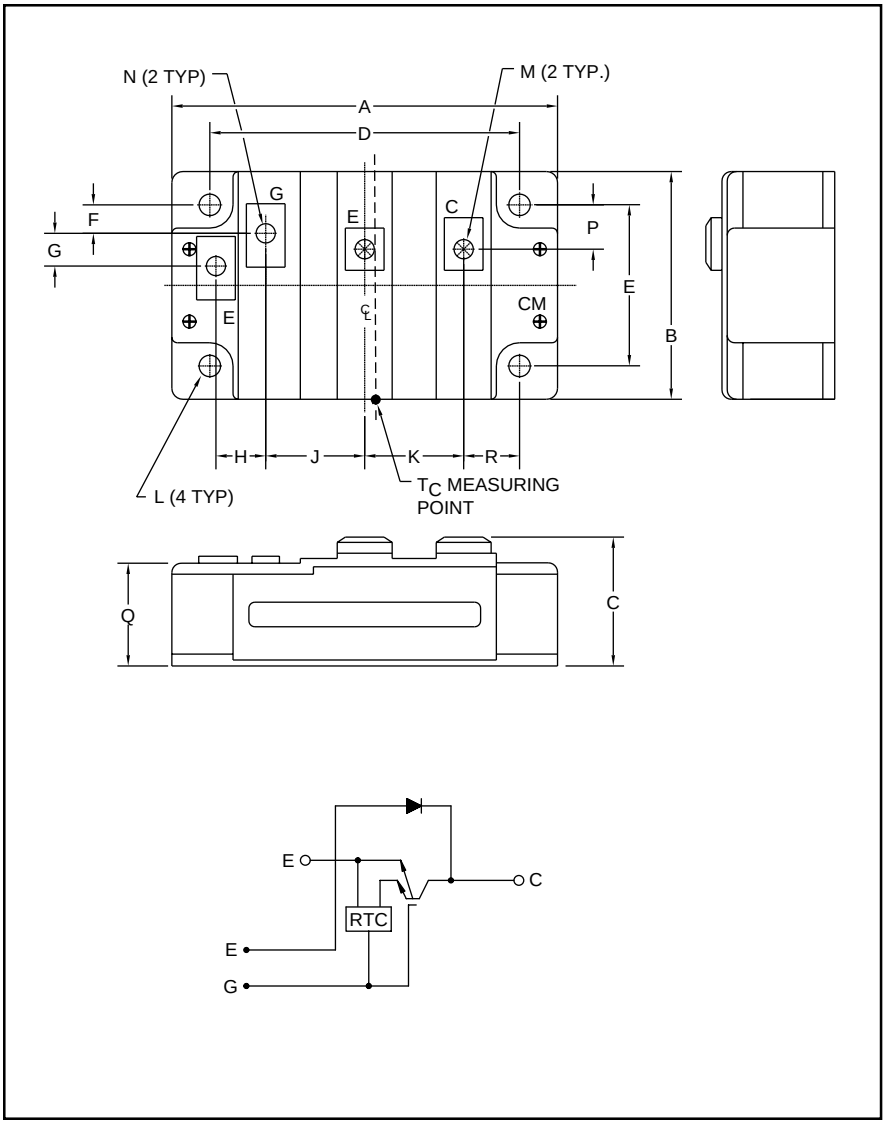
Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (724) 925-7272

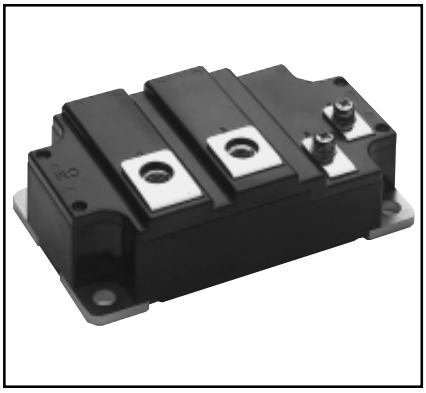
Trench Gate Design Single IGBTMOD™ 600 Amperes/600 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	4.21	107.0
B	2.44	62.0
C	1.34 +0.04/-0.02	34.0 +1.0/-0.5
D	3.66±0.01	93.0±0.25
E	1.88±0.01	48.0±0.25
F	0.37	9.5
G	0.39	10.0
H	0.53	13.5

Dimensions	Inches	Millimeters
J	1.02	26.0
K	1.14	29.0
L	0.26 Dia	6.5 Dia.
M	M8	M8
N	M4	M4
P	0.49	12.55
Q	1.02 +0.04/-0.02	26.0 +1.0/-0.5
R	0.81	20.5



