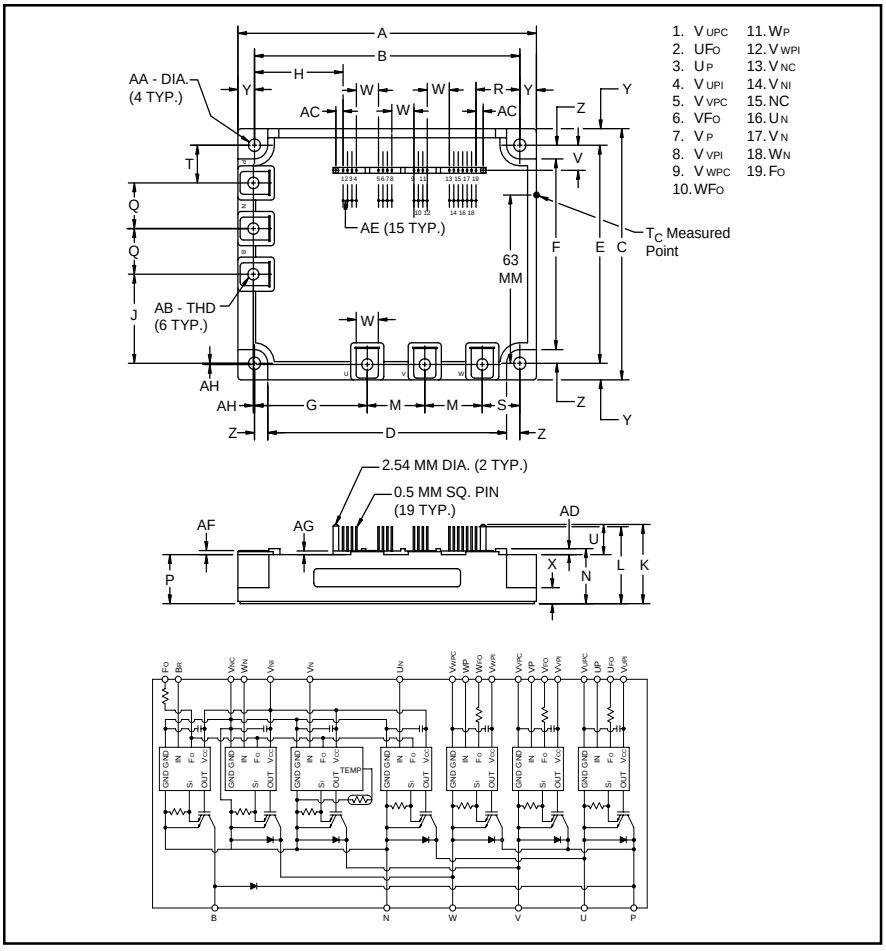
PM300RSD060

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

Intellimod™ Module

Three Phase + Brake
IGBT Inverter Output
300 Amperes/600 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	5.31±0.04	135.0±1.0
B	4.74±0.02	120.5±0.5
C	4.33±0.04	110.0±1.0
D	4.27	10.5
E	3.76±0.02	95.5±0.5
F	3.29	83.5
G	2.01	51.0
H	1.602	40.68
J	1.56	39.5
K	1.37	34.7
L	1.33	33.7
M	1.02	26.0
N	0.95 +0.06/-0.0	24.1 +1.5/-0.0
P	0.85	21.5
Q	0.79	20.0
R	0.780	19.82

Dimensions	Inches	Millimeters
S	0.69	17.5
T	0.65	16.5
U	0.52	13.2
V	0.43	11.0
W	0.41	10.5
X	0.30	7.7
Y	0.285	7.25
Z	0.24	6.0
AA	0.22 Dia.	Dia. 5.5
AB	Metric M5	M5
AC	0.128	3.22
AD	0.10	2.6
AE	0.08	2.0
AF	0.07	1.8
AG	0.06	1.6
AH	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
- ☐ 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. PM300RSD060 is a 600V, 300 Ampere Intellimod™ Intelligent Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 10)
PM	300	60

