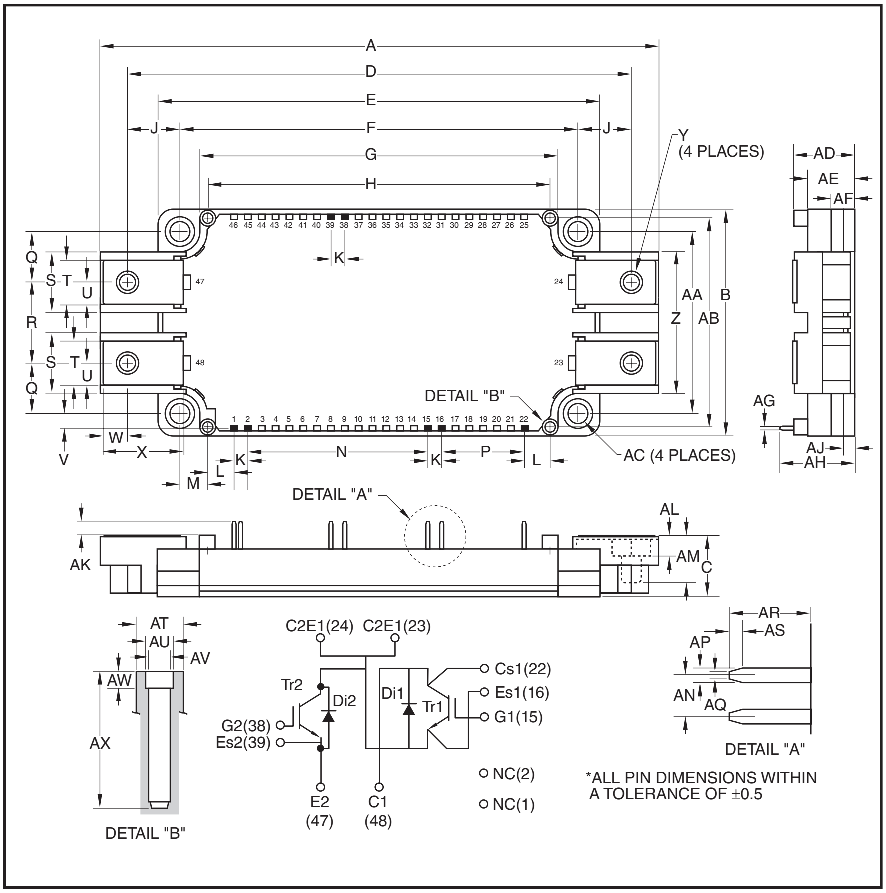
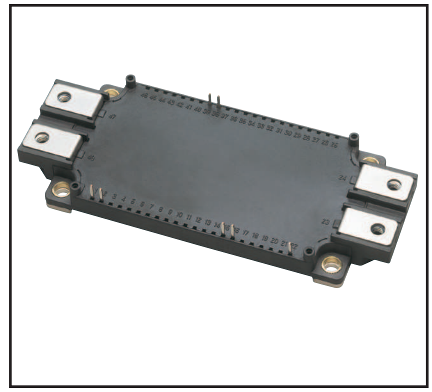
Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272
www.pwrx.com

Dual IGBTMOD™ NX-Series Module

300 Amperes/1200 Volts





Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	5.98	152.0
B	2.44	62.0
C	0.67+0.04/-0.02	17.0+1.0/-0.5
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	3.81
L	0.28	7.25
M	0.30	7.75
N	1.95	49.53
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	0.05	1.2
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 high frequency applications; 30 kHz for hard switching applications and 60 to 70 kHz for soft 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. CM300DX1-24NFJ is a 1200V (V_{CES}), 300 Ampere Dual IGBTMOD™ Power Module.

