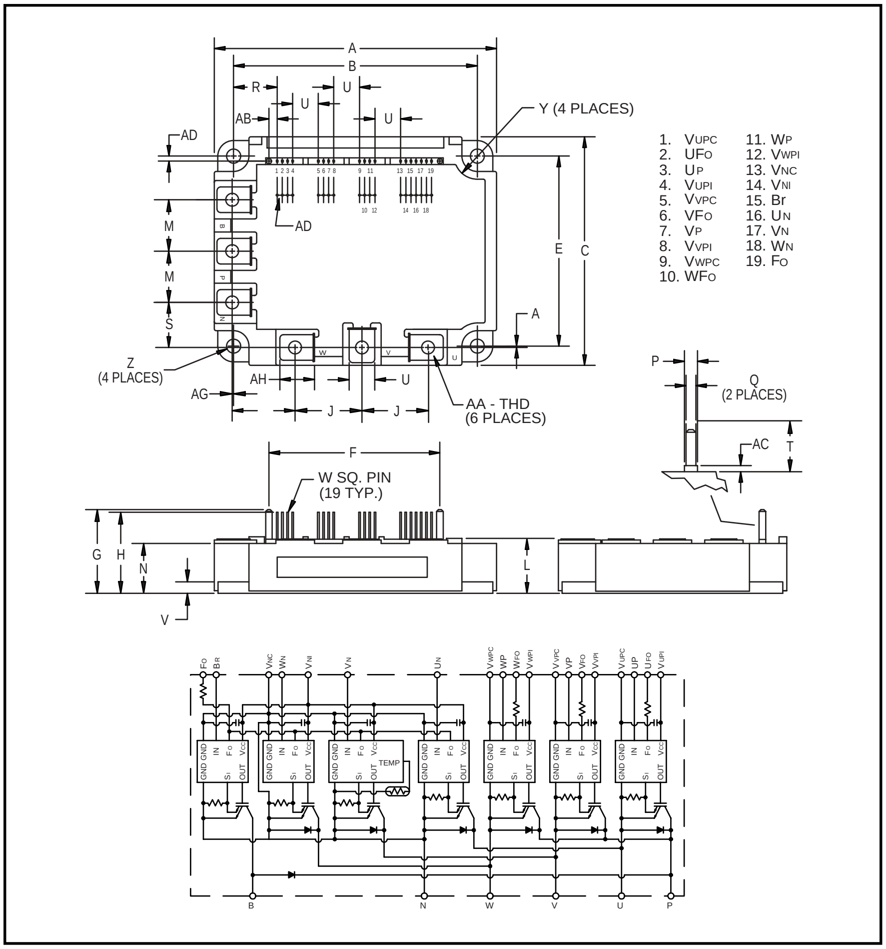
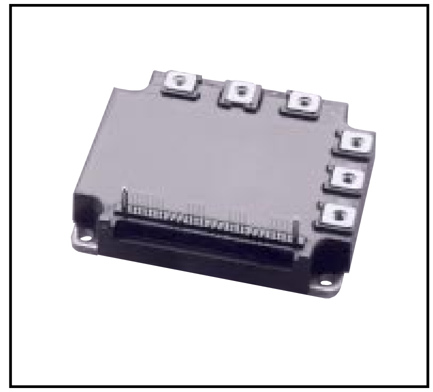
Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (724) 925-7272

PM50RSD120

Intellimod™ Module

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





Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	4.33±0.04	110.0±1.0
B	3.74±0.02	95.0±0.5
C	3.50±0.04	89.0±1.0
E	2.91±0.02	74.0±0.5
F	2.62	66.44
G	1.28	32.6
H	1.24	31.6
J	1.02	26.0
K	0.94	24.0
L	0.87 +0.04/-0.02	22.0 +1.0/-0.5
M	0.79	20.0
N	0.76	19.4
P	0.18	4.5
Q	0.10	2.54

Dimensions	Inches	Millimeters
R	0.67	17.02
S	0.67	17.02
T	0.52	13.2
U	0.39	10.0
V	0.16	4.0
W	0.02	0.5
Y	0.24 Rad.	Rad. 6.0
Z	0.22 Dia.	Dia.5.5
AA	M5	M5
AB	0.13	3.22
AC	0.06	1.6
AD	0.08±0.02	2.0±0.5
AG	0.020.01	0.5±0.3
AH	0.47	12.0

