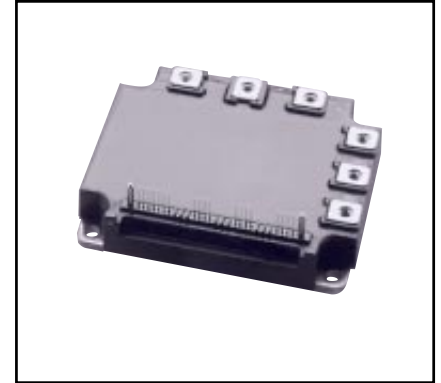
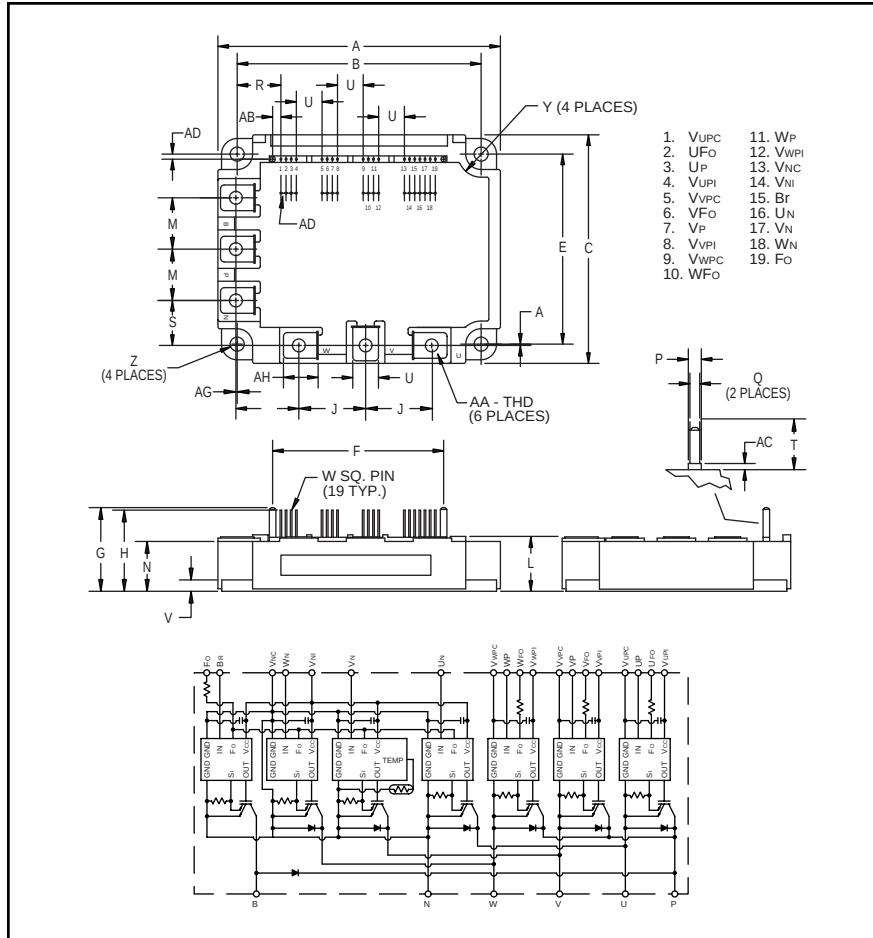


Intellimod™ Module

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



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

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

PM50RSD120

Intellimod™ Module

Three Phase + Brake IGBT Inverter Output

50 Amperes/1200 Volts

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

Characteristics	Symbol	PM50RSD120	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	—	31	in-lb
Mounting Torque, M5 Main Terminal Screws	—	31	in-lb
Module Weight (Typical)	—	560	Grams
Supply Voltage Protected by OC and SC ($V_D = 13.5 - 16.5\text{V}$, Inverter Part) $T_j = 125^\circ\text{C}$ Start	$V_{\text{CC(prot.)}}$	800	Volts
Isolation Voltage, AC 1 minute, 60Hz Sinusoidal	V_{ISO}	2500	Volts

