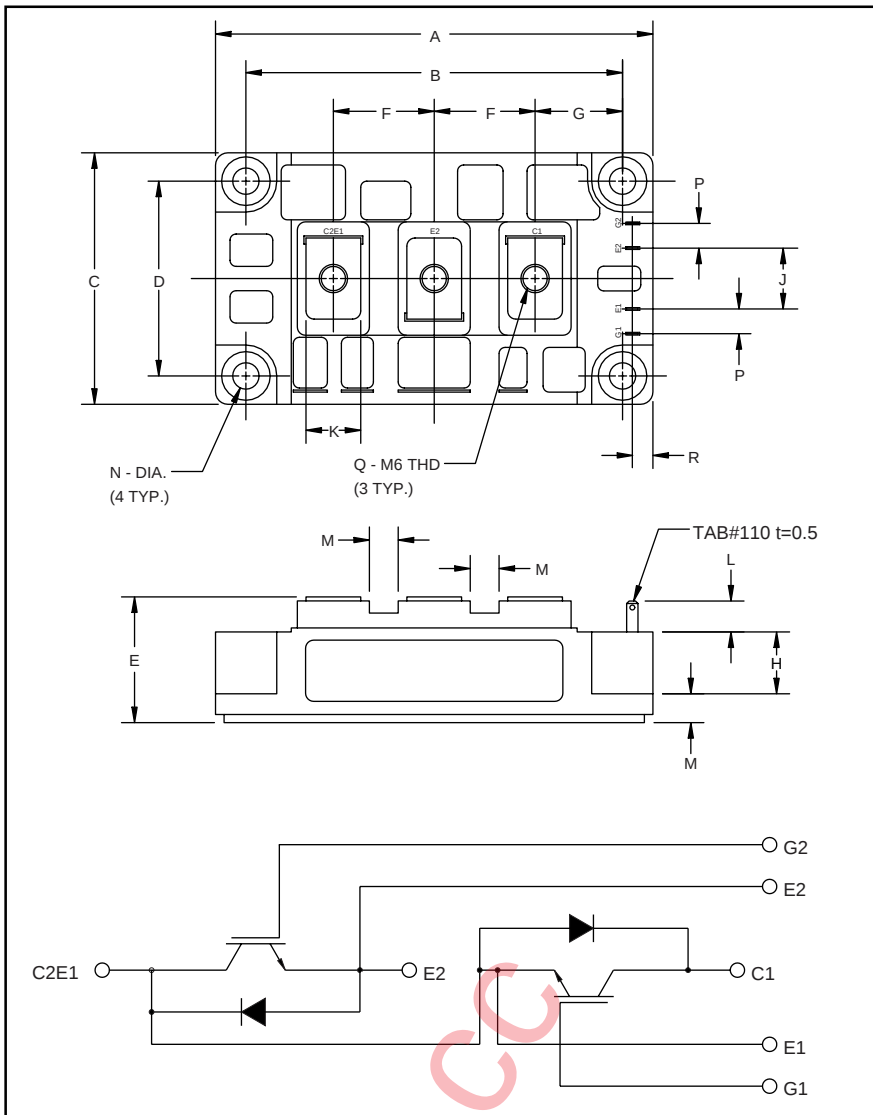


MITSUBISHI IGBT MODULES
CM400DY-12H
HIGH POWER SWITCHING USE
INSULATED TYPE



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	4.25	108.0
B	3.66±0.01	93.0±0.25
C	2.44	62.0
D	1.89±0.01	48.0±0.25
E	1.22 Max.	31.0 Max.
F	0.98	25.0
G	0.85	21.5
H	0.60	15.2

Dimensions	Inches	Millimeters
J	0.59	15.0
K	0.55	14.0
L	0.30	8.5
M	0.28	7.0
N	0.256 Dia.	Dia. 6.5
P	0.24	6.0
Q	M6 Metric	M6
R	0.20	5.0



Description:

Mitsubishi IGBT Modules are designed for use in switching applications. Each module consists of two IGBTs in a half-bridge configuration with each transistor having a reverse-connected super-fast recovery free-wheel diode. All components and interconnects are isolated from the heat sinking baseplate, offering simplified system assembly and thermal management.

