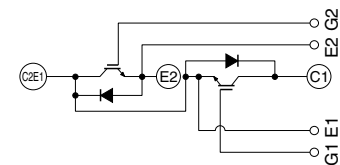
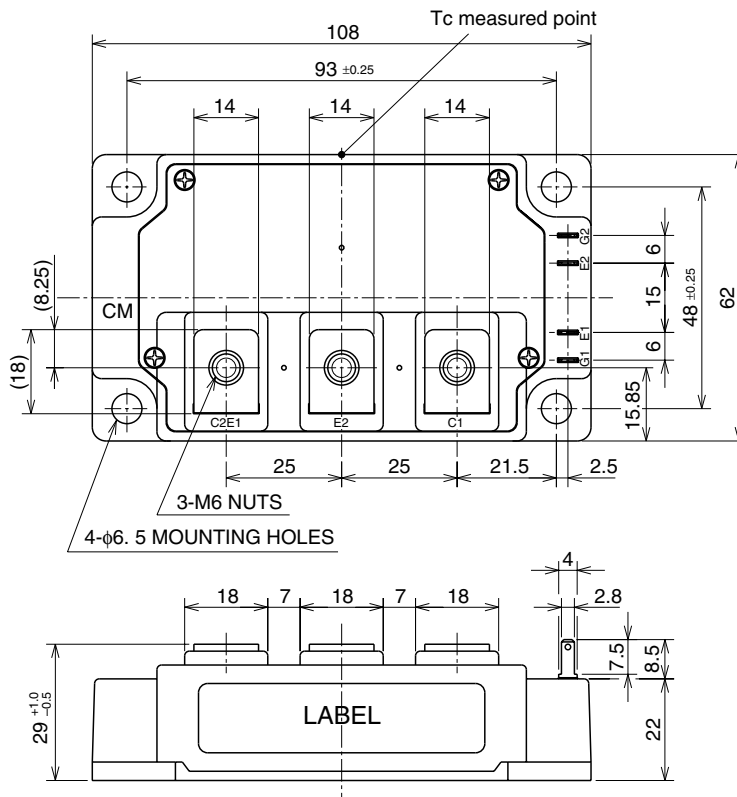




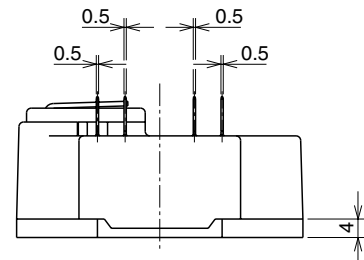
- ## APPLICATION

OUTLINE DRAWING & CIRCUIT DIAGRAM

Dimensions in mm



CIRCUIT DIAGRAM



CM400DU-5F

HIGH POWER SWITCHING USE

MAXIMUM RATINGS (T_j = 25°C)

Symbol	Parameter	Conditions	Ratings	Unit
V _{CES}	Collector-emitter voltage	G-E Short	250	V
V _{GES}	Gate-emitter voltage	C-E Short	±20	V
I _C	Collector current	T _C = 25°C	400	A
I _{CM}		Pulse (Note 2)	800	
I _E (Note 1)	Emitter current	T _C = 25°C	400	A
I _{EM} (Note 1)		Pulse (Note 2)	800	
P _C (Note 3)	Maximum collector dissipation	T _C = 25°C	890	W
T _j	Junction temperature		−40 ~ +150	°C
T _{stg}	Storage temperature		−40 ~ +125	°C
V _{iso}	Isolation voltage	Main Terminal to base plate, AC 1 min.	2500	V
—	Mounting torque	Main Terminal M6	3.5 ~ 4.5	N • m
—		Mounting holes M6	3.5 ~ 4.5	N • m
—	Weight	Typical value	400	g

ELECTRICAL CHARACTERISTICS (T_j = 25°C)

