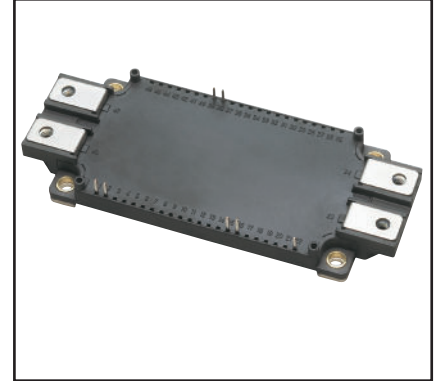
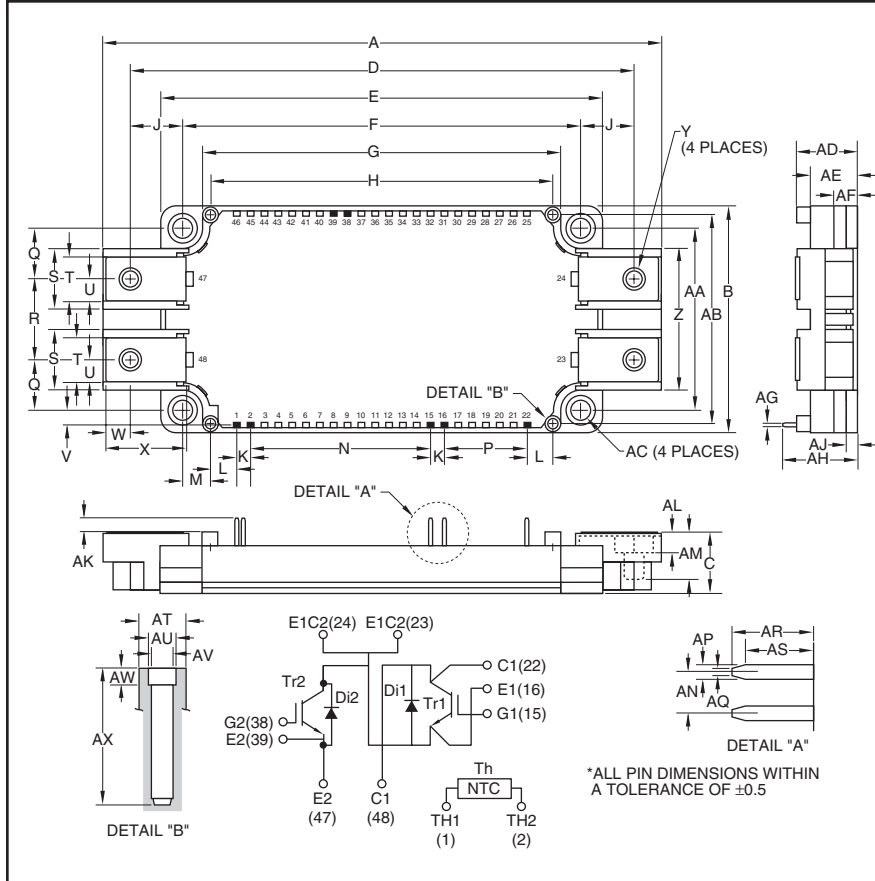


### Dual IGBTMOD™ NX-Series Module 150 Amperes/1200 Volts



#### Description:

Powerex IGBTMOD™ Modules are designed for use in switching applications. Each module consists of two IGBT Transistors in a half-bridge configuration with each transistor having a reverse-connected super-fast recovery free-wheel diode. 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. CM150DX-24A is a 1200V ( $V_{CES}$ ), 150 Ampere Dual IGBTMOD™ Power Module.

#### Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	5.98	152.0
B	2.44	62.0
C	0.67	17.0
D	5.39	137.0
E	4.79	121.7
F	4.33±0.02	110.0±0.5
G	3.89	99.0
H	3.72	94.5
J	0.53	13.5
K	0.15	3.8
L	0.28	7.25
M	0.30	7.75
N	1.95	49.54
P	0.9	22.86
Q	0.55	14.0
R	0.87	22.0
S	0.67	17.0
T	0.48	12.0
U	0.24	6.0
V	0.16	4.2
W	0.37	6.5
X	0.83	21.14
Y	M6	M6

Dimensions	Inches	Millimeters
Z	1.53	39.0
AA	1.97±0.02	50.0±0.5
AB	2.26	57.5
AC	0.22 Dia.	5.5 Dia.
AD	0.67+0.04/-0.02	17.0+1.0/-0.5
AE	0.51	13.0
AF	0.27	7.0
AG	0.03	0.8
AH	0.81	20.5
AJ	0.12	3.0
AK	0.14	3.5
AL	0.21	5.4
AM	0.49	12.5
AN	0.15	3.81
AP	0.05	1.15
AQ	0.025	0.65
AR	0.29	7.4
AS	0.24	6.2
AT	0.17 Dia.	4.3 Dia.
AU	0.10 Dia.	2.5 Dia.
AV	0.08 Dia.	2.1 Dia.
AW	0.06	1.5
AX	0.49	12.5

