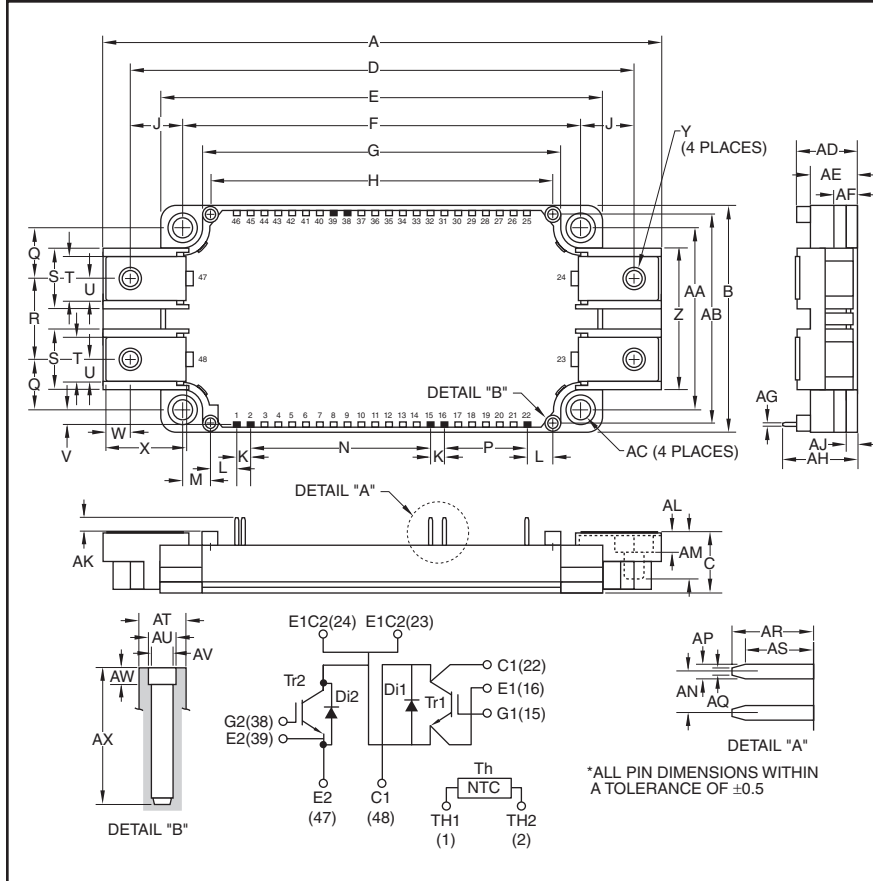


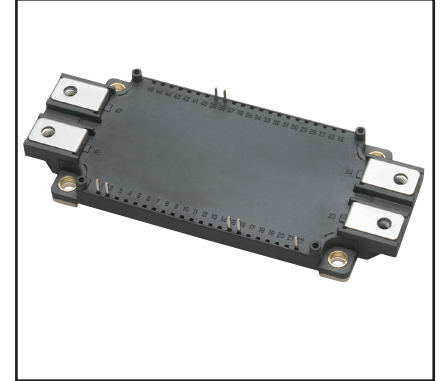
Dual IGBTMOD™ NX-Series Module 450 Amperes/1200 Volts



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



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. CM450DX-24A is a 1200V (V_{CES}), 450 Ampere Dual IGBTMOD™ Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	450	24

CM450DX-24A
Dual IGBTMOD™ NX-Series Module
 450 Amperes/1200 Volts

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

Characteristics	Symbol	CM450DX-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
Isolation Voltage, AC 1 minute, 60Hz Sinusoidal	V_{ISO}	2500	Volts

Inverter Sector

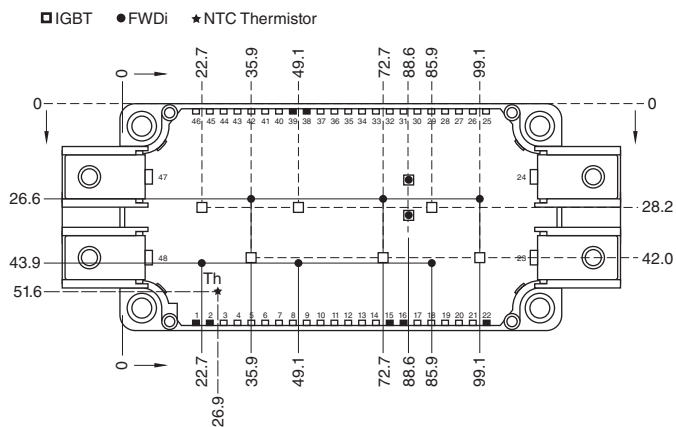
Collector-Emitter Voltage (G-E Short)	V_{CES}	1200	Volts
Gate-Emitter Voltage (C-E Short)	V_{GES}	± 20	Volts
Collector Current ($T_C = 90^\circ\text{C}$)*	I_C	450	Amperes
Peak Collector Current**	I_{CM}	900	Amperes
Emitter Current ($T_C = 25^\circ\text{C}$, $T_j < 150^\circ\text{C}$)*	I_E^{***}	450	Amperes
Peak Emitter Current ($T_j < 150^\circ\text{C}$)**	I_{EM}^{***}	900	Amperes
Maximum Collector Dissipation ($T_C = 25^\circ\text{C}$, $T_j < 150^\circ\text{C}$)*	P_C	2840	Watts

* 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).

