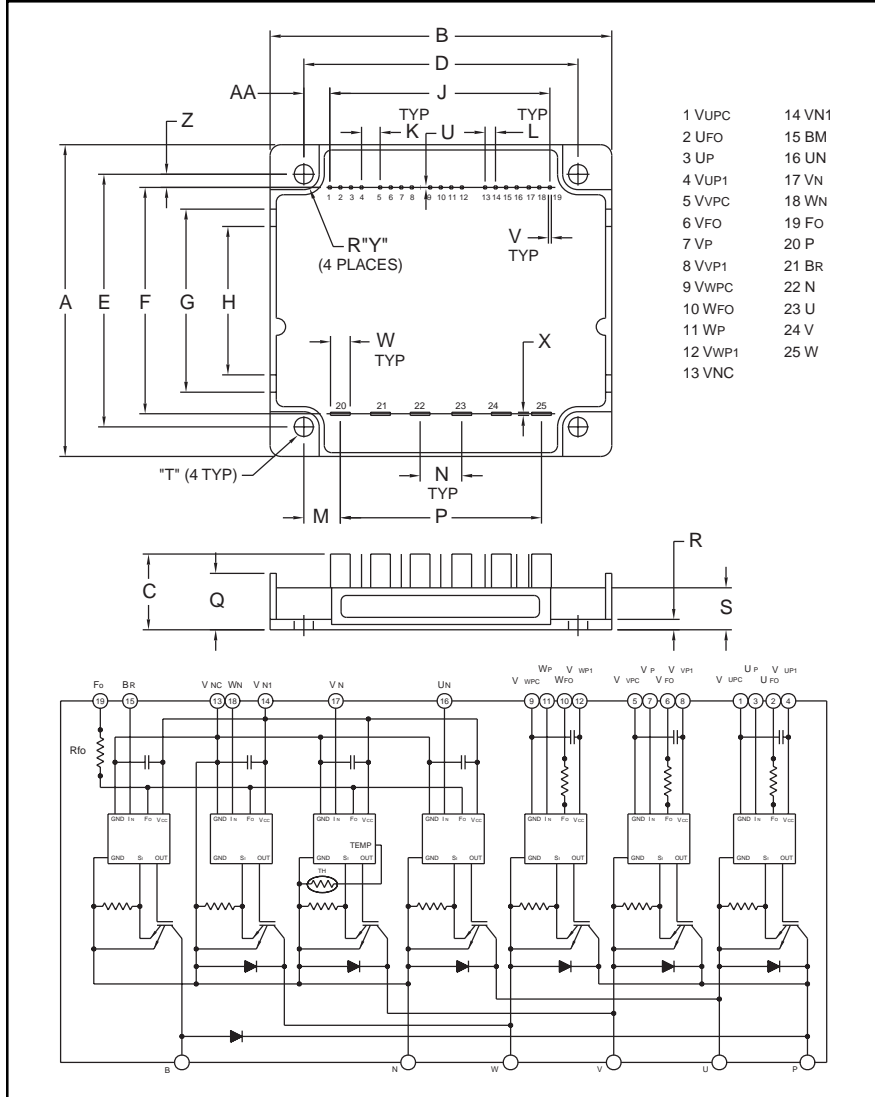


Intellimod™ Module Three Phase + Brake IGBT Inverter Output 25 Amperes/1200 Volts



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. PM25RSK120 is a 1200V, 25 Ampere Intellimod™ Intelligent Power Module.

Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	2.76±0.04	70.0±1.0
B	3.96±0.04	100.5±1.0
C	0.71±0.04	18.0±1.0
D	3.48±0.02	88.5±0.5
E	2.30±0.02	58.5±0.5
F	2.23±0.03	56.75±0.8
G	1.61	41.0
H	1.30	33.0
J	2.70±0.03	68.58±0.8
K	0.40	10.16
L	0.10±0.01	2.54±0.25
M	0.41	10.5
N	0.53±0.01	13.5±0.3

Dimensions	Inches	Millimeters
P	2.66±0.03	67.5±0.8
Q	0.49	12.4
R	0.17 Rad.	4.4 Rad.
S	0.35	8.9
T	0.18 Dia.	Dia. 4.5
U	0.02	0.4
V	0.02	0.6
W	0.08±0.004	2.0±0.1
X	0.02	0.5
Y	0.20	5.0
Z	0.04	1.02
AA	0.39±0.03	9.96±0.8

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



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

PM25RSK120
Intellimod™ Module
Three Phase + Brake IGBT Inverter Output
25 Amperes/1200 Volts

