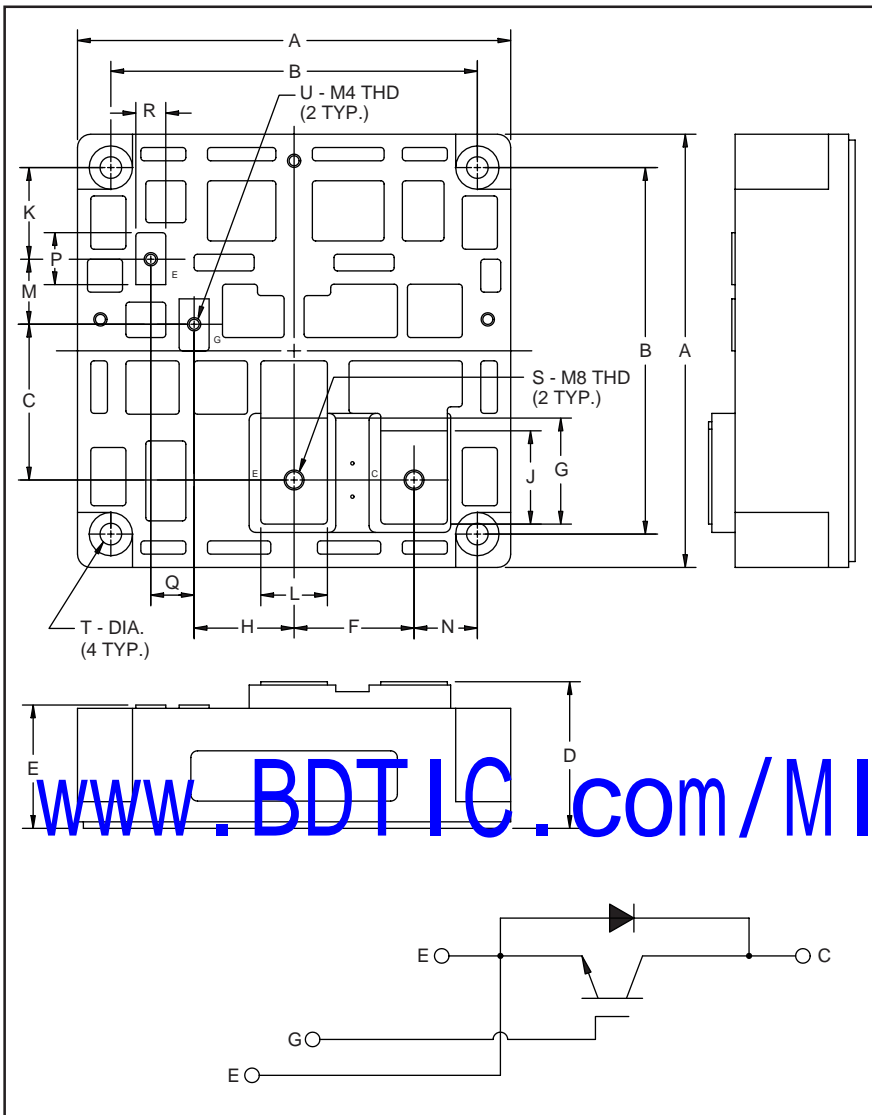


# MITSUBISHI IGBT MODULES

## CM1000HA-24H

HIGH POWER SWITCHING USE  
INSULATED TYPE



### 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
- Motion/Servo Control
- UPS
- Welding Power Supplies

### Ordering Information:

Example: Select the complete part module number you desire from the table below -i.e. CM1000HA-24H is a 1200V ( $V_{CES}$ ), 1000 Ampere Single IGBT Module.

Type	Current Rating Amperes	$V_{CES}$ Volts (x 50)
CM	1000	24

Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	5.12	130.0
B	4.33±0.01	110.0±0.25
C	1.840	46.75
D	1.73+0.04/-0.02	44.0+1.0/-0.5
E	1.46+0.04/-0.02	37.0+1.0/-0.5
F	1.42	36.0
G	1.25	31.8
H	1.18	30.0
J	1.10	28.0
K	1.08	27.5

Dimensions	Inches	Millimeters
L	0.79	20.0
M	0.77	19.5
N	0.75	19.0
P	0.61	15.6
Q	0.51	13.0
R	0.35	9.0
S	M8 Metric	M8
T	0.26 Dia.	Dia. 6.5
U	M4 Metric	M4

## CM1000HA-24H

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	Symbol	Ratings	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)	$V_{\text{CES}}$	1200	Volts
Gate-Emitter Voltage (C-E SHORT)	$V_{\text{GES}}$	$\pm 20$	Volts
Collector Current ( $T_C = 25\text{ }^\circ\text{C}$ )	$I_C$	1000	Amperes
Peak Collector Current ( $T_j \leq 150\text{ }^\circ\text{C}$ )	$I_{\text{CM}}$	2000*	Amperes
Emitter Current** ( $T_C = 25\text{ }^\circ\text{C}$ )	$I_E$	1000	Amperes
Peak Emitter Current**	$I_{\text{EM}}$	2000*	Amperes
Maximum Collector Dissipation ( $T_C = 25\text{ }^\circ\text{C}$ )	$P_C$	5800	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	-	1600	Grams
Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)	$V_{\text{iso}}$	2500	$V_{\text{rms}}$