Features:

- ☐ Low Drive Power
- ☐ Low $V_{CE(sat)}$
- ☐ Discrete Super-Fast Recovery Free-Wheel Diode
- ☐ High Frequency Operation
- ☐ Isolated Baseplate for Easy Heat Sinking

Applications:

- ☐ AC Motor Control
- ☐ Motion/Servo Control
- ☐ UPS
- ☐ Welding Power Supplies

Ordering Information:

Example: Select the complete part module number you desire from the table below -i.e. CM400DY-12H is a 600V (V_{CES}), 400 Ampere Dual IGBT Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	400	12

CM400DY-12H

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Ratings	Symbol	CM400DY-12H	Units
Junction Temperature	T_j	-40 to 150	$^{\circ}\text{C}$
Storage Temperature	T_{stg}	-40 to 125	$^{\circ}\text{C}$
Collector-Emitter Voltage (G-E SHORT)	V_{CES}	600	Volts
Gate-Emitter Voltage (C-E SHORT)	V_{GES}	± 20	Volts
Collector Current ($T_C = 25^{\circ}\text{C}$)	I_C	400	Amperes
Peak Collector Current	I_{CM}	800*	Amperes
Emitter Current** ($T_C = 25^{\circ}\text{C}$)	I_E	400	Amperes
Peak Emitter Current**	I_{EM}	800*	Amperes
Maximum Collector Dissipation ($T_C = 25^{\circ}\text{C}$, $T_j \leq 150^{\circ}\text{C}$)	P_C	1500	Watts
Mounting Torque, M6 Main Terminal	—	1.96 ~ 2.94	N · m
Mounting Torque, M6 Mounting	—	1.96 ~ 2.94	N · m
Weight	—	400	Grams
Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)	V_{iso}	2500	Vrms

*Pulse width and repetition rate should be such that the device junction temperature (T_j) does not exceed $T_{j(max)}$ rating.

**Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

Static Electrical Characteristics, $T_j = 25\text{ }^{\circ}\text{C}$ unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector-Cutoff Current	I_{CES}	$V_{CE} = V_{CES}$, $V_{GE} = 0V$	—	—	1.0	mA
Gate Leakage Current	I_{GES}	$V_{GE} = V_{GES}$, $V_{CE} = 0V$	—	—	0.5	μA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$I_C = 40\text{mA}$, $V_{CE} = 10V$	4.5	6.0	7.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 400\text{A}$, $V_{GE} = 15V$	—	2.1	2.8**	Volts
		$I_C = 400\text{A}$, $V_{GE} = 15V$, $T_j = 150^{\circ}\text{C}$	—	2.15	—	Volts
Total Gate Charge	Q_G	$V_{CC} = 300V$, $I_C = 400\text{A}$, $V_{GE} = 15V$	—	1200	—	nC
Emitter-Collector Voltage	V_{EC}	$I_E = 400\text{A}$, $V_{GE} = 0V$	—	—	2.8	Volts

** Pulse width and repetition rate should be such that device junction temperature rise is negligible.

Dynamic Electrical Characteristics, $T_j = 25\text{ }^{\circ}\text{C}$ unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Capacitance	C_{ies}	$V_{GE} = 0V$, $V_{CE} = 10V$	—	—	40	nF
Output Capacitance	C_{oes}		—	—	14	nF
Reverse Transfer Capacitance	C_{res}		—	—	8	nF
Resistive	Turn-on Delay Time	$V_{CC} = 300V$, $I_C = 400\text{A}$, $V_{GE1} = V_{GE2} = 15V$, $R_G = 1.6\Omega$	—	—	350	ns
Load	Rise Time		—	—	600	ns
Switching	Turn-off Delay Time		—	—	350	ns
Times	Fall Time		—	—	300	ns
Diode Reverse Recovery Time	t_{rr}	$I_E = 400\text{A}$, $di_E/dt = -800\text{A}/\mu\text{s}$	—	—	110	ns
Diode Reverse Recovery Charge	Q_{rr}	$I_E = 400\text{A}$, $di_E/dt = -800\text{A}/\mu\text{s}$	—	1.08	—	μC

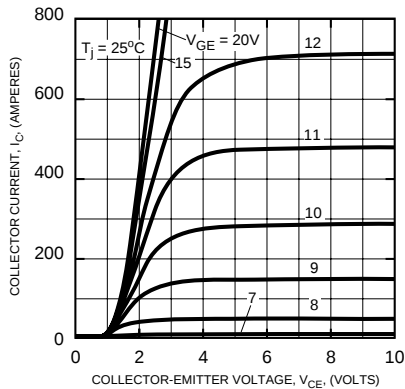
Thermal and Mechanical Characteristics, $T_j = 25\text{ }^{\circ}\text{C}$ unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case	$R_{th(j-c)}$	Per IGBT	—	—	0.085	$^{\circ}\text{C}/W$
Thermal Resistance, Junction to Case	$R_{th(j-c)}$	Per FWDi	—	—	0.18	$^{\circ}\text{C}/W$
Contact Thermal Resistance	$R_{th(c-f)}$	Per Module, Thermal Grease Applied	—	—	0.045	$^{\circ}\text{C}/W$

