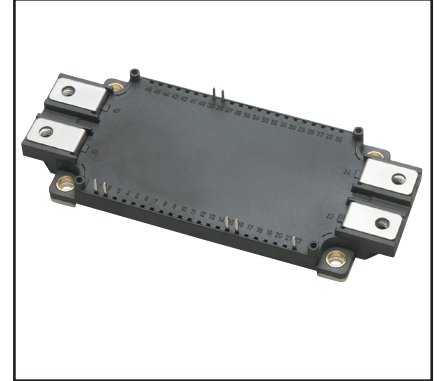
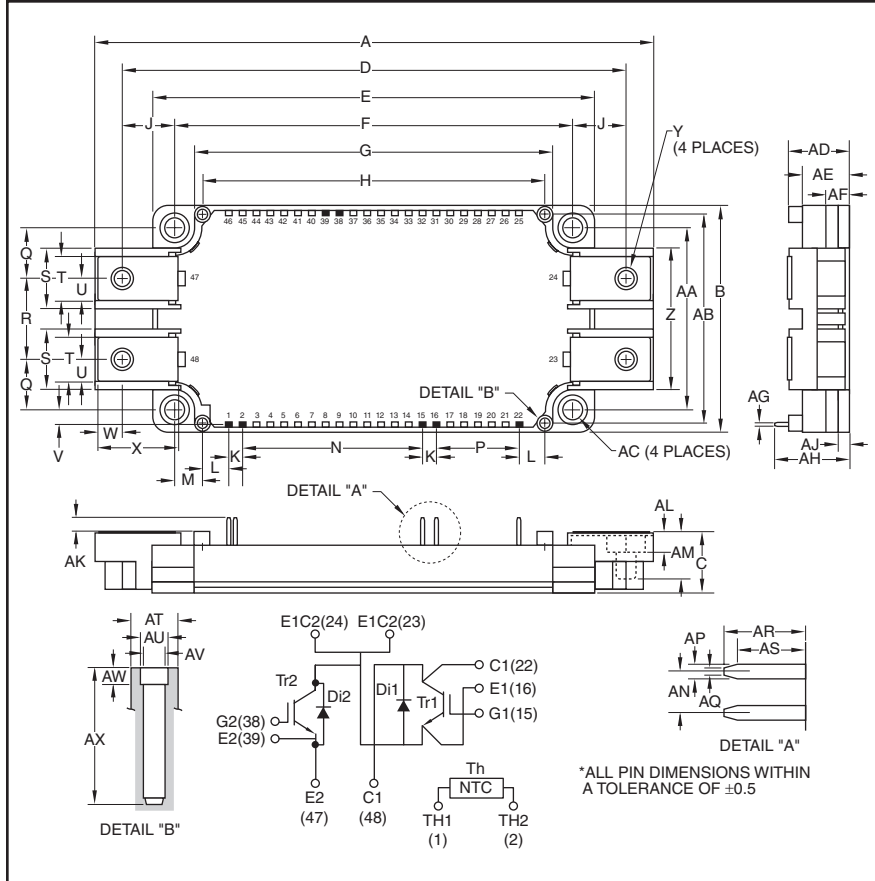


Dual IGBTMOD™ NX-Series Module 300 Amperes/1200 Volts



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:

- AISiC Baseplate
- 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

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 |

QID1230015
Dual IGBTMOD™ NX-Series Module
 300 Amperes/1200 Volts

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

| Characteristics | Symbol | QID1230015 | Units |
|---|------------------|------------|------------------|
| Power Device Junction Temperature | T_j | -40 to 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | -55 to 130 | $^\circ\text{C}$ |
| Mounting Torque, M5 Mounting Screws | — | 31 | in-lb |
| Mounting Torque, M6 Main Terminal Screws | — | 40 | in-lb |
| Module Weight (Typical) | — | 220 | Grams |
| Isolation Voltage, AC 1 minute, 60Hz Sinusoidal | V_{ISO} | 2500 | Volts |

