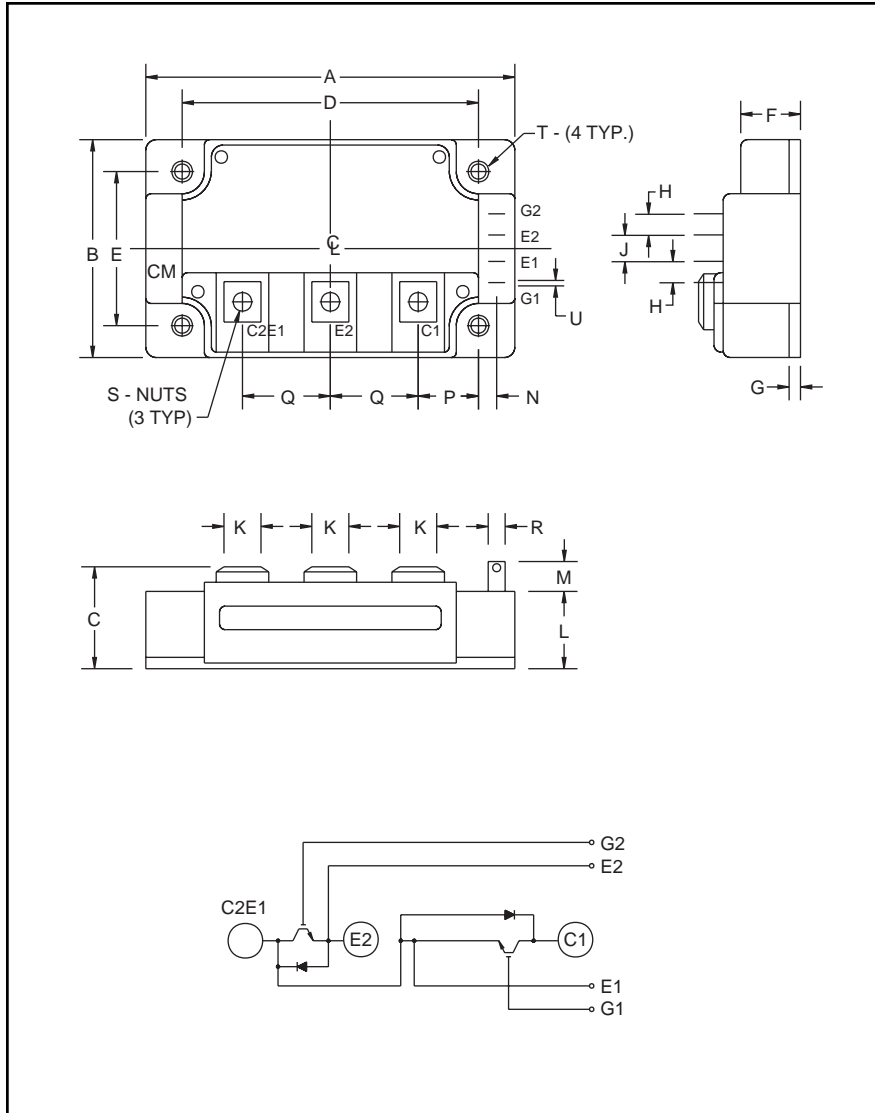


High Frequency Dual IGBTMOD™ 400 Amperes/600 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	4.25	108.0
B	2.44	62.0
C	1.14 +0.04/-0.02	29.0 +1.0/-0.5
D	3.66±0.01	93.0±0.25
E	1.88±0.01	48.0±0.25
F	0.67	17.0
G	0.16	4.0
H	0.24	6.0
J	0.59	15.0
K	0.55	14.0

Dimensions	Inches	Millimeters
L	0.87	22.0
M	0.33	8.5
N	0.10	2.5
P	0.85	21.5
Q	0.98	25.0
R	0.11	2.8
S	M6	M6
T	M6.5	M6.5
U	0.02	0.5



Description:

Powerex IGBTMOD™ Modules are designed for use in switching applications. Each module consists of two IGBT Transistors in a half-bridge configuration with each transistor having a reverse-connected super-fast recovery free-wheel diode. All components and interconnects are isolated from the heat sinking base plate, offering simplified system assembly and thermal management.

Features:

- Low Drive Power
- Low $V_{CE(sat)}$
- High Frequency Switching (50kHz to 60kHz)
- Isolated Base Plate for Easy Heat Sinking

Applications:

- AC Motor Control
- Motion/Servo Control
- UPS
- Welding Power Supplies
- Laser Power Supplies

Ordering Information:

Example: Select the complete module number you desire from the table - i.e. CM400DU-12NFH is a 600V (V_{CES}), 400 Ampere High Power Dual Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	400	12



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

CM400DU-12NFH
High Frequency Dual IGBTMOD™
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Absolute Maximum Ratings, $T_j = 25\text{ }^\circ\text{C}$ unless otherwise specified

