



POWEREX INC

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51E D ■ 7294621 0005742 684 ■ PRX

PM600HHA060

Intellimod™-3 Modules

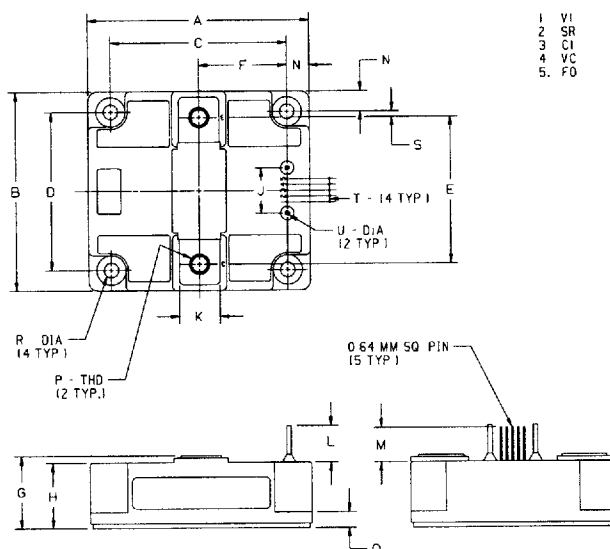
Half-Phase

IGBT Inverter Output

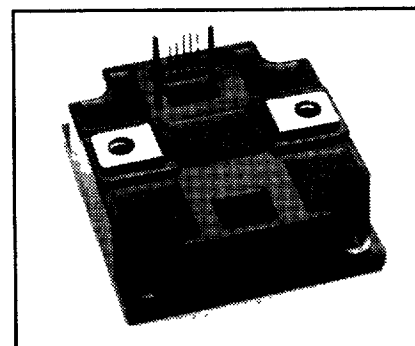
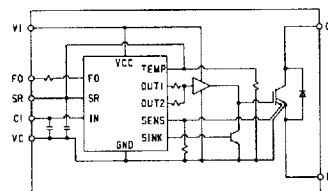
600 Amperes/110-230 Volt Line

F57-29

OUTLINE DRAWING



CONNECTION DIAGRAM



Description

Powerex Intellimod-3 Modules are designed for applications requiring a high frequency (20kHz) output switching inverter. The modules are isolated from the baseplate, consisting of complete drive, control and protection circuitry for the IGBT inverter.

Features:

- ☐ Complete Output Power Circuit
- ☐ Gate Drive Circuit
- ☐ Protection Logic
 - Short Circuit
 - Over-Current
 - Over Temperature
 - Under Voltage

Applications:

- ☐ Inverters
- ☐ Small UPS
- ☐ Motion/Servo Control
- ☐ AC Motor Control

Ordering Information

PM600HHA060

110-230 Volt Line, PM600HHA060 Outline Drawing

Dimensions	Inches	Millimeters
A	3.86	98.0
B	3.46	88.0
C	3.15±0.01	80.0±0.25
D	2.76±0.01	70.0±0.25
E	2.56	65.0
F	1.57	40.0
G	1.34+0.04/-0.02	34.0+1.0/-0.5
H	1.16	29.5
J	0.79	20.0
K	0.71	18.0

Dimensions	Inches	Millimeters
L	0.63	16.0
M	0.59	15.0
N	0.35	9.0
P	Metric M8	M8
Q	0.28	7.0
R	0.26 Dia.	6.5 Dia.
S	0.1	2.5
T	0.1	2.54
U	0.08 Dia.	2.0 Dia.



