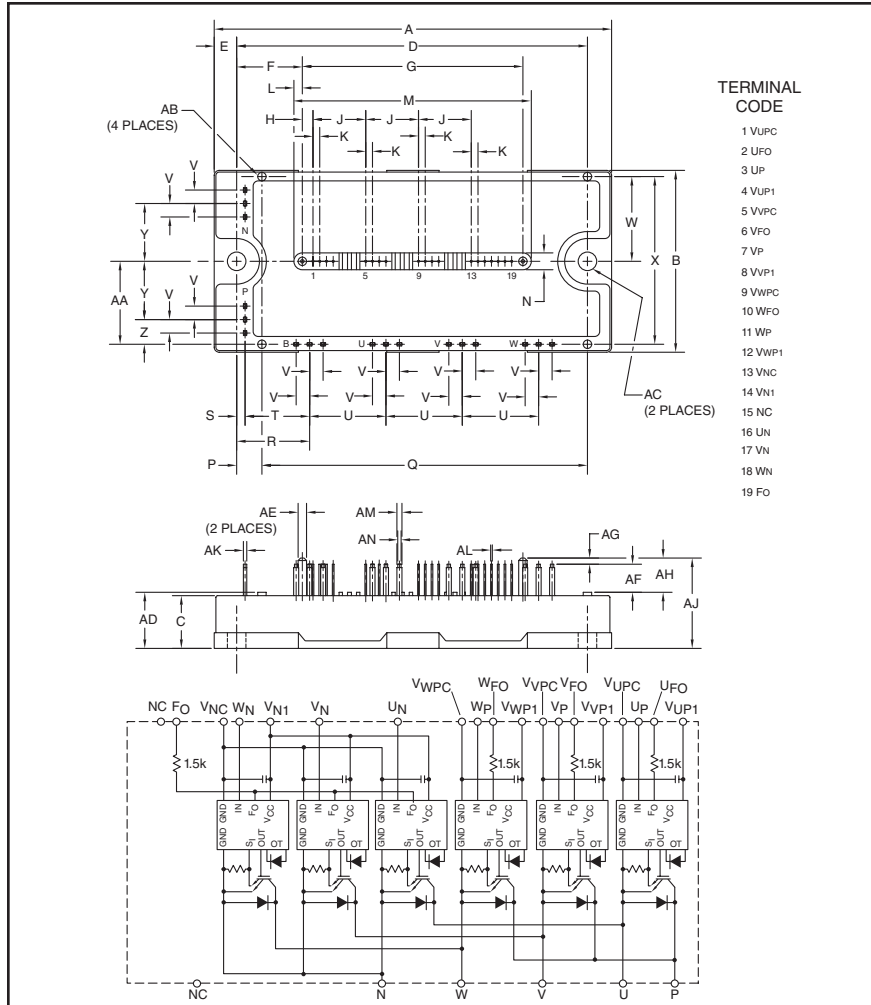
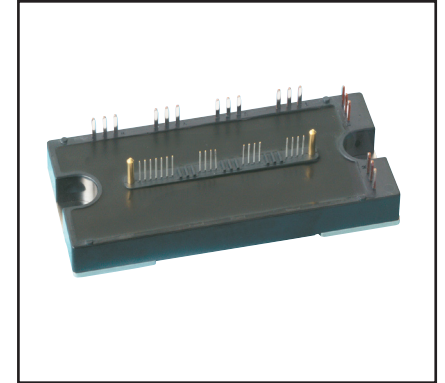


Intellimod™ L1-Series Three Phase IGBT Inverter 25 Amperes/1200 Volts



TERMINAL CODE

- 1 VUPC
- 2 UFO
- 3 UP
- 4 VUP1
- 5 VVPC
- 6 VFO
- 7 VP
- 8 VVP1
- 9 VVPC
- 10 WFO
- 11 WP
- 12 VWP1
- 13 VNC
- 14 VN1
- 15 NC
- 16 UN
- 17 VN
- 18 WN
- 19 FO



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 Temperature
 - Using On-chip Temperature Sensing
 - Under Voltage
- ☐ Low Loss Using Full Gate CSTBT™ IGBT Chip

Applications:

- ☐ Inverters
- ☐ UPS
- ☐ Motion/Servo Control
- ☐ Power Supplies

Ordering Information:

Example: Select the complete part number from the table below -i.e. PM25CL1B120 is a 1200V, 25 Ampere Intellimod™ Intelligent Power Module.

