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With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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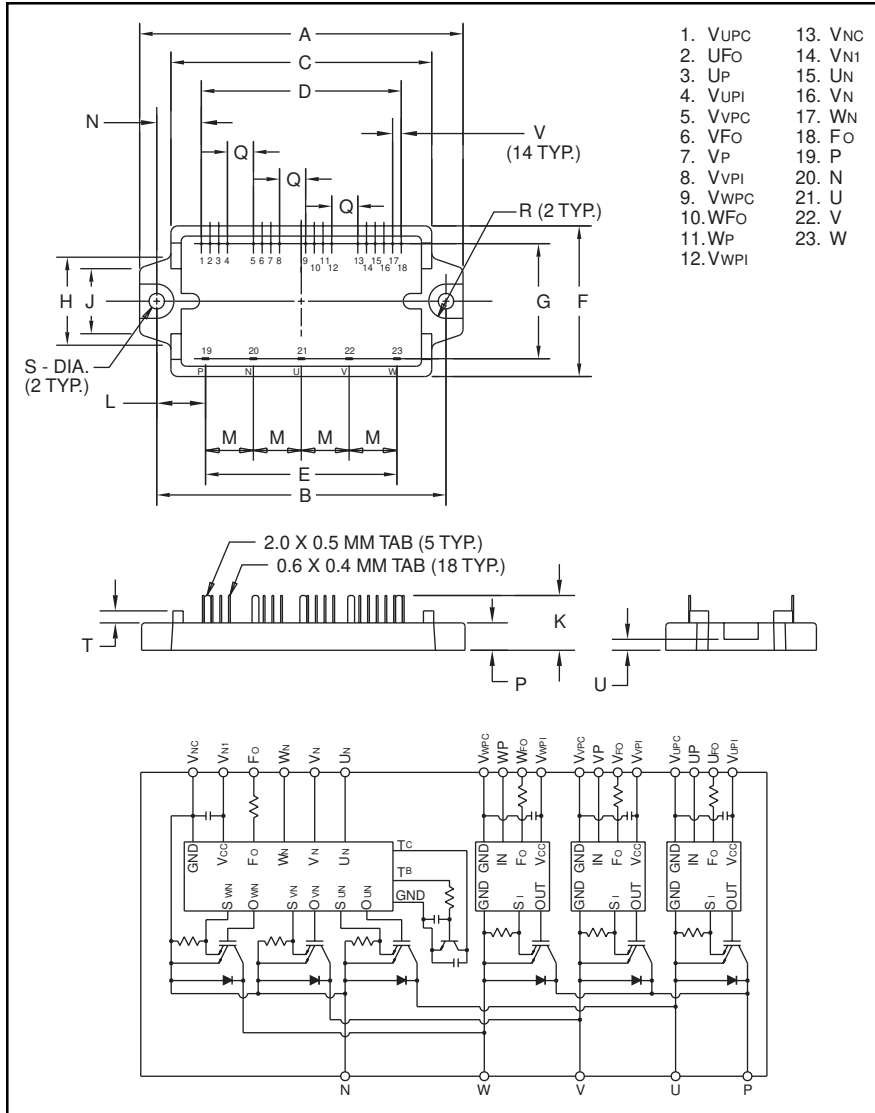
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### Intellimod™ Module Three Phase IGBT Inverter Output 20 Amperes/600 Volts



#### 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 Current
  - 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. PM20CSJ060 is a 600V, 20 Ampere Intellimod™ Intelligent Power Module.

Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	3.72±0.04	94.5±1.0
B	3.33±0.02	84.5±0.5
C	2.99	76.0
D	2.300±0.02	58.42±0.5
E	2.20±0.02	56.0±0.5
F	1.73±0.04	44.0±1.0
G	1.32±0.02	33.6±0.5
H	1.01	25.7
J	0.75	19.0
K	0.71±0.04	18.0±1.0

Dimensions	Inches	Millimeters
L	0.561	14.25
M	0.55±0.01	14.0±0.25
N	0.513	13.04
P	0.31±0.02	8.0±0.5
Q	0.300	7.62
R	0.20 Rad.	Rad. 5.0
S	0.18 Dia.	Dia. 4.5
T	0.14	3.5
U	0.13±0.02	3.2±0.5
V	0.100±0.01	2.54±0.25

Type	Current Rating Amperes	V <sub>CEs</sub> Volts (x 10)
PM	20	60



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

**PM20CSJ060**  
**Intellimod™ Module**  
**Three Phase IGBT Inverter Output**  
 20 Amperes/600 Volts

**Absolute Maximum Ratings,  $T_j = 25^\circ\text{C}$  unless otherwise specified**

Characteristics	Symbol	PM20CSJ060	Units
Power Device Junction Temperature	$T_j$	-20 to 150	$^\circ\text{C}$
Storage Temperature	$T_{\text{stg}}$	-40 to 125	$^\circ\text{C}$
Case Operating Temperature	$T_C$	-20 to 100	$^\circ\text{C}$
Mounting Torque, M4 Mounting Screws	—	13	in-lb
Module Weight (Typical)	—	60	Grams
Supply Voltage Protected by OC and SC ( $V_D = 13.5 - 16.5\text{V}$ , Inverter Part)	$V_{\text{CC(prot.)}}$	400	Volts
Isolation Voltage, AC 1 minute, 60Hz Sinusoidal	$V_{\text{RMS}}$	2500	Volts

**Control Sector**

Supply Voltage Applied between ( $V_{\text{UP1}}-V_{\text{U1PC}}$ , $V_{\text{VP1}}-V_{\text{V1PC}}$ , $V_{\text{WP1}}-V_{\text{W1PC}}$ , $V_{\text{N1}}-V_{\text{N1C}}$ )	$V_D$	20	Volts
Input Voltage Applied between ( $U_P$ , $V_P$ , $W_P$ , $U_N$ , $V_N$ , $W_N$ )	$V_{\text{CIN}}$	20	Volts
Fault Output Supply Voltage (Applied between $F_O$ and $V_C$ )	$V_{\text{FO}}$	20	Volts
Fault Output Current	$I_{\text{FO}}$	20	mA

**IGBT Inverter Sector**

Collector-Emitter Voltage ( $V_D = 15\text{V}$ , $V_{\text{CIN}} = 15\text{V}$ )	$V_{\text{CES}}$	600	Volts
Collector Current, $\pm$	$I_C$	20	Amperes
Peak Collector Current, $\pm$	$I_{\text{CP}}$	40	Amperes
Supply Voltage (Applied between P - N)	$V_{\text{CC}}$	450	Volts
Supply Voltage, Surge (Applied between P - N)	$V_{\text{CC(surge)}}$	500	Volts
Collector Dissipation	$P_C$	56	Watts



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**Electrical and Mechanical Characteristics,  $T_j = 25^\circ\text{C}$  unless otherwise specified**

