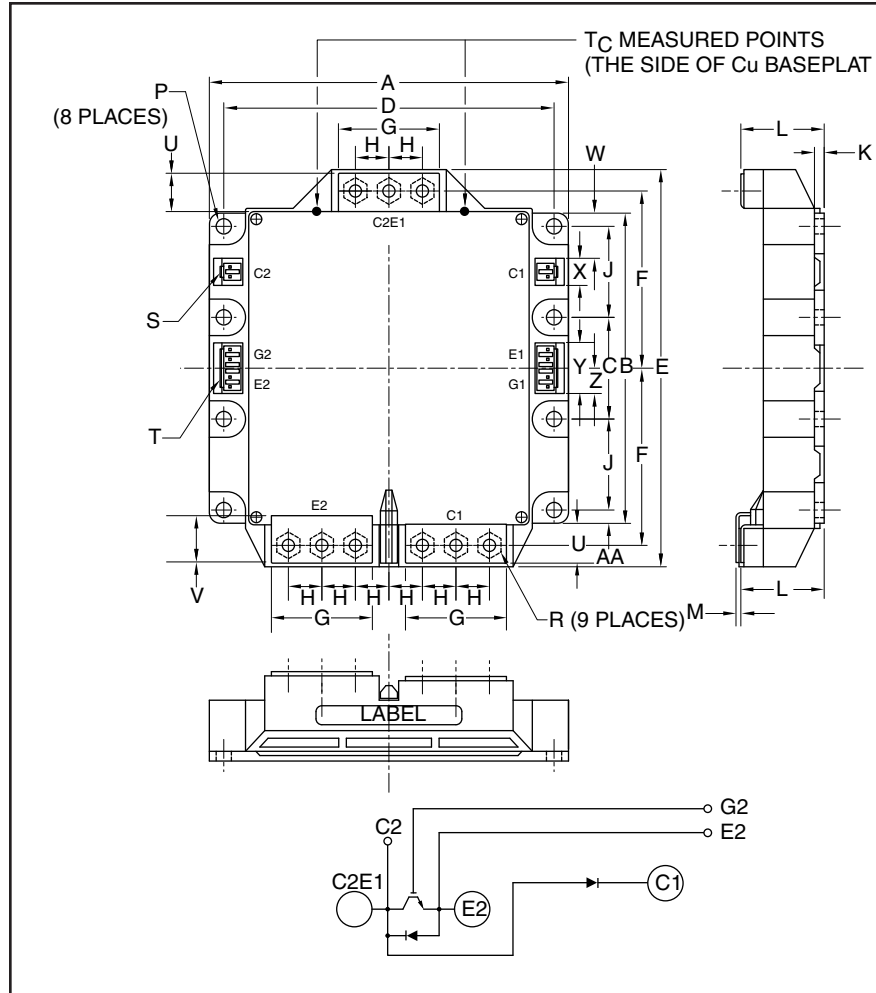


Mega Power Chopper IGBTMOD™ 1400 Amperes/1200 Volts



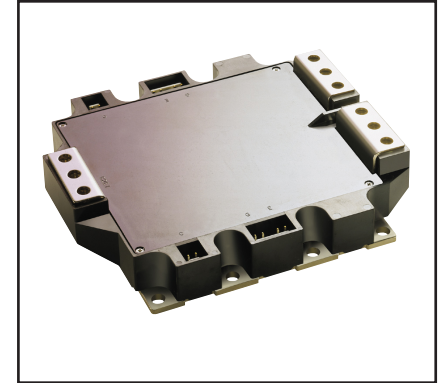
Outline Drawing and Circuit Diagram

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 $V_{CE(sat)}$
- ☐ 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_{CES}), 1400 Ampere Chopper IGBTMOD Power Module.

Type	Current Rating Amperes	V_{CES} 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}	± 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

CM1400E3U-24NF

Mega Power Chopper IGBTMOD™

1400 Amperes/1200 Volts

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	μA
Collector-Emitter Saturation Voltage		V _{CE(sat)}	I _C = 1400A, V _{GE} = 15V, T _j = 25°C	—	1.8	2.5	Volts
(Without Lead Resistance)		(Chip)	I _C = 1400A, V _{GE} = 15V, T _j = 125°C	—	2.0	—	Volts
Module Lead Resistance		R _(lead)	I _C = 1400A, Terminal-Chip	—	0.286	—	mΩ
Input Capacitance		C _{ies}	V _{CE} = 10V, V _{GE} = 0V	—	—	220	nF
Output Capacitance		C _{oes}		—	—	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 = 0.22Ω, 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	—	μC
Emitter-Collector Voltage**		V _{EC}	I _E = 100A, V _{GE} = 0V	—	—	3.0	Volts
External Gate Resistance		R _G		0.22	—	2.2	Ω

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)	$I_F = 1400A$, Clamp Diode Part	–	–	3.2	Volts
Reverse Recovery Time	t_{rr}	$I_F = 1400A$, Clamp Diode Part	–	–	700	ns
Reverse Recovery Charge	Q_{rr}		–	90	–	μC

* 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

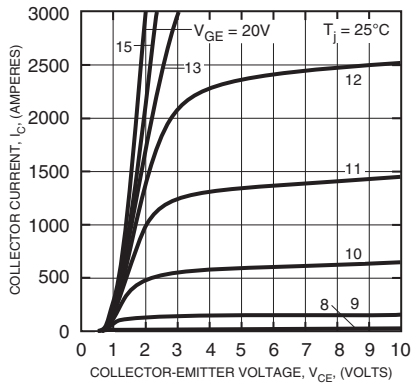
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case	$R_{th(j-c)Q}$	Per IGBT 1/2 Module, T_C Reference Point per Outline Drawing	–	–	0.032	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{th(j-c)D}$	Per Clamp Diode 1/2 Module, T_C Reference Point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

