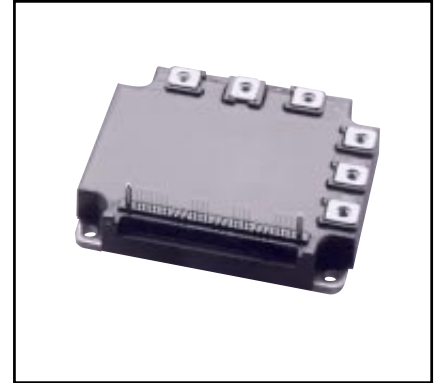
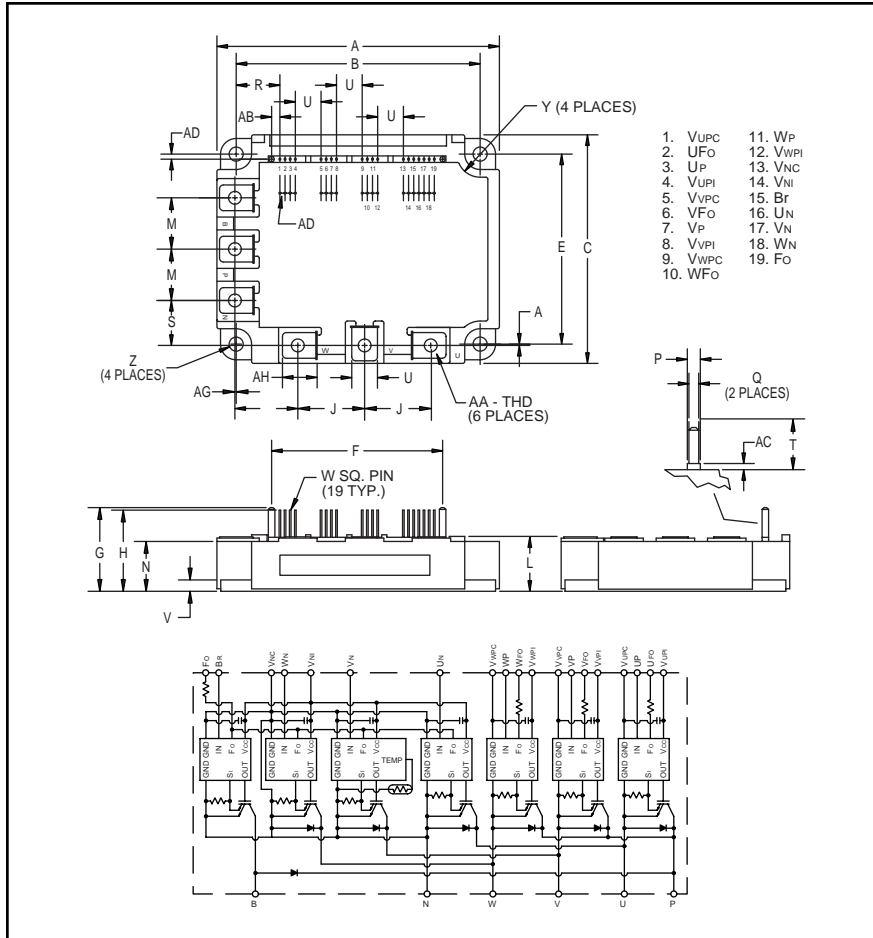


Intellimod™ Module Three Phase + Brake IGBT Inverter Output 50 Amperes/1200 Volts



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.