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
<b>Control Sector</b>						
Over Current Trip Level Inverter Part	OC	$-20^\circ\text{C} \leq T \leq 125^\circ\text{C}$	28	38	—	Amperes
Short Circuit Trip Level Inverter Part	SC	$-20^\circ\text{C} \leq T \leq 125^\circ\text{C}$	—	57	—	Amperes
Over Current Delay Time	$t_{\text{off}}(\text{OC})$	$V_D = 15\text{V}$	—	10	—	$\mu\text{S}$
Over Temperature Protection	OT	Trip Level	100	110	120	$^\circ\text{C}$
	$\text{OT}_R$	Reset Level	—	90	—	$^\circ\text{C}$
Supply Circuit Under Voltage Protection	UV	Trip Level	11.5	12.0	12.5	Volts
	$\text{UV}_R$	Reset Level	—	12.5	—	Volts
Supply Voltage	$V_D$	Applied between $V_{\text{UP}1}-V_{\text{UPC}}$ , $V_{\text{VP}1}-V_{\text{VPC}}$ , $V_{\text{WP}1}-V_{\text{WPC}}$ , $V_{\text{N}1}-V_{\text{NC}}$	13.5	15	16.5	Volts
Circuit Current	$I_D$	$V_D = 15\text{V}$ , $V_{\text{CIN}} = 15\text{V}$ , $V_{\text{N}1}-V_{\text{NC}}$	—	18	25	mA
		$V_D = 15\text{V}$ , $V_{\text{CIN}} = 15\text{V}$ , $V_{\text{XP}1}-V_{\text{XPC}}$	—	7	10	mA
Input ON Threshold Voltage	$V_{\text{CIN}(\text{on})}$	Applied between	1.2	1.5	1.8	Volts
Input OFF Threshold Voltage	$V_{\text{CIN}(\text{off})}$	$U_P, V_P, W_P, U_N, V_N, W_N$	1.7	2.0	2.3	Volts
PWM Input Frequency	$f_{\text{PWM}}$	3- $\emptyset$ Sinusoidal	—	15	20	kHz
Fault Output Current	$I_{\text{FO}(\text{H})}$	$V_D = 15\text{V}$ , $V_{\text{FO}} = 15\text{V}$	—	—	0.01	mA
	$I_{\text{FO}(\text{L})}$	$V_D = 15\text{V}$ , $V_{\text{FO}} = 15\text{V}$	—	10	15	mA
Minimum Fault Output Pulse Width	$t_{\text{FO}}$	$V_D = 15\text{V}$	1.0	1.8	—	mS

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Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
<b>IGBT Inverter Sector</b>						
Collector Cutoff Current	$I_{CEX}$	$V_{CE} = V_{CEX}, T_j = 25^\circ\text{C}$	—	—	1.0	mA
		$V_{CE} = V_{CEX}, T_j = 125^\circ\text{C}$	—	—	10	mA
Diode Forward Voltage	$V_{FM}$	$-I_C = 20\text{A}, V_D = 15\text{V}, V_{CIN} = 15\text{V}$	—	2.5	3.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 20\text{A}$	—	1.8	2.5	Volts
		$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 20\text{A}, T_j = 125^\circ\text{C}$	—	1.9	2.6	Volts
Inductive Load Switching Times	$t_{on}$		0.3	0.5	1.5	$\mu\text{S}$
	$t_{rr}$	$V_D = 15\text{V}, V_{CIN} = 0 \sim 15\text{V}$	—	0.12	0.3	$\mu\text{S}$
	$t_{C(on)}$	$V_{CC} = 300\text{V}, I_C = 20\text{A}$	—	0.2	0.8	$\mu\text{S}$
	$t_{off}$	$T_j = 125^\circ\text{C}$	—	1.5	2.3	$\mu\text{S}$
	$t_{C(off)}$		—	0.5	1.5	$\mu\text{S}$

