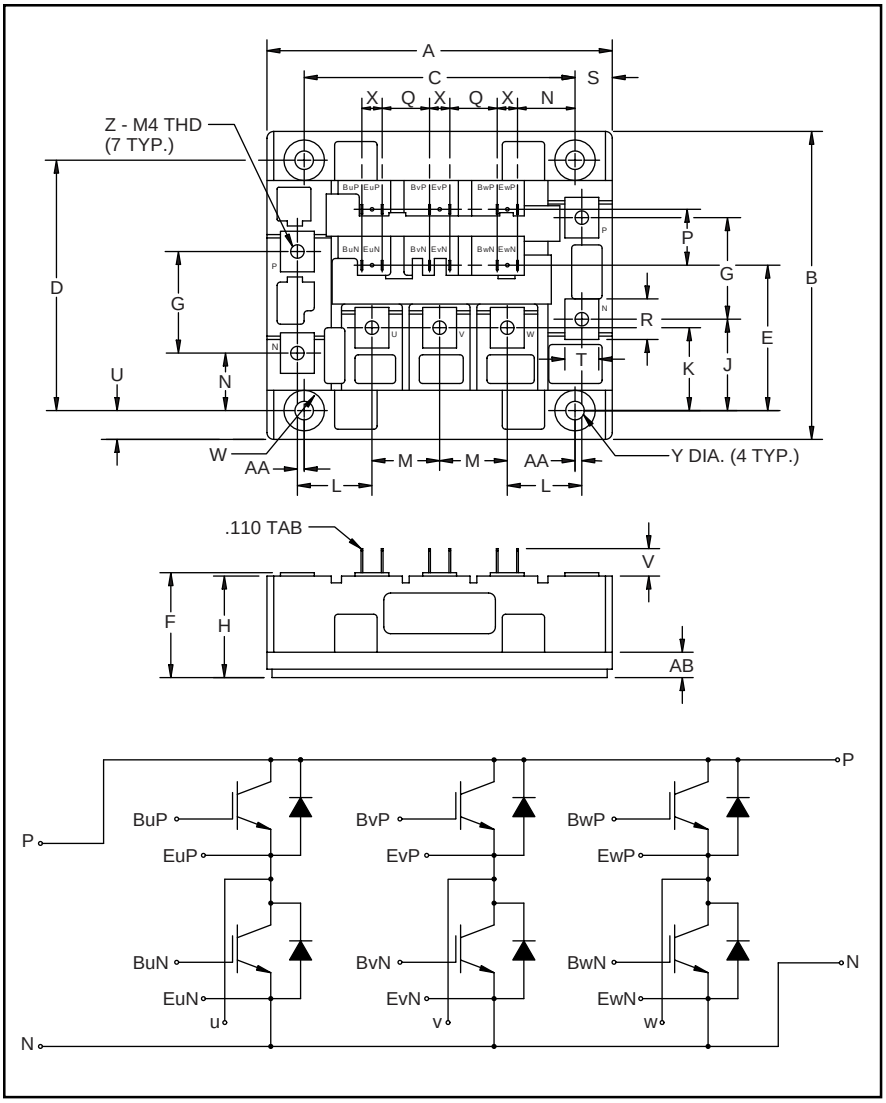
Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (724) 925-7272

Six-IGBT IGBTMOD™ H-Series Module

50 Amperes/1400 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	4.02±0.02	102.0±0.5
B	3.58±0.02	91.0±0.5
C	3.150±0.01	80.0±0.25
D	2.913±0.01	74.0±0.25
E	1.69	43.0
F	1.18 +0.06/-0.02	30 +1.5/-0.5
G	1.18	30.0
H	1.16	29.5
J	1.06	27.0
K	0.96	24.5
L	0.87	22.0
M	0.79	20.0
N	0.67	17.0

Dimensions	Inches	Millimeters
P	0.65	16.5
Q	0.55	14.0
R	0.47	12.0
S	0.43	11.0
T	0.39	10.0
U	0.33	8.5
V	0.32	8.1
W	0.24 Rad.	Rad. 6.0
X	0.24	6.0
Y	0.22 Dia.	Dia. 5.5
Z	M4 Metric	M4
AA	0.08	2.0
AB	0.28	7.0

Description:
Powerex IGBTMOD™ Modules are designed for use in switching applications. Each module consists of six IGBT Transistors in a three phase 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 baseplate, offering simplified system assembly and thermal management.

