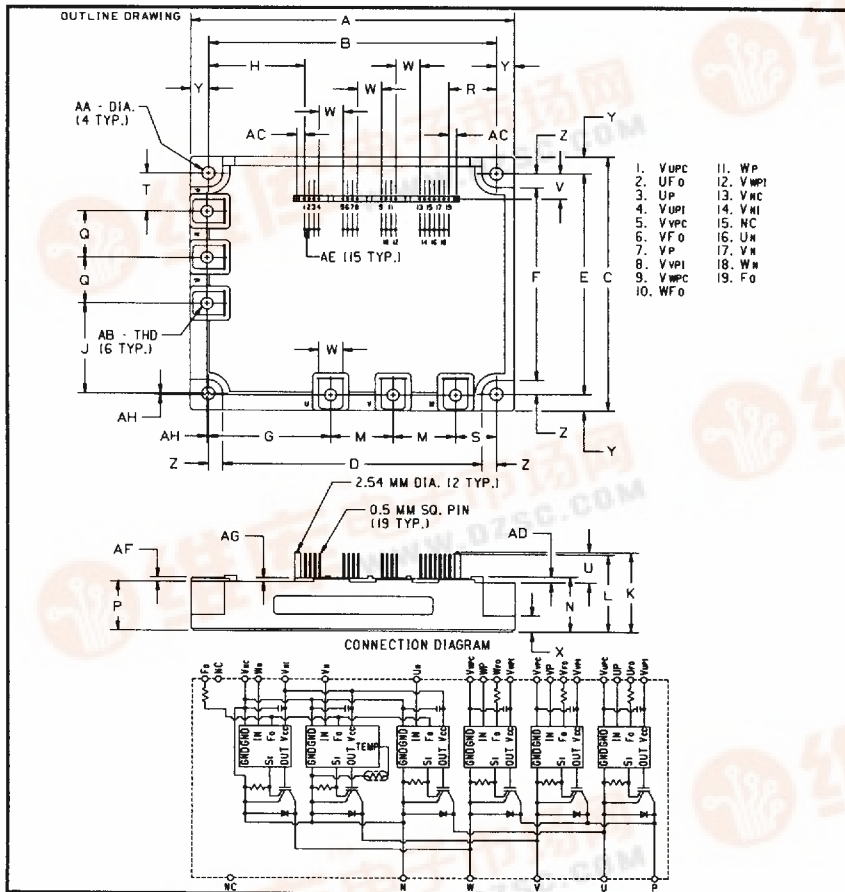


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PM100CSA120

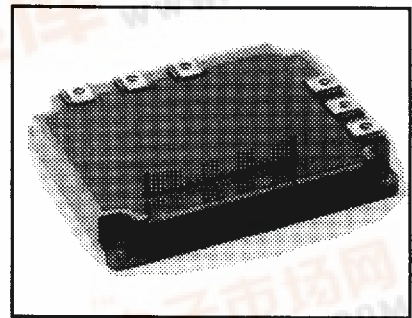
Intellimod™ Modules
Three Phase
IGBT Inverter Output
100 Amperes/1200 Volts



PM100CSA120 Outline Drawing

| Dimensions | Inches | Millimeters |
|------------|-----------------|----------------|
| A | 5.31 ± 0.04 | 135.0 ± 1.0 |
| B | 4.74 ± 0.02 | 120.5 ± 0.5 |
| C | 4.33 ± 0.04 | 110.0 ± 1.0 |
| D | 4.27 | 108.5 |
| E | 3.76 ± 0.02 | 95.5 ± 0.5 |
| F | 3.29 | 83.5 |
| G | 2.01 | 51.0 |
| H | 1.602 | 40.68 |
| J | 1.54 | 39.0 |
| K | 1.37 | 34.7 |
| L | 1.33 | 33.7 |
| M | 1.02 | 26.0 |
| N | 0.95 +0.06/-0.0 | 24.1 +1.5/-0.0 |
| P | 0.85 | 21.5 |
| Q | 0.79 | 20.0 |
| R | 0.780 | 19.82 |

