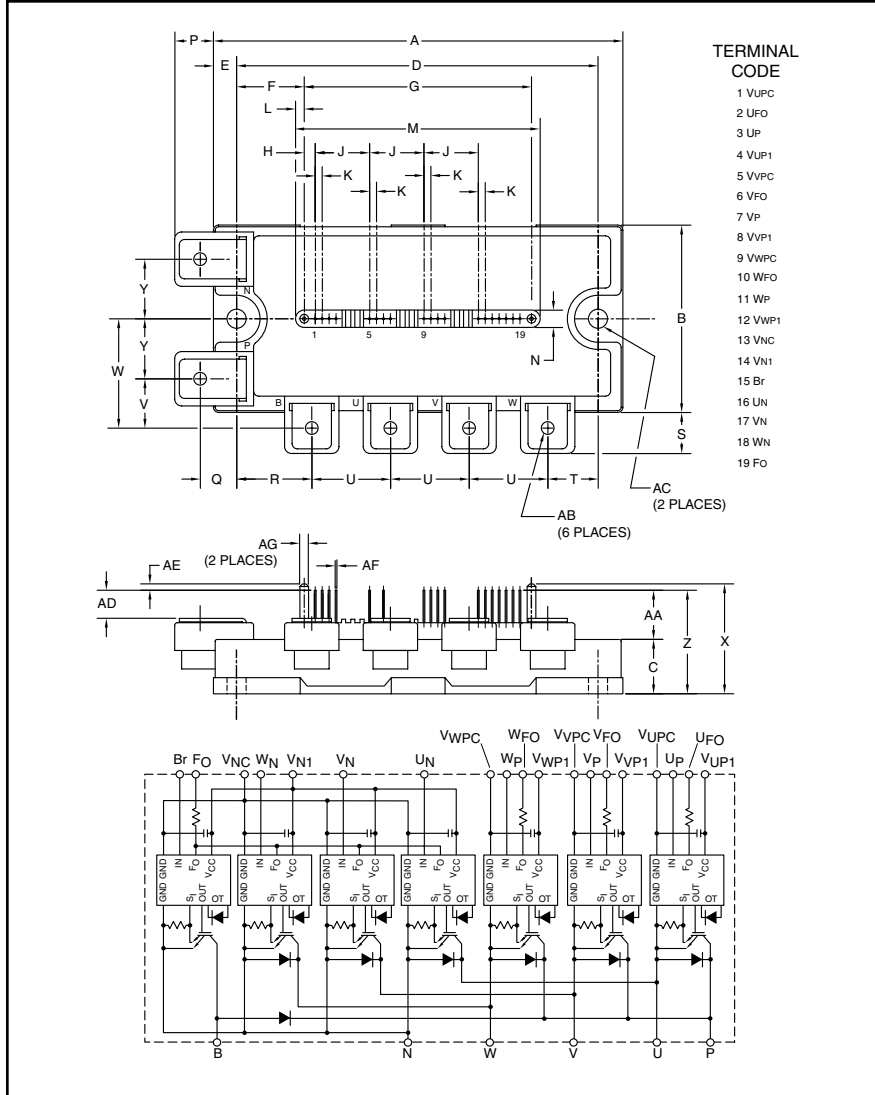
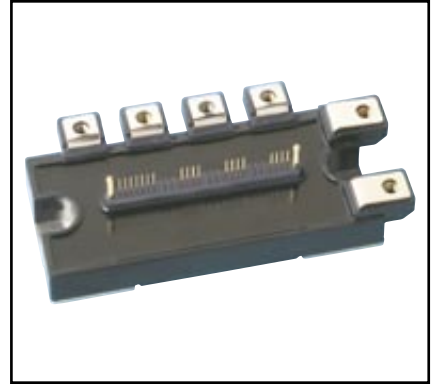


