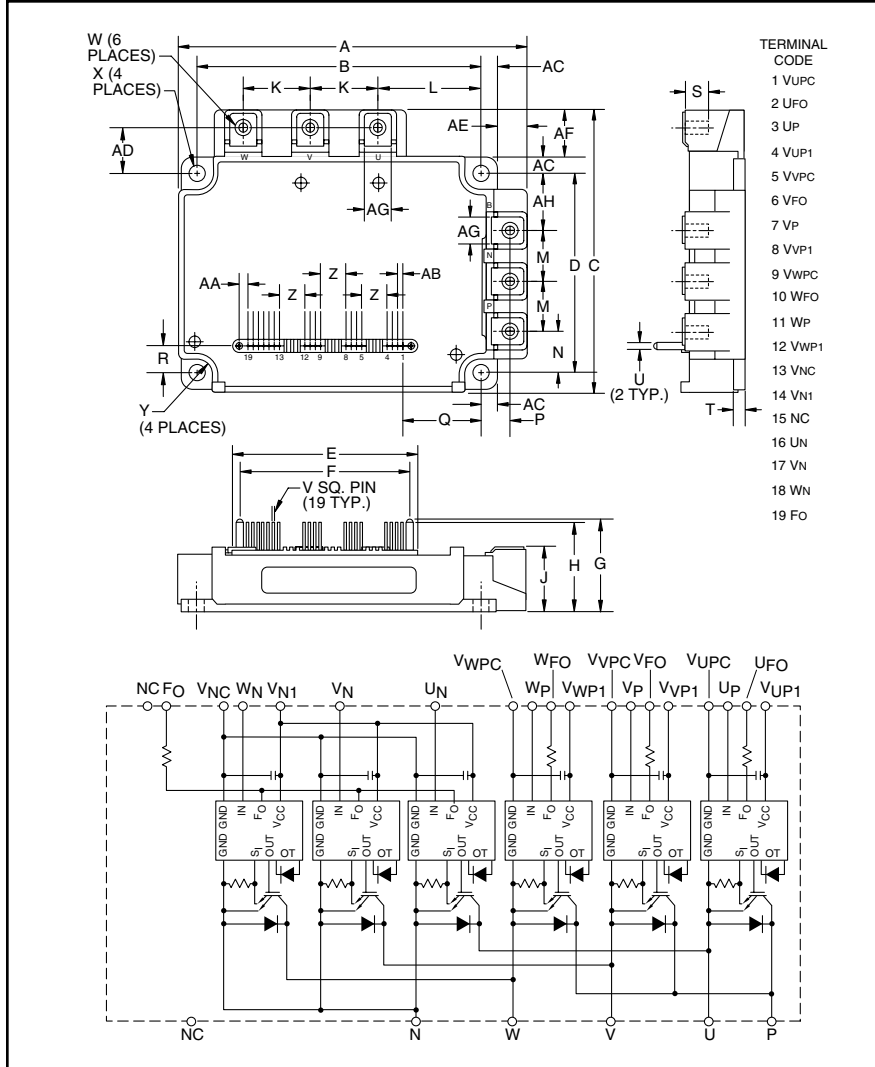


### Intellimod™ L-Series Three Phase IGBT Inverter 200 Amperes/600 Volts



Outline Drawing and Circuit Diagram



#### 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
  - Using On-chip Temperature Sensing
  - Under Voltage
- Low Loss Using 5th Generation IGBT Chip

#### Applications:

- Inverters
- UPS
- Motion/Servo Control
- Power Supplies

#### Ordering Information:

Example: Select the complete part number from the table below -i.e. PM200CLA060 is a 600V, 200 Ampere Intellimod™ Intelligent Power Module.

Dimensions	Inches	Millimeters
A	5.31	135.0
B	4.33±0.02	110±0.5
C	4.33	110.0
D	3.07	78.0±0.5
E	2.81	71.5
F	2.62	66.5
G	1.37	34.7
H	1.32	33.6
J	0.95+0.04/-0.01	24.1+1.0/-0.5
K	1.02	26.0
L	1.59	40.5
M	0.79	20.0
N	0.65	16.5
P	0.43±0.01	11.0±0.3
Q	1.19	30.15
R	0.43	11.0

Dimensions	Inches	Millimeters
S	0.51	13.0
T	0.16	4.0
U	0.1 Dia.	Dia.2.5
V	0.02 Sq.	Sq. 0.5
W	M5 Metric	M5
X	0.22 Dia.	Dia. 5.5
Y	0.24 Rad.	Rad. 6
Z	0.39	10.0
AA	0.13	3.25
AB	0.08	2.0
AC	0.24	6.05
AD	0.71	18.0
AE	0.46	11.7
AF	0.74	18.7
AG	0.41	10.5
AH	0.85	21.5