\*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	$I_{\text{CS}}$	$V_{\text{CE}} = V_{\text{CES}}, V_{\text{GE}} = 0\text{V}$	-	-	6	mA
Gate Leakage Current	$I_{\text{GES}}$	$V_{\text{CE}} = V_{\text{GES}}, V_{\text{GE}} = 0\text{V}$	-	-	2.5	$\mu\text{A}$
Gate-Emitter Threshold Voltage	$V_{\text{GE(th)}}$	$I_C = 100\text{mA}, V_{\text{CE}} = 10\text{V}$	4.3	6.0	7.5	Volts
Collector-Emitter Saturation Voltage	$V_{\text{CE(sat)}}$	$I_C = 1000\text{A}, V_{\text{GE}} = 15\text{V}$	-	2.7	3.6**	Volts
		$I_C = 1000\text{A}, V_{\text{GE}} = 15\text{V}, T_j = 150\text{ }^\circ\text{C}$	-	2.4	-	Volts
Total Gate Charge	$Q_G$	$V_{\text{CC}} = 600\text{V}, I_C = 1000\text{A}, V_{\text{GE}} = 15\text{V}$	-	5000	-	nC
Emitter-Collector Voltage	$V_{\text{EC}}$	$I_E = 1000\text{A}, V_{\text{GE}} = 0\text{V}$	-	-	3.5	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	$C_{\text{ies}}$		-	-	200	nF	
Output Capacitance	$C_{\text{oes}}$	$V_{\text{GE}} = 0\text{V}, V_{\text{CE}} = 10\text{V}$	-	-	70	nF	
Reverse Transfer Capacitance	$C_{\text{res}}$		-	-	40	nF	
Resistive	Turn-on Delay Time	$t_{\text{d(on)}}$	-	-	600	ns	
							Load
Switching	Turn-off Delay Time	$t_{\text{d(off)}}$	-	-	1200	ns	
							Time
Diode Reverse Recovery Time	$t_{\text{rr}}$	$I_E = 1000\text{A}, di_E/dt = -2000\text{A}/\mu\text{s}$	-	-	250	ns	
Diode Reverse Recovery Charge	$Q_{\text{rr}}$	$I_E = 1000\text{A}, di_E/dt = -2000\text{A}/\mu\text{s}$	-	7.4	-	$\mu\text{C}$	

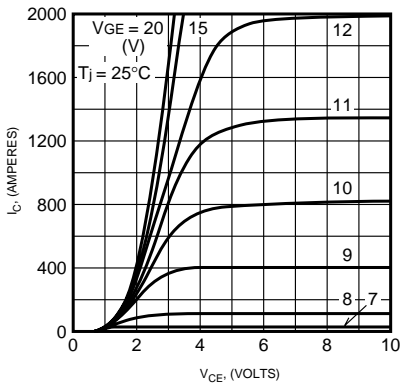
Thermal and Mechanical Characteristics,  $T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case	$R_{\text{th(j-c)}}$	Per IGBT	-	-	0.022	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Case	$R_{\text{th(j-c)}}$	Per FWDi	-	-	0.050	$^\circ\text{C}/\text{W}$
Contact Thermal Resistance	$R_{\text{th(c-f)}}$	Per Module, Thermal Grease Applied	-	-	0.018	$^\circ\text{C}/\text{W}$

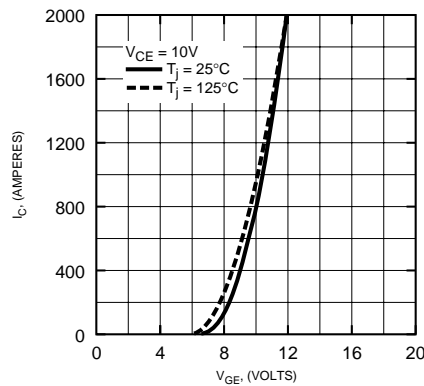
# CM1000HA-24H

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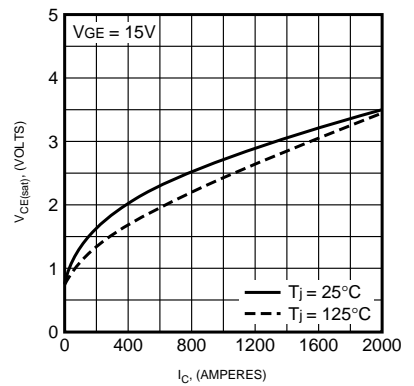
OUTPUT CHARACTERISTICS (TYPICAL)