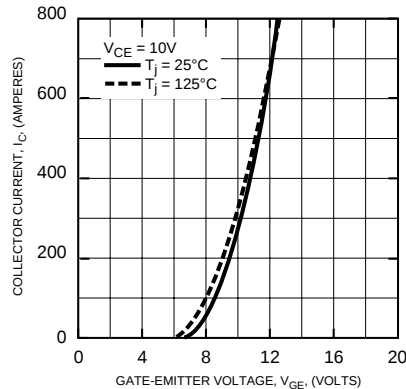
CM400DY-12H

HIGH POWER SWITCHING USE
INSULATED TYPE

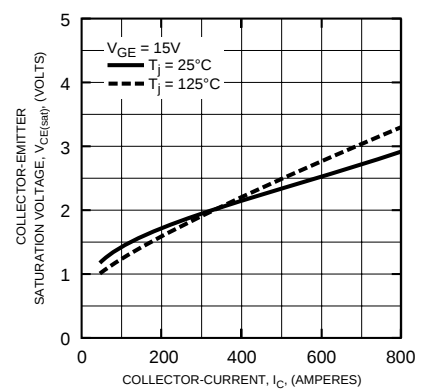
OUTPUT CHARACTERISTICS
(TYPICAL)



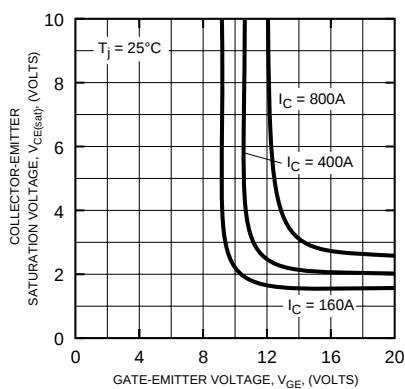
TRANSFER CHARACTERISTICS
(TYPICAL)



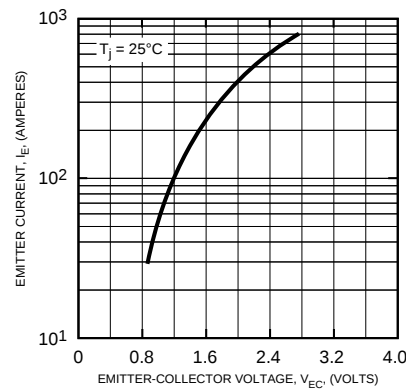
COLLECTOR-EMITTER
SATURATION VOLTAGE CHARACTERISTICS
(TYPICAL)



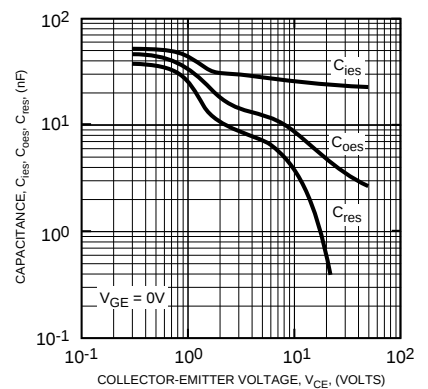
COLLECTOR-EMITTER
SATURATION VOLTAGE CHARACTERISTICS
(TYPICAL)



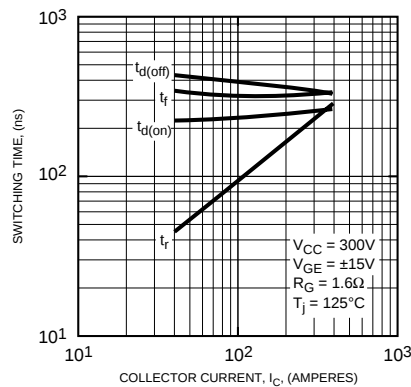
FREE-WHEEL DIODE
FORWARD CHARACTERISTICS
(TYPICAL)



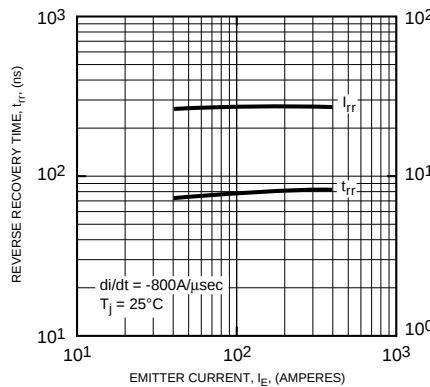
CAPACITANCE VS. Vce
(TYPICAL)



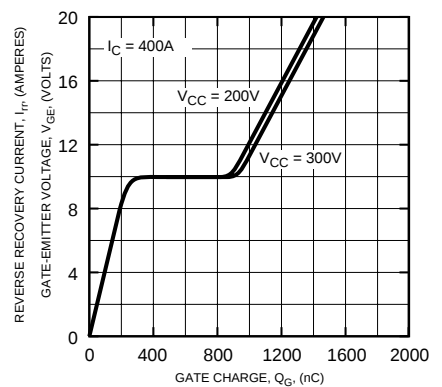
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)



REVERSE RECOVERY CHARACTERISTICS
(TYPICAL)



GATE CHARGE, Vge



CM400DY-12H

HIGH POWER SWITCHING USE
INSULATED TYPE