Features:
- ☐ Low Drive Power
- ☐ Low $V_{CE(sat)}$
- ☐ Discrete Super-Fast Recovery (135ns) Free-Wheel Diode
- ☐ High Frequency Operation (20-25kHz)
- ☐ Isolated Baseplate for Easy Heat Sinking

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

Ordering Information:
Example: Select the complete part module number you desire from the table below -i.e. CM50TF-28H is a 1400V (V_{CES}), 50 Ampere Six-IGBT IGBTMOD™ Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	50	28

CM50TF-28H
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Absolute Maximum Ratings, T_j = 25 °C unless otherwise specified

Characteristics	Symbol	CM50TF-28H	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}	1400	Volts
Gate-Emitter Voltage (C-E-SHORT)	V_{GES}	±20	Volts
Collector Current	I_C	50	Amperes
Peak Collector Current	I_{CM}	100*	Amperes
Diode Forward Current	I_{EC}	50	Amperes
Diode Forward Pulse Current	I_{ECM}	100*	Amperes
Power Dissipation	P_d	400	Watts
Max. Mounting Torque M4 Terminal Screws	–	13	in-lb
Max. Mounting Torque M5 Mounting Screws	–	17	in-lb
Module Weight (Typical)	–	540	Grams
V Isolation	V_{RMS}	2500	Volts

* Pulse width and repetition rate should be such that device junction temperature does not exceed the device rating.

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	–	–	1.0	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 = 5mA, V_{CE} = 10V	5.0	6.5	8.0	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 50A, V_{GE} = 15V	–	3.1	4.2**	Volts
		I_C = 50A, V_{GE} = 15V, T_j = 150°C	–	2.95	–	Volts
Total Gate Charge	Q_G	V_{CC} = 800V, I_C = 50A, V_{GS} = 15V	–	255	–	nC
Diode Forward Voltage	V_{FM}	I_E = 50A, V_{GS} = 0V	–	–	3.8	Volts

** Pulse width and repetition rate should be such that device junction temperature rise is negligible.

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

Characteristics		Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Capacitance		C_{ies}	V_{GE} = 0V, V_{CE} = 10V, f = 1MHz	–	–	10	nF
Output Capacitance		C_{oes}		–	–	3.5	nF
Reverse Transfer Capacitance		C_{res}		–	–	2	nF
Resistive	Turn-on Delay Time	$t_{d(on)}$	V_{CC} = 800V, I_C = 50A, $V_{GE1} = V_{GE2}$ = 15V, R_G = 6.3Ω	–	–	100	ns
Load	Rise Time	t_r		–	–	250	ns
Switch	Turn-off Delay Time	$t_{d(off)}$		–	–	150	ns
Time	Fall Time	t_f		–	–	500	ns
Diode Reverse Recovery Time		t_{rr}	I_E = 50A, di_E/dt = –100A/µs	–	–	300	ns
Diode Reverse Recovery Charge		Q_{rr}	I_E = 50A, di_E/dt = –100A/µs	–	0.5	–	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	$R_{th(j-c)}$	Per IGBT	–	–	0.31	°C/W
Thermal Resistance, Junction to Case	$R_{th(j-c)}$	Per FWDi	–	–	0.70	°C/W
Contact Thermal Resistance	$R_{th(c-f)}$	Per Module, Thermal Grease Applied	–	–	0.033	°C/W

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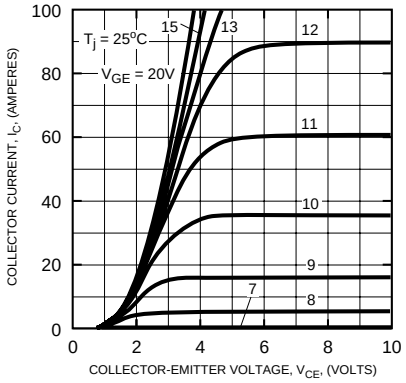
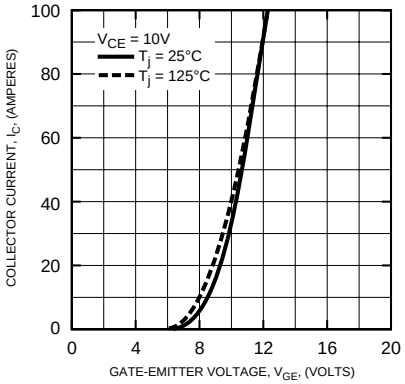
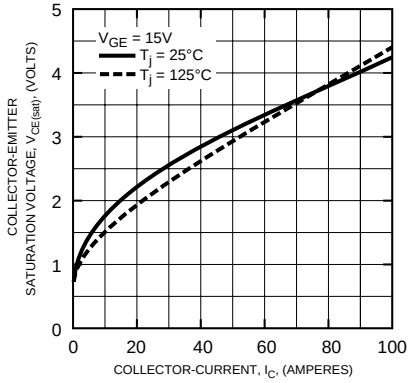
OUTPUT CHARACTERISTICS (TYPICAL)



