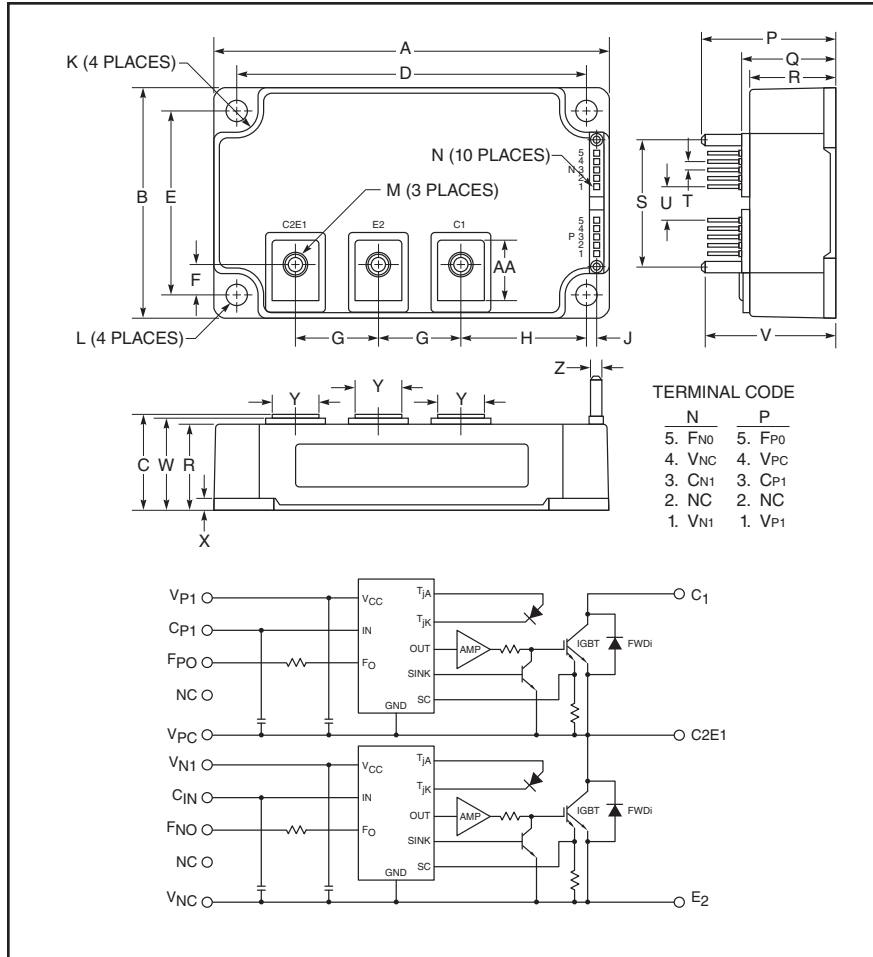


### Intellimod™ Module Single Phase IGBT Inverter Output 200 Amperes/1200 Volts



#### 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. PM200DV1A120 is a 1200V, 200 Ampere Intellimod™ Intelligent Power Module.

Type	Current Rating Amperes	V <sub>CES</sub> Volts (x 10)
PM	200	120

#### Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	4.72	120.0
B	2.76	70.0
C	1.14 +0.04/-0.02	29.0 +1.0/-0.5
D	4.17±0.010	106.0±0.25
E	2.20±0.010	56.0±0.25
F	0.37	9.3
G	0.98	25.0
H	1.50	38.0
J	0.12±0.02	3.0±0.5
K	0.26 Rad.	6.5 Rad.
L	0.26 Dia.	6.5 Dia.
M	M6 Metric	M6
N	0.025 Sq.	0.64 Sq.

