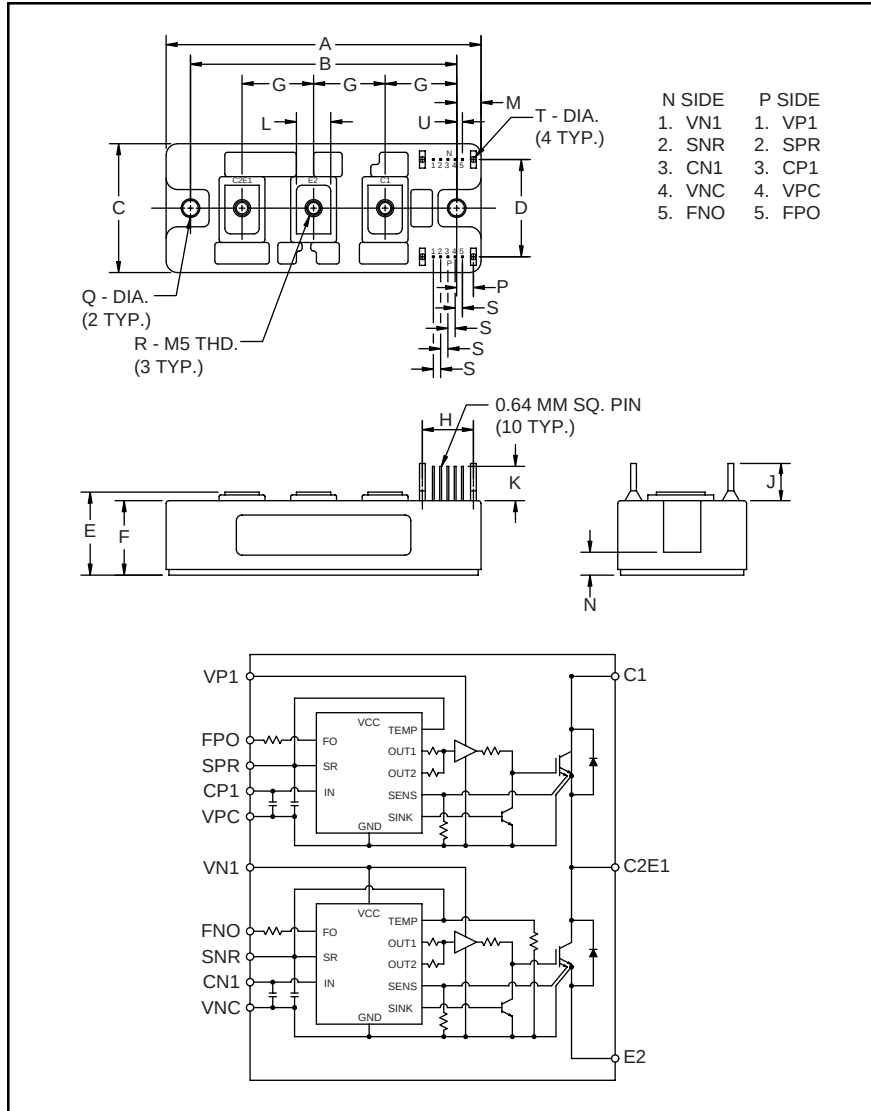


### Intellimod™ Module

Single Phase

IGBT Inverter Output

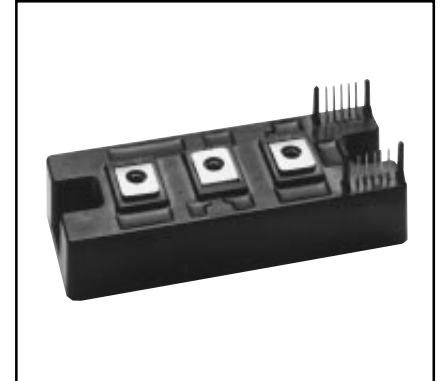
100 Amperes/1200 Volts



Outline Drawing and Circuit Diagram

| Dimensions | Inches           | Millimeters  |
|------------|------------------|--------------|
| A          | 4.33             | 110.0        |
| B          | 3.66±0.010       | 93.0±0.25    |
| C          | 1.77             | 45.0         |
| D          | 1.34             | 34.0         |
| E          | 1.14 +0.04/-0.02 | 29.0 +1/-0.5 |
| F          | 1.02             | 26.0         |
| G          | 0.98             | 25.0         |
| H          | 0.702            | 17.84        |
| J          | 0.55             | 14.0         |
| K          | 0.51             | 13.0         |