Type	Current Rating Amperes	V _{CES} Volts (x 10)
PM	25	120

Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	4.72	120.0
B	2.17	55.0
C	0.63	16.0
D	4.17	106.0
E	0.28	7.0
F	0.78	19.75
G	2.62	66.5
H	0.13	3.25
J	0.63	16.0
K	0.08	2.0
L	0.10	2.5
M	2.81	71.5
N	0.20	5.0
P	0.31	7.75
Q	3.87	98.25
R	0.87	22.0
S	0.10	2.5
T	0.77	19.5
U	0.91	23.0

Dimensions	Inches	Millimeters
V	0.16	4.0
W	1.01	25.75
X	2.00	50.75
Y	0.69	17.5
Z	0.30	7.5
AA	0.98	25.0
AB	0.10 Dia.	Dia. 2.5
AC	0.22 Dia.	Dia. 5.5
AD	0.67	17.0
AE	0.10 Dia.	Dia. 2.5
AF	0.33	8.5
AG	0.08	2.0
AH	0.41	10.5
AJ	1.08	27.5
AK	0.04	1.0
AL	0.02 Sq.	Sq. 0.5
AM	0.06	1.5
AN	0.04	1.0

PM25CL1B120
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Absolute Maximum Ratings, $T_j = 25^\circ\text{C}$ unless otherwise specified

Characteristics	Symbol	PM25CL1B120	Units
Power Device Junction Temperature	T_j	-20 to 150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-40 to 125	$^\circ\text{C}$
Mounting Torque, M5 Mounting Screws	—	31	in-lb
Mounting Torque, M5 Main Terminal Screws	—	31	in-lb
Module Weight (Typical)	—	380	Grams
Supply Voltage, Surge (Applied between P - N)	$V_{\text{CC(surge)}}$	1000	Volts
Supply Voltage Protected by Short Circuit Protection Capability*	$V_{\text{CC(prot.)}}$	800	Volts
Isolation Voltage, AC 1 minute, 60Hz Sinusoidal	V_{ISO}	2500	Volts

IGBT Inverter Sector

Collector-Emitter Voltage ($V_D = 15\text{V}$, $V_{\text{CIN}} = 15\text{V}$)	V_{CES}	1200	Volts
Collector Current ($T_C = 25^\circ\text{C}$) (Note 1)	$\pm I_C$	25	Amperes
Peak Collector Current ($T_C = 25^\circ\text{C}$)	$\pm I_{\text{CP}}$	50	Amperes
Collector Dissipation ($T_C = 25^\circ\text{C}$) (Note 1)	P_C	128	Watts

Control Sector

Supply Voltage (Applied between $V_{\text{UP1}}-V_{\text{UPC}}$, $V_{\text{VP1}}-V_{\text{VPC}}$, $V_{\text{WP1}}-V_{\text{WPC}}$, $V_{\text{N1}}-V_{\text{NC}}$)	V_D	20	Volts
Input Voltage (Applied between U_P-V_{UPC} , V_P-V_{VPC} , W_P-V_{WPC} , U_N-V_{NC} , V_N-V_{NC})	V_{CIN}	20	Volts
Fault Output Supply Voltage (Applied between $U_{\text{FO}}-V_{\text{UPC}}$, $V_{\text{FO}}-V_{\text{VPC}}$, $W_{\text{FO}}-V_{\text{WPC}}$, F_O-V_{NC})	V_{FO}	20	Volts
Fault Output Current (Sink Current at U_{FO} , V_{FO} , W_{FO} , F_O Terminals)	I_{FO}	20	mA

