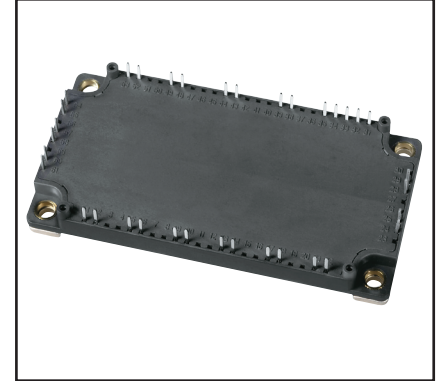
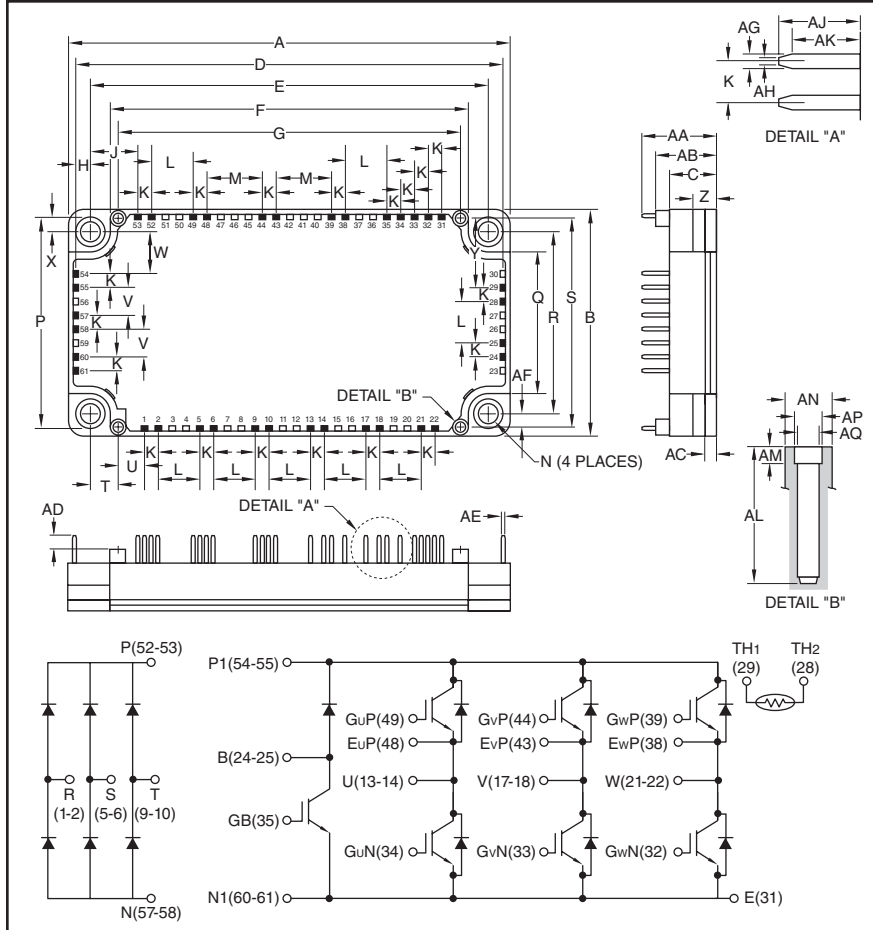




**THE DATASHEET OF
CM100MX-12A**



NX-Series CIB Module (3Ø Converter + 3Ø Inverter + Brake) 100 Amperes/600 Volts



Description:

CIBs are low profile and thermally efficient. Each module consists of a three-phase diode converter section, a three-phase inverter section and a brake circuit. A thermistor is included in the package for sensing the baseplate temperature. 5th Generation CSTBT chips yield low loss.

