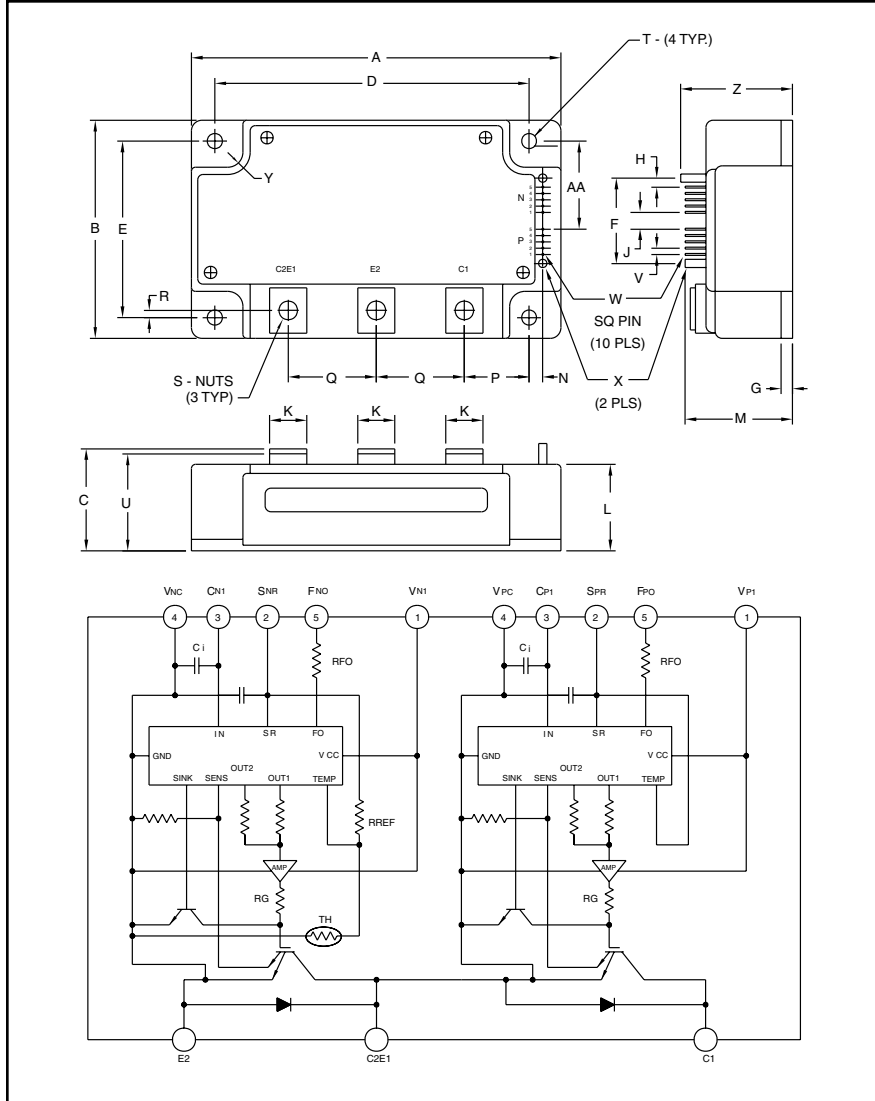


### Intellimod™ Module

Single Phase

IGBT Inverter Output

600 Amperes/600 Volts



Outline Drawing and Circuit Diagram

| Dimensions | Inches           | Millimeters  |
|------------|------------------|--------------|
| A          | 4.72             | 120.0        |
| B          | 3.54             | 90.0         |
| C          | 1.34 +0.04/-0.02 | 34 +1.0/-0.5 |
| D          | 4.17±0.010       | 106.0±0.25   |
| E          | 2.99±0.010       | 76.0±0.25    |
| F          | 1.52             | 38.5         |
| G          | 0.16             | 4.0          |
| H          | 0.16             | 4.01         |
| J          | 0.40             | 10.16        |
| K          | 0.71             | 18.0         |
| L          | 1.22             | 31.0         |
| M          | 1.73             | 44.0         |
| N          | 0.12             | 3.0          |

| Dimensions | Inches    | Millimeters |
|------------|-----------|-------------|
| P          | 1.22      | 31.0        |
| Q          | 1.10      | 28.0        |
| R          | 0.12      | 3.0         |
| S          | M8 Metric | M8          |
| T          | 0.26 Dia. | Dia. 6.5    |
| U          | 1.29      | 32.8        |
| V          | 0.10      | 2.54        |
| W          | 0.025 SQ  | 0.64 SQ     |
| X          | 0.14 Dia. | 3.5 Dia.    |
| Y          | 0.26 Dia. | Dia. 6.5    |
| Z          | 1.79      | 45.5        |
| AA         | 1.5       | 38.0        |