CHIP LOCATION (TOP VIEW)



CM450DX-24A
Dual IGBTMOD™ NX-Series Module
 450 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	$V_{GE(th)}$	$I_C = 45mA, V_{CE} = 10V$	6	7	8	Volts
Gate Leakage Current	I_{GES}	$V_{GE} = V_{GES}, V_{CE} = 0V$	—	—	0.5	μA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 450A, V_{GE} = 15V, T_j = 25^\circ\text{C}$	—	2.0	2.6	Volts
		$I_C = 450A, V_{GE} = 15V, T_j = 125^\circ\text{C}$	—	2.2	—	Volts
		$I_C = 450A, V_{GE} = 15V, \text{Chip}$	—	1.9	—	Volts
Input Capacitance	C_{ies}	$V_{CE} = 10V, V_{GE} = 0V$	—	—	68.0	nF
Output Capacitance	C_{oes}		—	—	5.9	nF
Reverse Transfer Capacitance	C_{res}		—	—	1.4	nF
Total Gate Charge	Q_G	$V_{CC} = 600V, I_C = 450A, V_{GE} = 15V$	—	2000	—	nC
Inductive	Turn-on Delay Time	$V_{CC} = 600V, I_C = 450A, V_{GE} = \pm 15V, R_G = 1.0\Omega, I_E = 450A,$	—	—	650	ns
Load	Turn-on Rise Time		—	—	250	ns
Switch	Turn-off Delay Time		—	—	700	ns
Time	Turn-off Fall Time		—	—	600	ns
Reverse Recovery Time*	t_{rr}	Inductive Load Switching Operation	—	—	250	ns
Reverse Recovery Charge*	Q_{rr}		—	14	—	μC
Emitter-Collector Voltage*	V_{EC}	$I_E = 450A, V_{GE} = 0V$	—	2.6	3.4	Volts
		$I_E = 450A, V_{GE} = 0V, \text{Chip}$	—	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)	—	0.8	—	m Ω
Thermal Resistance, Junction to Case**	$R_{th(j-c)Q}$	Per IGBT	—	—	0.044	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case**	$R_{th(j-c)D}$	Per FWDi	—	—	0.078	$^\circ\text{C/W}$
Contact Thermal Resistance**	$R_{th(c-f)}$	Thermal Grease Applied	—	0.015	—	$^\circ\text{C/W}$
Internal Gate Resistance	R_{Gint}	$T_C = 25^\circ\text{C}$	1.4	2.0	2.6	Ω
		$T_C = 125^\circ\text{C}$	2.8	3.0	5.2	Ω
External Gate Resistance	R_G		0.68	—	6.8	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_f measured point is just under the chips.

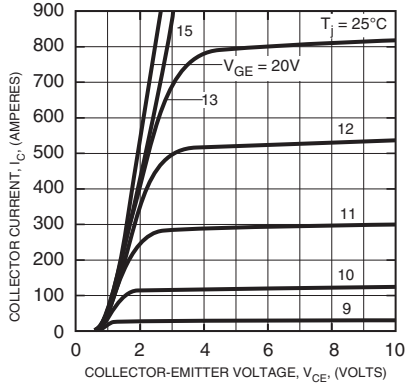
*** R_1 : Resistance at Absolute Temperature $T_1(K)$, R_2 : Resistance at Absolute Temperature $T_2(K)$, $T(K) = T(^{\circ}\text{C}) + 273.15$