Type	Current Rating Amperes	$V_{CES}$ Volts (x 50)
CM	150	24

**CM150DX-24A**  
**Dual IGBTMOD™ NX-Series Module**  
 150 Amperes/1200 Volts

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

Characteristics	Symbol	CM150DX-24A	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, M6 Main Terminal Screws	—	40	in-lb
Module Weight (Typical)	—	330	Grams
Baseplate Flatness, On Centerline X, Y (See Below)	—	$\pm 0 \sim +100$	$\mu\text{m}$
Isolation Voltage, AC 1 minute, 60Hz Sinusoidal	$V_{ISO}$	2500	Volts

**Inverter Sector**

Collector-Emitter Voltage (G-E Short)	$V_{CES}$	1200	Volts
Gate-Emitter Voltage (C-E Short)	$V_{GES}$	$\pm 20$	Volts
Collector Current ( $T_C = 91^\circ\text{C}$ )*1	$I_C$	150	Amperes
Peak Collector Current (Pulse)*3	$I_{CM}$	300	Amperes
Emitter Current ( $T_C = 25^\circ\text{C}$ )*1*4	$I_E^{*2}$	150	Amperes
Peak Emitter Current (Pulse)*3	$I_{EM}^{*2}$	300	Amperes
Maximum Collector Dissipation ( $T_C = 25^\circ\text{C}$ )*1*4	$P_C$	960	Watts

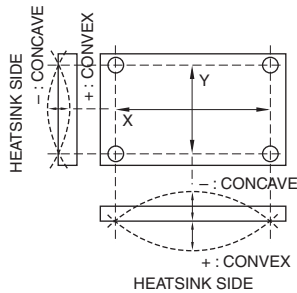
\*1 Case temperature ( $T_C$ ) and heatsink temperature ( $T_f$ ) are defined on the surface of the baseplate and heatsink at just under the chip.

\*2  $I_E$ ,  $I_{EM}$ ,  $V_{EC}$ ,  $t_{rr}$  and  $Q_{rr}$  represent ratings and characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

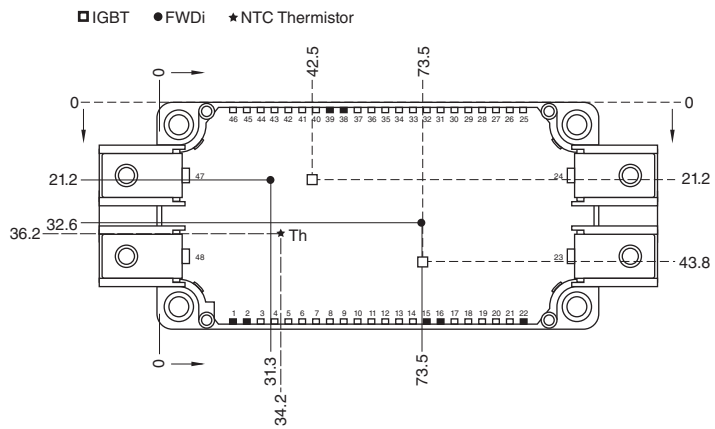
\*3 Pulse width and repetition rate should be such that device junction temperature ( $T_j$ ) does not exceed  $T_{j(max)}$  rating.

\*4 Junction temperature ( $T_j$ ) should not increase beyond  $T_{j(max)}$  rating.

