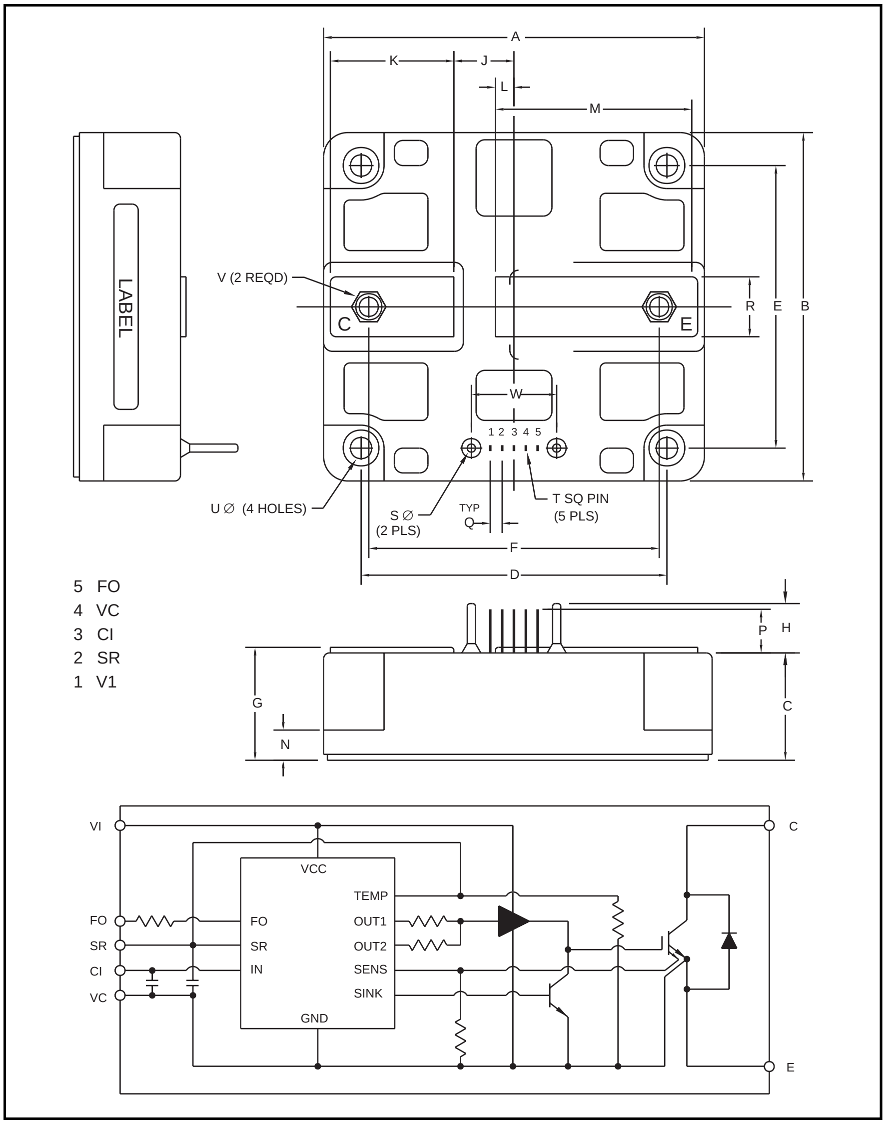
POWEREX

PM800HSA060

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

Intellimod™ Module

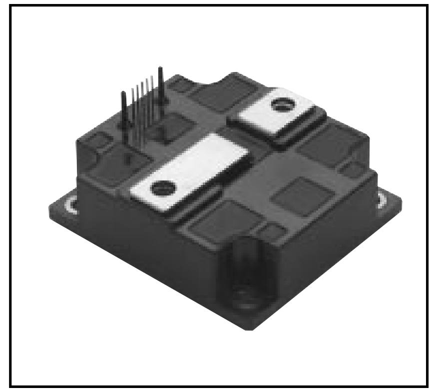
Half Phase
IGBT Inverter Output
800 Amperes/600 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	3.46	88.0
B	3.85	98.0
C	1.16	29.5
D	2.76	70.0
E	3.15	80.0
F	2.56	65.0
G	1.34	34.0
H	0.63	16.0
J	0.63	16.1
K	1.00	25.4
L	0.20	5.1

Dimensions	Inches	Millimeters
M	1.83	46.6
N	0.28	7.0
P	0.59	15.0
Q	0.10	2.54
R	0.71	18.0
S	0.08	2.0
T	0.02 SQ	0.64 SQ
U	0.26	6.5
V	M8	M8
W	0.79	20.0



Description:
Powerex Intellimod™ Intelligent Power Modules are isolated base modules designed for power switching applications operating at frequencies to 20kHz. Built-in control circuits provide optimum gate drive and protection for the IGBT and free-wheel diode power devices.

