

MITSUBISHI IGBT MODULES  
**CM400HU-24F**

HIGH POWER SWITCHING USE

**CM400HU-24F**



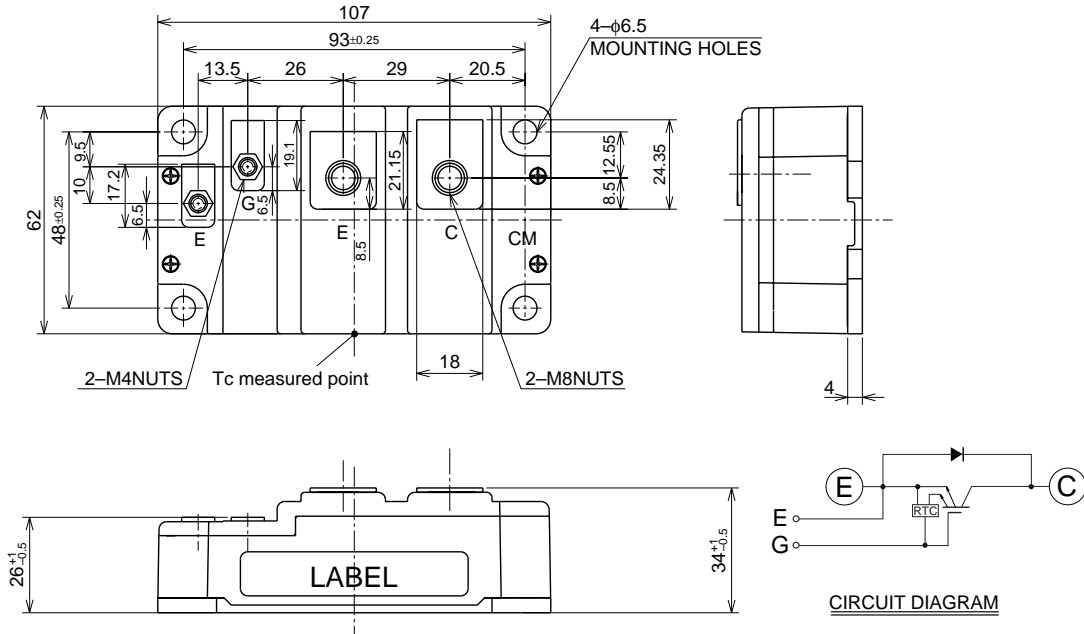
- Ic ..... 400A
- VCES ..... 1200V
- Insulated Type
- 1-elements in a pack

**APPLICATION**

General purpose inverters & Servo controls, etc

**OUTLINE DRAWING & CIRCUIT DIAGRAM**

Dimensions in mm



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MAXIMUM RATINGS (Tj = 25°C)

Symbol	Parameter	Conditions	Ratings	Unit
VCES	Collector-emitter voltage	G-E Short	1200	V
VGES	Gate-emitter voltage	C-E Short	±20	V
IC	Collector current	Tc = 25°C	400	A
ICM		Pulse (Note 2)	800	
IE (Note 1)	Emitter current	Tc = 25°C	400	A
IEM (Note 1)		Pulse (Note 2)	800	
PC (Note 3)	Maximum collector dissipation	Tc = 25°C	1600	W
Tj	Junction temperature		-40 ~ +150	°C
Tstg	Storage temperature		-40 ~ +125	°C
Viso	Isolation voltage	Main terminal to base plate, AC 1 min.	2500	V
—	Torque strength	Main Terminal M8	8.8 ~ 10.8	N • m
		Mounting holes M6	3.5 ~ 4.5	N • m
		G(E) Terminal M4	1.3 ~ 1.7	N • m
—	Weight	Typical value	450	g

ELECTRICAL CHARACTERISTICS (Tj = 25°C)

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
ICES	Collector cutoff current	VCE = VCES, VGE = 0V	—	—	2	mA
VGE(th)	Gate-emitter threshold voltage	IC = 40mA, VCE = 10V	5	6	7	V
IGES	Gate leakage current	VGE = VCES, VCE = 0V	—	—	80	µA
VCE(sat)	Collector-emitter saturation voltage	Tj = 25°C	—	1.8	2.4	V
		Tj = 125°C	—	1.9	—	
Cies	Input capacitance	VCE = 10V VGE = 0V	—	—	160	nF
Coes	Output capacitance		—	—	6.8	
Cres	Reverse transfer capacitance		—	—	4.0	
QG	Total gate charge	VCC = 600V, IC = 400A, VGE = 15V	—	4400	—	nC
td(on)	Turn-on delay time	VCC = 600V, IC = 400A VGE1 = VGE2 = 15V RG = 0.78Ω, Inductive load switching operation	—	—	300	ns
tr	Turn-on rise time		—	—	100	
td(off)	Turn-off delay time		—	—	600	
tr	Turn-off fall time		—	—	300	
trr (Note 1)	Reverse recovery time	IE = 400A	—	—	350	ns
Qrr (Note 1)	Reverse recovery charge		—	23.6	—	µC
VEC(Note 1)	Emitter-collector voltage	IE = 400A, VGE = 0V	—	—	3.2	V
Rth(j-c)Q	Thermal resistance*1	IGBT part	—	—	0.078	°C/W
Rth(j-c)R		FWDi part	—	—	0.09	
Rth(c-f)	Contact thermal resistance	Case to fin, Thermal compound applied*2	—	0.02	—	
Rth(j-c)Q	Thermal resistance	Tc measured point is just under the chips	—	—	0.045*3	
RG	External gate resistance		0.78	—	7.8	Ω

Note 1. IE, VEC, trr, Qrr, 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. (Tj) does not exceed Tjmax rating.