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

Characteristics	Symbol	PM25RSK120	Units
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 M4 Mounting Screws	-	13	in-lb
Module Weight (Typical)	-	130	Grams
Supply Voltage Protected by OC and SC ($V_D = 13.5 \sim 16.5\text{V}$, Inverter Part, $T_j = 125^\circ\text{C}$)	$V_{CC(prot.)}$	800	Volts
Isolation Voltage, AC 1 Minute, 60Hz Sinusoidal	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 Voltage Applied between (U_P , V_P , W_P , U_N , V_N , W_N , B_r)	V_{CIN}	20	Volts
Fault Output Supply Voltage (Applied between F_O and V_{NC})	V_{FO}	20	Volts
Fault Output Current	I_{FO}	20	mA

IGBT Inverter Sector

Collector-Emitter Voltage ($V_D = 15\text{V}$, $V_{CIN} = 15\text{V}$)	V_{CES}	1200	Volts
Collector Current, \pm	I_C	25	Amperes
Peak Collector Current, \pm	I_{CP}	50	Amperes
Supply Voltage (Applied between P-N)	V_{CC}	900	Volts
Supply Voltage, Surge (Applied between P-N)	$V_{CC(surge)}$	1000	Volts
Collector Dissipation	P_C	100	Watts

Brake Sector

Collector-Emitter Voltage ($V_D = 15\text{V}$, $V_{CIN} = 15\text{V}$)	V_{CES}	1200	Volts
Collector Current, \pm	I_C	10	Amperes
Peak Collector Current, \pm	I_{CP}	20	Amperes
Supply Voltage (Applied between P-N)	V_{CC}	900	Volts
Supply Voltage, Surge (Applied between P-N)	$V_{CC(surge)}$	1000	Volts
Collector Dissipation	P_C	43	Watts
Diode Forward Current	I_F	10	Amperes
Diode DC Reverse Voltage	$V_{R(DC)}$	1200	Volts

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Control Sector						
Over Current Trip Level Inverter Part	OC	$-20\text{ °C} \leq T_j \leq 125\text{ °C}$	32	58	–	Amperes
Over Current Trip Level Brake Part			15	30	–	Amperes
Short Circuit Trip Level Inverter Part	SC	$-20\text{ °C} \leq T_j \leq 125\text{ °C}$	–	81	–	Amperes
Short Circuit Trip Level Brake Part			–	41	–	Amperes
Over Current Delay Time	$t_{\text{off(OC)}}$	$V_D = 15\text{V}$	–	10	–	μS
Over Temperature Protection	OT	Trip Level	100	110	120	°C
	OT_R	Reset Level	–	90	–	°C
Supply Circuit Under Voltage Protection	UV	Trip Level	11.5	12.0	12.5	Volts
	UV_R	Reset Level	–	12.5	–	Volts
Supply Voltage	V_D	Applied between $V_{\text{UP1}}-V_{\text{UPC}}$, $V_{\text{VP1}}-V_{\text{VPC}}$, $V_{\text{WP1}}-V_{\text{WPC}}$, $V_{\text{N1}}-V_{\text{NC}}$	13.5	15.0	16.5	Volts
Circuit Current	I_D	$V_D = 15\text{V}$, $V_{\text{CIN}} = 15\text{V}$, $V_{\text{N1}}-V_{\text{NC}}$	–	44	60	mA
		$V_D = 15\text{V}$, $V_{\text{CIN}} = 15\text{V}$, $V_{\text{XP1}}-V_{\text{XPC}}$	–	13	18	mA
Input ON Threshold Voltage	$V_{\text{CIN(on)}}$	Applied between	1.2	1.5	1.8	Volts
Input OFF Threshold Voltage	$V_{\text{CIN(off)}}$	$U_P, V_P, W_P, U_N, V_N, W_N, B_r$	1.7	2.0	2.3	Volts
PWM Input Frequency	f_{PWM}	3- \emptyset Sinusoidal	5	15	20	kHz
Fault Output Current	$I_{\text{FO(H)}}$	$V_D = 15\text{V}$, $V_{\text{FO}} = 15\text{V}$	–	–	0.01	mA
	$I_{\text{FO(L)}}$	$V_D = 15\text{V}$, $V_{\text{FO}} = 15\text{V}$	–	10	15	mA
Minimum Fault Output Pulse Width	t_{FO}	$V_D = 15\text{V}$	1.0	1.8	–	mS