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
IGBT Inverter Sector						
Collector-Emitter Saturation Voltage	$V_{\text{CE(sat)}}$	$V_D = 15\text{V}$, $V_{\text{CIN}} = 0\text{V}$, $I_C = 25\text{A}$, $T_j = 25^\circ\text{C}$	—	1.65	2.15	Volts
		$V_D = 15\text{V}$, $V_{\text{CIN}} = 0\text{V}$, $I_C = 25\text{A}$, $T_j = 125^\circ\text{C}$	—	1.85	2.35	Volts
Diode Forward Voltage	V_{EC}	$-I_C = 25\text{A}$, $V_{\text{CIN}} = 15\text{V}$, $V_D = 15\text{V}$	—	2.3	3.3	Volts
Inductive Load Switching Times	t_{on}	$V_D = 15\text{V}$, $V_{\text{CIN}} = 0 \leftrightarrow 15\text{V}$ $V_{\text{CC}} = 600\text{V}$, $I_C = 25\text{A}$ $T_j = 125^\circ\text{C}$	0.3	0.8	2.0	μs
	t_{rr}		—	0.3	0.8	μs
	$t_{\text{C(on)}}$		—	0.4	1.0	μs
	t_{off}		—	1.2	2.8	μs
	$t_{\text{C(off)}}$		—	0.4	1.2	μs
Collector-Emitter Cutoff Current	I_{CES}	$V_{\text{CE}} = V_{\text{CES}}$, $V_D = 15\text{V}$, $T_j = 25^\circ\text{C}$	—	—	1.0	mA
		$V_{\text{CE}} = V_{\text{CES}}$, $V_D = 15\text{V}$, $T_j = 125^\circ\text{C}$	—	—	10	mA

* $V_D = 13.5 \sim 16.5\text{V}$, Inverter Part, $T_j = 125^\circ\text{C}$

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Three Phase IGBT Inverter
 25 Amperes/1200 Volts

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Control Sector						
Circuit Current	I_D	$V_D = 15\text{V}, V_{CIN} = 15\text{V}, V_{N1}-V_{NC}$	—	6	12	mA
		$V_D = 15\text{V}, V_{CIN} = 15\text{V}, V_{P1}-V_{PC}$	—	2	4	mA
Input ON Threshold Voltage	$V_{th(on)}$	Applied between U_P-V_{UPC} ,	1.2	1.5	1.8	Volts
Input OFF Threshold Voltage	$V_{th(off)}$	$V_P-V_{VPC}, W_P-V_{WPC}, U_N-V_N, W_N-V_{NC}$	1.7	2.0	2.3	Volts
Short Circuit Trip Level	SC	$-20^\circ\text{C} \leq T_j \leq 125^\circ\text{C}, V_D = 15\text{V}$	50	—	—	Amperes
Short Circuit Current Delay Time	$t_{off(SC)}$	$V_D = 15\text{V}$	—	0.2	—	μs
Over Temperature Protection (Detect T_j of IGBT Chip)	OT	Trip Level	135	—	—	$^\circ\text{C}$
	$OT_{(hys)}$	Hysteresis Level	—	20	—	$^\circ\text{C}$
Supply Circuit Under-voltage Protection ($-20 \leq T_j \leq 125^\circ\text{C}$)	UV	Trip Level	11.5	12.0	12.5	Volts
	UV_R	Reset Level	—	12.5	—	Volts
Fault Output Current*	$I_{FO(H)}$	$V_D = 15\text{V}, V_{CIN} = 15\text{V}$	—	—	0.01	mA
	$I_{FO(L)}$	$V_D = 15\text{V}, V_{CIN} = 15\text{V}$	—	10	15	mA
Fault Output Pulse Width*	t_{FO}	$V_D = 15\text{V}$	1.0	1.8	—	ms