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T-57-29

PM600HHA060**Intellimod-3 Modules****Half-Phase IGBT Inverter Output**

600 Amperes/110-230 Volt Line

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

Characteristics	Symbol	PM600HHA060	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 +100	$^\circ\text{C}$
Mounting Torque, M6 Mounting Screws	—	30	Kg-cm
Mounting Torque, M8 Main Terminal Screws	—	110	Kg-cm
Module Weight (Typical)	—	630	Grams
Supply Voltage Protected by OC and SC ($V_D = 13.5 - 16.5\text{V}$, Inverter Part)	$V_{CC(prot)}$	400	Volts
Isolation Voltage AC 1 minute, 60Hz	V_{RMS}	2500	Volts

Control Sector

Supply Voltage Applied between ($V_1 - V_C$)	V_D	20	Volts
Input Voltage Applied between ($C_1 - V_C$)	V_{CIN}	10	Volts
Fault Output Supply Voltage Applied between ($F_O - V_C$)	V_{FO}	20	Volts
Fault Output Current (Sink Current at F_O , Terminals)	I_{FO}	20	mA

IGBT Inverter Sector

Collector-Emitter Voltage	V_{CES}	600	Volts
Collector Current $\pm$	I_C	600	Amperes
Peak Collector Current $\pm$	I_{CP}	1200	Amperes
Collector Dissipation	P_C	2080	Watts



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PM600HHA060

Intellimod-3 Modules

Half-Phase IGBT Inverter Output

600 Amperes/110-230 Volt Line

T-57-29

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Control Sector						
Overcurrent Trip Level	OC	$-20^\circ\text{C} \leq T \leq 125^\circ\text{C}$, Fig. 5	740	1000	—	Amperes
Short Circuit Trip Level	SC	$-20^\circ\text{C} \leq T \leq 125^\circ\text{C}$, Fig. 5	1000	1400	—	Amperes
Over Current Delay Time	$t_{off(OC)}$	$V_D = 15\text{V}$, Fig. 5	—	5	—	μS
Over Temperature Protection	OT	Trip Level	100	110	120	$^\circ\text{C}$
Over Temperature Protection	OT_R	Reset Level	85	95	105	$^\circ\text{C}$
Supply Circuit Under Voltage Protection	UV	Trip Level	11.5	12.0	12.5	Volts
Supply Circuit Under Voltage Protection	UV_R	Reset Level	—	12.5	—	Volts
Supply Voltage	V_D	Applied between $V_1 - V_C$	13.5	15	16.5	Volts
Circuit Current	I_D	V1 Terminal Current, $V_D = 15\text{V}$, $V_{CIN} = 5\text{V}$	—	23	30	mA
Input On Voltage	$V_{CIN(on)}$	Applied between $C_1 - V_C$	1.2	1.5	1.8	Volts
Input Off Voltage	$V_{CIN(off)}$		1.7	2.0	2.3	Volts
PWM Input Frequency	f_{PWM}	3- $\emptyset$ Sinusoidal	—	15	20	kHz
Dead Time	t_{DEAD}	For each Input Pulse	4.0	—	—	μS
		Using example Interface Circuit*	6.0	—	—	μS
Fault Output Current	$I_{FO(H)}$	$V_D = 15\text{V}$, $V_{FO} = 15\text{V}$	—	—	0.01	mA
	$I_{FO(L)}$	$V_D = 15\text{V}$, $V_{FO} = 15\text{V}$	—	10	15	mA
Minimum Fault Output Pulse Width	t_{FO}	$V_D = 15\text{V}$	1.0	1.8	—	μS
SXR Terminal Output Voltage	V_{SXR}	$T_j = 125^\circ\text{C}$, $R_{IN} = 6.8\text{k}\Omega$, (S_R)	4.5	5.1	5.6	Volts

*See Intellimod-3 Applications Data Section 4.3.