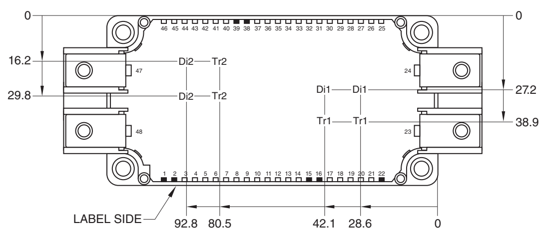
Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	300	24

CM300DX1-24NFJ
Dual IGBTMOD™ NX-Series Module
300 Amperes/1200 Volts

Absolute Maximum Ratings, T_j = 25°C unless otherwise specified

Characteristics	Symbol	Rating	Units
Collector-Emitter Voltage (G-E Short-circuited)	V_{CES}	1200	Volts
Gate-Emitter Voltage (C-E Short-circuited)	V_{GES}	±20	Volts
Collector Current (Operation)*4	I_C	300	Amperes
Collector Current (Pulse)*3	I_{CRM}	600	Amperes
Total Power Dissipation (T_C = 25°C)*2,*4	P_{tot}	1890	Watts
Emitter Current (Operation)*4	I_E*1	300	Amperes
Emitter Current (Pulse)*3	I_{ERM}*1	600	Amperes
Junction Temperature	T_j	-40 to 150	°C
Storage Temperature	T_{stg}	-40 to 125	°C
Isolation Voltage (Terminals to Baseplate, f = 60Hz, AC 1 minute)	V_{ISO}	2500	V_{rms}

*1 Represent ratings and characteristics of the anti-parallel, emitter-to-collector free wheeling diode (FWDi).
*2 Case temperature (T_C) and heatsink temperature (T_f) measured point is just under the chips.



Each mark points to the center position of each chip.

Tr1 / Tr2: IGBT Di1 / Di2: 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 maximum junction temperature ($T_{j(max)}$) rating.

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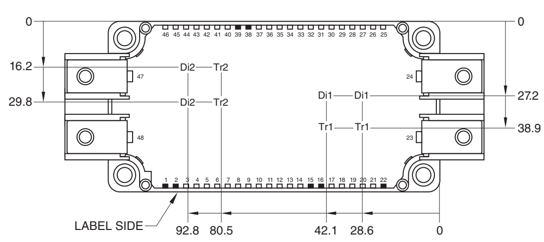
Electrical and Mechanical Characteristics, T_j = 25°C unless otherwise specified

Inverter Sector

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector-Emitter Cutoff Current	I_{CES}	$V_{CE} = V_{CES}$, V_{GE} = 0V	—	—	1	mA
Gate-Emitter Leakage Current	I_{GES}	$\pm V_{GE} = V_{GES}$, V_{CE} = 0V	—	—	1	μA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	I_C = 30mA, V_{CE} = 10V	4.5	6.0	7.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 300A, V_{GE} = 15V, T_j = 25°C*5	—	5.0	6.5	Volts
		I_C = 300A, V_{GE} = 15V, T_j = 125°C*5	—	5.0	—	Volts
Input Capacitance	C_{ies}	V_{CE} = 10V , V_{GE} = 0V	—	—	47	nF
Output Capacitance	C_{oes}		—	—	5.6	nF
Reverse Transfer Capacitance	C_{res}		—	—	1.1	nF
Gate Charge	Q_G	V_{CC} = 600V, I_C = 300A, V_{GE} = 15V	—	1360	—	nC
Turn-on Delay Time	$t_{d(on)}$	V_{CC} = 600V, I_C = 300A,	—	—	300	ns
Rise Time	t_r	V_{GE} = ±15V, R_G = 1.0Ω,	—	—	80	ns
Turn-off Delay Time	$t_{d(off)}$	Inductive Load	—	—	500	ns
Fall Time	t_f		—	—	150	ns
Emitter-Collector Voltage	V_{EC}*1	I_E = 300A, V_{GE} = 0V, T_j = 25°C*5	—	5.0	6.5	Volts
		I_E = 300A, V_{GE} = 0V, T_j = 125°C*5	—	3.0	—	Volts
Reverse Recovery Time	t_{rr}*1	V_{CC} = 600V, I_E = 300A, V_{GE} = ±15V,	—	—	150	ns
Reverse Recovery Charge	Q_{rr}*1	R_G = 1.0Ω, Inductive Load	—	6.5	—	μC
Internal Lead Resistance	$R_{CC' + EE'}$	Main Terminals-Chip, Per Switch, T_C = 25°C*2	—	—	—	mΩ
Internal Gate Resistance	r_g	T_C = 25°C, per Switch*2	0.56	0.8	1.04	Ω
		T_C = 125°C, per Switch*2	1.12	1.6	2.08	Ω
External Gate Resistance	R_G	Per Switch	1.0	—	10	Ω

*1 Represent ratings and characteristics of the anti-parallel, emitter-to-collector free wheeling diode (FWDi).
*2 Case temperature (T_C) and heatsink temperature (T_f) measured point is just under the chips.



