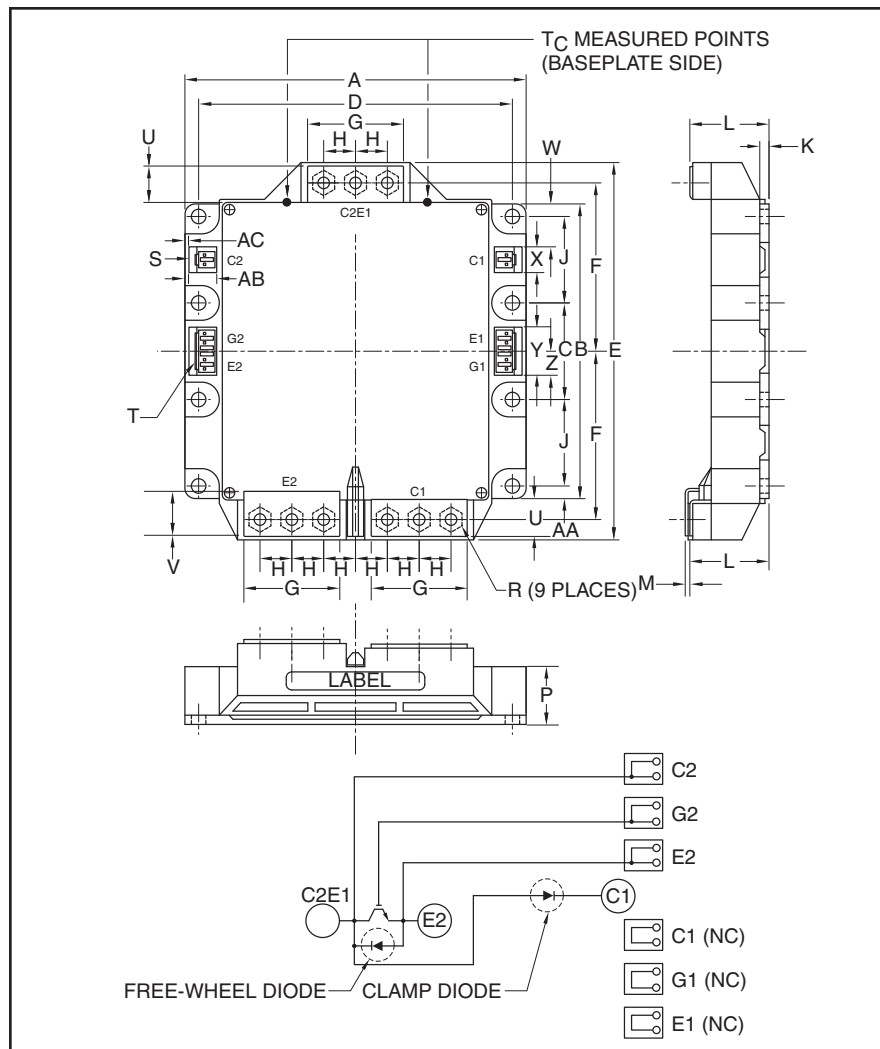


Mega Power Chopper IGBTMOD™ 1000 Amperes/1700 Volts



Outline Drawing and Circuit Diagram

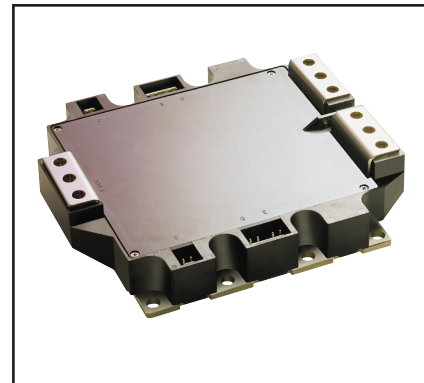
Dimensions	Inches	Millimeters
A	5.91	150.0
B	5.10	129.5
C	1.67±0.01	42.5±0.25
D	5.41±0.01	137.5±0.25
E	6.54	166.0
F	2.91±0.01	74.0±0.25
G	1.65	42.0
H	0.55	14.0
J	1.50±0.01	38.0±0.25
K	0.16	4.0
L	1.36 +0.04/-0.02	34.6 +1.0/-0.5

