

# SPECIFICATION

Device Name : IGBT module

Type Name : IMBL400NB-060

Spec. No. : **MS5F3233**

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Fuji Electric Co., Ltd.  
Matsumoto Factory

	DATE	NAME	APPROVED	Fuji Electric Co., Ltd.	
DRAWN	Oct. - 3 - 95	S. Miyashita	S. Kobayashi	DWG. NO.	<b>MS5F3233</b> 1/8
CHECKED	Oct. - 3 - 95	T. HOSEN			

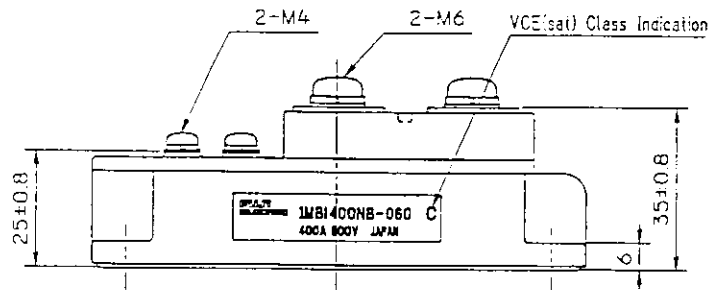
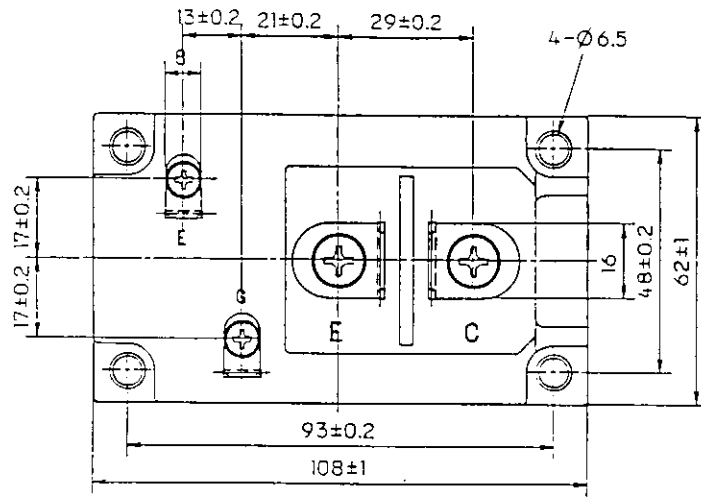


Ratings and characteristics of Fuji IGBT Module

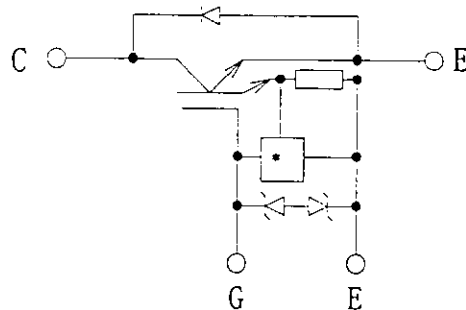
1MBI400NB-060

1. Outline Drawing

Unit : mm



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>	600	V
Gate-Emitter voltage		V <sub>GES</sub>	±20	V
Collector current	Continuous	I <sub>c</sub>	400	A
	1ms	I <sub>c</sub> pulse	800	
		-I <sub>c</sub>	400	
	1ms	-I <sub>c</sub> pulse	800	
Max. power dissipation		P <sub>C</sub>	1500	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	
	Terminals *3		1.7	

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

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

\*3 Recommendable value : 1.3~1.7 N · m (M4)