IGBT Inverter Sector

Collector-Emitter Voltage ($V_D = 15\text{V}$, $V_{\text{CIN}} = 15\text{V}$)	V_{CES}	1200	Volts
Collector Current, $\pm$ ($T_C = 25^\circ\text{C}$)	I_C	50	Amperes
Peak Collector Current, $\pm$ ($T_C = 25^\circ\text{C}$)	I_{CP}	100	Amperes
Supply Voltage (Applied between P - N)	V_{CC}	800	Volts
Supply Voltage, Surge (Applied between P - N)	$V_{\text{CC(surge)}}$	1000	Volts
Collector Dissipation ($T_C = 25^\circ\text{C}$)	P_C	328	Watts

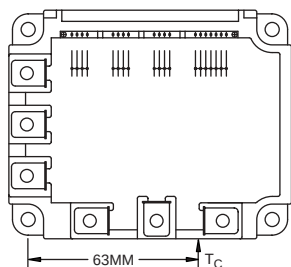
IGBT Brake Sector

Collector-Emitter Voltage ($V_D = 15\text{V}$, $V_{\text{CIN}} = 15\text{V}$)	V_{CES}	1200	Volts
Collector Current, $\pm$ ($T_C = 25^\circ\text{C}$)	I_C	15	Amperes
Peak Collector Current, $\pm$ ($T_C = 25^\circ\text{C}$)	I_{CP}	30	Amperes
FWDi Rated DC Reverse Voltage ($T_C = 25^\circ\text{C}$)	$V_{\text{R(DC)}}$	1200	Volts
FWDi Forward Current ($T_C = 25^\circ\text{C}$)	I_F	15	Amperes
Collector Dissipation ($T_C = 25^\circ\text{C}$)	P_C	201	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_{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 ($U_{\text{FO}}-V_{\text{UPC}}$, $V_{\text{FO}}-V_{\text{VPC}}$, $W_{\text{FO}}-V_{\text{WPC}}$, 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



PM50RSD120
Intellimod™ Module
Three Phase + Brake IGBT Inverter Output
50 Amperes/1200 Volts

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°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 (V _D = 15V)	OC	T _j = 25°C	93	157	—	Amperes
		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, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (724) 925-7272

PM50RSD120

Intellimod™ Module

Three Phase + Brake IGBT Inverter Output

50 Amperes/1200 Volts

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 measured just under the chips.