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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
IGBT Inverter Sector						
Collector-Emitter Cutoff Current	I_{CES}	$V_{CE} = V_{CES}, V_D = 15\text{V}, T_j = 25^\circ\text{C}$	-	-	1	mA
		$V_{CE} = V_{CES}, V_D = 15\text{V}, T_j = 125^\circ\text{C}$	-	-	10	mA
Diode Forward Voltage	V_{FM}	$-I_C = 25\text{A}, V_D = 15\text{V}, V_{CIN} = 15\text{V}$	-	2.5	3.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 25\text{A}, T_j = 25^\circ\text{C}$	-	2.5	3.5	Volts
		$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 25\text{A}, T_j = 125^\circ\text{C}$	-	2.2	3.2	Volts
Inductive Load Switching Times	t_{on}		0.5	1.0	2.5	μS
	t_{rr}	$V_D = 15\text{V}, V_{CIN} = 0 \sim 15\text{V},$	-	0.15	0.3	μS
	$t_{C(on)}$	$V_{CC} = 600\text{V}, I_C = 25\text{A},$	-	0.4	1.0	μS
	t_{off}	$T_j = 125^\circ\text{C}, \text{ Inductive Load}$	-	2.0	3.0	μS
	$t_{C(off)}$		-	0.7	1.2	μS

Brake Sector

Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 10\text{A}, T_j = 25^\circ\text{C}$	-	2.8	3.8	Volts
		$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 10\text{A}, T_j = 125^\circ\text{C}$	-	2.5	3.5	Volts
Diode Forward Voltage	V_{FM}	$-I_C = 15\text{A}, V_D = 15\text{V}, V_{CIN} = 15\text{V}$	-	2.5	3.5	Volts
Collector-Emitter Cutoff Current	I_{CES}	$V_{CE} = V_{CES}, V_D = 15\text{V}, T_j = 25^\circ\text{C}$	-	-	1	mA
		$V_{CE} = V_{CES}, V_D = 15\text{V}, T_j = 125^\circ\text{C}$	-	-	10	mA

Thermal Characteristics

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Units
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	Each Inverter IGBT	-	-	1.25	$^\circ\text{C/Watt}$
	$R_{th(j-c)D}$	Each Inverter FWDi	-	-	3.0	$^\circ\text{C/Watt}$
	$R_{th(j-c)Q}$	Each Brake IGBT	-	-	2.9	$^\circ\text{C/Watt}$
	$R_{th(j-c)D}$	Each Brake FWDi	-	-	5.4	$^\circ\text{C/Watt}$
Contact Thermal Resistance	$R_{th(c-f)}$	Case to Fin Per Module, Thermal Grease Applied	-	-	0.038	$^\circ\text{C/Watt}$

Recommended Conditions for Use

Characteristic	Symbol	Condition	Value	Units
Supply Voltage	V_{CC}	Applied across P-N Terminals	0 ~ 800	Volts
	V_D	Applied between $V_{UP1}-V_{UPC},$ $V_{N1}-V_{NC}, V_{VP1}-V_{VPC}, V_{WP1}-V_{WPC}$	15 ± 1.5	Volts
Input ON Voltage	$V_{CIN(on)}$	Applied between	0 ~ 0.8	Volts
Input OFF Voltage	$V_{CIN(off)}$	$U_P, V_P, W_P, U_N, V_N, W_N, B_r$	$4.0 \sim V_D$	Volts
PWM Input Frequency	f_{PWM}	Using Application Circuit	5 ~ 20	kHz
Minimum Dead Time	t_{DEAD}	Input Signal	≥ 2.5	μS

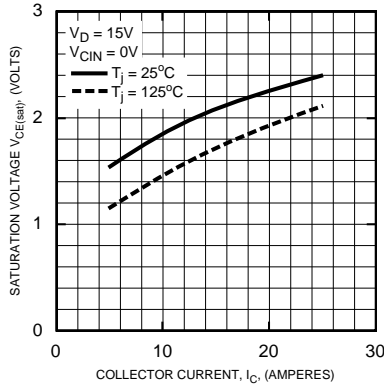


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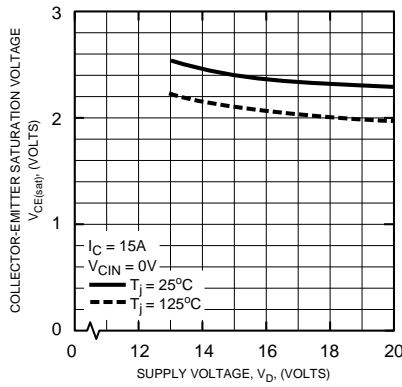
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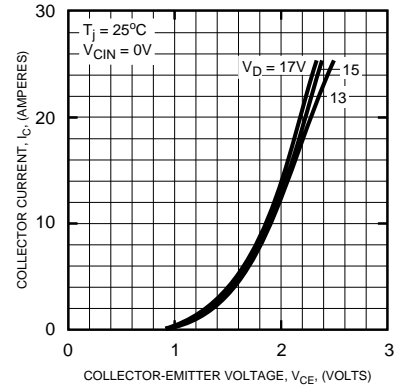
SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