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Intellimod-3 Modules

Half-Phase IGBT Inverter Output

600 Amperes/110-230 Volt Line

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
IGBT Inverter Sector						
Collector Cutoff Current	I_{CEX}	$V_{CE} = V_{CES}$, $T_J = 25^\circ\text{C}$, Fig. 4	—	—	1	mA
Collector Cutoff Current	I_{CEX}	$V_{CE} = V_{CES}$, $T_J = 125^\circ\text{C}$, Fig. 4	—	—	10.0	mA
Diode Forward Voltage	V_{FM}	$-I_C = 600\text{A}$, $V_{CIN} = 5\text{V}$, Fig. 2	—	1.6	2.5	Volts
Collector Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15\text{V}$, $V_{CIN} = 0\text{V}$, $I_C = 600\text{A}$, Fig. 1	—	2.6	3.5	Volts
Collector Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15\text{V}$, $V_{CIN} = 0\text{V}$, $I_C = 600\text{A}$, $T_J = 125^\circ\text{C}$, Fig. 1	—	2.4	3.4	Volts
Inductive Load Switching Times	t_{on}	$V_D = 15\text{V}$, $V_{CIN} = 0\text{V}$,	0.5	1.4	2.5	μS
	t_{rr}	$V_{CC} = 300\text{V}$, $I_C = 600\text{A}$,	—	0.2	0.4	μS
	$t_{C(on)}$	$T_J = 125^\circ\text{C}$	—	0.5	1.0	μS
	t_{off}	Fig. 3	—	2.0	3.0	μS
	$t_{C(off)}$		—	0.5	1.0	μS

Thermal Characteristics

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistances Junction to Case	$R_{th(j-c)Q}$	Inverter IGBT	—	—	0.060	$^\circ\text{C/W}$
	$R_{th(j-c)F}$	Inverter FWD	—	—	0.12	$^\circ\text{C/W}$
Contact Thermal Resistance	$R_{th(c-f)}$	Case to Fin, Thermal Grease Applied	—	—	0.038	$^\circ\text{C/W}$

Recommended Operating Conditions

Characteristics	Symbol	Test Conditions	Value	Units
Supply Voltage	V_{CC}		0 ~ 400	Volts
	V_D	Applied between $V_1 - V_C$	15±1.5	Volts
Input On Voltage	$V_{CIN(on)}$	Applied between	0 ~ 0.8	Volts
Input Off Voltage	$V_{CIN(off)}$	$C_1 - V_C$	4.0 ~ V_{SXR}	Volts
PWM Input Frequency	f_{PWM}	Using example Interface Circuit *	5 ~ 20	kHz
Minimum Dead Time	t_{DEAD}	Using example Interface Circuit *	6.0	μS

*See Intellimod-3 Applications Data Section 4.3.

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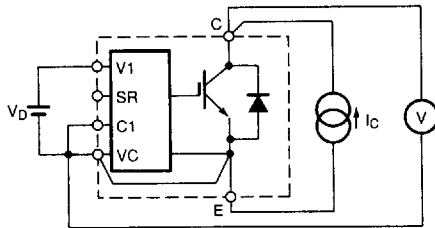


