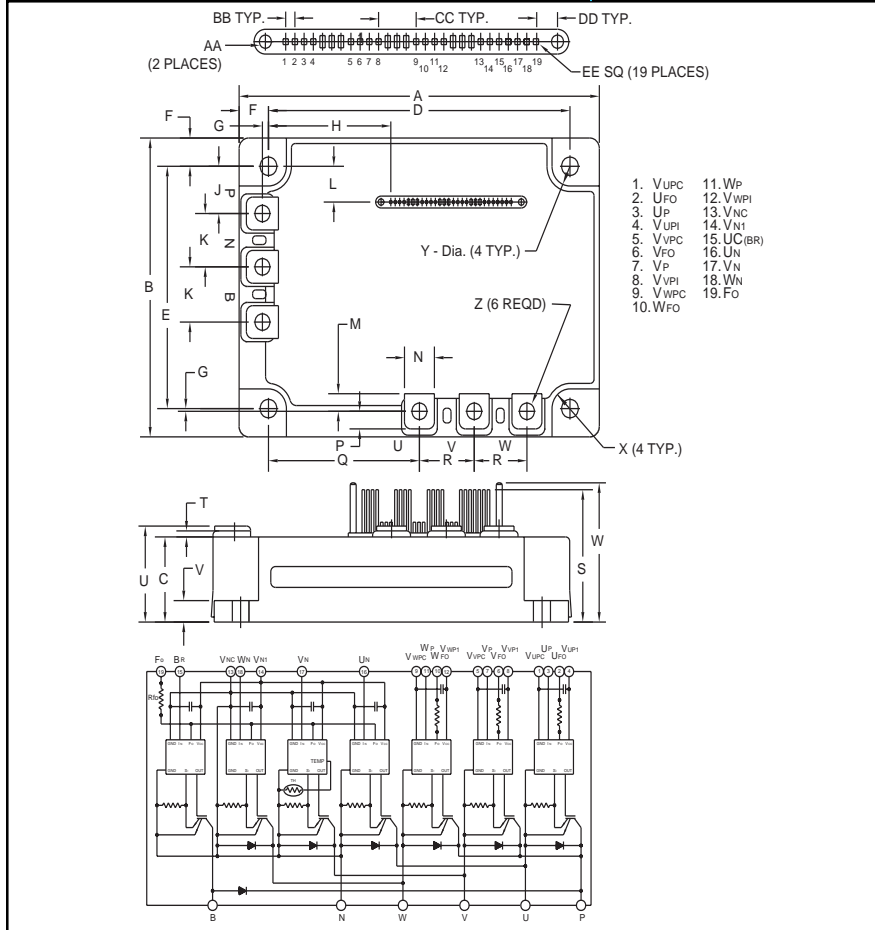




**THE DATASHEET OF
PM200RSA060**



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 _{CEs} 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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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	$-20^\circ\text{C} \leq T \leq 125^\circ\text{C}$	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	—	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 $V_{\text{UP}1}\text{-}V_{\text{UPC}}$, $V_{\text{VP}1}\text{-}V_{\text{VPC}}$, $V_{\text{WP}1}\text{-}V_{\text{WPC}}$, $V_{\text{N}1}\text{-}V_{\text{NC}}$	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_{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_{FO}	$V_D = 15\text{V}$	1.0	1.8	—	mS
Brake Sector						
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_{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_{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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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	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	μS
	t_{rr}	$V_D = 15\text{V}, V_{CIN} = 0 \sim 15\text{V}$	—	0.15	0.3	μS
	$t_{C(on)}$	$V_{CC} = 300\text{V}, I_C = 200\text{A}$	—	0.4	1.0	μS
	t_{off}	$T_j = 125^\circ\text{C}$	—	2.0	2.9	μS
	$t_{C(off)}$		—	0.7	1.2	μS