Intellimod™ L-Series Three Phase IGBT Inverter + Brake 25 Amperes/1200 Volts



TERMINAL CODE

- 1 VUPC
- 2 UFO
- 3 UP
- 4 VUP1
- 5 VVPC
- 6 VFO
- 7 VP
- 8 VWP1
- 9 VVPC
- 10 WFO
- 11 WP
- 12 VWP1
- 13 VNC
- 14 VN1
- 15 Br
- 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 5th Generation IGBT Chip

- Applications:**
- Inverters
 - UPS
 - Motion/Servo Control
 - Power Supplies

Ordering Information:
Example: Select the complete part number from the table below -i.e. PM25RLA120 is a 1200V, 25 Ampere Intellimod™ Intelligent Power Module.

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	0.43	11.0
Q	0.42	10.75
R	0.87	22.0

Dimensions	Inches	Millimeters
S	0.46	11.75
T	0.59	15.0
U	0.91	23.0
V	0.57	14.5
W	1.26	32.0
X	1.22	31.0
Y	0.69	17.5
Z	1.14	29.0
AA	0.51	13.0
AB	M5 Metric	M5
AC	0.22 Dia.	Dia. 5.5
AD	0.28	7.0
AE	0.08	2.0
AF	0.02 Sq.	Sq. 0.5
AG	0.10 Dia.	Dia. 2.5

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

PM25RLA120
Intellimod™ L-Series
Three Phase IGBT Inverter + Brake
 25 Amperes/1200 Volts

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

Characteristics	Symbol	PM25RLA120	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
Self-protection Supply Voltage Limit (Short Circuit protection Capability)*	$V_{\text{CC(prot.)}}$	800	Volts
Isolation Voltage, AC 1 minute, 60Hz Sinusoidal	V_{ISO}	2500	Volts

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

IGBT Inverter Sector

Collector-Emitter Voltage ($V_D = 15\text{V}$, $V_{\text{CIN}} = 15\text{V}$)	V_{CES}	1200	Volts
Collector Current ($T_C = 25^\circ\text{C}$)	$\pm I_C$	25	Amperes
Peak Collector Current ($T_C = 25^\circ\text{C}$)	$\pm I_{\text{CP}}$	50	Amperes
Collector Dissipation ($T_C = 25^\circ\text{C}$)	P_C	116	Watts

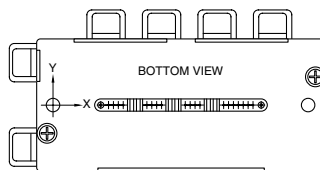
IGBT Brake Sector

Collector-Emitter Voltage ($V_D = 15\text{V}$, $V_{\text{CIN}} = 15\text{V}$)	V_{CES}	1200	Volts
Collector Current ($T_C = 25^\circ\text{C}$)	$\pm I_C$	15	Amperes
Peak Collector Current ($T_C = 25^\circ\text{C}$)	$\pm I_{\text{CP}}$	30	Amperes
Collector Dissipation ($T_C = 25^\circ\text{C}$)	P_C	100	Watts
Diode Rated DC Reverse Voltage ($T_C = 25^\circ\text{C}$)	$V_{\text{R(DC)}}$	1200	Volts
Diode Forward Current	I_F	15	Amperes

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_N , W_N , $\text{Br}-V_{\text{NC}}$)	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 (U_{FO} , V_{FO} , W_{FO} , F_O Terminals)	I_{FO}	20	mA

T_C (Base Plate) Measurement Point



Arm \ Axis	UP		VP		WP		UN		VN		WN		Br	
	IGBT	FWDi	IGBT	FWDi	IGBT	FWDi	IGBT	FWDi	IGBT	FWDi	IGBT	FWDi	IGBT	FWDi
X	29.0	29.3	64.0	65.5	85.6	85.9	37.8	37.5	55.2	55.7	75.8	75.3	19.0	22.3
Y	-7.1	1.5	-7.1	2.0	-7.1	2.0	5.1	-4.5	5.1	-4.5	5.1	-4.5	-7.3	6.6

