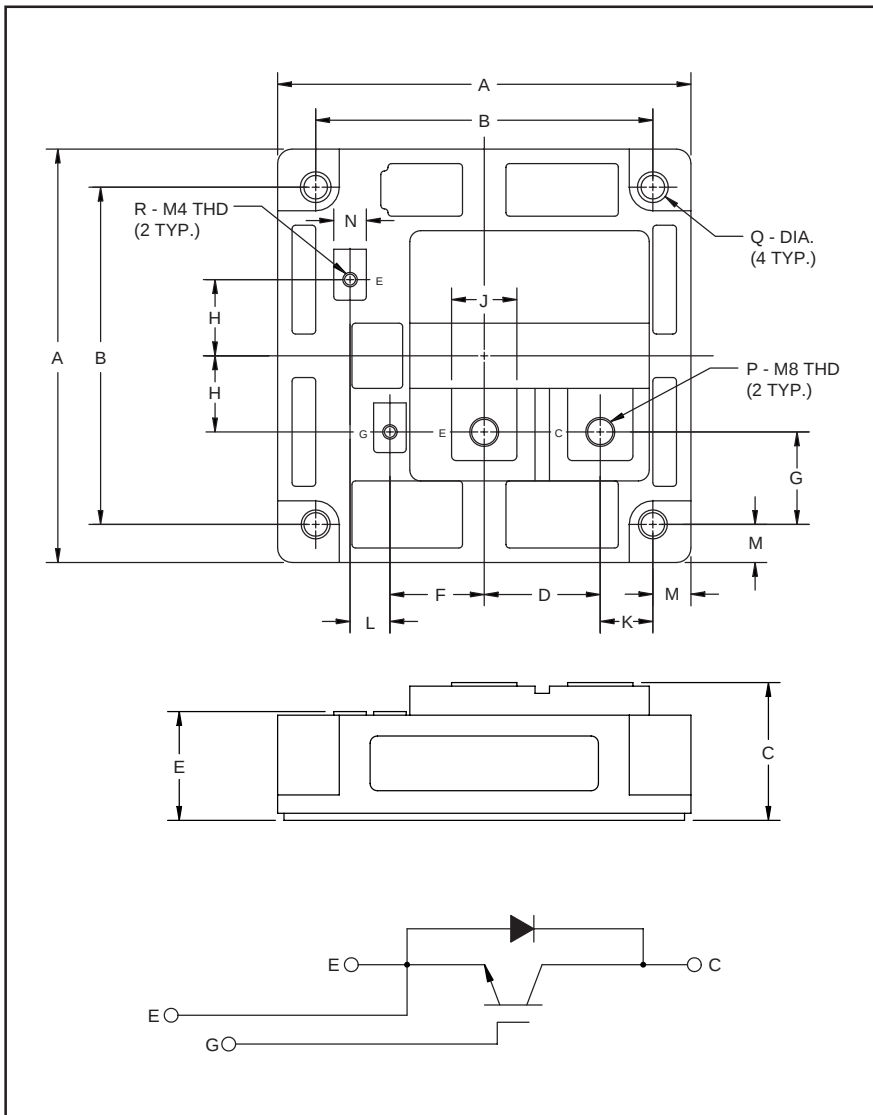


MITSUBISHI IGBT MODULES
CM400HA-34H
 HIGH POWER SWITCHING USE
 INSULATED TYPE



Outline Drawing and Circuit Diagram



Description:

Mitsubishi IGBT Modules are designed for use in switching applications. Each module consists of one IGBT in a single configuration with 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
- ☐ Auxilliary Inverter for Traction
- ☐ UPS
- ☐ Welding Power Supplies

Ordering Information:

Example: Select the complete part module number you desire from the table below -i.e. CM400HA-34H is a 1700V (V_{CES}), 400 Ampere Single IGBT Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	400	34

Dimensions	Inches	Millimeters
A	4.49	114.0
B	3.66±0.01	93.0±0.25
C	1.50+0.04/-0.02	38.0+1.0/-0.5
D	1.26	32.0
E	1.18+0.04/-0.02	30.0+1.0/-0.5
F	1.02	26.0
G	1.0	25.5
H	0.83	21.0

Dimensions	Inches	Millimeters
J	0.71	18.0
K	0.57	14.5
L	0.43	11.0
M	0.41	10.5
N	0.35	9.0
P	M8 Metric	M8
Q	0.26 Dia.	Dia. 6.5
R	M4 Metric	M4

