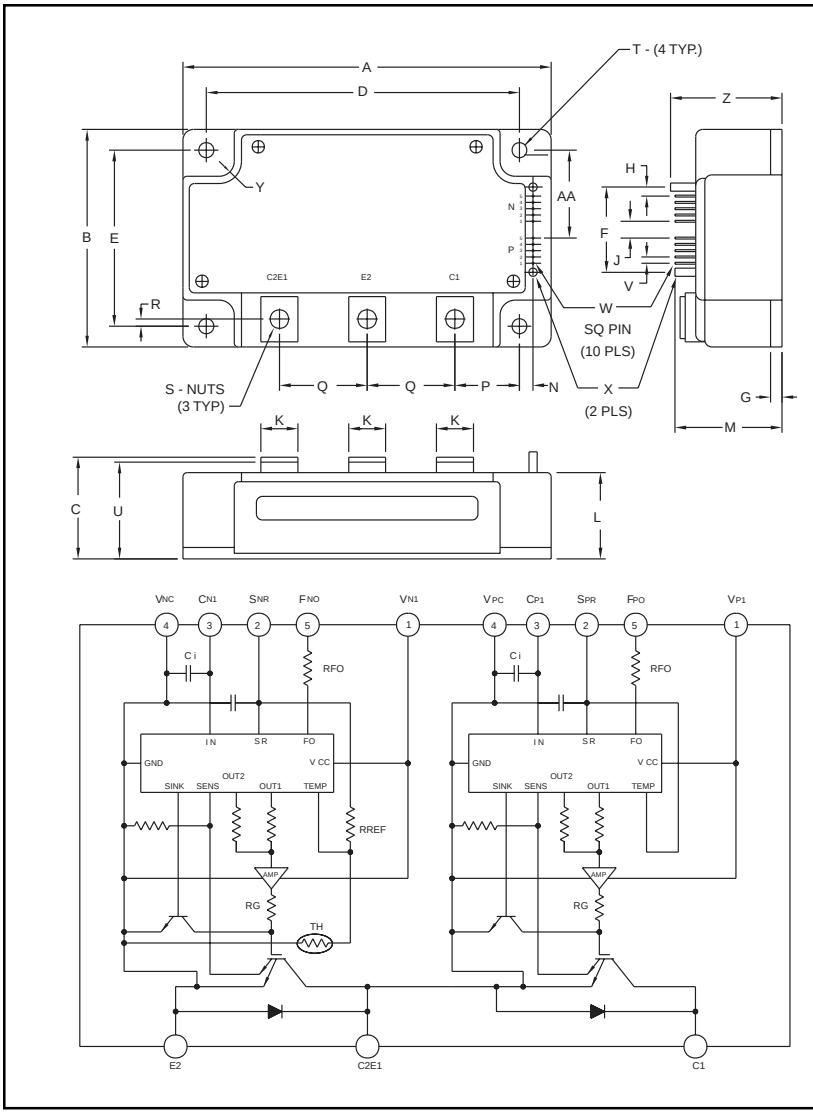
Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (724) 925-7272

Intellimod™ Module

Single Phase
IGBT Inverter Output
300 Amperes/1200 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	4.72	120.0
B	3.54	90.0
C	1.34 +0.04/-0.02	34 +1.0/-0.5
D	4.17±0.010	106.0±0.25
E	2.99±0.010	76.0±0.25
F	1.52	38.5
G	0.16	4.0
H	0.16	4.01
J	0.40	10.16
K	0.71	18.0
L	1.22	31.0
M	1.73	44.0
N	0.12	3.0

Dimensions	Inches	Millimeters
P	1.22	31.0
Q	1.10	28.0
R	0.12	3.0
S	M8 Metric	M8
T	0.26 Dia.	Dia. 6.5
U	1.29	32.8
V	0.10	2.54
W	0.025 SQ	0.64 SQ
X	0.14 Dia.	3.5 Dia.
Y	0.26 Dia.	Dia. 6.5
Z	1.79	45.5
AA	1.5	38.0

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 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. PM300DVA120 is a 1200V, 300 Ampere Intellimod™ Intelligent Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 10)
PM	300	120

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PM300DVA120
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Absolute Maximum Ratings, T_j = 25°C unless otherwise specified