Each mark points to the center position of each chip.
Tr1 / Tr2: IGBT Di1 / Di2: FWDi

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

Thermal Characteristics

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case	$R_{th(j-c)}Q$	Per IGBT Part*2	—	—	0.066	K/W
Thermal Resistance, Junction to Case	$R_{th(j-c)}D$	Per FWDi Part*2	—	—	0.093	K/W
Contact Thermal Resistance	$R_{th(c-s)}$	Per 1 Module*2,*6	—	0.015	—	K/W
(Case to Heatsink)		Thermal Grease Applied				

Mechanical Characteristics

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Mounting Torque	M_t	Main Terminals, M6 Screw	31	35	40	in-lb
	M_s	Mounting to Heatsink, M5 Screw	22	27	31	in-lb
Weight	m		—	330	—	Grams
Flatness of Baseplate	e_c	On Centerline X, Y*7	±0	—	±100	µm

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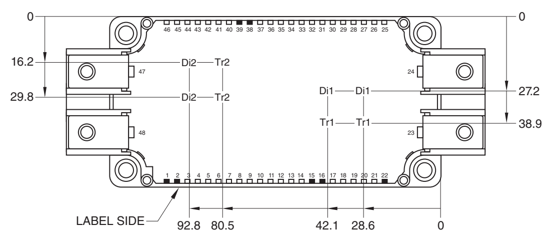
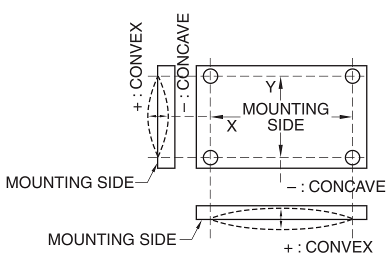


Each mark points to the center position of each chip.

Tr1 / Tr2: IGBT Di1 / Di2: FWDi

*6 Typical value is measured by using thermally conductive grease of λ = 0.9 [W/(m • K)].
*7 Baseplate (mounting side) flatness measurement points (X, Y) are shown in the figure below.



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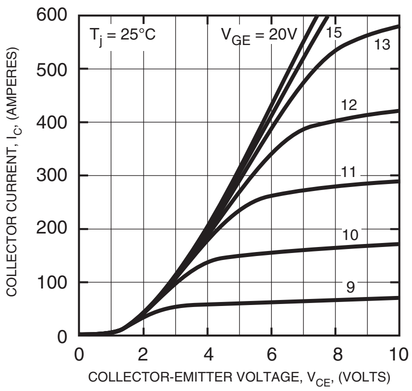
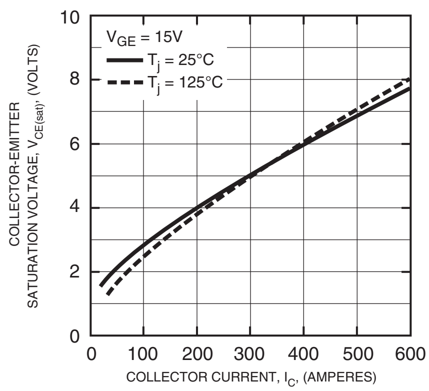
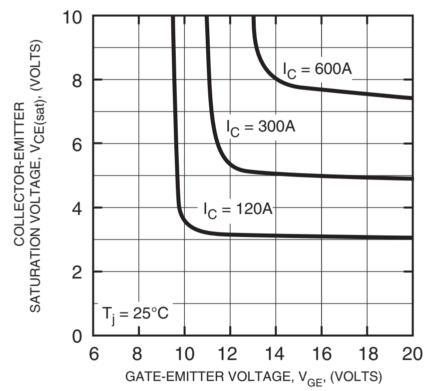
OUTPUT CHARACTERISTICS (TYPICAL)