Type	Current Rating Amperes	V <sub>CEs</sub> Volts (x 10)
PM	200	60

**PM200CLA060**  
**Intellimod™ L-Series**  
**Three Phase IGBT Inverter**  
 200 Amperes/600 Volts

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

Characteristics	Symbol	PM200CLA060	Units
Power Device Junction Temperature	$T_j$	-20 to 150	$^\circ\text{C}$
Storage Temperature	$T_{\text{stg}}$	-40 to 125	$^\circ\text{C}$
Mounting Torque, M5 Mounting Screws	—	31	in-lb
Mounting Torque, M5 Main Terminal Screws	—	31	in-lb
Module Weight (Typical)	—	800	Grams
Supply Voltage, Surge (Applied between P - N)	$V_{\text{CC(surge)}}$	550	Volts
Self-protection Supply Voltage Limit (Short Circuit protection Capability)*	$V_{\text{CC(prot.)}}$	400	Volts
Isolation Voltage, AC 1 minute, 60Hz Sinusoidal	$V_{\text{ISO}}$	2500	Volts

\*VD = 13.5 ~ 16.5V, Inverter Part,  $T_j = 125^\circ\text{C}$

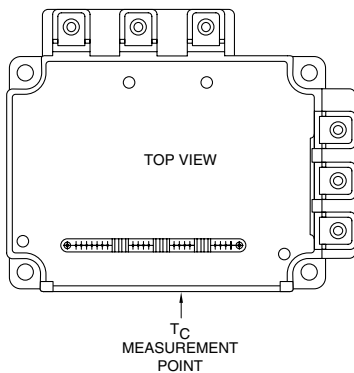
### IGBT Inverter Sector

Collector-Emitter Voltage ( $V_D = 15\text{V}$ , $V_{\text{CIN}} = 15\text{V}$ )	$V_{\text{CES}}$	600	Volts
Collector Current ( $T_C = 25^\circ\text{C}$ )	$\pm I_C$	200	Amperes
Peak Collector Current ( $T_C = 25^\circ\text{C}$ )	$\pm I_{\text{CP}}$	400	Amperes
Collector Dissipation ( $T_C = 25^\circ\text{C}$ )	$P_C$	600	Watts

### Control Sector

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

Note 1:  $T_C$  (Base Plate) Measurement Point



**PM200CLA060**  
**Intellimod™ L-Series**  
**Three Phase IGBT Inverter**  
**200 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	$I_{CES}$	$V_{CE} = V_{CES}, V_D = 15V, T_j = 25^\circ\text{C}$	—	—	1.0	mA
		$V_{CE} = V_{CES}, V_D = 15V, T_j = 125^\circ\text{C}$	—	—	10	mA
Diode Forward Voltage	$V_{EC}$	$-I_C = 200A, V_{CIN} = 15V, V_D = 15V$	—	2.2	3.3	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15V, V_{CIN} = 0V, I_C = 200A, T_j = 25^\circ\text{C}$	—	1.6	2.1	Volts
		$V_D = 15V, V_{CIN} = 0V, I_C = 200A, T_j = 125^\circ\text{C}$	—	1.5	2.0	Volts
Inductive Load Switching Times	$t_{on}$		0.5	1.0	2.4	$\mu\text{s}$
	$t_{rr}$	$V_D = 15V, V_{CIN} = 0 \Leftrightarrow 15V$	—	0.2	0.4	$\mu\text{s}$
	$t_{C(on)}$	$V_{CC} = 300V, I_C = 200A$	—	0.4	1.0	$\mu\text{s}$
	$t_{off}$	$T_j = 125^\circ\text{C}$	—	1.2	2.5	$\mu\text{s}$
	$t_{C(off)}$		—	0.5	1.0	$\mu\text{s}$
<b>Control Sector</b>						
Short Circuit Trip Level	SC	$-20^\circ\text{C} \leq T_j \leq 125^\circ\text{C}, V_D = 15V$	400	—	—	Amperes
Short Circuit Current Delay Time	$t_{off(SC)}$	$V_D = 15V$	—	0.2	—	$\mu\text{s}$
Over Temperature Protection	OT	Trip Level	135	145	155	$^\circ\text{C}$
(Detect $T_j$ of IGBT Chip)	$OT_R$	Reset Level	—	125	—	$^\circ\text{C}$
Supply Circuit Under-voltage Protection	UV	Trip Level	11.5	12.0	12.5	Volts
( $-20 \leq T_j \leq 125^\circ\text{C}$ )	$UV_R$	Reset Level	—	12.5	—	Volts
Circuit Current	$I_D$	$V_D = 15V, V_{CIN} = 15V, V_{N1}-V_{NC}$	—	18	28	mA
		$V_D = 15V, V_{CIN} = 15V, V_{XP1}-V_{XPC}$	—	6	12	mA
Input ON Threshold Voltage	$V_{th(on)}$	Applied between $U_P-V_{UPC}$ .	1.2	1.5	1.8	Volts
Input OFF Threshold Voltage	$V_{th(off)}$	$V_P-V_{VPC}, W_P-V_{WPC}, U_N-V_N, W_N-V_{NC}$	1.7	2.0	2.3	Volts
Fault Output Current*	$I_{FO(H)}$	$V_D = 15V, V_{CIN} = 15V$	—	—	0.01	mA
	$I_{FO(L)}$	$V_D = 15V, V_{CIN} = 15V$	—	10	15	mA
Fault Output Pulse Width*	$t_{FO}$	$V_D = 15V$	1.0	1.8	—	ms

