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SPECIFICATION

Device Name : IGBT module

Type Name : I MBL400NB-060

Spec. No. : **MS5F3233**

Fuji Electric Co., Ltd.
Matsumoto Factory

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

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Revised Records

Date	Classification	Ind.	Content	Applied date	Drawn	Checked	Approved
Oct. -3- '85	enactment	—	—	Issued date	—	T. HUSEK	S. Kobayashi

Fuji Electric Co., Ltd.

DWG. NO.

MS5 F 3233

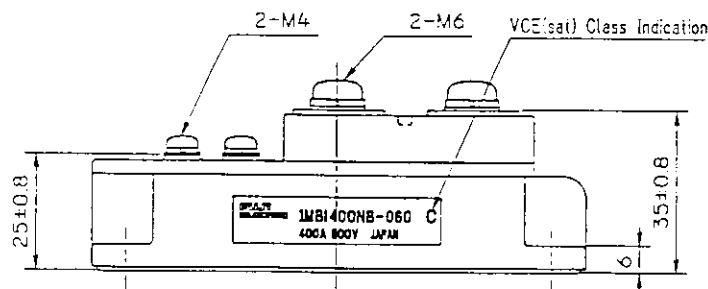
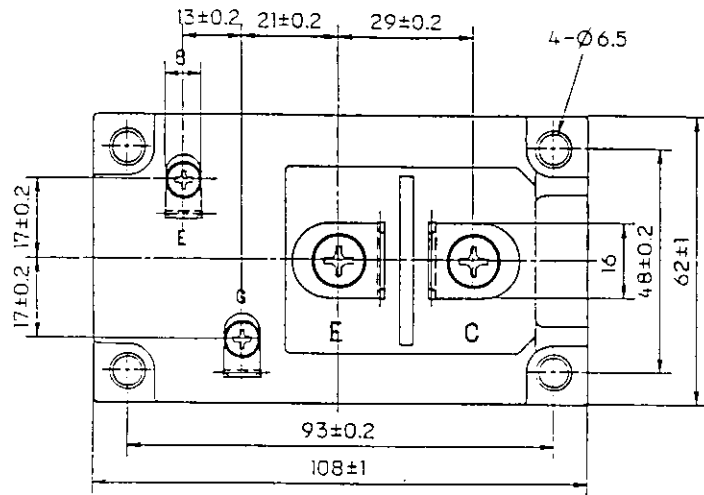
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Ratings and characteristics of Fuji IGBT Module

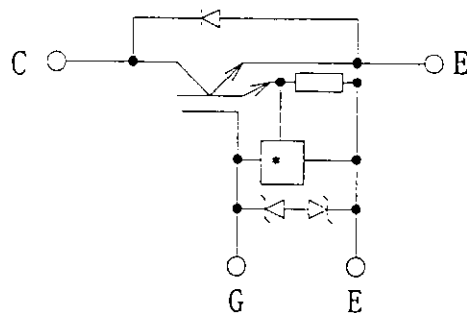
1MBI400NB-060

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 _{CES}	600	V
Gate-Emitter voltage		V _{GES}	±20	V
Collector current	Continuous	I _C	400	A
	1ms	I _C pulse	800	
		-I _C	400	
	1ms	-I _C pulse	800	
Max. power dissipation		P _C	1500	W
Operating temperature		T _j	+150	°C
Storage temperature		T _{stg}	-40~+125	°C
Isolation voltage		V _{is}	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_j=25°C unless otherwise specified)

Items	Symbols	Characteristics			Conditions	Units
		min.	typ.	max.		
Zero gate voltage Collector current	I _{CES}			4.0	V _{GE} =0V, V _{CE} =600V	mA
Gate-Emitter leakage current	I _{GES}			60	V _{CE} =0V, V _{GE} =±20V	μA
Gate-Emitter threshold voltage	V _{GE(th)}	4.5		7.5	V _{CE} =20V, I _C =400mA	V
Collector-Emitter saturation voltage	V _{CE(sat)}			2.8	V _{GE} =15V, I _C =400A	V
Input capacitance	C _{ies}		26400		V _{GE} =0V	pF
Output capacitance	C _{oes}		5870		V _{CE} =10V	
Reverse transfer capacitance	C _{res}		2670		f=1MHz	
Turn-on time	ton		0.6	1.2	V _{CC} =300V	μs
	tr		0.2	0.6	I _C =400A	
Turn-off time	toff		0.6	1.0	V _{GE} =±15V	
	tf		0.2	0.35	R _G =4.7Ω	
Diode forward on voltage	V _F			3.0	I _F =400A, V _{GE} =0V	V
Reverse recovery time	trr			300	I _F =400A	ns

