

MITSUBISHI IGBT MODULES
CM400DY-34A

HIGH POWER SWITCHING USE

CM400DY-34A



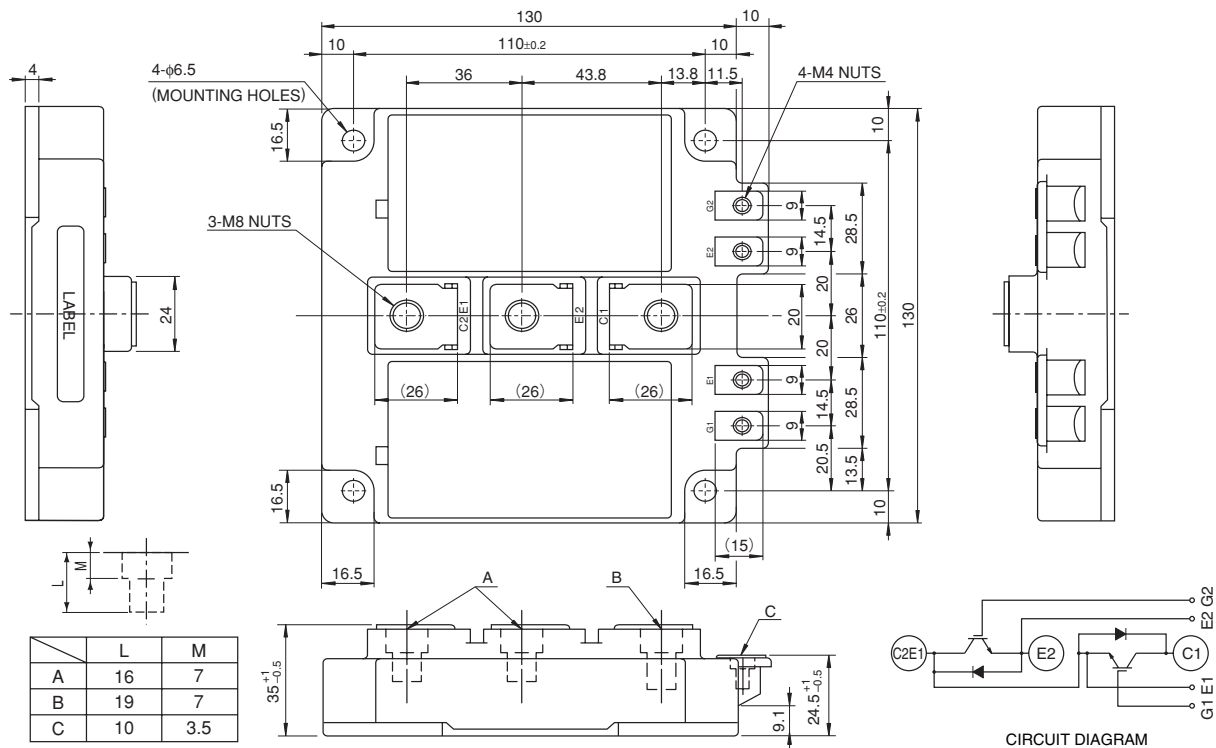
- IC 400A
- VCES 1700V
- Insulated Type
- 2-elements in a pack

APPLICATION

General purpose inverters & Servo controls, etc

OUTLINE DRAWING & CIRCUIT DIAGRAM

Dimensions in mm



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ABSOLUTE MAXIMUM RATINGS (T_J = 25°C, unless otherwise specified)

Symbol	Parameter	Conditions	Ratings	Unit
V _{CE}	Collector-emitter voltage	G-E Short	1700	V
V _{GE}	Gate-emitter voltage	C-E Short	±20	V
I _C	Collector current	DC, T _C = 107°C ^{*1} (Note 2)	400	A
I _{CM}		Pulse (Note 2)	800	
I _E (Note 1)	Emitter current	Operation (Note 2)	400	A
I _{EM} (Note 1)		Pulse (Note 2)	800	
P _C (Note 3)	Maximum collector dissipation	T _C = 25°C ^{*1}	3780	W
T _J	Junction temperature		-40 ~ +150	°C
T _{stg}	Storage temperature		-40 ~ +125	°C
V _{iso}	Isolation voltage	Terminals to base plate, f = 60Hz, AC 1 minute	3500	V _{rms}
—	Torque strength	Main terminals M8 screw	8.8 ~ 10.8	N · m
—		Mounting M6 screw	3.5 ~ 4.5	
—		G(E) terminal M4 screw	1.3 ~ 1.7	
—	Weight	Typical value	1200	g