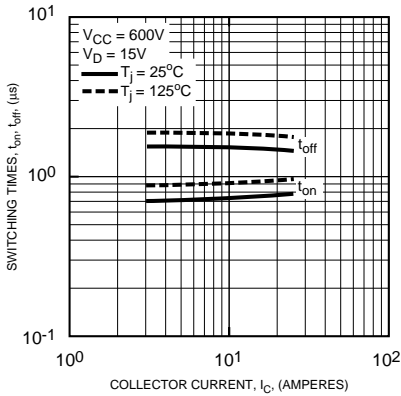
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



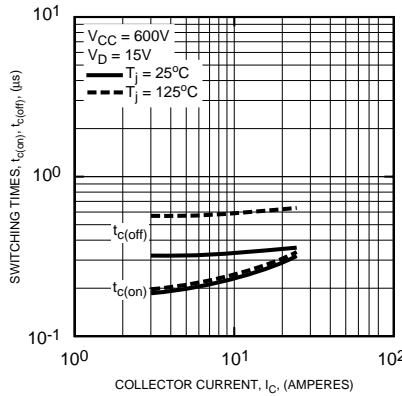
OUTPUT CHARACTERISTICS (TYPICAL)



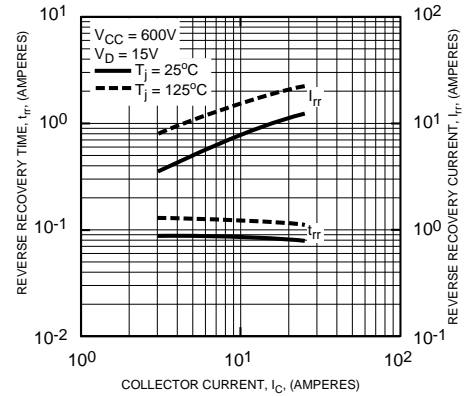
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



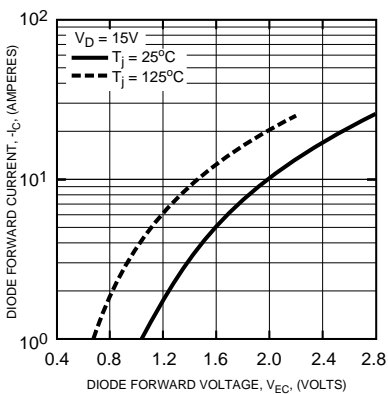
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



REVERSE RECOVERY CURRENT VS. COLLECTOR CURRENT (TYPICAL)

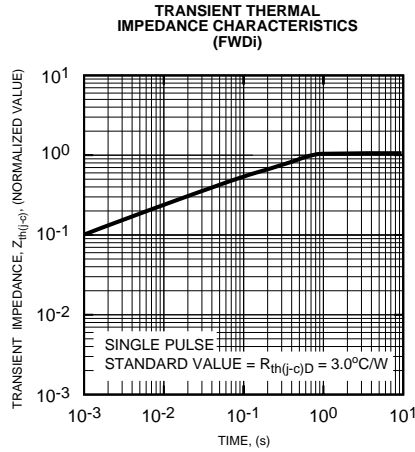
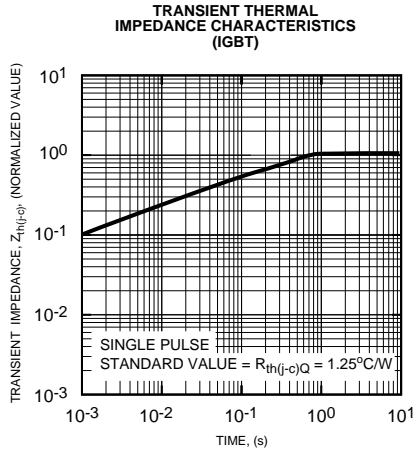


DIODE FORWARD CHARACTERISTICS (TYPICAL)



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Inverter Sector



Brake Sector

