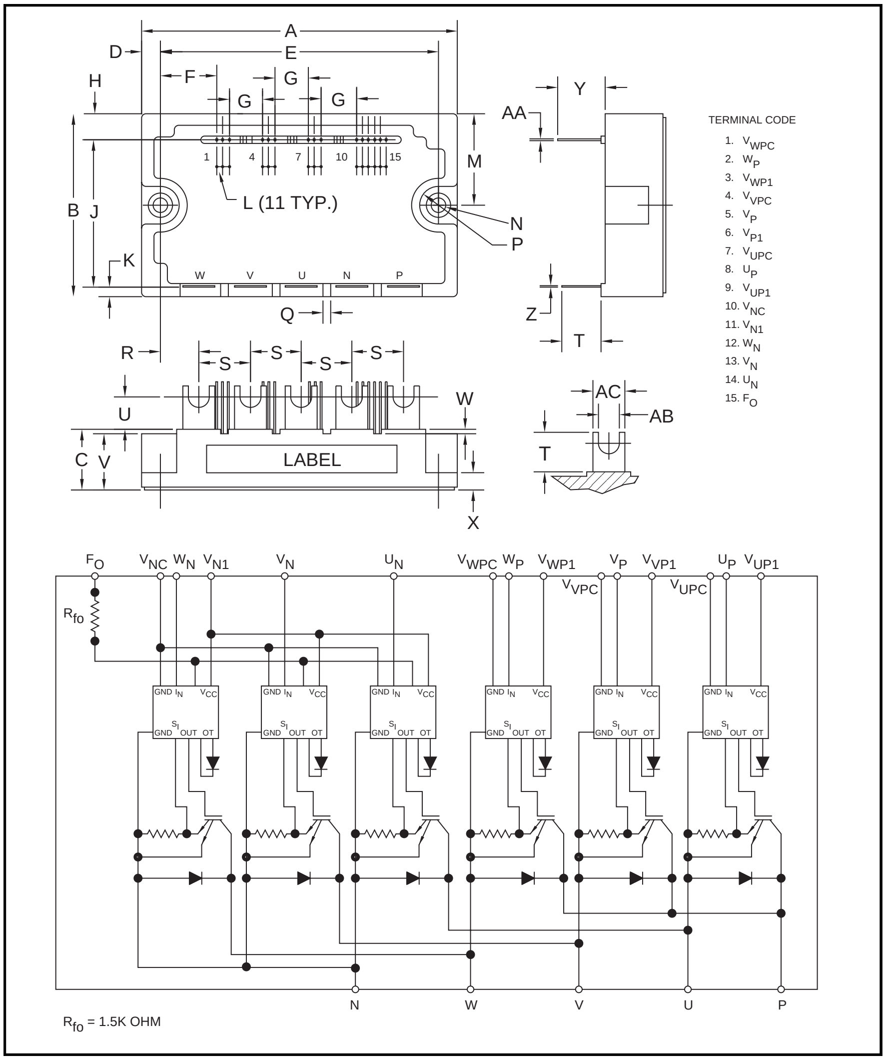
PM100CBS060

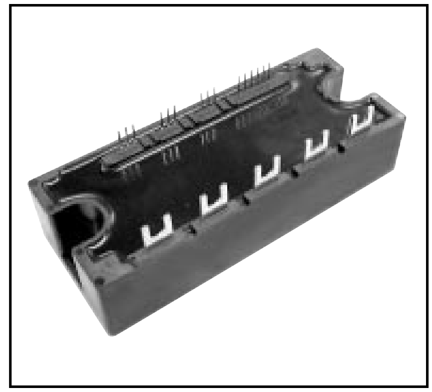
Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (724) 925-7272

Intellimod™ Module

MAXISS Series™
Multi AXIS Servo IPM
100 Amperes/600 Volts



Outline Drawing and Circuit Diagram



Dimensions	Inches	Millimeters
A	4.72	120.0
B	1.97	50.0
C	1.18	30.0
D	0.3	7.0
E	4.17±0.1	106.0±0.3
F	0.94	23.79
G	0.40	10.16
H	0.34	8.5
J	1.54	39.0
K	0.10	2.5
L	0.10	2.54
M	0.98	25.0
N	5.5 Dia.	Dia 5.5
P	0.28 Rad.	Rad. 7.0

Dimensions	Inches	Millimeters
Q	0.12	3.0
R	0.59	15.0
S	0.75	19.0
T	0.39	10.0
U	0.24	6.0
V	1.10	28.0
W	0.08	2.0
X	0.26	6.5
Y	0.43	11.0
Z	0.04	1.0
AA	0.03	0.64
AB	0.20	5.0
AC	0.35	9.0