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>			4.0	V <sub>GE</sub> =0V, V <sub>CES</sub> =600V	mA
Gate-Emitter leakage current	I <sub>GES</sub>			60	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> =400mA	V
Collector-Emitter saturation voltage	V <sub>CE(sat)</sub>			2.8	V <sub>GE</sub> =15V, I <sub>c</sub> =400A	V
Input capacitance	C <sub>ies</sub>		26400		V <sub>GE</sub> =0V	pF
Output capacitance	C <sub>oes</sub>		5870		V <sub>CE</sub> =10V	
Reverse transfer capacitance	C <sub>res</sub>		2670		f=1MHz	
Turn-on time	t <sub>on</sub>		0.6	1.2	V <sub>cc</sub> =300V	μs
	t <sub>r</sub>		0.2	0.6	I <sub>c</sub> =400A	
Turn-off time	t <sub>off</sub>		0.6	1.0	V <sub>GE</sub> =±15V	
	t <sub>f</sub>		0.2	0.35	R <sub>G</sub> =4.7Ω	
Diode forward on voltage	V <sub>F</sub>			3.0	I <sub>F</sub> =400A, V <sub>GE</sub> =0V	V
Reverse recovery time	t <sub>rr</sub>			300	I <sub>F</sub> =400A	ns

5. Thermal resistance characteristics

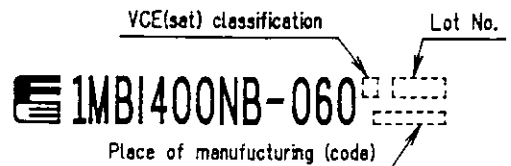
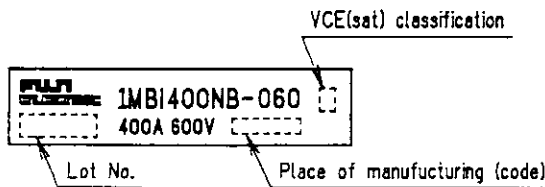
Items	Symbols	Characteristics			Conditions	Units
		min.	typ.	max.		
Thermal resistance	R <sub>th(j-c)</sub>			0.085	IGBT	°C/W
	R <sub>th(j-c)</sub>			0.18	Diode	
	※		0.0125		the base to cooling	
	R <sub>th(c-f)</sub>				fin	

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

6. VCE(sat) class

Class	VCE(sat) range [V]
F	1.85 ~ 2.1
A	2.0 ~ 2.25
B	2.15 ~ 2.4
C	2.3 ~ 2.6
D	2.5 ~ 2.8

7. Indication on module (モジュール表示)



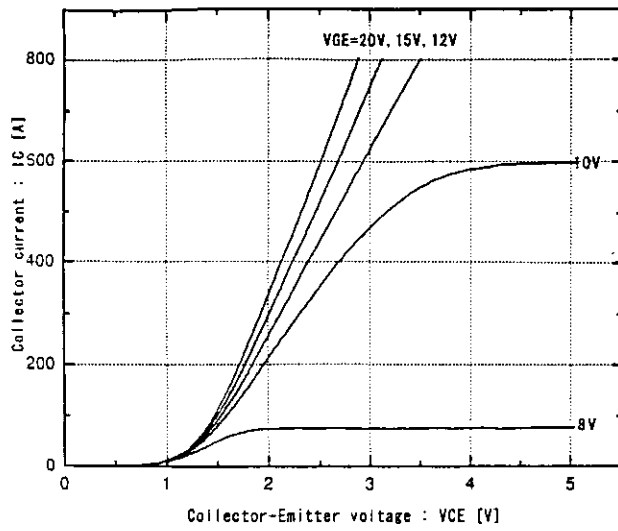
8. Applicable category (適用範囲)

This specification is applied to IGBT module named 1MBI400NB-060.  
 本納入仕様書は、IGBTモジュール 1MBI400NB-060 に適用する。