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
I _{CES}	Collector cutoff current	V _{CE} = V _{CES} , V _{GE} = 0V	—	—	1	mA
V _{GE(th)}	Gate-emitter threshold voltage	I _C = 40mA, V _{CE} = 10V	3.0	4.0	5.0	V
I _{GES}	Gate leakage current	V _{GE} = V _{CES} , V _{CE} = 0V	—	—	0.5	μA
V _{CE(sat)}	Collector to emitter saturation voltage	T _j = 25°C	—	1.2	1.7	V
		T _j = 125°C	—	1.1	—	
C _{ies}	Input capacitance	V _{CE} = 10V V _{GE} = 0V	—	—	110	nF
C _{oes}	Output capacitance		—	—	7.0	
C _{res}	Reverse transfer capacitance		—	—	3.8	
Q _G	Total gate charge	V _{CC} = 100V, I _C = 400A, V _{GE} = 10V	—	750	—	nC
t _{d(on)}	Turn-on delay time	V _{CC} = 100V, I _C = 400A V _{GE1} = V _{GE2} = 10V R _G = 6.3Ω, Inductive load switching operation I _E = 400A	—	—	850	ns
t _r	Turn-on rise time		—	—	400	
t _{d(off)}	Turn-off delay time		—	—	1100	
t _f	Turn-off fall time		—	—	500	
t _{rr} (Note 1)	Reverse recovery time		—	—	300	ns
Q _{rr} (Note 1)	Reverse recovery charge		—	16.0	—	μC
V _{EC} (Note 1)	Emitter-collector voltage	I _E = 200A, V _{GE} = 0V	—	—	2	V
R _{th(j-c)Q}	Thermal resistance*1	IGBT part (1/2 module)	—	—	0.14	°C/W
R _{th(j-c)R}		FWDi part (1/2 module)	—	—	0.24	
R _{th(c-f)}	Contact thermal resistance	Case to fin, Thermal compound applied*2 (1/2 module)	—	0.04	—	
R _{th(j-c)Q}	Thermal resistance*3	T _C measured point is just under the chips	—	—	0.08	

Note 1. I_E, V_{EC}, t_{rr}, Q_{rr} and die/dt represent characteristics of the anti-parallel, emitter to collector free-wheel diode. (FWDi).

2. Pulse width and repetition rate should be such that the device junction temp. (T_j) does not exceed T_{jmax} rating.

3. Junction temperature (T_j) should not increase beyond 150°C.

4. Pulse width and repetition rate should be such as to cause negligible temperature rise.

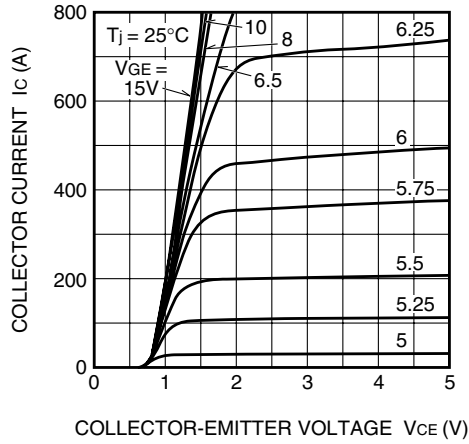
*1 : T_C measured point is indicated in OUTLINE DRAWING.

*2 : Typical value is measured by using Shin-etsu Silicone "G-746".

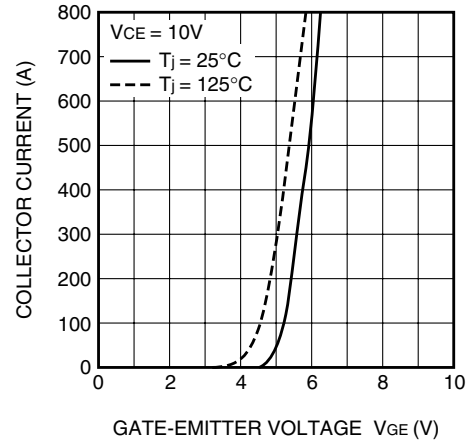
*3 : If you use this value, R_{th(f-a)} should be measured just under the chips.

PERFORMANCE CURVES

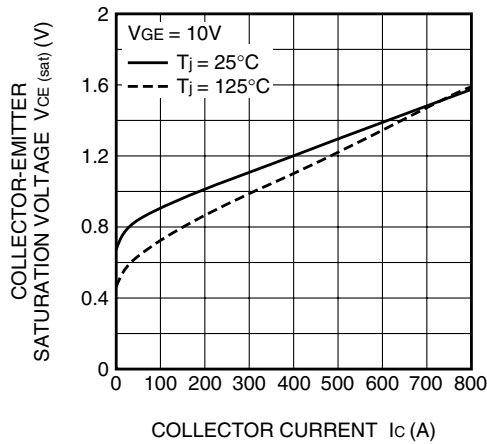
OUTPUT CHARACTERISTICS
(TYPICAL)



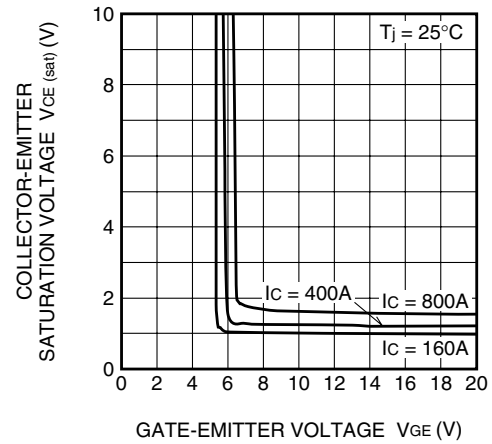
TRANSFER CHARACTERISTICS
(TYPICAL)