Thermal Characteristics

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Units
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	IGBT (Per 1 Element) (Note 1)	—	—	0.97	$^\circ\text{C/Watt}$
	$R_{th(j-c)D}$	FWDi (Per 1 Element) (Note 1)	—	—	1.60	$^\circ\text{C/Watt}$
Contact Thermal Resistance	$R_{th(c-f)}$	Case to Fin Per Module, Thermal Grease Applied (Note 1)	—	—	0.038	$^\circ\text{C/Watt}$

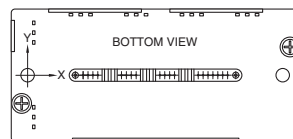
Recommended Conditions for Use

Characteristic	Symbol	Condition	Value	Units
Supply Voltage	V_{CC}	Applied across P-N Terminals	≤ 800	Volts
Control Supply Voltage**	V_D	Applied between $V_{UP1}-V_{UPC}$, $V_{VP1}-V_{VPC}, V_{WP1}-V_{WPC}, V_{N1}-V_{NC}$	15.0 ± 1.5	Volts
Input ON Voltage	$V_{CIN(on)}$	Applied between U_P-V_{UPC} ,	≤ 0.8	Volts
Input OFF Voltage	$V_{CIN(off)}$	$V_P-V_{VPC}, W_P-V_{WPC}, U_N-V_N, W_N-V_{NC}$	≥ 9.0	Volts
PWM Input Frequency	f_{PWM}	—	≤ 20	kHz
Arm Shoot-through Blocking Time	t_{DEAD}	Input Signal	≥ 2.5	μs

*Fault output is given only when the internal SC, OT and UV protections schemes of either upper or lower arm device operates to protect it.

