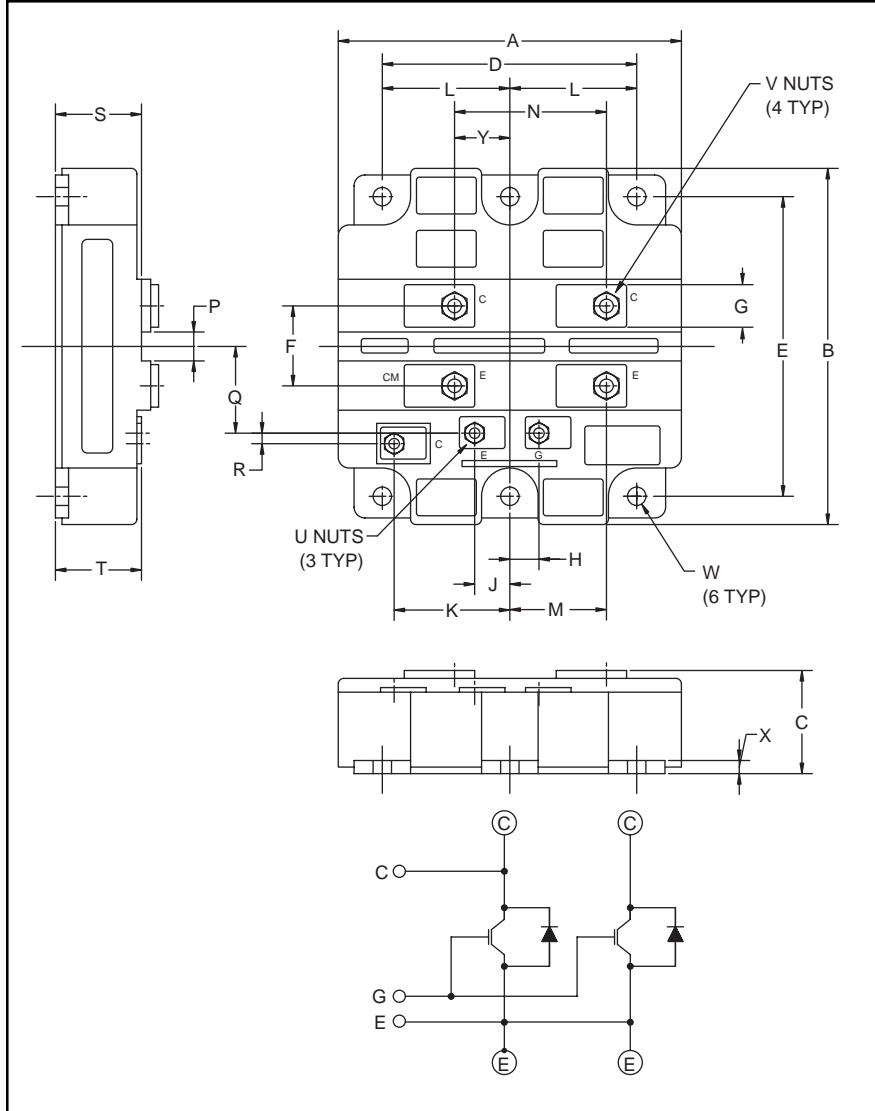


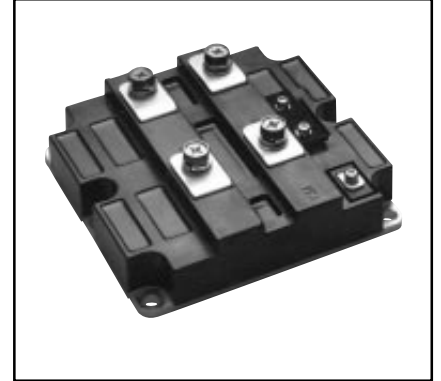
### Single IGBTMOD™ HVIGBT 400 Amperes/4500 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	5.12	130.0
B	5.51	140.0
C	1.50	38.0
D	4.48	114.0
E	4.88±0.01	124.0±0.25
F	1.57	40.0
G	0.79	20.0
H	0.41	10.35
J	0.42	10.65
K	1.92	48.8
L	2.24±0.01	57.0±0.25
M	1.71	43.5

Dimensions	Inches	Millimeters
N	2.42	61.5
P	0.59	15.0
Q	1.57	40.0
R	0.20	5.2
S	1.16	29.5
T	1.10	28.0
U	M4 Metric	M4
V	M8 Metric	M8
W	0.28 Dia.	Dia.7.0
X	0.20	5.0
Y	0.71	18.0



#### Description:

Powerex IGBTMOD™ Modules are designed for use in switching applications. Each module consists of one IGBT Transistor 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  $V_{CE(sat)}$
- Super-Fast Recovery Free-Wheel Diode
- Isolated Baseplate for Easy Heat Sinking

#### Applications:

- Traction
- Medium Voltage Drive
- High Voltage Power Supplies

#### Ordering Information:

Example: Select the complete part module number you desire from the table below -i.e. CM400HB-90H is a 4500V ( $V_{CES}$ ), 400 Ampere Single IGBTMOD™ Power Module.