CM400HA-34H

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	Symbol	Ratings	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}	1700	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 ($T_j \leq 150^{\circ}\text{C}$)	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 ($T_c = 25^{\circ}\text{C}$)	P_c	4100	Watts
Mounting Torque, M8 Main Terminal	—	8.83~10.8	$\text{N} \cdot \text{m}$
Mounting Torque, M6 Mounting	—	1.96~2.94	$\text{N} \cdot \text{m}$
Mounting Torque, M4 Terminal	—	0.98~1.47	$\text{N} \cdot \text{m}$
Weight	—	980	Grams
Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)	V_{iso}	4000	V_{rms}

* 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_{CES}	$V_{\text{CE}} = V_{\text{CES}}, V_{\text{GE}} = 0\text{V}$	—	—	4	mA
Gate Leakage Current	I_{GES}	$V_{\text{GE}} = V_{\text{GES}}, V_{\text{CE}} = 0\text{V}$	—	—	0.5	μA
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	$V_{\text{CE(sat)}}$	$I_C = 400\text{A}, V_{\text{GE}} = 15\text{V}$	—	2.7	3.7**	Volts
		$I_C = 400\text{A}, V_{\text{GE}} = 15\text{V}, T_j = 150^{\circ}\text{C}$	—	—	—*	Volts
Total Gate Charge	Q_G	$V_{\text{CC}} = 750\text{V}, I_C = 400\text{A}, V_{\text{GE}} = 15\text{V}$	—	2900	—	nC
Emitter-Collector Voltage	V_{EC}	$I_E = 400\text{A}, V_{\text{GE}} = 0\text{V}$	—	—	3.4	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}	$V_{\text{GE}} = 0\text{V}, V_{\text{CE}} = 10\text{V}$	—	—	85	nF
Output Capacitance	C_{oes}		—	—	20	nF
Reverse Transfer Capacitance	C_{res}		—	—	15	nF
Resistive	Turn-on Delay Time	$V_{\text{CC}} = 750\text{V}, I_C = 400\text{A},$ $V_{\text{GE1}} = V_{\text{GE2}} = 15\text{V}, R_G = 10\Omega$	—	—	900	ns
Load	Rise Time		—	—	1500	ns
Switching	Turn-off Delay Time		—	—	1500	ns
Times	Fall Time		—	—	800	ns
Diode Reverse Recovery Time	t_{rr}	$I_E = 400\text{A}, di_E/dt = -800\text{A}/\mu\text{s}$	—	—	400	ns
Diode Reverse Recovery Charge	Q_{rr}	$I_E = 400\text{A}, di_E/dt = -800\text{A}/\mu\text{s}$	—	7.0	—	μC

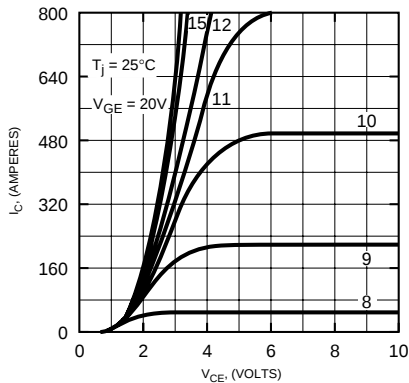
Thermal and Mechanical Characteristics, $T_j = 25\text{ }^{\circ}\text{C}$ unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case	$R_{\text{th(j-c)}}$	Per IGBT	—	—	0.030	$^{\circ}\text{C}/\text{W}$
Thermal Resistance, Junction to Case	$R_{\text{th(j-c)}}$	Per FWDi	—	—	0.060	$^{\circ}\text{C}/\text{W}$
Contact Thermal Resistance	$R_{\text{th(c-f)}}$	Per Module, Thermal Grease Applied	—	—	0.023	$^{\circ}\text{C}/\text{W}$

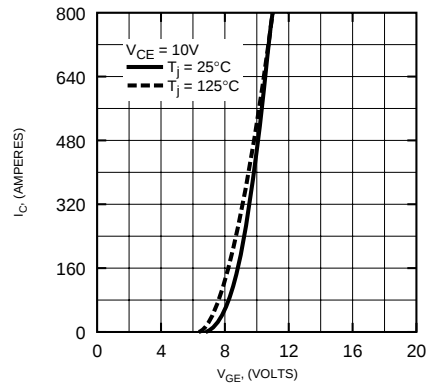
CM400HA-34H

HIGH POWER SWITCHING USE
INSULATED TYPE

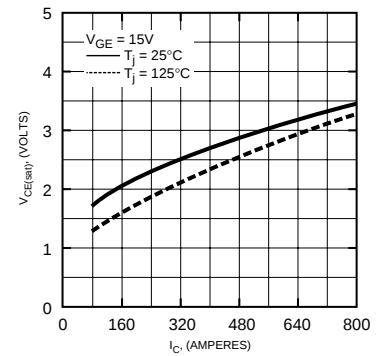
OUTPUT CHARACTERISTICS
(TYPICAL)