PM25RLA120
Intellimod™ L-Series
Three Phase IGBT Inverter + Brake
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
IGBT Inverter Sector						
Collector-Emitter Cutoff Current	I_{CES}	$V_{CE} = V_{CES}, V_D = 15V, T_j = 25^\circ\text{C}$	—	—	1.0	mA
		$V_{CE} = V_{CES}, V_D = 15V, T_j = 125^\circ\text{C}$	—	—	10	mA
Diode Forward Voltage	V_{EC}	$-I_C = 25A, V_{CIN} = 15V, V_D = 15V$	—	2.5	3.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15V, V_{CIN} = 0V, I_C = 25A,$ $T_j = 25^\circ\text{C}$	—	1.8	2.3	Volts
		$V_D = 15V, V_{CIN} = 0V, I_C = 25A,$ $T_j = 125^\circ\text{C}$	—	1.9	2.4	Volts
Inductive Load Switching Times	t_{on}		0.5	1.0	2.5	μs
	t_{rr}	$V_D = 15V, V_{CIN} = 0 \Leftrightarrow 15V$	—	0.5	0.8	μs
	$t_{C(on)}$	$V_{CC} = 600V, I_C = 25A$	—	0.4	1.0	μs
	t_{off}	$T_j = 125^\circ\text{C}$	—	2.0	3.0	μs
	$t_{C(off)}$		—	0.7	1.2	μs
IGBT Brake Sector						
Collector-Emitter Cutoff Current	I_{CES}	$V_{CE} = V_{CES}, V_D = 15V, T_j = 25^\circ\text{C}$	—	—	1.0	mA
		$V_{CE} = V_{CES}, V_D = 15V, T_j = 125^\circ\text{C}$	—	—	10	mA
Diode Forward Voltage	V_{FM}	$I_F = 15A$	—	2.5	3.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15V, V_{CIN} = 0V, I_C = 15A,$ $T_j = 25^\circ\text{C}$	—	1.8	2.3	Volts
		$V_D = 15V, V_{CIN} = 0V, I_C = 15A,$ $T_j = 125^\circ\text{C}$	—	1.9	2.4	Volts
Control Sector						
Short Circuit Trip Level	SC	Inverter Part	50	—	—	Amperes
		Brake Part	30	—	—	Amperes
Short Circuit Current Delay Time	$t_{off(SC)}$	$V_D = 15V$	—	0.2	—	μs
Over Temperature Protection	OT	Trip Level	135	145	155	$^\circ\text{C}$
		Reset Level	—	125	—	$^\circ\text{C}$
Supply Circuit Under-voltage Protection	UV	Trip Level	11.5	12.0	12.5	Volts
		Reset Level	—	12.5	—	Volts
Circuit Current	I_D	$V_D = 15V, V_{CIN} = 15V, V_{N1}-V_{NC}$	—	20	30	mA
		$V_D = 15V, V_{CIN} = 15V, V_{XP1}-V_{XPC}$	—	5	10	mA
Input ON Threshold Voltage	$V_{th(on)}$	Applied between $U_P-V_{U_{PC}}$,	1.2	1.5	1.8	Volts
Input OFF Threshold Voltage	$V_{th(off)}$	$V_P-V_{V_{PC}}, W_P-V_{W_{PC}}, U_N-V_N- W_N-Br-V_{NC}$	1.7	2.0	2.3	Volts
Fault Output Current*	$I_{FO(H)}$	$V_D = 15V, V_{CIN} = 15V$	—	—	0.01	mA
		$V_D = 15V, V_{CIN} = 15V$	—	10	15	mA
Fault Output Pulse Width*	t_{FO}	$V_D = 15V$	1.0	1.8	—	ms

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



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

PM25RLA120
Intellimod™ L-Series
Three Phase IGBT Inverter + Brake
 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
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Thermal Characteristics, $T_j = 25^\circ\text{C}$ unless otherwise specified