Dimensions	Inches	Millimeters
P	1.59	40.5
Q	1.14	29.0
R	1.02	26.0
S	1.52	38.5
T	0.10	2.54
U	0.40	10.16
V	1.54	39.0
W	1.10	28.0
X	0.14	3.5
Y	0.55	14.0
Z	0.14 Dia.	3.5 Dia.
AA	0.72	18.3



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**PM200DV1A120**  
**Intellimod™ Module**  
**Single Phase IGBT Inverter Output**  
 200 Amperes/1200 Volts

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

Characteristics	Symbol	PM200DV1A120	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)	—	43	in-lb
Mounting Torque, M6 Main Terminal Screws (Typical)	—	43	in-lb
Module Weight (Typical)	—	510	Grams
Supply Voltage Protected by SC ( $V_D = 13.5 \sim 16.5\text{V}$ , Inverter Part, $T_j = 125^\circ\text{C}$ Start)	$V_{CC(prot)}$	800	Volts
Surge Supply Voltage (Applied between C1-E2, Surge Value)	$V_{CC(surge)}$	1000	Volts
Isolation Voltage, (60Hz, Sinusoidal, Charged Part to Base, AC 1 minute)	$V_{RMS}$	2500	Volts

**Inverter Sector**

Collector-Emitter Voltage ( $V_D = 15\text{V}$ , $V_{CIN} = 15\text{V}$ )	$V_{CES}$	1200	Volts
Collector Current ( $T_C = 25^\circ\text{C}$ )	$I_C$	200	Amperes
Peak Collector Current (Pulse)	$I_{CRM}$	400	Amperes
Emitter Current ( $T_C = 25^\circ\text{C}$ )	$I_E$	200	Amperes
Peak Emitter Current (Pulse)	$I_{ERM}$	400	Amperes
Total Power Dissipation ( $T_C = 25^\circ\text{C}$ )* <sup>1</sup>	$P_{tot}$	1388	Watts

**Control Sector**

Supply Voltage (Applied Between $V_{P1}-V_{PC}$ , $V_{N1}-V_{NC}$ )	$V_D$	20	Volts
Input Voltage (Applied Between $C_{P1}-V_{PC}$ , $V_{N1}-V_{NC}$ )	$V_{CIN}$	20	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 $F_{PO}$ , $F_{NO}$ Terminals)	$I_{FO}$	20	mA

\*1 Case temperature ( $T_C$ ) measured point is just under the chips.



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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
<b>IGBT Inverter Sector</b>						
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 200\text{A},$ Pulsed, $T_j = 25^\circ\text{C}$	—	1.65	2.15	Volts
		$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 200\text{A},$ Pulsed, $T_j = 125^\circ\text{C}$	—	1.85	2.35	Volts
Emitter-Collector Voltage	$V_{EC}$	$I_E = 200\text{A}, V_D = 15\text{V}, V_{CIN} = 15\text{V}$	—	2.3	3.3	Volts
Switching Times	$t_{on}$	$V_D = 15\text{V}, V_{CIN} = 0 \sim 15\text{V},$	0.3	0.8	2.0	$\mu\text{s}$
	$t_{rr}$	$V_{CC} = 600\text{V}, I_C = 200\text{A},$	—	0.3	0.8	$\mu\text{s}$
	$t_{C(on)}$	$T_j = 125^\circ\text{C},$	—	0.4	1.0	$\mu\text{s}$
	$t_{off}$	Inductive Load	—	2.4	3.3	$\mu\text{s}$
	$t_{C(off)}$	(Per 1 Arm)	—	0.4	1.2	$\mu\text{s}$
Collector-Emitter Cutoff Current	$I_{CES}$	$V_{CE} = V_{CES}, V_D = 15\text{V},$ $V_{CIN} = 15, T_j = 25^\circ\text{C}$	—	—	1.0	mA
		$V_{CE} = V_{CES}, V_D = 15\text{V},$ $V_{CIN} = 15, T_j = 125^\circ\text{C}$	—	—	10.0	mA

