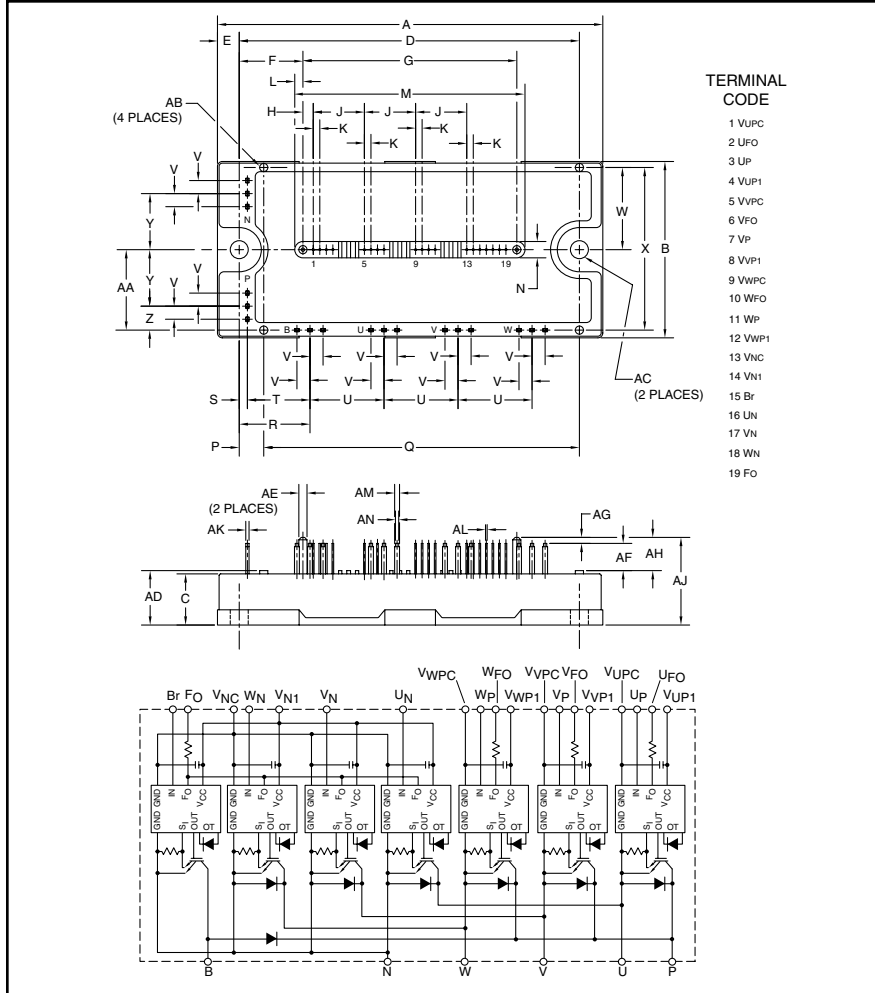
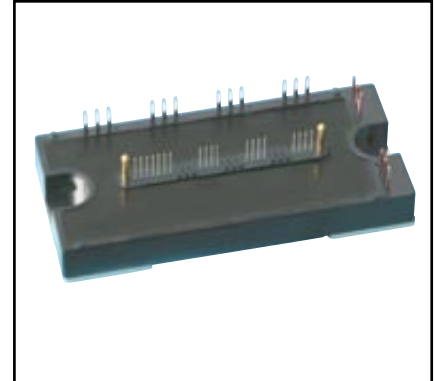


### Intellimod™ L-Series Three Phase IGBT Inverter + Brake 25 Amperes/1200 Volts



**TERMINAL CODE**

- 1 VUPC
- 2 UFO
- 3 UP
- 4 VUP1
- 5 VVPC
- 6 VFO
- 7 VP
- 8 VVP1
- 9 VWPC
- 10 WFO
- 11 WP
- 12 WVP1
- 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. PM25RLB120 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	0.31	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
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

Type	Current Rating Amperes	V <sub>CES</sub> Volts (x 10)
PM	25	120

**PM25RLB120**  
**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	PM25RLB120	Units
Power Device Junction Temperature	$T_j$	-20 to 150	$^\circ\text{C}$
Storage Temperature	$T_{\text{stg}}$	-40 to 125	$^\circ\text{C}$
Mounting Torque, M5 Mounting Screws	—	31	in-lb
Module Weight (Typical)	—	340	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	$V_{\text{ISO}}$	2500	Volts