5. Thermal resistance characteristics

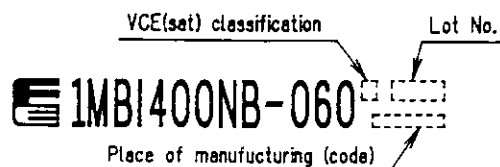
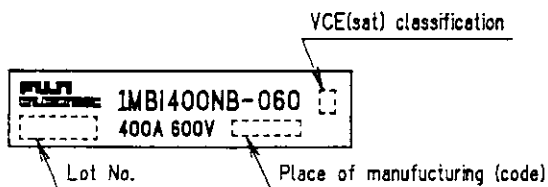
Items	Symbols	Characteristics			Conditions	Units
		min.	typ.	max.		
Thermal resistance	R _{th(j-c)}			0.085	IGBT	°C/W
	R _{th(j-c)}			0.18	Diode	
	※		0.0125		the base to cooling	
	R _{th(c-f)}				fin	

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

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)



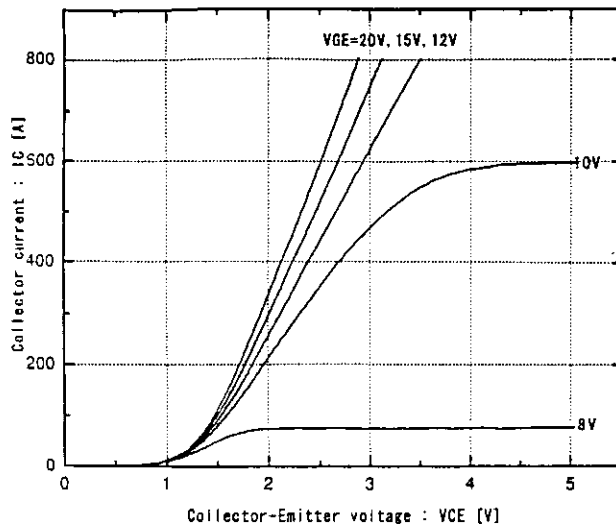
8. Applicable category (適用範囲)

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。

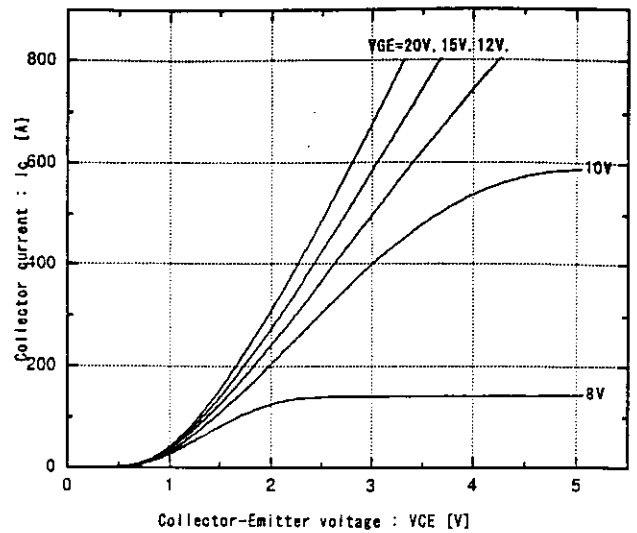
9. Storage and transportation notes (保管、運搬上の注意事項)

- 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。

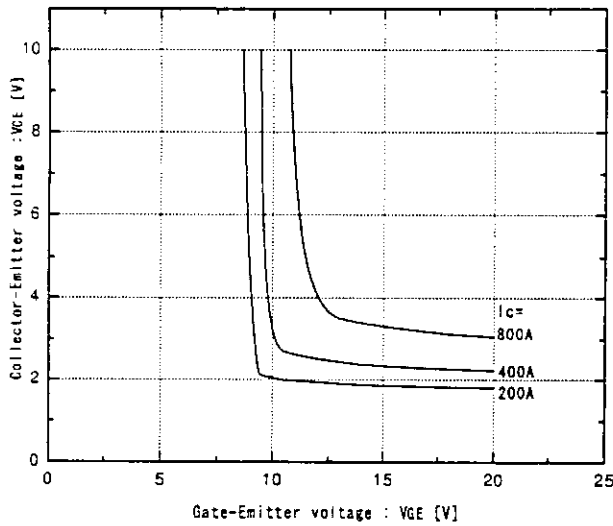
Collector current vs. Collector-Emitter voltage
T_j=25°C



