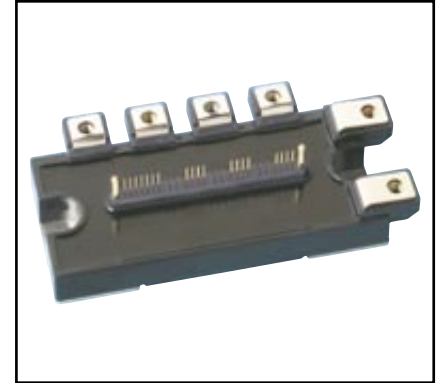
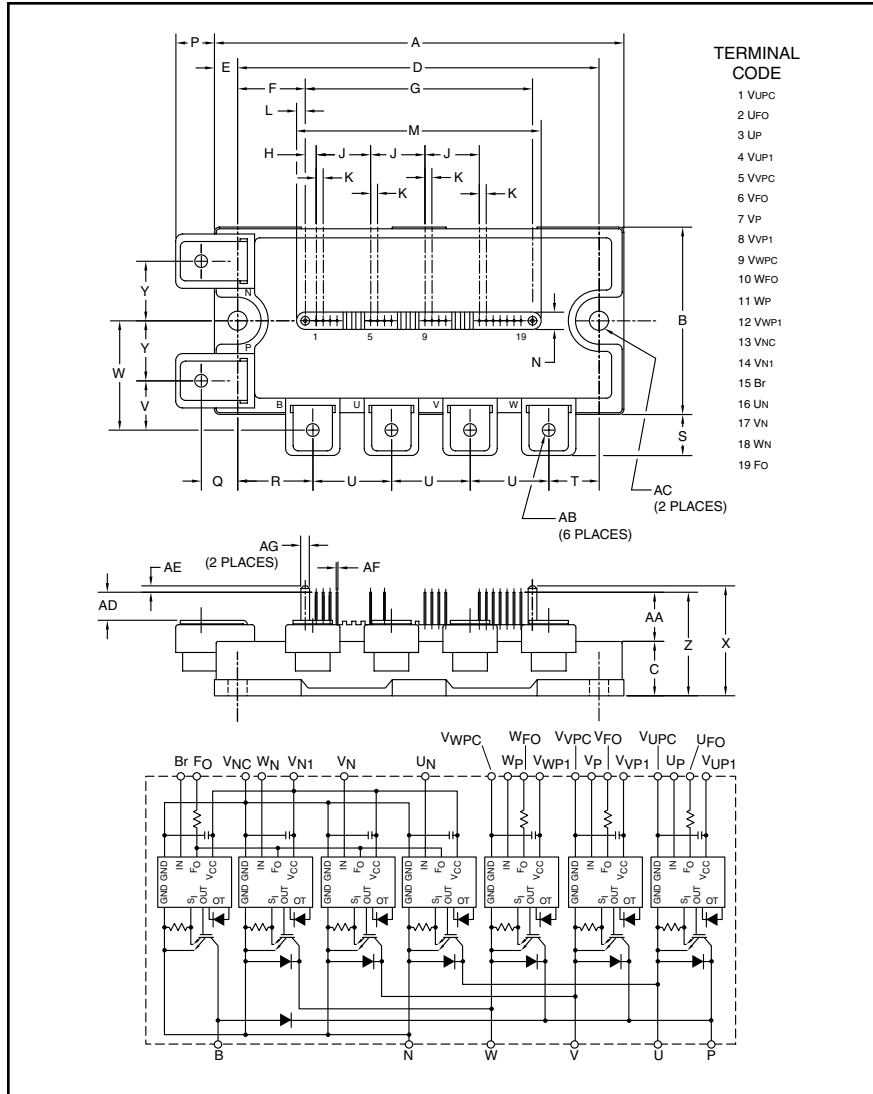


Intellimod™ L-Series

Three Phase

IGBT Inverter + Brake

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 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.