\*Fault output is given only when the internal SC, OT and UV protections schemes of either upper or lower device operate to protect it.



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

**PM200CLA060**  
**Intellimod™ L-Series**  
**Three Phase IGBT Inverter**  
**200 Amperes/600 Volts**

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
-----------------	--------	-----------------	------	------	------	-------

**Thermal Characteristics**

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Units
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	IGBT (Per 1/6 Module) (Note 1)	—	—	0.21	$^\circ\text{C/Watt}$
	$R_{th(j-c)D}$	FWDi (Per 1/6 Module) (Note 1)	—	—	0.33	$^\circ\text{C/Watt}$
	$R_{th(j-c)Q}$	IGBT (Per 1/6 Module)	—	—	0.16	$^\circ\text{C/Watt}$
	$R_{th(j-c)D}$	FWDi (Per 1/6 Module)	—	—	0.25	$^\circ\text{C/Watt}$
Contact Thermal Resistance	$R_{th(c-f)}$	Case to Fin Per Module, Thermal Grease Applied	—	—	0.023	$^\circ\text{C/Watt}$

**Recommended Conditions for Use**

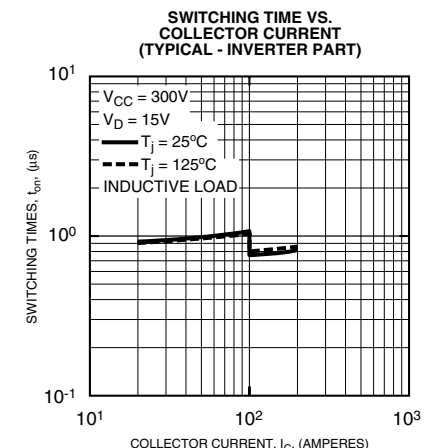
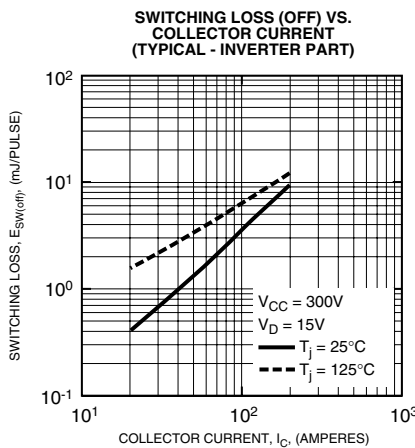
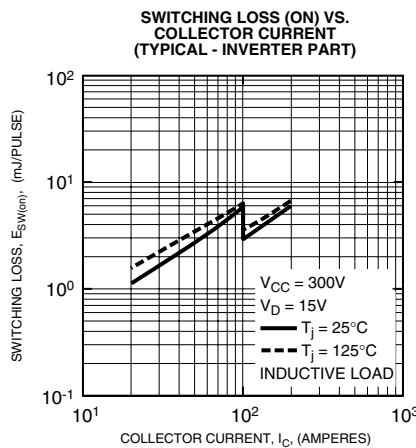