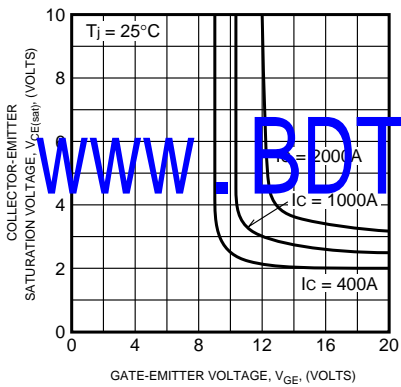
OUTPUT CHARACTERISTICS (TYPICAL)



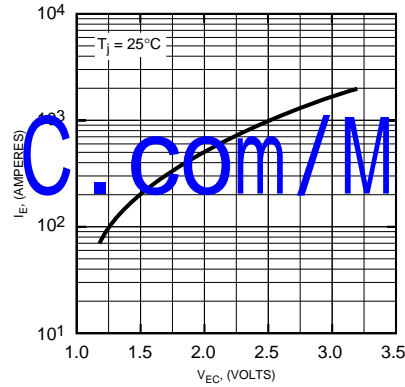
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



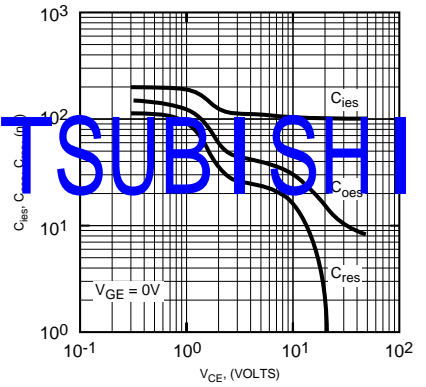
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



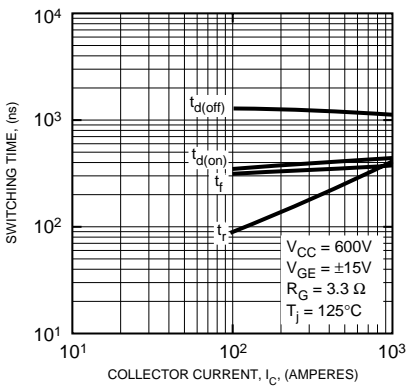
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



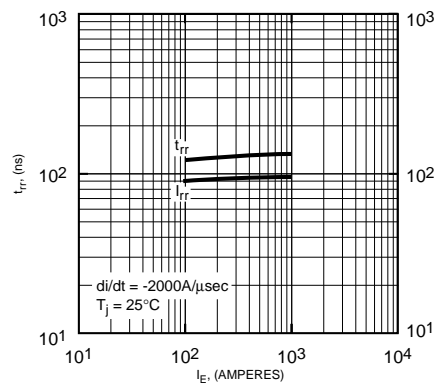
CAPACITANCE VS. VCE (TYPICAL)



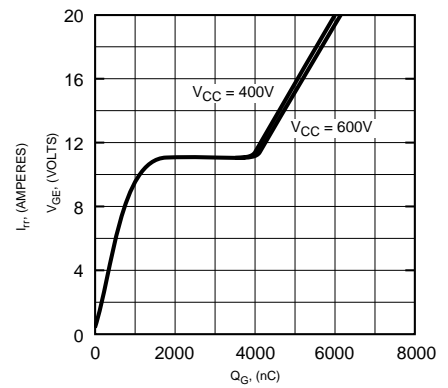
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



REVERSE RECOVERY CHARACTERISTICS (TYPICAL)

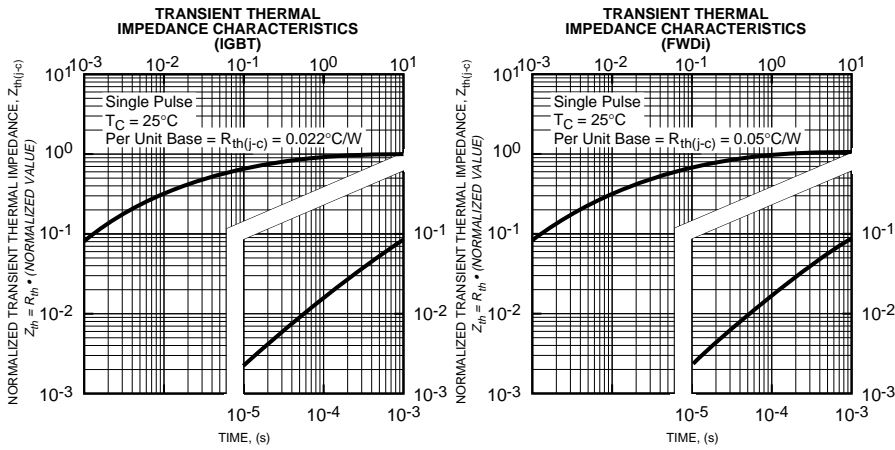


GATE CHARGE, VGE (TYPICAL)



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