





POWEREX INC

51E D ■ 7294621 0005612 T66 ■ PRX ■

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Powerex, Europe, S.A. 428 Avenue G. Durand, BP107, 72003 Le Mans, France (43) 41.14.14

T-57-29

**PM20CEA060**  
**Intellimod-2 Modules**  
**Three Phase IGBT Inverter Output**  
20 Amperes/110-230 Volt Line

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

Characteristics	Symbol	PM20CEA060	Units
Power Device Junction Temperature	$T_J$	-20 to +150	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-40 to +125	$^\circ\text{C}$
Case Operating Temperature	$T_C$	-20 to +90	$^\circ\text{C}$
Module Weight (Typical)	—	114	Grams
Isolation Voltage AC 1 minute, 60Hz	$V_{RMS}$	2500	Volts

**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 Current Applied between ( $U_P, V_P, W_P, U_N, V_N, W_N$ )	$I_{CIN}$	20	mA
Input Voltage between $V_{CIN} - GND$	$V_{CIN}$	—	Volts
Fault Output Supply Voltage	$V_{FO}$	20	Volts
Fault Output Current	$I_{FO}$	20	mA

**IGBT Inverter Sector**

Collector-Emitter Voltage	$V_{CES}$	600	Volts
Collector Current $\pm$	$I_C$	20	Amperes
Peak Collector Current $\pm$	$I_{CP}$	40	Amperes
Free Wheel Diode DC Current	$I_{FM}$	20	Amperes
Supply Voltage (Applied between P - N)	$V_{CC}$	400	Volts
Collector Dissipation	$P_C$	50	Watts



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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
<b>Control Sector</b>						
Overcurrent Trip Level	OC	$T_j < 125\text{ }^\circ\text{C}$ , Fig. 3.7*	26	30	35	Amperes
Short Circuit Trip Level	SC	$T_j < 125\text{ }^\circ\text{C}$ , Fig. 3.7*	-	45	-	Amperes
Overcurrent Delay Time	$t_{off(OC)}$	$V_D = 15\text{V}$ , Fig. 3.7*	-	10	-	$\mu\text{S}$
Over Temperature Protectic	OT	Trip Level	90	105	120	$^\circ\text{C}$
Over Temperature Protection	$OT_R$	Reset Level	-	85	-	$^\circ\text{C}$
Under Voltage Protection	UV	Trip Level	11.5	12.0	12.5	Volts
Under Voltage Protection	$UV_R$	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	15	17	Volts
Circuit Current	$I_D$	$V_D = 15\text{V}$ , $I_{CIN} = 0\text{mA}$ , $V_{N1} - V_{NC}$ , $V_{XP1} - V_{XPC}$	-	25	-	mA
	$I_D$	$V_D = 15\text{V}$ , $I_{CIN} = 0\text{mA}$ , $V_{N1} - V_{NC}$ , $V_{XP1} - V_{XPC}$	-	7	-	mA
Input Bias On Current	$I_{CIN(on)}$	Sink Current at $U_P, V_P, W_P, U_N, V_N, W_N$	5	10	20	mA
Input Bias Off Current	$I_{CIN(off)}$	Sink current at $U_P, V_P, W_P, U_N, V_N, W_N$	-	-	1	mA
PWM Input Frequency	$f_{PWM}$	3- $\emptyset$ Sinusoidal	-	-	10	kHz
Dead Time	$t_{DEAD}$	For each Input Pulse	7.0	-	-	$\mu\text{S}$
Fault Output Current	$I_{FO(H)}$	$V_D = 15\text{V}$ , $V_{FO} = 15\text{V}$	-	-	0.1	mA
	$I_{FO(L)}$	$V_D = 15\text{V}$ , $V_{FO} = 15\text{V}$	-	10	-	mA
Minimum Fault Output Pulse Width	$t_{FO}$	$V_D = 15\text{V}$	20	40	60	$\mu\text{S}$

\*Figures can be found in Intellimod-2 Application Information Section.



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PM20CEA060

Intellimod-2 Modules

Three Phase IGBT Inverter Output

20 Amperes/110-230 Volt Line

### Recommended Operating Conditions

Characteristics	Symbol	Test Conditions	Value	Units
Supply Voltage	$V_{CC}$	Applied across P-N Terminals	300	Volts
	$V_D$	Applied between $V_{UP1} - V_{UPC}$ , $V_{N1} - V_{NC}$ , $V_{VP1} - V_{VPC}$ , $V_{WP1} - V_{WPC}$	15	Volts
Input Bias On Current	$I_{CIN(on)}$	Applied between $U_p, V_p, W_p, U_N, V_N, W_N$	10	mA
PWM Input Frequency	$f_{PWM}$	Using Application Circuit of Fig. 3.9*	1.5	kHz
Minimum Dead Time	$t_{DEAD}$	Using Application Circuit of Fig. 3.9*	8	$\mu S$

\*Figures can be found in Intellimod-2 Application Information Section.