**BASEPLATE FLATNESS MEASUREMENT POINT**



**CHIP LOCATION (TOP VIEW)**



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

**CM150DX-24A**  
**Dual IGBTMOD™ NX-Series Module**  
 150 Amperes/1200 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	$V_{GE(th)}$	$I_C = 15mA, V_{CE} = 10V$	6	7	8	Volts
Gate Leakage Current	$I_{GES}$	$V_{GE} = V_{GES}, V_{CE} = 0V$	—	—	0.5	$\mu A$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 150A, V_{GE} = 15V, T_j = 25^\circ\text{C}^{*5}$	—	2.0	2.6	Volts
		$I_C = 150A, V_{GE} = 15V, T_j = 125^\circ\text{C}^{*5}$	—	2.2	—	Volts
		$I_C = 150A, V_{GE} = 15V, \text{Chip}$	—	1.9	—	Volts
Input Capacitance	$C_{ies}$		—	—	23.0	nF
Output Capacitance	$C_{oes}$	$V_{CE} = 10V, V_{GE} = 0V$	—	—	2.0	nF
Reverse Transfer Capacitance	$C_{res}$		—	—	0.45	nF
Total Gate Charge	$Q_G$	$V_{CC} = 600V, I_C = 150A, V_{GE} = 15V$	—	675	—	nC
Inductive	Turn-on Delay Time	$t_{d(on)}$	—	—	130	ns
Load	Turn-on Rise Time	$t_r$	$V_{CC} = 600V, I_C = 150A,$		100	ns
Switch	Turn-off Delay Time	$t_{d(off)}$	$V_{GE} = \pm 15V,$		450	ns
Time	Turn-off Fall Time	$t_f$	$R_G = 2.2\Omega, I_E = 150A,$		600	ns
Reverse Recovery Time	$t_{rr}^{*2}$	Inductive Load Switching Operation	—	—	150	ns
Reverse Recovery Charge	$Q_{rr}^{*2}$		—	6	—	$\mu C$
Emitter-Collector Voltage	$V_{EC}^{*2}$	$I_E = 150A, V_{GE} = 0V, T_j = 25^\circ\text{C}^{*5}$	—	2.6	3.4	Volts
		$I_E = 150A, V_{GE} = 0V, T_j = 125^\circ\text{C}^{*5}$	—	2.16	—	Volts
		$I_E = 150A, V_{GE} = 0V, \text{Chip}$	—	2.5	—	Volts

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Module Lead Resistance	$R_{lead}$	Main Terminals-Chip (Per Switch)	—	1.6	—	m $\Omega$
Thermal Resistance, Junction to Case**	$R_{th(j-c)Q}$	Per IGBT <sup>*1</sup>	—	—	0.13	$^\circ\text{C}/W$
Thermal Resistance, Junction to Case**	$R_{th(j-c)D}$	Per FWDi <sup>*1</sup>	—	—	0.23	$^\circ\text{C}/W$
Contact Thermal Resistance**	$R_{th(c-f)}$	Case to Heatsink (Per 1 Module) Thermal Grease Applied <sup>*1*7</sup>	—	0.015	—	$^\circ\text{C}/W$
Internal Gate Resistance	$R_{Gint}$	$T_C = 25^\circ\text{C}$	—	0	—	$\Omega$
External Gate Resistance	$R_G$		2	—	21	$\Omega$

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Zero Power Resistance	$R_{TH}$	$T_C = 25^\circ\text{C}^{*1}$	4.85	5.00	5.15	k $\Omega$
Deviation of Resistance	$\Delta R/R$	$T_C = 100^\circ\text{C}, R_{100} = 493\Omega^{*1}$	-7.3	—	+7.8	%
B Constant	$B_{(25/50)}$	$B = (\ln R_1 - \ln R_2) / (1/T_1 - 1/T_2)^{*6}$	—	3375	—	K
Power Dissipation	$P_{25}$	$T_C = 25^\circ\text{C}^{*1}$	—	—	10	mW

\*\*Thermal resistance values are per 1 element.

\*1 Case temperature ( $T_C$ ) and heatsink temperature ( $T_f$ ) are defined on the surface of the baseplate and heatsink at just under the chip.

\*2  $I_E, I_{EM}, V_{EC}, t_{rr}$  and  $Q_{rr}$  represent ratings and characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

\*5 Pulse width and repetition rate should be such as to cause negligible temperature rise.

\*6  $R_1$ : Resistance at Absolute Temperature  $T_1(K)$ ,  $R_2$ : Resistance at Absolute Temperature  $T_2(K)$ ,  $T(K) = T(^\circ\text{C}) + 273.15$

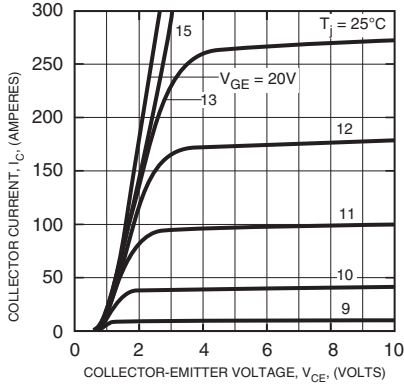
\*7 Typical value is measured by using thermally conductive grease of  $\lambda = 0.9 \text{ [W/(m} \cdot \text{K)]}$ .