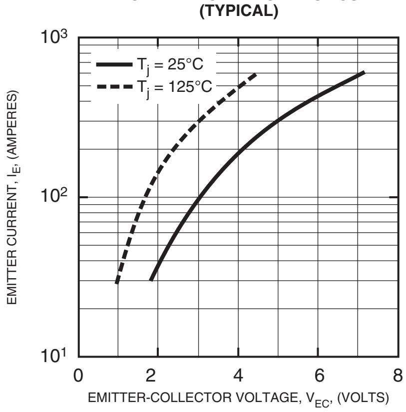
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



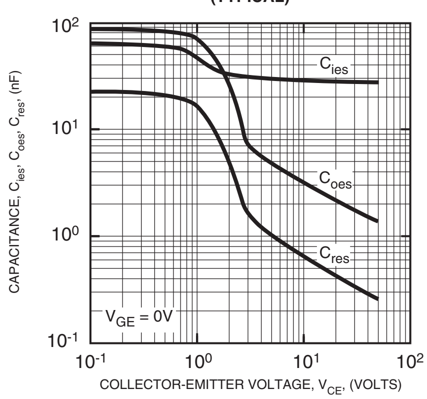
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



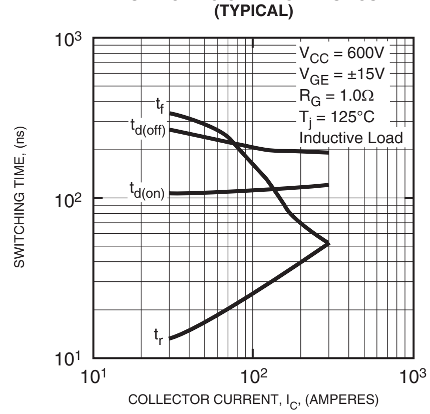
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



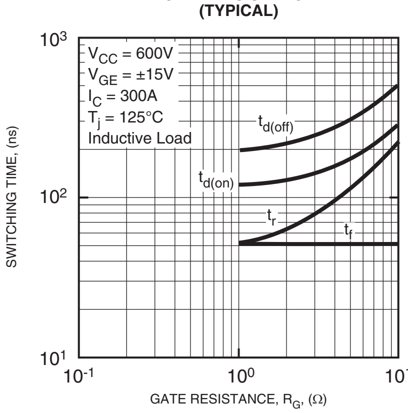
CAPACITANCE VS. V_{CE} (TYPICAL)



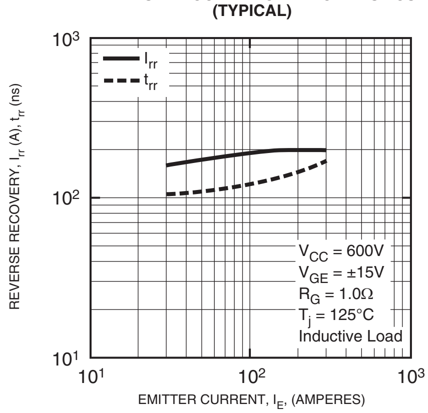
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



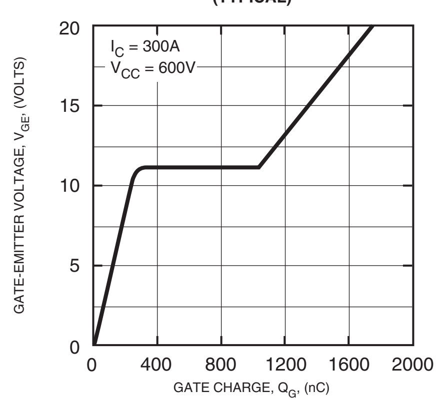
SWITCHING TIME VS. GATE RESISTANCE (TYPICAL)



REVERSE RECOVERY CHARACTERISTICS (TYPICAL)



GATE CHARGE VS. V_{GE} (TYPICAL)



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