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

S = VHR-2N

T = VHR-5N

Dimensions	Inches	Millimeters
M	0.075±0.008	1.9±0.2
P	1.0	25.1
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
AB	0.47	12.0
AC	0.08	2.0



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. CM1000E3U-34NF is a 1000V (V_{CES}), 1700 Ampere Chopper IGBTMOD Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	1000	34

CM1000E3U-34NF

Mega Power Chopper IGBTMOD™

1000 Amperes/1700 Volts

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

Ratings	Symbol	CM1000E3U-34NF	Units
Junction Temperature	T_j	-40 to 150	$^\circ\text{C}$
Storage Temperature ^{*7}	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 DC ($T_C = 104^\circ\text{C}$) ^{*6}	I_C	1000	Amperes
Peak Collector Current (Pulse) ^{*2}	I_{CM}	2000	Amperes
Emitter Current ($T_C = 25^\circ\text{C}$) ^{*4}	I_E^{*1}	75	Amperes
Peak Emitter Current (Pulse) ^{*2}	I_{EM}^{*1}	150	Amperes
Maximum Collector Dissipation ($T_C = 25^\circ\text{C}$) ^{*2,4}	P_C	3900	Watts
Mounting Torque, M6 Mounting Screws (Max.)	—	40	in-lb
Mounting Torque, M6 Main Terminal Screw (Max.)	—	40	in-lb
Weight (Typical)	—	1400	Grams
Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)	V_{iso}	3500	V_{rms}

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

Repetitive Peak Reverse Voltage	V_{RRM}	1700	Volts
Forward Current ($T_C = 25^\circ\text{C}$) ^{*4}	I_F	1000	Amperes
Peak Forward Current (Pulse) ^{*2}	I_{FM}	2000	Amperes

^{*1} I_E , I_{EM} , and V_{EC} represent ratings and characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

^{*2} Pulse width and repetition rate should be such that device junction temperature (T_j) does not exceed $T_{j(\text{max})}$ rating.

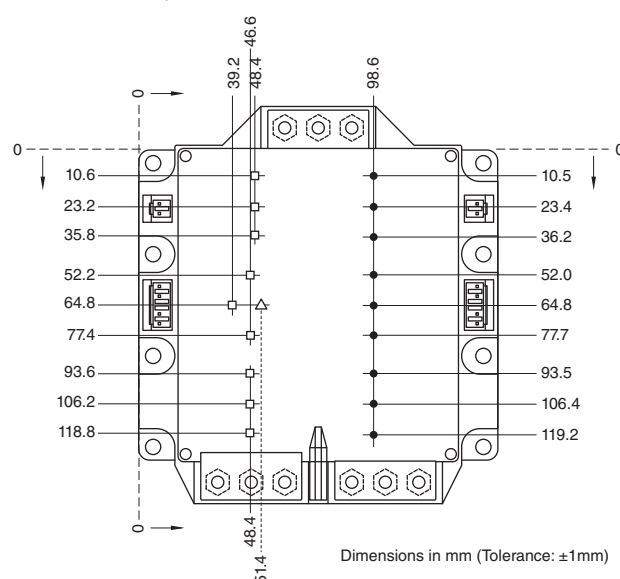
^{*4} Case temperature (T_C) is baseplate side.

^{*6} Case temperature (T_C) and heatsink temperature (T_f) measured point is just under the chips.

^{*7} The operation temperature is restrained by the permission temperature of female connector housing.

Chip Location (Top View)