ELECTRICAL CHARACTERISTICS (T_J = 25°C, unless otherwise specified)

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
I _{CES}	Collector cutoff current	V _{CE} = V _{CE} , V _{GE} = 0V	—	—	1	mA
V _{GE(th)}	Gate-emitter threshold voltage	I _C = 40mA, V _{CE} = 10V	5.5	7.0	8.5	V
I _{GES}	Gate leakage current	±V _{GE} = V _{GES} , V _{CE} = 0V	—	—	2.0	μA
V _{CE(sat)}	Collector to emitter saturation voltage	I _C = 400A, V _{GE} = 15V	—	2.2	2.8	V
		T _J = 25°C	—	2.45	—	
C _{ies}	Input capacitance	V _{CE} = 10V V _{GE} = 0V	—	—	98.8	nF
C _{oes}	Output capacitance		—	—	11.2	
C _{res}	Reverse transfer capacitance		—	—	2.12	
Q _G	Total gate charge	V _{CC} = 1000V, I _C = 400A, V _{GE} = 15V	—	2670	—	nC
t _{d(on)}	Turn-on delay time	V _{CC} = 1000V, I _C = 400A V _{GE} = ±15V R _G = 1.2Ω, Inductive load I _E = 400A	—	—	950	ns
t _r	Turn-on rise time		—	—	300	
t _{d(off)}	Turn-off delay time		—	—	1000	
t _f	Turn-off fall time		—	—	350	
t _{rr} (Note 1)	Reverse recovery time		—	—	450	
Q _{rr} (Note 1)	Reverse recovery charge		—	40	—	μC
V _{EC} (Note 1)	Emitter-collector voltage	I _E = 400A, V _{GE} = 0V	—	—	3.0	V
R _{th(j-c)Q}	Thermal resistance	IGBT part (1/2 module) ^{*1}	—	—	0.033	K/W
R _{th(j-c)R}		FWDi part (1/2 module) ^{*1}	—	—	0.055	
R _{th(c-f)}	Contact thermal resistance	Case to heat sink, Thermal compound applied (1/2 module) ^{*1,*2}	—	0.019	—	
R _G	External gate resistance		1.2	—	12	Ω

*1 : Case temperature (T_C), heat sink temperature (T_H) measured point is just under the chips.

*2 : Typical value is measured by using thermally conductive grease of λ = 0.9[W/(m · K)].

Note 1. I_E, I_{EM}, V_{EC}, t_{rr} & Q_{rr} represent characteristics of the anti-parallel, emitter-collector free-wheel diode (FWDi).

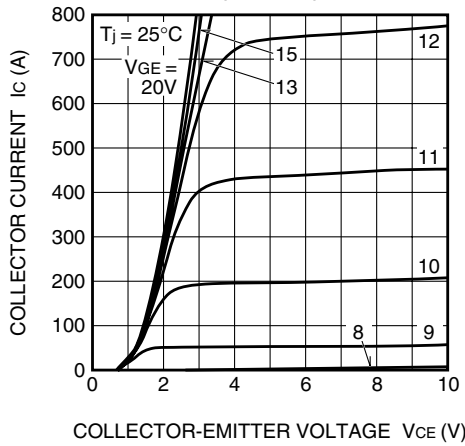
2. Pulse width and repetition rate should be such that the device junction temperature (T_J) does not exceed T_{Jmax} rating.

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

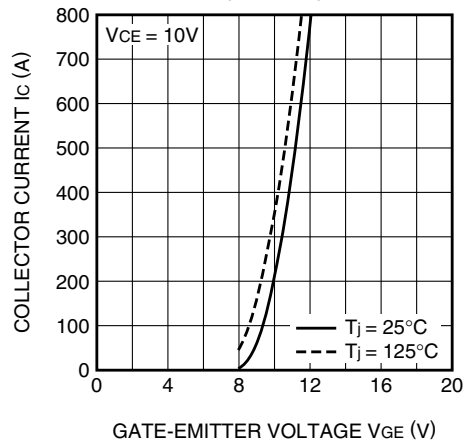
4. Pulse width and repetition rate should be such as to cause negligible temperature rise.