#### 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 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. PM600DVA060 is a 600V, 600 Ampere Intellimod™ Intelligent Power Module.

| Type | Current Rating<br>Amperes | V <sub>CES</sub><br>Volts (x 10) |
|------|---------------------------|----------------------------------|
| PM   | 600                       | 60                               |



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

**PM600DVA060**  
**Intellimod™ Module**  
**Single Phase IGBT Inverter Output**  
**600 Amperes/600 Volts**

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

| Characteristics   | Symbol          | PM600DVA060 | Units            |
|---|-----------------|-------------|------------------|
| Power Device Junction Temperature   | $T_j$           | -20 to 150  | $^\circ\text{C}$ |
| Storage Temperature   | $T_{stg}$       | -40 to 125  | $^\circ\text{C}$ |
| Case Operating Temperature  | $T_C$           | -20 to 100  | $^\circ\text{C}$ |
| Mounting Torque, M6 Mounting Screws (Typical)   | —               | 26          | in-lb            |
| Mounting Torque, M8 Main Terminal Screws (Typical)  | —               | 95          | in-lb            |
| Module Weight (Typical)   | —               | 720         | Grams            |
| Supply Voltage (Applied between C1-E2)  | $V_{CC(surge)}$ | 500         | Volts            |
| Supply Voltage Protected by SC ( $V_D = 13.5 \sim 16.5\text{V}$ , Inverter Part, $T_j = 125^\circ\text{C}$ Start) | $V_{CC(prot.)}$ | 400         | Volts            |
| Isolation Voltage, AC 1 minute, 60Hz Sinusoidal   | $V_{RMS}$       | 2500        | Volts            |

**Control Sector**

|  |           |    |       |
|--|-----------|----|-------|
| Supply Voltage Applied between ( $V_{P1-V_{PC}}$ , $V_{N1-V_{NC}}$ )             | $V_D$     | 20 | Volts |
| Input Voltage Applied between ( $C_{P1-V_{PC}}$ , $V_{N1-V_{NC}}$ )              | $V_{CIN}$ | 10 | Volts |
| Fault Output Supply Voltage (Applied between $F_{PO-V_{PC}}$ , $F_{NO-V_{NC}}$ ) | $V_{FO}$  | 20 | Volts |
| Fault Output Current (Sink Current at $F_O$ Terminals)                           | $I_{FO}$  | 20 | mA    |

**IGBT Inverter Sector**

|  |           |      |         |
|--|-----------|------|---------|
| Collector-Emitter Voltage ( $V_D = 15\text{V}$ , $V_{CIN} = 5\text{V}$ ) | $V_{CES}$ | 600  | Volts   |
| Collector Current, $\pm$ ( $T_C = 25^\circ\text{C}$ )                    | $I_C$     | 600  | Amperes |
| Peak Collector Current, $\pm$ ( $T_C = 25^\circ\text{C}$ )               | $I_{CP}$  | 1200 | Amperes |
| Collector Dissipation ( $T_C = 25^\circ\text{C}$ )                       | $P_C$     | 1260 | Watts   |

**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>                                   |                |   |      |      |      |                  |
| Short Circuit Trip Level                                | SC             | $-20^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$ , $V_D = 15\text{V}$            | 740  | —    | —    | Amperes          |
| Short Circuit Current Delay Time                        | $t_{off(SC)}$  | $V_D = 15\text{V}$  | —    | 10   | —    | $\mu\text{s}$    |
| Over Temperature Protection                             | OT             | Trip Level  | 111  | 118  | 125  | $^\circ\text{C}$ |
| ( $V_D = 15\text{V}$ , Lower Arm)                       | $OT_r$         | Reset Level   | —    | 100  | —    | $^\circ\text{C}$ |
| Supply Circuit Under Voltage Protection                 | UV             | Trip Level  | 11.5 | 12.0 | 12.5 | Volts            |
| ( $-20^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$ ) | $UV_r$         | Reset Level   | —    | 12.5 | —    | Volts            |
| Circuit Current   | $I_D$          | $V_D = 15\text{V}$ , $V_{CIN} = 5\text{V}$ , $V_{N1-V_{NC}}$                        | —    | 27   | 38   | mA               |
|   |                | $V_D = 15\text{V}$ , $V_{CIN} = 5\text{V}$ , $V_{P1-V_{PC}}$                        | —    | 27   | 38   | mA               |
| Input ON Threshold Voltage                              | $V_{CIN(on)}$  | Applied between   | 1.2  | 1.5  | 1.8  | Volts            |
| Input OFF Threshold Voltage                             | $V_{CIN(off)}$ | $C_{P1-V_{PC}}$ , $C_{N1-V_{NC}}$   | 1.7  | 2.0  | 2.3  | Volts            |
| Fault Output Current                                    | $I_{FO(H)}$    | $V_D = 15\text{V}$ , $V_{FO} = 15\text{V}$  | —    | —    | 0.01 | mA               |
|   | $I_{FO(L)}$    | $V_D = 15\text{V}$ , $V_{FO} = 15\text{V}$  | —    | 10   | 15   | mA               |
| Minimum Fault Output Pulse Width                        | $t_{FO}$       | $V_D = 15\text{V}$  | 1.0  | 1.8  | —    | mS               |
| SXR Terminal Output Voltage                             | $V_{SXR}$      | $T_j \leq 125^\circ\text{C}$ , $R_{in} = 6.8\text{k}\Omega$ ( $S_{PR}$ , $S_{NR}$ ) | 4.5  | 5.1  | 5.6  | Volts            |