□ IGBT ● Clamp Diode △ Diode



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

CM1000E3U-34NF

Mega Power Chopper IGBTMOD™

1000 Amperes/1700 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 Leakage Current	I_{GES}	$V_{GE} = V_{GES}, V_{CE} = 0V$	–	–	0.5	μA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$I_C = 100\text{mA}, V_{CE} = 10V$	5.5	7	8.5	Volts
Collector-Emitter Saturation Voltage (Without Lead Resistance)	$V_{CE(sat)}$	$I_C = 1000A, V_{GE} = 15V, T_j = 25^\circ\text{C}^{*3}$	–	2.2	2.8	Volts
	(Chip)	$I_C = 1000A, V_{GE} = 15V, T_j = 125^\circ\text{C}^{*3}$	–	2.45	–	Volts
Module Lead Resistance	$R_{(lead)}$	$I_C = 1000A$, Terminal-Chip	–	0.286	–	$\text{m}\Omega$
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	$V_{CC} = 1000V, I_C = 1000A, V_{GE} = 15V$	–	6000	–	nC
Turn-on Delay Time	$t_{d(on)}$	$V_{CC} = 1000V, I_C = 1000A$,	–	–	600	ns
Turn-on Rise Time	t_r	$V_{GE} = \pm 15V$,	–	–	150	ns
Turn-off Delay Time	$t_{d(off)}$	$R_G = 0.47\Omega$,	–	–	900	ns
Turn-off Fall Time	t_f	Inductive Load	–	–	200	ns
Emitter-Collector Voltage ^{*1}	V_{EC}	$I_E = 75A, V_{GE} = 0V^{*3}$	–	–	2.8	Volts
External Gate Resistance	R_G		0.47	–	4.7	Ω

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Repetitive Peak Reverse Current	I_{RRM}	$V_R = V_{RRM}$	–	–	1	mA
Forward Voltage	V_{FM}	$I_F = 1000A^{*3}$	–	–	3.0	Volts
Reverse Recovery Time	t_{rr}	$I_F = 1000A$	–	–	450	ns
Reverse Recovery Charge	Q_{rr}	$I_F = 1000A$	–	90	–	μC

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 ^{*4}	$R_{th(j-c)}Q$	IGBT	–	–	0.032	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case ^{*4}	$R_{th(j-c)}D$	Clamp	–	–	0.053	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case ^{*6}	$R_{th(j-c')}Q$	IGBT	–	–	0.014	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case ^{*6}	$R_{th(j-c')}D$	Clamp	–	–	0.023	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case ^{*4}	$R_{th(c-f)}D$	Thermal Grease Applied per 1/2 Module ^{*5}	–	0.016	–	$^\circ\text{C/W}$
Contact Thermal Resistance ^{*6}	$R_{th(c-f)}$	Thermal Grease Applied per 1/2 Module ^{*5}	–	0.012	–	$^\circ\text{C/W}$

^{*1} I_E , I_{EM} , and V_{EC} represent ratings and characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

^{*3} Pulse width and repetition rate should be such as to cause negligible temperature rise.

^{*4} Case temperature (T_C) is baseplate side.

^{*5} Typical value is measured by using thermally conductive grease of $\lambda = 0.9 \text{ [W/(m} \cdot \text{K)]}$.

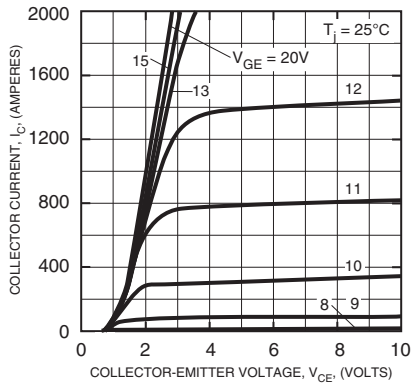
^{*6} Case temperature (T_C') and heatsink temperature (T_f') measured point is just under the chips.

CM1000E3U-34NF

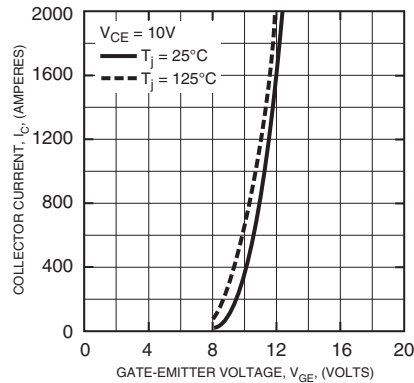
Mega Power Chopper IGBTMOD™

1000 Amperes/1700 Volts

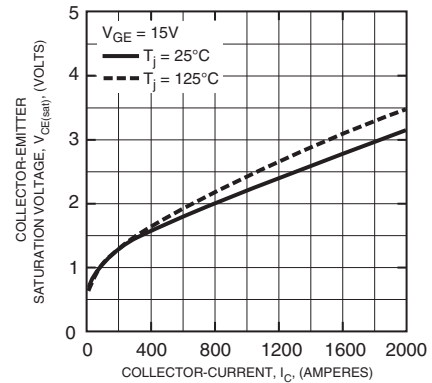
OUTPUT CHARACTERISTICS
(TYPICAL)



