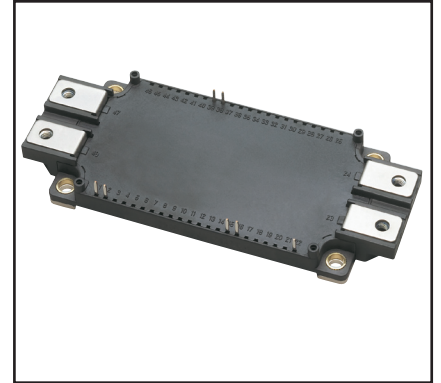
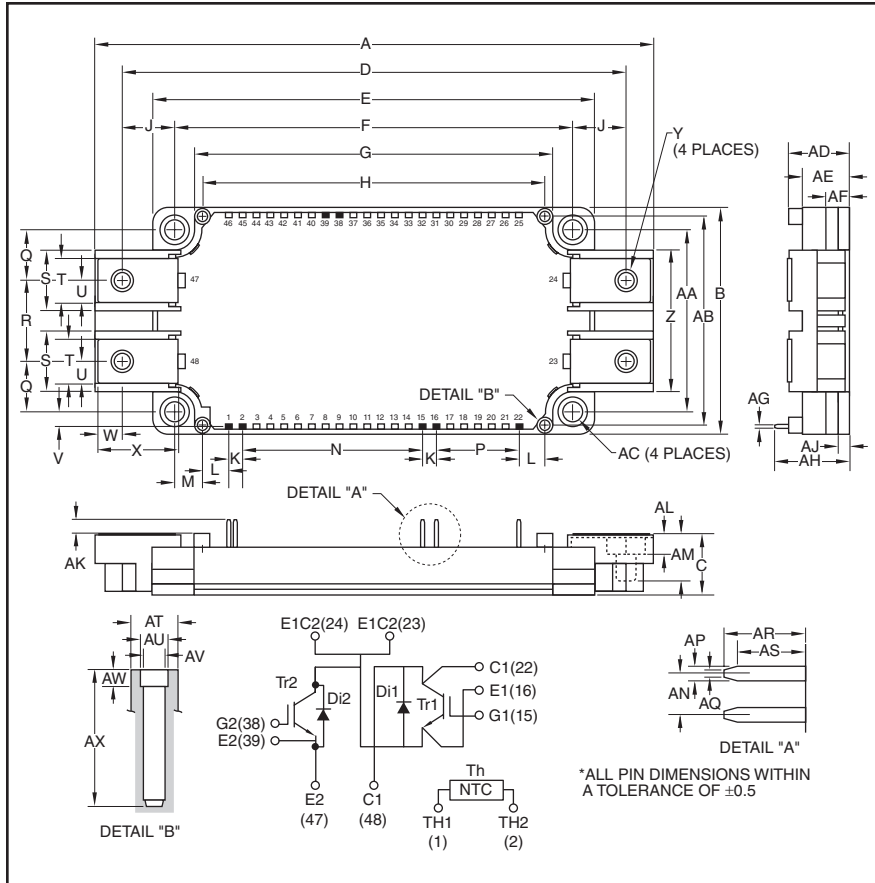


### Dual IGBTMOD™ NX-Series Module 300 Amperes/1200 Volts



#### 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. CM300DX-24A is a 1200V ( $V_{CES}$ ), 300 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<br>Amperes | $V_{CES}$<br>Volts (x 50) |
|------|---------------------------|---------------------------|
| CM   | 300                       | 24                        |

**CM300DX-24A**  
**Dual IGBTMOD™ NX-Series Module**  
 300 Amperes/1200 Volts

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

| Characteristics                                 | Symbol           | CM300DX-24A | 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            |
| Mounting Torque, M6 Main Terminal Screws        | —                | 40          | in-lb            |
| Module Weight (Typical)                         | —                | 330         | Grams            |
| Isolation Voltage, AC 1 minute, 60Hz Sinusoidal | $V_{\text{ISO}}$ | 2500        | Volts            |