CM1400E3U-24NF

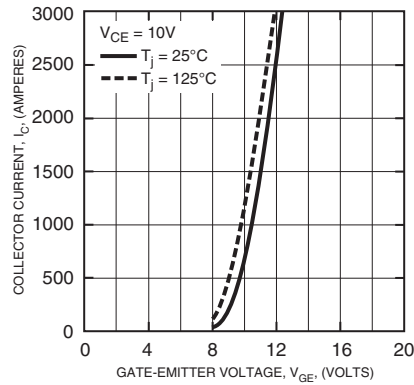
Mega Power Chopper IGBTMOD™

1400 Amperes/1200 Volts

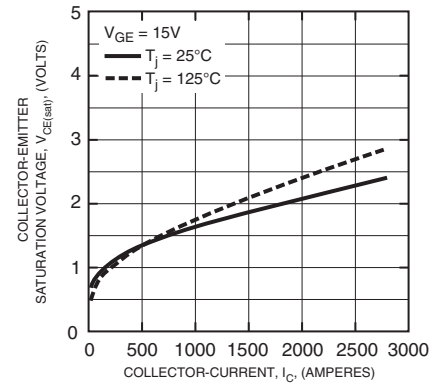
OUTPUT CHARACTERISTICS
(TYPICAL)



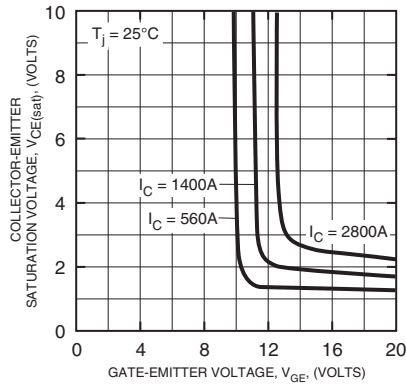
TRANSFER CHARACTERISTICS
(TYPICAL)



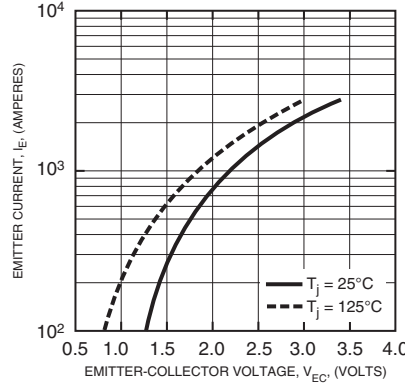
COLLECTOR-EMITTER
SATURATION VOLTAGE CHARACTERISTICS
(TYPICAL)



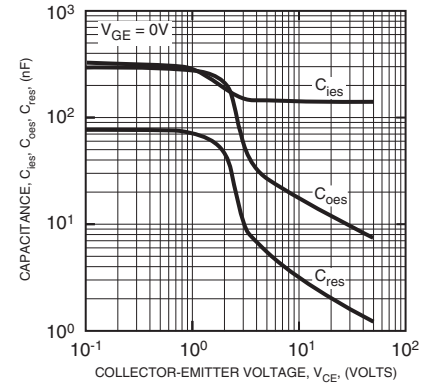
COLLECTOR-EMITTER
SATURATION VOLTAGE CHARACTERISTICS
(TYPICAL)



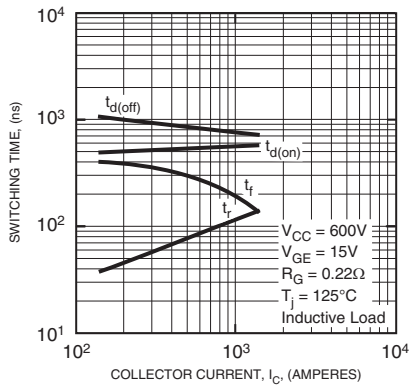
FREE-WHEEL DIODE
FORWARD CHARACTERISTICS
(TYPICAL)



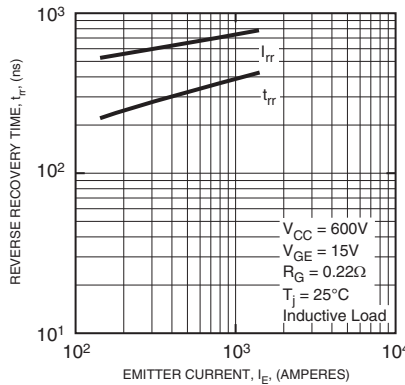
CAPACITANCE VS. V_{CE}
(TYPICAL)



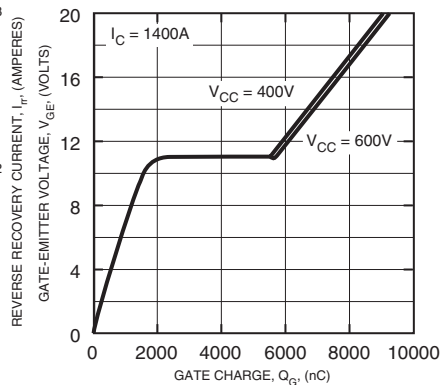
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)



REVERSE RECOVERY CHARACTERISTICS
(TYPICAL)



GATE CHARGE, V_{GE}



CM1400E3U-24NF

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