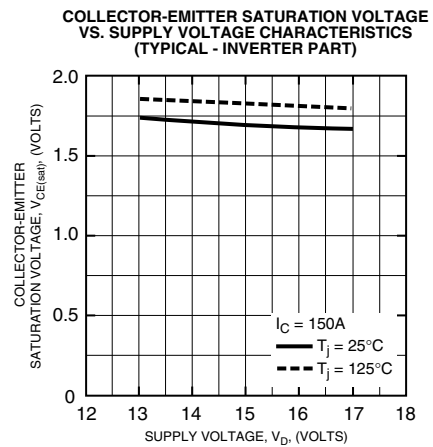
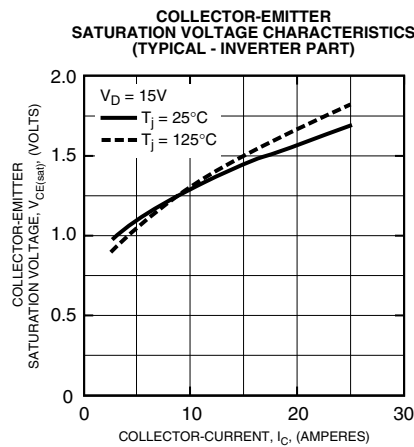
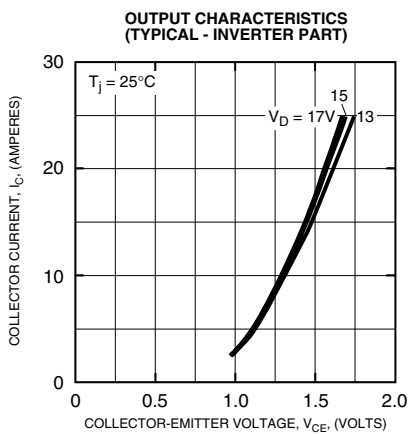
Characteristic	Symbol	Condition	Min.	Typ.	Max.	Units
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	IGBT (Per 1/6 Module)	—	—	0.83*	$^\circ\text{C}/\text{Watt}$
Inverter Part	$R_{th(j-c)D}$	FWDi (Per 1/6 Module)	—	—	1.36*	$^\circ\text{C}/\text{Watt}$
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	IGBT	—	—	0.96*	$^\circ\text{C}/\text{Watt}$
Brake Part	$R_{th(j-c)D}$	FWDi	—	—	1.82*	$^\circ\text{C}/\text{Watt}$
Contact Thermal Resistance	$R_{th(c-f)}$	Case to Fin Per Module, Thermal Grease Applied	—	—	0.038	$^\circ\text{C}/\text{Watt}$

* If you use this value, $R_{th(f-a)}$ should be measured just under the chips.