PERFORMANCE CURVES

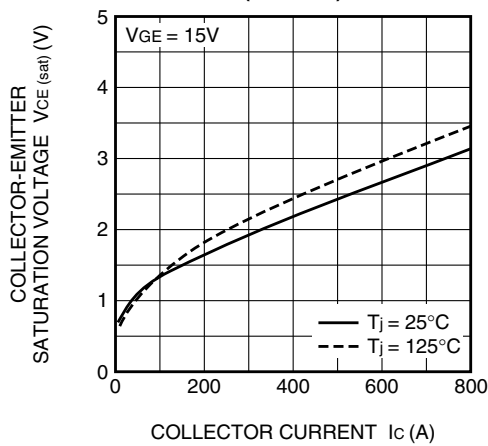
OUTPUT CHARACTERISTICS (TYPICAL)



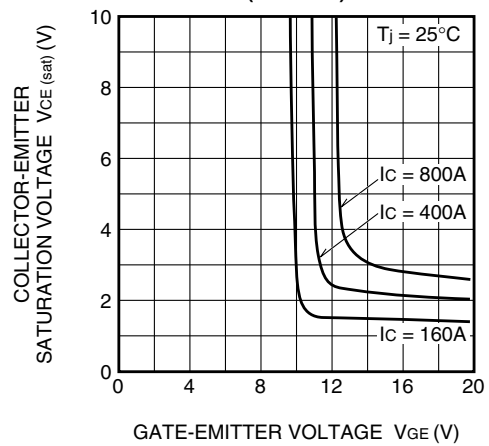
TRANSFER CHARACTERISTICS (TYPICAL)



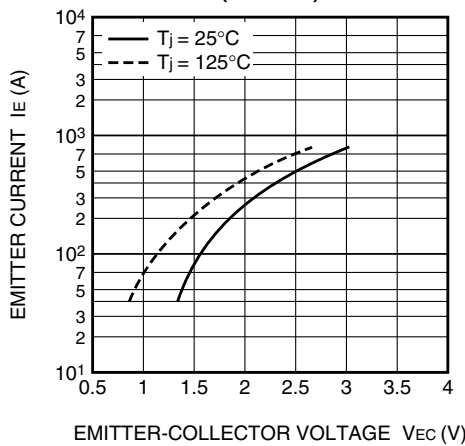
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



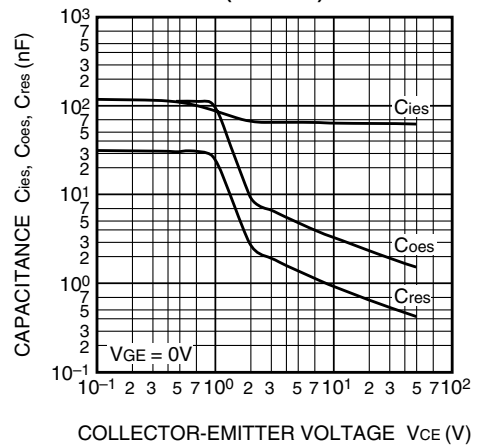
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



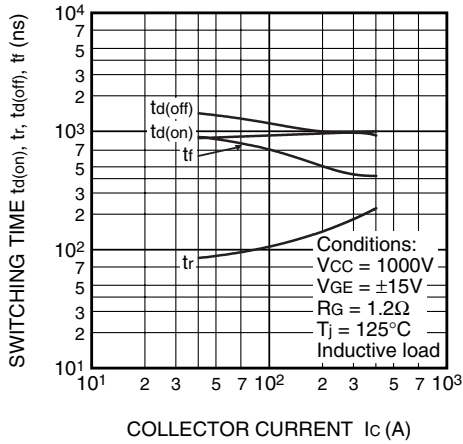
CAPACITANCE-VCE CHARACTERISTICS (TYPICAL)