Thermal Characteristics

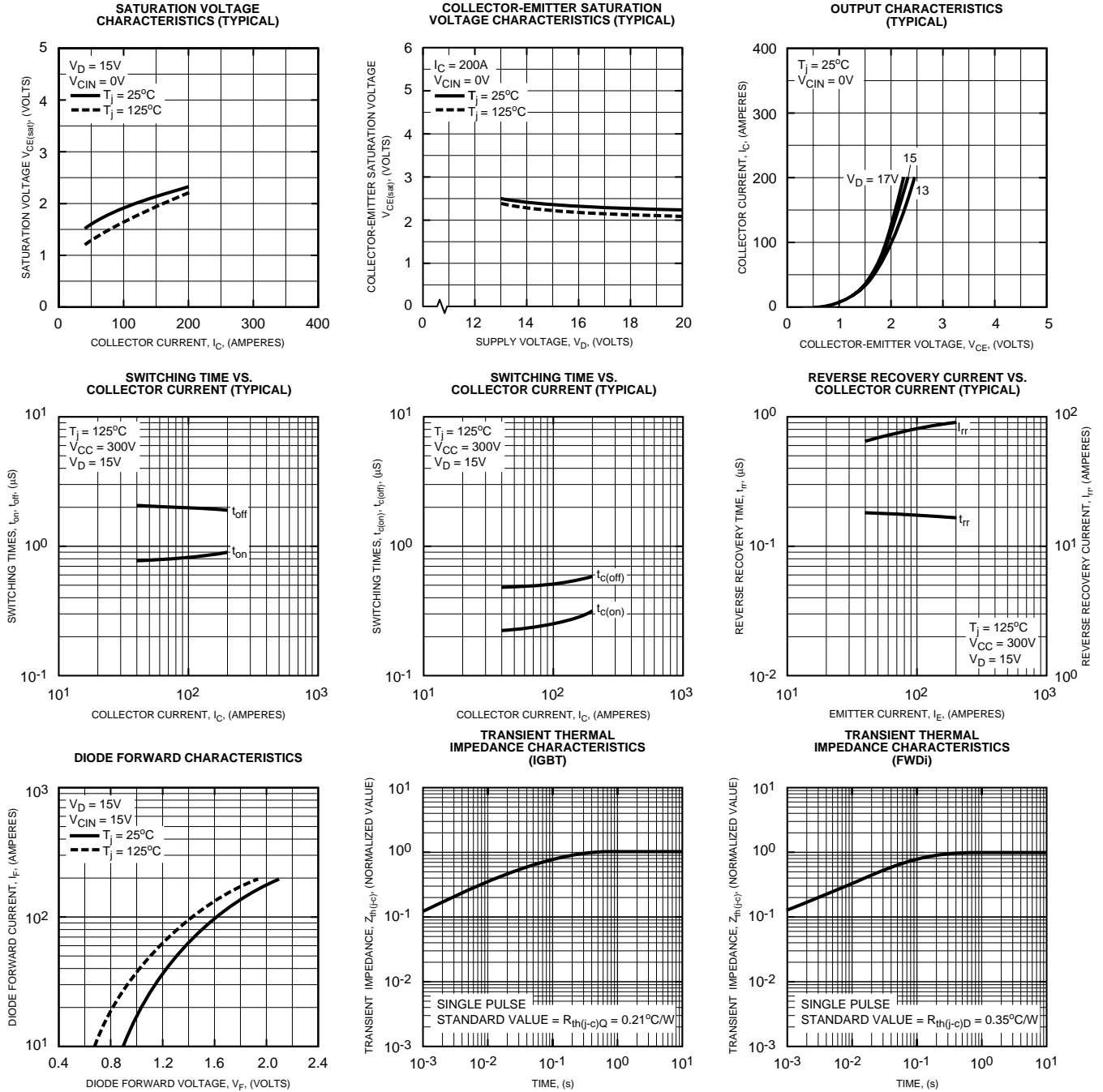
Characteristic	Symbol	Condition	Min.	Typ.	Max.	Units
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	Each Inverter IGBT	—	—	0.21	$^\circ\text{C/Watt}$
	$R_{th(j-c)D}$	Each Inverter FWDi	—	—	0.35	$^\circ\text{C/Watt}$
	$R_{th(c-f)Q}$	Each Brake IGBT	—	—	0.33	$^\circ\text{C/Watt}$
	$R_{th(c-f)D}$	Each 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	≤ 400	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	≤ 0.8	Volts
Input OFF Voltage	$V_{CIN(off)}$	$U_P, V_P, W_P, U_N, V_N, W_N, B_r$	≥ 4.0	Volts
PWM Input Frequency	f_{PWM}	Using Application Circuit	≤ 20	kHz
Minimum Dead Time	t_{DEAD}	Input Signal	≥ 2.5	μS