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

**IGBT Inverter Sector**

Collector-Emitter Voltage ( $V_D = 15\text{V}$ , $V_{\text{CIN}} = 15\text{V}$ )	$V_{\text{CES}}$	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

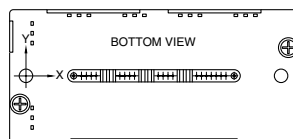
**IGBT Brake Sector**

Collector-Emitter Voltage ( $V_D = 15\text{V}$ , $V_{\text{CIN}} = 15\text{V}$ )	$V_{\text{CES}}$	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 $U_P-V_{\text{UPC}}$ , $V_P-V_{\text{VPC}}$ , $W_P-V_{\text{WPC}}$ , $U_N-V_N-W_N-Br-V_{\text{NC}}$ )	$V_{\text{CIN}}$	20	Volts
Fault Output Supply Voltage (Applied between $U_{\text{FO}}-V_{\text{UPC}}$ , $V_{\text{FO}}-V_{\text{VPC}}$ , $W_{\text{FO}}-V_{\text{WPC}}$ , $F_O-V_{\text{NC}}$ )	$V_{\text{FO}}$	20	Volts
Fault Output Current ( $U_{\text{FO}}$ , $V_{\text{FO}}$ , $W_{\text{FO}}$ , $F_O$ Terminals)	$I_{\text{FO}}$	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

**PM25RLB120**  
**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
<b>IGBT Inverter Sector</b>						
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	$\mu\text{s}$
	$t_{rr}$	$V_D = 15V, V_{CIN} = 0 \Leftrightarrow 15V$	—	0.5	0.8	$\mu\text{s}$
	$t_{C(on)}$	$V_{CC} = 600V, I_C = 25A$	—	0.4	1.0	$\mu\text{s}$
	$t_{off}$	$T_j = 125^\circ\text{C}$	—	2.0	3.0	$\mu\text{s}$
	$t_{C(off)}$		—	0.7	1.2	$\mu\text{s}$
<b>IGBT Brake Sector</b>						
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
<b>Control Sector</b>						
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	—	$\mu\text{s}$
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.

**PM25RLB120**  
**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
-----------------	--------	-----------------	------	------	------	-------

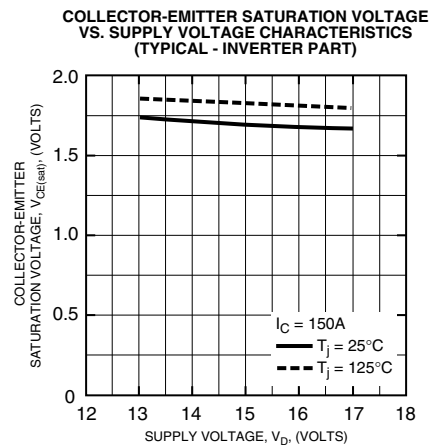
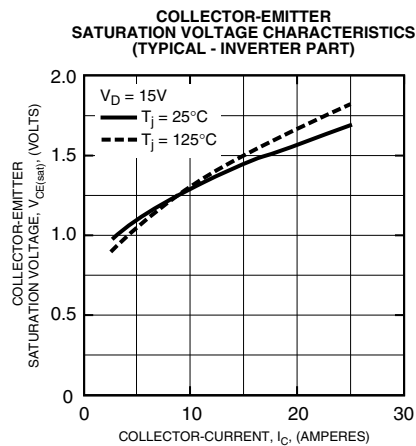
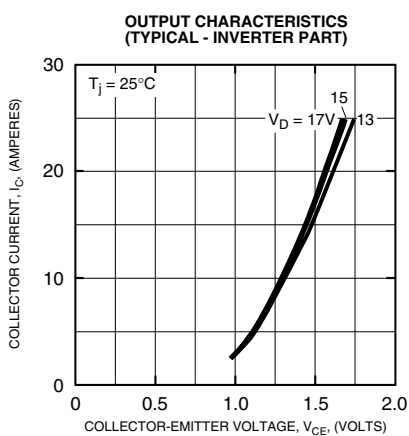
## Thermal Characteristics, $T_j = 25^\circ\text{C}$ unless otherwise specified

