CM400HU-24H

HIGH POWER SWITCHING USE
INSULATED TYPE

CM400HU-24H

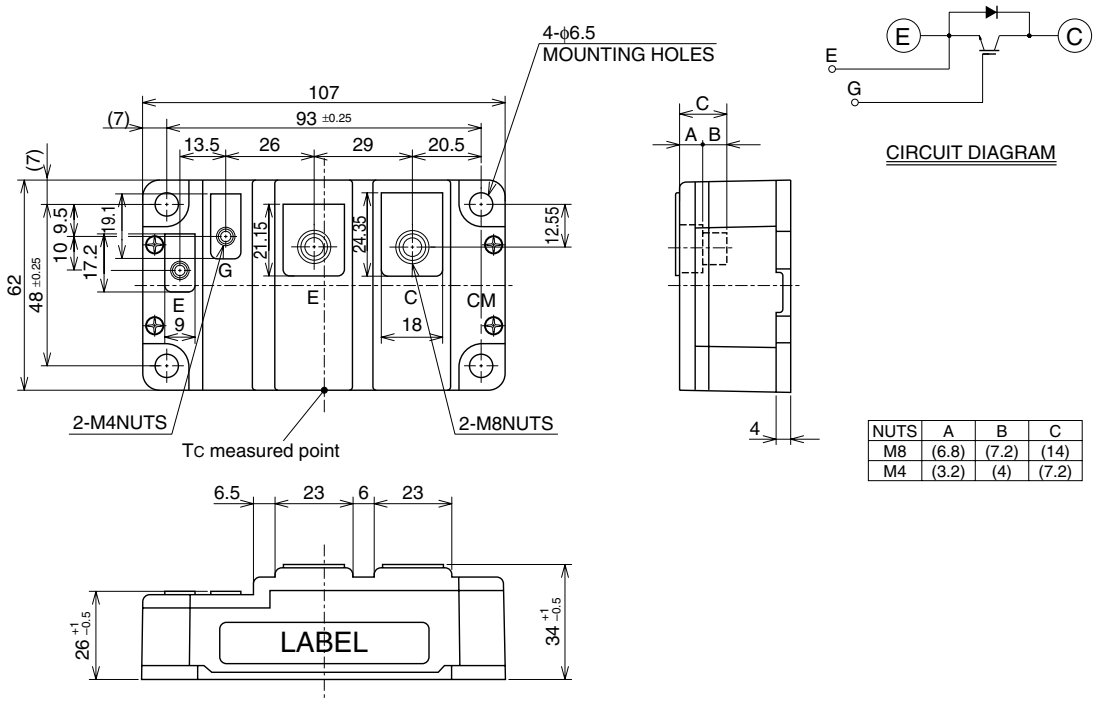
- I_C 400A
- V_{CES} 1200V
- Insulated Type
- 1-element in a pack
- UL Recognized

Yellow Card No. E80276
File No. E80271

APPLICATION

UPS, NC machine, AC-Drive control, Servo, Welders

OUTLINE DRAWING & CIRCUIT DIAGRAM **Dimensions in mm**



NUTS	A	B	C
M8	(6.8)	(7.2)	(14)
M4	(3.2)	(4)	(7.2)

MITSUBISHI ELECTRIC

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

Symbol	Item	Conditions	Ratings	Unit
V_{CES}	Collector-emitter voltage	V_{GE} = 0V	1200	V
V_{GES}	Gate-emitter voltage	V_{CE} = 0V	±20	V
I_C	Collector current	T_C = 25°C	400	A
I_{CM}		Pulse (Note 1)	800	A
I_E (Note 2)	Emitter current	T_C = 25°C	400	A
I_{EM} (Note 2)		Pulse (Note 1)	800	A
P_C (Note 3)	Maximum collector dissipation	T_C = 25°C	2100	W
T_j	Junction temperature	—	–40 ~ +150	°C
T_{stg}	Storage temperature	—	–40 ~ +125	°C
V_{iso}	Isolation voltage	Charged part to base plate, f = 60Hz, AC 1 minute	2500	Vrms
—	Mounting torque	Main terminals M8 screw	8.8 ~ 10.8	N·m
		Mounting M6 screw	3.5 ~ 4.5	N·m
		Auxiliary terminals M4 screw	1.3 ~ 1.7	N·m
—	Weight	Typical value	450	g

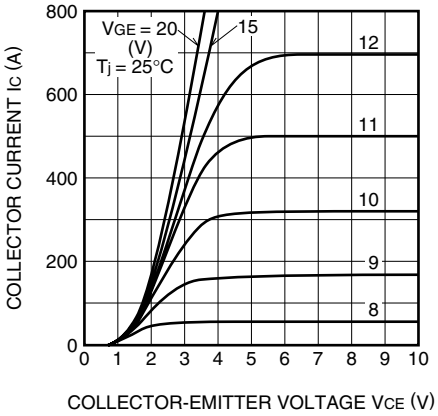
ELECTRICAL CHARACTERISTICS (Tj = 25°C, unless otherwise specified.)