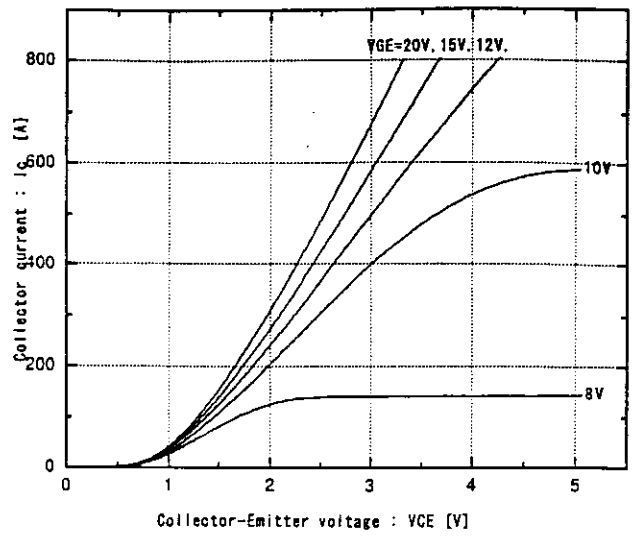
9. Storage and transportation notes (保管、運搬上の注意事項)

- The IGBT module should be stored at a standard temperature of 5 to 35°C and humidity of 45 to 75%.  
 常温保存が望ましい。(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の保管すること。
- 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。

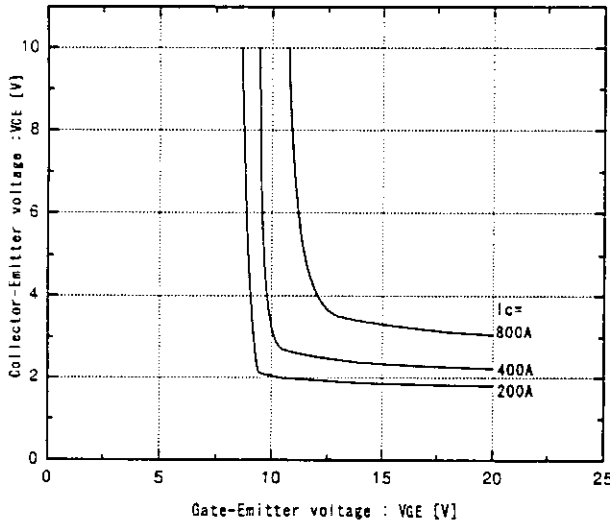
Collector current vs. Collector-Emitter voltage  
T<sub>j</sub>=25°C



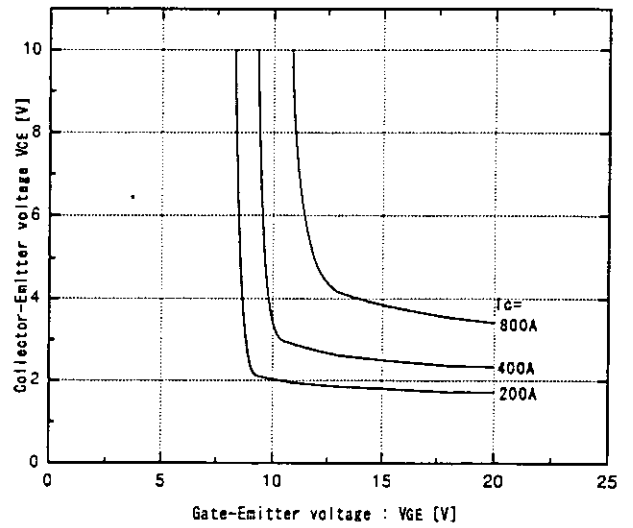
Collector current vs. Collector-Emitter voltage  
T<sub>j</sub>=125°C



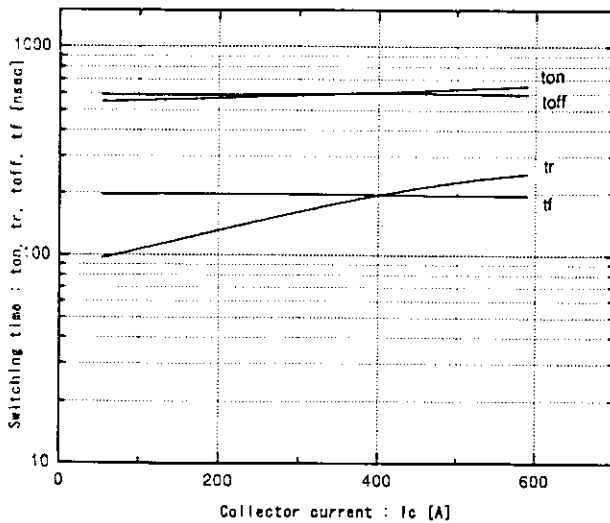
Collector-Emitter vs. Gate-Emitter voltage  
T<sub>j</sub>=25°C