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	$^\circ\text{C}/\text{Watt}$

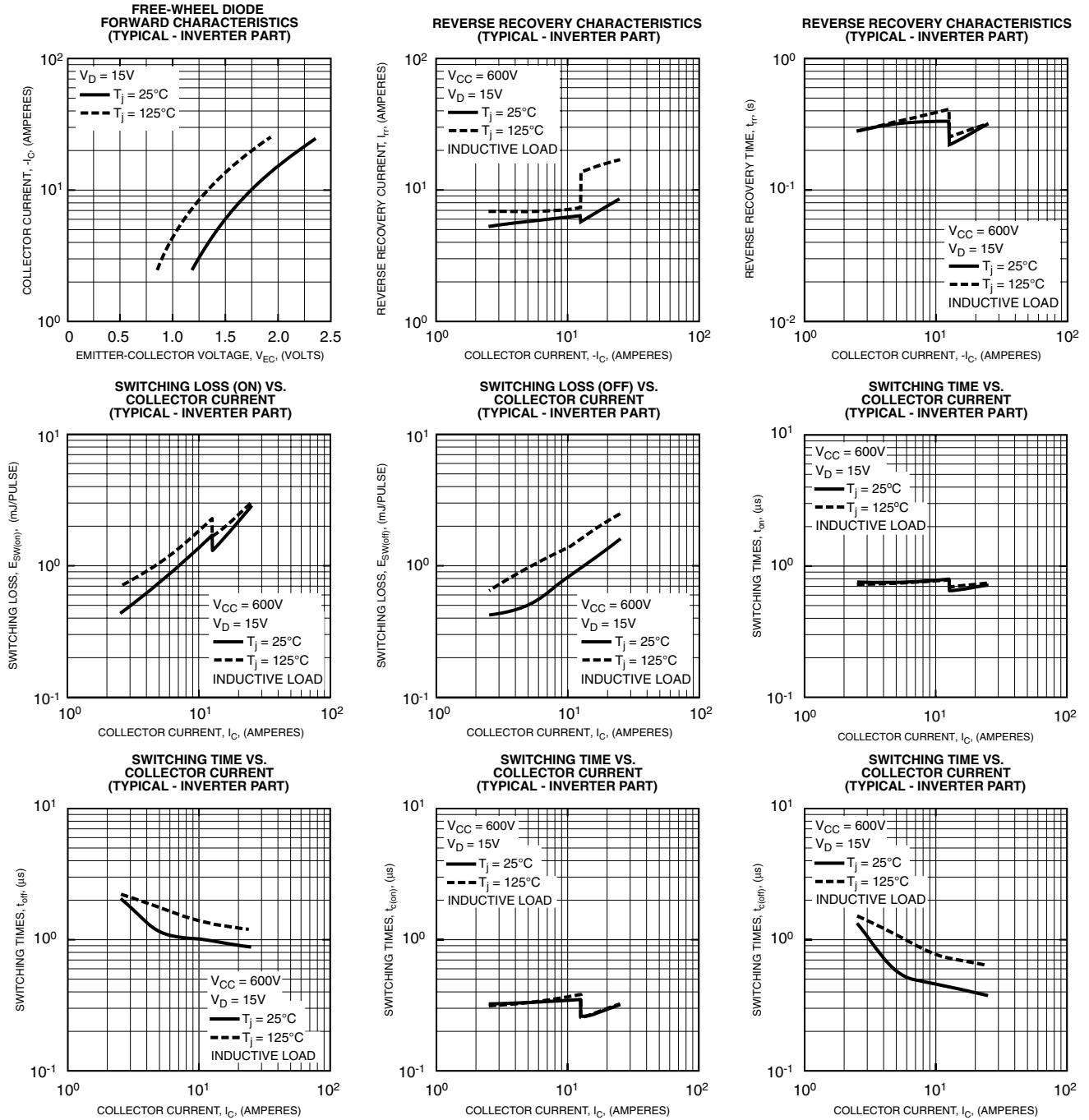
## Recommended Conditions for Use

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

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

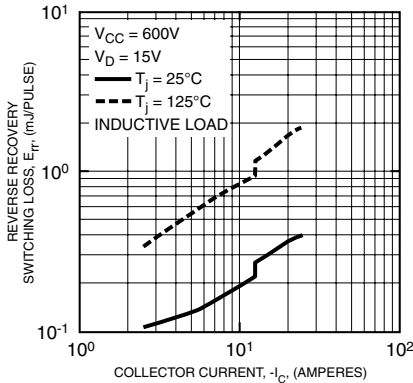


**PM25RLB120**  
**Intellimod™ L-Series**  
**Three Phase IGBT Inverter + Brake**  
**25 Amperes/1200 Volts**

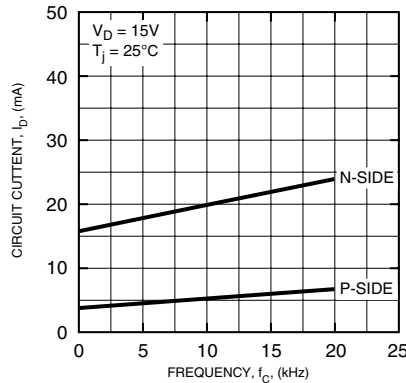


**PM25RLB120**  
**Intellimod™ L-Series**  
**Three Phase IGBT Inverter + Brake**  
**25 Amperes/1200 Volts**

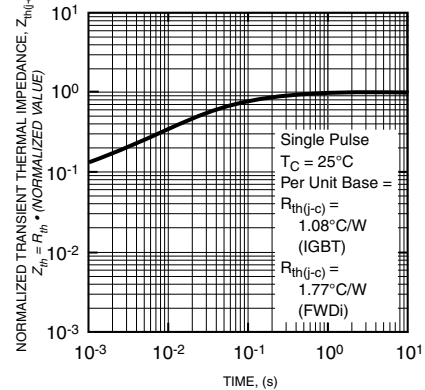
