

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



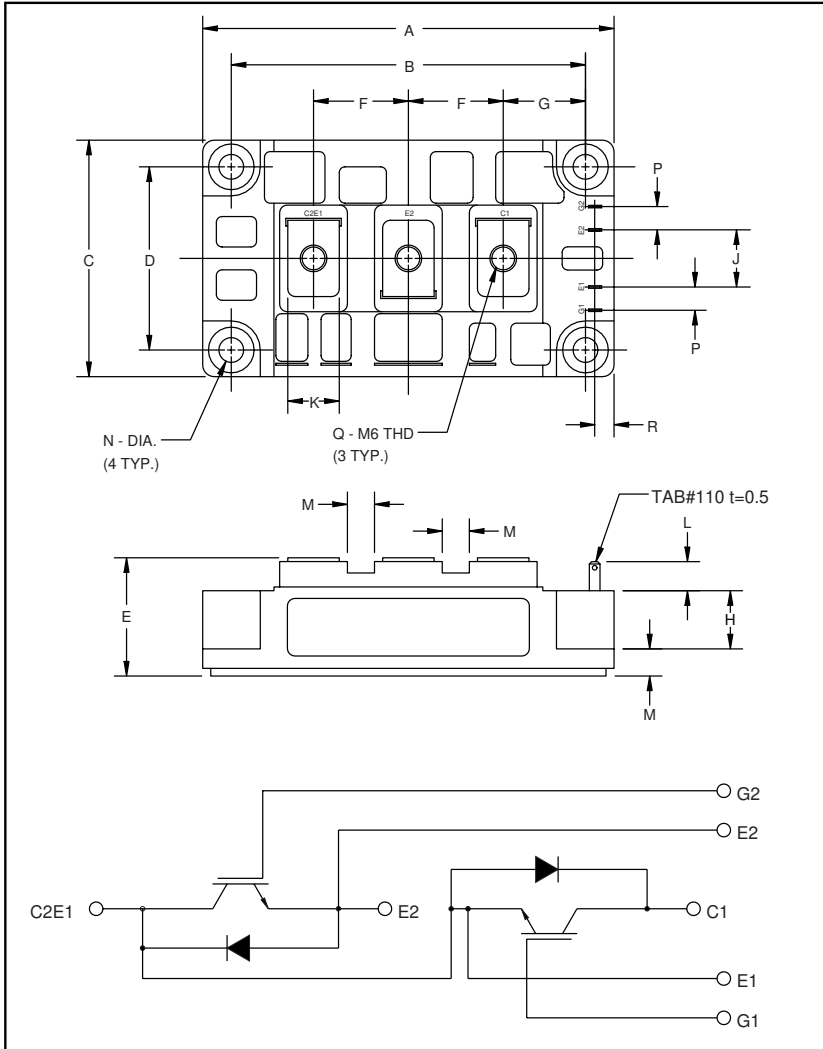
**Description:**  
 Mitsubishi IGBT Modules are designed for use in switching applications. Each module consists of two IGBTs in a half-bridge configuration with each transistor having a reverse-connected super-fast recovery free-wheel diode. All components and interconnects are isolated from the heat 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



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

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**Absolute Maximum Ratings,  $T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified**

Ratings	Symbol	CM400DY-12H	Units
Junction Temperature	$T_j$	-40 to 150	$^\circ\text{C}$
Storage Temperature	$T_{\text{stg}}$	-40 to 125	$^\circ\text{C}$
Collector-Emitter Voltage (G-E SHORT)	$V_{\text{CES}}$	600	Volts
Gate-Emitter Voltage (C-E SHORT)	$V_{\text{GES}}$	$\pm 20$	Volts
Collector Current ( $T_C = 25^\circ\text{C}$ )	$I_C$	400	Amperes
Peak Collector Current	$I_{\text{CM}}$	800*	Amperes
Emitter Current** ( $T_C = 25^\circ\text{C}$ )	$I_E$	400	Amperes
Peak Emitter Current**	$I_{\text{EM}}$	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.)	$V_{\text{iso}}$	2500	Vrms

