CM400DY-34A

HIGH POWER SWITCHING USE

CM400DY-34A

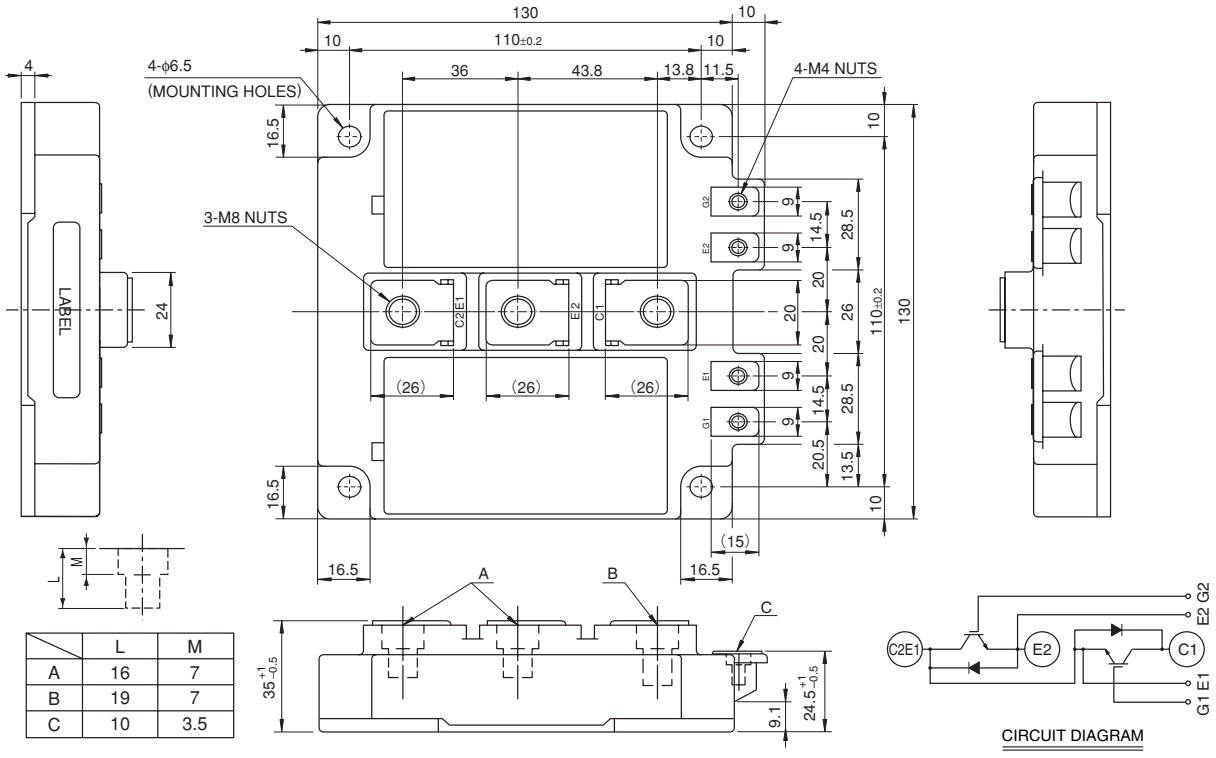
- I_C 400A
- V_{CES} 1700V
- Insulated Type
- 2-elements in a pack

APPLICATION

General purpose inverters & Servo controls, etc

OUTLINE DRAWING & CIRCUIT DIAGRAM

Dimensions in mm



	L	M
A	16	7
B	19	7
C	10	3.5

MITSUBISHI ELECTRIC

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

Symbol	Parameter	Conditions	Ratings	Unit
V_{CES}	Collector-emitter voltage	G-E Short	1700	V
V_{GES}	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	Main terminal to base plate, AC 1 min.	3500	V
—	Torque strength	Main terminal M8	8.8 ~ 10.8	N • m
—		Mounting holes M6	3.5 ~ 4.5	
—		G(E) terminal M4	1.3 ~ 1.7	
—	Weight	Typical value	1200	g

