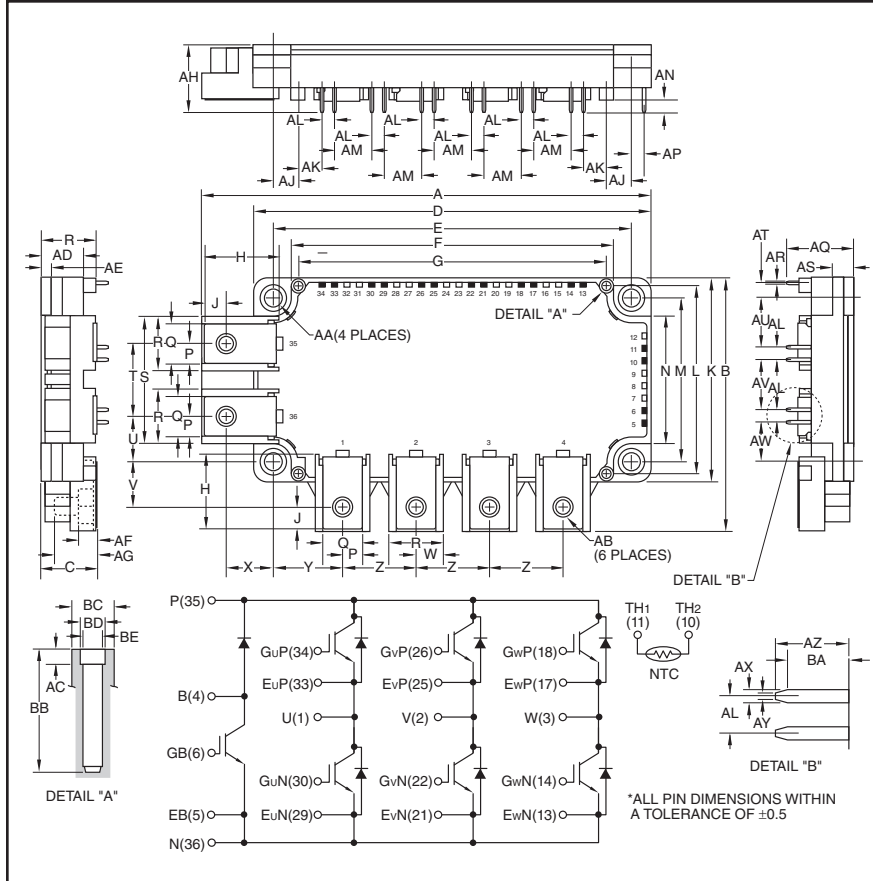


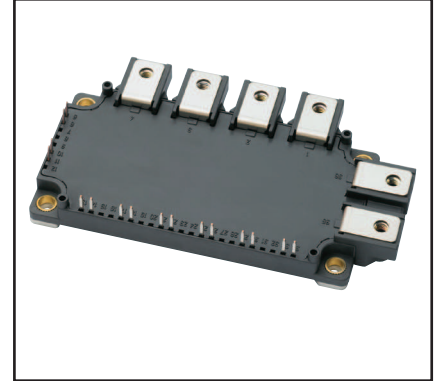
Six IGBTMOD™ + Brake NX-Series Module 200 Amperes/600 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	5.39	136.9
B	3.03	77.1
C	0.67+0.04/-0.02	17.0+1.0/-0.5
D	4.79	121.7
E	4.33±0.02	110.0±0.5
F	3.89	99.0
G	3.72	94.5
H	0.83	21.14
J	0.37	6.5
K	2.44	62.0
L	2.26	57.5
M	1.97±0.02	50.0±0.5
N	1.53	39.0
P	0.24	6.0
Q	0.48	12.0
R	0.67	17.0
S	1.53	39.0
T	0.87	22.0
U	0.55	14.0
V	0.54	13.64
W	0.33	8.5
X	0.53	13.5
Y	0.81	20.71
Z	0.9	22.86
AA	0.22 Dia.	5.5 Dia.
AB	M5	M5
AC	0.06	1.5