Characteristics	Symbol	PM300DVA120	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, M6 Mounting Screws (Typical)	—	26	in-lb
Mounting Torque, M6 Main Terminal Screws (Typical)	—	26	in-lb
Module Weight (Typical)	—	720	Grams
Supply Voltage (Applied between C1-E2)	$V_{CC(surge)}$	1000	Volts
Supply Voltage Protected by 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_{RMS}	2500	Volts

Control Sector

Supply Voltage Applied between (V_{P1}-V_{PC}, V_{N1}-V_{NC})	V_D	20	Volts
Input Voltage Applied between (C_{P1}-V_{PC}, C_{N1}-V_{NC})	V_{CIN}	10	Volts
Fault Output Supply Voltage (Applied between F_{PO}-V_{PC}, F_{NO}-V_{NC})	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} = 5V)	V_{CES}	1200	Volts
Collector Current, ± (T_C = 25°C)	I_C	300	Amperes
Peak Collector Current, ± (T_C = 25°C)	I_{CP}	600	Amperes
Collector Dissipation (T_C = 25°C)	P_C	1380	Watts

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Control Sector						
Short Circuit Trip Level	SC	-20°C ≤ T_j ≤ 125°C, V_D = 15V	380	—	—	Amperes
Short Circuit Current Delay 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} = 5V, V_{N1}-V_{NC}	—	37	48	mA
		V_D = 15V, V_{CIN} = 5V, V_{P1}-V_{PC}	—	37	48	mA
Input ON Threshold Voltage	$V_{CIN(on)}$	Applied between	1.2	1.5	1.8	Volts
Input OFF Threshold Voltage	$V_{CIN(off)}$	C_{P1}-V_{PC}, C_{N1}-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
SXR Terminal Output Voltage	V_{SXR}	T_j ≤ 125°C, R_{in} = 6.8kΩ (S_{PR}, S_{NR})	4.5	5.1	5.6	Volts

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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-Emitter Cutoff Current	I_{CES}	$V_{CE} = V_{CES}$, V_D = 5V, T_j = 25°C	—	—	1.0	mA
		$V_{CE} = V_{CES}$, V_D = 5V, T_j = 125°C	—	—	10.0	mA
FWDi Forward Voltage	V_{EC}	$-I_C$ = 300A, V_D = 15V, V_{CIN} = 5V	—	2.50	3.50	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_D = 15V, V_{CIN} = 0V, I_C = 300A, Pulsed, T_j = 25°C	—	2.65	3.30	Volts
		V_D = 15V, V_{CIN} = 0V, I_C = 300A, Pulsed, T_j = 125°C	—	2.75	3.35	Volts
Inductive Load Switching Times	t_{on}	V_D = 15V, V_{CIN} = 0V ~ 5V, V_{CC} = 600V, I_C = 300A, T_j = 125°C	0.4	0.9	2.3	µS
	t_{rr}		—	0.2	0.3	µS
	$t_{C(on)}$		—	0.4	1.0	µS
	t_{off}		—	2.4	3.4	µS
	$t_{C(off)}$		—	0.7	1.2	µS

Thermal Characteristics

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Units
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	Each Inverter IGBT	—	—	0.09	°C/Watt
	$R_{th(j-c)D}$	Each Inverter FWDi	—	—	0.13	°C/Watt
Contact Thermal Resistance	$R_{th(c-f)}$	Case to Fin Per Module, Thermal Grease Applied	—	—	0.033	°C/Watt

Recommended Conditions for Use

Characteristic	Symbol	Condition	Value	Units
Supply Voltage	V_{CC}	Applied across C1-E2 Terminals	≤ 800	Volts
	$V_{CE(surge)}$	Applied across C1-E1, C2-E2 Terminals	≤ 1000	Volts
	V_D	Applied between V_{P1}-V_{PC}, V_{N1}-V_{NC}	15 ± 1.5	Volts
Input ON Voltage	$V_{CIN(on)}$	Applied between C_{P1}-V_{PC}, C_{N1}-V_{NC}	≤ 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	≥ 3.5	µS

