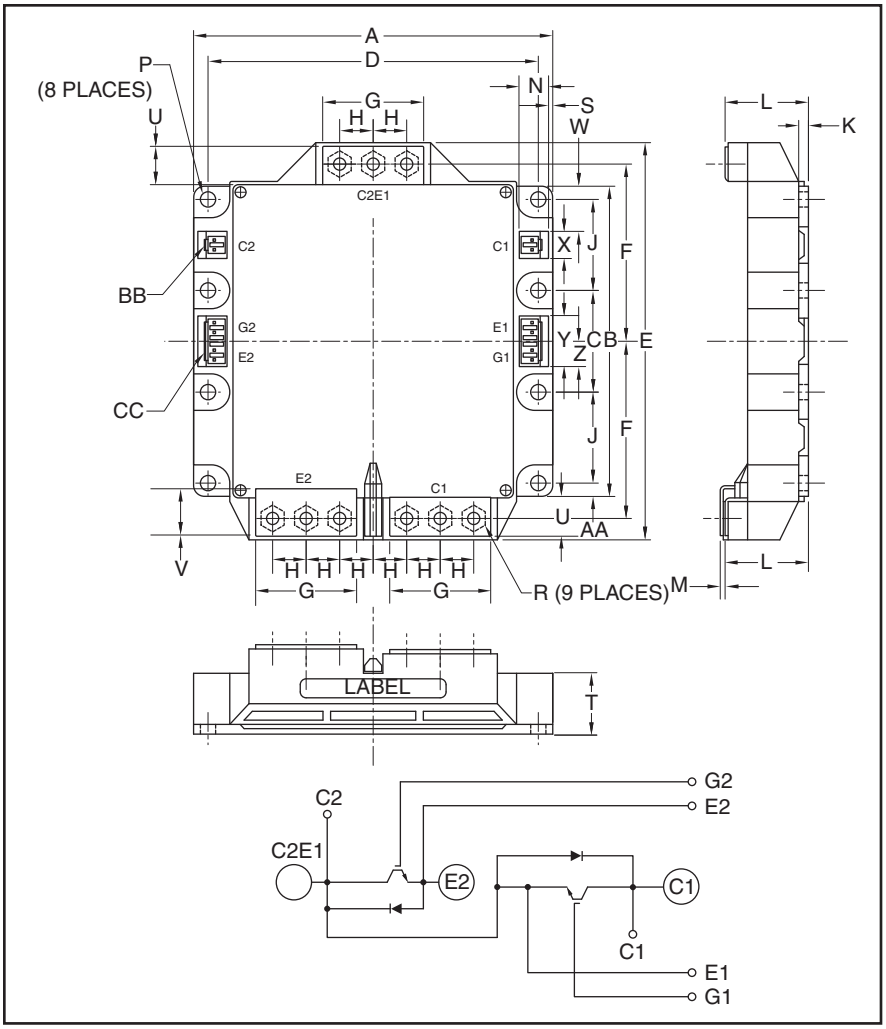
Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272
www.pwrx.com

Mega Power Dual IGBTMOD™
1000 Amperes/1700 Volts

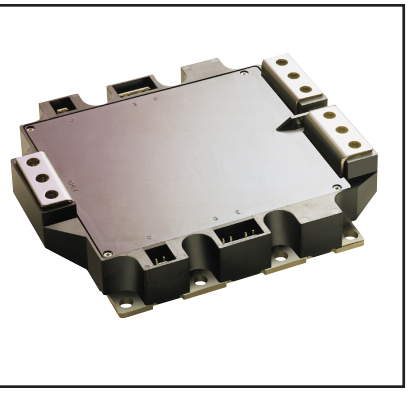


Outline Drawing and Circuit Diagram

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)
BB = VHR-2N
CC = VHR-5N

Dimensions	Inches	Millimeters
M	0.075±0.008	1.9±0.2
N	0.47	12.0
P	0.26	6.5
R	M6 Metric	M6
S	0.08	2.0
T	0.99	25.1
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 Mega Power Dual (MPD) Modules are designed for use in switching applications. Each module consists of two IGBT Transistors having 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
- ☐ Isolated Baseplate for Easy Heatsinking
- ☐ RoHS Compliant

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. CM1000DUC-24NF is a 1700V (V_{CES}), 1000 Ampere Dual IGBTMOD Power Module.