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 Current
  - Under Voltage
  - Over Temperature by On-Chip Temperature Sensor
- Low Loss Using 4th Generation IGBT Chip

Applications:

- Motion Control
- Servo Control

Ordering Information:

Example: Select the complete part number from the table below -i.e. PM100CBS060 is a 600V, 100 Ampere Intellimod™ Intelligent Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 10)
PM	100	060

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

Characteristics	Symbol	PM100CBS060	Units
Storage Temperature	T_{stg}	-40 to 125	°C
Case Operating Temperature*	T_C	-20 to 100	°C
Mounting Torque, M5 Mounting Screws	—	31	in-lb
Mounting Torque, M5 Main Terminal Screws	—	31	in-lb
Module Weight (Typical)	—	400	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
Supply Voltage, Surge (Applied between P - N)	$V_{CC(surge)}$	500	Volts
Isolation Voltage, AC 1 minute, 60Hz Sinusoidal	V_{ISO}	2500	V_{rms}

IGBT Inverter Sector

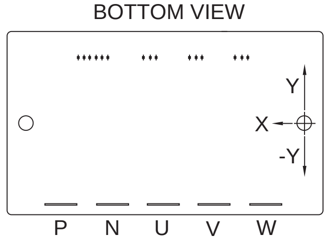
Characteristics	Symbol	PM100CBS060	Units
Collector-Emitter Voltage (V_D = 15V, V_{CIN} = 15V)	V_{CES}	600	Volts
Collector Current, ± (T_C = 25°C)	I_C	100	Amperes
Peak Collector Current, ± (T_C = 25°C)	I_{CP}	200	Amperes
Collector Dissipation	P_C	568	Watts
Power Device Junction Temperature	T_j	-20 to 150	°C

Control Sector

Characteristics	Symbol	PM100CBS060	Units
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-V_{NC})	V_{CIN}	20	Volts
Fault Output Supply Voltage (Applied between F_O and V_{NC})	V_{FO}	V_D +0.5	Volts
Fault Output Current (Sink Current at F_O Terminal)	I_{FO}	20	mA

*T_C Measure Point (Under the Chip)

BOTTOM VIEW



(mm)

ARM / AXIS	U_P		V_P		W_P		U_N		V_N		W_N	
	IGBT	FWDi	IGBT	FWDi	IGBT	FWDi	IGBT	FWDi	IGBT	FWDi	IGBT	FWDi
X	83.3	83.3	41.8	41.8	16.8	16.8	70.8	70.8	54.3	54.3	29.3	29.3
Y	4.9	-4.8	4.9	-4.8	4.9	-4.8	-1.2	-10.8	-1.2	-10.8	-1.2	-10.8

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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 = 15V, T_j = 25°C	—	—	1.0	mA
		$V_{CE} = V_{CES}$, V_D = 15V, T_j = 125°C	—	—	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, Inductive Load	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
	$t_{C(off)}$		—	0.5	1.0	µS
Control Sector						
Over Current Trip Level	OC	T_j = -20°C, V_D = 15V	—	—	470	Amperes
		T_j = 25°C, V_D = 15V	220	290	390	Amperes
		T_j = 125°C, V_D = 15V	158	—	—	Amperes
Short Circuit Trip Level	SC	-20°C ≤ T_j ≤ 125°C, V_D = 15V	—	360	—	Amperes
Over Current Delay Time	$t_{off(OC)}$	V_D = 15V	—	10	—	µS
Over Temperature Protection	OT	Trip Level	135	145	155	°C
(Detect T_j of IGBT Chip)	OT_R	Reset Level	—	125	—	°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
Circuit Current	I_D	V_D = 15V, V_{CIN} = 15V, V_{N1}-V_{NC}	—	40	60	mA
		V_D = 15V, V_{CIN} = 15V, V_{XP1}-V_{XPC}	—	13	18	mA
Input ON Threshold Voltage	$V_{th(on)}$	Applied between U_P-V_{UPC}, V_P-V_{VPC}, W_P-V_{WPC}, U_N, V_N, W_N-V_{NC}	1.2	1.5	1.8	Volts
Input OFF Threshold Voltage	$V_{th(off)}$		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

Thermal Characteristics

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Units
Junction to Case Thermal Resistance	$R_{th(j-c')Q}$	Each IGBT*	—	—	0.22**	°C/Watt
	$R_{th(j-c')F}$	Each FWDi*	—	—	0.36**	°C/Watt
Contact Thermal Resistance	$R_{th(c-f)}$	Case to Fin Per Module, Thermal Grease Applied	—	—	0.046	°C/Watt

*T_C measured point is just under the chips.
**If you use this value, $R_{th(f-a)}$ should be mesured just under the chips.