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

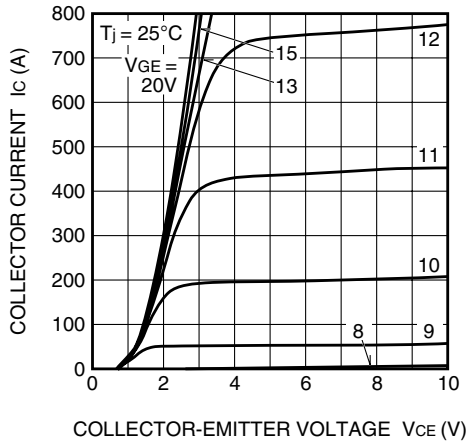
Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
I_{CES}	Collector cutoff current	V_{CE} = V_{CES}, V_{GE} = 0V	—	—	1	mA
$V_{GE(th)}$	Gate-emitter threshold voltage	I_C = 40mA, V_{CE} = 10V	5.5	7.0	8.5	V
I_{GES}	Gate leakage current	±V_{GE} = V_{GES}, V_{CE} = 0V	—	—	2.0	μA
$V_{CE(sat)}$	Collector to emitter saturation voltage	T_j = 25°C; I_C = 400A, V_{GE} = 15V	—	2.2	2.8	V
		T_j = 125°C; I_C = 400A, V_{GE} = 15V	—	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_{GE1} = V_{GE2} = 15V, R_G = 1.2Ω, Inductive load switching operation, 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	°C/W
$R_{th(j-c)R}$		FWDi part (1/2 module)*1	—	—	0.055	
$R_{th(c-f)}$	Contact thermal resistance	Case to fin, Thermal compound applied (1/2 module)*1,*2	—	0.019	—	
R_G	External gate resistance		1.2	—	12	Ω

*1 : Tc, Tf measured point is just under the chips.
*2 : Typical value is measured by using Shin-Etsu Chemical Co.,Ltd “G-746”.

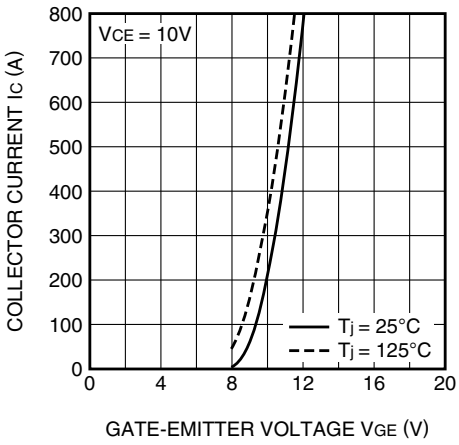
Note 1. I_E, I_{EM}, V_{EC}, t_{rr} & Q_{rr} represent characteristics of the anti-parallel, emitter to collector free-wheel diode (FWDi).
2. Pulse width and repetition rate should be such that the device junction temperature (T_j) does not exceed T_{jmax} rating.
3. Junction temperature (T_j) should not increase beyond 150°C.
4. Pulse width and repetition rate should be such as to cause negligible temperature rise.