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	0.43	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

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

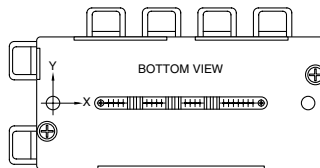
IGBT Brake Sector

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} , $U_N-V_N-V_N-\text{Br}-V_{\text{Nc}}$)	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°C	—	—	1.0	mA
		V _{CE} = V _{CES} , V _D = 15V, T _j = 125°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°C	—	1.8	2.3	Volts
		V _D = 15V, V _{CIN} = 0V, I _C = 25A, T _j = 125°C	—	1.9	2.4	Volts
Inductive Load Switching Times	t _{on}	V _D = 15V, V _{CIN} = 0 ⇔ 15V V _{CC} = 600V, I _C = 25A T _j = 125°C	0.5	1.0	2.5	μs
	t _{rr}		—	0.5	0.8	μs
	t _{C(on)}		—	0.4	1.0	μs
	t _{off}		—	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°C	—	—	1.0	mA
		V _{CE} = V _{CES} , V _D = 15V, T _j = 125°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°C	—	1.8	2.3	Volts
		V _D = 15V, V _{CIN} = 0V, I _C = 15A, T _j = 125°C	—	1.9	2.4	Volts
Control Sector						
Short Circuit Trip Level (-20°C ≤ T _j ≤ 125°C, V _D = 15V)	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 (Detect T _j of IGBT Chip)	OT	Trip Level	135	145	155	°C
	OT _R	Reset Level	—	125	—	°C
Supply Circuit Under-voltage Protection (-20 ≤ T _j ≤ 125°C)	UV	Trip Level	11.5	12.0	12.5	Volts
	UV _R	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 _{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 -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
	I _{FO(L)}	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.

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

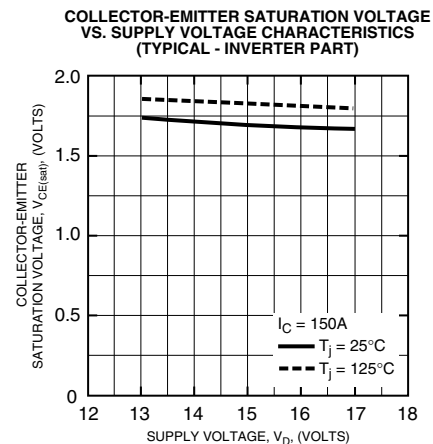
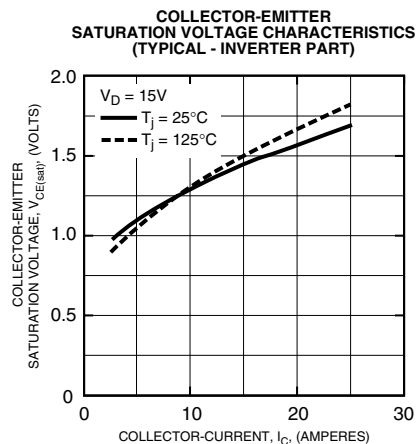
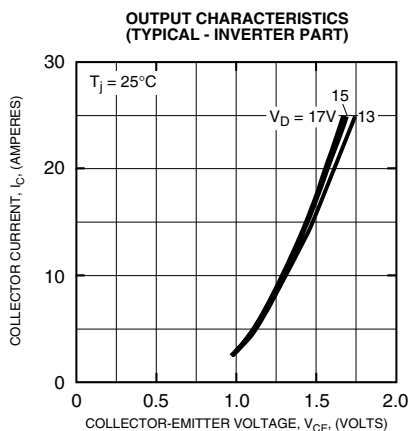
Characteristic	Symbol	Condition	Min.	Typ.	Max.	Units
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	IGBT (Per 1/6 Module)	—	—	0.83*	$^\circ\text{C/Watt}$
Inverter Part	$R_{th(j-c)D}$	FWDi (Per 1/6 Module)	—	—	1.36*	$^\circ\text{C/Watt}$
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	IGBT	—	—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