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**PM600DVA060**  
**Intellimod™ Module**  
**Single Phase IGBT Inverter Output**  
**600 Amperes/600 Volts**

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

| Characteristics                      | Symbol        | Test Conditions  | Min. | Typ. | Max. | Units         |
|--------------------------------------|---------------|--|------|------|------|---------------|
| <b>IGBT Inverter Sector</b>          |               |  |      |      |      |               |
| Collector-Emitter Cutoff Current     | $I_{CES}$     | $V_{CE} = V_{CES}, V_D = 15\text{V}, T_j = 25^\circ\text{C}$                                     | —    | —    | 1.0  | mA            |
|                                      |               | $V_{CE} = V_{CES}, V_D = 15\text{V}, T_j = 125^\circ\text{C}$                                    | —    | —    | 10.0 | mA            |
| FWDi Forward Voltage                 | $V_{EC}$      | $-I_C = 600\text{A}, V_D = 15\text{V}, V_{CIN} = 5\text{V}$                                      | —    | 2.20 | 3.30 | Volts         |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 600\text{A},$<br>Pulsed, $T_j = 25^\circ\text{C}$  | —    | 2.35 | 2.80 | Volts         |
|                                      |               | $V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 600\text{A},$<br>Pulsed, $T_j = 125^\circ\text{C}$ | —    | 2.55 | 3.05 | Volts         |
| Inductive Load Switching Times       | $t_{on}$      |  | 0.4  | 0.8  | 2.1  | $\mu\text{S}$ |
|                                      | $t_{rr}$      | $V_D = 15\text{V}, V_{CIN} = 0\text{V} \sim 5\text{V}$   | —    | 0.2  | 0.3  | $\mu\text{S}$ |
|                                      | $t_{C(on)}$   | $V_{CC} = 300\text{V}, I_C = 600\text{A},$<br>$T_j = 125^\circ\text{C}$                          | —    | 0.3  | 1.1  | $\mu\text{S}$ |
|                                      | $t_{off}$     |  | —    | 1.8  | 2.9  | $\mu\text{S}$ |
|                                      | $t_{C(off)}$  |  | —    | 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 Inverter IGBT                                | —    | —    | 0.099 | $^\circ\text{C/Watt}$ |
|                                     | $R_{th(j-c)D}$ | Each Inverter FWDi                                | —    | —    | 0.13  | $^\circ\text{C/Watt}$ |
| Contact Thermal Resistance          | $R_{th(c-f)}$  | Case to Fin Per Module,<br>Thermal Grease Applied | —    | —    | 0.065 | $^\circ\text{C/Watt}$ |

**Recommended Conditions for Use**

| Characteristic                  | Symbol          | Condition   | Value        | Units         |
|---------------------------------|-----------------|---|--------------|---------------|
| Supply Voltage                  | $V_{CC}$        | Applied across C1-E2 Terminals                    | $\leq 400$   | Volts         |
|                                 | $V_{CE(surge)}$ | Applied across C1-E1, C2-E2 Terminals             | $\leq 500$   | Volts         |
|                                 | $V_D$           | Applied between<br>$V_{P1}-V_{PC}, V_{N1}-V_{NC}$ | $15 \pm 1.5$ | Volts         |
| Input ON Voltage                | $V_{CIN(on)}$   | Applied between                                   | $\leq 0.8$   | Volts         |
| Input OFF Voltage               | $V_{CIN(off)}$  | $C_{P1}-V_{PC}, C_{N1}-V_{NC}$                    | $\geq 4.0$   | Volts         |
| Arm Shoot-Through Blocking Time | $t_{DEAD}$      | For IPM's each Input Signal                       | $\geq 3.0$   | $\mu\text{S}$ |



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