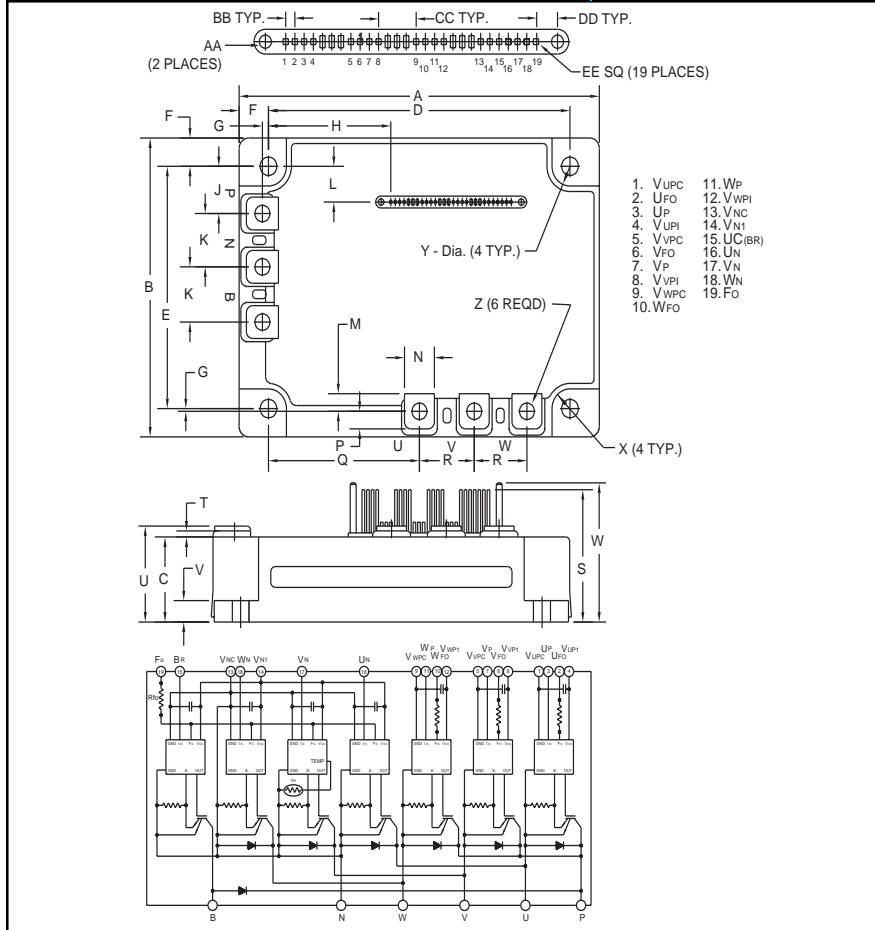


### Intellimod™ Module Three Phase + Brake IGBT Inverter Output 200 Amperes/600 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	5.31±0.04	135.0±1.0
B	4.33±0.04	110.0±1.0
C	0.84	21.3
D	4.74±0.02	120.5±0.5
E	3.76±0.02	95.5±0.5
F	0.29	7.25
G	0.02±0.1	0.5±0.3
H	1.60	40.68
J	0.65	16.5
K	0.79	20.0
L	0.43	11.0
M	0.29	7.4
N	0.39	10.0
P	0.24	6.0
Q	2.01	51.0

Dimensions	Inches	Millimeters
R	1.02	26.0
S	1.33	33.7
T	0.07	1.8
U	0.95+0.06	24.1 +1.5
V	0.28	7.0
W	1.37	34.7
X	0.24 Rad.	Rad. 6.0
Y	0.22 Dia.	Dia. 5.5
Z	M5 Metric	M5
AA	0.10	2.54
BB	0.08	2.0
CC	0.39	10.0
DD	0.13	3.22
EE	0.02	0.5



#### 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. PM200RSA060 is a 600V, 200 Ampere Intellimod™ Intelligent Power Module.