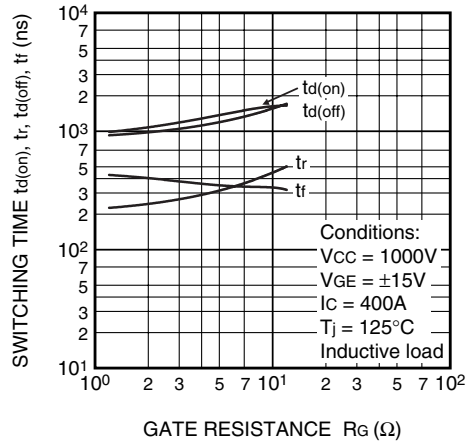
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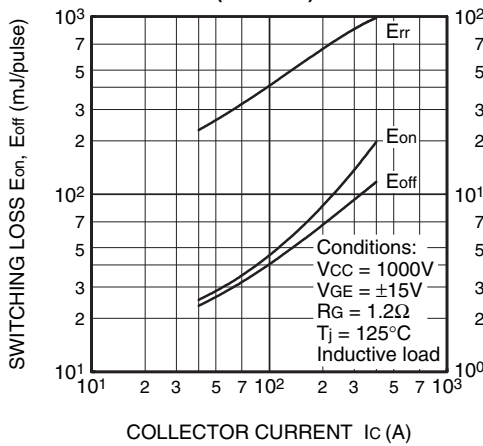
HALF-BRIDGE SWITCHING CHARACTERISTICS
SWITCHING TIME vs. COLLECTOR CURRENT (TYPICAL)



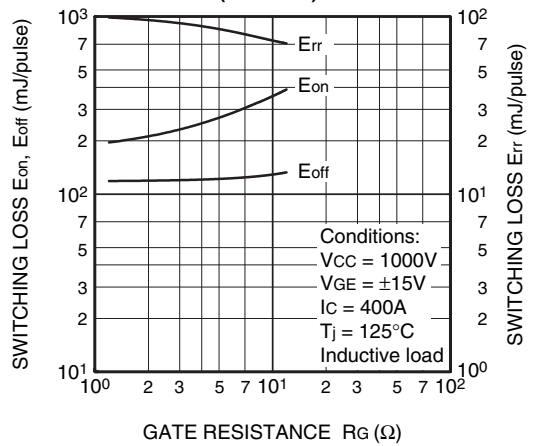
HALF-BRIDGE SWITCHING CHARACTERISTICS
SWITCHING TIME vs. GATE RESISTANCE (TYPICAL)



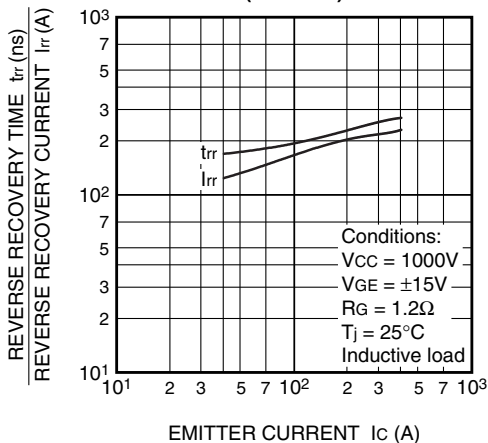
SWITCHING LOSS vs. COLLECTOR CURRENT (TYPICAL)



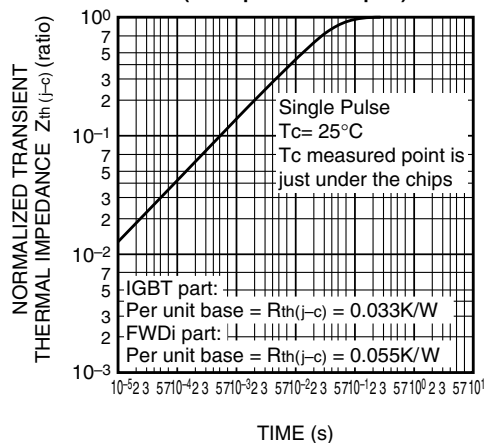
SWITCHING LOSS vs. GATE RESISTANCE (TYPICAL)



REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT part & FWDi part)



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