Features:
- ☐ Complete Output Power Circuit
- ☐ Gate Drive Circuit
- ☐ Protection Logic
  - – Short Circuit
  - – Over Current
  - – Over Temperature
  - – Under Voltage

Applications:
- ☐ Inverters
- ☐ UPS
- ☐ Motion/Servo Control
- ☐ Power Supplies

Ordering Information:
Example: Select the complete part number from the table below -i.e. PM800HSA060 is a 600V, 800 Ampere Intellimod™ Intelligent Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 10)
PM	800	60

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

Characteristics	Symbol	PM800HSA060	Units
Power Device Junction Temperature	T_j	-20 to 150	°C
Storage Temperature	T_{stg}	-40 to 125	°C
Case Operating Temperature	T_C	-20 to 100	°C
Mounting Torque, M6 Mounting Screws (Typical)	—	25	in-lb
Mounting Torque, M8 Main Terminal Screws (Typical)	—	100	in-lb
Module Weight (Typical)	—	630	Grams
Supply Voltage Protected by OC and SC (V_D = 13.5 ~16.5V, Inverter Part)	$V_{CC(prot.)}$	400	Volts
Isolation Voltage, AC 1 minute, 60Hz Sinusoidal	V_{RMS}	2500	Volts

Control Sector, T_j = 25°C unless otherwise specified

Supply Voltage Applied between (V_1-V_C)	V_D	20	Volts
Input Voltage Applied between (C_1-V_C)	V_{CIN}	10	Volts
Fault Output Supply Voltage (Applied between F_O and V_{NC})	V_{FO}	20	Volts
Fault Output Current	I_{FO}	20	mA

IGBT Inverter Sector, T_j = 25°C unless otherwise specified

Collector-Emitter Voltage (V_D = 15V, V_{CIN} = 5V)	V_{CES}	600	Volts
Collector Current, ±	I_C	800	Amperes
Peak Collector Current, ±	I_{CP}	1600	Amperes
Collector Dissipation	P_C	2100	Watts

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Control Sector						
Over Current Trip Level Inverter Part	OC	-20°C ≤ T_j ≤ 125°C, V_D = 15V	1000	1350	—	Amperes
Short Circuit Trip Level Inverter Part	SC	-20°C ≤ T_j ≤ 125°C, V_D = 15V	1350	1870	—	Amperes
Over Current Delay Time	$t_{off(OC)}$	V_D = 15V	—	5	—	µS
Over Temperature Protection	OT	Trip Level	100	110	120	°C
	OT_R	Reset Level	85	95	105	°C
Supply Circuit Under Voltage Protection	UV	Trip Level	11.5	12.0	12.5	Volts
	UV_R	Reset Level	—	12.5	—	Volts
Supply Voltage	V_D	Applied between V_1-V_C	13.5	15	16.5	Volts
Circuit Current	I_D	V_D = 15V, V_{CIN} = 5V	—	23	30	mA
Input ON Threshold Voltage	$V_{CIN(on)}$	Applied between C_1-V_C	1.2	1.5	1.8	Volts
Input OFF Threshold Voltage	$V_{CIN(off)}$	Applied between C_1-V_C	1.7	2.0	2.3	Volts
PWM Input Frequency	f_{PWM}	3-Ø Sinusoidal	—	15	20	kHz
Arm Shoot-through Blocking Time	t_{DEAD}	At IPM's Input Terminals	3.5	—	—	µS
Fault Output Current	$I_{FO(H)}$	V_D = 15V, V_{FO} = 15V	—	—	0.01	mA
	$I_{FO(L)}$	V_D = 15V, V_{FO} = 15V	—	10	15	mA
Minimum Fault Output Pulse Width	t_{FO}	V_D = 15V	1.0	1.8	—	mS