PERFORMANCE CURVES

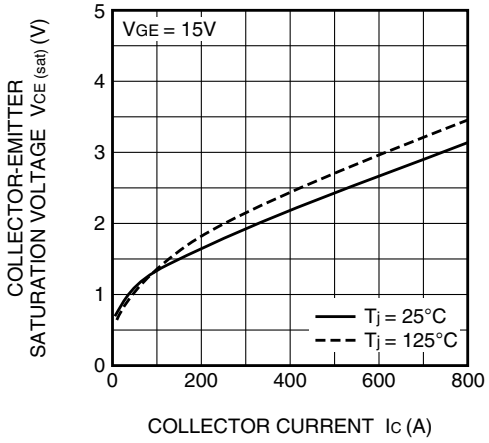
OUTPUT CHARACTERISTICS



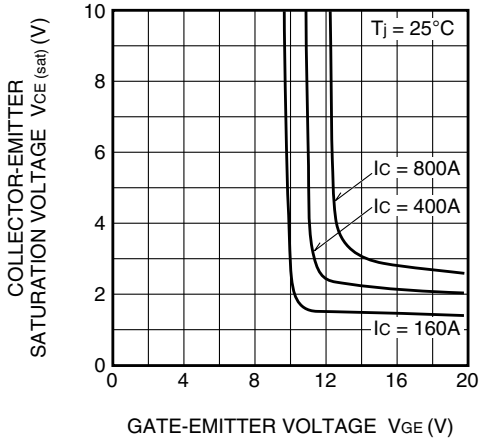
TRANSFER CHARACTERISTICS



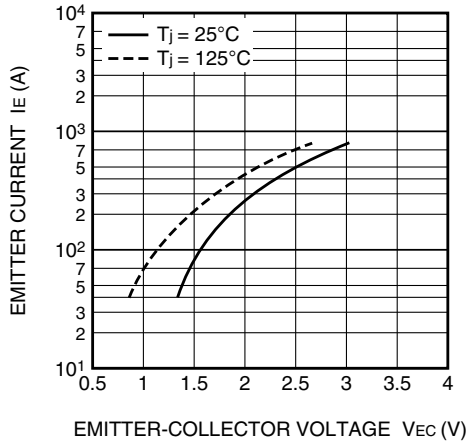
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS



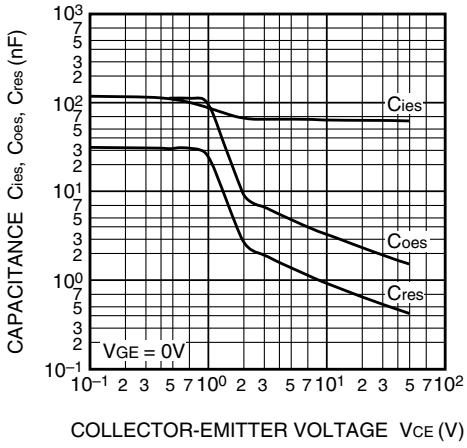
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS



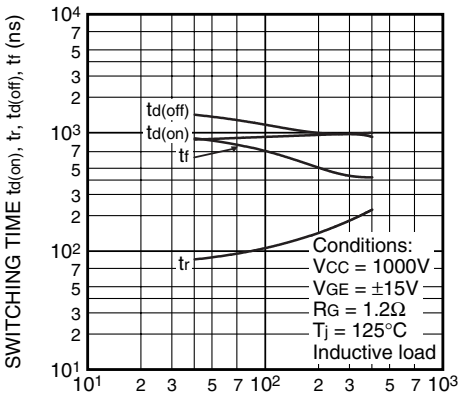
FREE-WHEEL DIODE FORWARD CHARACTERISTICS



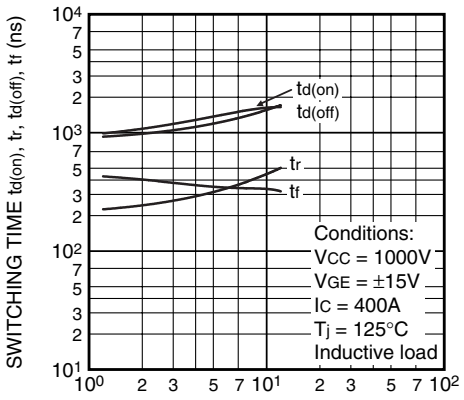
CAPACITANCE–VCE CHARACTERISTICS



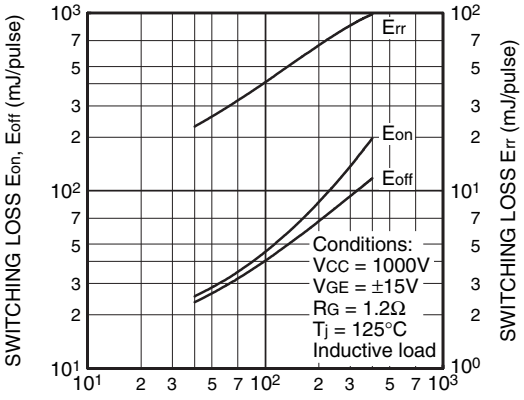
HALF-BRIDGE SWITCHING CHARACTERISTICS SWITCHING TIME vs. COLLECTOR CURRENT



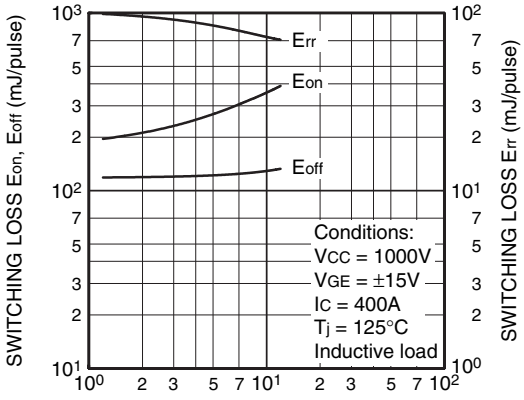
HALF-BRIDGE SWITCHING CHARACTERISTICS SWITCHING TIME vs. GATE RESISTANCE



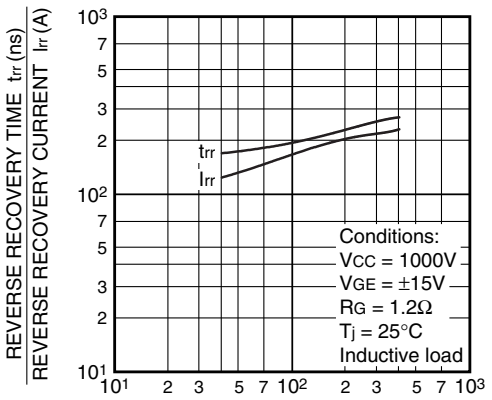
SWITCHING LOSS vs. COLLECTOR CURRENT



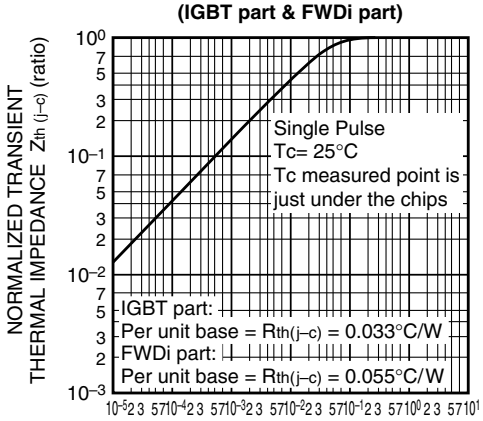
SWITCHING LOSS vs. GATE RESISTANCE

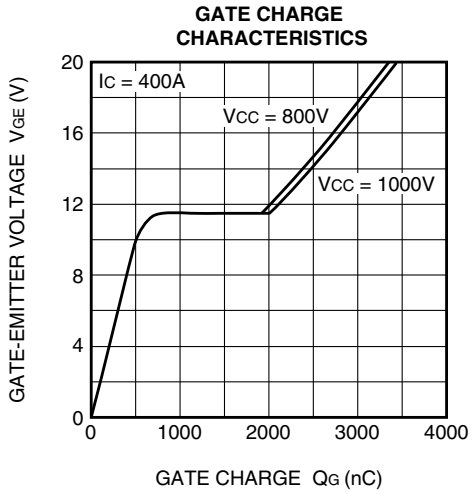


REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT part & FWDi part)




GATE CHARGE
CHARACTERISTICS
IC = 400A
VCC = 800V
VCC = 1000V
GATE-EMITTER VOLTAGE VGE (V)
GATE CHARGE QG (nC)
0
4
8
12
16
20
0
1000
2000
3000
4000