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

Characteristics	Symbol	PM300RSD060	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	—	17	in-lb
Mounting Torque, M5 Main Terminal Screws	—	17	in-lb
Module Weight (Typical)	—	920	Grams
Supply Voltage Protected by OC and SC (V_D = 13.5 - 16.5V, Inverter Part) T_j = 125°C	$V_{CC(prot.)}$	400	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}	600	Volts
Collector Current, ± (T_C = 25°C)	I_C	300	Amperes
Peak Collector Current, ± (T_C = 25°C)	I_{CP}	600	Amperes
Supply Voltage (Applied between P - N)	V_{CC}	400	Volts
Supply Voltage, Surge (Applied between P - N)	$V_{CC(surge)}$	500	Volts
Collector Dissipation (T_C = 25°C)	P_C	657	Watts

IGBT Brake Sector

Collector-Emitter Voltage (V_D = 15V, V_{CIN} = 15V)	V_{CES}	600	Volts
Collector Current, ± (T_C = 25°C)	I_C	100	Amperes
Peak Collector Current, ± (T_C = 25°C)	I_{CP}	200	Amperes
FWDi Rated DC Reverse Voltage (T_C = 25°C)	$V_{R(DC)}$	600	Volts
FWDi Forward Current (T_C = 25°C)	I_F	100	Amperes
Collector Dissipation (T_C = 25°C)	P_C	307	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 F_O and V_C)	V_{FO}	20	Volts
Fault Output Current (U_{FO}, V_{FO}, W_{FO}, F_O)	I_{FO}	20	mA

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, V_{CIN} = 15V	—	—	1.0	mA
		$V_{CE} = V_{CES}$, T_j = 125°C V_D = 15V, V_{CIN} = 15V	—	—	10	mA
Diode Forward Voltage	V_{EC}	$-I_C$ = 300A, V_D = 15V, V_{CIN} = 15V	—	2.2	3.3	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_D = 15V, V_{CIN} = 0V, I_C = 300A T_j = 25°C	—	1.70	—	Volts
		V_D = 15V, V_{CIN} = 0V, I_C = 300A, T_j = 125°C	—	1.70	—	Volts
Inductive Load Switching Times	t_{on}	V_D = 15V, V_{CIN} = 0 ~ 15V V_{CC} = 300V, I_C = 300A T_j = 125°C	0.5	0.8	1.5	µS
	t_{rr}		—	0.15	0.3	µS
	$t_{C(on)}$		—	0.4	1.0	µS
	t_{off}		—	2.0	2.5	µS
	$t_{C(off)}$		—	0.5	1.0	µS
IGBT Brake Sector						
Collector Cutoff Current	I_{CES}	$V_{CE} = V_{CES}$, T_j = 25°C, V_D = 15V, V_{CIN} = 15V	—	—	1.0	mA
		$V_{CE} = V_{CES}$, T_j = 125°C V_D = 15V, V_{CIN} = 15V	—	—	10	mA
FWDi Forward Voltage	V_{FM}	I_F = 100A	—	2.2	3.3	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_D = 15V, V_{CIN} = 0V, I_C = 100A, T_j = 25°C	—	2.35	2.80	Volts
		V_D = 15V, V_{CIN} = 0V, I_C = 100A, T_j = 125°C	—	2.55	3.05	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_j ≤ 125°C, V_D = 15V	390	540	—	Amperes
Over Current Trip Level Brake Part			140	195	—	Amperes
Short Circuit Trip Level Inverter Part	SC	-20°C ≤ T_j ≤ 125°C, V_D = 15V	—	760	—	Amperes
Short Circuit Trip Level Brake Part			—	292	—	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
	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
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}	—	96	125	mA
		V_D = 15V, V_{CIN} = 15V, V_{XP1}-V_{XPC}	—	32	42	mA
Thermal Voltage ON	$V_{th(on)}$	Applied between	1.2	1.5	1.8	Volts
Thermal Voltage OFF	$V_{th\ (off)}$	U_P, V_P, W_P, U_N, V_N, W_N, B_r-V_{NC}	1.7	2.0	2.3	Volts
Input ON Threshold Voltage	$V_{CIN(on)}$	Applied between	—	—	0.8	Volts
Input OFF Threshold Voltage	$V_{CIN(off)}$	U_P, V_P, W_P, U_N, V_N, W_N, B_r-V_{NC}	4.0	—	—	Volts
PWM Input Frequency	f_{PWM}	3-∅ Sinusoidal	—	—	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