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

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

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

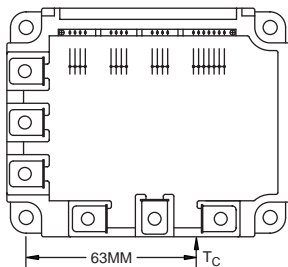
IGBT Brake Sector

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 ($V_{\text{UP1-VUPC}}$, $V_{\text{VP1-VVPC}}$, $V_{\text{WP1-VWPC}}$, $V_{\text{N1-VNC}}$)	V_D	20	Volts
Input Voltage Applied between (U_P-V_{UPC} , V_P-V_{VPC} , W_P-V_{WPC} , $U_N, V_N, W_N, B_r-V_{\text{NC}}$)	V_{CIN}	20	Volts
Fault Output Supply Voltage Applied between ($U_{\text{FO-VUPC}}$, $V_{\text{FO-VVPC}}$, $W_{\text{FO-VWPC}}$, 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}	$V_{CE} = V_{CES}, T_j = 25^\circ\text{C}, V_D = 15\text{V}$	—	—	1.0	mA
		$V_{CE} = V_{CES}, T_j = 125^\circ\text{C}, V_D = 15\text{V}$	—	—	10	mA
Diode Forward Voltage	V_{EC}	$-I_C = 50\text{A}, V_D = 15\text{V}, V_{CIN} = 15\text{V}$	—	2.5	3.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 50\text{A},$ Pulsed, $T_j = 25^\circ\text{C}$	—	2.4	3.2	Volts
		$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 50\text{A},$ Pulsed, $T_j = 125^\circ\text{C}$	—	2.1	2.8	Volts
Inductive Load Switching Times	t_{on}		0.5	1.0	2.5	μS
	t_{rr}	$V_D = 15\text{V}, V_{CIN} = 0 \sim 15\text{V}$	—	0.15	0.3	μS
	$t_{C(on)}$	$V_{CC} = 600\text{V}, I_C = 50\text{A}$	—	0.4	1.0	μS
	t_{off}	$T_j = 125^\circ\text{C}, \text{Inductive Load}$	—	2.5	3.5	μS
	$t_{C(off)}$		—	0.7	1.2	μS
IGBT Brake Sector						
Collector Cutoff Current	I_{CES}	$V_{CE} = V_{CES}, T_j = 25^\circ\text{C}, V_D = 15\text{V}$	—	—	1.0	mA
		$V_{CE} = V_{CES}, T_j = 125^\circ\text{C}, V_D = 15\text{V}$	—	—	10	mA
FWDi Forward Voltage	V_{FM}	$I_F = 15\text{A}$	—	2.5	3.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 15\text{A},$ Pulsed, $T_j = 25^\circ\text{C}$	—	2.5	3.3	Volts
		$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 15\text{A},$ Pulsed, $T_j = 125^\circ\text{C}$	—	2.2	3.2	Volts
Control Sector						
Over Current Trip Level Inverter Part ($V_D = 15\text{V}$)	OC	$T_j = 25^\circ\text{C}$	93	157	—	Amperes
		$T_j = 125^\circ\text{C}$	59	—	—	Amperes
Over Current Trip Level Brake Part	OC	$-20^\circ\text{C} \leq T_j \leq 125^\circ\text{C}, V_D = 15\text{V}$	22	—	—	Amperes
Short Circuit Trip Level Inverter Part	SC	$-20^\circ\text{C} \leq T_j \leq 125^\circ\text{C}, V_D = 15\text{V}$	—	183	—	Amperes
Short Circuit Trip Level Brake Part			—	95	—	Amperes
Over Current Delay Time	$t_{off(OC)}$	$V_D = 15\text{V}$	—	10	—	μS
Over Temperature Protection ($V_D = 15\text{V}$) (Lower Arm)	OT	Trip Level	111	118	125	$^\circ\text{C}$
	OT_R	Reset Level	—	100	—	$^\circ\text{C}$
Supply Circuit Under Voltage Protection ($-20 \leq T_j \leq 125^\circ\text{C}$)	UV	Trip Level	11.5	12.0	12.5	Volts
	UV_R	Reset Level	—	12.5	—	Volts
Circuit Current	I_D	$V_D = 15\text{V}, V_{CIN} = 15\text{V}, V_{N1}-V_{NC}$	—	44	60	mA
		$V_D = 15\text{V}, V_{CIN} = 15\text{V}, V_{XP1}-V_{XPC}$	—	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*	$I_{FO(H)}$	$V_D = 15\text{V}, V_{CIN} = 15\text{V}$	—	—	0.01	mA
	$I_{FO(L)}$	$V_D = 15\text{V}, V_{CIN} = 15\text{V}$	—	10	15	mA
Minimum Fault Output Pulse Width*	t_{FO}	$V_D = 15\text{V}$	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.

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
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

* 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.