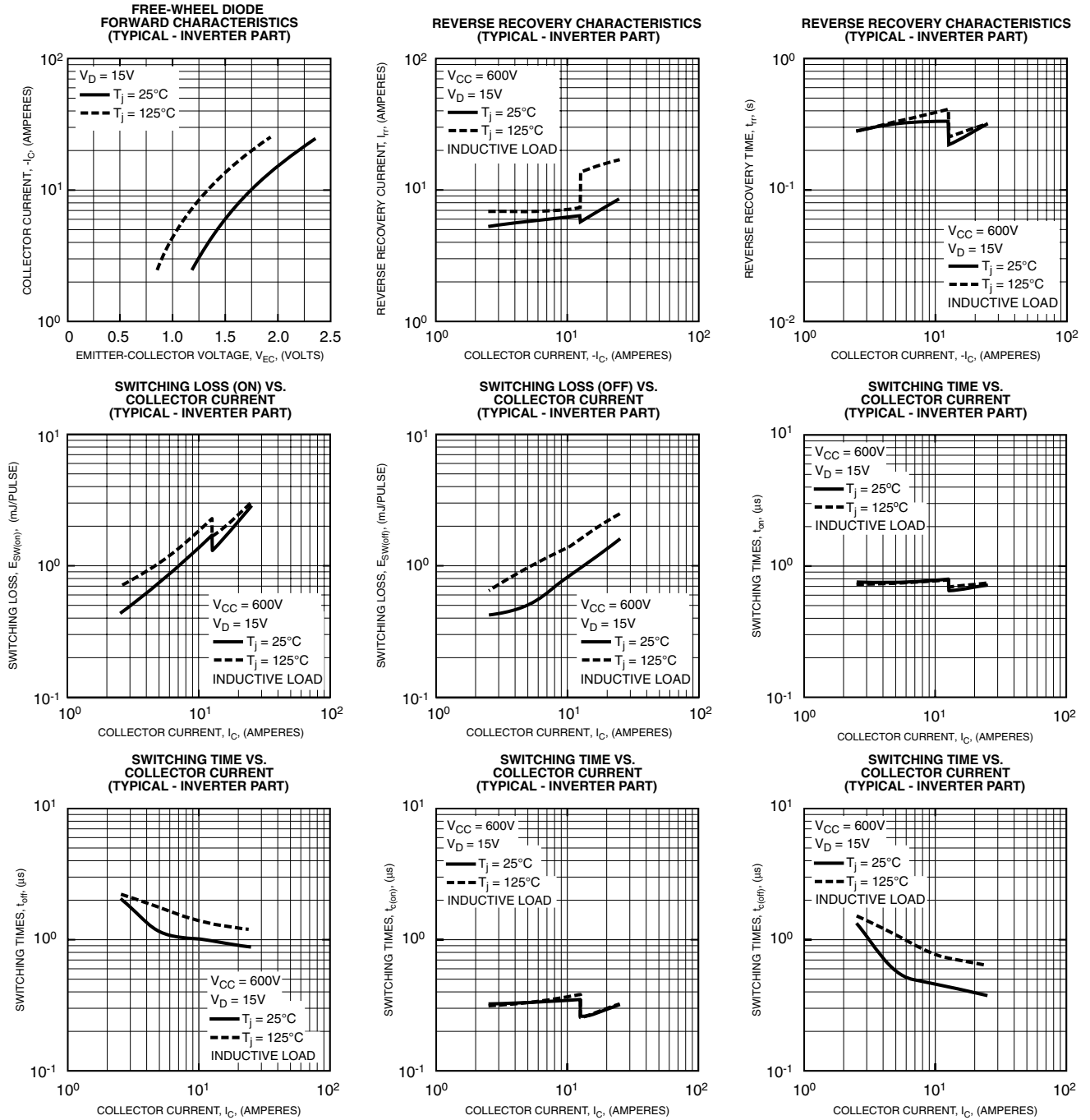
Recommended Conditions for Use

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-Br-V_{NC}	≥ 9.0	Volts
PWM Input Frequency	f_{PWM}	—	≤ 20	kHz
Arm Shoot-through Blocking Time	t_{DEAD}	Input Signal	≥ 2.5	μs

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

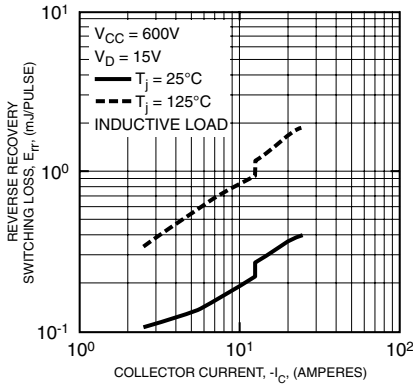


PM25RLA120
Intellimod™ L-Series
Three Phase IGBT Inverter + Brake
25 Amperes/1200 Volts