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. CM100MX-12A is a 600V (V_{CES}), 100 Ampere CIB Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	100	12

Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	4.79	121.7
B	2.44	62.0
C	0.51	13.0
D	4.65	118.1
E	4.33±0.02	110.0±0.5
F	3.89	99.0
G	3.72	94.5
H	0.16	4.06
J	0.51	13.09
K	0.15	3.81
L	0.45	11.43
M	0.6	15.24
N	0.22 Dia.	5.5 Dia.
P	2.30	58.4
Q	1.53	39.0
R	1.97±0.02	50.0±0.5
S	2.26	57.5
T	0.30	7.75
U	0.28	7.25
V	0.3	7.62

Dimensions	Inches	Millimeters
W	0.46	11.66
X	0.16	4.2
Y	0.61	15.48
Z	0.27	7.0
AA	0.81	20.5
AB	0.67	17.0
AC	0.12	3.0
AD	0.14	3.5
AE	0.03	0.8
AF	0.15	3.75
AG	0.05	1.15
AH	0.025	0.65
AJ	0.29	7.4
AK	0.24	6.2
AL	0.49	12.5
AM	0.06	1.5
AN	0.17 Dia.	4.3 Dia.
AP	0.10 Dia.	2.5 Dia.
AQ	0.08 Dia.	2.1 Dia.



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

CM100MX-12A

NX-Series CIB Module

(3Ø Converter + 3Ø Inverter + Brake)

100 Amperes/600 Volts

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

Characteristics	Symbol	CM100MX-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
Module Weight (Typical)	—	270	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 ($T_C = 75^\circ\text{C}$)*	I_C	100	Amperes
Peak Collector Current**	I_{CM}	200	Amperes
Emitter Current ($T_C = 25^\circ\text{C}$, $T_j < 150^\circ\text{C}$)*	I_E^{***}	100	Amperes
Peak Emitter Current ($T_j < 150^\circ\text{C}$ **)	I_{EM}^{***}	200	Amperes
Maximum Collector Dissipation ($T_C = 25^\circ\text{C}$, $T_j < 150^\circ\text{C}$)*	P_C	400	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 ($T_C = 97^\circ\text{C}$)*	I_C	50	Amperes
Peak Collector Current**	I_{CM}	100	Amperes
Maximum Collector Dissipation ($T_C = 25^\circ\text{C}$, $T_j < 150^\circ\text{C}$)*	P_C	280	Watts
Repetitive Peak Reverse Voltage (Clamp Diode Part)	V_{RRM}^{***}	600	Volts
Forward Current ($T_C = 25^\circ\text{C}$)*	I_F^{***}	50	Amperes
Forward Current (Clamp Diode Part)**	I_{FM}^{***}	100	Amperes

Converter Sector

Repetitive Peak Reverse Voltage	V_{RRM}	800	Volts
Recommended Input Voltage	E_a	220	Volts RMS
DC Output Current (3-Phase Full Wave Rectifying, $T_C = 137^\circ\text{C}$)*	I_O	100	Amperes
Surge Forward Current (sine Half-wave 1 Cycle Peak Value, $F = 60\text{Hz}$, Non-repetitive)	I_{FSM}	1000	Amperes
Current Square Time (Value for One Cycle of Surge Current)	I^2t	4160	A^2s

* 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).