CM450DX-24A

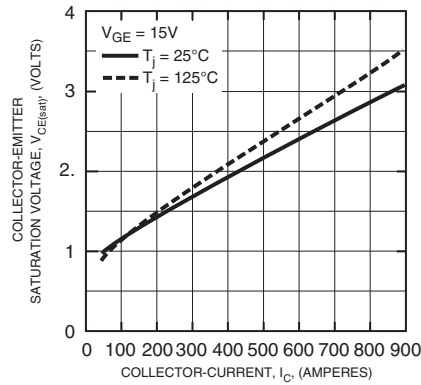
Dual IGBTMOD™ NX-Series Module

450 Amperes/1200 Volts

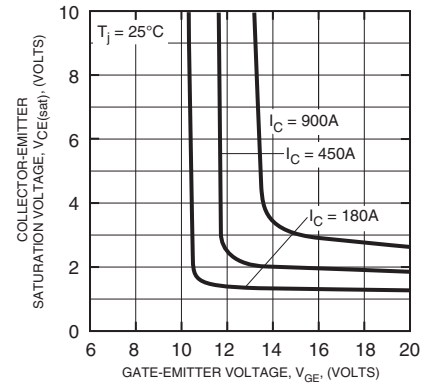
OUTPUT CHARACTERISTICS
(INVERTER PART - TYPICAL)



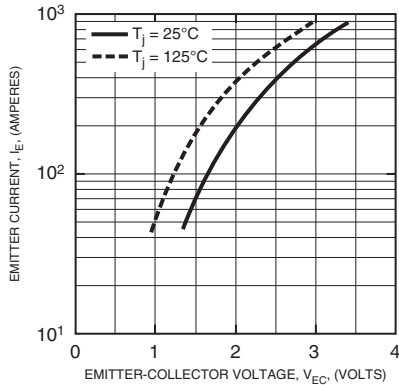
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS
(INVERTER PART - TYPICAL)



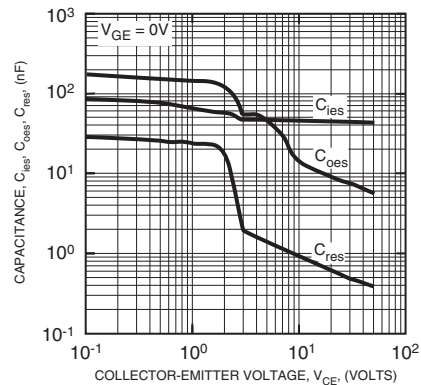
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS
(INVERTER PART - TYPICAL)



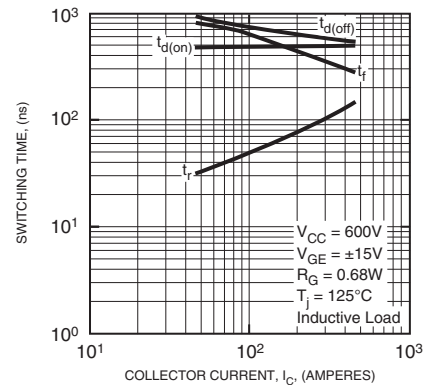
FREE-WHEEL DIODE FORWARD CHARACTERISTICS
(INVERTER PART - TYPICAL)



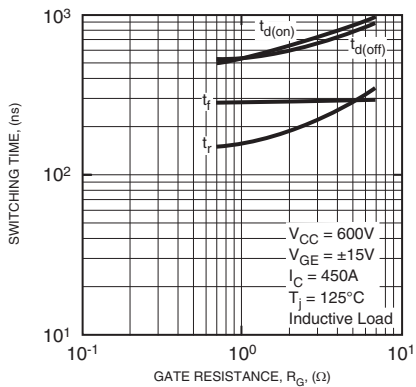
CAPACITANCE VS. V_{CE}
(INVERTER PART - TYPICAL)



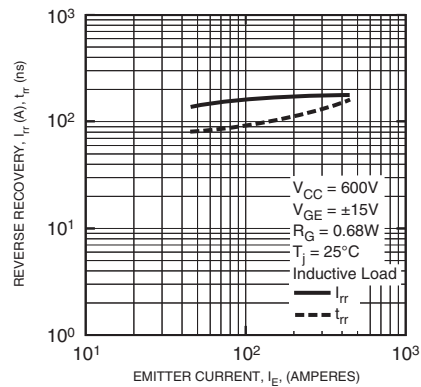
HALF-BRIDGE SWITCHING CHARACTERISTICS
(INVERTER PART - TYPICAL)



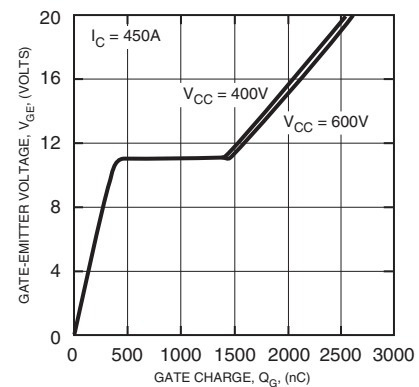
SWITCHING TIME VS. GATE RESISTANCE
(INVERTER PART - TYPICAL)



REVERSE RECOVERY CHARACTERISTICS
(INVERTER PART - TYPICAL)



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



CM450DX-24A

Dual IGBTMOD™ NX-Series Module

450 Amperes/1200 Volts

