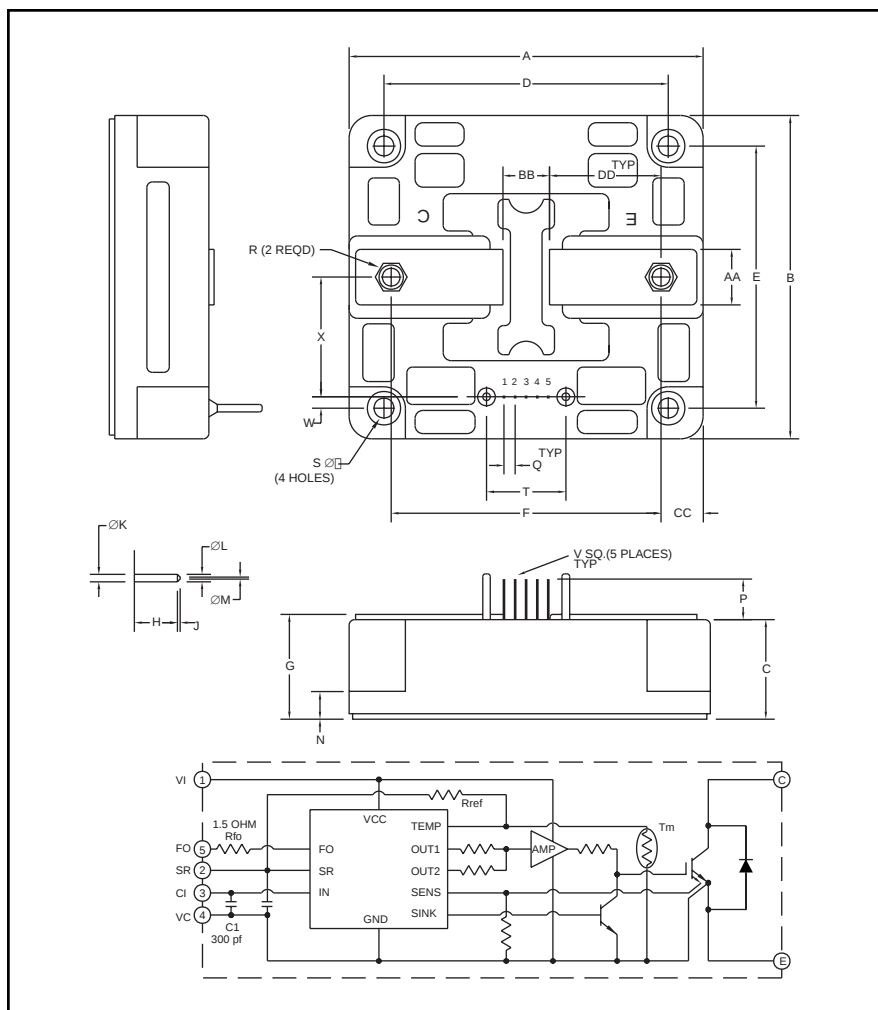


### Intellimod™ Module

Half Phase

IGBT Inverter Output

800 Amperes/1200 Volts



Outline Drawing and Circuit Diagram

| Dimensions | Inches           | Millimeters    |
|------------|------------------|----------------|
| A          | 3.94             | 100.0          |
| B          | 5.20             | 132.0          |
| C          | 1.33 +0.04/-0.02 | 33.7 +1.0/-0.5 |
| D          | 3.23±0.010       | 82.0±0.25      |
| E          | 4.33±0.010       | 110.0±0.25     |
| F          | 2.84             | 72.0           |
| G          | 1.42             | 36.0           |
| H          | 0.53             | 13.5           |
| J          | 0.06             | 1.5            |
| K          | 0.17             | 4.4            |
| L          | 0.15             | 3.8            |
| M          | 0.06             | 1.5            |
| N          | 0.35             | 9.0            |
| P          | 0.53             | 13.5           |

| Dimensions | Inches    | Millimeters |
|------------|-----------|-------------|
| Q          | 0.10      | 2.54        |
| R          | M8 Metric | M8          |
| S          | Ø 6.5     | Ø 6.5       |
| T          | 1.02      | 26.0        |
| U          | 0.26      | 6.5         |
| V          | 0.025     | 0.64        |
| W          | 0.20      | 5.0         |
| X          | 1.97      | 50.0        |
| AA         | 0.71      | 18.0        |
| BB         | 0.55      | 14.0        |
| CC         | 0.39      | 10.0        |
| DD         | 1.14.     | 29.0        |



#### 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. PM800HSA120 is a 1200V, 800 Ampere Intellimod™ Intelligent Power Module.

| Type | Current Rating<br>Amperes | V <sub>CS</sub><br>Volts (x 10) |
|------|---------------------------|---------------------------------|
| PM   | 800                       | 120                             |