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
IGBT Inverter Sector						
Collector Cutoff Current	I_{CES}	$V_{CE} = V_{CES}$, T_j = 25°C	—	—	1.0	mA
		$V_{CE} = V_{CES}$, T_j = 125°C	—	—	10.0	mA
Diode Forward Voltage	V_{FM}	$-I_C$ = 800A, V_D = 15V, V_{CIN} = 5V	—	1.9	2.8	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_D = 15V, V_{CIN} = 0V, I_C = 800A, T_j = 25°C, Pulsed	—	2.0	2.7	Volts
		V_D = 15V, V_{CIN} = 0V, I_C = 800A, T_j = 125°C, Pulsed	—	2.1	2.8	Volts
Inductive Load Switching Times	t_{on}	V_D = 15V, V_{CIN} = 0 ~ 5V, V_{CC} = 300V, I_C = 800A, T_j = 125°C	0.5	1.4	2.5	µS
	t_{rr}		—	0.15	0.3	µS
	$t_{C(on)}$		—	0.4	1.0	µS
	t_{off}		—	2.5	3.5	µS
	$t_{C(off)}$		—	0.5	1.0	µS

Thermal Characteristics

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Units
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	Each IGBT	—	—	0.06	°C/Watt
	$R_{th(j-c)D}$	Each FWDi	—	—	0.09	°C/Watt
Contact Thermal Resistance	$R_{th(c-f)}$	Case to Fin Per Module, Thermal Grease Applied	—	—	0.038	°C/Watt

Recommended Conditions for Use

Characteristic	Symbol	Condition	Value	Units
Supply Voltage	V_{CC}	Applied across C-E Terminals	0 ~ 400	Volts
	V_D	Applied between V_1-V_C	15 ± 1.5	Vol
Input ON Voltage	$V_{CIN(on)}$	Applied between C_1-V_C	0 ~ 0.8	Volts
Input OFF Voltage	$V_{CIN(off)}$	Applied between C_1-V_C	4.0 ~ V_{SE}	Volts
PWM Input Frequency	f_{PWM}	Using Application Circuit	5 ~ 20	kHz
Minimum Dead Time	t_{DEAD}	Input Signal	≥ 3.5	µS

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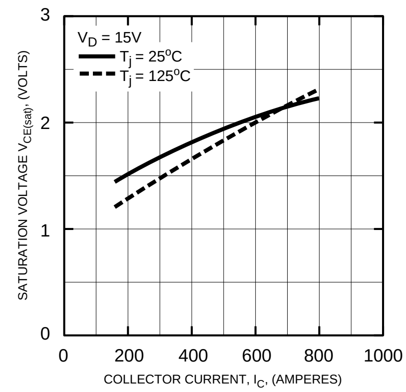
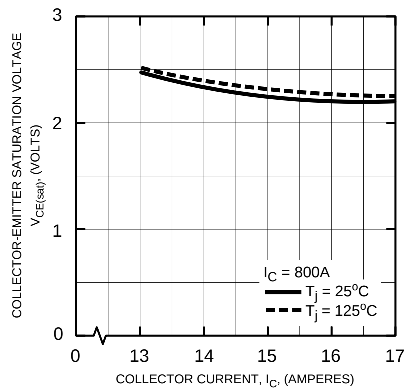
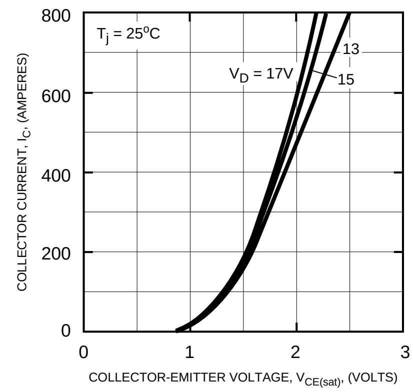
SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



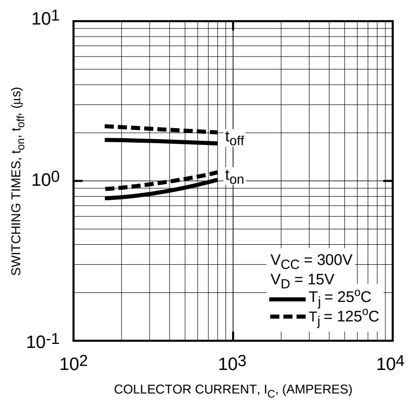
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



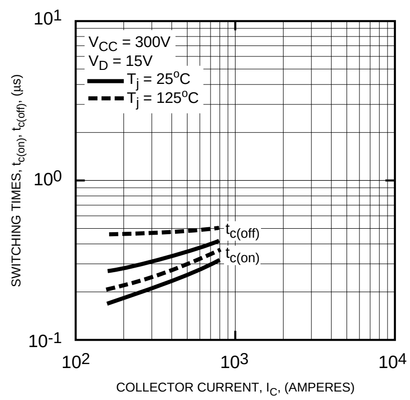
OUTPUT CHARACTERISTICS (TYPICAL)