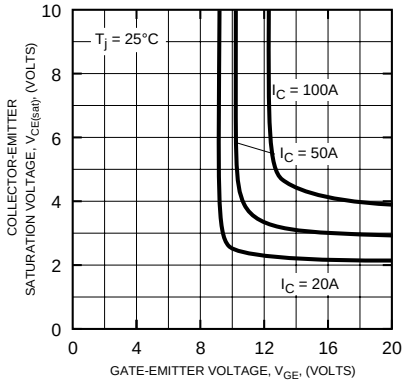
TRANSFER CHARACTERISTICS (TYPICAL)



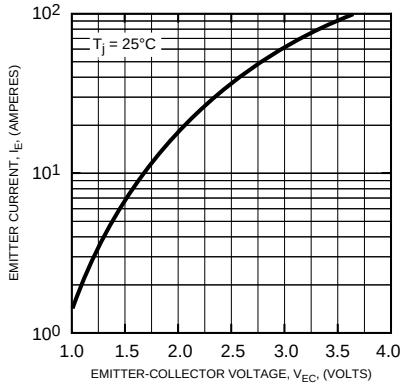
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



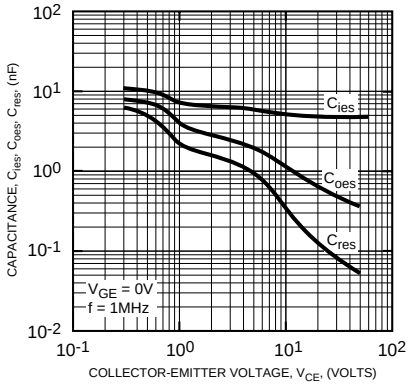
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



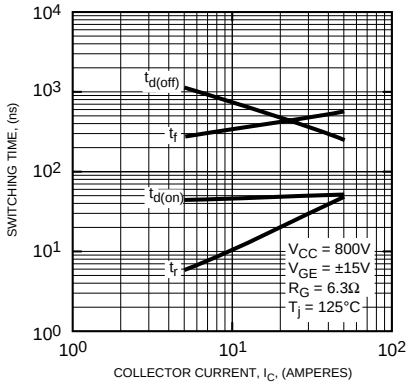
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



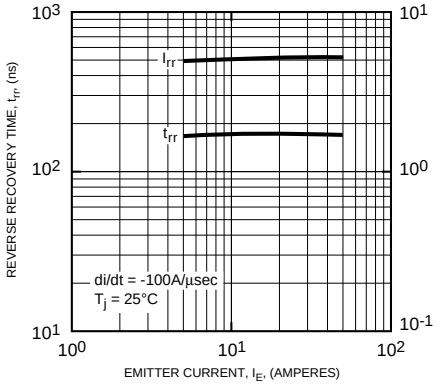
CAPACITANCE VS. V_{CE} (TYPICAL)



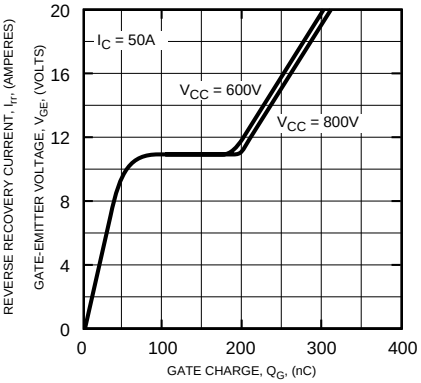
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



REVERSE RECOVERY CHARACTERISTICS (TYPICAL)



GATE CHARGE, V_{GE}



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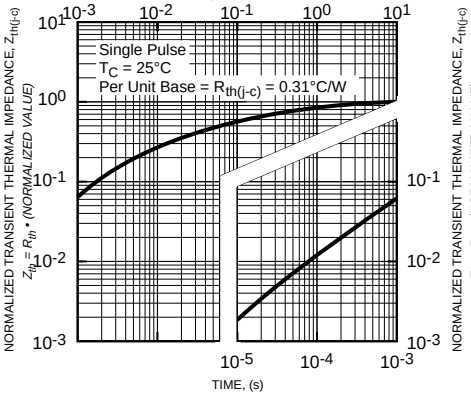
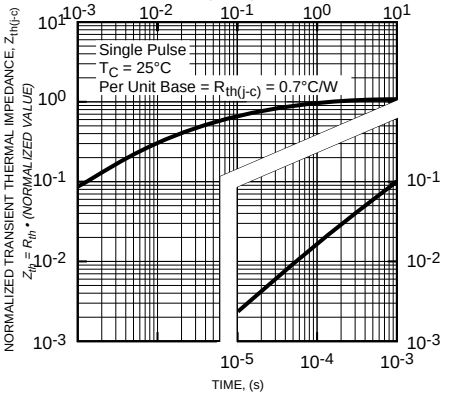
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (FWDi)