| Dimensions | Inches    | Millimeters |
|------------|-----------|-------------|
| L          | 0.47      | 12.0        |
| M          | 0.33      | 8.5         |
| N          | 0.28      | 7.0         |
| P          | 0.230     | 5.84        |
| Q          | 0.22 Dia. | Dia. 5.5    |
| R          | M5 Metric | M5          |
| S          | 0.100     | 2.54        |
| T          | 0.08 Dia. | Dia. 2.0    |
| U          | 0.08      | 2.0         |



### 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. PM100DSA120 is a 1200V, 100 Ampere Intellimod™ Intelligent Power Module.

| Type | Current Rating<br>Amperes | V <sub>CE</sub><br>Volts (x 10) |
|------|---------------------------|---------------------------------|
| PM   | 100                       | 120                             |

**PM100DSA120**  
**Intellimod™ Module**  
**Single Phase IGBT Inverter Output**  
100 Amperes/1200 Volts

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

| Characteristics                                                                      | Symbol                 | PM100DSA120 | 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, M5 Mounting Screws                                                  | —                      | 17          | in-lb            |
| Mounting Torque, M5 Main Terminal Screws                                             | —                      | 17          | in-lb            |
| Module Weight (Typical)                                                              | —                      | 340         | 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 ( $V_{P1}-V_{PC}$ , $V_{N1}-V_{NC}$ )               | $V_D$            | 20 | Volts |
| Input Voltage Applied between ( $C_{P1}-V_{PC}$ , $C_{N1}-V_{NC}$ )                | $V_{\text{CIN}}$ | 10 | Volts |
| Fault Output Supply Voltage (Applied between $F_{p0}-V_{PC}$ and $F_{n0}-V_{NC}$ ) | $V_{\text{FO}}$  | 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, $\pm$                                                        | $I_C$                  | 100  | Amperes |
| Peak Collector Current, $\pm$                                                   | $I_{\text{CP}}$        | 200  | Amperes |
| Supply Voltage (Applied between C1 - E2)                                        | $V_{\text{CC}}$        | 900  | Volts   |
| Supply Voltage, Surge (Applied between C1 - E2)                                 | $V_{\text{CC(surge)}}$ | 1000 | Volts   |
| Collector Dissipation                                                           | $P_C$                  | 595  | Watts   |

**PM100DSA120**  
**Intellimod™ Module**  
**Single Phase IGBT Inverter Output**  
**100 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                    | $-20^\circ\text{C} \leq T \leq 125^\circ\text{C}$                                                          | 145  | 230  | —    | Amperes          |
| Short Circuit Trip Level Inverter Part  | SC                    | $-20^\circ\text{C} \leq T \leq 125^\circ\text{C}$                                                          | 200  | 340  | —    | Amperes          |
| Over Current Delay Time                 | $t_{\text{off(OC)}}$  | $V_D = 15\text{V}$                                                                                         | —    | 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 $V_{P1}$ - $V_{PC}$ , $V_{N1}$ - $V_{NC}$                                                  | 13.5 | 15   | 16.5 | Volts            |
| Circuit Current                         | $I_D$                 | $V_D = 15\text{V}$ , $V_{\text{CIN}} = 5\text{V}$ , $V_{N1}$ - $V_{NC}$                                    | —    | 19   | 26   | mA               |
|                                         |                       | $V_D = 15\text{V}$ , $V_{\text{CIN}} = 5\text{V}$ , $V_{\text{XP1}}$ - $V_{\text{XPC}}$                    | —    | 19   | 26   | mA               |
| Input ON Threshold Voltage              | $V_{\text{CIN(on)}}$  | Applied between                                                                                            | 1.2  | 1.5  | 1.8  | Volts            |
| Input OFF Threshold Voltage             | $V_{\text{CIN(off)}}$ | $C_{P1}$ - $V_{PC}$ , $C_{N1}$ - $V_{NC}$                                                                  | 1.7  | 2.0  | 2.3  | Volts            |
| PWM Input Frequency                     | $f_{\text{PWM}}$      | 3- $\phi$ 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             | $V_{\text{SXR}}$      | $T_j \leq 125^\circ\text{C}$ , $R_{\text{in}} = 6.8 \text{ k}\Omega$ ( $S_{\text{PR}}$ , $S_{\text{NR}}$ ) | 4.5  | 5.1  | 5.6  | Volts            |