Description:
Powerex IGBTMOD™ Modules are designed for use in switching applications. Each module consists of one IGBT Transistor in a single configuration with 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 Heat Sinking

Applications:
- ☐ AC Motor Control
- ☐ UPS
- ☐ Battery Powered Supplies

Ordering Information:
Example: Select the complete module number you desire from the table - i.e. CM600HU-12F is a 600V (V_{CES}), 600 Ampere Single IGBTMOD™ Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	600	12

Absolute Maximum Ratings, T_j = 25 °C unless otherwise specified

Ratings	Symbol	CM600HU-12F	Units
Junction Temperature	T_j	-40 to 150	°C
Storage Temperature	T_{stg}	-40 to 125	°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°C)	I_C	600	Amperes
Peak Collector Current ($T_j \leq$ 150°C)	I_{CM}	1200*	Amperes
Emitter Current** (T_c = 25°C)	I_E	600	Amperes
Peak Emitter Current**	I_{EM}	1200*	Amperes
Maximum Collector Dissipation (T_c = 25°C)	P_c	1420	Watts
Mounting Torque, M8 Main Terminal	–	95	in-lb
Mounting Torque, M6 Mounting	–	40	in-lb
Mounting Torque, M4 Terminal	–	15	in-lb
Weight	–	450	Grams
Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)	V_{iso}	2500	Volts

Static 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 Voltage	I_{GES}	$V_{GE} = V_{CES}$, V_{CE} = 0V	–	–	80	µA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	I_C = 60mA, V_{CE} = 10V	5	6	7	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 600A, V_{GE} = 15V, T_j = 25°C	–	1.6	2.2	Volts
		I_C = 600A, V_{GE} = 15V, T_j = 125°C	–	1.6	–	Volts
Total Gate Charge	Q_G	V_{CC} = 300V, I_C = 600A, V_{GE} = 15V	–	3720	–	nC
Emitter-Collector Voltage**	V_{EC}	I_E = 600A, V_{GE} = 0V	–	–	2.6	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).

Dynamic Electrical Characteristics, T_j = 25 °C unless otherwise specified

Characteristics		Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Capacitance		C_{ies}	V_{CE} = 10V, V_{GE} = 0V	–	–	160	nf
Output Capacitance		C_{oes}		–	–	11	nf
Reverse Transfer Capacitance		C_{res}		–	–	6	nf
Inductive	Turn-on Delay Time	$t_{d(on)}$	V_{CC} = 300V, I_C = 600A,	–	–	600	ns
Load	Rise Time	t_r	V_{GE1} = V_{GE2} = 15V,	–	–	400	ns
Switch	Turn-off Delay Time	$t_{d(off)}$	R_G = 3.1Ω,	–	–	900	ns
Times	Fall Time	t_f	Inductive Load	–	–	250	ns
Diode Reverse Recovery Time**		t_{rr}	Switching Operation	–	–	300	ns
Diode Reverse Recovery Charge**		Q_{rr}	I_E = 600A	–	11.7	–	μC

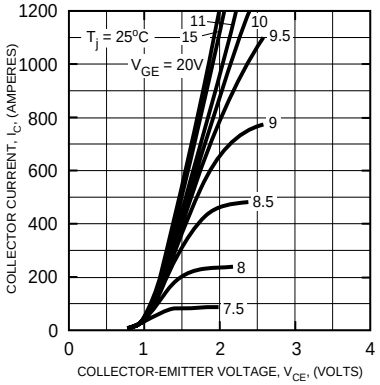
Thermal and Mechanical Characteristics, T_j = 25 °C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case	$R_{th(j-c)}Q$	Per IGBT, T_c Reference Point per Outline Drawing	–		0.088	°C/W
Thermal Resistance, Junction to Case	$R_{th(j-c)}D$	Per FWDi, T_c Reference Point per Outline Drawing	–	–	0.12	°C/W
Thermal Resistance, Junction to Case	$R_{th(j-c)}'Q$	Per IGBT, T_c Reference Point Under Chip	–	0.04		°C/W
Contact Thermal Resistance	$R_{th(c-f)}$	Per Module, Thermal Grease Applied	–	0.02	–	°C/W

