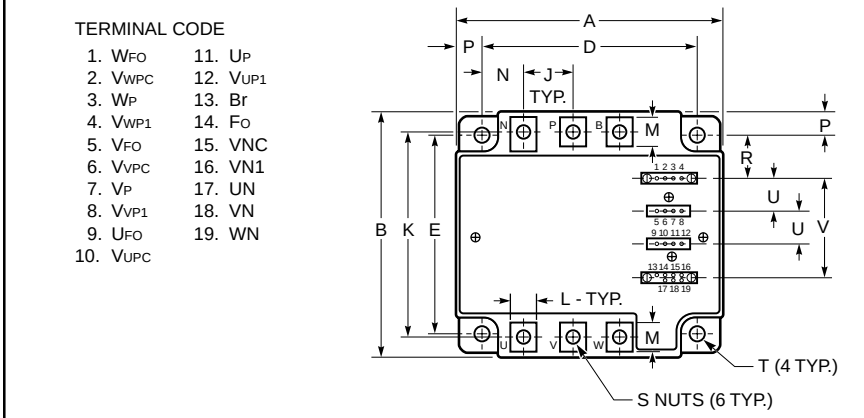
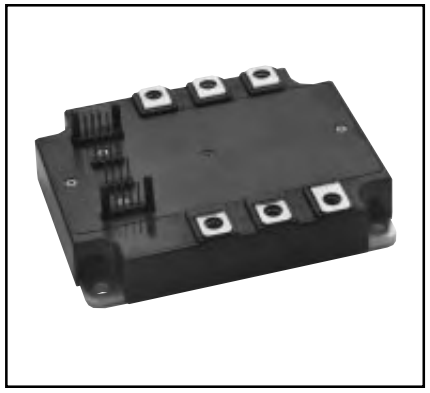
Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (724) 925-7272

Intellimod™ Module

Three Phase + Brake
IGBT Inverter Output
75 Amperes/600 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 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. PM75RVA060 is a 600V, 75 Ampere Intellimod™ Intelligent Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 10)
PM	75	60

Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	4.33	110.0
B	3.50	89.0
C	0.87 +0.04/-0.02	22.0 +1.0/-0.5
D	3.74±0.010	95.0±0.25
E	2.91±0.010	74.0±0.25
F	0.16	4.0
G	0.87	22.0
H	0.42	10.6
J	0.79	20.0
K	2.99±0.02	76.0±0.5
L	0.39	10.0
M	0.49	12.5
N	0.67	17.0

Dimensions	Inches	Millimeters
P	0.30	7.5
R	0.65	16.5
S	M5 Metric	M5
T	0.22 Dia.	Dia. 5.5
U	0.56±0.010	14.1±0.25
V	1.72±0.012	43.57±0.3
W	0.57±0.012	14.6±0.3
X	2.90	73.7
Y	0.78	19.7
Z	0.10±0.010	2.54±0.25
AA	0.137±0.010	3.49±0.25
BB	0.02 SQ	0.64 SQ
CC	0.12 +0.04/-0.02	3.0 +1.0/-0.5

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PM75RVA060
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Three Phase + Brake IGBT Inverter Output
75 Amperes/600 Volts

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

Characteristics	Symbol	PM75RVA060	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 (Typical)	—	17	in-lb
Mounting Torque, M5 Main Terminal Screws (Typical)	—	17	in-lb
Module Weight (Typical)	—	560	Grams
Supply Voltage (Applied between P - N, Surge Value)	$V_{CC(surge)}$	500	Volts
Supply Voltage Protected by SC (V_D = 13.5 ~16.5V, Inverter Part, T_j = 125°C Start)	$V_{CC(prot.)}$	400	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 (Applied between F_O-V_{NC}, $*_{FO}$-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 = 15V, V_{CIN} = 15V)	V_{CES}	600	Volts
Collector Current, ± (T_C = 25°C)	I_C	75	Amperes
Peak Collector Current, ± (T_C = 25°C)	I_{CP}	150	Amperes
Collector Dissipation (T_C = 25°C)	P_C	284	Watts