Dimensions	Inches	Millimeters
AD	0.51	13.0
AE	0.12	3.0
AF	0.21	5.4
AG	0.49	12.5
AH	0.81	20.5
AJ	0.30	7.75
AK	0.28	7.25
AL	0.15	3.81
AM	0.45	11.44
AN	0.14	3.5
AP	0.16	4.06
AQ	0.78	20.05
AR	0.03	0.8
AS	0.27	7.0
AT	0.16	4.2
AU	0.61	15.48
AV	0.60	15.24
AW	0.46	11.66
AX	0.04	1.15
AY	0.02	0.65
AZ	0.29	7.4
BA	0.05	6.2
BB	0.49	12.5
BC	0.17 Dia.	4.3 Dia.
BD	0.10 Dia.	2.5 Dia.
BE	0.08 Dia.	2.1 Dia.



Description:

Powerex IGBTMOD™ Modules are designed for use in switching applications. Each module consists of six IGBT Transistors in a three phase bridge configuration and a seventh IGBT with free-wheel diode for dynamic braking. All components and interconnects are isolated from the heat sinking baseplate, offering simplified system assembly and thermal management.

Features:

- ☐ Low Drive Power
- ☐ Low $V_{CE(sat)}$
- ☐ Discrete Super-Fast Recovery Free-Wheel Diode
- ☐ Isolated Baseplate for Easy Heat Sinking

Applications:

- ☐ AC Motor Control
- ☐ Motion/Servo Control
- ☐ Photovoltaic/Fuel Cell

Ordering Information:

Example: Select the complete module number you desire from the table below -i.e. CM200RX-12A is a 600V (V_{CES}), 200 Ampere Six-IGBTMOD™ + Brake Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	200	12



Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272

CM200RX-12A

Six IGBTMOD™ + Brake NX-Series Module

200 Amperes/600 Volts

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

Characteristics	Symbol	CM200RX-12A	Units
Power Device Junction Temperature	T_j	-40 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)	—	330	Grams
Isolation Voltage, AC 1 minute, 60Hz Sinusoidal	V_{ISO}	2500	Volts

Inverter Sector

Collector-Emitter Voltage (G-E Short)	V_{CES}	600	Volts
Gate-Emitter Voltage (C-E Short)	V_{GES}	± 20	Volts
Collector Current ($T_C = 68^\circ\text{C}$)*	I_C	200	Amperes
Peak Collector Current**	I_{CM}	400	Amperes
Emitter Current ($T_C = 25^\circ\text{C}$, $T_j < 150^\circ\text{C}$)*	I_E^{***}	200	Amperes
Peak Emitter Current ($T_j < 150^\circ\text{C}$)**	I_{EM}^{***}	400	Amperes
Maximum Collector Dissipation ($T_C = 25^\circ\text{C}$, $T_j < 150^\circ\text{C}$)*	P_C	735	Watts

Brake Sector

Collector-Emitter Voltage (G-E Short)	V_{CES}	600	Volts
Gate-Emitter Voltage (C-E Short)	V_{GES}	± 20	Volts
Collector Current ($T_C = 75^\circ\text{C}$)*	I_C	100	Amperes
Peak Collector Current**	I_{CM}	200	Amperes
Maximum Collector Dissipation ($T_C = 25^\circ\text{C}$, $T_j < 150^\circ\text{C}$)*	P_C	400	Watts
Repetitive Peak Reverse Voltage (Clamp Diode Part)	V_{RRM}^{***}	600	Volts
Forward Current ($T_C = 25^\circ\text{C}$)*	I_F^{***}	100	Amperes
Forward Current (Clamp Diode Part)**	I_{FM}^{***}	200	Amperes

* T_C , T_f measured point is just under the chips.

**Pulse width and repetition rate should be such that device junction temperature (T_j) does not exceed $T_{j(\text{max})}$ rating.

***Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

CM200RX-12A
Six IGBTMOD™ + Brake NX-Series Module
 200 Amperes/600 Volts

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

Inverter Sector

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector Cutoff Current	I_{CES}	$V_{CE} = V_{CES}, V_{GE} = 0V$	—	—	1.0	mA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$I_C = 20mA, V_{CE} = 10V$	5	6	7	Volts
Gate Leakage Current	I_{GES}	$V_{GE} = V_{GES}, V_{CE} = 0V$	—	—	0.5	μA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 200A, V_{GE} = 15V, T_j = 25^\circ\text{C}$	—	1.7	2.1	Volts
		$I_C = 200A, V_{GE} = 15V, T_j = 125^\circ\text{C}$	—	1.9	—	Volts
		$I_C = 200A, V_{GE} = 15V, \text{Chip}$	—	1.6	—	Volts
Input Capacitance	C_{ies}	$V_{CE} = 10V, V_{GE} = 0V$	—	—	27.0	nF
Output Capacitance	C_{oes}		—	—	2.7	nF
Reverse Transfer Capacitance	C_{res}		—	—	0.8	nF
Total Gate Charge	Q_G	$V_{CC} = 300V, I_C = 200A, V_{GE} = 15V$	—	530	—	nC
Inductive	Turn-on Delay Time	$V_{CC} = 300V, I_C = 200A,$ $V_{GE} = \pm 15V,$ $R_G = 5.6\Omega, I_E = 150A,$ Inductive Load Switching Operation	—	—	120	ns
Load	Turn-on Rise Time		—	—	150	ns
Switch	Turn-off Delay Time		—	—	350	ns
Time	Turn-off Fall Time		—	—	600	ns
Reverse Recovery Time*	t_{rr}	Inductive Load Switching Operation	—	—	200	ns
Reverse Recovery Charge*	Q_{rr}		—	5.0	—	μC
Emitter-Collector Voltage*	V_{EC}	$I_E = 200A, V_{GE} = 0V, T_j = 25^\circ\text{C}$	—	2.0	2.8	Volts
		$I_E = 200A, V_{GE} = 0V, T_j = 125^\circ\text{C}$	—	1.95	—	Volts
		$I_E = 200A, V_{GE} = 0V, \text{Chip}$	—	1.9	—	Volts

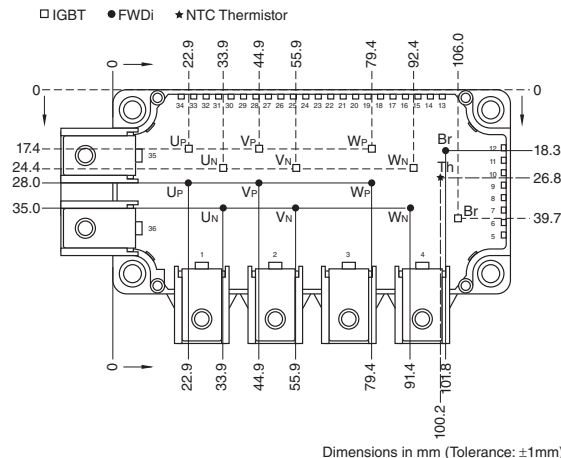
Thermal and Mechanical Characteristics, $T_j = 25^\circ\text{C}$ unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case**	$R_{th(j-c)Q}$	Per IGBT	—	—	0.17	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case**	$R_{th(j-c)D}$	Per FWDi	—	—	0.33	$^\circ\text{C/W}$
Contact Thermal Resistance**	$R_{th(c-f)}$	Thermal Grease Applied	—	0.015	—	$^\circ\text{C/W}$
Internal Gate Resistance	R_{Gint}	$T_C = 25^\circ\text{C}$	—	0	—	Ω
External Gate Resistance	R_G		3.0	—	30	Ω

*Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

** T_C, T_f measured point is just under the chips.

CHIP LOCATION (TOP VIEW)



CM200RX-12A

Six IGBTMOD™ + Brake NX-Series Module

200 Amperes/600 Volts

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

Brake Sector

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector Cutoff Current	I_{CES}	$V_{CE} = V_{CES}, V_{GE} = 0V$	—	—	1.0	mA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$I_C = 10mA$	5	6	7	Volts
Gate Leakage Current	I_{GES}	$V_{GE} = V_{GES}, V_{CE} = 0V$	—	—	0.5	μA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 100A, V_{GE} = 15V, T_j = 25^\circ\text{C}$	—	1.7	2.1	Volts
		$I_C = 100A, V_{GE} = 15V, T_j = 125^\circ\text{C}$	—	1.9	—	Volts
		$I_C = 100A, V_{GE} = 15V, \text{Chip}$	—	1.6	—	Volts
Input Capacitance	C_{ies}	$V_{CE} = 10V, V_{GE} = 0V$	—	—	13.3	nF
Output Capacitance	C_{oes}		—	—	1.4	nF
Reverse Transfer Capacitance	C_{res}		—	—	0.45	nF
Total Gate Charge	Q_G	$V_{CC} = 300V, I_C = 100A, V_{GE} = 15V$	—	300	—	nC
Repetitive Reverse Current*	I_{RRM}	$V_R = V_{RRM}$	—	—	1.0	mA
Forward Voltage Drop *	V_F	$I_F = 100A, T_j = 25^\circ\text{C}$	—	2.0	2.8	Volts
		$I_F = 100A, T_j = 125^\circ\text{C}$	—	1.95	—	Volts
		$I_F = 100A, \text{Chip}$	—	1.9	—	Volts

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case**	$R_{th(j-c)Q}$	Per IGBT	—	—	0.31	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case**	$R_{th(j-o)D}$	Per FWDi	—	—	0.59	$^\circ\text{C/W}$
Contact Thermal Resistance**	$R_{th(j-f)}$	Thermal Grease Applied	—	0.015	—	$^\circ\text{C/W}$
Internal Gate Resistance	R_{Gint}	$T_C = 25^\circ\text{C}$	—	0	—	Ω
External Gate Resistance	R_G		6	—	62	Ω

NTC Thermistor Sector, $T_j = 25^\circ\text{C}$ unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Zero Power Resistance	R	$T_C = 25^\circ\text{C}$	4.85	5.00	5.15	k Ω
Deviation of Resistance	$\Delta R/R$	$T_C = 100^\circ\text{C}, R_{100} = 493\Omega$	-7.3	—	+7.8	%
B Constant	$B_{(25/50)}$	$B = (\ln R_1 - \ln R_2) / (1/T_1 - 1/T_2)^{***}$	—	3375	—	K
Power Dissipation	P_{25}	$T_C = 25^\circ\text{C}$	—	—	10	mW

*Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

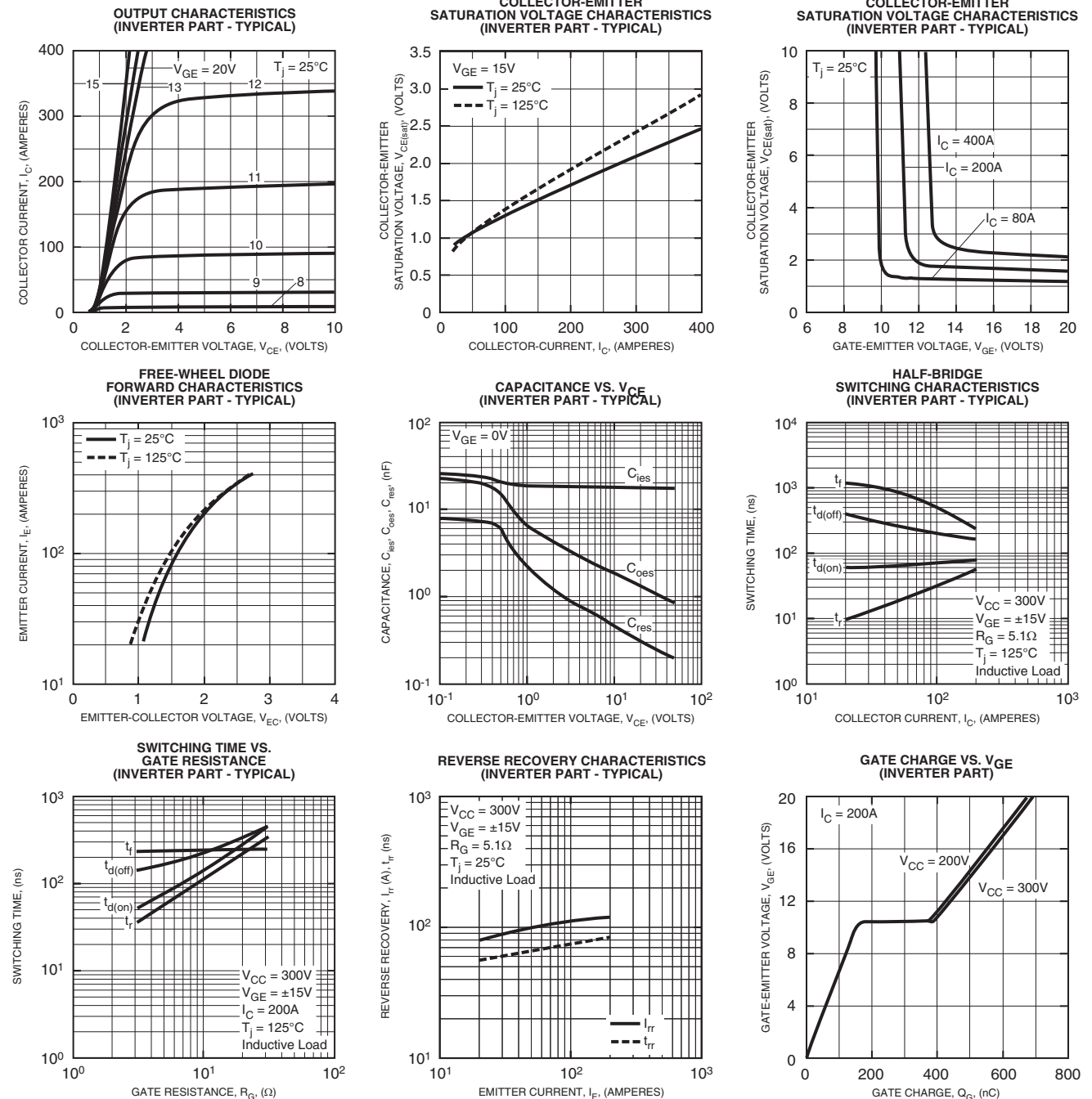
** T_C, T_j measured point is just under the chips.

*** R_1 : Resistance at Absolute Temperature $T_1(K)$, R_2 : Resistance at Absolute Temperature $T_2(K)$, $T(K) = t(^{\circ}\text{C}) + 273.15$