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
- ☐ Low Loss Using 4th 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. PM50RSD120 is a 1200V, 50 Ampere Intellimod™ Intelligent Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 10)
PM	50	120

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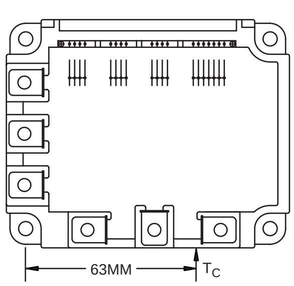
Absolute Maximum Ratings, T_j = 25°C unless otherwise specified

Characteristics	Symbol	PM50RSD120	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, M5 Mounting Screws	—	31	in-lb
Mounting Torque, M5 Main Terminal Screws	—	31	in-lb
Module Weight (Typical)	—	560	Grams
Supply Voltage Protected by OC and SC (V_D = 13.5 - 16.5V, Inverter Part) T_j = 125°C Start	$V_{CC(prot.)}$	800	Volts
Isolation Voltage, AC 1 minute, 60Hz Sinusoidal	V_{ISO}	2500	Volts
IGBT Inverter Sector			
Collector-Emitter Voltage (V_D = 15V, V_{CIN} = 15V)	V_{CES}	1200	Volts
Collector Current, ± (T_C = 25°C)	I_C	50	Amperes
Peak Collector Current, ± (T_C = 25°C)	I_{CP}	100	Amperes
Supply Voltage (Applied between P - N)	V_{CC}	800	Volts
Supply Voltage, Surge (Applied between P - N)	$V_{CC(surge)}$	1000	Volts
Collector Dissipation (T_C = 25°C)	P_C	328	Watts
IGBT Brake Sector			
Collector-Emitter Voltage (V_D = 15V, V_{CIN} = 15V)	V_{CES}	1200	Volts
Collector Current, ± (T_C = 25°C)	I_C	15	Amperes
Peak Collector Current, ± (T_C = 25°C)	I_{CP}	30	Amperes
FWDi Rated DC Reverse Voltage (T_C = 25°C)	$V_{R(DC)}$	1200	Volts
FWDi Forward Current (T_C = 25°C)	I_F	15	Amperes
Collector Dissipation (T_C = 25°C)	P_C	201	Watts
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_{UPC}, V_P-V_{VPC}, W_P-V_{WPC}, U_N, V_N, W_N, B_r-V_{NC})	V_{CIN}	20	Volts
Fault Output Supply Voltage Applied between (U_{FO}-V_{UPC}, V_{FO}-V_{VPC}, W_{FO}-V_{WPC}, F_O-V_{NC})	V_{FO}	20	Volts
Fault Output Current (U_{FO}, V_{FO}, W_{FO}, F_O)	I_{FO}	20	mA