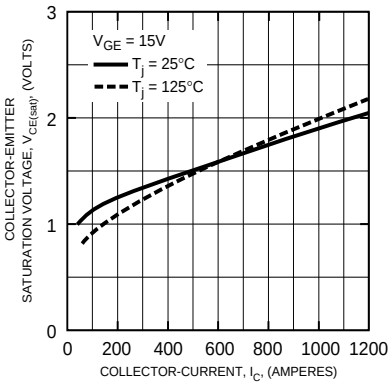
** Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

CM600HU-12F
Trench Gate Design Single IGBTMOD™
600 Amperes/600 Volts

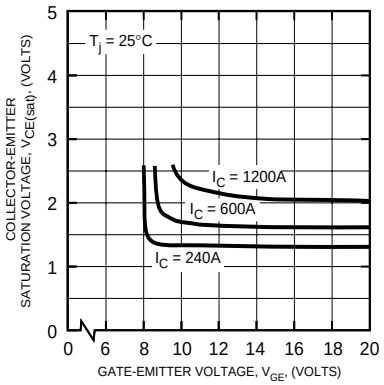
OUTPUT CHARACTERISTICS (TYPICAL)



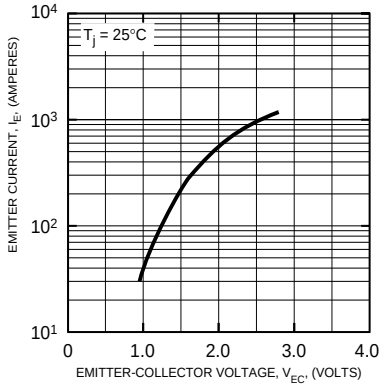
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



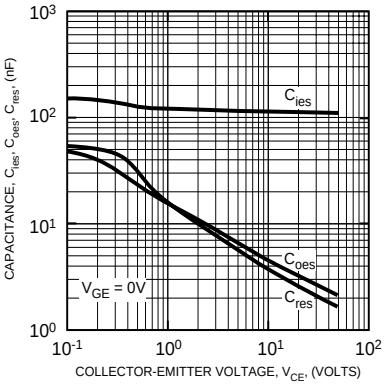
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



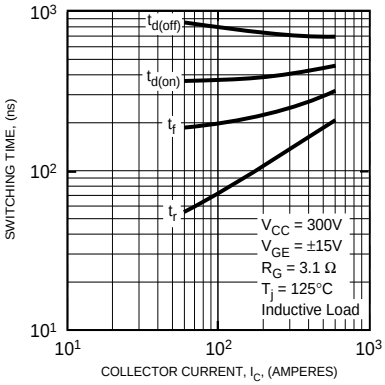
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



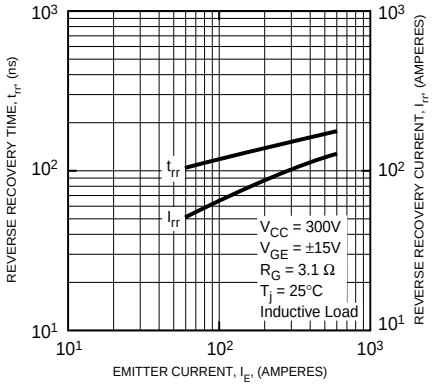
CAPACITANCE VS. V_{CE} (TYPICAL)



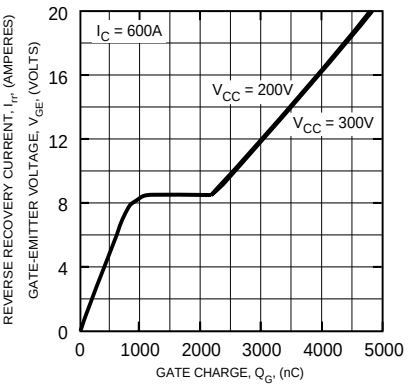
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



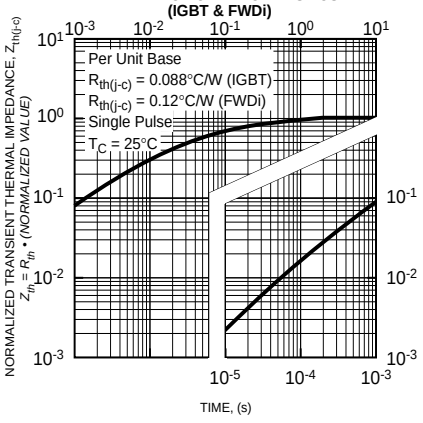
REVERSE RECOVERY CHARACTERISTICS (TYPICAL)



GATE CHARGE, V_{GE}



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT & FWDi)



4