**Control Sector**

Circuit Current	$I_D$	$V_D = 15\text{V}, V_{CIN} = 15\text{V}, V_{P1}-V_{PC}$	—	2	4	mA
		$V_D = 15\text{V}, V_{CIN} = 15\text{V}, V_{N1}-V_{NC}$	—	2	4	mA
Input ON Threshold Voltage	$V_{th(on)}$	Applied Between	1.2	1.5	1.8	Volts
Input OFF Threshold Voltage	$V_{th(off)}$	$C_{P1}-V_{PC}, C_{N1}-V_{NC}$	1.7	2.0	2.3	Volts
Short Circuit Trip Level	SC	$-20^\circ\text{C} \leq T_j \leq 125^\circ\text{C}, V_D = 15\text{V}$	300	—	—	Amperes
Short Circuit Current Delay Time	$t_{off(SC)}$	$V_D = 15\text{V}$	—	0.2	—	$\mu\text{s}$
Over Temperature Protection (Detect Temperature of Chip)	OT	Trip Level	135	—	—	$^\circ\text{C}$
	$OT_{(hys)}$	Reset Level	—	20	—	$^\circ\text{C}$
Supply Circuit Under Voltage Protection ( $T_j \leq 125^\circ\text{C}$ )	UV	Trip Level	11.5	12.0	12.5	Volts
	$UV_r$	Hysteresis	—	12.5	—	Volts
Fault Output Current	$I_{FO(H)}$	$V_D = 15\text{V}, V_{FO} = 15\text{V}^{*2}$	—	—	0.01	mA
	$I_{FO(L)}$	$V_D = 15\text{V}, V_{FO} = 15\text{V}^{*2}$	—	10	15	mA
Fault Output Pulse Width	$t_{FO}$	$V_D = 15\text{V}^{*2}$	1.0	1.8	—	ms

\*2 Fault output is given only when the internal SC, OT and UV protection.  
 Fault output of SC, OT and UV protection operate by lower arms.  
 Fault output of SC protection given pulse.  
 Fault output of OT, UV protection given pulse while over trip level.



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### Thermal Characteristics

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Units
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	Inverter IGBT (Per 1 Element) <sup>*1</sup>	—	—	0.09	K/Watt
	$R_{th(j-c)D}$	Inverter FWDi (Per 1 Element) <sup>*1</sup>	—	—	0.146	K/Watt
Contact Thermal Resistance	$R_{th(c-s)}$	Case to Heatsink (Per 1 Module), Thermal Grease Applied <sup>*1</sup>	—	0.018	—	K/Watt