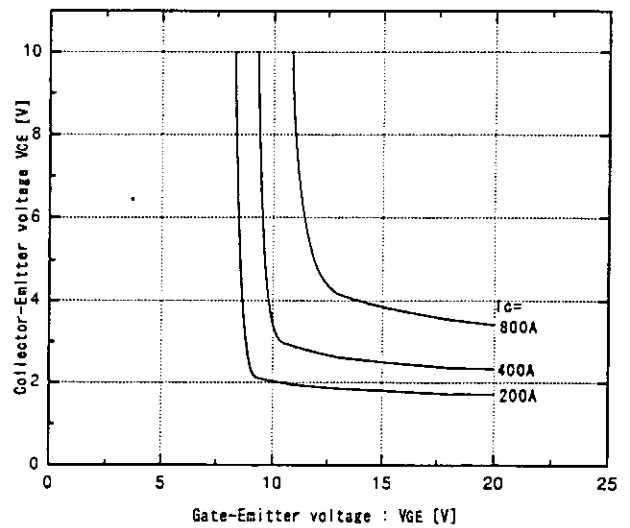
Collector current vs. Collector-Emitter voltage
T_j=125°C



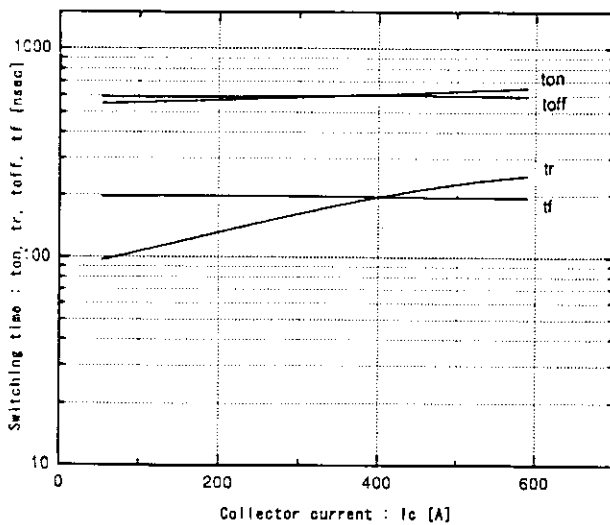
Collector-Emitter vs. Gate-Emitter voltage
T_j=25°C



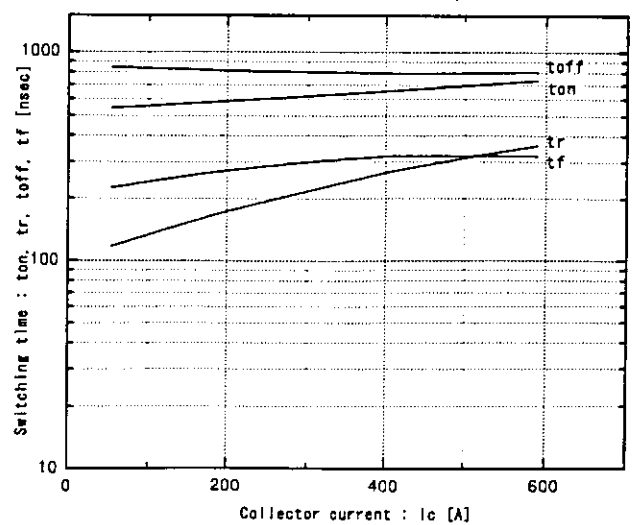
Collector-Emitter vs. Gate-Emitter voltage
T_j=125°C



Switching time vs. Collector current
V_{CC}=300V, R_G=4.7Ω, V_{GE}±15V, T_j=25°C

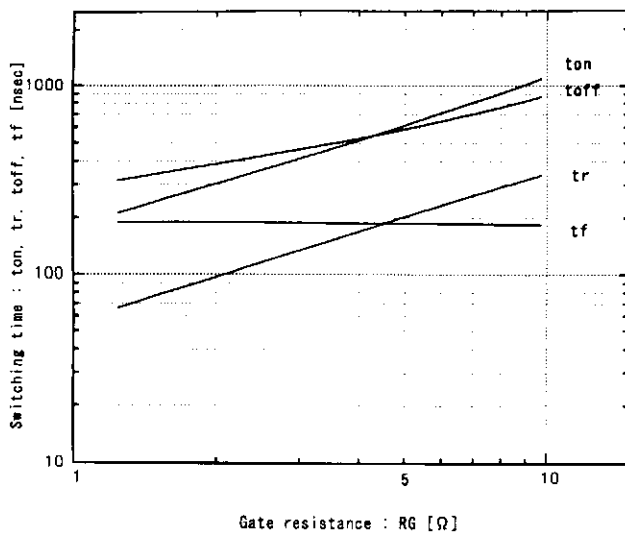


Switching time vs. Collector current
V_{CC}=300V, R_G=4.7Ω, V_{GE}±15V, T_j=125°C