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



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

**PM200RSA060**  
**Intellimod™ Module**  
**Three Phase + Brake IGBT Inverter Output**  
**200 Amperes/600 Volts**

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

Characteristics	Symbol	PM200RSA060	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	—	17	in-lb
Mounting Torque, M5 Main Terminal Screw	—	17	in-lb
Module Weight (Typical)	—	920	Grams
Supply Voltage Protected by OC and SC ( $V_D = 13.5 - 16.5\text{V}$ , Inverter Part, $T_j = 125^\circ\text{C}$ )	$V_{CC(prot.)}$	400	Volts
Isolation Voltage, AC 1 minute, 60Hz Sinsoidal	$V_{RMS}$	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 ( $U_P$ , $V_P$ , $W_P$ , $U_N$ , $V_N$ , $W_N$ , $B_r$ )	$V_{CIN}$	20	Volts
Fault Output Supply Voltage (Applied between $F_O-V_{NC}$ , $*F_O-V^*PC$ )	$V_{FO}$	20	Volts
Fault Output Current (Sink Current at $F_O$ Terminals)	$I_{FO}$	20	mA

**IGBT Inverter Sector**

Collector-Emitter Voltage ( $V_D = 15\text{V}$ , $V_{CIN} = 15\text{V}$ )	$V_{CES}$	600	Volts
Collector Current, $\pm$	$I_C$	200	Amperes
Peak Collector Current, $\pm$	$I_{CP}$	400	Amperes
Supply Voltage (Applied between P - N)	$V_{CC}$	450	Volts
Supply Voltage, Surge (Applied between P - N)	$V_{CC(surge)}$	500	Volts
Collector Dissipation	$P_C$	595	Watts

**Brake Sector**

Collector-Emitter Voltage ( $V_D = 15\text{V}$ , $V_{CIN} = 15\text{V}$ )	$V_{CES}$	600	Volts
Collector Current, $\pm$	$I_C$	75	Amperes
Peak Collector Current, $\pm$	$I_{CP}$	150	Amperes
Supply Voltage (Applied between P - N)	$V_{CC}$	450	Volts
Supply Voltage, Surge (Applied between P - N)	$V_{CC(surge)}$	500	Volts
Collector Dissipation	$P_C$	370	Watts
Diode Forward Current	$I_F$	75	Amperes
Diode DC Reverse Voltage	$V_{R(DC)}$	600	Volts



