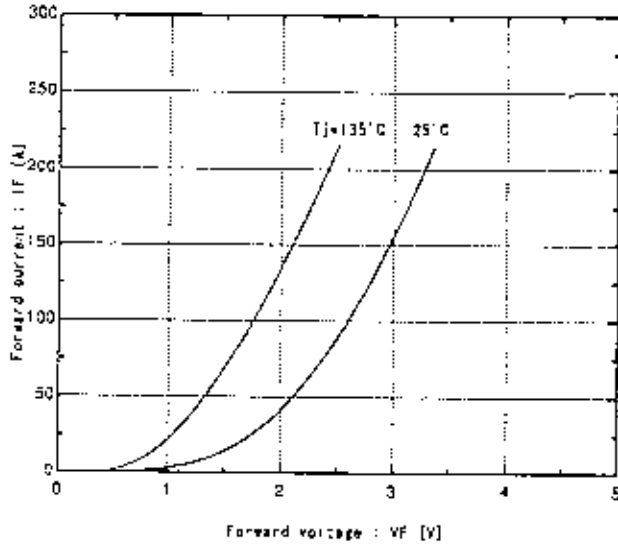
Switching time vs.  $R_G$   
 $V_{CC}=700V$ ,  $I_C=150A$ ,  $V_{GE}=+15V/-5V$ ,  $T_J=25^\circ C$



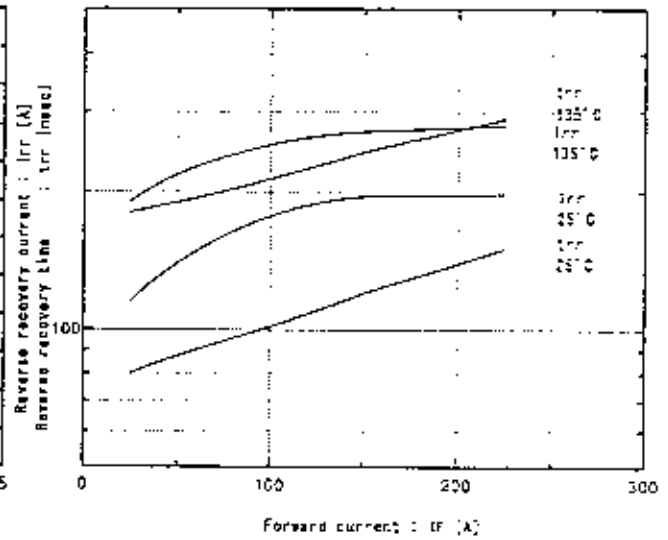
Dynamic input characteristics  
 $T_J=25^\circ C$



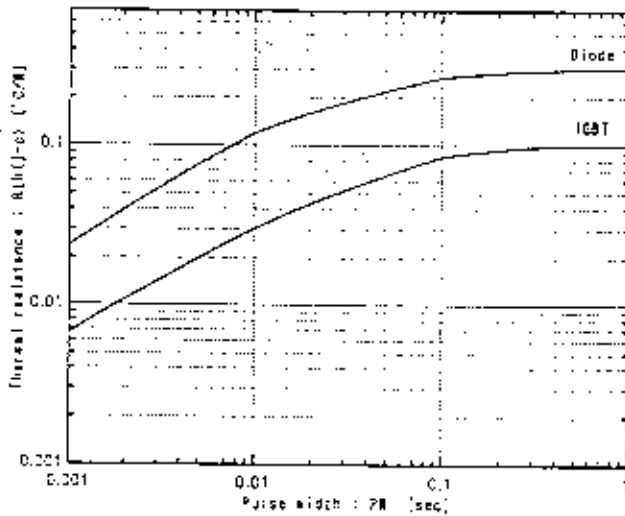
Forward current vs. Forward voltage  
 $V_{GE}=0V$



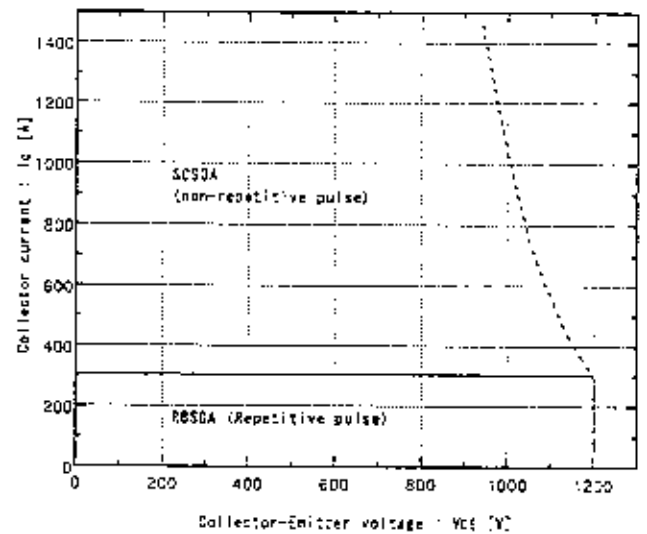
Reverse recovery characteristics  
 $t_{rr}$ ,  $I_{rr}$  vs.  $I_F$



Transient thermal resistance



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



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