CM200RX-12A

Six IGBTMOD™ + Brake NX-Series Module

200 Amperes/600 Volts

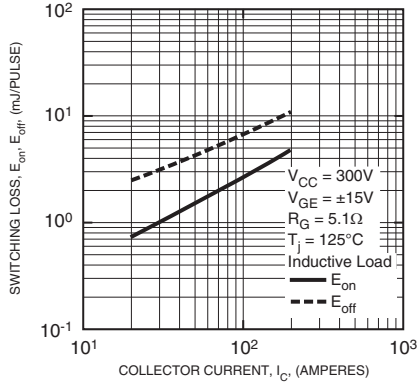


CM200RX-12A

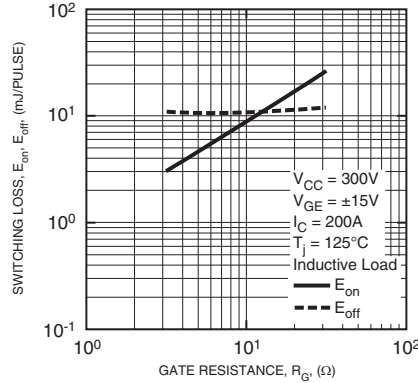
Six IGBTMOD™ + Brake NX-Series Module

200 Amperes/600 Volts

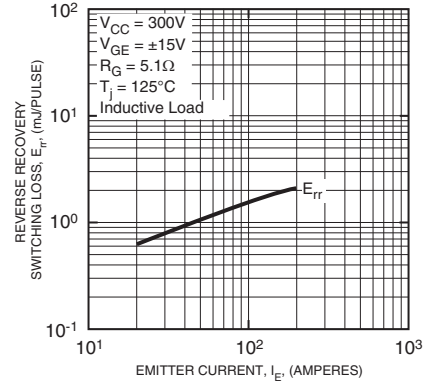
SWITCHING LOSS VS.
COLLECTOR CURRENT
(INVERTER PART - TYPICAL)



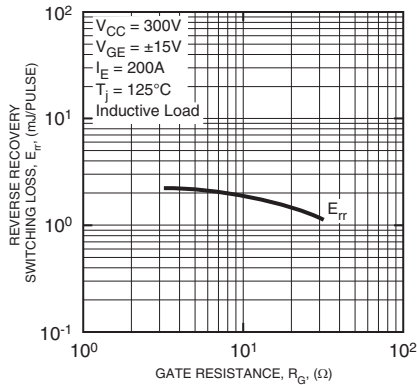
SWITCHING LOSS VS.
GATE RESISTANCE
(INVERTER PART - TYPICAL)



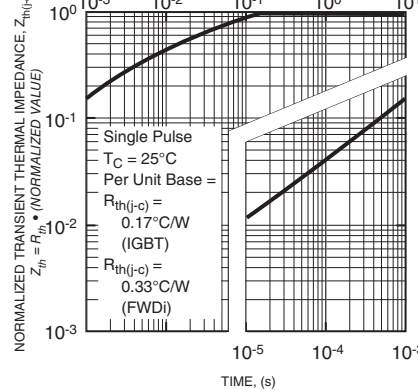
REVERSE RECOVERY SWITCHING LOSS VS.
EMITTER CURRENT
(INVERTER PART - TYPICAL)



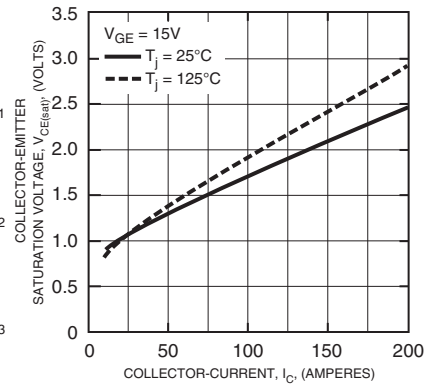
REVERSE RECOVERY SWITCHING LOSS VS.
GATE RESISTANCE
(INVERTER PART - TYPICAL)



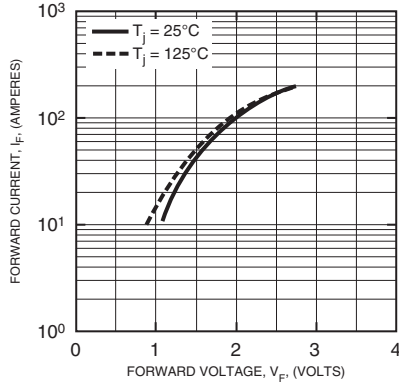
TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(INVERTER PART - TYPICAL)



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



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



TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(BRAKE PART - TYPICAL)