CM100MX-12A
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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	$V_{GE(th)}$	$I_C = 10mA, V_{CE} = 10V$	5	6	7	Volts	
Gate Leakage Current	I_{GES}	$V_{GE} = V_{GES}, V_{CE} = 0V$	—	—	0.5	μA	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 100A, V_{GE} = 15V, T_j = 25^\circ\text{C}$	—	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}		—	—	11.3	nF	
Output Capacitance	C_{oes}	$V_{CE} = 10V, V_{GE} = 0V$	—	—	1.4	nF	
Reverse Transfer Capacitance	C_{res}		—	—	0.45	nF	
Total Gate Charge	Q_G	$V_{CC} = 300V, I_C = 100A, V_{GE} = 15V$	—	270	—	nC	
Inductive Load	Turn-on Delay Time	$V_{CC} = 300V, I_C = 100A,$ $V_{GE} = \pm 15V,$ $R_G = 6.2\Omega, I_E = 100A,$ Inductive Load Switching Operation	$t_{d(on)}$	—	—	100	ns
	Turn-on Rise Time		t_r	—	—	100	ns
	Turn-off Delay Time		$t_{d(off)}$	—	—	300	ns
	Turn-off Fall Time		t_f	—	—	600	ns
Reverse Recovery Time*	t_{rr}		—	—	200	ns	
Reverse Recovery Charge*	Q_{rr}		—	3.6	—	μC	
Emitter-Collector Voltage*	V_{EC}	$I_E = 100A, V_{GE} = 0V$	—	2.0	2.8	Volts	
		$I_E = 100A, V_{GE} = 0V, \text{Chip}$	—	1.9	—	Volts	

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

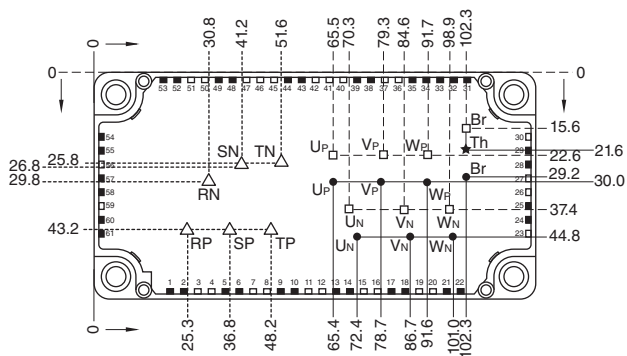
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case**	$R_{th(j-c)Q}$	Per IGBT	—	—	0.31	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case**	$R_{th(j-c)D}$	Per FWDi	—	—	0.59	$^\circ\text{C/W}$
Contact Thermal Resistance**	$R_{th(c-f)}$	Thermal Grease Applied	—	0.015	—	$^\circ\text{C/W}$
Internal Gate Resistance	R_{Gint}	$T_C = 25^\circ\text{C}$	—	0	—	Ω
External Gate Resistance	R_G		6.0	—	63	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)

□ IGBT ● FWDi △ Converter Diode ★ NTC Thermistor



Dimensions in mm (Tolerance: $\pm 1\text{mm}$)

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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	$V_{GE(th)}$	$I_C = 5mA$	5	6	7	Volts
Gate Leakage Current	I_{GES}	$V_{GE} = V_{GES}, V_{CE} = 0V$	—	—	0.5	μA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 50A, V_{GE} = 15V, T_j = 25^\circ\text{C}$	—	1.7	2.1	Volts
		$I_C = 50A, V_{GE} = 15V, T_j = 125^\circ\text{C}$	—	1.9	—	Volts
		$I_C = 50A, V_{GE} = 15V, \text{Chip}$	—	1.6	—	Volts
Input Capacitance	C_{ies}		—	—	7.5	nF
Output Capacitance	C_{oes}	$V_{CE} = 10V, V_{GE} = 0V$	—	—	1.0	nF
Reverse Transfer Capacitance	C_{res}		—	—	0.3	nF
Total Gate Charge	Q_G	$V_{CC} = 300V, I_C = 50A, V_{GE} = 15V$	—	200	—	nC
Repetitive Reverse Current*	I_{RRM}	$V_R = V_{RRM}$	—	—	1.0	mA
Forward Voltage Drop *	V_F	$I_F = 50A$	—	2.3	3.2	Volts
		$I_F = 50A, \text{Chip}$	—	2.2	—	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	—	—	0.44	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case**	$R_{th(j-c)D}$	Per FWDi	—	—	0.85	$^\circ\text{C/W}$
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		13	—	125	Ω

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Repetitive Peak Reverse Current	I_{RRM}	$V_R = V_{RRM}, T_j = 150^\circ\text{C}$	—	—	20	mA
Forward Voltage Drop	V_F	$I_F = 100A$	—	1.2	1.6	Volts
Thermal Resistance, Junction to Case**	$R_{th(j-c)}$	Per FWDi	—	—	0.24	K/W
Contact Thermal Resistance**	$R_{th(c-f)}$	Thermal Grease Applied	—	0.015	—	$^\circ\text{C/W}$

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).