Symbol	Item	Test Conditions		Limits			Unit
				Min	Typ	Max	
I_{CES}	Collector cutoff current	V_{CE} = V_{CES}, V_{GE} = 0V		—	—	2	mA
$V_{GE(th)}$	Gate-emitter threshold voltage	I_C = 40mA, V_{CE} = 10V		4.5	6	7.5	V
I_{GES}	Gate-leakage current	±V_{GE} = V_{GES}, V_{CE} = 0V		—	—	0.5	µA
$V_{CE(sat)}$	Collector-emitter saturation voltage	I_C = 400A, V_{GE} = 15V (Note 4)	T_j = 25°C	—	2.9	3.7	V
			T_j = 125°C	—	2.85	—	
C_{ies}	Input capacitance	V_{CE} = 10V, V_{GE} = 0V		—	—	60	nF
C_{oes}	Output capacitance			—	—	21	nF
C_{res}	Reverse transfer capacitance			—	—	12	nF
Q_G	Total gate charge	V_{CC} = 600V, I_C = 400A, V_{GE} = 15V		—	1500	—	nC
$t_{d(on)}$	Turn-on delay time	V_{CC} = 600V, I_C = 400A, V_{GE} = ±15V, R_G = 0.78Ω, Resistive load		—	—	250	ns
t_r	Turn-on rise time			—	—	350	ns
$t_{d(off)}$	Turn-off delay time			—	—	350	ns
t_f	Turn-off fall time			—	—	350	ns
V_{EC} (Note 2)	Emitter-collector voltage	I_E = 400A, V_{GE} = 0V		—	—	3.2	V
t_{rr} (Note 2)	Reverse recovery time	I_E = 400A, die / dt = –800A / µs		—	—	300	ns
Q_{rr} (Note 2)	Reverse recovery charge			—	2.2	—	µC
$R_{th(j-c)Q}$	Thermal resistance (Note 5)	Junction to case, IGBT part		—	—	0.06	K/W
$R_{th(j-c)R}$		Junction to case, FWDi part		—	—	0.09	K/W
$R_{th(c-f)}$	Contact thermal resistance	Case to heat sink, conductive grease applied (Note 6)		—	0.02	—	K/W

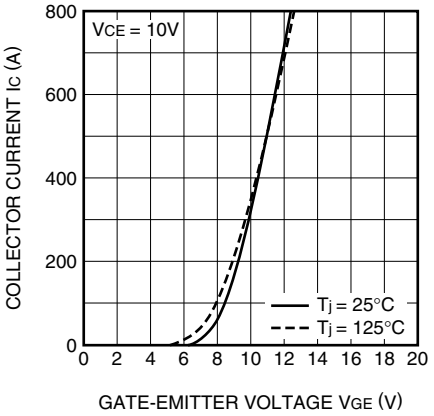
Note 1. Pulse width and repetition rate should be such that the device junction temperature (T_j) does not exceed T_{jmax} rating.
2. I_E, I_{EM}, V_{EC}, t_{rr}, Q_{rr} & die/dt represent characteristics of the anti-parallel, emitter-collector free-wheel diode.
3. Junction temperature (T_j) should not increase beyond 150°C.
4. Pulse width and repetition rate should be such as to cause negligible temperature rise.
5. Case temperature (T_C) measured point is shown in page OUTLINE DRAWING.
6. Typical value is measured by using thermally conductive grease of λ = 0.9[W/(m • K)].

PERFORMANCE CURVES

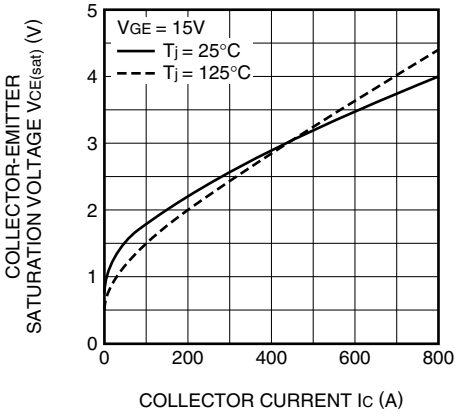
OUTPUT CHARACTERISTICS (TYPICAL)



