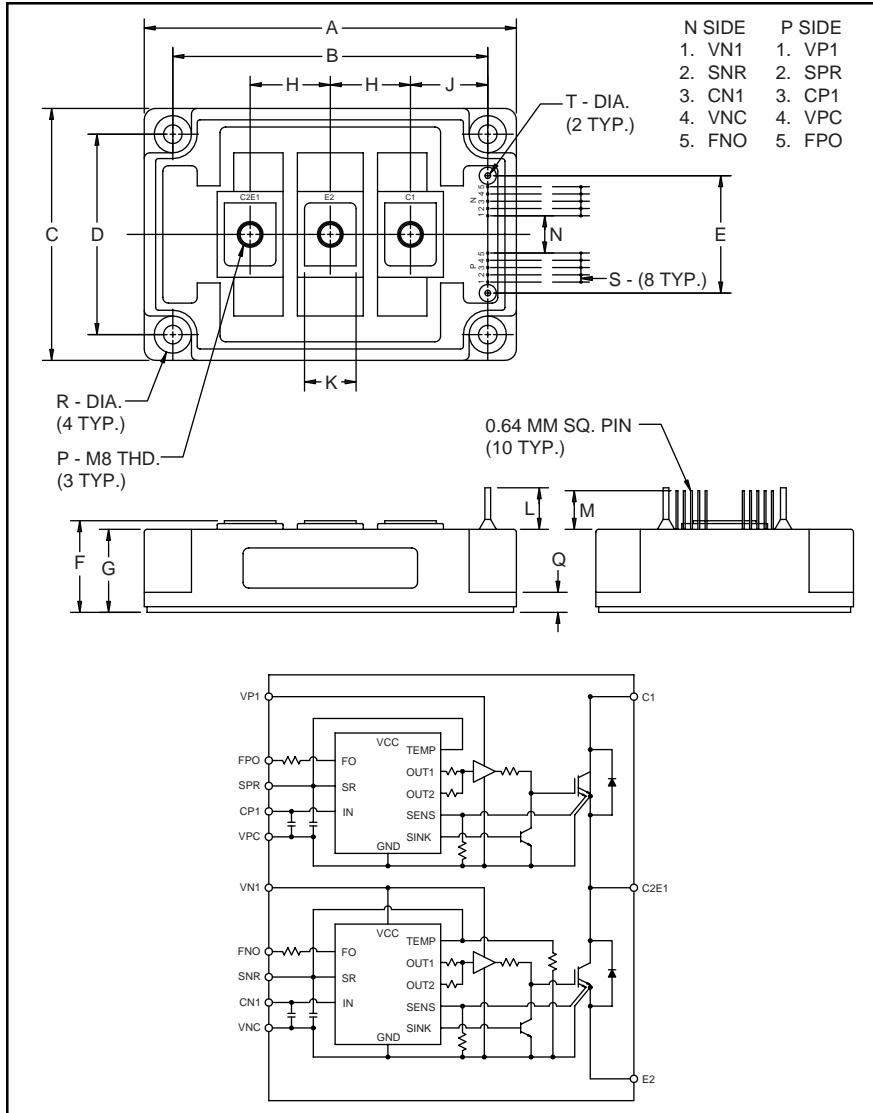


Intellimod™ Module Single Phase IGBT Inverter Output 300 Amperes/1200 Volts



Outline Drawing and Circuit Diagram

| Dimensions | Inches | Millimeters |
|------------|------------------|--------------|
| A | 5.12 | 130.0 |
| B | 4.33±0.010 | 110.0±0.25 |
| C | 3.54 | 90.0 |
| D | 2.76±0.010 | 70.0±0.25 |
| E | 1.61 | 41.0 |
| F | 1.34 +0.04/-0.02 | 34.0 +1/-0.5 |
| G | 1.22 | 31.0 |
| H | 1.10 | 28.0 |
| J | 1.06 | 27.0 |

| Dimensions | Inches | Millimeters |
|------------|-----------|-------------|
| K | 0.71 | 18.0 |
| L | 0.57 | 14.5 |
| M | 0.53 | 13.5 |
| N | 0.51 | 13.0 |
| P | M8 Metric | M8 |
| Q | 0.28 | 7.0 |
| R | 0.26 Dia. | Dia. 6.5 |
| S | 0.100 | 2.54 |
| T | 0.08 Dia. | Dia. 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. PM300DSA120 is a 1200V, 300 Ampere Intellimod™ Intelligent Power Module.