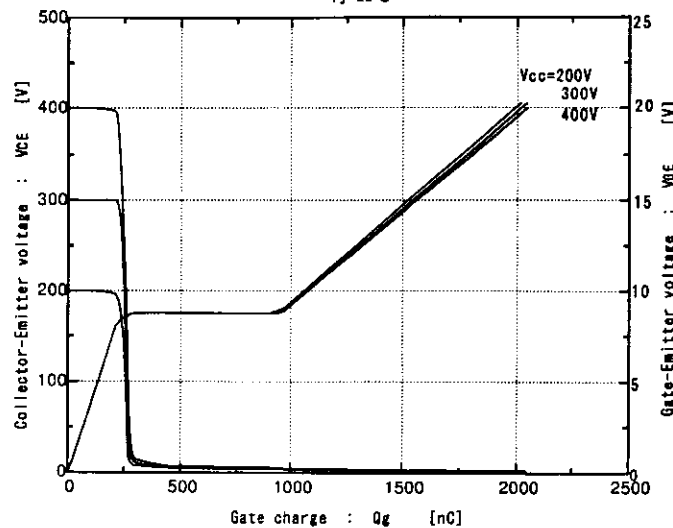


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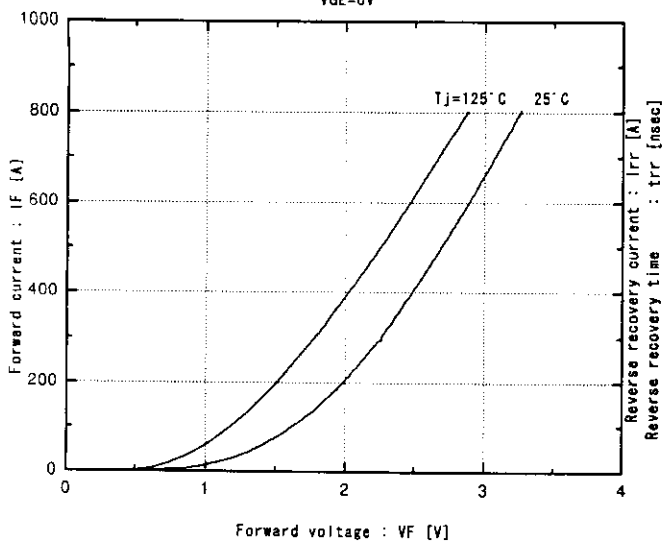
Switching time vs. R_G
 $V_{CC}=300V$, $I_C=400A$, $V_{GE}=\pm 15V$, $T_J=25^\circ C$



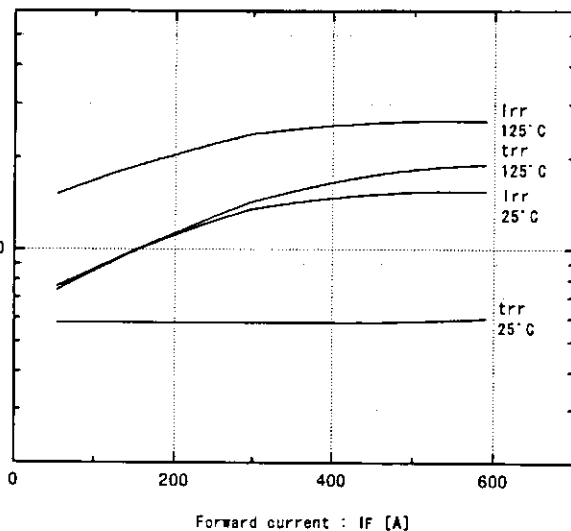
Dynamic input characteristics
 $T_J=25^\circ C$



