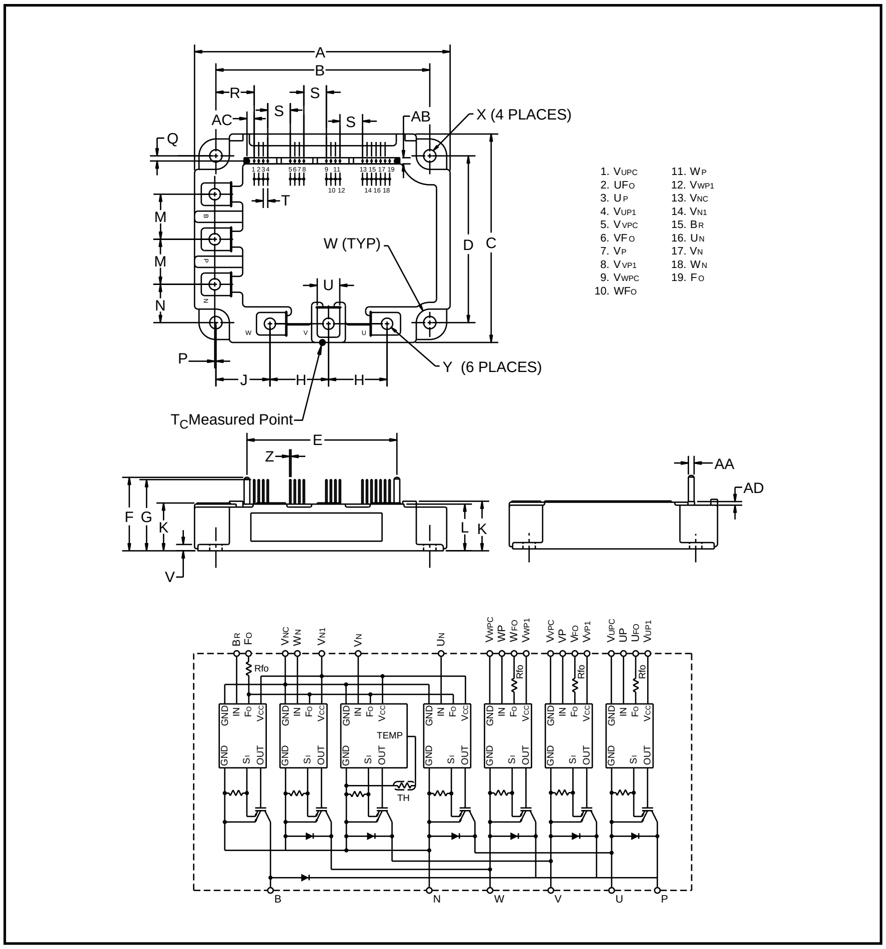
POWEREX

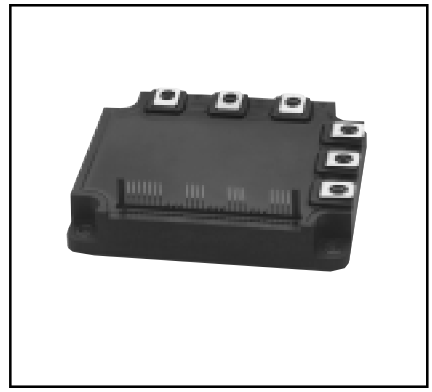
PM100RSD060

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

Intellimod™ Module

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





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
D	2.91±0.02	74.0±0.5
E	2.62	66.44
F	1.28	32.6
G	1.24	31.6
H	1.02	26.0
J	0.94	24.0
K	0.87 +0.04/-0.02	22.0 +1.0/-0.5
L	0.84	21.2
M	0.79	20.0
N	0.69	17.5
P	0.02±0.01	0.5±0.3

Dimensions	Inches	Millimeters
Q	0.08±0.02	2.0±0.5
R	0.670	17.02
S	0.39	10.0
T	0.08	2.0
U	0.39	10.0
V	0.16	4.0
W	0.24 Rad.	Rad. 6.0
X	0.217 Dia.	M5.5
Y	0.197	M5
Z	0.2 Sq.	Sq. 0.5
AA	0.10	2.54
AB	0.18	4.5
AC	0.13	3.22
AD	0.06	1.6

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. PM100RSD060 is a 600V, 100 Ampere Intellimod™ Intelligent Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 10)
PM	100	60