| Dimensions | Inches | Millimeters |
|------------|-----------|-------------|
| S | 0.69 | 17.5 |
| T | 0.65 | 16.5 |
| U | 0.52 | 13.2 |
| V | 0.43 | 11.0 |
| W | 0.39 | 10.0 |
| X | 0.31 | 8.0 |
| Y | 0.285 | 7.5 |
| Z | 0.24 | 6.0 |
| AA | 0.22 Dia. | Dia. 5.5 |
| AD | Metric M5 | M5 |
| AC | 0.128 | 3.22 |
| AD | 0.10 | 2.6 |
| AE | 0.08 | 2.0 |
| AF | 0.07 | 1.8 |
| AG | 0.06 | 1.6 |
| AH | 0.02 | 0.5 |



Description:

Powerex Intellimod Modules are designed for applications requiring a high frequency (20kHz) output switching inverter. The modules are isolated from the baseplate, consisting of complete drive, control and protection circuitry for the IGBT inverter.

Features:

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

Applications:

- ☐ Inverters
- ☐ Small UPS
- ☐ Motion/Servo Control
- ☐ AC Motor Control

Ordering Information:
PM100CSA120



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PM100CSA120

Intellimod™ Modules

Three Phase IGBT Inverter Output

100 Amperes/1200 Volts

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

| Characteristics | Symbol | PM100CSA120 | 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, M5 Mounting Screws | — | 20 | kg-cm |
| Mounting Torque, M5 Main Terminal Screws | — | 20 | kg-cm |
| Module Weight (Typical) | — | 920 | Grams |
| Supply Voltage Protected by OC and SC ($V_D = 13.5 - 16.5\text{V}$, Inverter Part, $T_j = 125^\circ\text{C}$) | $V_{\text{CC(prot.)}}$ | 800 | Volts |
| Isolation Voltage, AC 1 minute, 60Hz | V_{RMS} | 2500 | Volts |

Control Sector

| | | | |
|--|------------------|----|-------|
| Supply Voltage Applied between ($V_{UP1}-V_{UPC}$, $V_{VP1}-V_{VPC}$, $V_{WP1}-V_{WPC}$, $V_{N1}-V_{NC}$) | V_D | 20 | Volts |
| Input Voltage Applied between (U_P , V_P , W_P , U_N , V_N , W_N) | V_{CIN} | 20 | Volts |
| Fault Output Supply Voltage (Applied between F_O and V_C) | V_{FO} | 20 | Volts |
| Fault Output Current | I_{FO} | 20 | mA |

IGBT Inverter Sector

| | | | |
|---|------------------------|------|---------|
| Collector-Emitter Voltage | V_{CES} | 1200 | Volts |
| Collector Current, \pm | I_C | 100 | Amperes |
| Peak Collector Current, \pm | I_{CP} | 200 | Amperes |
| Supply Voltage (Applied between P - N) | V_{CC} | 900 | Volts |
| Supply Voltage, Surge (Applied between P - N) | $V_{\text{CC(surge)}}$ | 1000 | Volts |
| Collector Dissipation | P_C | 595 | Watts |