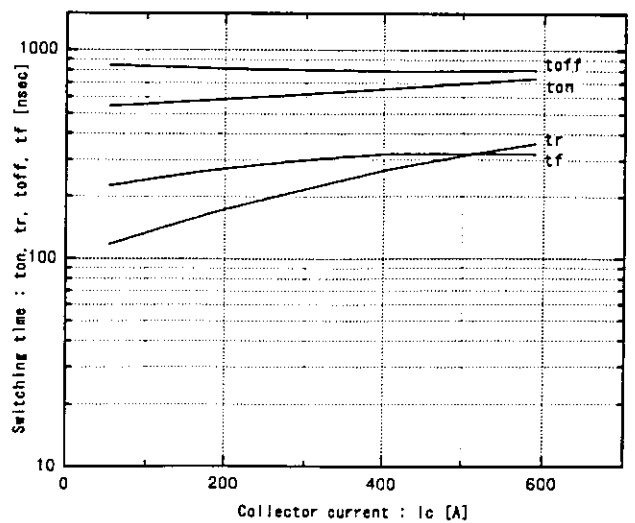
Collector-Emitter vs. Gate-Emitter voltage  
T<sub>j</sub>=125°C



Switching time vs. Collector current  
V<sub>cc</sub>=300V, R<sub>G</sub>=4.7Ω, V<sub>GE</sub>±15V, T<sub>j</sub>=25°C



Switching time vs. Collector current  
V<sub>cc</sub>=300V, R<sub>G</sub>=4.7Ω, V<sub>GE</sub>±15V, T<sub>j</sub>=125°C



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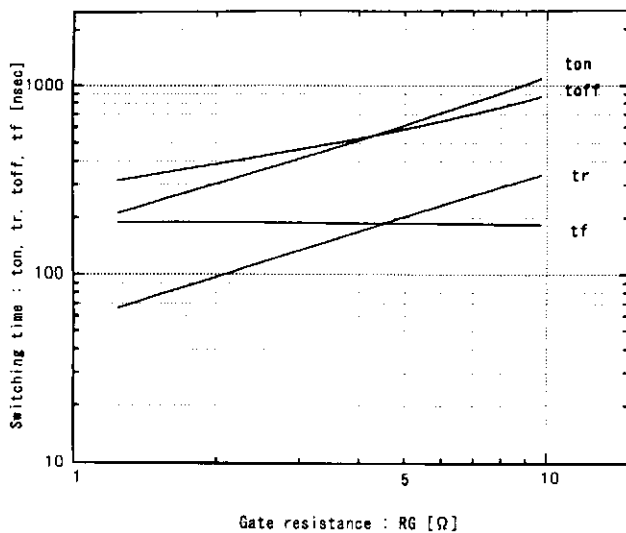
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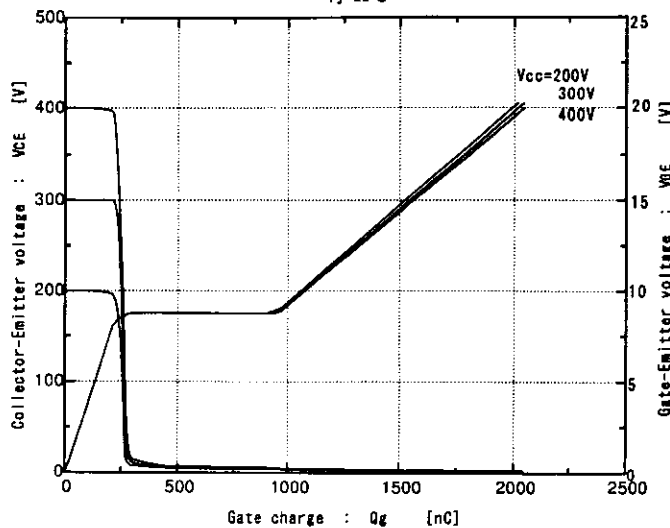
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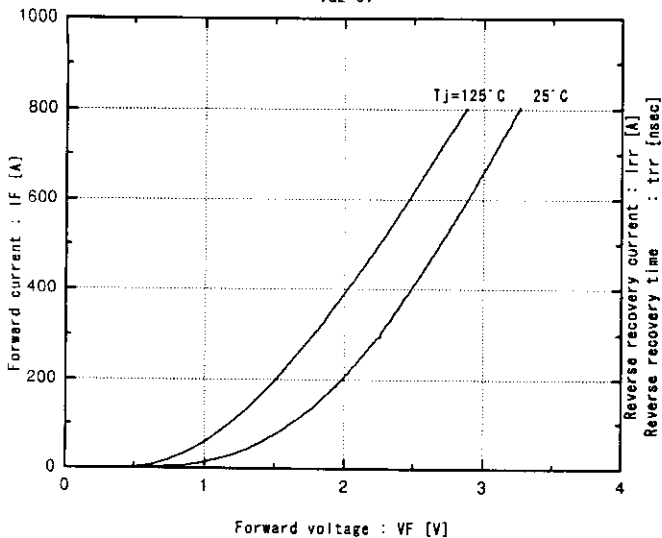
Switching time vs.  $R_G$   
 $V_{CC}=300V, I_C=400A, V_{GE}=\pm 15V, T_J=25^\circ C$