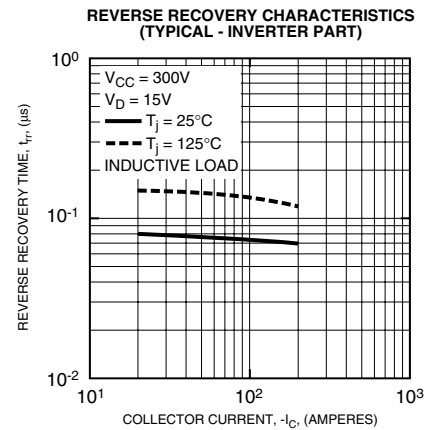
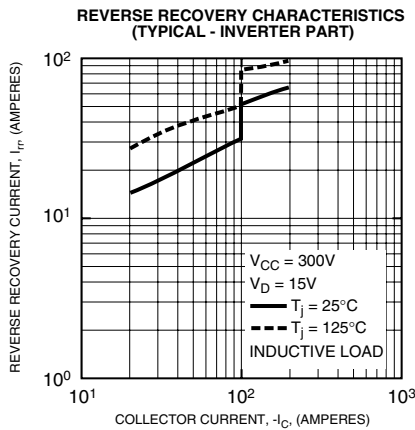
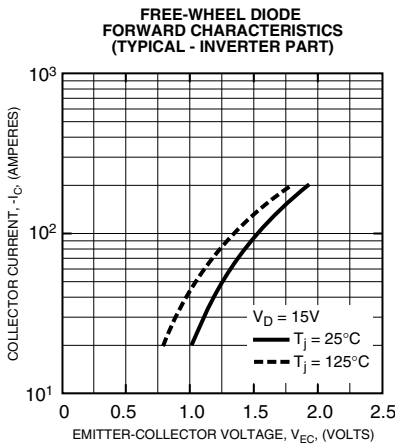
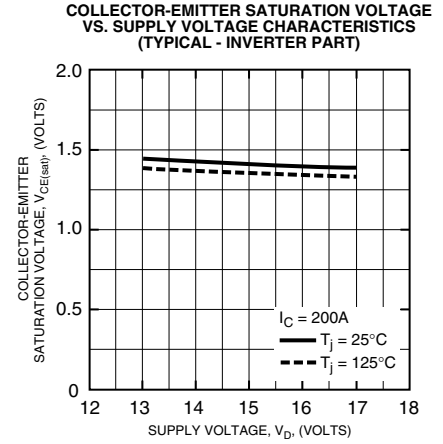
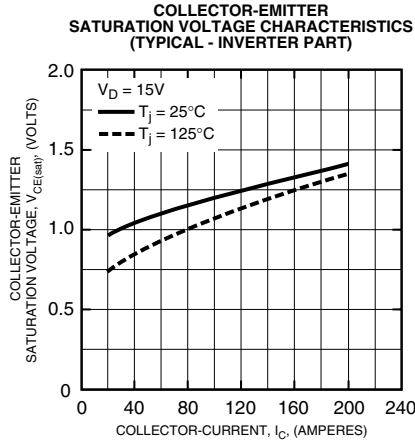
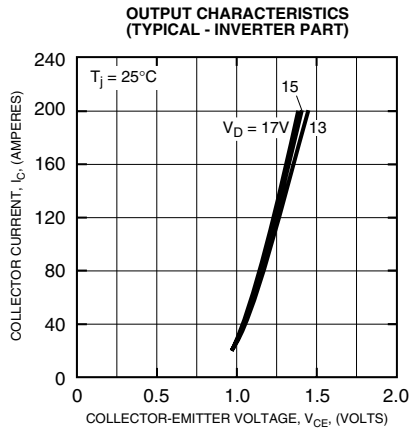
Characteristic	Symbol	Condition	Value	Units
Supply Voltage	$V_{CC}$	Applied across P-N Terminals	$\leq 400$	Volts
Control Supply Voltage*	$V_D$	Applied between $V_{UP1}-V_{UPC}$ , $V_{VP1}-V_{VPC}$ , $V_{WP1}-V_{WPC}$ , $V_{N1}-V_{NC}$	$15.0 \pm 1.5$	Volts
Input ON Voltage	$V_{CIN(on)}$	Applied between $U_P-V_{UPC}$ ,	$\leq 0.8$	Volts
Input OFF Voltage	$V_{CIN(off)}$	$V_P-V_{VPC}$ , $W_P-V_{WPC}$ , $U_N-V_N$ , $W_N-V_{NC}$	$\geq 9.0$	Volts
PWM Input Frequency	$f_{PWM}$	—	$\leq 20$	kHz
Arm Shoot-through Blocking Time	$t_{DEAD}$	Input Signal	$\geq 2.0$	$\mu\text{s}$

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



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

**PM200CLA060**  
**Intellimod™ L-Series**  
**Three Phase IGBT Inverter**  
 200 Amperes/600 Volts



**PM200CLA060**  
**Intellimod™ L-Series**  
**Three Phase IGBT Inverter**  
 200 Amperes/600 Volts