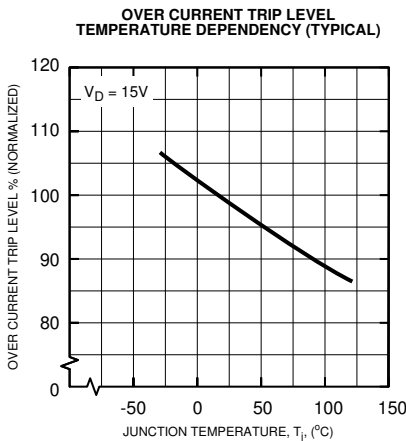
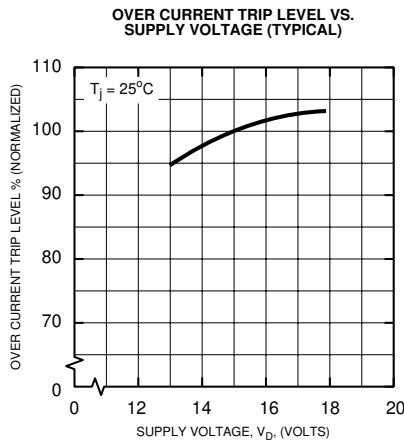
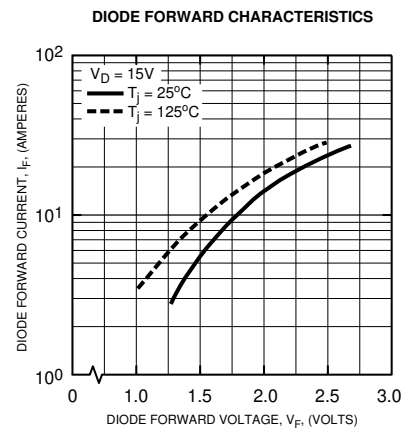
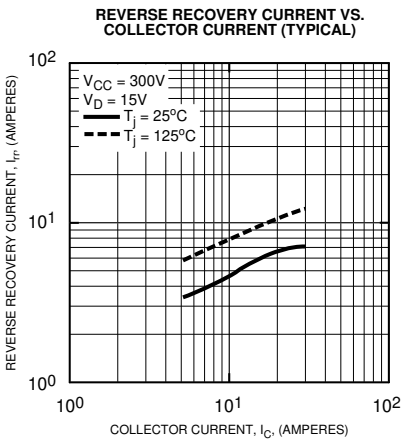
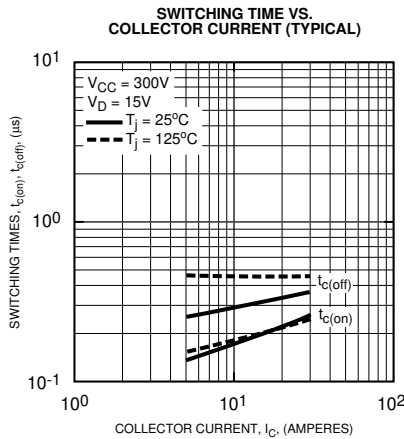
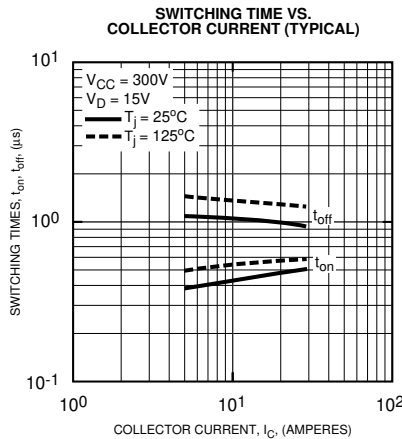
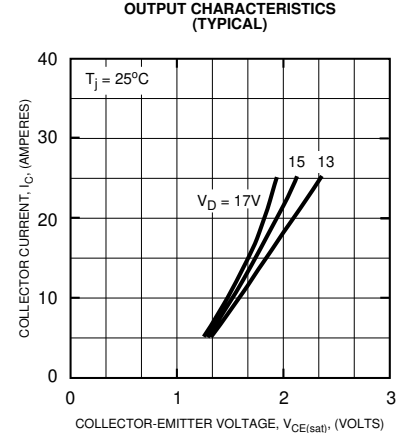
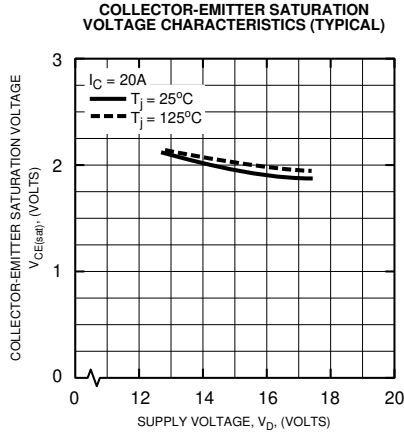
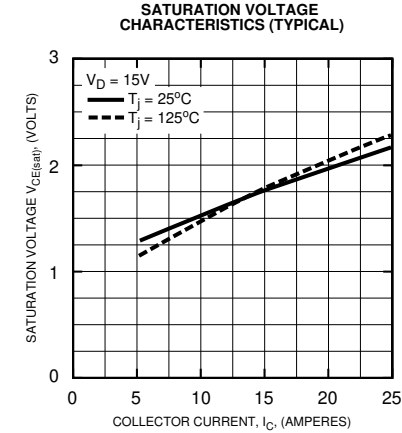
**Thermal Characteristics**

