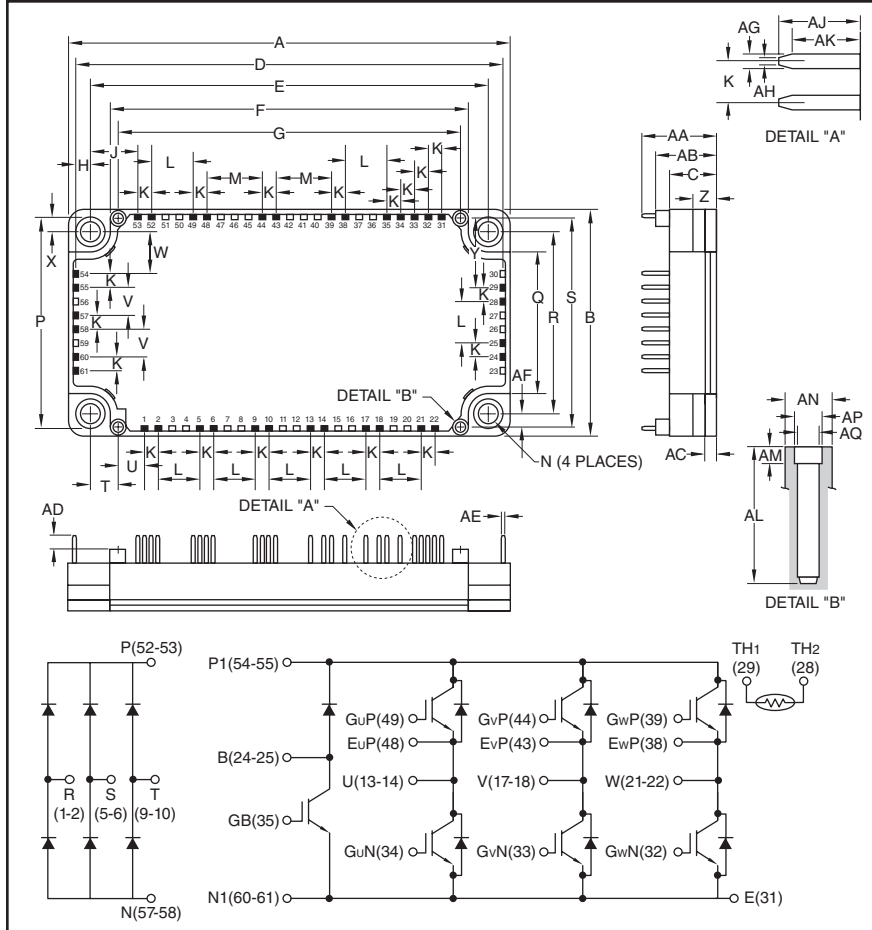


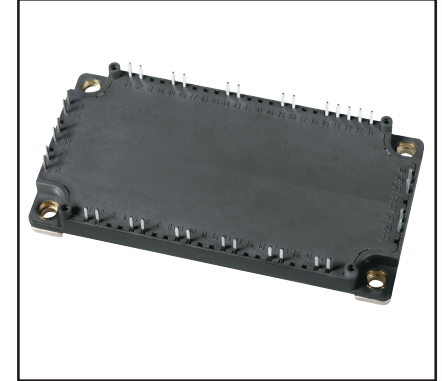
### NX-Series CIB Module (3Ø Converter + 3Ø Inverter + Brake) 100 Amperes/600 Volts



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.



#### 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

## 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	$T_{\text{stg}}$	-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	$V_{\text{ISO}}$	2500	Volts

### Inverter Sector

Collector-Emitter Voltage (G-E Short)	$V_{\text{CES}}$	600	Volts
Gate-Emitter Voltage (C-E Short)	$V_{\text{GES}}$	$\pm 20$	Volts
Collector Current ( $T_C = 75^\circ\text{C}$ )*	$I_C$	100	Amperes
Peak Collector Current**	$I_{\text{CM}}$	200	Amperes
Emitter Current ( $T_C = 25^\circ\text{C}$ , $T_j < 150^\circ\text{C}$ )*	$I_E^{***}$	100	Amperes
Peak Emitter Current ( $T_j < 150^\circ\text{C}$ **)	$I_{\text{EM}}^{***}$	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)	$V_{\text{CES}}$	600	Volts
Gate-Emitter Voltage (C-E Short)	$V_{\text{GES}}$	$\pm 20$	Volts
Collector Current ( $T_C = 97^\circ\text{C}$ )*	$I_C$	50	Amperes
Peak Collector Current**	$I_{\text{CM}}$	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)	$V_{\text{RRM}}^{***}$	600	Volts
Forward Current ( $T_C = 25^\circ\text{C}$ )*	$I_F^{***}$	50	Amperes
Forward Current (Clamp Diode Part)**	$I_{\text{FM}}^{***}$	100	Amperes