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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 | $-20^\circ\text{C} \leq T \leq 125^\circ\text{C}$ | 145 | 230 | — | Amperes |
| Short Circuit Trip Level Inverter Part | SC | $-20^\circ\text{C} \leq T \leq 125^\circ\text{C}$ | — | 340 | — | Amperes |
| Over Current Delay Time | $t_{\text{off(OC)}}$ | $V_D = 15\text{V}$ | — | 10 | — | μs |
| Over Temperature Protection | OT | Trip Level | 111 | 118 | 125 | $^\circ\text{C}$ |
| | OT_R | Reset Level | — | 100 | — | $^\circ\text{C}$ |
| 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 $V_{\text{UP1}}-V_{\text{UPC}}$, $V_{\text{VP1}}-V_{\text{VPC}}$, $V_{\text{WP1}}-V_{\text{WPC}}$, $V_{\text{N1}}-V_{\text{NC}}$ | 13.5 | 15 | 16.5 | Volts |
| Circuit Current | I_D | $V_D = 15\text{V}$, $V_{\text{CIN}} = 15\text{V}$, $V_{\text{N1}}-V_{\text{NC}}$ | — | 40 | 55 | mA |
| | | $V_D = 15\text{V}$, $V_{\text{CIN}} = 15\text{V}$, $V_{\text{XP1}}-V_{\text{XPC}}$ | — | 13 | 18 | mA |
| Input Bias ON Voltage | $V_{\text{CIN(on)}}$ | Applied between | 1.2 | 1.5 | 1.8 | mA |
| Input Bias OFF Voltage | $V_{\text{CIN(off)}}$ | $U_P, V_P, W_P, U_N, V_N, W_N$ | 1.7 | 2.0 | 2.3 | mA |
| PWM Input Frequency | f_{PWM} | 3- ϕ Sinusoidal | — | 15 | 20 | kHz |
| Dead Time | t_{DEAD} | For each Input Pulse | 2.5 | — | — | μs |
| | | Using App. Circuit Optocoupler's Input Signal $I_F = 12\text{mA}$ | 4.5 | — | — | μs |
| 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 |



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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} | $-I_C = 100\text{A}, V_D = 15\text{V}, V_{CIN} = 0\text{V}$ | — | 2.5 | 3.5 | Volts |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $V_D = 15\text{V}, V_{CIN} = 15\text{V}, I_C = 100\text{A}$ | — | 2.5 | 3.5 | Volts |
| | | $V_D = 15\text{V}, V_{CIN} = 15\text{V}, I_C = 100\text{A}, T_j = 125^\circ\text{C}$ | — | 2.2 | 3.2 | Volts |
| Inductive Load Switching Times | t_{on} | | 0.5 | 1.0 | 2.5 | μS |
| | t_{rr} | $V_D = 15\text{V}, V_{CIN} = 0 \sim 15\text{V}$ | — | 0.15 | 0.3 | μS |
| | $t_{C(on)}$ | $V_{CC} = 600\text{V}, I_C = 100\text{A}$ | — | 0.4 | 1.0 | μS |
| | t_{off} | $T_j = 125^\circ\text{C}$ | — | 2.0 | 3.0 | μS |
| | $t_{C(off)}$ | | — | 0.7 | 1.2 | μS |

Thermal Characteristics

| Characteristic | Symbol | Condition | Min. | Typ. | Max. | Units |
|-------------------------------------|----------------|-------------------------------------|------|------|-------|-----------------------|
| Junction to Case Thermal Resistance | $R_{th(j-c)Q}$ | Inverter IGBT Part | — | — | 0.21 | $^\circ\text{C/Watt}$ |
| | $R_{th(j-c)F}$ | Inverter FWD | — | — | 0.35 | $^\circ\text{C/Watt}$ |
| Contact Thermal Resistance | $R_{th(c-f)}$ | Case to Fin, Thermal Grease Applied | — | — | 0.018 | $^\circ\text{C/Watt}$ |