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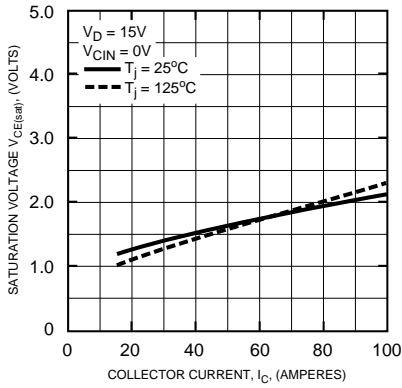
Inverter Part



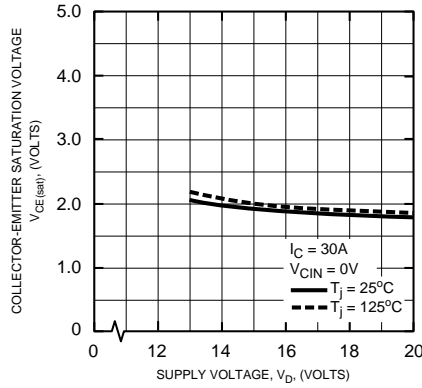
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Brake Part

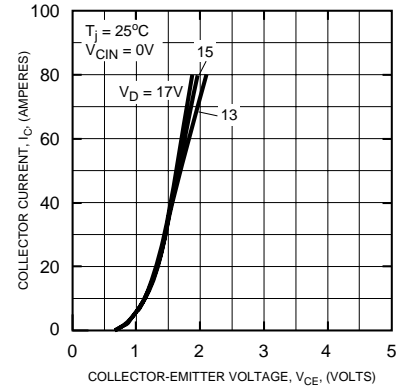
SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



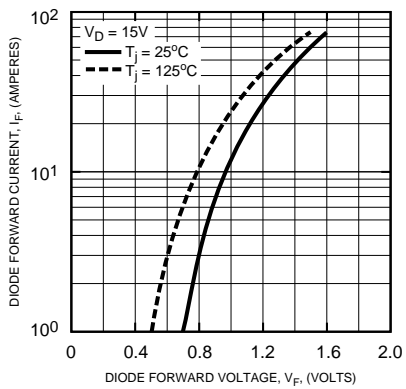
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



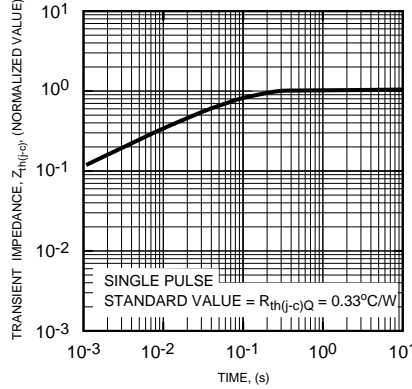
OUTPUT CHARACTERISTICS (TYPICAL)



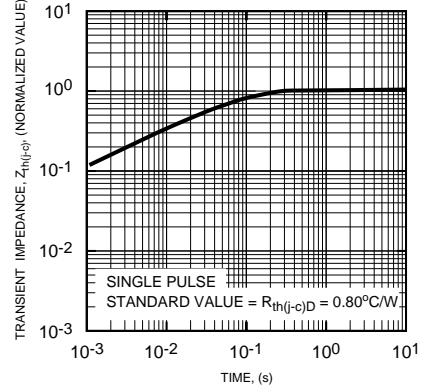
DIODE FORWARD CHARACTERISTICS



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (FWD)



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