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

**PM800HSA120**  
**Intellimod™ Module**  
**Half Phase IGBT Inverter Output**  
800 Amperes/1200 Volts

### Absolute Maximum Ratings, $T_j = 25^\circ\text{C}$ unless otherwise specified

| Characteristics                                                                      | Symbol                 | PM800HSA120 | Units            |
|--------------------------------------------------------------------------------------|------------------------|-------------|------------------|
| Power Device Junction Temperature                                                    | $T_j$                  | -20 to 150  | $^\circ\text{C}$ |
| Storage Temperature                                                                  | $T_{\text{stg}}$       | -40 to 125  | $^\circ\text{C}$ |
| Case Operating Temperature                                                           | $T_C$                  | -20 to 100  | $^\circ\text{C}$ |
| Mounting Torque, M6 Mounting Screws                                                  | —                      | 26          | in-lb            |
| Mounting Torque, M8 Main Terminal Screws                                             | —                      | 95          | in-lb            |
| Module Weight (Typical)                                                              | —                      | 1100        | Grams            |
| Supply Voltage Protected by OC and SC ( $V_D = 13.5 - 16.5\text{V}$ , Inverter Part) | $V_{\text{CC(prot.)}}$ | 800         | Volts            |
| Isolation Voltage, AC 1 minute, 60Hz Sinusoidal                                      | $V_{\text{RMS}}$       | 2500        | Volts            |

### Control Sector

|                                                              |                  |    |       |
|--------------------------------------------------------------|------------------|----|-------|
| Supply Voltage Applied between ( $V_1$ - $V_C$ )             | $V_D$            | 20 | Volts |
| Input Voltage Applied between ( $C_1$ - $V_C$ )              | $V_{\text{CIN}}$ | 10 | Volts |
| Fault Output Supply Voltage (Applied between $F_0$ - $V_C$ ) | $V_{\text{FO}}$  | 20 | Volts |
| Fault Output Current                                         | $I_{\text{FO}}$  | 20 | mA    |

### IGBT Inverter Sector

|                                                                                 |                  |      |         |
|---------------------------------------------------------------------------------|------------------|------|---------|
| Collector-Emitter Voltage ( $V_D = 15\text{V}$ , $V_{\text{CIN}} = 5\text{V}$ ) | $V_{\text{CES}}$ | 1200 | Volts   |
| Collector Current, $\pm$                                                        | $I_C$            | 800  | Amperes |
| Peak Collector Current, $\pm$                                                   | $I_{\text{CP}}$  | 1600 | Amperes |
| Collector Dissipation                                                           | $P_C$            | 4630 | Watts   |



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**Half Phase IGBT Inverter Output**  
**800 Amperes/1200 Volts**

### Electrical and Mechanical Characteristics, $T_j = 25^\circ\text{C}$ unless otherwise specified

| Characteristics                         | Symbol                      | Test Conditions                                                      | Min. | Typ. | Max. | Units            |
|-----------------------------------------|-----------------------------|----------------------------------------------------------------------|------|------|------|------------------|
| <b>Control Sector</b>                   |                             |                                                                      |      |      |      |                  |
| Over Current Trip Level Inverter Part   | OC                          | $-20^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$                  | 1000 | 1350 | ---- | Amperes          |
| Short Circuit Trip Level Inverter Part  | SC                          | $-20^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$                  | 1350 | 1870 | —    | Amperes          |
| Over Current Delay Time                 | $t_{\text{off}}(\text{OC})$ | $V_D = 15\text{V}$                                                   | —    | 5    | —    | $\mu\text{S}$    |
| Over Temperature Protection             | OT                          | Trip Level                                                           | 100  | 110  | 120  | $^\circ\text{C}$ |
|                                         | $\text{OT}_R$               | Reset Level                                                          | 85   | 95   | 105  | $^\circ\text{C}$ |
| Supply Circuit Under Voltage Protection | UV                          | Trip Level                                                           | 11.5 | 12.0 | 12.5 | Volts            |
|                                         | $\text{UV}_R$               | Reset Level                                                          | —    | 12.5 | —    | Volts            |
| Supply Voltage                          | $V_D$                       | Applied between $V_1$ - $V_C$                                        | 13.5 | 15   | 16.5 | Volts            |
| Circuit Current                         | $I_D$                       | $V_D = 15\text{V}$ , $V_{\text{CIN}} = 5\text{V}$ , $V_1$ - $V_C$    | —    | 23   | 40   | mA               |
| Input ON Threshold Voltage              | $V_{\text{CIN(on)}}$        | Applied between $C_1$ - $V_C$                                        | 1.2  | 1.5  | 1.8  | Volts            |
| Input OFF Threshold Voltage             | $V_{\text{CIN(off)}}$       | Applied between $C_1$ - $V_C$                                        | 1.7  | 2.0  | 2.3  | Volts            |
| PWM Input Frequency                     | $f_{\text{PWM}}$            | 3- $\emptyset$ Sinusoidal                                            | —    | 15   | 20   | kHz              |
| Fault Output Current                    | $I_{\text{FO(H)}}$          | $V_D = 15\text{V}$ , $V_{\text{FO}} = 15\text{V}$                    | —    | —    | 0.01 | mA               |
|                                         | $I_{\text{FO(L)}}$          | $V_D = 15\text{V}$ , $V_{\text{FO}} = 15\text{V}$                    | —    | 10   | 15   | mA               |
| Minimum Fault Output Pulse Width        | $t_{\text{FO}}$             | $V_D = 15\text{V}$                                                   | 1.0  | 1.8  | —    | mS               |
| SXR Terminal Output Voltage             | $V_{\text{SXR}}$            | $T_j \leq 125^\circ\text{C}$ , $R_{\text{in}} = 6.8 \text{ k}\Omega$ | 4.5  | 5.1  | 5.6  | Volts            |