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

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

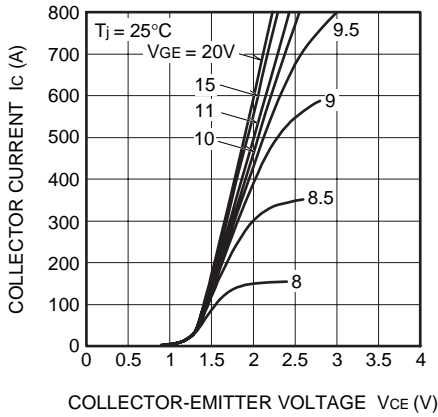
\*1 : Tc measured point is indicated in OUTLINE DRAWING.

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

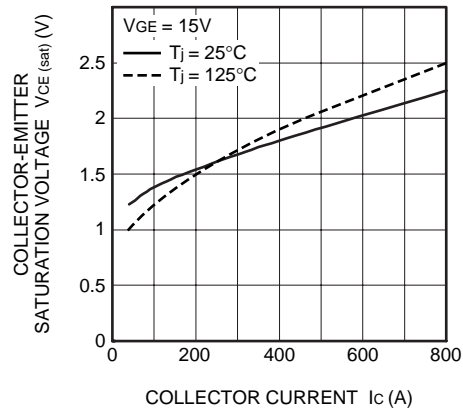
\*3 : If you use this value, Rth(f-a) should be measured just under the chips.

PERFORMANCE CURVES

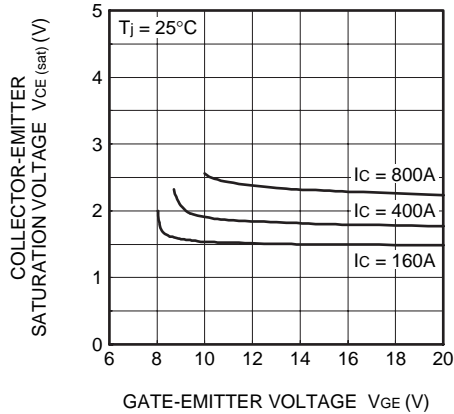
OUTPUT CHARACTERISTICS (TYPICAL)



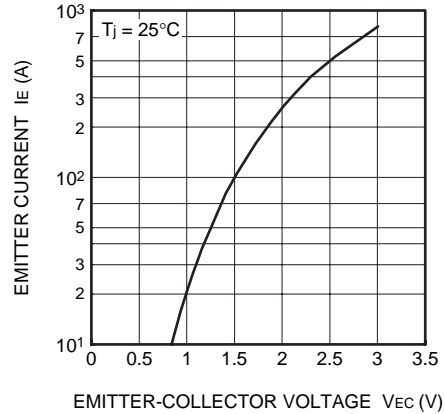
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



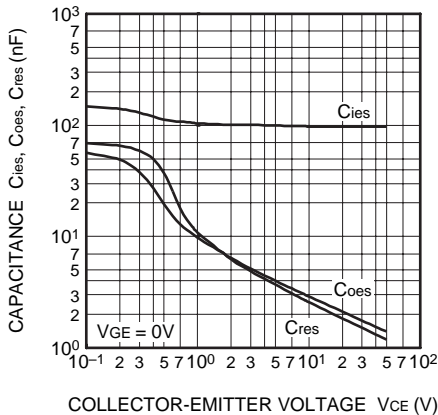
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



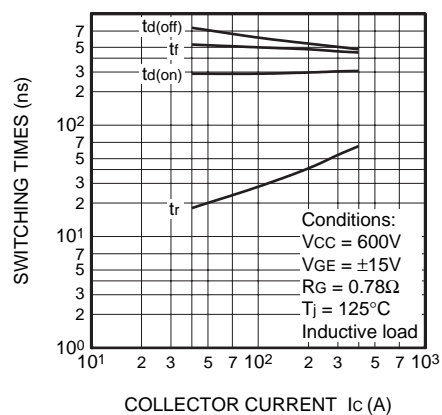
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



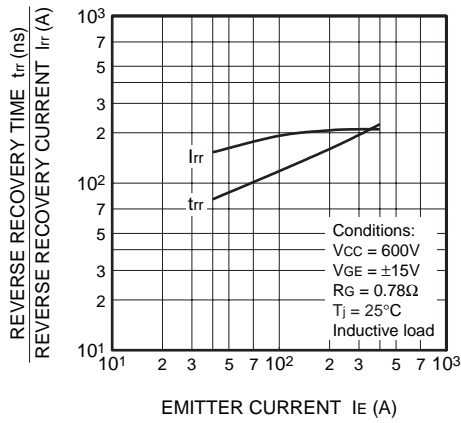
CAPACITANCE-VCE CHARACTERISTICS (TYPICAL)



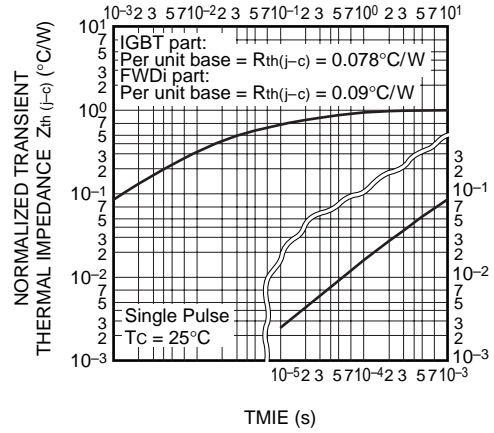
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT part & FWDi part)



GATE CHARGE CHARACTERISTICS (TYPICAL)