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**PM200RSA060**  
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**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>Control Sector</b>						
Over Current Trip Level Inverter Part	OC	$-20^\circ\text{C} \leq T \leq 125^\circ\text{C}$	310	400	—	Amperes
Over Current Trip Level Brake Part			115	161	—	Amperes
Short Circuit Trip Level Inverter Part	SC	$-20^\circ\text{C} \leq T \leq 125^\circ\text{C}$	—	560	—	Amperes
Short Circuit Trip Level Brake Part			—	241	—	Amperes
Over Current Delay Time	$t_{\text{off}}(\text{OC})$	$V_D = 15\text{V}$	—	10	—	$\mu\text{S}$
Over Temperature Protection	OT	Trip Level	111	118	125	$^\circ\text{C}$
	$\text{OT}_R$	Reset Level	—	100	—	$^\circ\text{C}$
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 $V_{\text{UP}1}\text{-}V_{\text{UPC}}$ , $V_{\text{VP}1}\text{-}V_{\text{VPC}}$ , $V_{\text{WP}1}\text{-}V_{\text{WPC}}$ , $V_{\text{N}1}\text{-}V_{\text{NC}}$	13.5	15	16.5	Volts
Circuit Current	$I_D$	$V_D = 15\text{V}$ , $V_{\text{CIN}} = 15\text{V}$ , $V_{\text{N}1}\text{-}V_{\text{NC}}$	—	52	72	mA
		$V_D = 15\text{V}$ , $V_{\text{CIN}} = 15\text{V}$ , $V_{\text{XP}1}\text{-}V_{\text{XPC}}$	—	13	18	mA
Input ON Threshold Voltage	$V_{\text{CIN}}(\text{on})$	Applied between	1.2	1.5	1.8	Volts
Input OFF Threshold Voltage	$V_{\text{CIN}}(\text{off})$	$U_P$ , $V_P$ , $W_P$ , $U_N$ , $V_N$ , $W_N$ , $B_r$	1.7	2.0	2.3	Volts
PWM Input Frequency	$f_{\text{PWM}}$	3- Sinusoidal	—	15	20	kHz
Fault Output Current	$I_{\text{FO}}(\text{H})$	$V_D = 15\text{V}$ , $V_{\text{FO}} = 15\text{V}$	—	—	0.01	mA
	$I_{\text{FO}}(\text{L})$	$V_D = 15\text{V}$ , $V_{\text{FO}} = 15\text{V}$	—	10	15	mA
Minimum Fault Output Pulse Width	$t_{\text{FO}}$	$V_D = 15\text{V}$	1.0	1.8	—	mS
<b>Brake Sector</b>						
Collector-Emitter Saturation Voltage	$V_{\text{CE}}(\text{sat})$	$V_D = 15\text{V}$ , $V_{\text{CIN}} = 0\text{V}$ , $I_C = 75\text{A}$ , $T_j = 25^\circ\text{C}$	—	1.8	2.7	Volts
		$V_D = 15\text{V}$ , $V_{\text{CIN}} = 0\text{V}$ , $I_C = 75\text{A}$ , $T_j = 125^\circ\text{C}$	—	1.85	2.78	Volts
Diode Forward Voltage	$V_{\text{FM}}$	$-I_C = 75\text{A}$ , $V_D = 15\text{V}$ , $V_{\text{CIN}} = 15\text{V}$	—	1.7	2.5	Volts
Collector Cutoff Current	$I_{\text{CES}}$	$V_{\text{CE}} = V_{\text{CES}}$ , $T_j = 25^\circ\text{C}$	—	—	1	mA
		$V_{\text{CE}} = V_{\text{CES}}$ , $T_j = 125^\circ\text{C}$	—	—	10	mA



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**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 Cutoff Current	$I_{CES}$	$V_{CE} = V_{CES}, T_j = 25^\circ\text{C}$	—	—	1	mA
		$V_{CE} = V_{CES}, T_j = 125^\circ\text{C}$	—	—	10	mA
Diode Forward Voltage	$V_{EC}$	$-I_C = 200\text{A}, V_D = 15\text{V}, V_{CIN} = 15\text{V}$	—	1.9	2.8	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 200\text{A}, T_j = 25^\circ\text{C}$	—	1.8	2.7	Volts
		$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 200\text{A}, T_j = 125^\circ\text{C}$	—	1.75	2.63	Volts
Inductive Load Switching Times	$t_{on}$		0.4	0.8	2.0	$\mu\text{S}$
	$t_{rr}$	$V_D = 15\text{V}, V_{CIN} = 0 \sim 15\text{V}$	—	0.15	0.3	$\mu\text{S}$
	$t_{C(on)}$	$V_{CC} = 300\text{V}, I_C = 200\text{A}$	—	0.4	1.0	$\mu\text{S}$
	$t_{off}$	$T_j = 125^\circ\text{C}$	—	2.0	2.9	$\mu\text{S}$
	$t_{C(off)}$		—	0.7	1.2	$\mu\text{S}$