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

CM1000DUC-34NF
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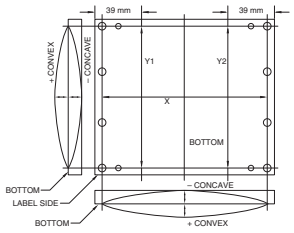
Absolute Maximum Ratings, T_j = 25°C unless otherwise specified

Ratings	Symbol	CM1000DUC-34NF	Units
Junction Temperature	T_j	-40 to 150	°C
Storage Temperature	T_{stg} *7	-40 to 125	°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°C) *2	I_C	1000	Amperes
Peak Collector Current (Pulse, Repetitive) *3	I_{CRM}	2000	Amperes
Total Power Dissipation (T_C = 25°C) *2,*4	P_{tot}	8925	Watts
Emitter Current, FWDi (T_C = 25°C) *2,*4	I_E *1	1000	Amperes
Peak Emitter Current, FWDi (Pulse, Repetitive) *3	I_{ERM} *1	2000	Amperes
Main terminals Mounting Torque, M6 Screw	–	40	in-lb (max.)
Mounting to Heatsink Mounting Torque, M6 Screw	–	40	in-lb (max.)
Weight (Typical)	–	1450	Grams
Flatness to Baseplate (On Centerline X, Y1, Y2) *8	e_c	-50 to 100	µm
Isolation Voltage (Main Terminal to Baseplate, RMS, f = 60Hz,AC 1 min.)	V_{iso}	3500	Volts

*1 Represent ratings and characteristics of the anti-parallel, emitter-to-collector free wheeling diode (FWDi).
*2 Case temperature (T_C) and heatsink temperature (T_s) measured point is just under the chips.
*3 Pulse width and repetition rate should be such that device junction temperature (T_j) does not exceed $T_{j(max)}$ rating.
*4 Junction temperature (T_j) should not increase beyond maximum junction temperature ($T_{j(max)}$) rating.
*7 The operation temperature is restrained by the permission temperature of female connector housing.
*8 Baseplate flatness measurement point is as in the following figure.



Electrical Characteristics, T_j = 25°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	–	–	5	µA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	I_C = 100mA, V_{CE} = 10V	6	7	8	Volts
Collector-Emitter Saturation Voltage (Chip)	$V_{CE(sat)}$	I_C = 1000A, V_{GE} = 15V, T_j = 25°C[*5]	–	2.2	2.85	Volts
(Without Lead Resistance)		I_C = 1000A, V_{GE} = 15V, T_j = 125°C[*5]	–	2.45	–	Volts
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} = 1000V, I_C = 1000A, V_{GE} = 15V	–	6000	–	nC
Inductive Turn-on Delay Time	$t_{d(on)}$	V_{CC} = 1000V, I_C = 1000A,	–	–	600	ns
Load Rise Time	t_r	$V_{GE1} = V_{GE2}$ = 15V,	–	–	200	ns
Switch Turn-off Delay Time	$t_{d(off)}$	R_G = 0.47Ω, Inductive Load	–	–	1000	ns
Times Fall Time	t_f	Switching Operation	–	–	300	ns
Emitter-Collector Voltage (Chip)	V_{EC}[*1]	I_E = 1000A, V_{GE} = 0V[*5]	–	2.3	3	Volts
(Without Lead resistance)						
Reverse Recovery Time	t_{rr}[*1]	V_{CC} = 1000V, I_E = 1000A, V_{GE} = ±15V,	–	–	500	ns
Reverse Recovery Charge	Q_{rr}[*1]	R_G = 0.47Ω, Inductive Load	–	90	–	µC
Turn-on Switching Energy Per Pulse	E_{on}	V_{CC} = 1000V, $I_C = I_E$ = 1000A,	–	272.4	–	mJ
Turn-off Switching Energy Per Pulse	E_{off}	V_{GE} = 15V, R_G = 0.47Ω,	–	250.2	–	mJ
Reverse Recovery Energy Per Pulse	E_{rr}[*1]	T_j = 125°C, Inductive Load	–	172.4	–	mJ
Internal Lead Resistance	$R_{(lead)}$	Main Terminals-Chip, Per Switch, T_j = 25°C[*2]	–	0.286	–	mΩ
Internal Gate Resistance	r_g	Per Switch	–	0.67	–	Ω

Thermal and Mechanical Characteristics, T_j = 25°C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case[*2]	$R_{th(j-c)}Q$	Per IGBT	–	–	0.014	°C/W
Thermal Resistance, Junction to Case[*2]	$R_{th(j-c)}D$	Per Clamp Diode	–	–	0.023	°C/W
Contact Thermal Resistance,	$R_{th(c-f)}$	Per 1/2 Module	–	0.012	–	°C/W
Case to Heatsink[*2]		Thermal Grease Applied[*6]				