### Recommended Conditions for Use

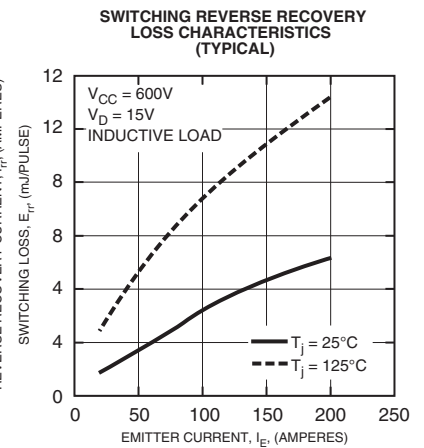
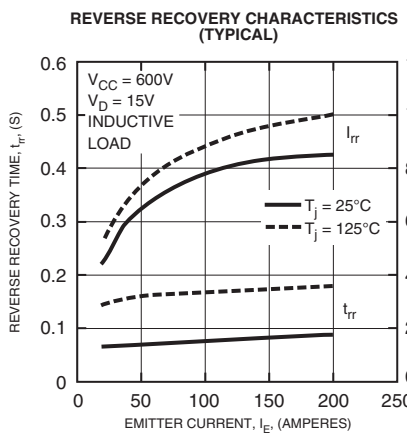
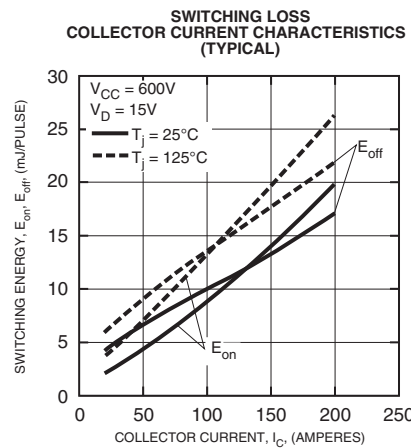
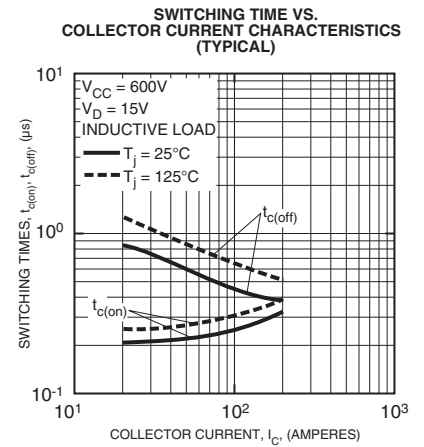
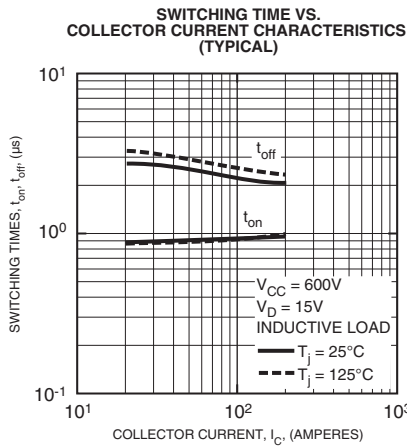
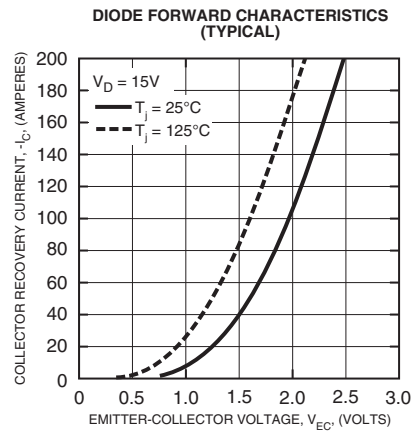
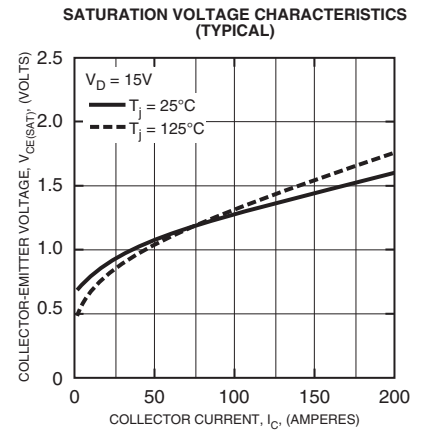
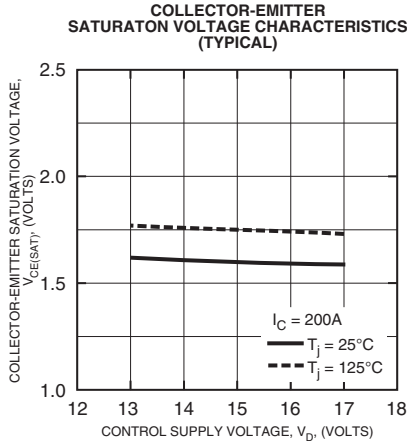
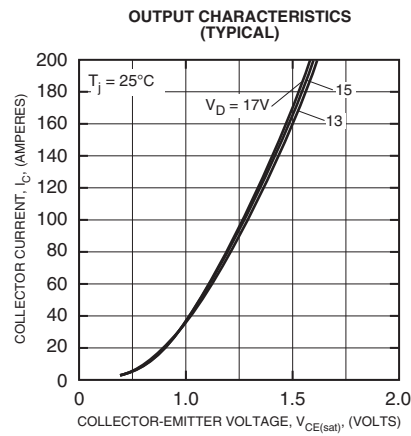
Characteristic	Symbol	Condition	Value	Units
Supply Voltage	$V_{CC}$	Applied Across C1-E2 Terminals	$\leq 800$	Volts
Control Supply Voltage	$V_D$	Applied Between $V_{P1}-V_{PC}$ , $V_{N1}-V_{NC}$ <sup>*3</sup>	$15 \pm 1.5$	Volts
Input ON Voltage	$V_{CIN(on)}$	Applied Between	$\leq 0.8$	Volts
Input OFF Voltage	$V_{CIN(off)}$	$C_{P1}-V_{PC}$ , $C_{N1}-V_{NC}$	$\geq 4.0$	Volts
PWM Input Frequency	$f_{PWM}$	Using Application Circuit	$\leq 20$	kHz
Arm Shoot-Through Blocking Time	$t_{DEAD}$	For IPM's each Input Signal	$\geq 3.5$	$\mu s$