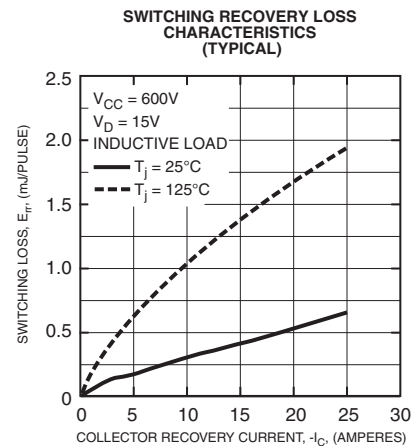
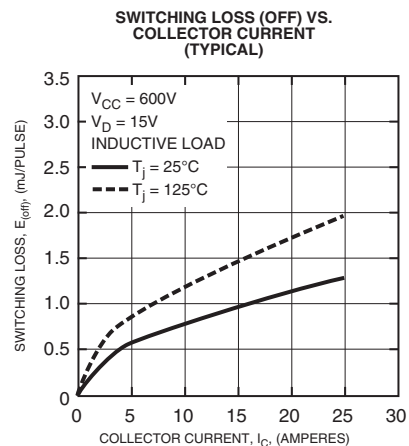
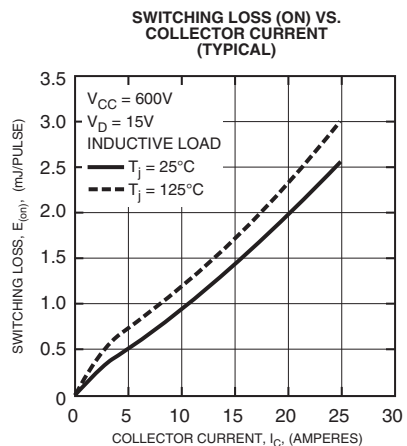
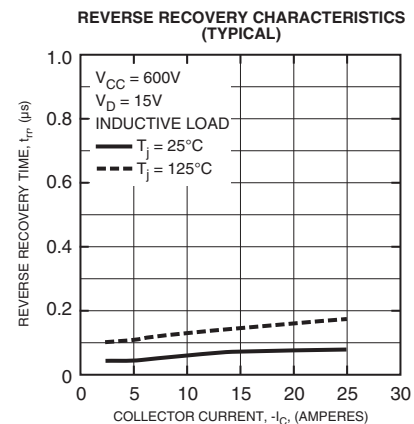
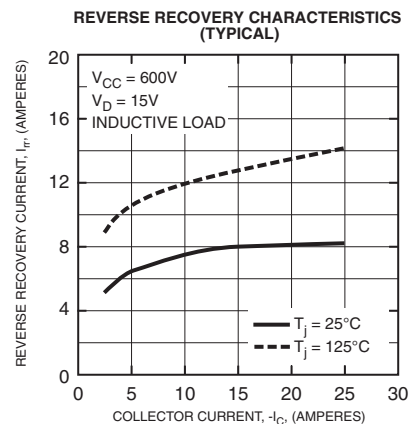
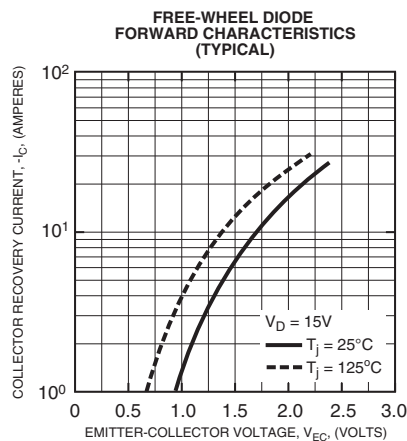
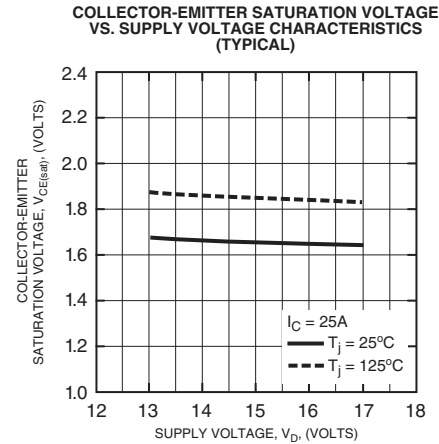
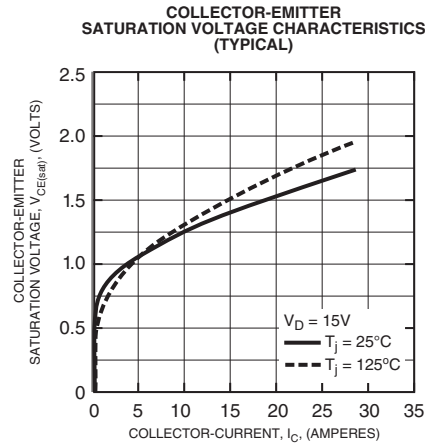
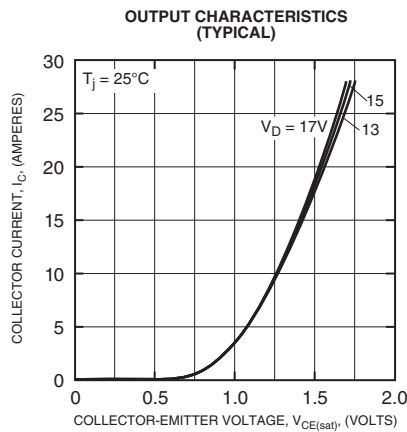
** With ripple satisfying the following conditions: dv/dt swing $\leq \pm 5\text{V}/\mu\text{s}$, Variation $\leq 2\text{V}$ peak to peak.

Note 1: T_C (under the chip) Measurement Point



Arm Axis	UP		VP		WP		UN		VN		WN	
	IGBT	FWDi	IGBT	FWDi	IGBT	FWDi	IGBT	FWDi	IGBT	FWDi	IGBT	FWDi
X	27.0	27.0	66.9	66.9	86.5	86.5	39.2	33.2	54.3	60.7	73.9	80.3
Y	-7.0	-0.2	-7.0	-0.2	-7.0	-0.2	4.0	4.8	4.0	4.8	4.0	4.8

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