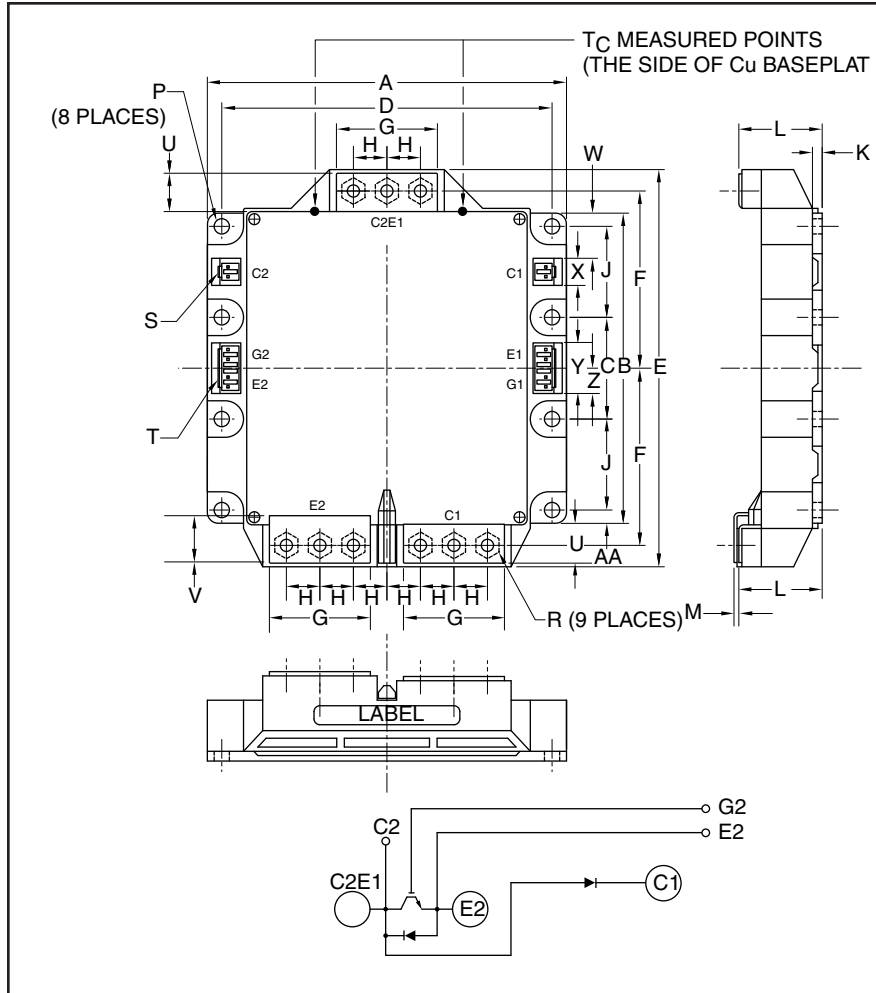


### Mega Power Chopper IGBTMOD™ 1400 Amperes/1200 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	5.91	150.0
B	5.10	129.5
C	1.67±0.01	42.5±0.25
D	5.41±0.01	137.5±0.25
E	6.54	166.0
F	2.91±0.01	74.0±0.25
G	1.65	42.0
H	0.55	14.0
J	1.50±0.01	38.0±0.25
K	0.16	4.0

**Housing Type (J.S.T. MFG. CO. LTD)**

S = VHR-2N  
T = VHR-5N

Dimensions	Inches	Millimeters
L	1.36 +0.04/-0.02	34.6 +1.0/-0.5
M	0.075±0.08	1.9±0.2
P	0.26	6.5
R	M6 Metric	M6
U	0.62	15.7
V	0.71	18.0
W	0.75	19.0
X	0.43	11.0
Y	0.83	21.0
Z	0.41	10.5
AA	0.22	5.5



**Description:**

Powerex Chopper IGBTMOD™ Modules are designed for use in switching applications. Each module consists of one IGBT Transistor having a reverse-connected super-fast recovery free-wheel diode and an anode-collector 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<sub>CE(sat)</sub>
- Discrete Super-Fast Recovery Free-Wheel Diode
- Isolated Baseplate for Easy Heat Sinking

**Applications:**

- High Power DC Power Supply
- Large DC Motor Drives
- Utility Interface Inverters

**Ordering Information:**

Example: Select the complete module number you desire from the table - i.e. CM1400E3U-24NF is a 1200V (V<sub>CES</sub>), 1400 Ampere Chopper IGBTMOD Power Module.