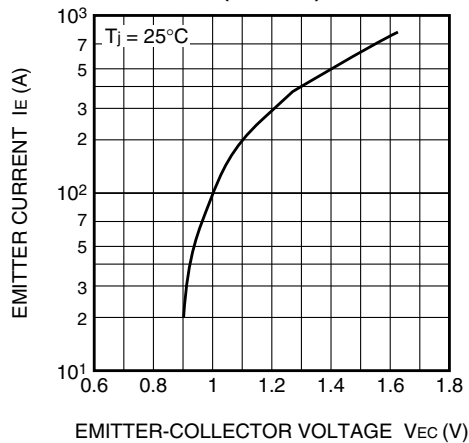
COLLECTOR-EMITTER SATURATION
VOLTAGE CHARACTERISTICS
(TYPICAL)



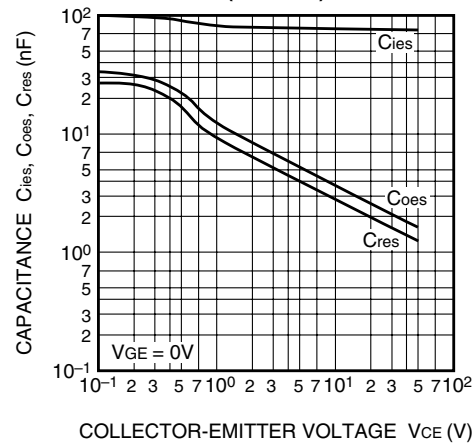
COLLECTOR-EMITTER SATURATION
VOLTAGE CHARACTERISTICS
(TYPICAL)



FREE-WHEEL DIODE
FORWARD CHARACTERISTICS
(TYPICAL)



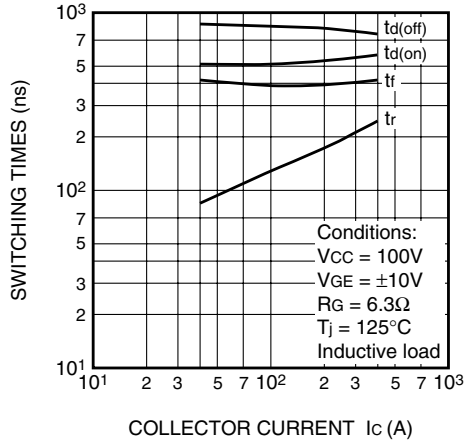
CAPACITANCE- V_{CE}
CHARACTERISTICS
(TYPICAL)



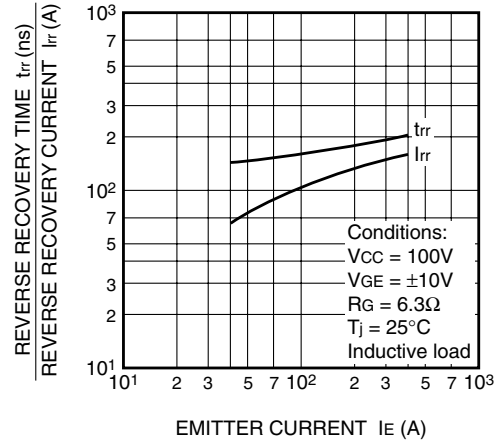
CM400DU-5F

HIGH POWER SWITCHING USE

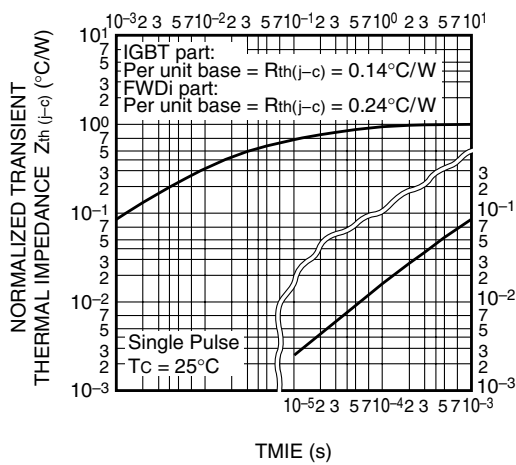
**HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)**



**REVERSE RECOVERY CHARACTERISTICS
OF FREE-WHEEL DIODE
(TYPICAL)**



**TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(IGBT part & FWDi part)**



**GATE CHARGE
CHARACTERISTICS
(TYPICAL)**