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

Characteristics	Symbol	PM100RSD060	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)	—	560	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	100	Amperes
Peak Collector Current, ± (T_C = 25°C)	I_{CP}	200	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	328	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	30	Amperes
Peak Collector Current, ± (T_C = 25°C)	I_{CP}	60	Amperes
FWDi Rated DC Reverse Voltage (T_C = 25°C)	$V_{R(DC)}$	600	Volts
FWDi Forward Current (T_C = 25°C)	I_F	30	Amperes
Collector Dissipation (T_C = 25°C)	P_C	176	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	—	—	1.0	mA
		$V_{CE} = V_{CES}$, T_j = 125°C V_D = 15V	—	—	10	mA
Diode Forward Voltage	V_{EC}	$-I_C$ = 100A, 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 = 100A T_j = 25°C	—	1.7	2.3	Volts
		V_D = 15V, V_{CIN} = 0V, I_C = 100A, T_j = 125°C	—	1.7	2.3	Volts
Inductive Load Switching Times	t_{on}	V_D = 15V, V_{CIN} = 0 ~ 15V V_{CC} = 300V, I_C = 100A T_j = 125°C	0.8	1.2	2.4	µS
	t_{rr}		—	0.15	0.3	µS
	$t_{C(on)}$		—	0.4	1.0	µS
	t_{off}		—	2.4	3.3	µS
	$t_{C(off)}$		—	0.6	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}	$-I_F$ = 30A	—	2.5	3.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_D = 15V, V_{CIN} = 0V, I_C = 30A, T_j = 25°C	—	1.8	2.5	Volts
		V_D = 15V, V_{CIN} = 0V, I_C = 30A, T_j = 125°C	—	1.9	2.6	Volts

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Control Sector						
Over Current Trip Level Inverter Part	OC	-20°C ≤ T_j ≤ 125°C, V_D = 15V	158	240	—	Amperes
Over Current Trip Level Brake Part			39	53	—	Amperes
Short Circuit Trip Level Inverter Part	SC	-20°C ≤ T_j ≤ 125°C, V_D = 15V	—	360	—	Amperes
Short Circuit Trip Level Brake Part			—	79	—	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
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}	—	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	1.2	1.5	1.8	Volts
Input OFF Threshold Voltage	$V_{CIN(off)}$	U_P, V_P, W_P, U_N, V_N, W_N, B_r-V_{NC}	1.7	2.0	2.3	Volts
PWM Input Frequency	f_{PWM}	3-∅ Sinusoidal	—	—	20	kHz
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

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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	—	—	0.38	°C/Watt
	$R_{th(j-c)F}$	Each Inverter FWDi	—	—	0.70	°C/Watt
	$R_{th(j-c)Q}$	Each Brake IGBT	—	—	0.71	°C/Watt
	$R_{th(j-c)F}$	Each Brake FWDi	—	—	1.66	°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	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	5 ~ 20	kHz
Minimum Dead Time	t_{DEAD}	Input Signal	≥ 2.5	µS

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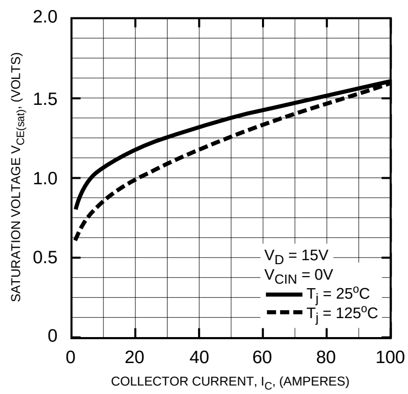
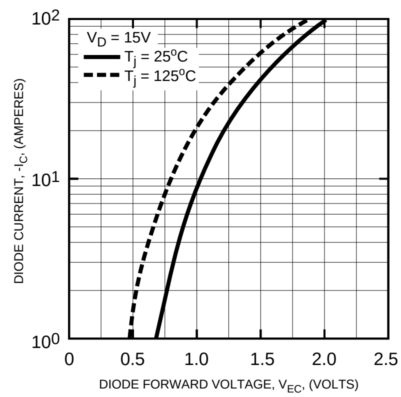
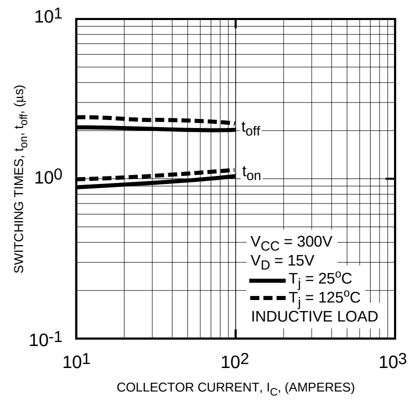
SATURATION VOLTAGE CHARACTERISTICS (TYPICAL) (INVERTER PART)