Type	Current Rating Amperes	V <sub>CES</sub> Volts (x 50)
CM	1400	24



Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272

**CM1400E3U-24NF**  
**Mega Power Chopper IGBTMOD™**  
1400 Amperes/1200 Volts

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

Ratings	Symbol	CM1400E3U-24NF	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)	$V_{CES}$	1200	Volts
Gate-Emitter Voltage (C-E SHORT)	$V_{GES}$	$\pm 20$	Volts
Collector Current DC ( $T_C = 94^\circ\text{C}$ )	$I_C$	1400	Amperes
Peak Collector Current (Pulse, $T_j \leq 150^\circ\text{C}$ )	$I_{CM}$	2800*	Amperes
Emitter Current ( $T_C = 25^\circ\text{C}$ )**	$I_E$	100	Amperes
Peak Emitter Current (Pulse)**	$I_{EM}$	200*	Amperes
Maximum Collector Dissipation ( $T_j < 150^\circ\text{C}$ , $T_C = 25^\circ\text{C}$ )	$P_C$	3900	Watts
Mounting Torque, M6 Mounting Screws	–	40	in-lb
Mounting Torque, M6 Main Terminal Screw	–	40	in-lb
Weight (Typical)	–	1400	Grams
Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)	$V_{iso}$	2500	Volts

**Clamp Diode Part,  $T_j = 25^\circ\text{C}$  unless otherwise specified**

Repetitive Peak Reverse Voltage	$V_{RRM}$	1200	Volts
Forward Current ( $T_C = 25^\circ\text{C}$ )	$I_F$	1400*	Amperes
Peak Forward Current (Pulse)	$I_{FM}$	2800*	Amperes



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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector-Cutoff Current	$I_{CES}$	$V_{CE} = V_{CES}, V_{GE} = 0V$	–	–	1	mA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$I_C = 140mA, V_{CE} = 10V$	6	7	8	Volts
Gate Leakage Current	$I_{GES}$	$V_{GE} = V_{GES}, V_{CE} = 0V$	–	–	1.5	$\mu A$
Collector-Emitter Saturation Voltage (Without Lead Resistance)	$V_{CE(sat)}$ (Chip)	$I_C = 1400A, V_{GE} = 15V, T_j = 25^\circ\text{C}$ $I_C = 1400A, V_{GE} = 15V, T_j = 125^\circ\text{C}$	–	1.8 2.0	2.5 –	Volts
Module Lead Resistance	$R_{(lead)}$	$I_C = 1400A, \text{Terminal-Chip}$	–	0.286	–	$m\Omega$
Input Capacitance	$C_{ies}$		–	–	220	nF
Output Capacitance	$C_{oes}$	$V_{CE} = 10V, V_{GE} = 0V$	–	–	25	nF
Reverse Transfer Capacitance	$C_{res}$		–	–	4.7	nF
Total Gate Charge	$Q_G$	$V_{CC} = 600V, I_C = 1400A, V_{GE} = 15V$	–	7200	–	nC
Inductive Turn-on Delay Time	$t_{d(on)}$	$V_{CC} = 600V, I_C = 1400A,$	–	–	800	ns
Load Rise Time	$t_r$	$V_{GE1} = V_{GE2} = 15V,$	–	–	300	ns
Switch Turn-off Delay Time	$t_{d(off)}$	$R_G = 0.22\Omega, \text{Inductive Load}$	–	–	1000	ns
Times Fall Time	$t_f$	Switching Operation	–	–	300	ns
Reverse Recovery Time*	$t_{rr}$	$I_E = 100A$	–	–	700	ns
Reverse Recovery Charge*	$Q_{rr}$		–	90	–	$\mu C$
Emitter-Collector Voltage**	$V_{EC}$	$I_E = 100A, V_{GE} = 0V$	–	–	3.0	Volts
External Gate Resistance	$R_G$		0.22	–	2.2	$\Omega$

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Emitter-Collector Voltage (without Lead Resistance)	$V_{FM}$ (Chip)	$I_F = 1400A, \text{Clamp Diode Part}$	–	–	3.2	Volts
Reverse Recovery Time	$t_{rr}$	$I_F = 1400A, \text{Clamp Diode Part}$	–	–	700	ns
Reverse Recovery Charge	$Q_{rr}$		–	90	–	$\mu C$

\* 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).