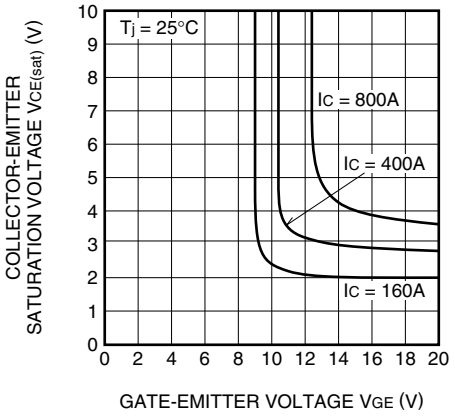
TRANSFER CHARACTERISTICS (TYPICAL)



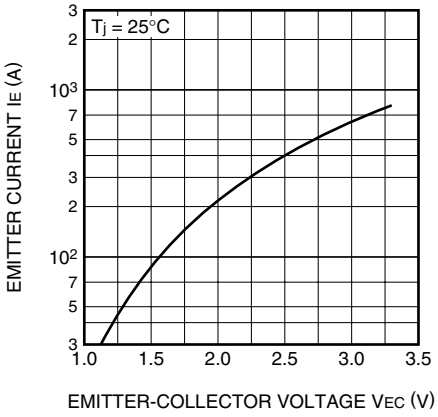
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



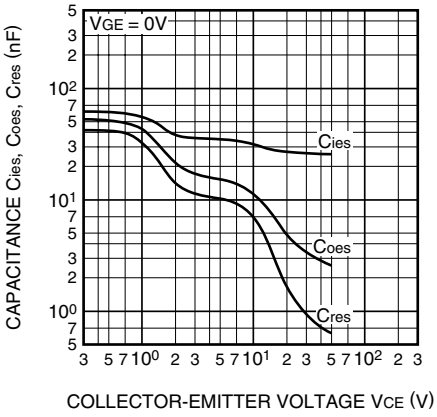
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



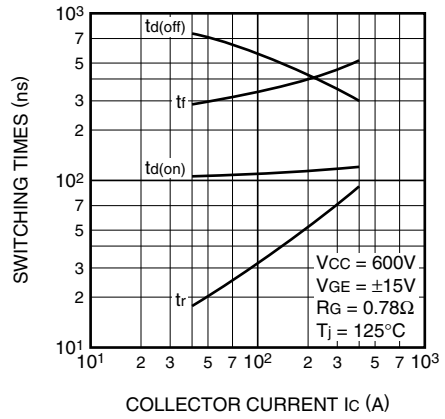
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



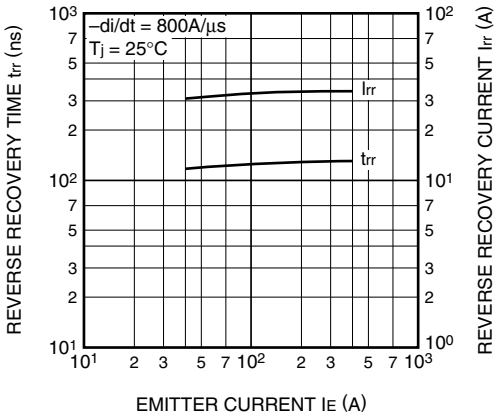
CAPACITANCE CHARACTERISTICS (TYPICAL)



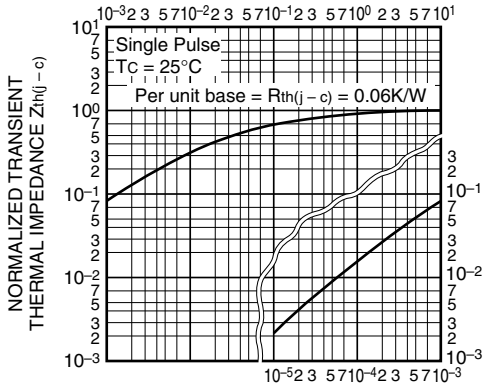
HALF-BRIDGE SWITCHING TIME CHARACTERISTICS (TYPICAL)



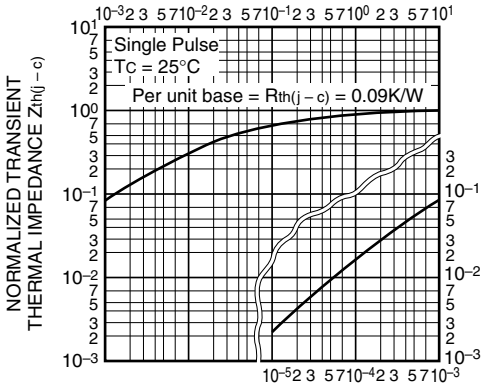
REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT part)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (FWDi part)



GATE CHARGE CHARACTERISTICS (TYPICAL)