**Thermal Characteristics**

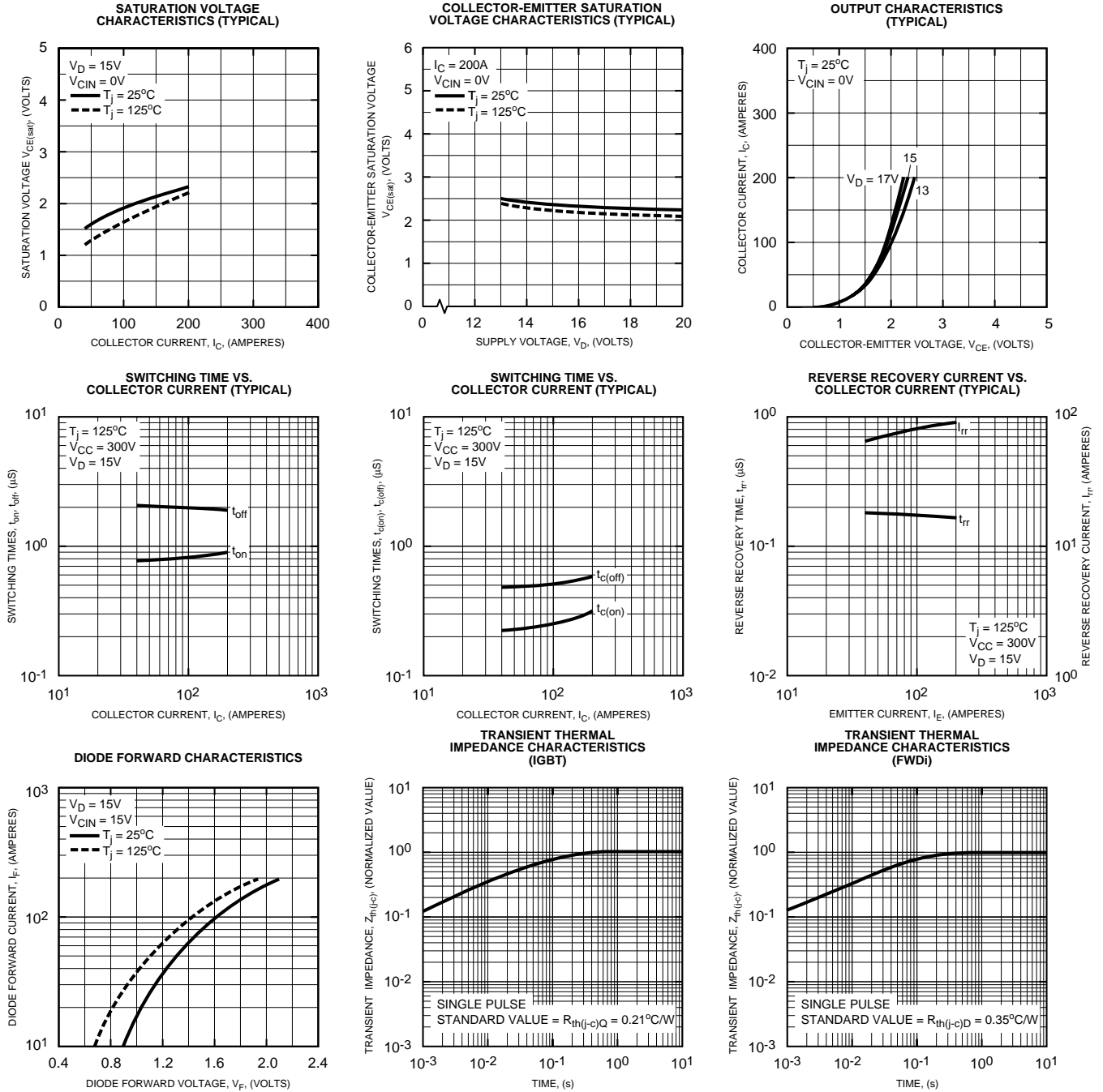
Characteristic	Symbol	Condition	Min.	Typ.	Max.	Units
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	Each Inverter IGBT	—	—	0.21	$^\circ\text{C/Watt}$
	$R_{th(j-c)D}$	Each Inverter FWDi	—	—	0.35	$^\circ\text{C/Watt}$
	$R_{th(c-f)Q}$	Each Brake IGBT	—	—	0.33	$^\circ\text{C/Watt}$
	$R_{th(c-f)D}$	Each Brake FWDi	—	—	0.8	$^\circ\text{C/Watt}$
Contact Thermal Resistance	$R_{th(c-f)}$	Case to Fin Per Module, 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	$\leq 400$	Volts
	$V_D$	Applied between $V_{UP1}-V_{UPC}, V_{N1}-V_{NC}, V_{VP1}-V_{VPC}, V_{WP1}-V_{WPC}$	$15 \pm 1.5$	Volts
Input ON Voltage	$V_{CIN(on)}$	Applied between	$\leq 0.8$	Volts
Input OFF Voltage	$V_{CIN(off)}$	$U_P, V_P, W_P, U_N, V_N, W_N, B_r$	$\geq 4.0$	Volts
PWM Input Frequency	$f_{PWM}$	Using Application Circuit	$\leq 20$	kHz
Minimum Dead Time	$t_{DEAD}$	Input Signal	$\geq 2.5$	$\mu\text{S}$