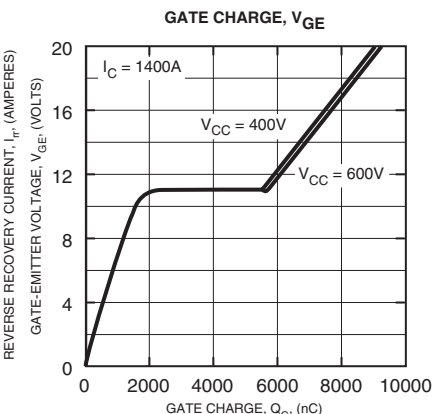
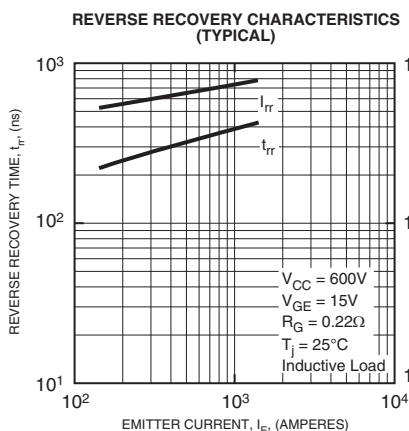
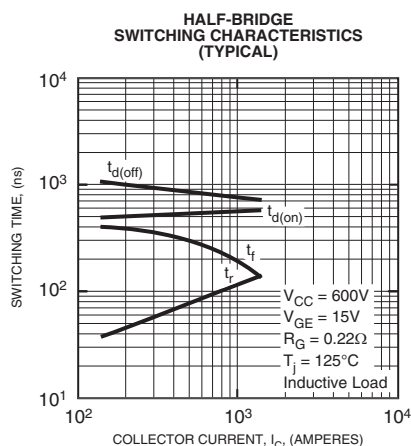
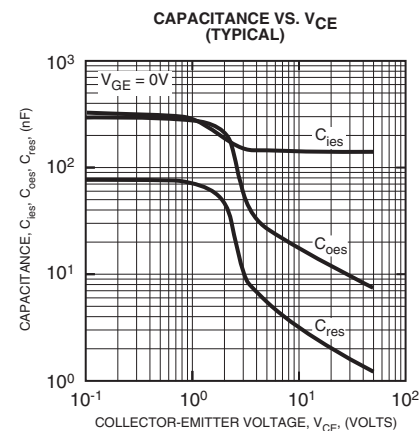
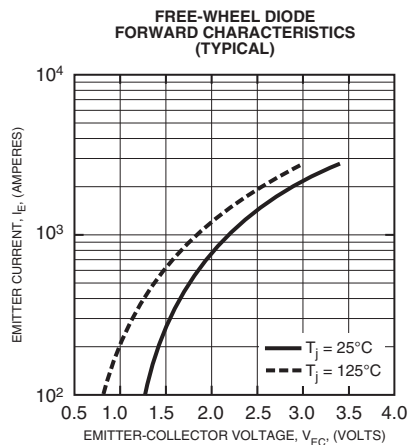
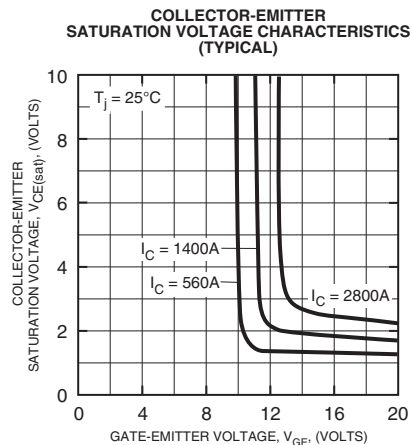
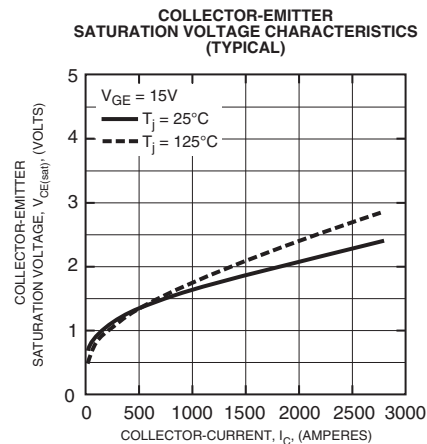
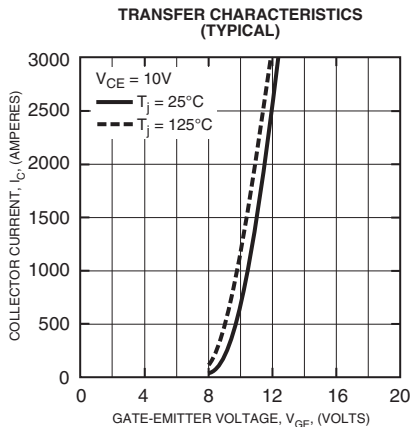
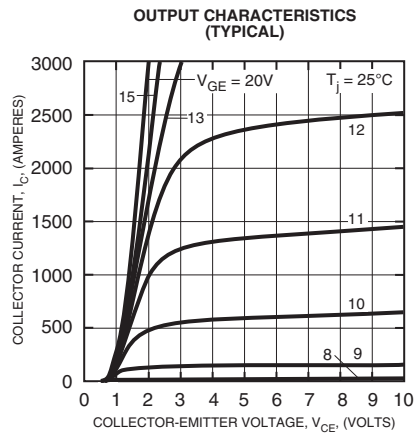
**Thermal and Mechanical Characteristics,  $T_j = 25^\circ\text{C}$  unless otherwise specified**

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case	$R_{th(j-c)Q}$	Per IGBT 1/2 Module, $T_C$ Reference Point per Outline Drawing	–	–	0.032	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{th(j-c)D}$	Per Clamp Diode 1/2 Module, $T_C$ Reference Point per Outline Drawing	–	–	0.053	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{th(j-c')Q}$	Per IGBT 1/2 Module, $T_C$ Reference Point Under Chip	–	–	0.014	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{th(j-c')D}$	Per Clamp Diode 1/2 Module, $T_C$ Reference Point Under Chip	–	–	0.023	$^\circ\text{C/W}$
Contact Thermal Resistance	$R_{th(c-f)}$	Per 1/2 Module, Thermal Grease Applied	–	0.016	–	$^\circ\text{C/W}$



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