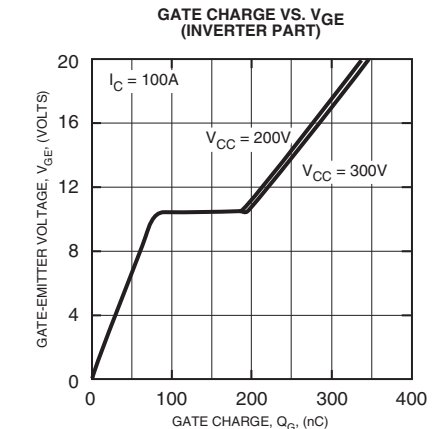
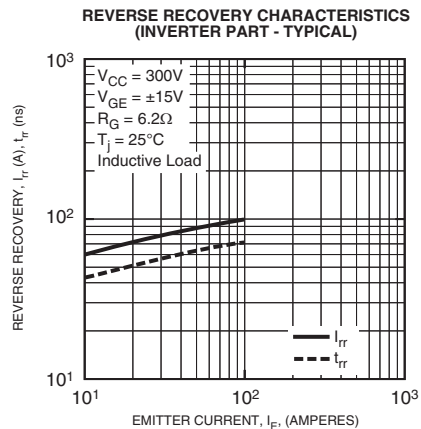
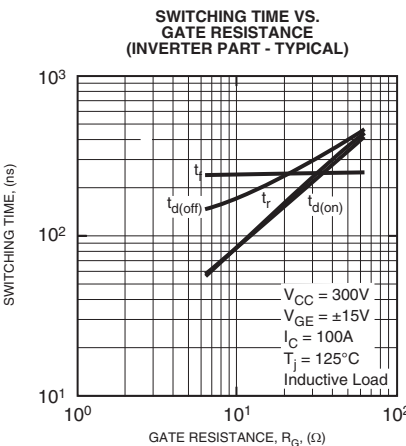
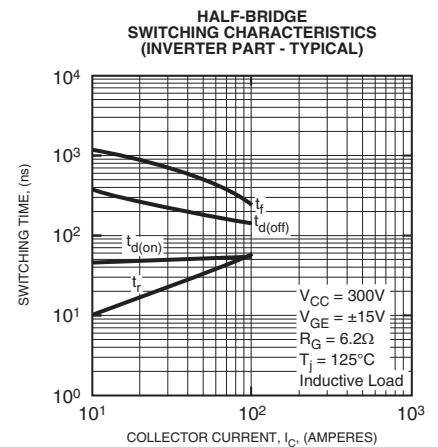
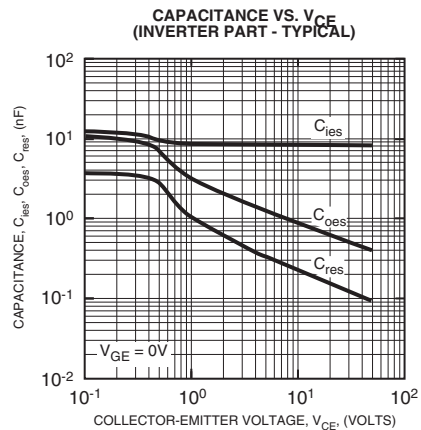