### Converter Sector

Repetitive Peak Reverse Voltage	$V_{\text{RRM}}$	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)	$I_{\text{FSM}}$	1000	Amperes
Current Square Time (Value for One Cycle of Surge Current)	$I^2t$	4160	$\text{A}^2\text{s}$

\* $T_C$ ,  $T_f$  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**  
**NX-Series CIB Module**  
**(3Ø Converter + 3Ø Inverter + Brake)**  
 100 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	$V_{GE(th)}$	$I_C = 10mA, V_{CE} = 10V$	5	6	7	Volts	
Gate Leakage Current	$I_{GES}$	$V_{GE} = V_{GES}, V_{CE} = 0V$	—	—	0.5	$\mu A$	
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	—	—	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	—	$\mu C$	
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

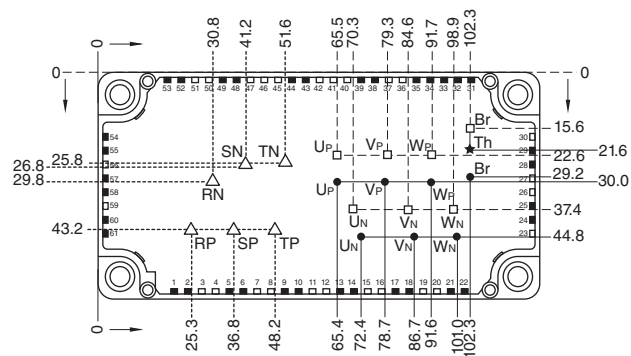
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case**	$R_{th(j-c)Q}$	Per IGBT	—	—	0.31	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case**	$R_{th(j-c)D}$	Per FWDi	—	—	0.59	$^\circ\text{C/W}$
Contact Thermal Resistance**	$R_{th(c-f)}$	Thermal Grease Applied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

\*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:  $\pm 1\text{mm}$ )

**CM100MX-12A**  
**NX-Series CIB Module**  
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 100 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	$V_{GE(th)}$	$I_C = 5mA$	5	6	7	Volts
Gate Leakage Current	$I_{GES}$	$V_{GE} = V_{GES}, V_{CE} = 0V$	—	—	0.5	$\mu\text{A}$
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	—	$\Omega$
External Gate Resistance	$R_G$		13	—	125	$\Omega$