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

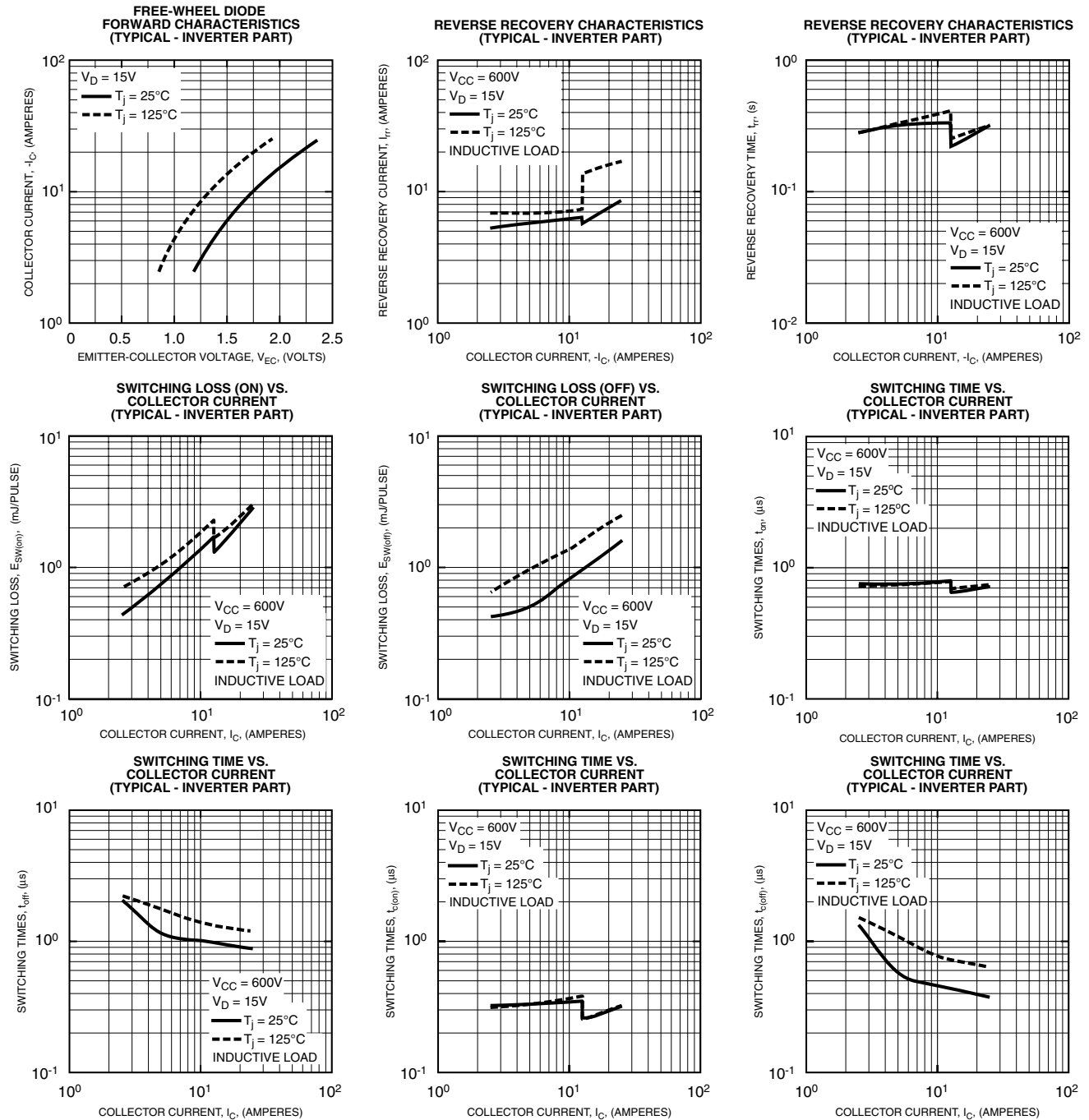
Recommended Conditions for Use

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_{NC} , 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.