Ratings	Symbol	CM400DU-12NFH	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}	600	Volts
Gate-Emitter Voltage (C-E SHORT)	V_{GES}	± 20	Volts
Collector Current ($T_c = 25^\circ\text{C}$)	I_C	400	Amperes
Peak Collector Current	I_{CM}	800*	Amperes
Emitter Current** ($T_c = 25^\circ\text{C}$)	I_E	400	Amperes
Peak Emitter Current**	I_{EM}	800*	Amperes
Maximum Collector Dissipation ($T_j < 150^\circ\text{C}$)	P_C	960	Watts
Maximum Collector Dissipation ($T_j < 150^\circ\text{C}$)	P_C'	1640	Watts
Mounting Torque, M6 Main Terminal	–	40	in-lb
Mounting Torque, M6 Mounting	–	40	in-lb
Weight	–	400	Grams
Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)	V_{ISO}	2500	Volts

* 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).

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}	$V_{CE} = V_{CES}, V_{GE} = 0V$	–	–	1	mA
Gate Leakage Current	I_{GES}	$V_{GE} = V_{GES}, V_{CE} = 0V$	–	–	0.5	μA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$I_C = 40\text{mA}, V_{CE} = 10V$	5	6	7	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 400A, V_{GE} = 15V, T_j = 25^\circ\text{C}$	–	2.0	2.7	Volts
		$I_C = 400A, V_{GE} = 15V, T_j = 125^\circ\text{C}$	–	1.95	–	Volts
Total Gate Charge	Q_G	$V_{CC} = 300V, I_C = 400A, V_{GE} = 15V$	–	2480	–	nC
Emitter-Collector Voltage*	V_{EC}	$I_E = 400A, V_{GE} = 0V$	–	–	2.6	Volts

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

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}		–	–	110	nF
Output Capacitance	C_{oes}	$V_{CE} = 10V, V_{GE} = 0V$	–	–	7.2	nF
Reverse Transfer Capacitance	C_{res}		–	–	4.0	nF
Resistive	Turn-on Delay Time	$V_{CC} = 300V, I_C = 400A,$ $V_{GE1} = V_{GE2} = 15V,$	–	–	400	ns
Load	Rise Time					
Switch	Turn-off Delay Time	$R_G = 3.1\Omega, \text{Inductive}$ Load Switching Operation	–	–	700	ns
	Fall Time					
Diode Reverse Recovery Time*	t_{rr}	$I_E = 400A$	–	–	200	ns
Diode Reverse Recovery Charge*	Q_{rr}		–	7.7	–	μC

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



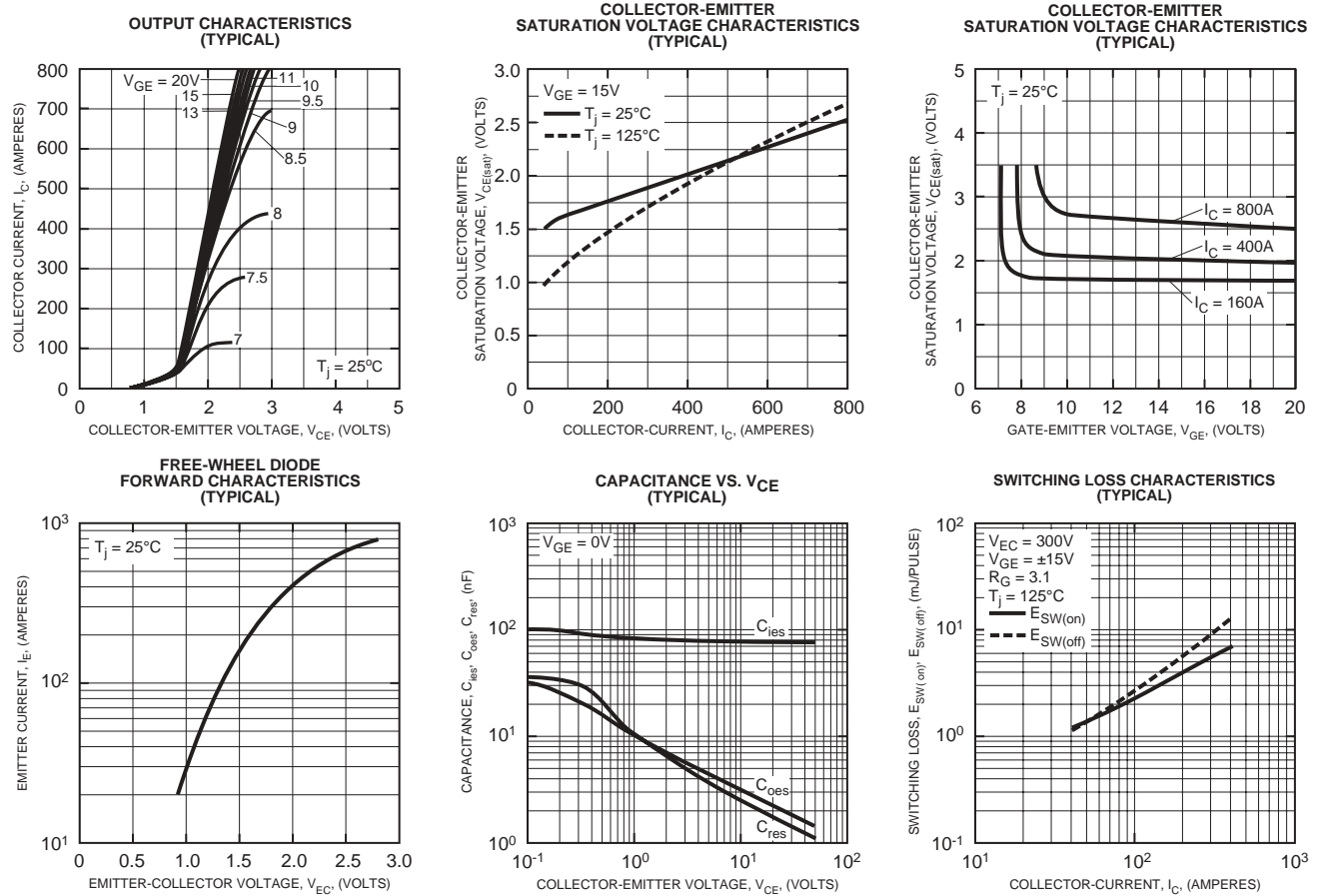
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CM400DU-12NFH
High Frequency Dual IGBTMOD™
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Thermal and Mechanical Characteristics, $T_j = 25^\circ\text{C}$ unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
External Gate Resistance	R_G		1.6	—	16	Ω
Thermal Resistance, Junction to Case	$R_{th(j-c)Q}$	Per IGBT 1/2 Module	—	—	0.13	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{th(j-c)Q}$	T_C measured Point is just Under the Chips	—	—	0.076*	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{th(j-c)D}$	Per FWDi 1/2 Module	—	—	0.18	$^\circ\text{C/W}$
Contact Thermal Resistance	$R_{th(c-f)}$	Per Module, Thermal Grease Applied	—	0.04	—	$^\circ\text{C/W}$