## 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

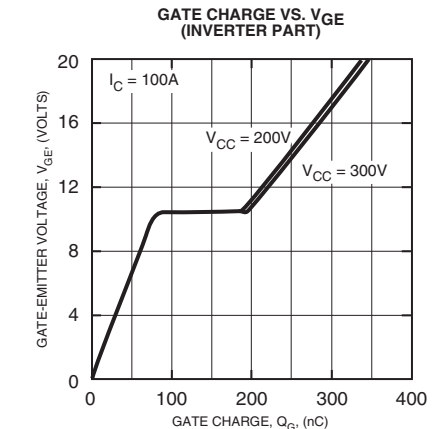
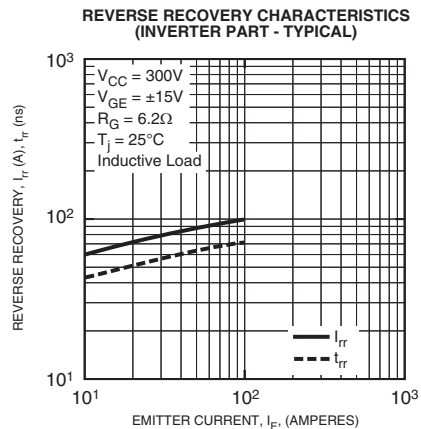
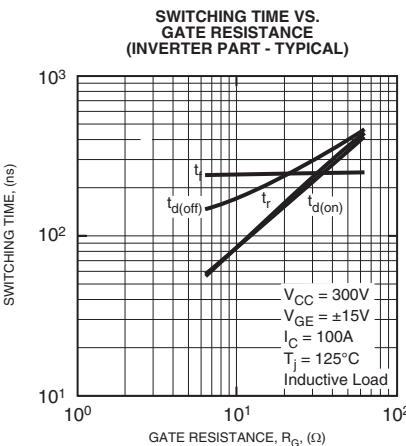
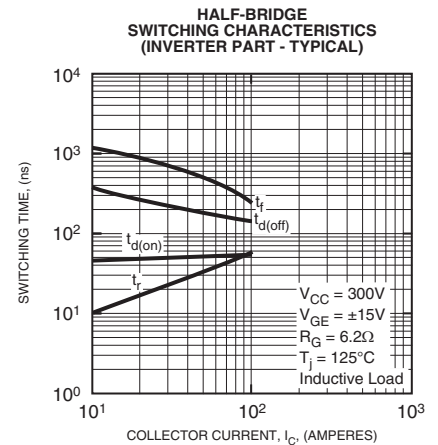
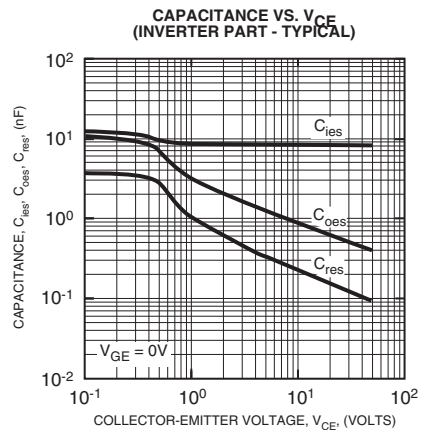
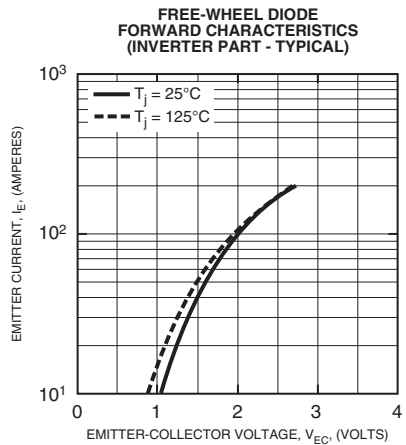
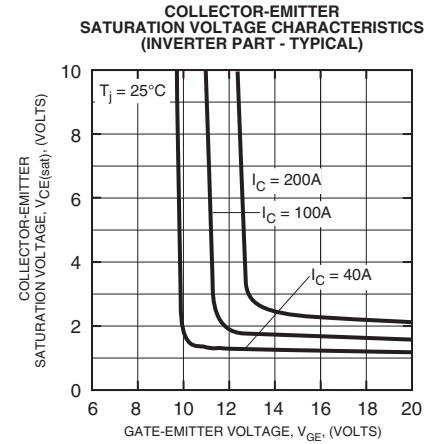
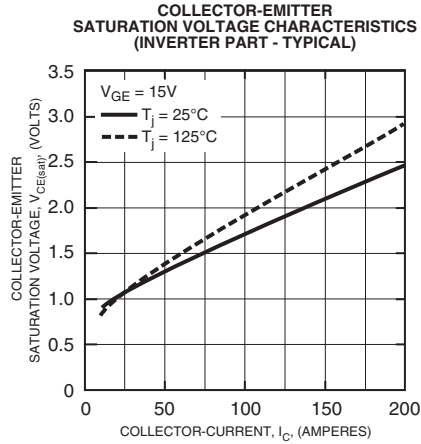
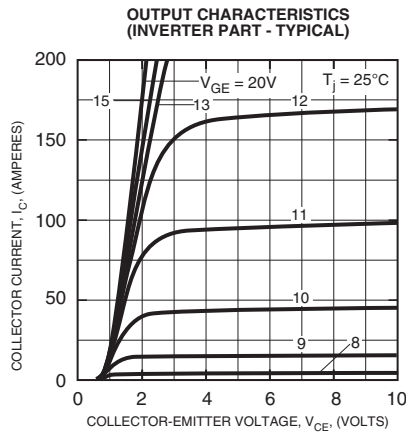
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Zero Power Resistance	$R$	$T_C = 25^\circ\text{C}$	4.85	5.00	5.15	k $\Omega$
Deviation of Resistance	$\Delta R/R$	$T_C = 100^\circ\text{C}, R_{100} = 493\Omega$	-7.3	—	+7.8	%
B Constant	$B_{(25/50)}$	$B = (\ln R_1 - \ln R_2) / (1/T_1 - 1/T_2)^{***}$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