| Type | Current Rating Amperes | V _{CEs} Volts (x 10) |
|------|---------------------------|----------------------------------|
| PM | 300 | 120 |



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

PM300DSA120
Intellimod™ Module
Single Phase IGBT Inverter Output
 300 Amperes/1200 Volts

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

| Characteristics | Symbol | PM300DSA120 | 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 | — | 26 | in-lb |
| Mounting Torque, M8 Main Terminal Screws | — | 95 | in-lb |
| Module Weight (Typical) | — | 910 | 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_{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_{CIN} | 10 | Volts |
| Fault Output Supply Voltage (Applied between $F_{po}-V_{pc}$ and $F_{no}-V_{nc}$) | V_{FO} | 20 | Volts |
| Fault Output Current | I_{FO} | 20 | mA |

IGBT Inverter Sector

| | | | |
|---|------------------------|------|---------|
| Collector-Emitter Voltage ($V_D = 15\text{V}$, $V_{\text{CIN}} = 5\text{V}$) | V_{CES} | 1200 | Volts |
| Collector Current, \pm | I_C | 300 | Amperes |
| Peak Collector Current, \pm | I_{CP} | 600 | Amperes |
| Supply Voltage (Applied between C1 - E2) | V_{CC} | 900 | Volts |
| Supply Voltage, Surge (Applied between C1 - E2) | $V_{\text{CC(surge)}}$ | 1000 | Volts |
| Collector Dissipation | P_C | 1790 | Watts |

PM300DSA120
Intellimod™ Module
Single Phase IGBT Inverter Output
300 Amperes/1200 Volts

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

| Characteristics | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|---|-----------------------|--|------|------|------|------------------|
| Control Sector | | | | | | |
| Over Current Trip Level Inverter Part | OC | $-20^\circ\text{C} \leq T \leq 125^\circ\text{C}$ | 380 | 560 | — | Amperes |
| Short Circuit Trip Level Inverter Part | SC | $-20^\circ\text{C} \leq T \leq 125^\circ\text{C}$ | 500 | 840 | — | Amperes |
| Over Current Delay Time | $t_{\text{off(OC)}}$ | $V_D = 15\text{V}$ | — | 5 | — | μS |
| Over Temperature Protection | OT | Trip Level | 100 | 110 | 120 | $^\circ\text{C}$ |
| | 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 |
| | 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 | $V_D = 15\text{V}$, $V_{CIN} = 5\text{V}$, $V_{N1}-V_{NC}$ | — | 23 | 30 | mA |
| | | $V_D = 15\text{V}$, $V_{CIN} = 5\text{V}$, $V_{XP1}-V_{XPC}$ | — | 23 | 30 | mA |
| Input ON Threshold Voltage | $V_{CIN(\text{on})}$ | Applied between | 1.2 | 1.5 | 1.8 | Volts |
| Input OFF Threshold Voltage | $V_{CIN(\text{off})}$ | $C_{P1}-V_{PC}$, $C_{N1}-V_{NC}$ | 1.7 | 2.0 | 2.3 | Volts |
| PWM Input Frequency | f_{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_{FO} | $V_D = 15\text{V}$ | 1.0 | 1.8 | — | mS |
| SXR Terminal Output Voltage | V_{SXR} | $T_j \leq 125^\circ\text{C}$, $R_{\text{in}} = 6.8 \text{ k}\Omega$ (S_{PR} , S_{NR}) | 4.5 | 5.1 | 5.6 | Volts |

PM300DSA120
Intellimod™ Module
Single Phase IGBT Inverter Output
300 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_{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} | $-I_C = 300\text{A}, V_D = 15\text{V}, V_{CIN} = 5\text{V}$ | — | 2.5 | 3.5 | Volts |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 300\text{A}$ | — | 2.3 | 3.2 | Volts |
| | | $V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 300\text{A}, T_j = 125^\circ\text{C}$ | — | 2.1 | 2.9 | Volts |
| Inductive Load Switching Times | t_{on} | | 0.5 | 1.4 | 2.5 | μS |
| | t_{rr} | $V_D = 15\text{V}, V_{CIN} = 0 \sim 5\text{V}$ | — | 0.2 | 0.4 | μS |
| | $t_{C(on)}$ | $V_{CC} = 600\text{V}, I_C = 300\text{A}$ | — | 0.4 | 1.0 | μS |
| | t_{off} | $T_j = 125^\circ\text{C}$ | — | 2.5 | 3.5 | μS |
| | $t_{C(off)}$ | | — | 0.6 | 1.1 | μS |