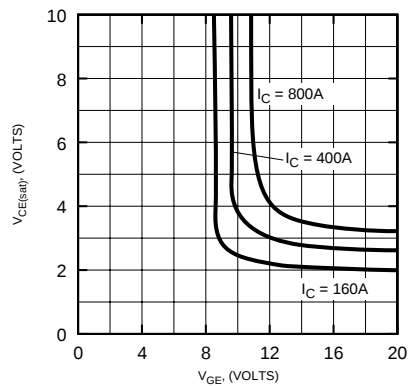
OUTPUT CHARACTERISTICS
(TYPICAL)



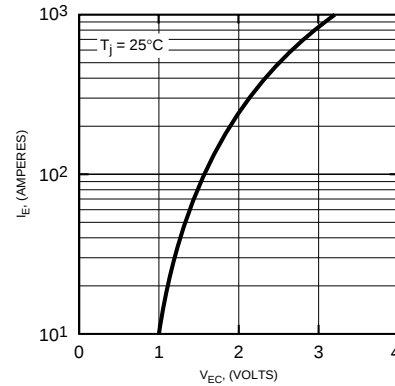
COLLECTOR-EMITTER
SATURATION VOLTAGE CHARACTERISTICS
(TYPICAL)



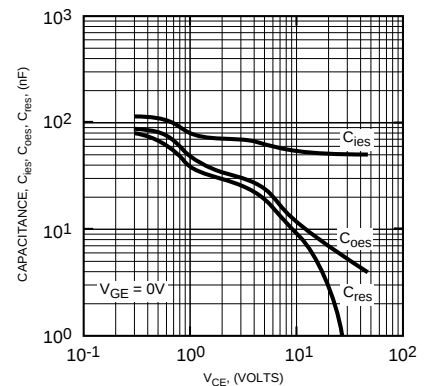
COLLECTOR-EMITTER
SATURATION VOLTAGE CHARACTERISTICS
(TYPICAL)



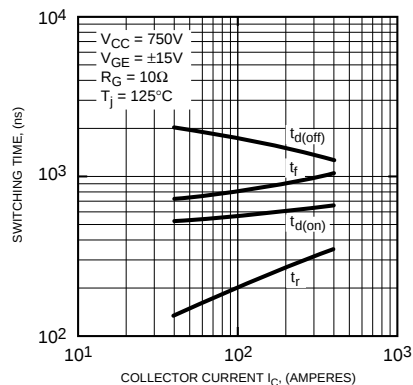
FREE-WHEEL DIODE
FORWARD CHARACTERISTICS
(TYPICAL)



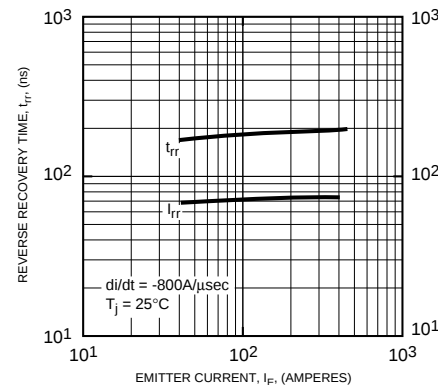
CAPACITANCE VS. VCE
(TYPICAL)



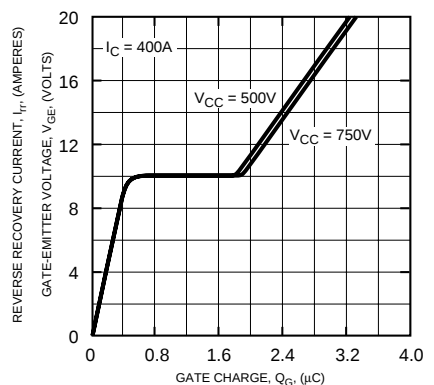
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)



REVERSE RECOVERY CHARACTERISTICS
(TYPICAL)



GATE CHARGE, VGE



CM400HA-34H

HIGH POWER SWITCHING USE
INSULATED TYPE