**PM100DSA120**  
**Intellimod™ Module**  
**Single Phase IGBT Inverter Output**  
**100 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>IGBT Inverter Sector</b>          |               |                                                                                                                          |      |      |      |               |
| Collector Cutoff Current             | $I_{CEX}$     | $V_{CE} = V_{CEX}, T_j = 25^\circ\text{C}$                                                                               | —    | —    | 1    | mA            |
|                                      |               | $V_{CE} = V_{CEX}, T_j = 125^\circ\text{C}$                                                                              | —    | —    | 10   | mA            |
| Diode Forward Voltage                | $V_{FM}$      | $-I_C = 100\text{A}, V_D = 15\text{V}, V_{CIN} = 5\text{V}$                                                              | —    | 2.5  | 3.5  | Volts         |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 100\text{A}$                                                               | —    | 2.3  | 3.2  | Volts         |
|                                      |               | $V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 100\text{A}, T_j = 125^\circ\text{C}$                                      | —    | 2.1  | 2.9  | Volts         |
| Inductive Load Switching Times       | $t_{on}$      | $V_D = 15\text{V}, V_{CIN} = 0 \sim 5\text{V}$<br>$V_{CC} = 600\text{V}, I_C = 100\text{A}$<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  | 3.5  | $\mu\text{S}$ |
|                                      | $t_{C(off)}$  |                                                                                                                          | —    | 0.6  | 1.1  | $\mu\text{S}$ |