Thermal Characteristics

| Characteristic | Symbol | Condition | Min. | Typ. | Max. | Units |
|-------------------------------------|----------------|---|------|------|-------|-----------------------|
| Junction to Case Thermal Resistance | $R_{th(j-c)Q}$ | Each IGBT | — | — | 0.07 | $^\circ\text{C/Watt}$ |
| | $R_{th(j-c)D}$ | Each FWDi | — | — | 0.13 | $^\circ\text{C/Watt}$ |
| Contact Thermal Resistance | $R_{th(c-f)}$ | Case to Fin Per Module, Thermal Grease Applied | — | — | 0.030 | $^\circ\text{C/Watt}$ |

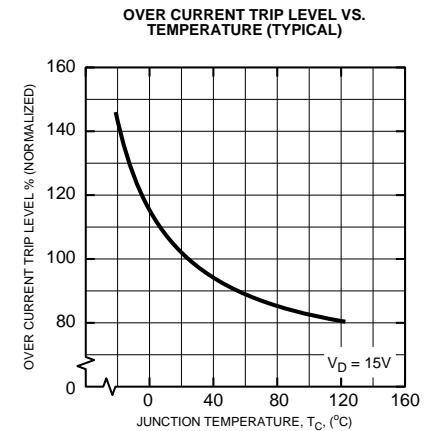
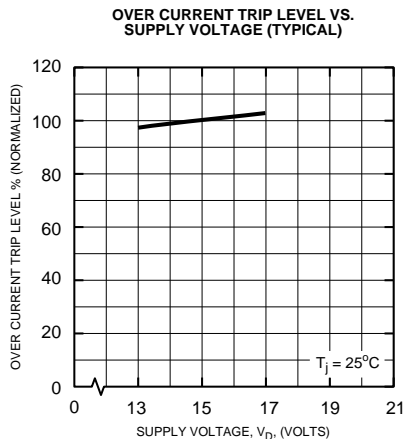
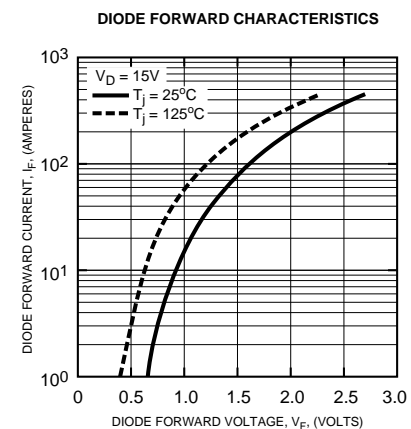
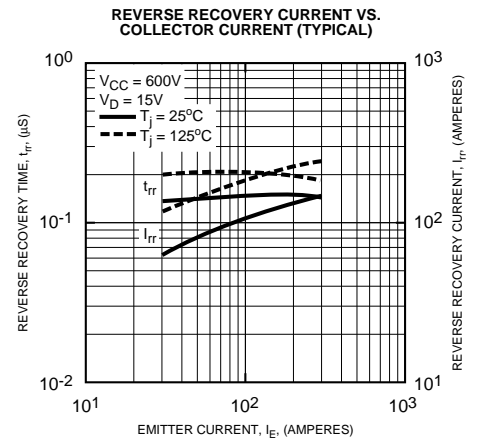
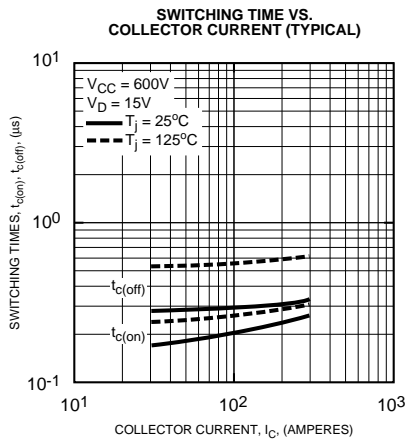
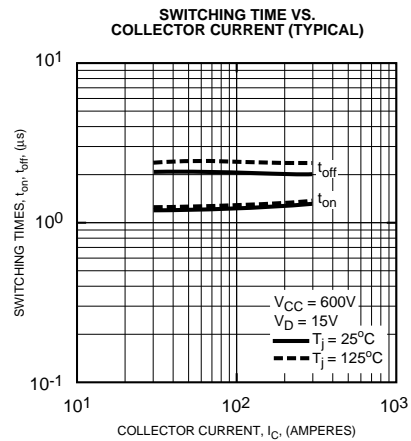
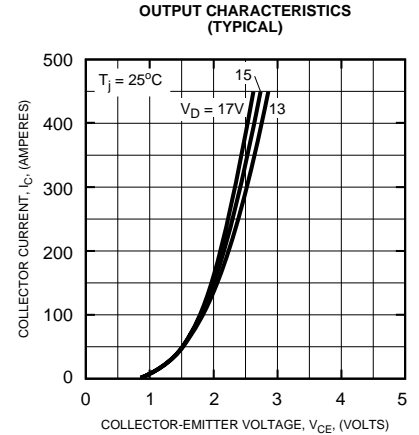
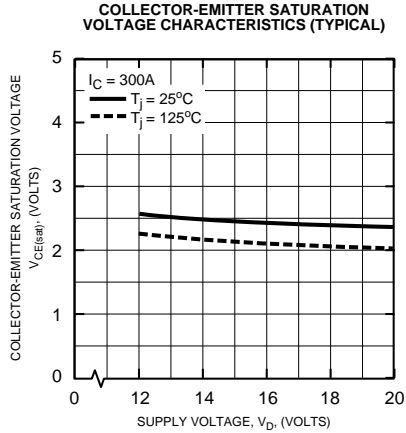
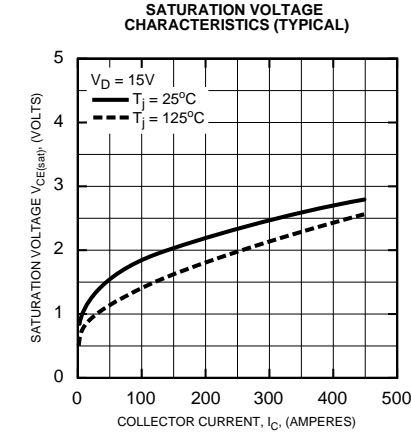
Recommended Conditions for Use