**Inverter Sector**

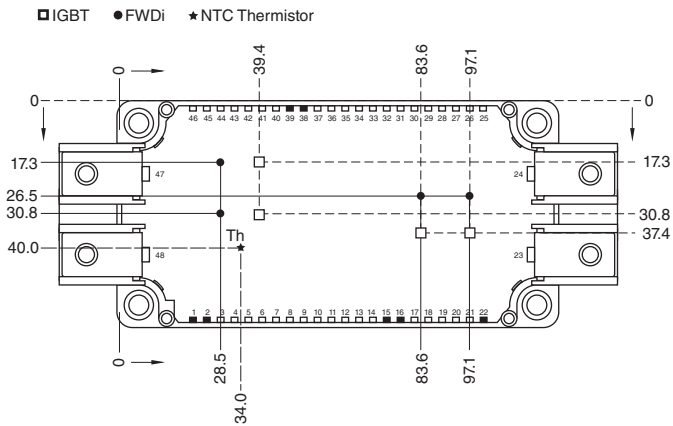
|   |                       |          |         |
|---|-----------------------|----------|---------|
| Collector-Emitter Voltage (G-E Short)   | $V_{\text{CES}}$      | 1200     | Volts   |
| Gate-Emitter Voltage (C-E Short)  | $V_{\text{GES}}$      | $\pm 20$ | Volts   |
| Collector Current ( $T_C = 90^\circ\text{C}$ )*   | $I_C$                 | 300      | Amperes |
| Peak Collector Current**  | $I_{\text{CM}}$       | 600      | Amperes |
| Emitter Current ( $T_C = 25^\circ\text{C}$ , $T_j < 150^\circ\text{C}$ )*               | $I_E^{***}$           | 300      | Amperes |
| Peak Emitter Current ( $T_j < 150^\circ\text{C}$ **)                                    | $I_{\text{EM}}^{***}$ | 600      | Amperes |
| Maximum Collector Dissipation ( $T_C = 25^\circ\text{C}$ , $T_j < 150^\circ\text{C}$ )* | $P_C$                 | 1890     | 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)**



**CM300DX-24A**  
**Dual IGBTMOD™ NX-Series Module**  
 300 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       | $V_{GE(th)}$        | $I_C = 30mA, V_{CE} = 10V$                          | 6                              | 7    | 8    | Volts   |
| Gate Leakage Current                 | $I_{GES}$           | $V_{GE} = V_{GES}, V_{CE} = 0V$                     | —                              | —    | 0.5  | $\mu A$ |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$       | $I_C = 300A, V_{GE} = 15V, T_j = 25^\circ\text{C}$  | —                              | 2.0  | 2.6  | Volts   |
|                                      |                     | $I_C = 300A, V_{GE} = 15V, T_j = 125^\circ\text{C}$ | —                              | 2.2  | —    | Volts   |
|                                      |                     | $I_C = 300A, V_{GE} = 15V, \text{Chip}$             | —                              | 1.9  | —    | Volts   |
| Input Capacitance                    | $C_{ies}$           |   | —                              | —    | 47.0 | nF      |
| Output Capacitance                   | $C_{oes}$           | $V_{CE} = 10V, V_{GE} = 0V$                         | —                              | —    | 4.0  | nF      |
| Reverse Transfer Capacitance         | $C_{res}$           |   | —                              | —    | 0.9  | nF      |
| Total Gate Charge                    | $Q_G$               | $V_{CC} = 600V, I_C = 300A, V_{GE} = 15V$           | —                              | 1350 | —    | nC      |
| Inductive                            | Turn-on Delay Time  | $t_{d(on)}$   | —                              | —    | 550  | ns      |
| Load                                 | Turn-on Rise Time   | $t_r$   | $V_{CC} = 600V, I_C = 300A,$   |      | 180  | ns      |
| Switch                               | Turn-off Delay Time | $t_{d(off)}$  | $V_{GE} = \pm 15V,$            |      | 600  | ns      |
| Time                                 | Turn-off Fall Time  | $t_f$   | $R_G = 1.0\Omega, I_E = 300A,$ |      | 600  | ns      |
| Reverse Recovery Time*               | $t_{rr}$            | Inductive Load Switching Operation                  | —                              | —    | 250  | ns      |
| Reverse Recovery Charge*             | $Q_{rr}$            |   | —                              | 8.0  | —    | $\mu C$ |
| Emitter-Collector Voltage*           | $V_{EC}$            | $I_E = 300A, V_{GE} = 0V$                           | —                              | 2.6  | 3.4  | Volts   |
|                                      |                     | $I_E = 300A, V_{GE} = 0V, \text{Chip}$              | —                              | 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) | —    | 1.2   | —     | m $\Omega$         |
| Thermal Resistance, Junction to Case** | $R_{th(j-c)Q}$ | Per IGBT                         | —    | —     | 0.066 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Case** | $R_{th(j-c)D}$ | Per FWDi                         | —    | —     | 0.12  | $^\circ\text{C/W}$ |
| Contact Thermal Resistance**           | $R_{th(c-f)}$  | Thermal Grease Applied           | —    | 0.015 | —     | $^\circ\text{C/W}$ |
| Internal Gate Resistance               | $R_{Gint}$     | $T_C = 25^\circ\text{C}$         | 2.1  | 3.0   | 3.9   | $\Omega$           |
|  |                | $T_C = 125^\circ\text{C}$        | 4.2  | 6.0   | 7.8   | $\Omega$           |
| External Gate Resistance               | $R_G$          |                                  | 1.0  | —     | 10    | $\Omega$           |