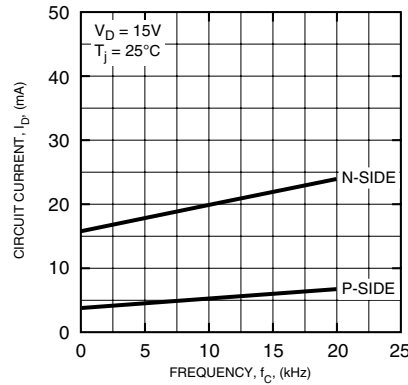


PM25RLA120
Intellimod™ L-Series
Three Phase IGBT Inverter + Brake
25 Amperes/1200 Volts

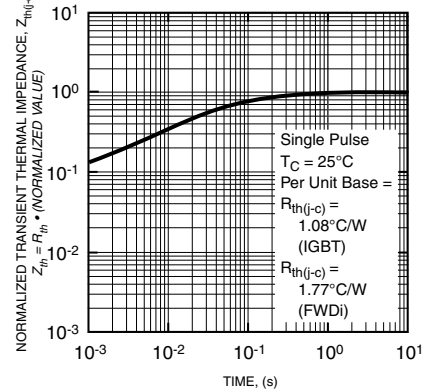
REVERSE RECOVERY SWITCHING LOSS VS. COLLECTOR CURRENT (TYPICAL - INVERTER PART)



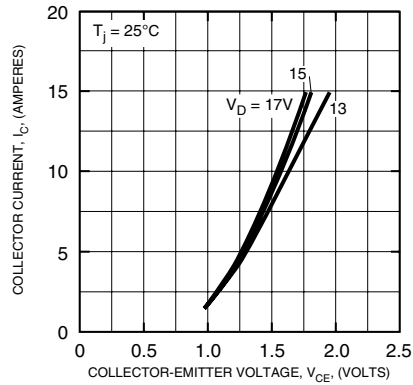
CIRCUIT CURRENT VS. FREQUENCY CHARACTERISTICS (TYPICAL)



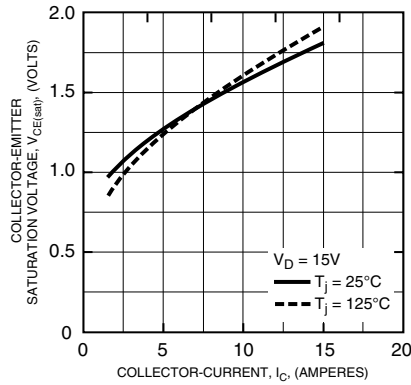
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT & FWDi - INVERTER PART)



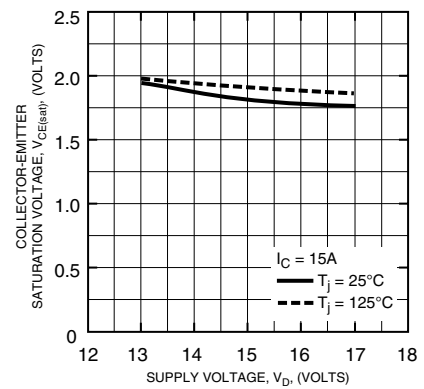
OUTPUT CHARACTERISTICS (TYPICAL - BRAKE PART)



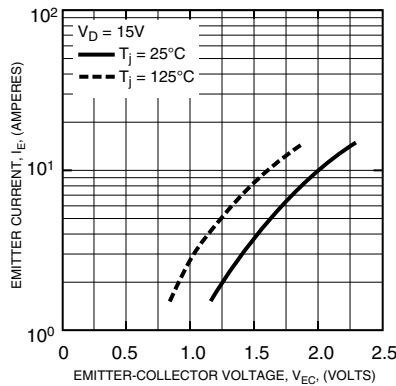
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL - BRAKE PART)



COLLECTOR-EMITTER SATURATION VOLTAGE VS. SUPPLY VOLTAGE CHARACTERISTICS (TYPICAL - BRAKE PART)



FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL - BRAKE PART)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT & FWDi - BRAKE PART)