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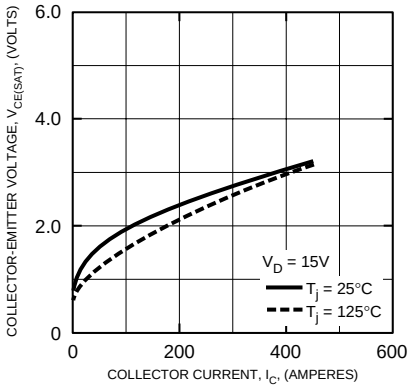
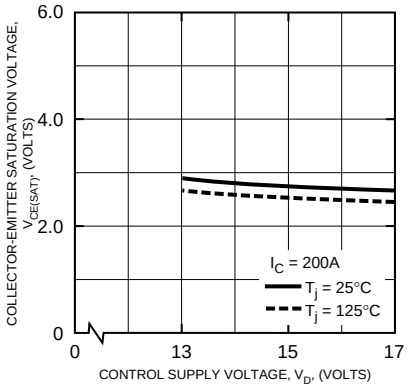
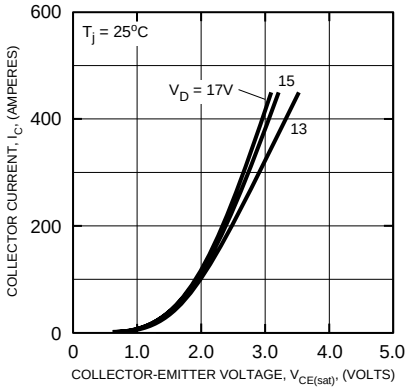
SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



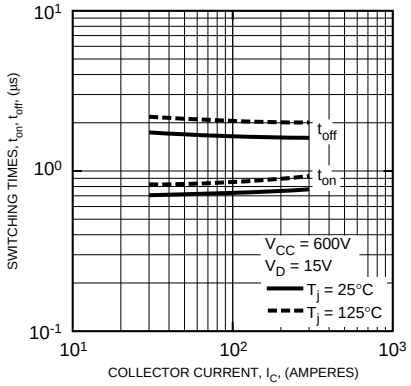
COLLECTOR-EMITTER SATURATON VOLTAGE CHARACTERISTICS (TYPICAL)



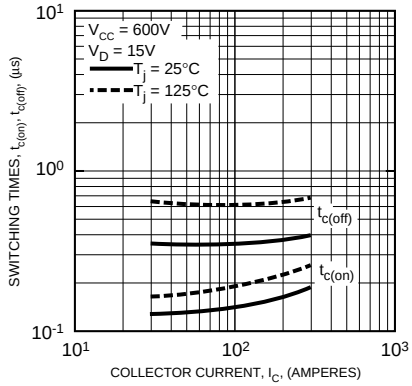
OUTPUT CHARACTERISTICS (TYPICAL)



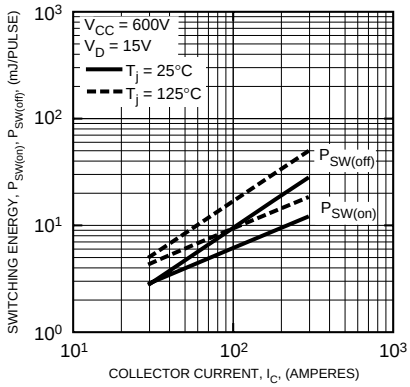
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



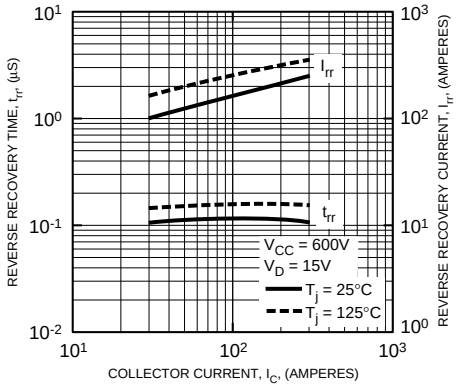
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



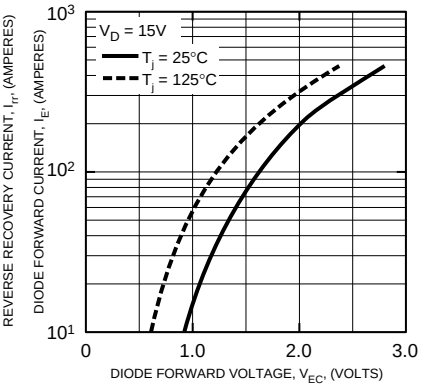
SWITCHING LOSS CHARACTERISTICS (TYPICAL)