**PM800HSA120**  
**Intellimod™ Module**  
**Half Phase IGBT Inverter Output**  
**800 Amperes/1200 Volts**

**Electrical and Mechanical Characteristics,  $T_j = 25^\circ\text{C}$  unless otherwise specified**

| Characteristics | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|-----------------|--------|-----------------|------|------|------|-------|
|-----------------|--------|-----------------|------|------|------|-------|

**IGBT Inverter Sector**

|                                      |               |                                                                                                                          |     |     |     |               |
|--------------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|---------------|
| Collector Cutoff Current             | $I_{CES}$     | $V_{CE} = V_{CES}, T_j = 25^\circ\text{C}$                                                                               | —   | —   | 1.0 | mA            |
|                                      |               | $V_{CE} = V_{CES}, T_j = 125^\circ\text{C}$                                                                              | —   | —   | 10  | mA            |
| Diode Forward Voltage                | $V_{FM}$      | $-I_C = 800\text{A}, V_D = 15\text{V}, V_{CIN} = 5\text{V}$                                                              | —   | 2.5 | 3.5 | Volts         |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 800\text{A}, T_j = 25^\circ\text{C}$                                       | —   | 2.5 | 3.5 | Volts         |
|                                      |               | $V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 800\text{A}, T_j = 125^\circ\text{C}$                                      | —   | 2.3 | 3.0 | Volts         |
| Inductive Load Switching Times       | $t_{on}$      | $V_D = 15\text{V}, V_{CIN} = 0 \sim 5\text{V}$<br>$V_{CC} = 600\text{V}, I_C = 800\text{A}$<br>$T_j = 125^\circ\text{C}$ | 0.5 | 1.4 | 2.5 | $\mu\text{S}$ |
|                                      | $t_{rr}$      |                                                                                                                          | —   | 0.2 | 0.4 | $\mu\text{S}$ |
|                                      | $t_{C(on)}$   |                                                                                                                          | —   | 0.4 | 1.0 | $\mu\text{S}$ |
|                                      | $t_{off}$     |                                                                                                                          | —   | 2.5 | 4.0 | $\mu\text{S}$ |
|                                      | $t_{C(off)}$  |                                                                                                                          | —   | 0.6 | 1.2 | $\mu\text{S}$ |

**Thermal Characteristics**

| Characteristic                      | Symbol         | Condition                                         | Min. | Typ. | Max.  | Units                 |
|-------------------------------------|----------------|---------------------------------------------------|------|------|-------|-----------------------|
| Junction to Case Thermal Resistance | $R_{th(j-c)Q}$ | Each IGBT                                         | —    | —    | 0.027 | $^\circ\text{C/Watt}$ |
|                                     | $R_{th(j-c)D}$ | Each FWDi                                         | —    | —    | 0.045 | $^\circ\text{C/Watt}$ |
| Contact Thermal Resistance          | $R_{th(c-f)}$  | Case to Fin Per Module,<br>Thermal Grease Applied | —    | —    | 0.022 | $^\circ\text{C/Watt}$ |