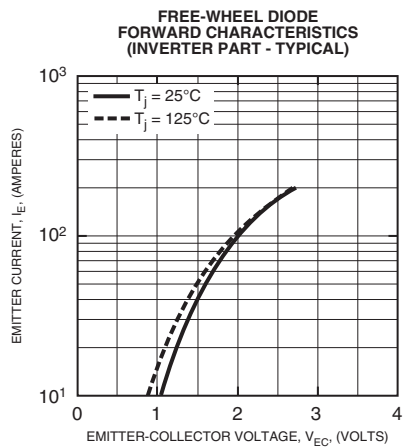
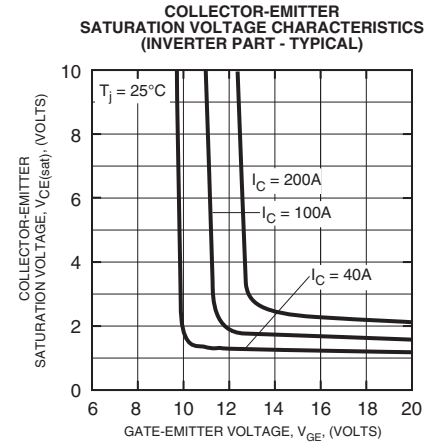
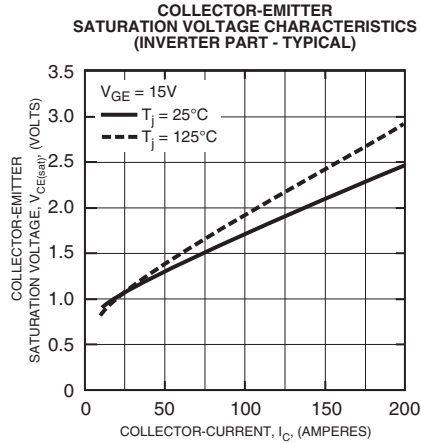
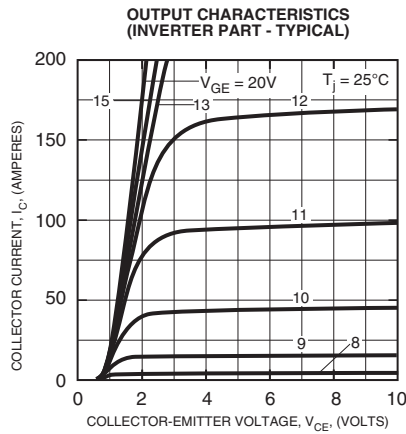
** T_C, T_f measured point is just under the chips.

