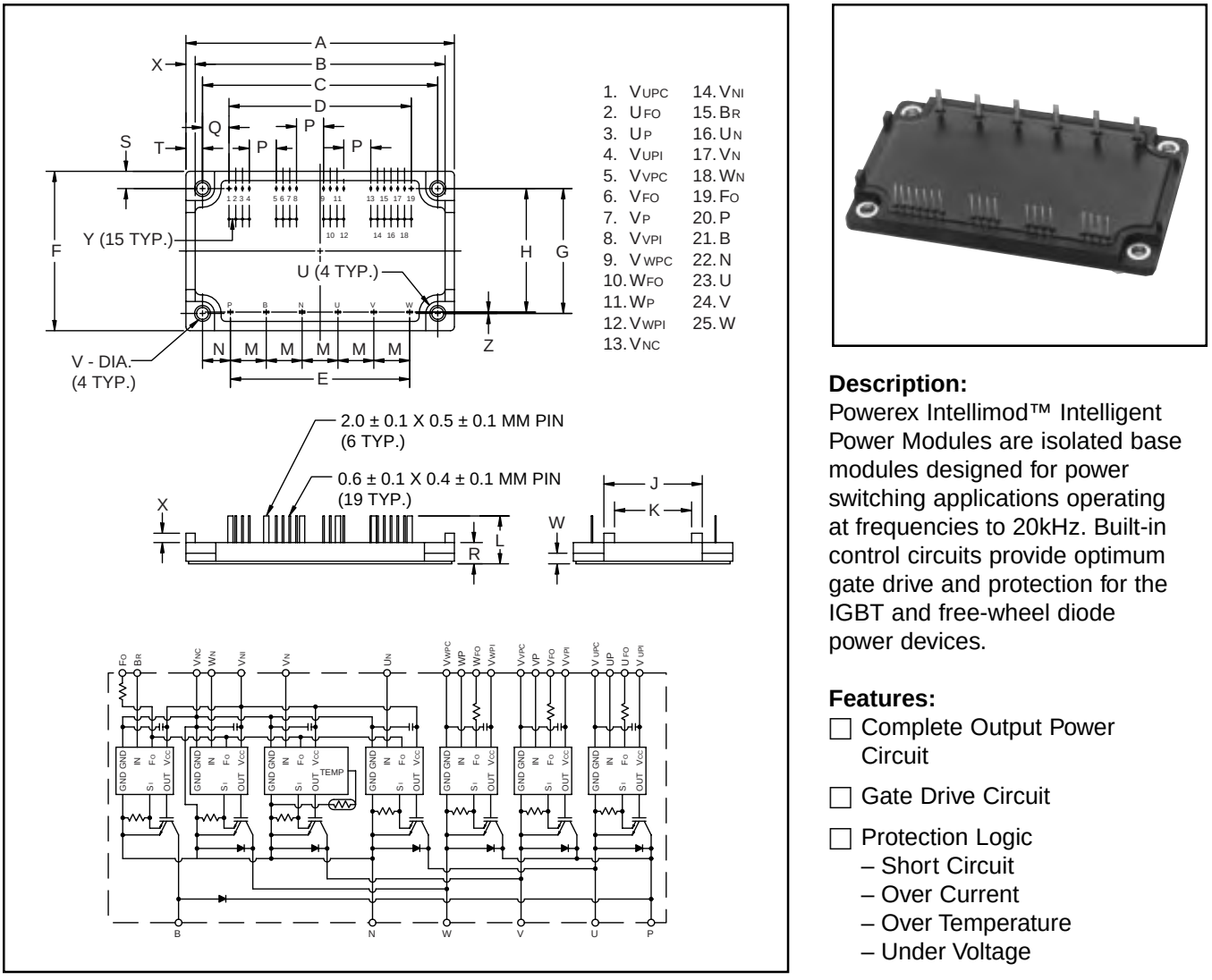
Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (724) 925-7272

Intellimod™ Module

Three Phase + Brake
IGBT Inverter Output
15 Amperes/1200 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	3.98±0.04	101.0±1.0
B	3.70	94.0
C	3.48±0.03	88.5±0.8
D	2.700±0.03	68.58±0.8
E	2.66±0.02	67.5±0.5
F	2.36±0.04	60.0±1.0
G	1.85±0.02	47.0±0.5
H	1.83±0.03	46.5±0.8
J	1.46	37.0
K	1.14	29.0
L	0.71±0.04	18.0±1.0
M	0.53±0.01	13.5±0.3

Dimensions	Inches	Millimeters
N	0.41	10.5
P	0.400	10.16
Q	0.392	9.96
R	0.31	8.0
S	0.26	6.5
T	0.246	6.25
U	0.18 Rad.	Rad. 4.5
V	0.18 Dia.	Dia. 4.5
W	0.16±0.02	4.0±0.5
X	0.14	3.5
Y	0.100±0.01	2.54±0.25
Z	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. PM15RSH120 is a 1200V, 15 Ampere Intellimod™ Intelligent Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 10)
PM	15	120

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Absolute Maximum Ratings, T_j = 25°C unless otherwise specified

Characteristics	Symbol	PM15RSH120	Units
Power Device Junction Temperature	T_j	-20 to 150	°C
Storage Temperature	T_{stg}	-40 to 125	°C
Case Operating Temperature	T_C	-20 to 100	°C
Mounting Torque, M4 Mounting Screws	—	13	in-lb
Module Weight (Typical)	—	100	Grams
Supply Voltage Protected by OC and SC (V_D = 13.5 - 16.5V, Inverter Part, T_j = 125°C)	$V_{CC(prot.)}$	800	Volts
Isolation Voltage, AC 1 minute, 60Hz Sinusoidal	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	V_{FO}	20	Volts
Fault Output Current	I_{FO}	20	mA