| 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 ± 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 | ≥ 3.5 | μS |



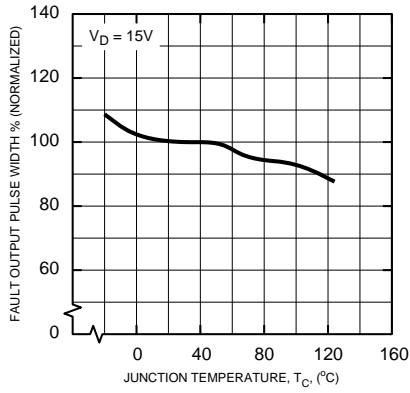
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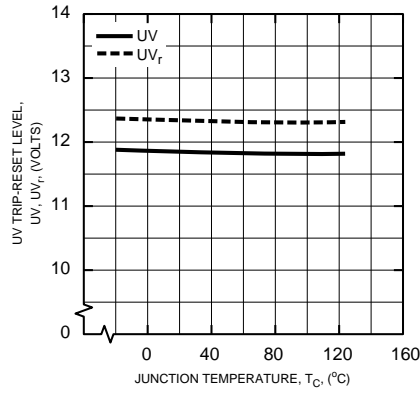


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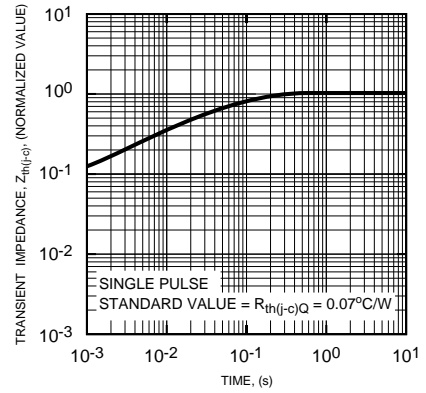
FAULT OUTPUT PULSE WIDTH VS. TEMPERATURE (TYPICAL)



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



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (FWD)