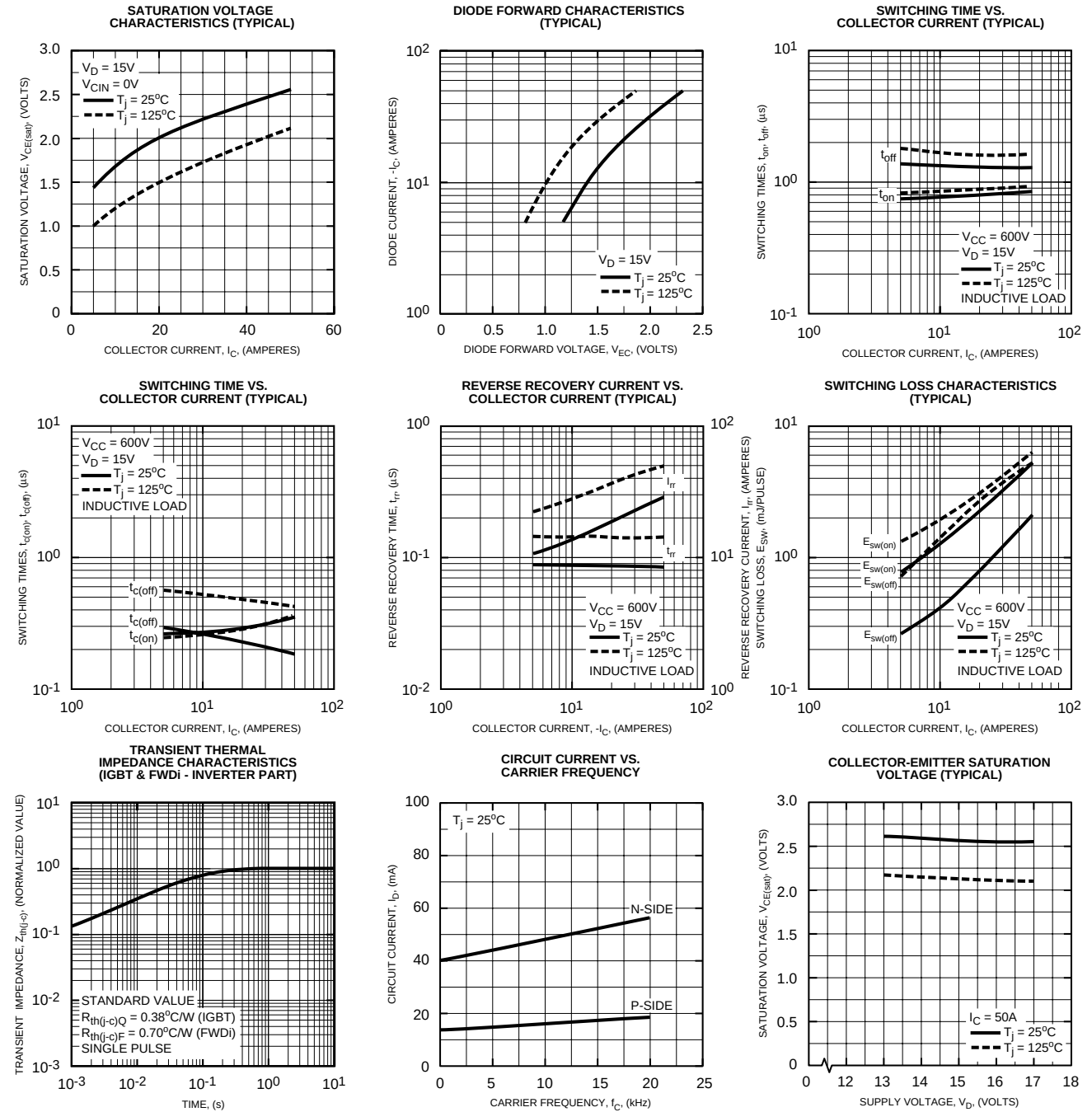
Recommended Conditions for Use

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}	$4.0 \sim V_D$	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: $dv/dt \leq \pm 5V/\mu s$, Variation $\leq 2V$ peak to peak.

PM50RSD120
Intellimod™ Module
Three Phase + Brake IGBT Inverter Output
50 Amperes/1200 Volts

Inverter Part



PM50RSD120

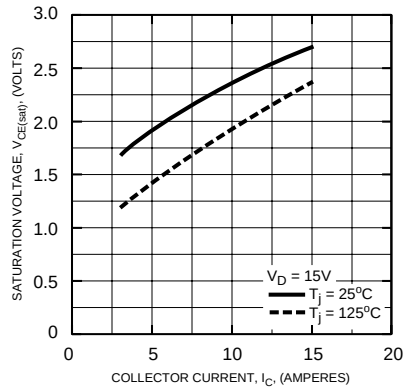
Intellimod™ Module

Three Phase + Brake IGBT Inverter Output

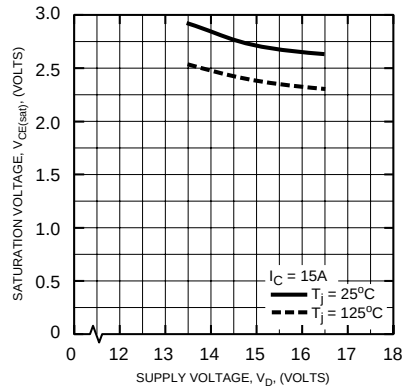
50 Amperes/1200 Volts

Brake Part

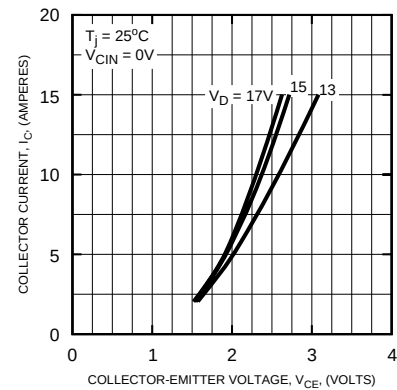
COLLECTOR-EMITTER SATURATION VOLTAGE (TYPICAL)



COLLECTOR-EMITTER SATURATION VOLTAGE (TYPICAL)



OUTPUT CHARACTERISTICS (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT & FWDI BRAKE PART)