Recommended Conditions for Use

Characteristic	Symbol	Condition	Value	Units
Supply Voltage	V_{CC}	Applied across P-N Terminals	≤ 400	Volts
Control Supply Voltage***	V_D	Applied between V_{UP1}-V_{UPC}, V_{VP1}-V_{VPC}, V_{WP1}-V_{WPC}, V_{N1}-V_{NC}	15 ± 1.5	Volts
Input ON Voltage	$V_{CIN(on)}$	Applied between U_P-V_{UPC}, V_P-V_{VPC},	≤ 0.8	Volts
Input OFF Voltage	$V_{CIN(off)}$	W_P-V_{WPC}, U_N, V_N, W_N-V_{NC}	≥ 4.0	Volts
PWM Input Frequency	f_{PWM}	Using Application Circuit	≤ 20	kHz
Minimum Dead Time	t_{DEAD}	Input Signal	≥ 2.5	µS

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

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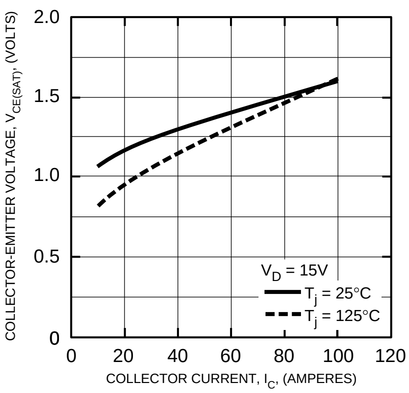
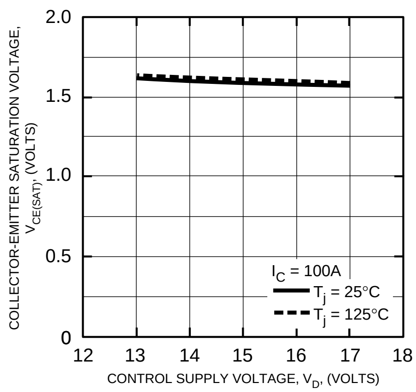
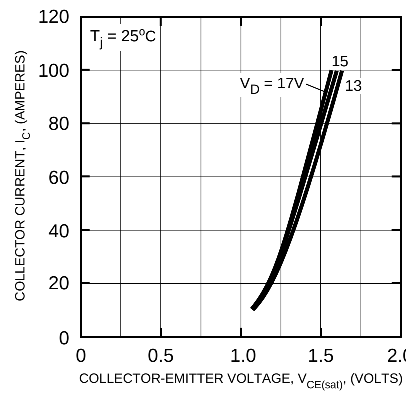
SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



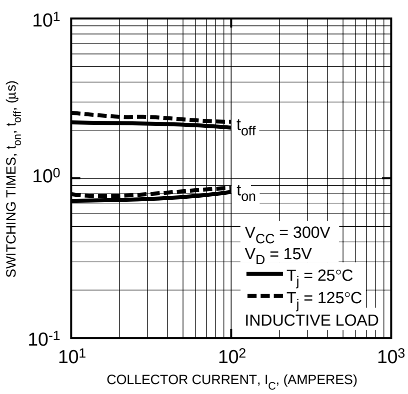
COLLECTOR-EMITTER SATURATON VOLTAGE CHARACTERISTICS (TYPICAL)



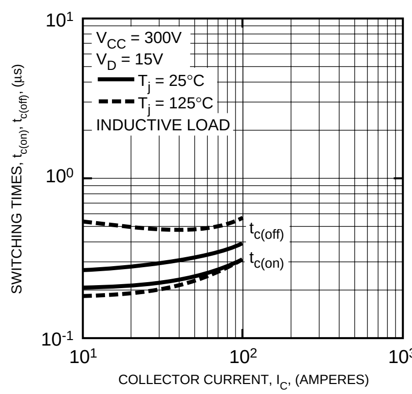
OUTPUT CHARACTERISTICS (TYPICAL)