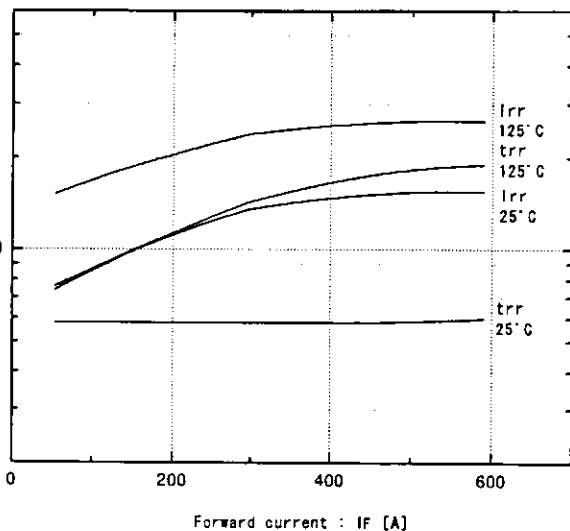
Dynamic input characteristics  
 $T_J=25^\circ C$



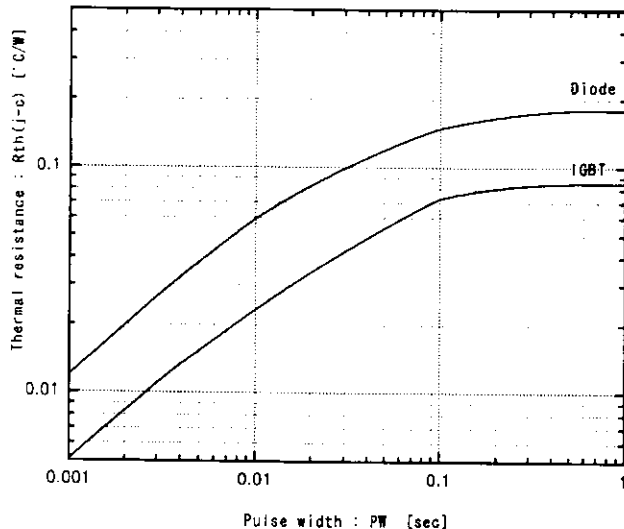
Forward current vs. Forward voltage  
 $V_{GE}=0V$