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

| Characteristics         | Symbol        | Test Conditions  | Min. | Typ. | Max. | Units      |
|-------------------------|---------------|--|------|------|------|------------|
| Zero Power Resistance   | $R$           | $T_C = 25^\circ\text{C}$   | 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              | $B_{(25/50)}$ | $B_{(25/50)} = \ln(R_{25} / R_{50}) / (1/T_{25} - 1/T_{50})^{***}$ | —    | 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.

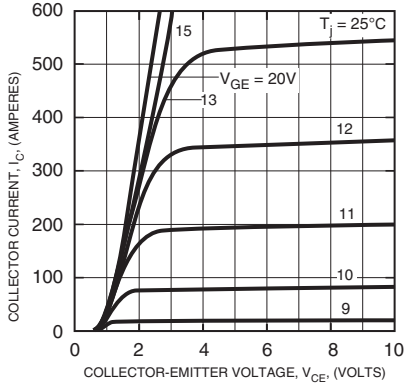
\*\*\* $R_{25}$ : Resistance at Absolute Temperature  $T_{25}(K)$ ,  $R_{50}$ : Resistance at Absolute Temperature  $T_{50}(K)$ ,  
 $T_{25} = 25(^\circ\text{C}) + 273.15 = 298.15(K)$ ,  $T_{50} = 50(^\circ\text{C}) + 273.15 = 323.15(K)$



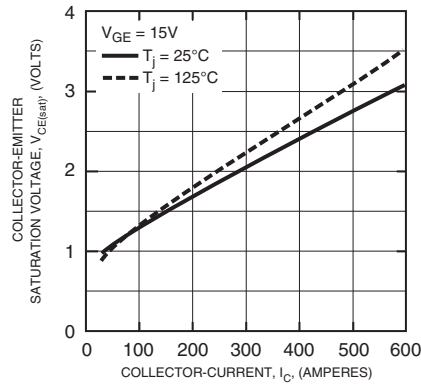
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**CM300DX-24A**  
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 300 Amperes/1200 Volts

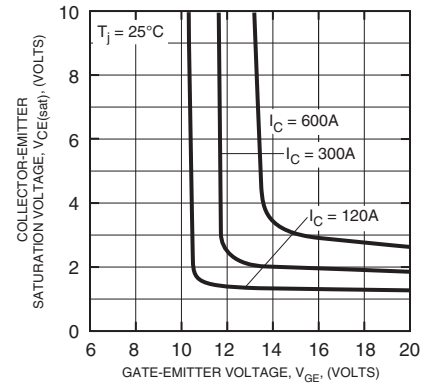
**OUTPUT CHARACTERISTICS**  
(INVERTER PART - TYPICAL)