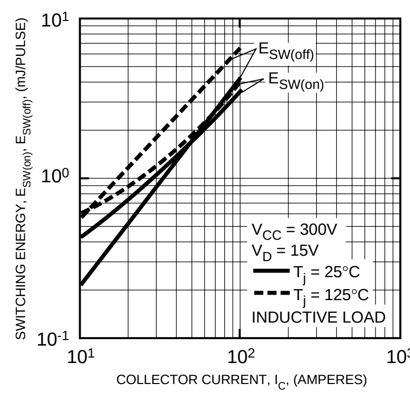
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



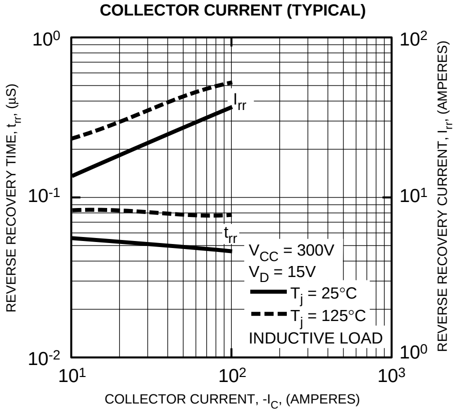
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



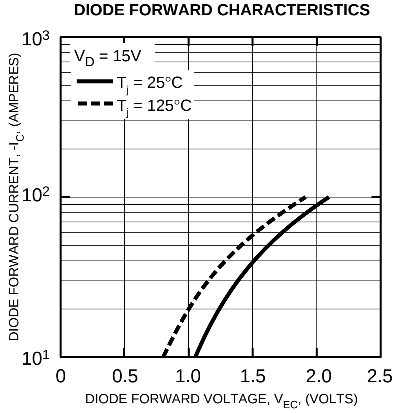
SWITCHING LOSS CHARACTERISTICS (TYPICAL)



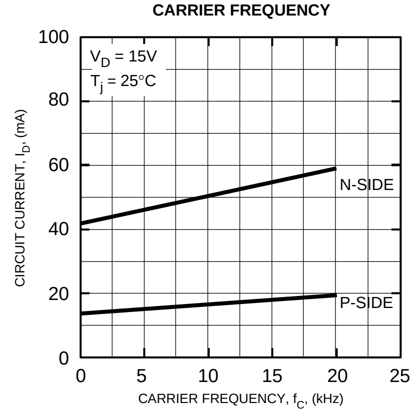
REVERSE RECOVERY CURRENT VS. COLLECTOR CURRENT (TYPICAL)



DIODE FORWARD CHARACTERISTICS



CIRCUIT CURRENT VS. CARRIER FREQUENCY



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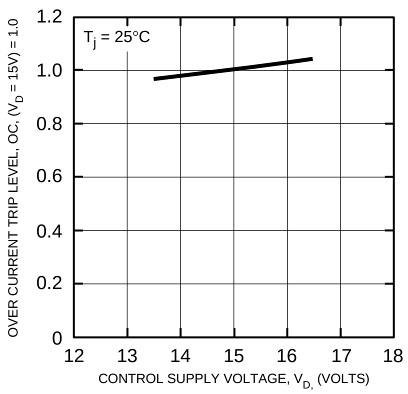
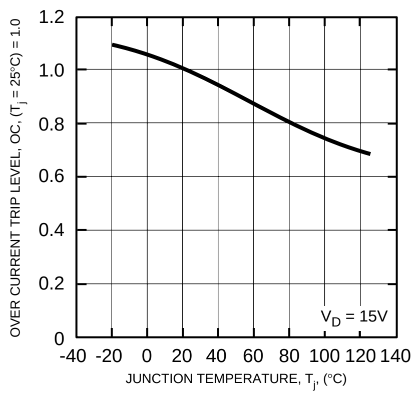
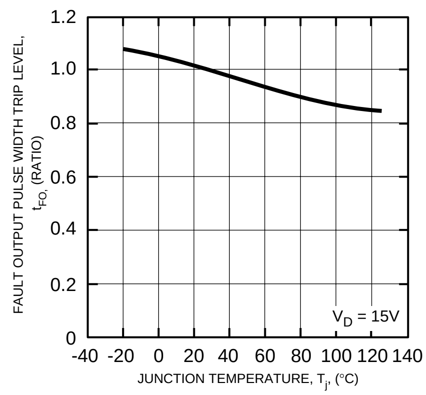
OVER CURRENT TRIP LEVEL VS. SUPPLY VOLTAGE (TYPICAL)



OVER CURRENT TRIP LEVEL TEMPERATURE DEPENDENCY (TYPICAL)



FAULT OUTPUT PULSE WIDTH VS. TEMPERATURE (TYPICAL)



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