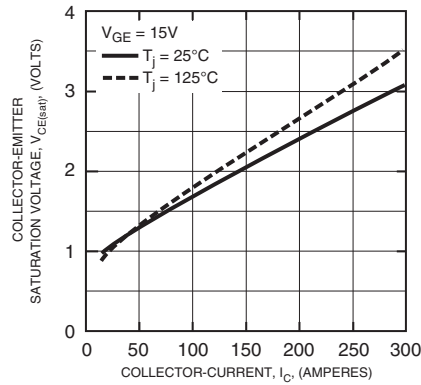
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**CM150DX-24A**  
**Dual IGBTMOD™ NX-Series Module**  
 150 Amperes/1200 Volts

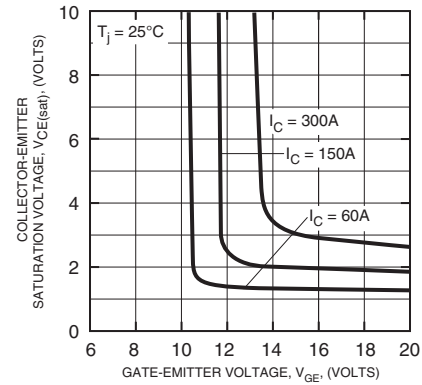
**OUTPUT CHARACTERISTICS (INVERTER PART - TYPICAL)**



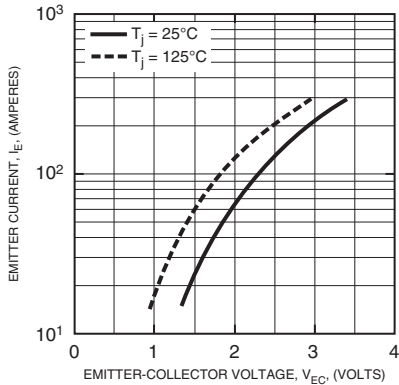
**COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (INVERTER PART - TYPICAL)**



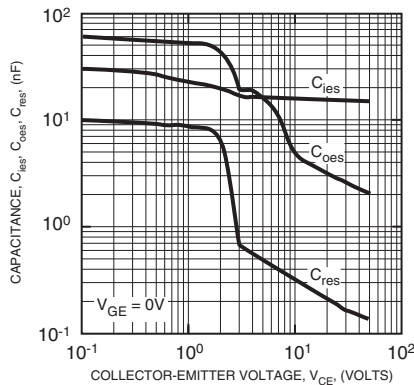
**COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (INVERTER PART - TYPICAL)**



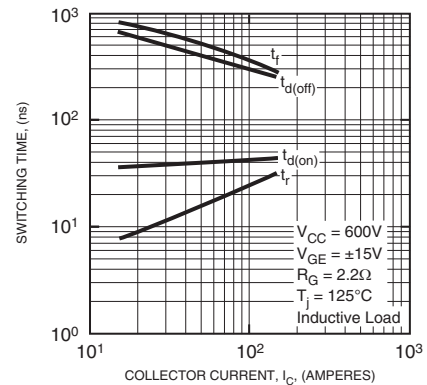
**FREE-WHEEL DIODE FORWARD CHARACTERISTICS (INVERTER PART - TYPICAL)**



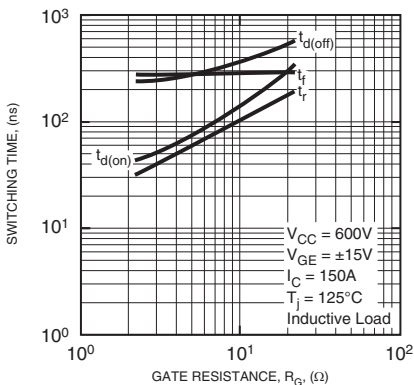
**CAPACITANCE VS.  $V_{CE}$  (INVERTER PART - TYPICAL)**



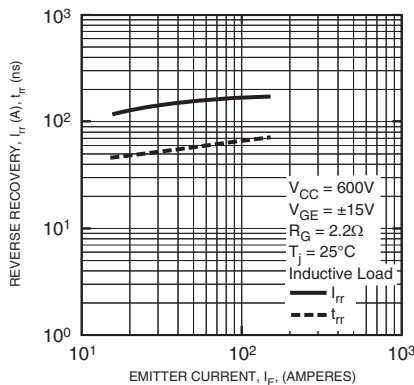
**HALF-BRIDGE SWITCHING CHARACTERISTICS (INVERTER PART - TYPICAL)**



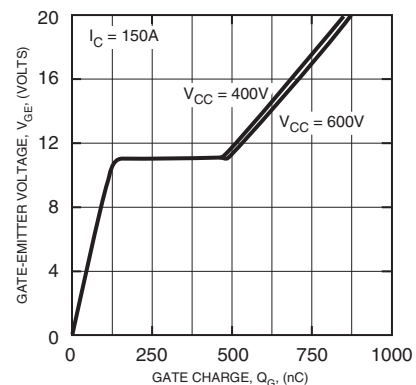
**SWITCHING TIME VS. GATE RESISTANCE (INVERTER PART - TYPICAL)**



**REVERSE RECOVERY CHARACTERISTICS (INVERTER PART - TYPICAL)**



**GATE CHARGE VS.  $V_{GE}$  (INVERTER PART)**





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