Type	Current Rating Amperes	$V_{CES}$ Volts (x 50)
CM	400	90



Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (724) 925-7272

**CM400HB-90H**  
**Single IGBTMOD™ HVIGBT**  
 400 Amperes/4500 Volts

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

Ratings	Symbol	CM400HB-90H	Units
Junction Temperature	$T_j$	-40 to 150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-40 to 125	$^\circ\text{C}$
Collector-Emitter Voltage ( $V_{GE} = 0V$ )	$V_{CES}$	4500	Volts
Gate-Emitter Voltage ( $V_{CE} = 0V$ )	$V_{GES}$	$\pm 20$	Volts
Collector Current ( $T_c = 25^\circ\text{C}$ )	$I_C$	400	Amperes
Peak Collector Current (Pulse)	$I_{CM}$	800*	Amperes
Diode Forward Current** ( $T_c = 25^\circ\text{C}$ )	$I_E$	400	Amperes
Diode Forward Surge Current** (Pulse)	$I_{EM}$	800*	Amperes
Maximum Collector Dissipation ( $T_c = 25^\circ\text{C}$ , IGBT Part, $T_j \leq 125^\circ\text{C}$ )	$P_C$	4300	Watts
Max. Mounting Torque M8 Terminal Screws	–	115	in-lb
Max. Mounting Torque M6 Mounting Screws	–	53	in-lb
Max. Mounting Torque M4 Auxiliary Terminal Screws	–	17	in-lb
Module Weight (Typical)	–	1.5	kg
Isolation Voltage (Charged Part to Baseplate, AC 60Hz 1 min.)	$V_{iso}$	6000	Volts

\* Pulse width and repetition rate should be such that 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	$I_{CES}$	$V_{CE} = V_{CES}, V_{GE} = 0V$	–	–	8.0	mA
Gate Leakage Current	$I_{GES}$	$V_{GE} = V_{GES}, V_{CE} = 0V$	–	–	0.5	$\mu\text{A}$
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	$V_{CE(sat)}$	$I_C = 400\text{A}, V_{GE} = 15V, T_j = 25^\circ\text{C}$	–	3.0	3.9*	Volts
		$I_C = 400\text{A}, V_{GE} = 15V, T_j = 125^\circ\text{C}$	–	3.3	–	Volts
Total Gate Charge	$Q_G$	$V_{CC} = 2250V, I_C = 400\text{A}, V_{GE} = 15V$	–	3.6	–	$\mu\text{C}$
Emitter-Collector Voltage**	$V_{EC}$	$I_E = 400\text{A}, V_{GE} = 0V$	–	4.0	5.2	Volts

\* Pulse width and repetition rate should be such that device junction temperature rise is negligible.  
 \*\*Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).



Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (724) 925-7272

**CM400HB-90H**  
**Single IGBTMOD™ HVIGBT**  
 400 Amperes/4500 Volts

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Capacitance	$C_{ies}$		–	72	–	nF
Output Capacitance	$C_{oes}$	$V_{GE} = 0V, V_{CE} = 10V$	–	5.3	–	nF
Reverse Transfer Capacitance	$C_{res}$		–	1.6	–	nF
Resistive	Turn-on Delay Time	$V_{CC} = 2250V, I_C = 400A,$ $V_{GE1} = V_{GE2} = 15V,$ $R_G = 22.5\Omega$	–	–	2.4	$\mu s$
Load	Rise Time		$t_{d(on)}$			
Switching	Turn-off Delay Time	Resistive Load Switching Operation	–	–	6.0	$\mu s$
Times	Fall Time		$t_{d(off)}$			
Diode Reverse Recovery Time**	$t_{rr}$	$I_E = 400A, di_E/dt = -800A/\mu s$	–	–	1.8	$\mu s$
Diode Reverse Recovery Charge**	$Q_{rr}$	$I_E = 400A, di_E/dt = -800A/\mu s$	–	160*	–	$\mu C$

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

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

**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	–	–	0.023	K/W
Thermal Resistance, Junction to Case	$R_{th(j-c)}$	Per FWDi	–	–	0.045	K/W
Contact Thermal Resistance, Case to Fin	$R_{th(c-f)}$	Per Module, Thermal Grease Applied	–	0.015	–	K/W

**CM400HB-90H**  
**Single IGBTMOD™ HVIGBT**  
 400 Amperes/4500 Volts