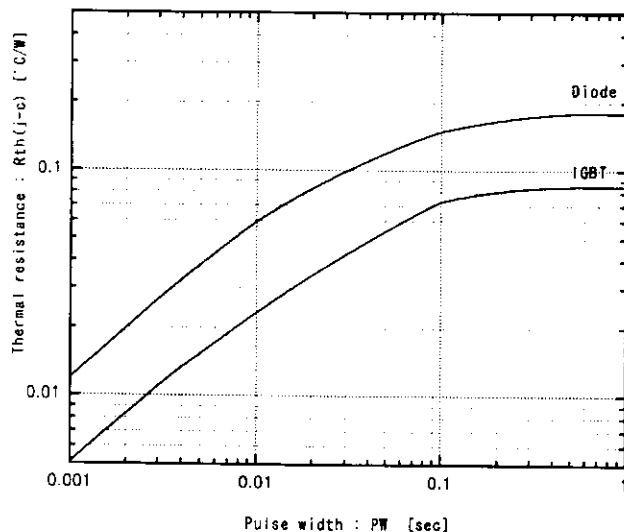
Forward current vs. Forward voltage
 $V_{GE}=0V$



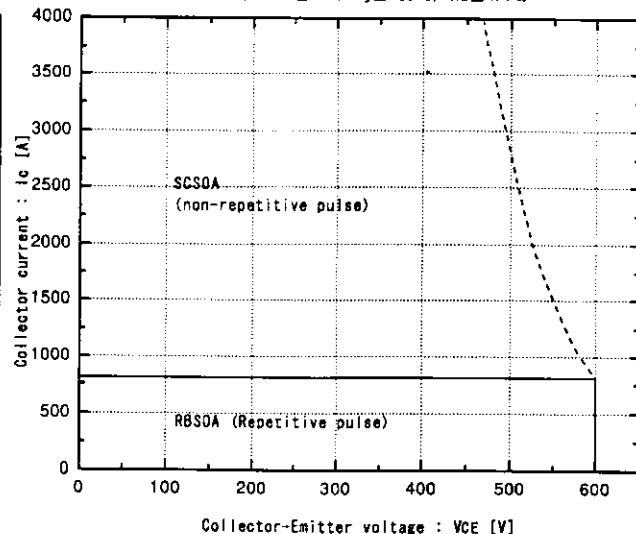
Reverse recovery characteristics
 trr , I_{rr} vs. I_F



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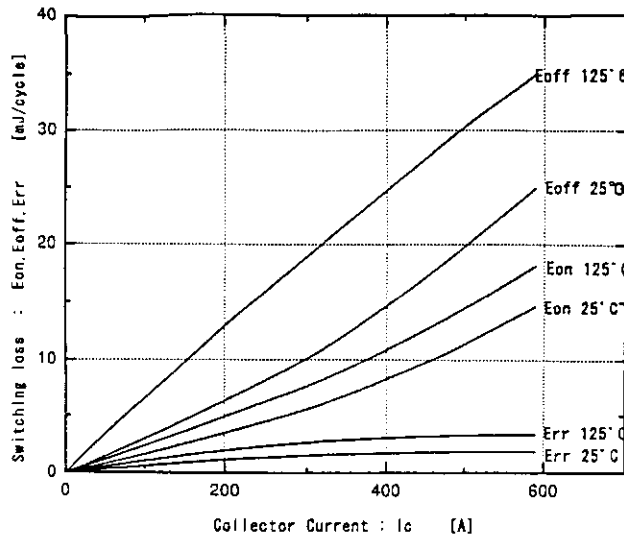
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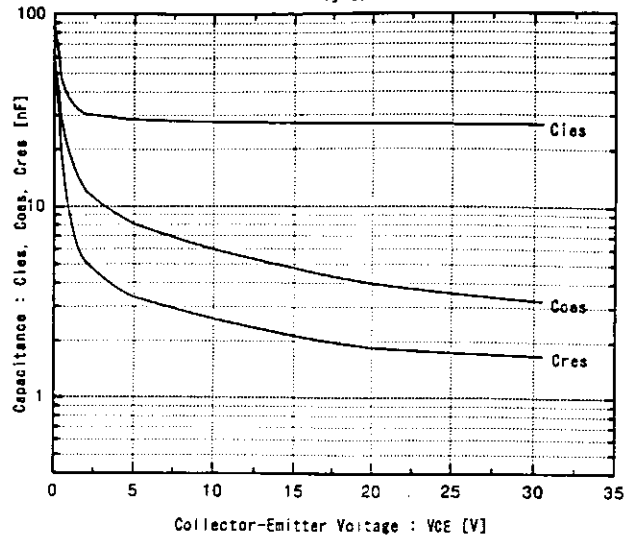
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Switching loss vs. Collector current
 $V_{CC}=300V$, $R_G=4.7\Omega$, $V_{GE}=\pm 15V$



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



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