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Units
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	Each IGBT	—	—	2.2	$^\circ\text{C/Watt}$
	$R_{th(j-c)D}$	Each FWDi	—	—	4.5	$^\circ\text{C/Watt}$
Contact Thermal Resistance	$R_{th(c-f)}$	Case to Fin Per Module, Thermal Grease Applied	—	—	0.083	$^\circ\text{C/Watt}$

**Recommended Conditions for Use**

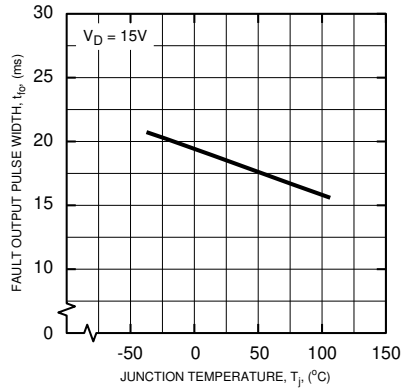
Characteristic	Symbol	Condition	Value	Units
Supply Voltage	$V_{CC}$	Applied across P-N Terminals	0 ~ 400	Volts
	$V_D$	Applied between $V_{UP1}-V_{UPC}, V_{N1}-V_{NC}, V_{WP1}-V_{WPC}, V_{WP1}-V_{WPC}$	$15 \pm 1.5$	Volts
Input ON Voltage	$V_{CIN(on)}$	Applied between	0 ~ 0.8	Volts
Input OFF Voltage	$V_{CIN(off)}$	$U_P, V_P, W_P, U_N, V_N, W_N$	$4.0 \sim V_D$	Volts
PWM Input Frequency	$f_{PWM}$	Using Application Circuit	5 ~ 20	kHz
Minimum Dead Time	$t_{DEAD}$	Input Signal	$\geq 2.0$	$\mu\text{S}$

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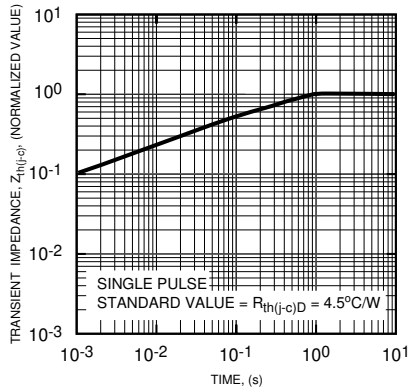


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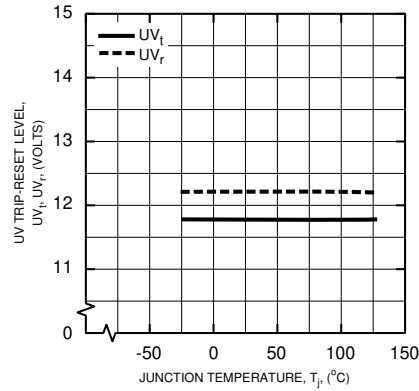
**FAULT OUTPUT PULSE WIDTH VS. TEMPERATURE (TYPICAL)**



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (FWDi)**



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



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT)**