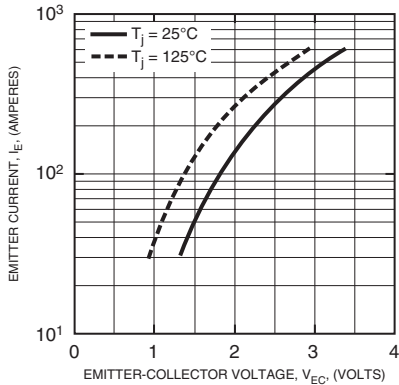
**COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS**  
(INVERTER PART - TYPICAL)



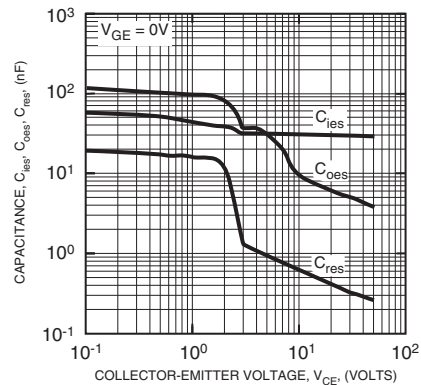
**COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS**  
(INVERTER PART - TYPICAL)



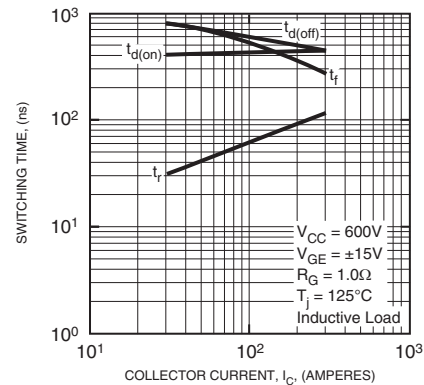
**FREE-WHEEL DIODE FORWARD CHARACTERISTICS**  
(INVERTER PART - TYPICAL)



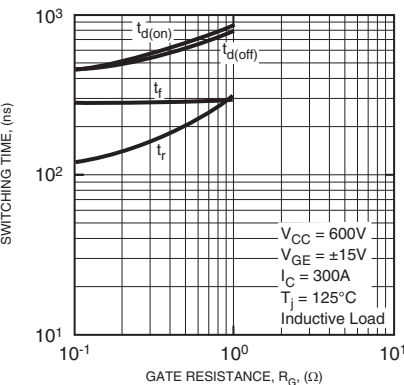
**CAPACITANCE VS. VCE**  
(INVERTER PART - TYPICAL)



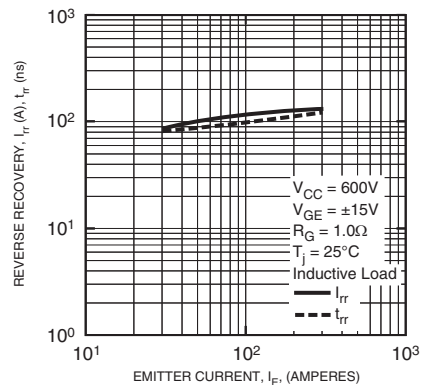
**HALF-BRIDGE SWITCHING CHARACTERISTICS**  
(INVERTER PART - TYPICAL)



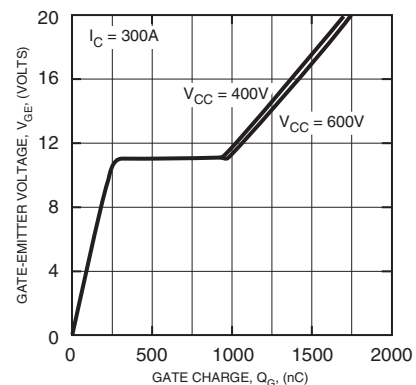
**SWITCHING TIME VS. GATE RESISTANCE**  
(INVERTER PART - TYPICAL)



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



**GATE CHARGE VS. VGE**  
(INVERTER PART)





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