Figure 1 $V_{CE(SAT)}$ Test

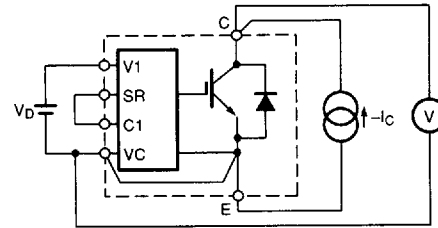


Figure 2 V_{EC} Test

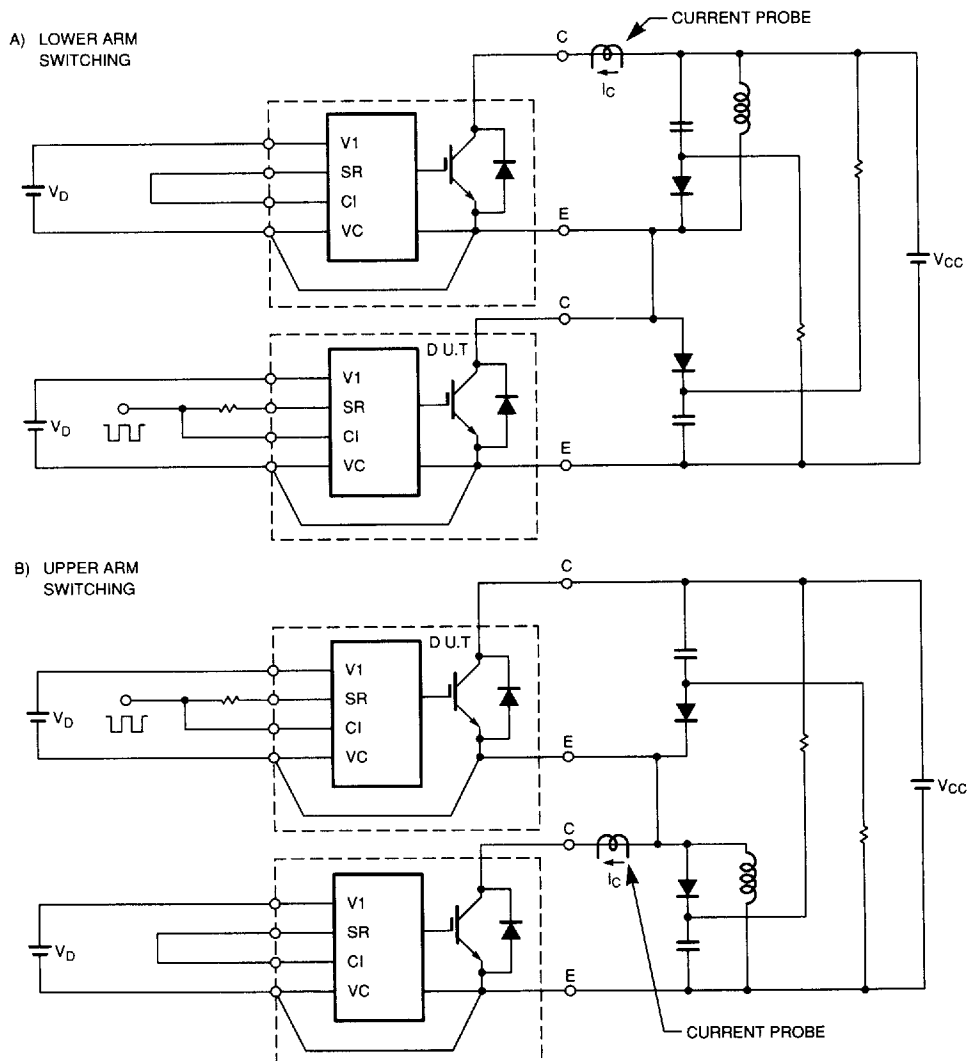


Figure 3 Half Bridge Switching Test and Waveform

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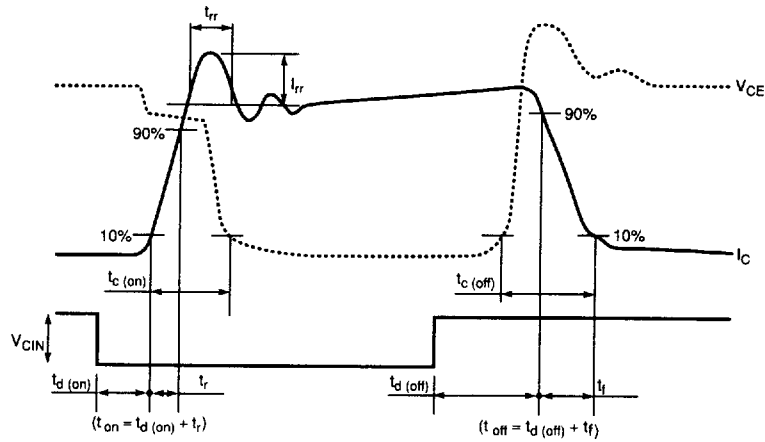


Figure 3 Half Bridge Switching Test and Waveform (Continued)

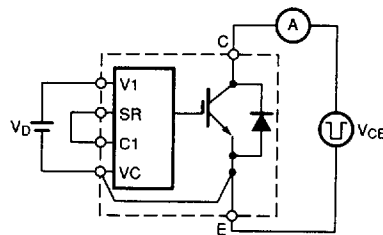


Figure 4 I_{CES} Test

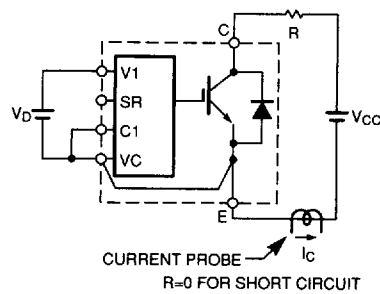


Figure 5 Over Current and Short Circuit Test