**Recommended Conditions for Use**

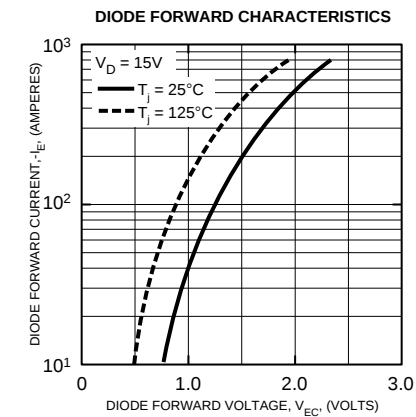
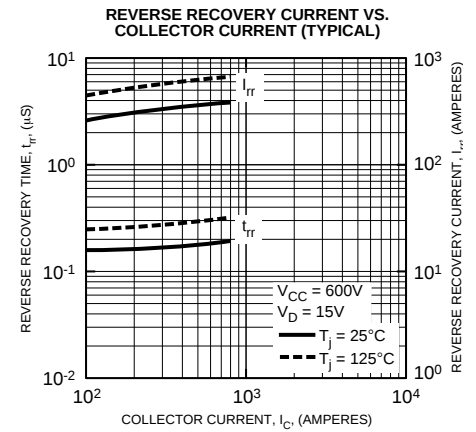
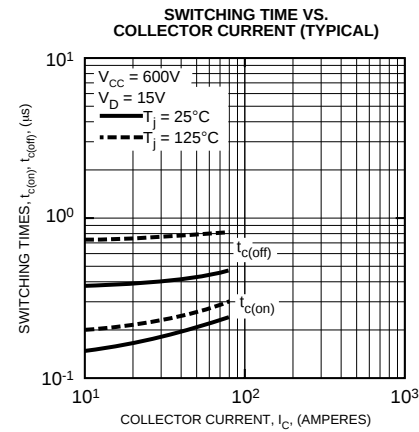
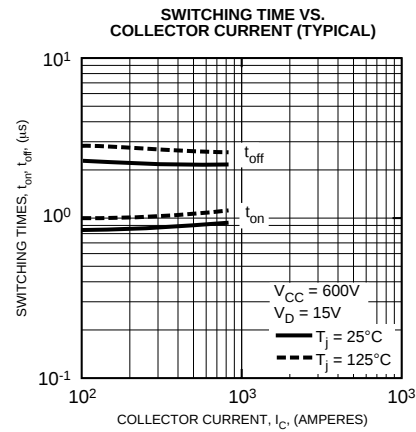
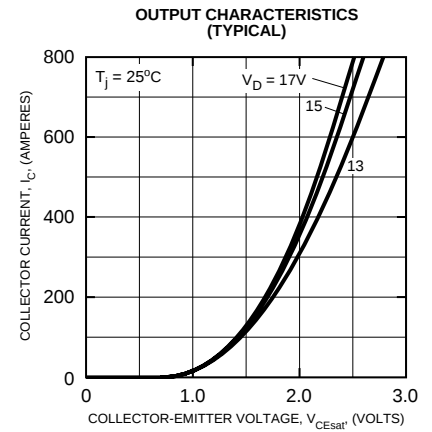
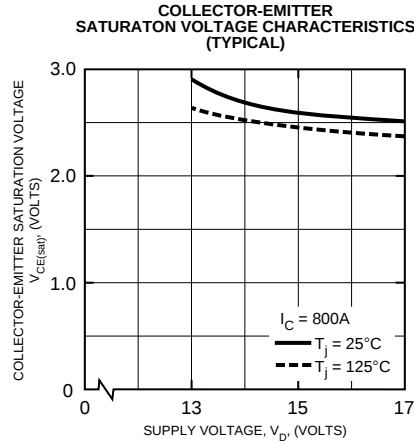
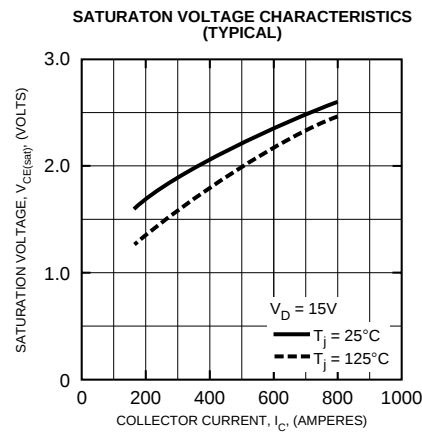
| Characteristic      | Symbol         | Condition                      | Value              | Units         |
|---------------------|----------------|--------------------------------|--------------------|---------------|
| Supply Voltage      | $V_{CC}$       | Applied across C1-E2 Terminals | 0 ~ 800            | Volts         |
|                     | $V_D$          | Applied between $V_1$ - $V_C$  | $15 \pm 1.5$       | Volts         |
| Input ON Voltage    | $V_{CIN(on)}$  | Applied between $C_1$ - $V_C$  | 0 ~ 0.8            | Volts         |
| Input OFF Voltage   | $V_{CIN(off)}$ | Applied between $C_1$ - $V_C$  | $4.0 \sim V_{SXR}$ | Volts         |
| PWM Input Frequency | $f_{PWM}$      | Using Application Circuit      | 5 ~ 20             | kHz           |
| Minimum Dead Time   | $t_{DEAD}$     | Input Signal                   | $\geq 4.0$         | $\mu\text{S}$ |

## PM800HSA120

### Intellimod™ Module

### Half Phase IGBT Inverter Output

800 Amperes/1200 Volts



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