* If you use this value, $R_{th(f-a)}$ should be measured just under the chips.

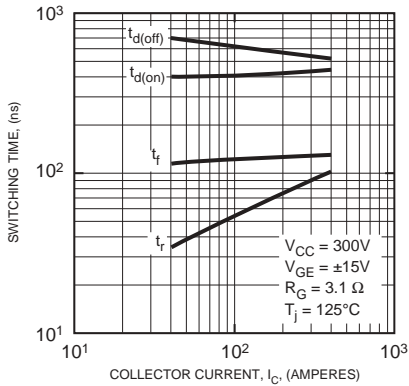




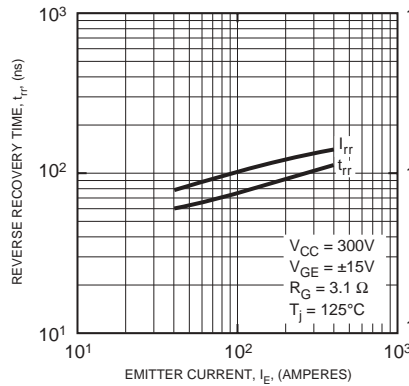
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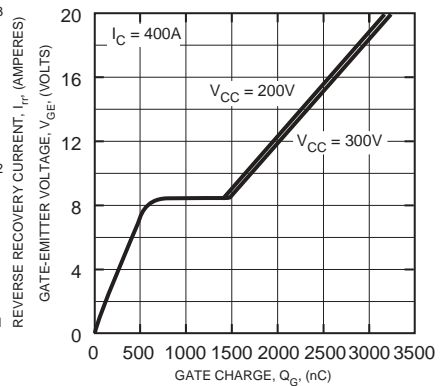
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



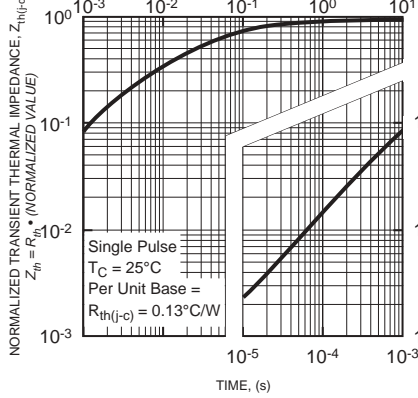
REVERSE RECOVERY CHARACTERISTICS (TYPICAL)



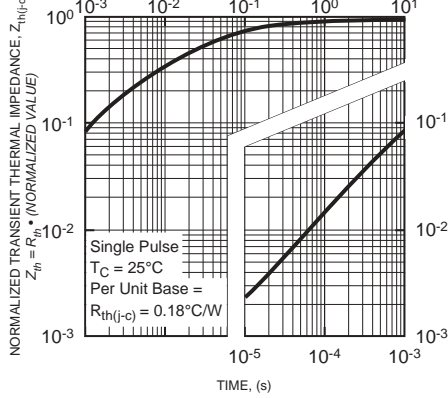
GATE CHARGE CHARACTERISTICS (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (FWDi)





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