\*1 Case temperature ( $T_C$ ) measured point is just under the chips.

\*3 With ripple satisfying the following conditions:  $dv/dt$  swing  $\leq \pm 5V/\mu s$ , variation  $\leq 2V$  peak to peak.



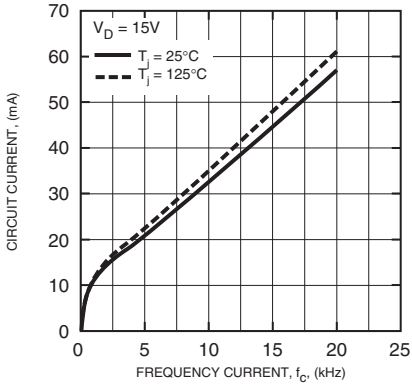
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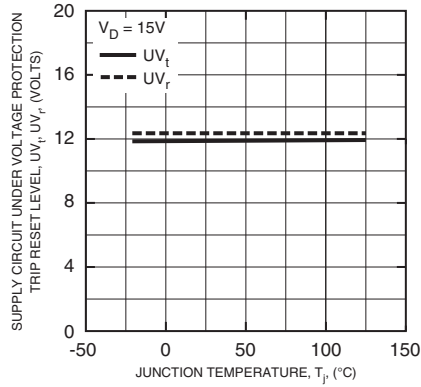


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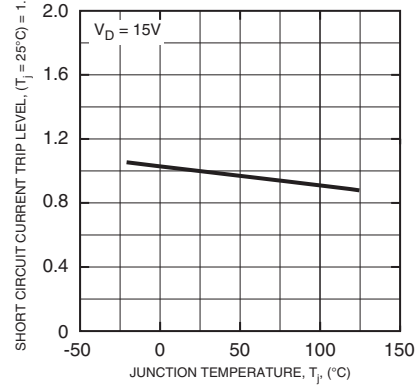
**CIRCUIT CURRENT VS. FREQUENCY CURRENT (TYPICAL)**



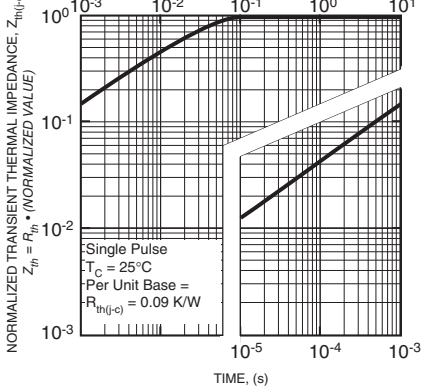
**CONTROL SUPPLY VOLTAGE TRIP-RESET LEVEL TEMPERATURE DEPENDENCY (TYPICAL)**



**SHORT CIRCUIT TRIP LEVEL VS. JUNCTION TEMPERATURE (TYPICAL)**



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT)**



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (FWDI)**