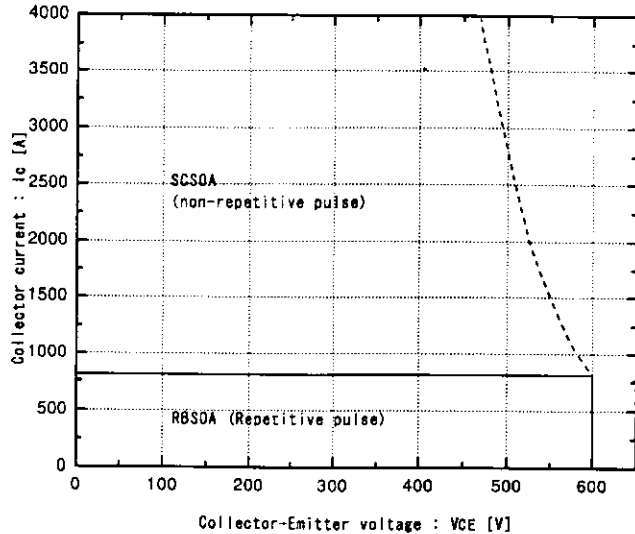
Reverse recovery characteristics  
 $t_{rr}, I_{rr}$  vs.  $I_F$



Transient thermal resistance



Reversed biased safe operating area  
 $+V_{GE}=15V, -V_{GE}\leq 15V, T_J\leq 125^\circ C, R_G\geq 4.7\Omega$

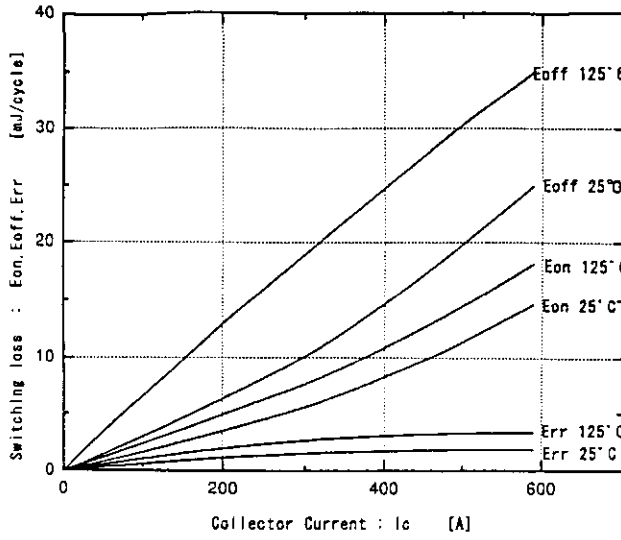


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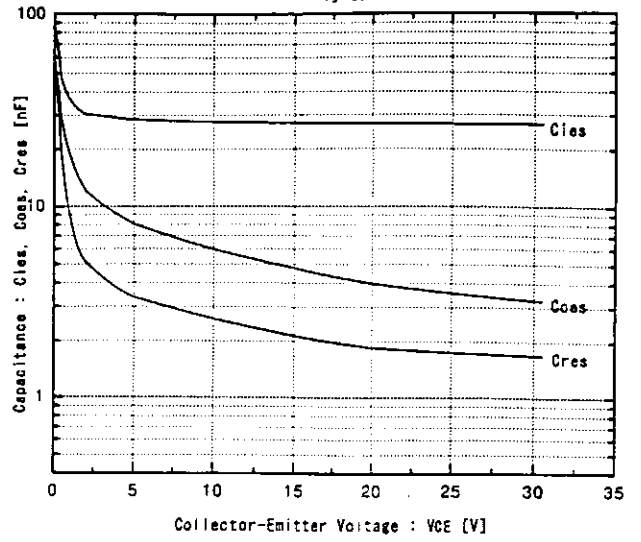
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Switching loss vs. Collector current  
 $V_{CC}=300V$ ,  $R_G=4.7\Omega$ ,  $V_{GE}=\pm 15V$



Capacitance vs. Collector-Emitter voltage  
 $T_J=25^\circ C$



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