Brake Sector

Collector-Emitter Voltage (V_D = 15V, V_{CIN} = 15V)	V_{CES}	600	Volts
Collector Current, ± (T_C = 25°C)	I_C	30	Amperes
Peak Collector Current, ± (T_C = 25°C)	I_{CP}	60	Amperes
Collector Dissipation (T_C = 25°C)	P_C	178	Watts
FWDi Forward Current (T_C = 25°C)	I_F	30	Amperes
FWDi Rated DC Reverse Voltage (T_C = 25°C)	$V_{R(DC)}$	600	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 Brake Part	OC	-20°C ≤ Tj ≤ 125°C, V_D = 15V	39	—	—	Amperes
Short Circuit Trip Level Inverter Part	SC	-20°C ≤ T_j ≤ 125°C, V_D = 15V	115	—	—	Amperes
Short Circuit Trip Level Brake Part			—	94	—	Amperes
Short Circuit Current Shut-off Time	$t_{off(SC)}$	V_D = 15V	—	10	—	µS
Over Temperature Protection	OT	Trip Level	100	110	120	°C
(V_D = 15V, Lower Arm)	OT_r	Reset Level	85	95	105	°C
Supply Circuit Under Voltage Protection	UV	Trip Level	11.5	12.0	12.5	Volts
(-20°C ≤ 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, Br-V_{NC}	1.7	2.0	2.3	Volts
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

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

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
IGBT Inverter Sector						
Collector-Emitter Cutoff Current	I_{CES}	$V_{CE} = V_{CES}$, V_D = 15V, T_j = 25°C	—	—	1.0	mA
		$V_{CE} = V_{CES}$, V_D = 15V, T_j = 125°C	—	—	10.0	mA
FWDi Forward Voltage	V_{EC}	$-I_C$ = 75A, V_D = 15V, V_{CIN} = 15V	—	2.20	3.30	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_D = 15V, V_{CIN} = 0V, I_C = 75A, Pulsed, T_j = 25°C	—	2.35	2.80	Volts
		V_D = 15V, V_{CIN} = 0V, I_C = 75A, Pulsed, T_j = 125°C	—	2.55	3.05	Volts
Inductive Load Switching Times	t_{on}		0.4	0.8	2.1	µS
(Upper-Lower Arm)	t_{rr}	V_D = 15V, V_{CIN} = 0V ~ 15V	—	0.2	0.3	µS
	$t_{C(on)}$	V_{CC} = 300V, I_C = 75A,	—	0.3	1.1	µS
	t_{off}	T_j = 125°C	—	1.8	2.9	µS
	$t_{C(off)}$		—	0.6	1.2	µS
Brake Sector						
Collector-Emitter Cutoff Current	I_{CES}	$V_{CE} = V_{CES}$, V_D = 15V, T_j = 25°C	—	—	1.0	mA
		$V_{CE} = V_{CES}$, V_D = 15V, T_j = 125°C	—	—	10.0	mA
FWDi Forward Voltage	V_{FM}	I_F = 30A	—	2.20	3.30	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_D = 15V, V_{CIN} = 0V, I_C = 30A, Pulsed, T_j = 25°C	—	2.35	2.80	Volts
		V_D = 15V, V_{CIN} = 0V, I_C = 30A, Pulsed, T_j = 125°C	—	2.55	3.05	Volts

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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	—	—	0.44	°C/Watt
	$R_{th(j-c)D}$	Each Inverter FWDi	—	—	1.00	°C/Watt
	$R_{th(j-c)Q}$	Each Brake IGBT	—	—	0.70	°C/Watt
	$R_{th(j-c)D}$	Each Brake FWDi	—	—	1.50	°C/Watt
Contact Thermal Resistance	$R_{th(c-f)}$	Case to Fin Per Module, Thermal Grease Applied	—	—	0.027	°C/Watt

Recommended Conditions for Use

Characteristic	Symbol	Condition	Value	Units
Supply Voltage	V_{CC}	Applied across P-N Terminals	≤ 400	Volts
	$V_{CE(surge)}$	Applied across C-E Terminals	≤ 500	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	≤ 0.8	Volts
Input OFF Voltage	$V_{CIN(off)}$		≥ 4.0	Volts
Arm Shoot-Through Blocking Time	t_{DEAD}	For IPM's each Input Signal	≥ 2.5	µS

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