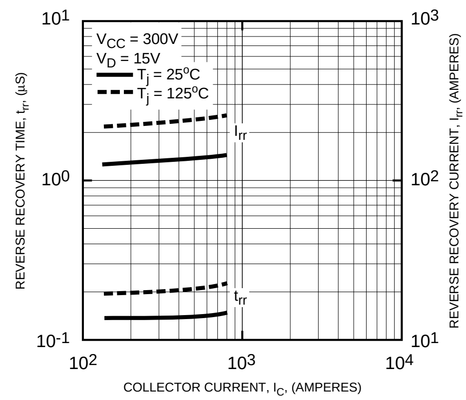
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



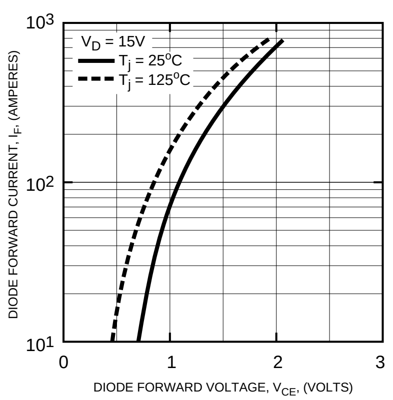
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



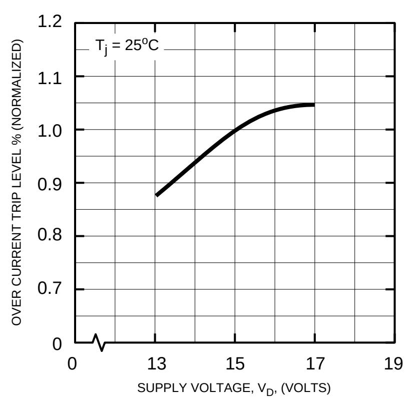
REVERSE RECOVERY CURRENT VS. COLLECTOR CURRENT (TYPICAL)



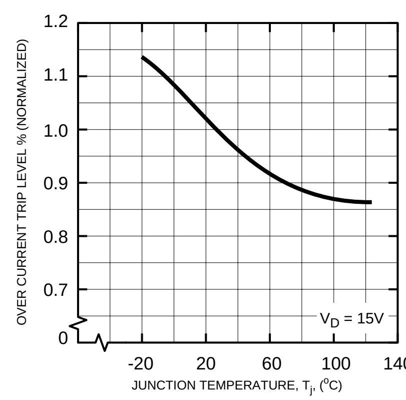
DIODE FORWARD CHARACTERISTICS



OVER CURRENT TRIP LEVEL VS. SUPPLY VOLTAGE (TYPICAL)



OVER CURRENT TRIP LEVEL VS. TEMPERATURE (TYPICAL)



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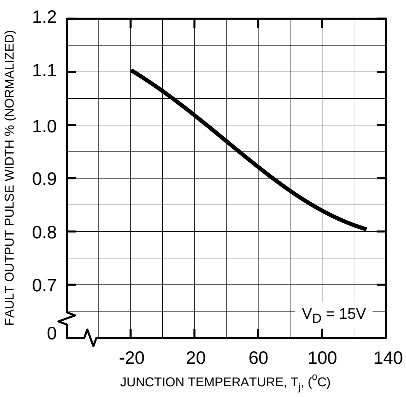
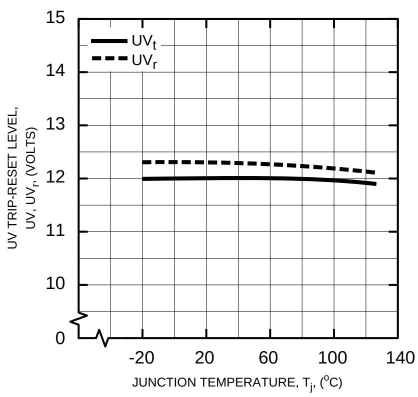
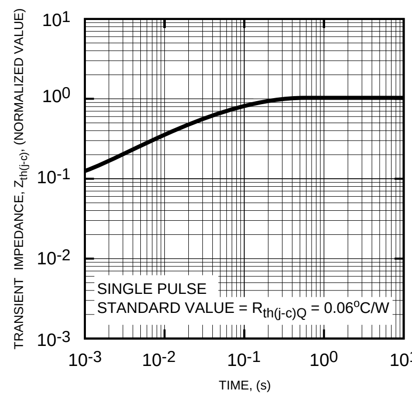
FAULT OUTPUT PULSE WIDTH VS. TEMPERATURE (TYPICAL)



CONTROL SUPPLY VOLTAGE TRIP-RESET LEVEL TEMPERATURE DEPENDANCY (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (FWDi)