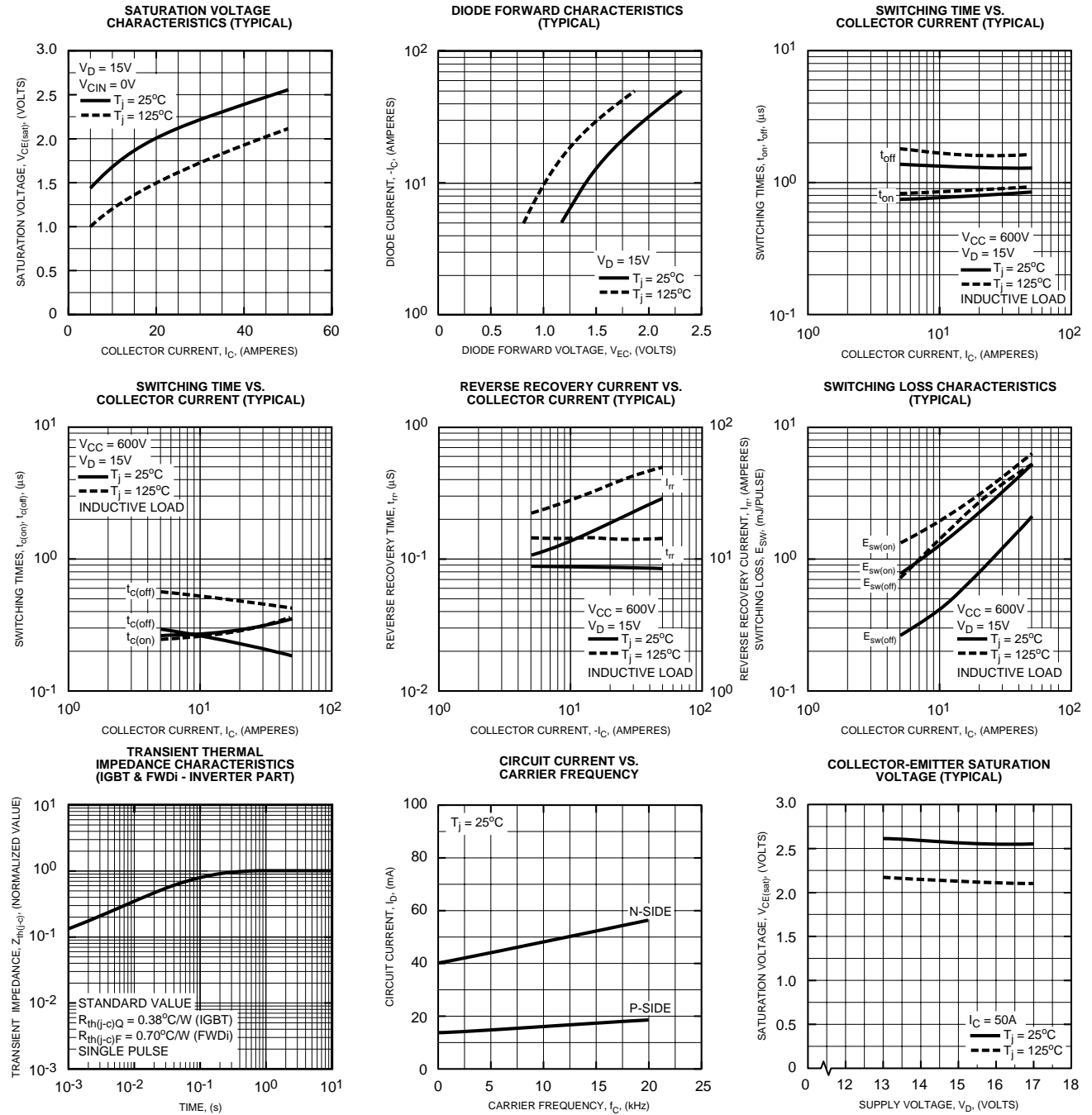
Recommended Conditions for Use

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
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50 Amperes/1200 Volts

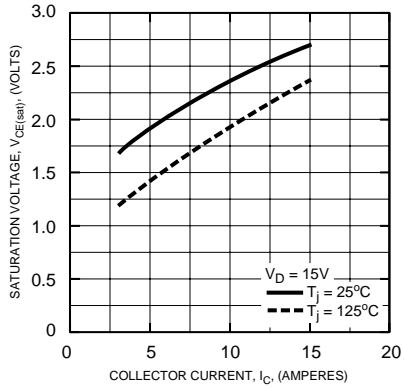
Inverter Part



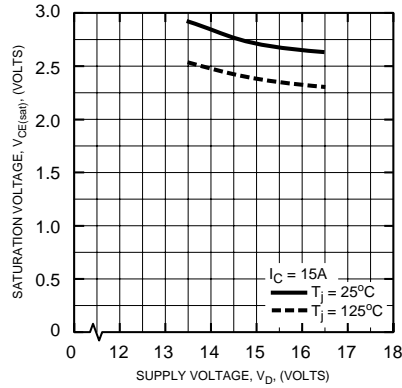
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Brake Part

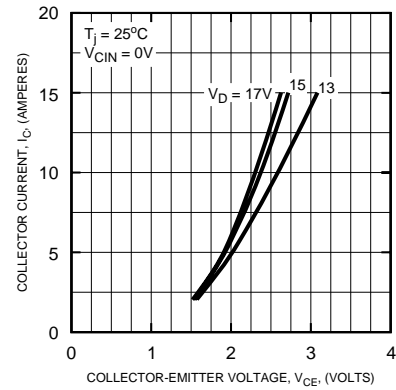
COLLECTOR-EMITTER SATURATION VOLTAGE (TYPICAL)



COLLECTOR-EMITTER SATURATION VOLTAGE (TYPICAL)



OUTPUT CHARACTERISTICS (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT & FWDI BRAKE PART)