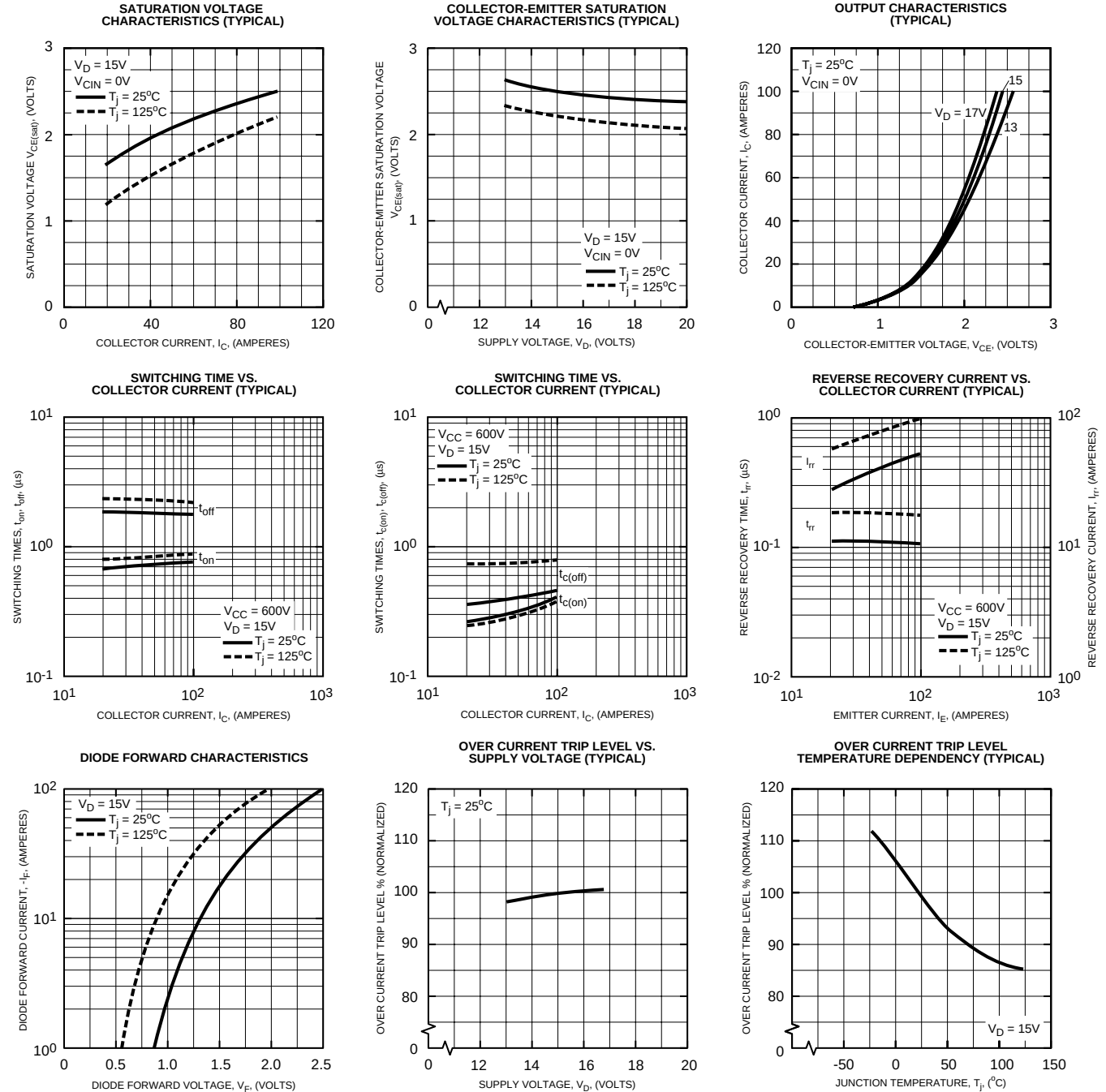
**Thermal Characteristics**

| Characteristic                      | Symbol         | Condition                                         | Min. | Typ. | Max.  | Units                 |
|-------------------------------------|----------------|---------------------------------------------------|------|------|-------|-----------------------|
| Junction to Case Thermal Resistance | $R_{th(j-c)Q}$ | Each IGBT                                         | —    | —    | 0.21  | $^\circ\text{C/Watt}$ |
|                                     | $R_{th(j-c)D}$ | Each FWDi                                         | —    | —    | 0.35  | $^\circ\text{C/Watt}$ |
| Contact Thermal Resistance          | $R_{th(c-f)}$  | Case to Fin Per Module,<br>Thermal Grease Applied | —    | —    | 0.060 | $^\circ\text{C/Watt}$ |

**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 $V_{P1}-V_{PC}, V_{N1}-V_{NC}$ | $15 \pm 1.5$       | Volts         |
| Input ON Voltage    | $V_{CIN(on)}$  | Applied between                                | 0 ~ 0.8            | Volts         |
| Input OFF Voltage   | $V_{CIN(off)}$ | $C_{P1}-V_{PC}, C_{N1}-V_{NC}$                 | $4.0 \sim V_{SXR}$ | Volts         |
| PWM Input Frequency | $f_{PWM}$      | Using Application Circuit                      | 5 ~ 20             | kHz           |
| Minimum Dead Time   | $t_{DEAD}$     | Input Signal                                   | $\geq 3.5$         | $\mu\text{S}$ |

**PM100DSA120**  
**Intellimod™ Module**  
**Single Phase IGBT Inverter Output**  
**100 Amperes/1200 Volts**



**PM100DSA120**  
**Intellimod™ Module**  
**Single Phase IGBT Inverter Output**  
**100 Amperes/1200 Volts**