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**Three Phase IGBT Inverter Output**  
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**Electrical Characteristics,  $T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified**

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
<b>IGBT Inverter Sector</b>						
Collector Cutoff Current	$I_{CEX}$	$V_{CE} = V_{CEX}$	-	-	1	mA
Collector Cutoff Current	$I_{CEX}$	$V_{CE} = V_{CEX}, T_j = 125\text{ }^\circ\text{C}$	-	-	10	mA
Diode Forward Voltage	$V_{FM}$	$I_{FM} = 20\text{A}$	-	-	2.5	Volts
Collector Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15\text{V}, I_{CIN} = 10\text{mA}, I_C = 20\text{A}$	-	-	3.5	Volts
Collector Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15\text{V}, I_{CIN} = 10\text{mA}, I_C = 8\text{A}, T_j = 125\text{ }^\circ\text{C}$	-	2.0	-	Volts
Inductive Load Switching Times	$t_{on}$	$V_D = 15\text{V}, I_{CIN} = 10\text{mA}, V_{CC} = 300\text{V}, I_C = 20\text{A}, T_j = 125\text{ }^\circ\text{C}$	-	1.0	-	$\mu\text{S}$
	$t_{rr}$		-	0.25	-	$\mu\text{S}$
	$t_{C(on)}$		-	1.0	-	$\mu\text{S}$
	$t_{off}$		-	3.5	-	$\mu\text{S}$
	$t_{C(off)}$		-	3.0	-	$\mu\text{S}$

**Thermal Characteristics**

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistances Junction to Case	$R_{\theta j-c}$	Inverter IGBT	-	-	2.5	$^\circ\text{C/W}$
Thermal Resistances Junction to Case	$R_{\theta j-c}$	Inverter FWD	-	-	4.5	$^\circ\text{C/W}$
Thermal Resistance Case to Sink	$R_{\theta c-s}$	Lubricated	-	-	0.5	$^\circ\text{C/W}$

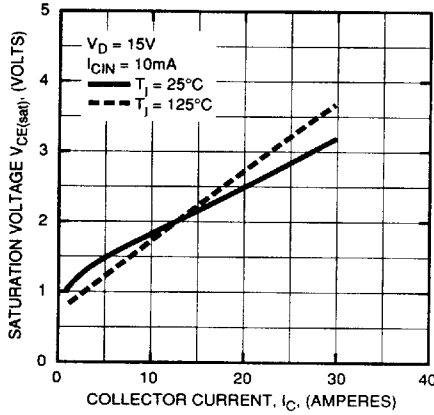
**PM20CEA060**

**Intellimod-2 Modules**

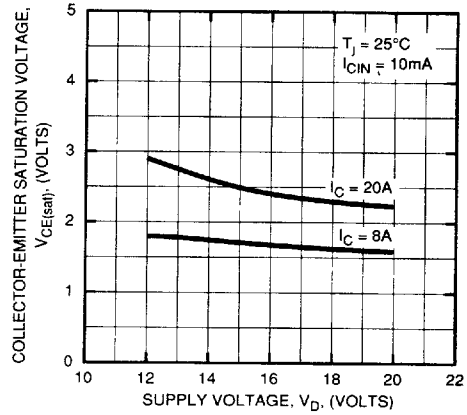
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**20 Amperes/110-230 Volt Line**

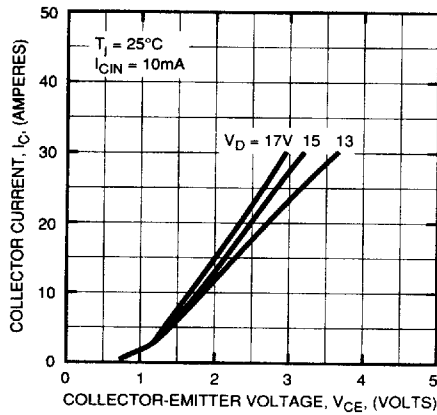
**SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)**



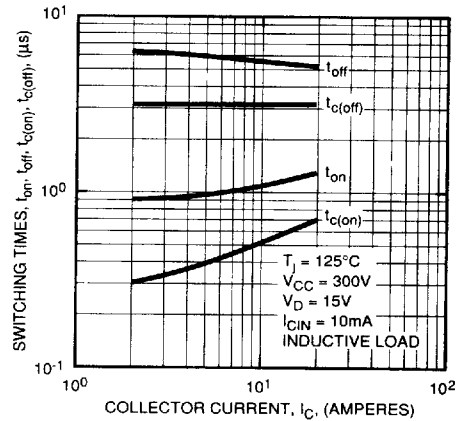
**COLLECTOR-EMITTER SATURATION VOLTAGE (TYPICAL)**



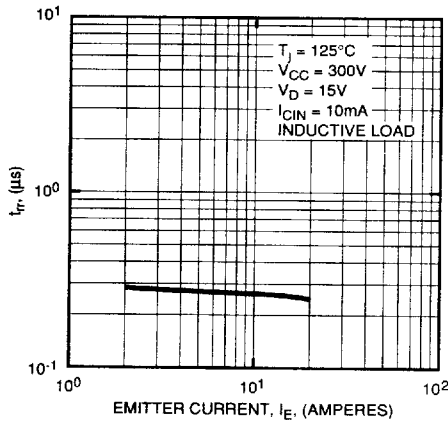
**OUTPUT CHARACTERISTICS (TYPICAL)**



**SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)**



**REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)**



**REVERSE COLLECTOR CURRENT VS. EMITTER-COLLECTOR VOLTAGE (DIODE FORWARD CHARACTERISTICS) (TYPICAL)**