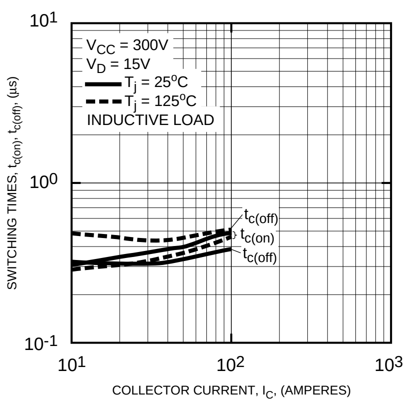
DIODE FORWARD CHARACTERISTICS (INVERTER PART)



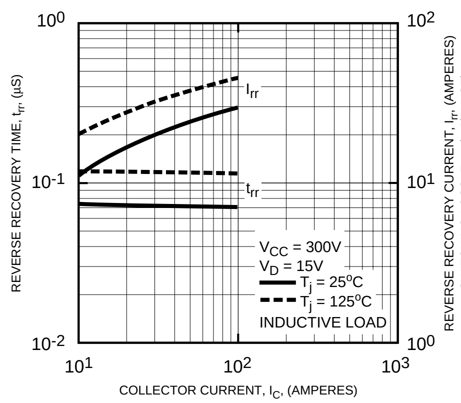
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



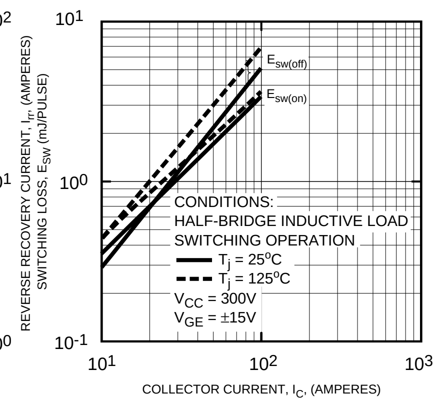
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



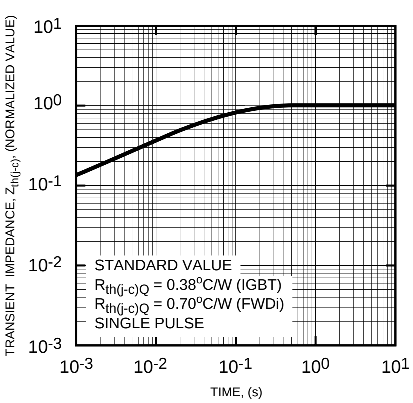
REVERSE RECOVERY CURRENT VS. COLLECTOR CURRENT (TYPICAL)



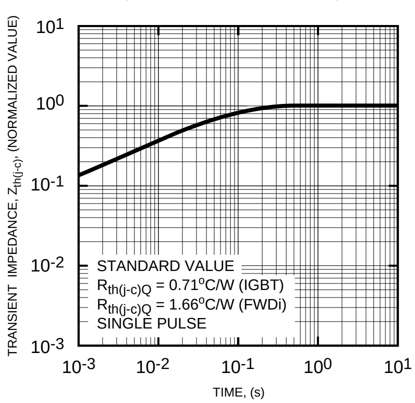
SWITCHING LOSS CHARACTERISTICS



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

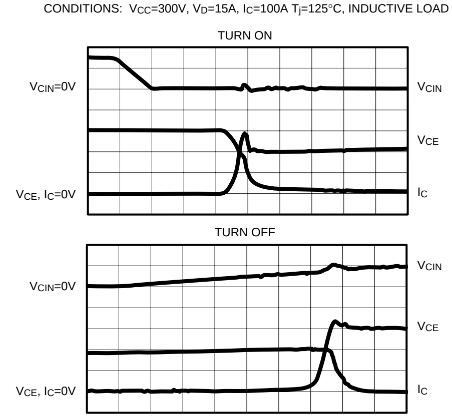


TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT & FWDi - BRAKE PART)



SWITCHING WAVEFORM (TYPICAL)

CONDITIONS: V_{CC}=300V, V_D=15A, I_C=100A T_j=125°C, INDUCTIVE LOAD



I_C=50A/div, V_{CC}=100V/div, V_{CIN}=10V/div, t=400ns/div