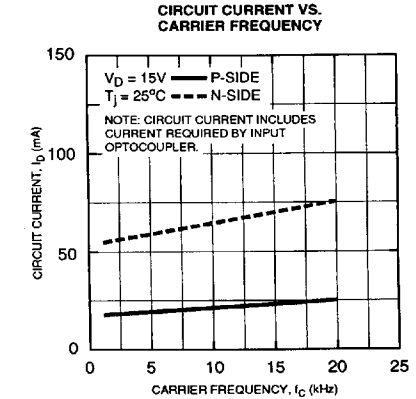
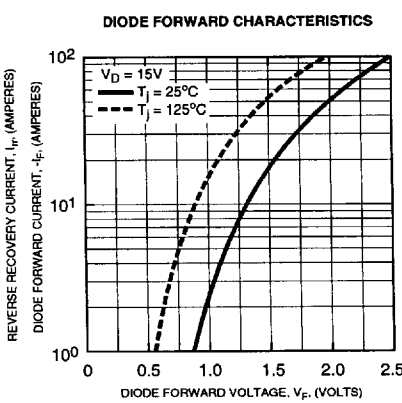
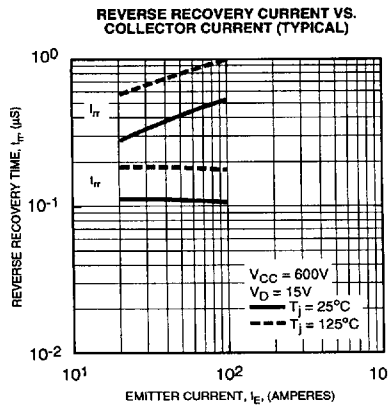
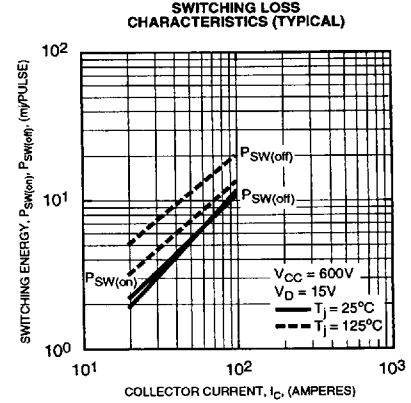
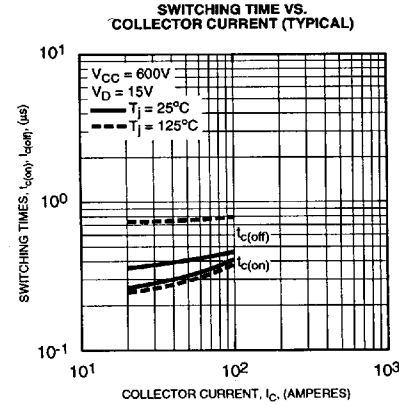
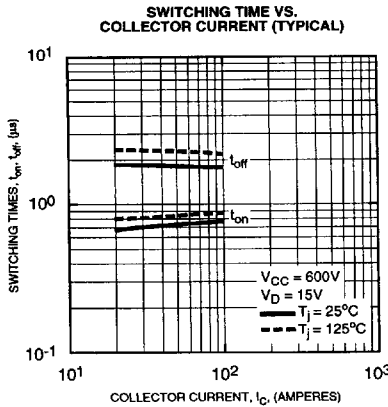
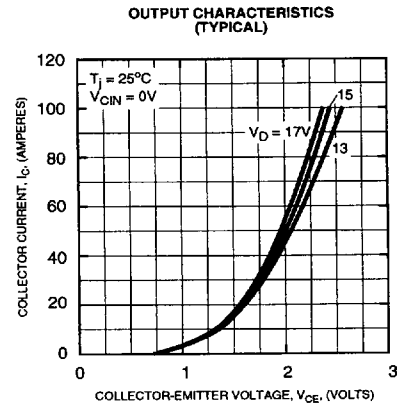
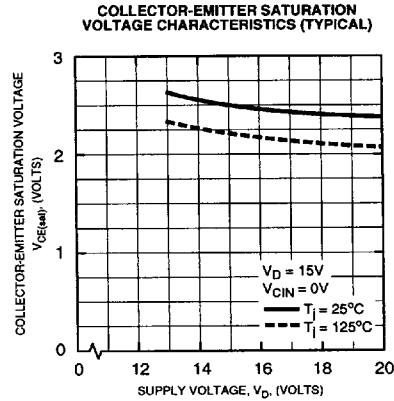
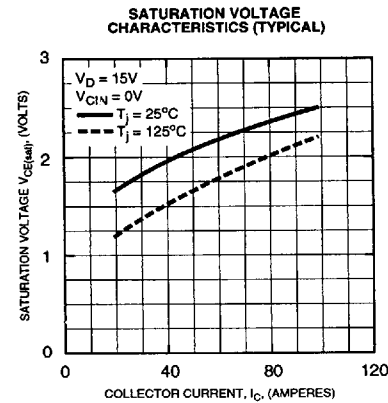
Recommended Conditions for Use