\*Pulse width and repetition rate should be such that the device junction temperature ( $T_j$ ) does not exceed  $T_{j(\text{max})}$  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	$I_{\text{CES}}$	$V_{\text{CE}} = V_{\text{CES}}$ , $V_{\text{GE}} = 0\text{V}$	-	-	1.0	mA
Gate Leakage Current	$I_{\text{GES}}$	$V_{\text{GE}} = V_{\text{GES}}$ , $V_{\text{CE}} = 0\text{V}$	-	-	0.5	$\mu\text{A}$
Gate-Emitter Threshold Voltage	$V_{\text{GE(th)}}$	$I_C = 40\text{mA}$ , $V_{\text{CE}} = 10\text{V}$	4.5	6.0	7.5	Volts
Collector-Emitter Saturation Voltage	$V_{\text{CE(sat)}}$	$I_C = 400\text{A}$ , $V_{\text{GE}} = 15\text{V}$	-	2.1	2.8**	Volts
		$I_C = 400\text{A}$ , $V_{\text{GE}} = 15\text{V}$ , $T_j = 150^\circ\text{C}$	-	2.15	-	Volts
Total Gate Charge	$Q_G$	$V_{\text{CC}} = 300\text{V}$ , $I_C = 400\text{A}$ , $V_{\text{GE}} = 15\text{V}$	-	1200	-	nC
Emitter-Collector Voltage	$V_{\text{EC}}$	$I_E = 400\text{A}$ , $V_{\text{GE}} = 0\text{V}$	-	-	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**