**REVERSE RECOVERY SWITCHING LOSS VS. COLLECTOR CURRENT (TYPICAL - INVERTER PART)**



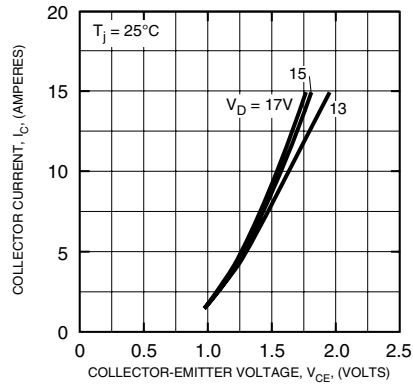
**CIRCUIT CURRENT VS. FREQUENCY CHARACTERISTICS (TYPICAL)**



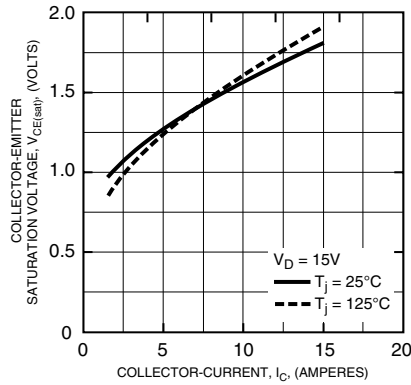
**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT & FWDi - INVERTER PART)**



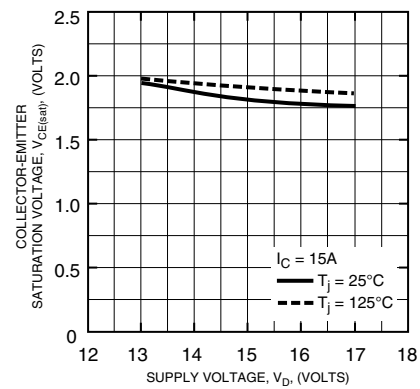
**OUTPUT CHARACTERISTICS (TYPICAL - BRAKE PART)**



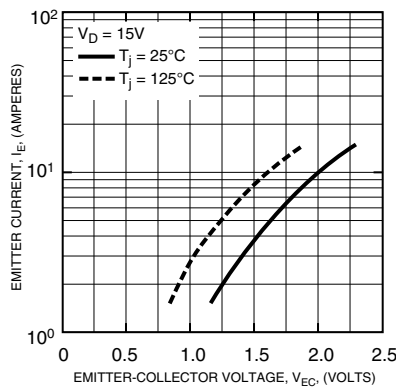
**COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL - BRAKE PART)**



**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)**