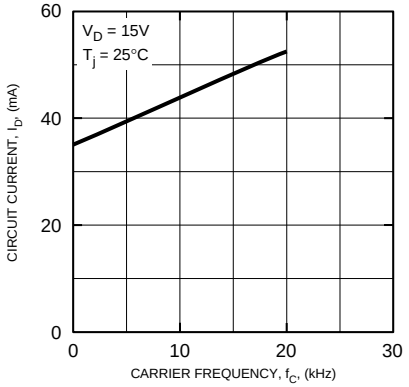
REVERSE RECOVERY CURRENT VS. COLLECTOR CURRENT (TYPICAL)



DIODE FORWARD CHARACTERISTICS



CIRCUIT CURRENT VS. CARRIER FREQUENCY



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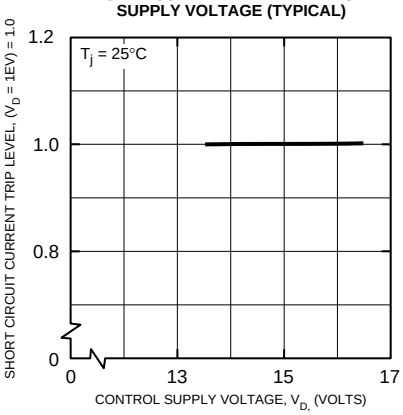
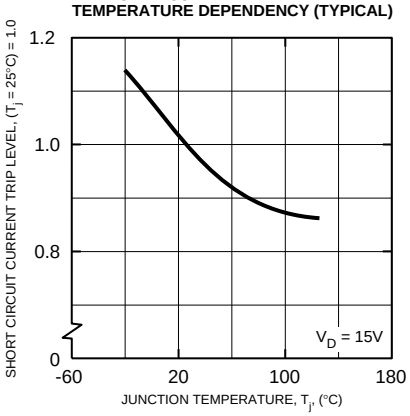
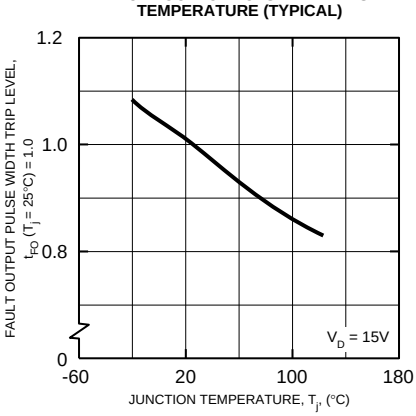
OVER CURRENT TRIP LEVEL VS. SUPPLY VOLTAGE (TYPICAL)



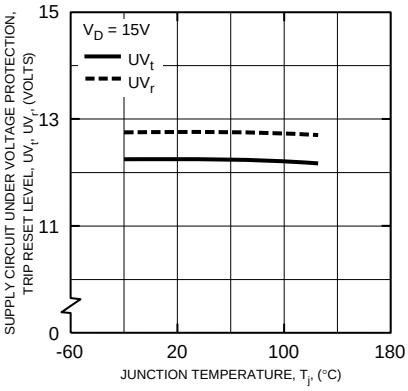
OVER CURRENT TRIP LEVEL TEMPERATURE DEPENDENCY (TYPICAL)



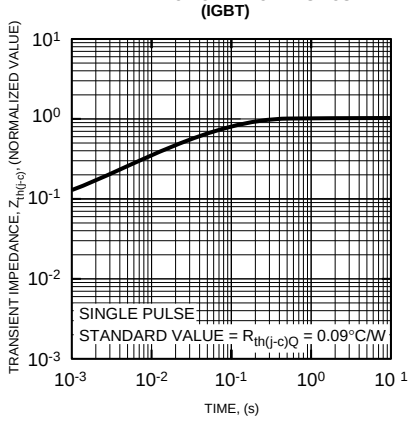
FAULT OUTPUT PULSE WIDTH VS. TEMPERATURE (TYPICAL)



CONTROL SUPPLY VOLTAGE TRIP-RESET LEVEL TEMPERATURE DEPENDENCY (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (FWDi)