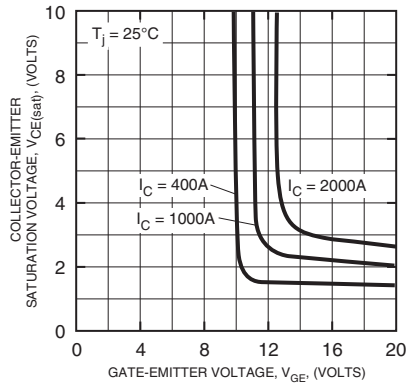
TRANSFER CHARACTERISTICS
(TYPICAL)



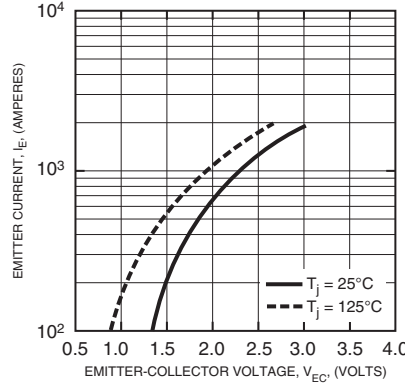
COLLECTOR-EMITTER
SATURATION VOLTAGE CHARACTERISTICS
(TYPICAL)



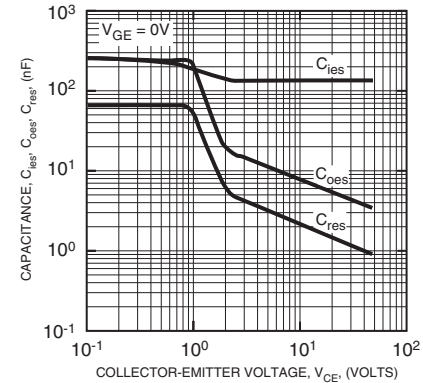
COLLECTOR-EMITTER
SATURATION VOLTAGE CHARACTERISTICS
(TYPICAL)



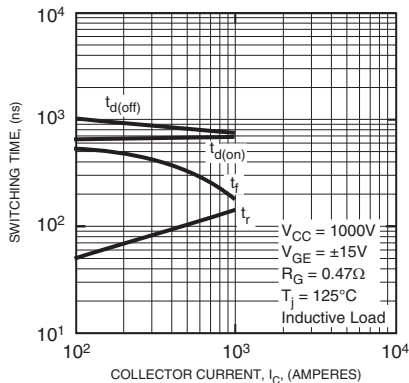
FREE-WHEEL DIODE
FORWARD CHARACTERISTICS
(TYPICAL)



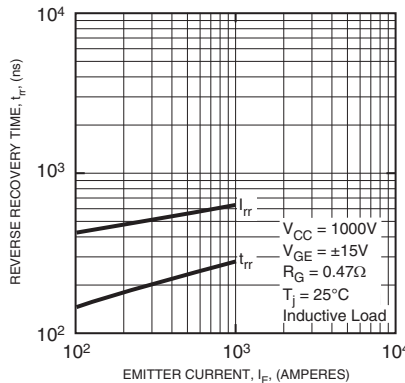
CAPACITANCE VS. V_{CE}
(TYPICAL)



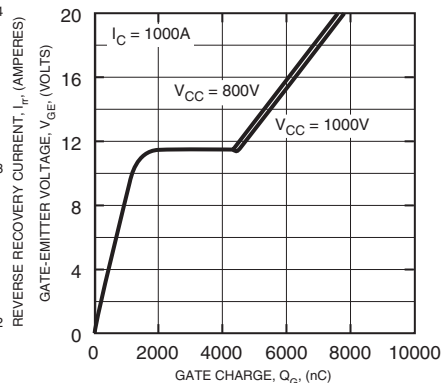
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)



REVERSE RECOVERY CHARACTERISTICS
(TYPICAL)



GATE CHARGE, V_{GE}



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