Recommended Operating Conditions, T_a = 25°C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
DC Supply Voltage $R_{th(j-c)}Q$	V_{CC}	Applied Across C1-E2	–	1000	1100	Volts
Gate (-Emitter Drive) Voltage	$V_{GE(on)}$	Applied Across G1-Es1/G2-Es2	13.5	15.0	16.5	Volts
External Gate Resistance	R_G	Per Switch	0.47	–	4.7	Ω

*1 Represent ratings and characteristics of the anti-parallel, emitter-to-collector free wheeling diode (FWDi).
*2 Case temperature (T_C) and heatsink temperature (T_s) measured point is just under the chips.
*5 Pulse width and repetition rate should be such as to cause negligible temperature rise.
*6 Typical value is measured by using thermally conductive grease of λ = 0.9 W/(m•K).

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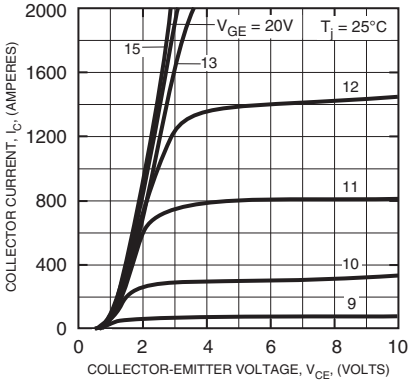
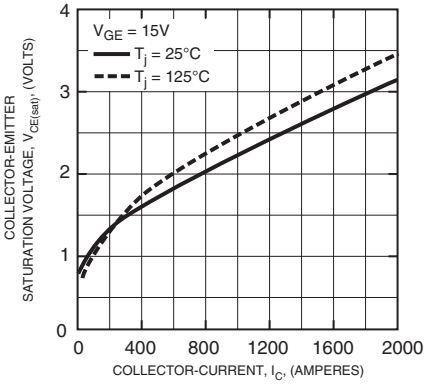
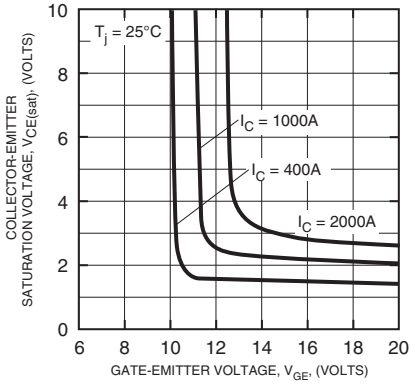
OUTPUT CHARACTERISTICS (TYPICAL)



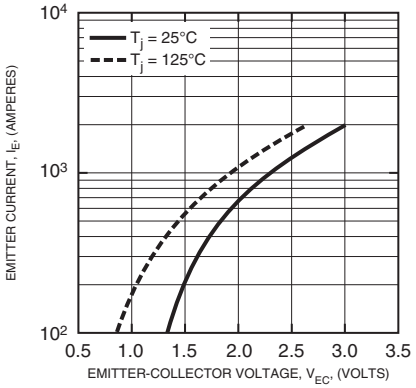
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



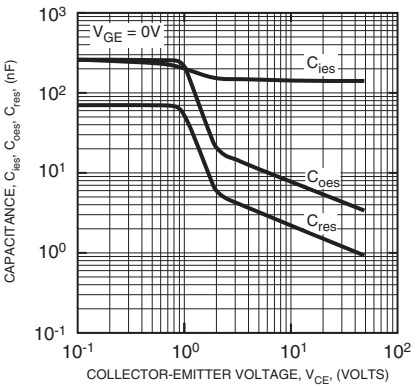
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



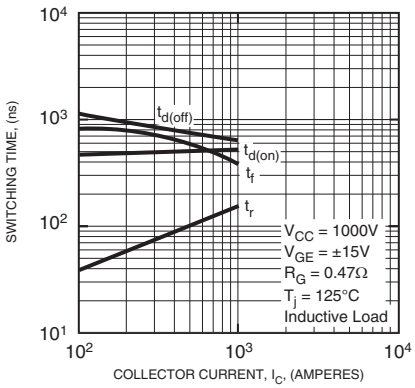
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



CAPACITANCE VS. V_{CE} (TYPICAL)



HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



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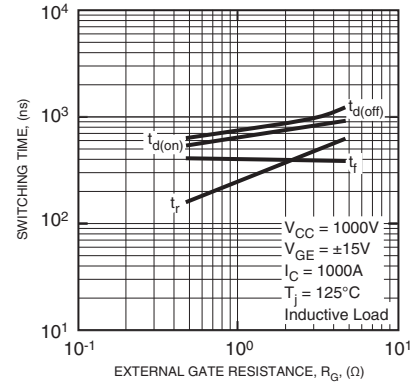
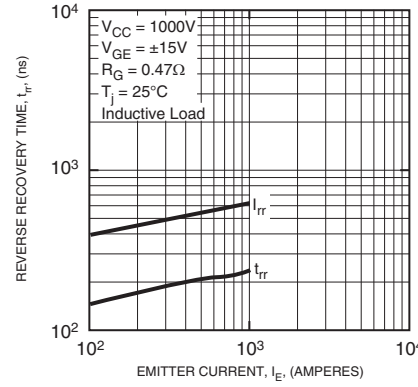
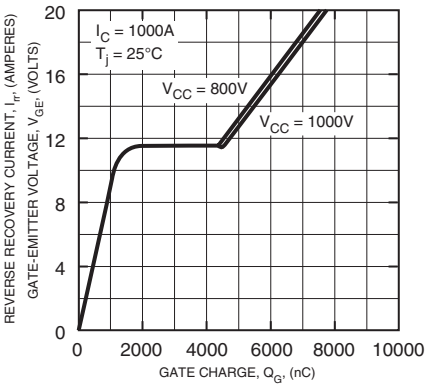


REVERSE RECOVERY CHARACTERISTICS (TYPICAL)



GATE CHARGE, V_{GE}



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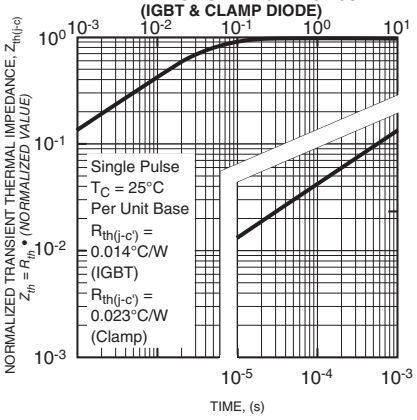
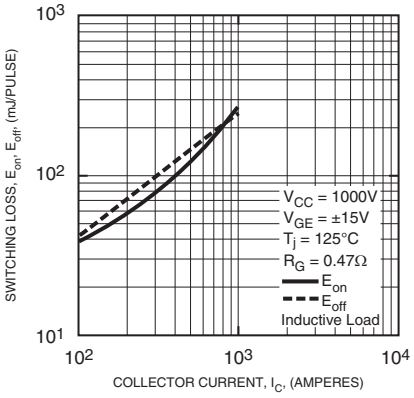
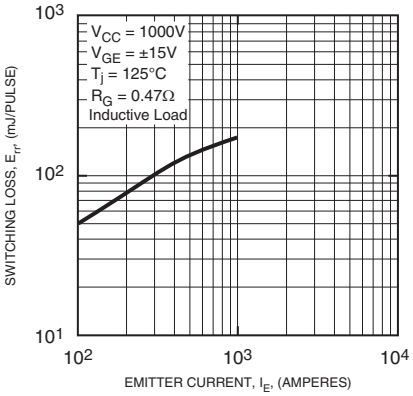
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT & CLAMP DIODE)



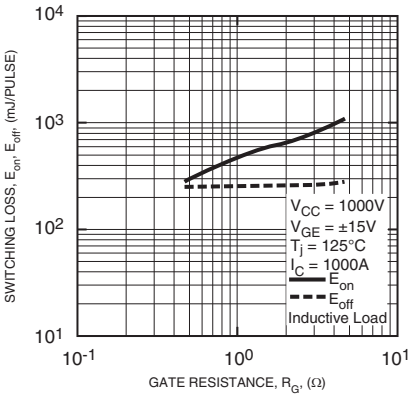
SWITCHING LOSS VS. COLLECTOR CURRENT (TYPICAL)



REVERSE RECOVERY ENERGY VS. FORWARD CURRENT (TYPICAL)



SWITCHING ENERGY VS. EXTERNAL GATE RESISTANCE (TYPICAL)



REVERSE RECOVERY ENERGY VS. EXTERNAL GATE RESISTANCE (TYPICAL)