| Characteristic | Symbol | Condition | Value | Units |
|---------------------|----------------|--|----------------|---------------|
| Supply Voltage | V_{CC} | Applied across P-N Terminals | 0 ~ 800 | Volts |
| | V_D | Applied between $V_{UP1}-V_{UPC}, V_{N1}-V_{NC}, V_{VP1}-V_{VPC}, V_{WP1}-V_{WPC}$ | 15 ± 1.5 | Volts |
| Input ON Voltage | $V_{CIN(on)}$ | Applied between | 0 ~ 0.8 | Volts |
| Input OFF Voltage | $V_{CIN(off)}$ | $U_P, V_P, W_P, U_N, V_N, W_N$ | $4.0 \sim V_D$ | Volts |
| PWM Input Frequency | f_{PWM} | Using Application Circuit | 5 ~ 20 | kHz |
| Minimum Dead Time | t_{DEAD} | Using Application Circuit Optocoupler's Input Signal | 4.5 | μS |



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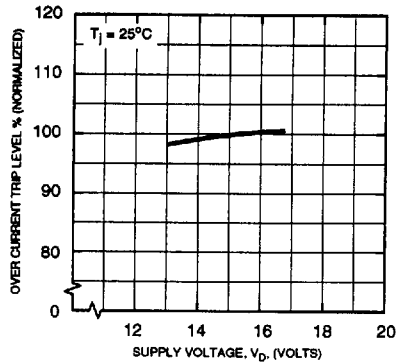




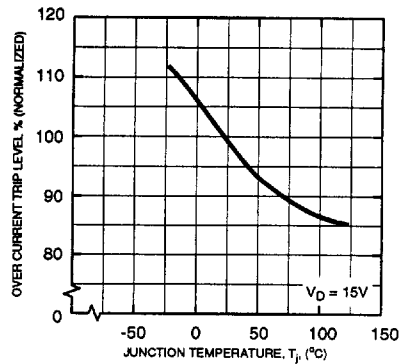
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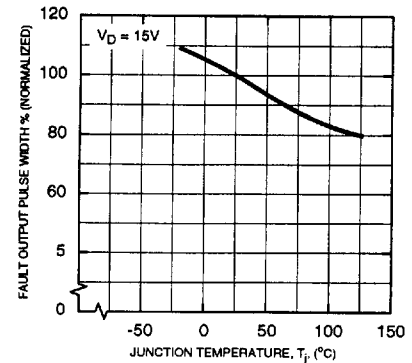
OVER CURRENT TRIP LEVEL VS.
SUPPLY VOLTAGE (TYPICAL)



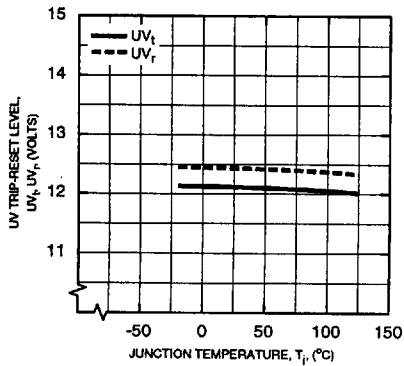
OVER CURRENT TRIP LEVEL
TEMPERATURE DEPENDENCY (TYPICAL)



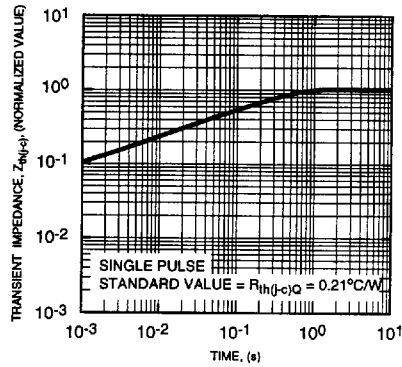
FAULT OUTPUT PULSE WIDTH VS.
TEMPERATURE (TYPICAL)



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



TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(IGBT REGION)



TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(FWDI REGION)