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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	—	—	0.16	°C/Watt
	$R_{th(j-c)F}$	Each Inverter FWDi	—	—	0.24	°C/Watt
	$R_{th(j-c)Q}$	Each Brake IGBT	—	—	0.30	°C/Watt
	$R_{th(j-c)F}$	Each Brake FWDi	—	—	0.80	°C/Watt
Contact Thermal Resistance	$R_{th(c-f)}$	Case to Fin Per Module, Thermal Grease Applied	—	—	0.018	°C/Watt

Recommended Conditions for Use

Characteristic	Symbol	Condition	Value	Units
Supply Voltage	V_{CC}	Applied across P-N Terminals	0 ~ 400	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	0 ~ 0.8	Volts
Input OFF Voltage	$V_{CIN(off)}$	U_P, V_P, W_P, 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	≥ 2.0	µS
		I_F = 12mA	≥ 4.0	µS

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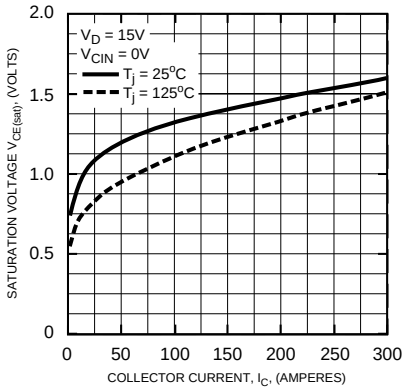
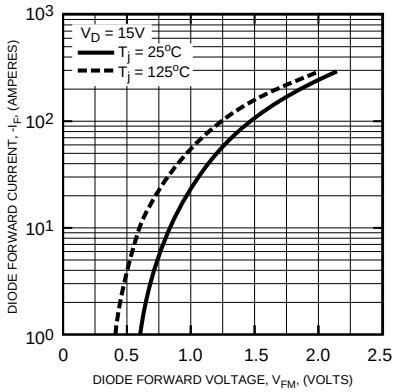
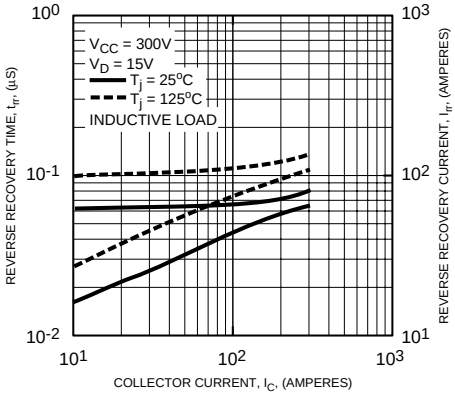
SATURATION VOLTAGE CHARACTERISTICS (TYPICAL) (INVERTER PART)



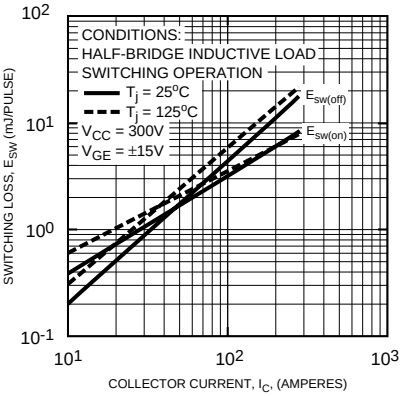
DIODE FORWARD CHARACTERISTICS (INVERTER PART)



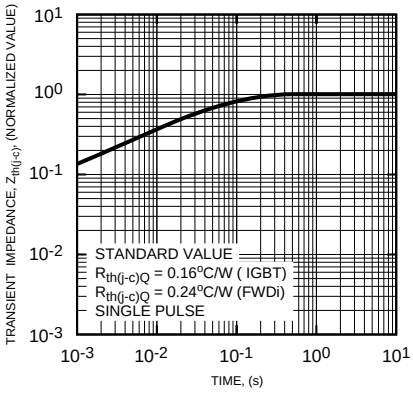
REVERSE RECOVERY CURRENT VS. COLLECTOR CURRENT (TYPICAL)



SWITCHING LOSS CHARACTERISTICS



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT & FWDi - INVERTER PART)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT & FWDi - BRAKE PART)