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

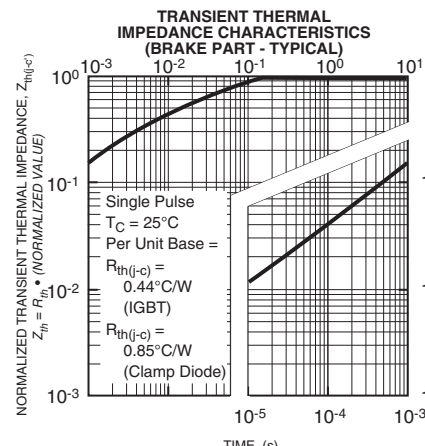
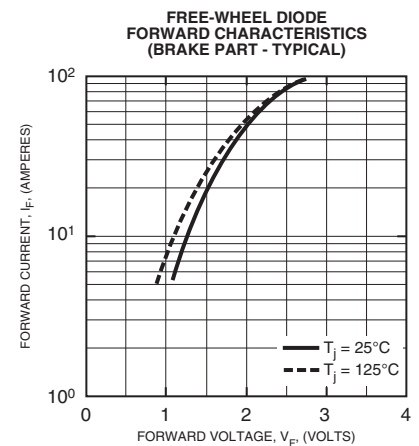
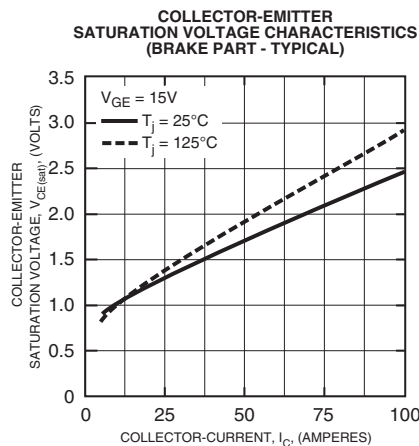
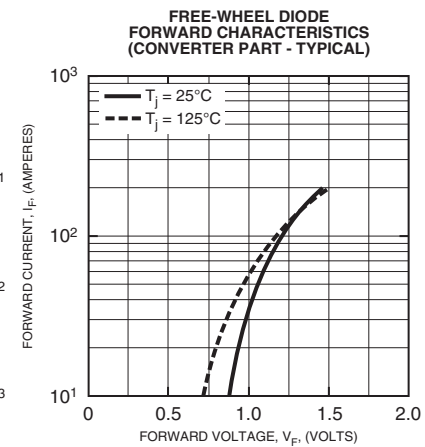
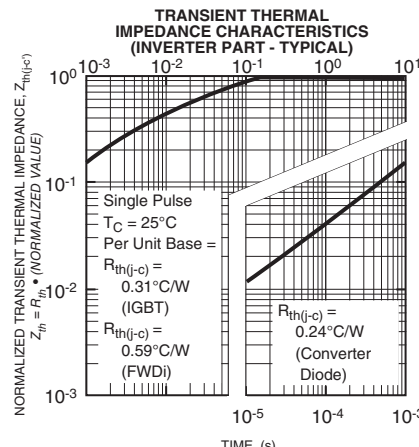
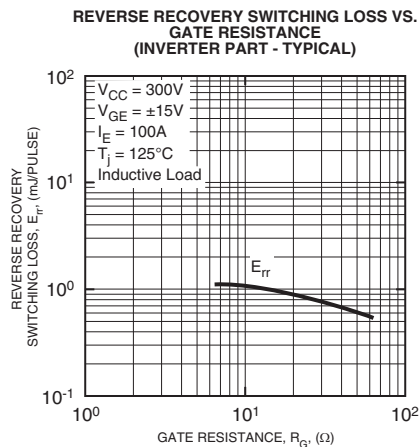
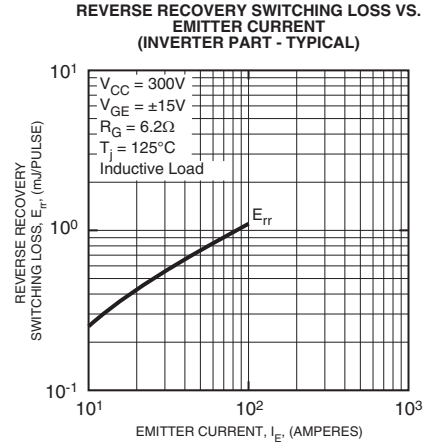
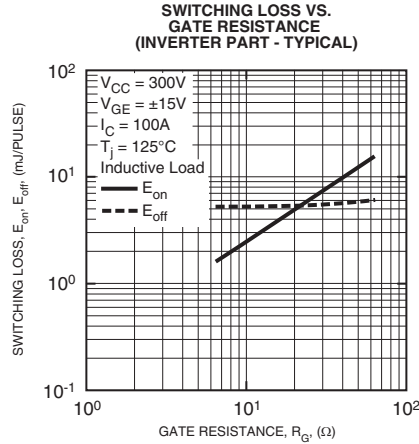
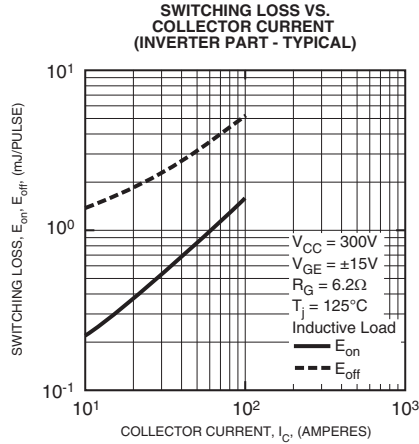


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