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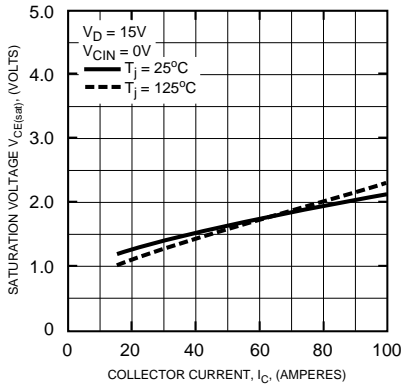
**Inverter Part**



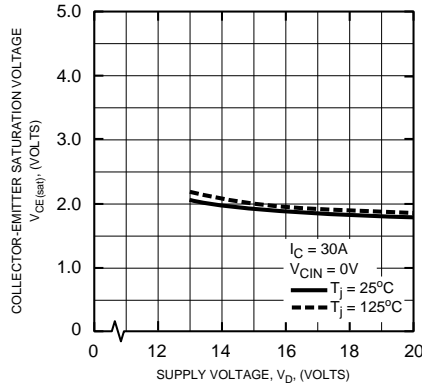
**PM200RSA060**  
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**Brake Part**

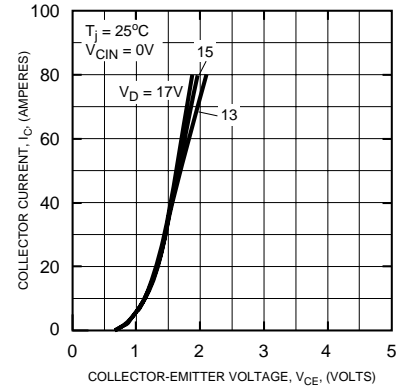
**SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)**



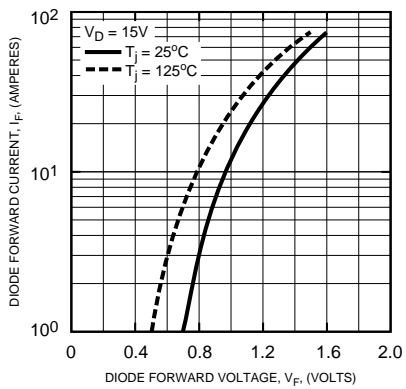
**COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)**



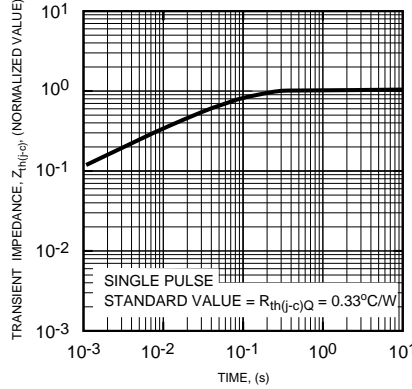
**OUTPUT CHARACTERISTICS (TYPICAL)**



**DIODE FORWARD CHARACTERISTICS**



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT)**



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (FWD)**