*T_C Measure Point



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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, V_D = 15V	—	—	1.0	mA
		$V_{CE} = V_{CES}$, T_j = 125°C, V_D = 15V	—	—	10	mA
Diode Forward Voltage	V_{EC}	$-I_C$ = 50A, V_D = 15V, V_{CIN} = 15V	—	2.5	3.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_D = 15V, V_{CIN} = 0V, I_C = 50A, Pulsed, T_j = 25°C	—	2.4	3.2	Volts
		V_D = 15V, V_{CIN} = 0V, I_C = 50A, Pulsed, T_j = 125°C	—	2.1	2.8	Volts
Inductive Load Switching Times	t_{on}	V_D = 15V, V_{CIN} = 0 ~ 15V V_{CC} = 600V, I_C = 50A T_j = 125°C, Inductive Load	0.5	1.0	2.5	µS
	t_{rr}		—	0.15	0.3	µS
	$t_{C(on)}$		—	0.4	1.0	µS
	t_{off}		—	2.5	3.5	µS
	$t_{C(off)}$		—	0.7	1.2	µS
IGBT Brake Sector						
Collector Cutoff Current	I_{CES}	$V_{CE} = V_{CES}$, T_j = 25°C, V_D = 15V	—	—	1.0	mA
		$V_{CE} = V_{CES}$, T_j = 125°C, V_D = 15V	—	—	10	mA
FWDi Forward Voltage	V_{FM}	I_F = 15A	—	2.5	3.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_D = 15V, V_{CIN} = 0V, I_C = 15A, Pulsed, T_j = 25°C	—	2.5	3.3	Volts
		V_D = 15V, V_{CIN} = 0V, I_C = 15A, Pulsed, T_j = 125°C	—	2.2	3.2	Volts
Control Sector						
Over Current Trip Level Inverter Part	OC	T_j = 25°C	93	157	—	Amperes
(V_D = 15V)		T_j = 125°C	59	—	—	Amperes
Over Current Trip Level Brake Part	OC	-20°C ≤ T_j ≤ 125°C, V_D = 15V	22	—	—	Amperes
Short Circuit Trip Level Inverter Part	SC	-20°C ≤ T_j ≤ 125°C, V_D = 15V	—	183	—	Amperes
Short Circuit Trip Level Brake Part			—	95	—	Amperes
Over Current Delay Time	$t_{off(OC)}$	V_D = 15V	—	10	—	µS
Over Temperature Protection (V_D = 15V)	OT	Trip Level	111	118	125	°C
(Lower Arm)	OT_R	Reset Level	—	100	—	°C
Supply Circuit Under Voltage Protection	UV	Trip Level	11.5	12.0	12.5	Volts
(-20 ≤ T_j ≤ 125°C)	UV_R	Reset Level	—	12.5	—	Volts
Circuit Current	I_D	V_D = 15V, V_{CIN} = 15V, V_{N1}-V_{NC}	—	44	60	mA
		V_D = 15V, V_{CIN} = 15V, V_{XP1}-V_{XPC}	—	13	18	mA
Input ON Threshold Voltage	$V_{CIN(on)}$	Applied between U_P-V_{UPC}, V_P-V_{VPC},	1.2	1.5	1.8	Volts
Input OFF Threshold Voltage	$V_{CIN(off)}$	W_P-V_{WPC}, U_N, V_N, W_N, B_r-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
Minimum Fault Output Pulse Width*	t_{FO}	V_D = 15V	1.0	1.8	—	mS

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

POWEREX

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Thermal Characteristics

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Units
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	Each IGBT	—	—	0.38	°C/Watt
Inverter Part	$R_{th(j-c)F}$	Each FWDi	—	—	0.70	°C/Watt
	$R_{th(j-c')Q}$	Each IGBT*	—	—	0.23**	°C/Watt
	$R_{th(j-c')F}$	Each FWDi*	—	—	0.36**	°C/Watt
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	Each IGBT	—	—	0.62	°C/Watt
Brake Part	$R_{th(j-c)F}$	Each FWDi	—	—	1.33	°C/Watt
	$R_{th(j-c')Q}$	Each IGBT*	—	—	0.40**	°C/Watt
	$R_{th(j-c')F}$	Each FWDi*	—	—	0.77**	°C/Watt
Contact Thermal Resistance	$R_{th(c-f)}$	Case to Fin Per Module, Thermal Grease Applied	—	—	0.027	°C/Watt

*T_C measured point is just under the chips.
**If you use this value, $R_{th(f-a)}$ should be mesured just under the chips.

Recommended Conditions for Use

Characteristic	Symbol	Condition	Value	Units
Supply Voltage	V_{CC}	Applied across P-N Terminals	0 ~ 800	Volts
Control Supply Voltage***	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_{UPC}, V_P-V_{VPC},	0 ~ 0.8	Volts
Input OFF Voltage	$V_{CIN(off)}$	W_P-V_{WPC}, U_N, V_N, W_N, B_r-V_{NC}	4.0 ~ V_D	Volts
PWM Input Frequency	f_{PWM}	Using Application Circuit	0 ~ 20	kHz
Minimum Dead Time	t_{DEAD}	Input Signal	≥ 3.0	µS

***With ripple satisfying the following conditions: dv/dt ≤ ±5v/µs, Variation ≤ 2V peak to peak.