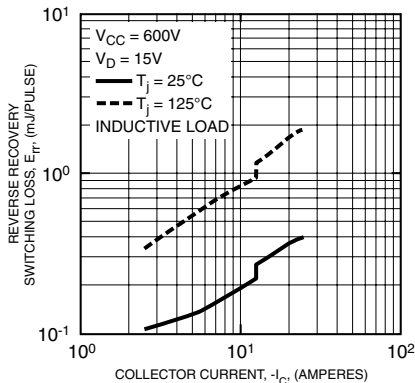


PM25RLA120
Intellimod™ L-Series
Three Phase IGBT Inverter + Brake
25 Amperes/1200 Volts

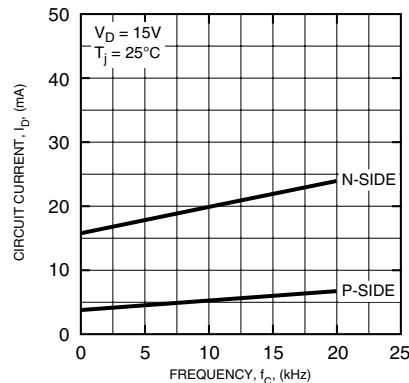


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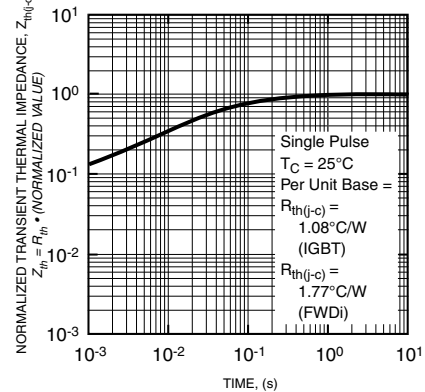
REVERSE RECOVERY SWITCHING LOSS VS. COLLECTOR CURRENT (TYPICAL - INVERTER PART)



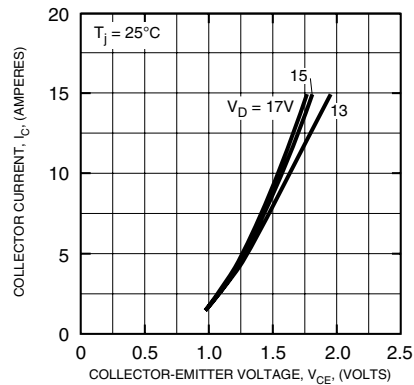
CIRCUIT CURRENT VS. FREQUENCY CHARACTERISTICS (TYPICAL)



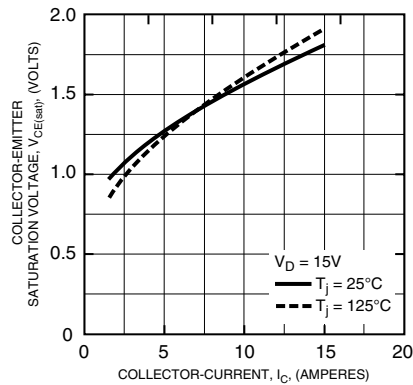
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT & FWDI - INVERTER PART)



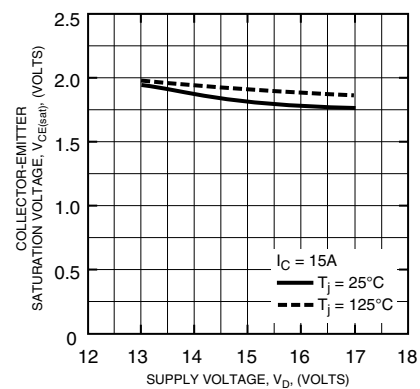
OUTPUT CHARACTERISTICS (TYPICAL - BRAKE PART)



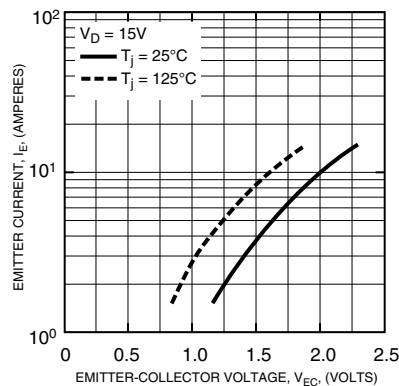
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL - BRAKE PART)



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)