IGBT Inverter Sector

Collector-Emitter Voltage (V_D = 15V, V_{CIN} = 15V)	V_{CES}	1200	Volts
Collector Current, ±	I_C	15	Amperes
Peak Collector Current, ±	I_{CP}	30	Amperes
Supply Voltage (Applied between P - N)	V_{CC}	900	Volts
Supply Voltage, Surge (Applied between P - N)	$V_{CC(surge)}$	1000	Volts
Collector Dissipation	P_C	83	Watts

Brake Sector

Collector-Emitter Voltage	V_{CES}	1200	Volts
Collector Current, ±	I_C	10	Amperes
Peak Collector Current, ±	I_{CP}	20	Amperes
Supply Voltage (Applied between P - N)	V_{CC}	900	Volts
Supply Voltage, Surge (Applied between P - N)	$V_{CC(surge)}$	1000	Volts
Collector Dissipation	P_C	41	Watts
Diode Forward Current	I_F	10	Amperes
Diode DC Reverse Voltage	$V_{R(DC)}$	1200	Volts

Electrical and Mechanical Characteristics, T_j = 25°C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Control Sector						
Over Current Trip Level Inverter Part	OC	-20°C ≤ T ≤ 125°C	22	37	—	Amperes
Over Current Trip Level Brake Part			15	27	—	Amperes
Short Circuit Trip Level Inverter Part	SC	-20°C ≤ T ≤ 125°C	—	56	—	Amperes
Short Circuit Trip Level Brake Part			—	41	—	Amperes
Over Current Delay Time	$t_{off(OC)}$	V_D = 15V	—	10	—	µS
Over Temperature Protection	OT	Trip Level	100	110	120	°C
	OT_R	Reset Level	—	90	—	°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_{UP1}-V_{UPC}, V_{VP1}-V_{VPC}, V_{WP1}-V_{WPC}, V_{N1}-V_{NC}	13.5	15	16.5	Volts
Circuit Current	I_D	V_D = 15V, V_{CIN} = 15V, V_{N1}-V_{NC}	—	25	35	mA
		V_D = 15V, V_{CIN} = 15V, V_{XP1}-V_{XPC}	—	7	10	mA
Input ON Threshold Voltage	$V_{CIN(on)}$	Applied between	1.2	1.5	1.8	Volts
Input OFF Threshold Voltage	$V_{CIN(off)}$	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	$I_{FO(H)}$	V_D = 15V, V_{FO} = 15V	—	—	0.01	mA
	$I_{FO(L)}$	V_D = 15V, V_{FO} = 15V	—	10	15	mA
Minimum Fault Output Pulse Width	t_{FO}	V_D = 15V	1.0	1.8	—	mS

Electrical and Mechanical Characteristics, T_j = 25°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°C	—	—	1.0	mA
		$V_{CE} = V_{CES}$, T_j = 125°C	—	—	10	mA
Diode Forward Voltage	V_{FM}	$-I_C$ = 15A, V_D = 15V, V_{CIN} = 5V	—	2.5	3.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_D = 15V, V_{CIN} = 0V, I_C = 15A	—	2.3	3.3	Volts
		V_D = 15V, V_{CIN} = 0V, I_C = 15A, T_j = 125°C	—	2.1	3.1	Volts
Inductive Load Switching Times	t_{on}	V_D = 15V, V_{CIN} = 0 ~ 15V, V_{CC} = 600V, I_C = 15A, T_j = 125°C	0.4	0.7	1.5	µS
	t_{rr}		—	0.15	0.3	µS
	$t_{C(on)}$		—	0.3	1.0	µS
	t_{off}		—	1.7	2.9	µS
	$t_{C(off)}$		—	0.7	1.3	µS
Brake Sector						
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_D = 15V, V_{CIN} = 0V, I_C = 15A, T_j = 25°C	—	2.8	3.8	Volts
		V_D = 15V, V_{CIN} = 0V, I_C = 15A, T_j = 125°C	—	2.5	3.5	Volts
Diode Forward Voltage	V_{FM}	$-I_C$ = 10A, V_D = 15V, V_{CIN} = 5V	—	2.5	3.5	Volts
Collector Cutoff Current	I_{CES}	$V_{CE} = V_{CES}$, T_j = 25°C	—	—	1	mA
		$V_{CE} = V_{CES}$, T_j = 125°C	—	—	10	mA

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Thermal Characteristics

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Units
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	Each Inverter IGBT	—	—	1.5	°C/Watt
	$R_{th(j-c)D}$	Each Inverter FWDi	—	—	4.5	°C/Watt
	$R_{th(c-f)Q}$	Each Brake IGBT	—	—	3.0	°C/Watt
	$R_{th(c-f)D}$	Each Brake FWDi	—	—	5.5	°C/Watt
Contact Thermal Resistance	$R_{th(c-f)}$	Case to Fin Per Module, Thermal Grease Applied	—	—	0.044	°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 U_P, V_P, W_P, U_N, V_N, W_N, B_r	0 ~ 0.8	Volts
Input OFF Voltage	$V_{CIN(off)}$		4.0 ~ V_D	Volts
PWM Input Frequency	f_{PWM}	Using Application Circuit	5 ~ 20	kHz
Minimum Dead Time	t_{DEAD}	Input Signal	≥ 2.5	µS