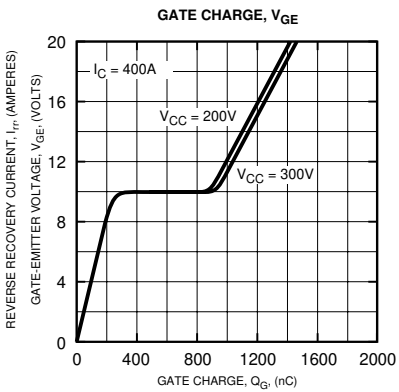
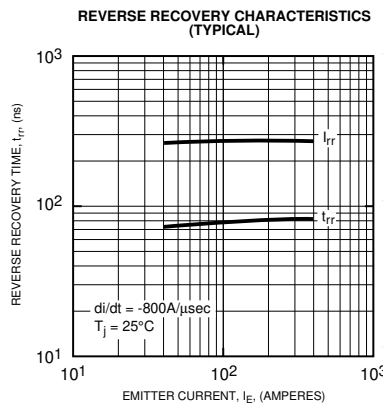
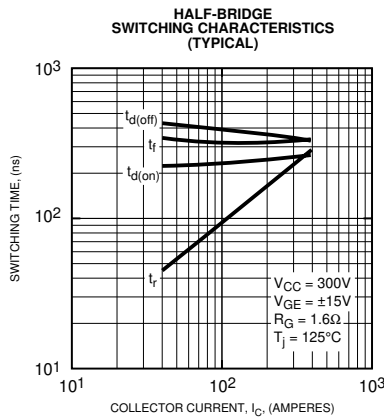
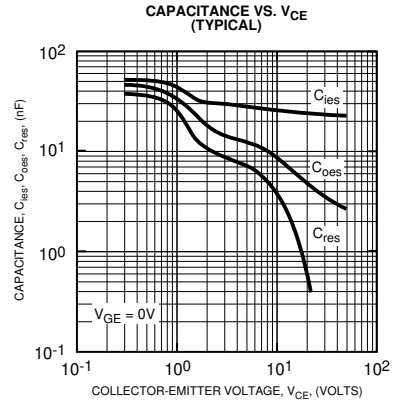
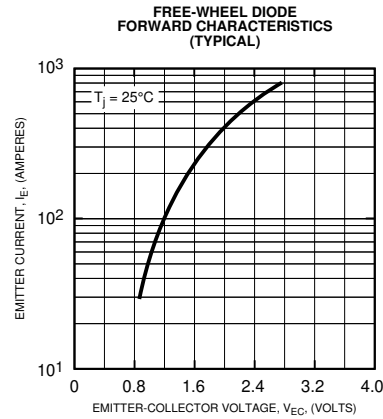
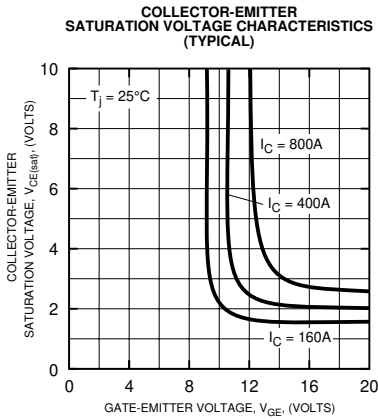
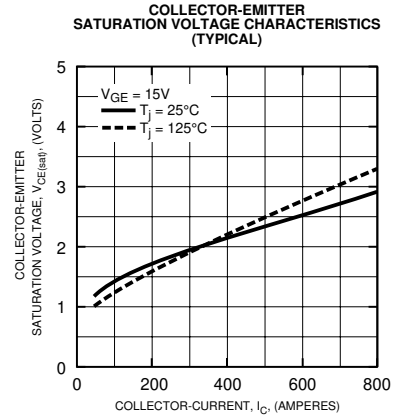
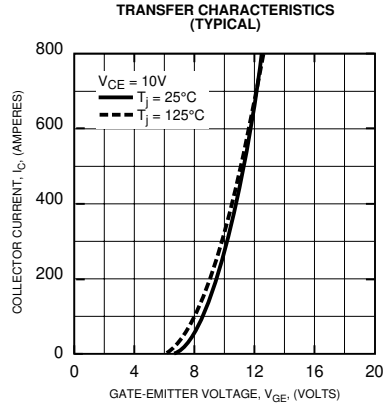
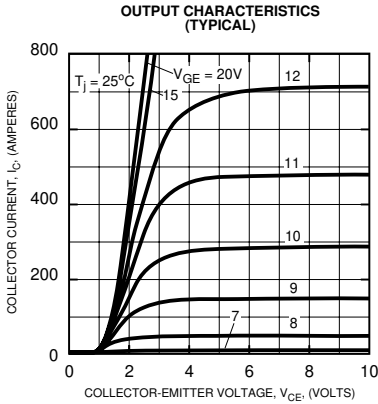
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Capacitance	$C_{\text{ies}}$		-	-	40	nF
Output Capacitance	$C_{\text{oes}}$	$V_{\text{GE}} = 0\text{V}$ , $V_{\text{CE}} = 10\text{V}$	-	-	14	nF
Reverse Transfer Capacitance	$C_{\text{res}}$		-	-	8	nF
Resistive	Turn-on Delay Time	$t_{\text{d(on)}}$	-	-	350	ns
	Rise Time	$t_r$	-	-	600	ns
Switching	Turn-off Delay Time	$t_{\text{d(off)}}$	-	-	350	ns
	Fall Time	$t_f$	-	-	300	ns
Diode Reverse Recovery Time	$t_{\text{rr}}$	$I_E = 400\text{A}$ , $di_E/dt = -800\text{A}/\mu\text{s}$	-	-	110	ns
Diode Reverse Recovery Charge	$Q_{\text{rr}}$	$I_E = 400\text{A}$ , $di_E/dt = -800\text{A}/\mu\text{s}$	-	1.08	-	$\mu\text{C}$

**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	$R_{\text{th(j-c)}}$	Per IGBT	-	-	0.085	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Case	$R_{\text{th(j-c)}}$	Per FWDi	-	-	0.18	$^\circ\text{C}/\text{W}$
Contact Thermal Resistance	$R_{\text{th(c-f)}}$	Per Module, Thermal Grease Applied	-	-	0.045	$^\circ\text{C}/\text{W}$

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