Inverter Sector

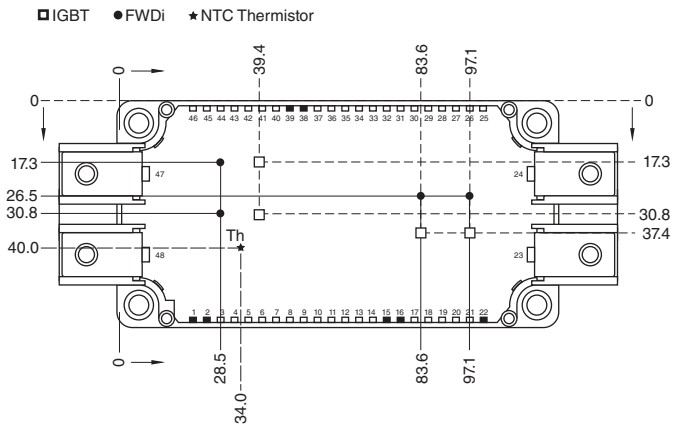
| | | | |
|---|-----------------------|----------|---------|
| Collector-Emitter Voltage (G-E Short) | V_{CES} | 1200 | Volts |
| Gate-Emitter Voltage (C-E Short) | V_{GES} | ± 20 | Volts |
| Collector Current ($T_C = 90^\circ\text{C}$)* | I_C | 300 | Amperes |
| Peak Collector Current** | I_{CM} | 600 | 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_{EM}^{***} | 600 | Amperes |
| Maximum Collector Dissipation ($T_C = 25^\circ\text{C}$, $T_j < 150^\circ\text{C}$)* | P_C | 1580 | 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)



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

QID1230015

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 | μA |
| 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 | — | μC |
| 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 Ω |
| Thermal Resistance, Junction to Case** | $R_{th(j-c)Q}$ | Per IGBT | — | — | 0.079 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Case** | $R_{th(j-c)D}$ | Per FWDi | — | — | 0.144 | $^\circ\text{C/W}$ |
| 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 | Ω |
| | | $T_C = 125^\circ\text{C}$ | 4.2 | 6.0 | 7.8 | Ω |
| External Gate Resistance | R_G | | 1.0 | — | 10 | 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 | $B_{(25/50)}$ | $B_{(25/50)} = \ln(R_{25} / R_{50}) / (1/T_{25} - 1/T_{50})^{***}$ | — | 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).

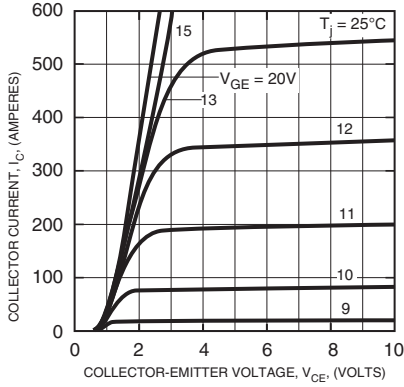
** T_C, T_f measured point is just under the chips.

*** R_{25} : Resistance at Absolute Temperature $T_{25}(K)$, R_{50} : Resistance at Absolute Temperature $T_{50}(K)$,

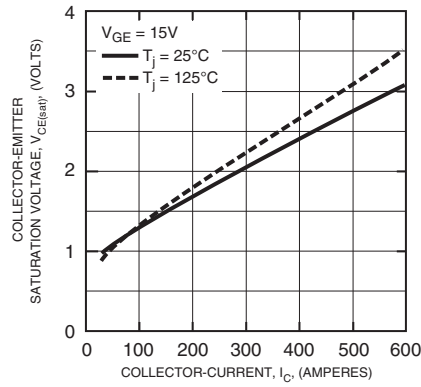
$T_{25} = 25(^\circ\text{C}) + 273.15 = 298.15(K)$, $T_{50} = 50(^\circ\text{C}) + 273.15 = 323.15(K)$

QID1230015
Dual IGBTMOD™ NX-Series Module
 300 Amperes/1200 Volts

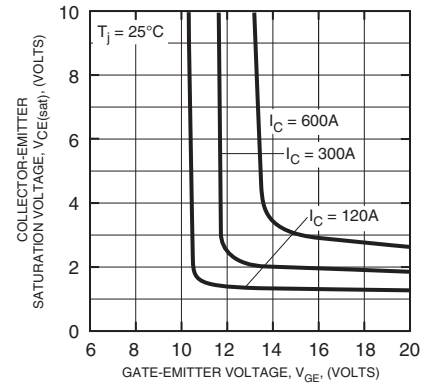
OUTPUT CHARACTERISTICS (INVERTER PART - TYPICAL)



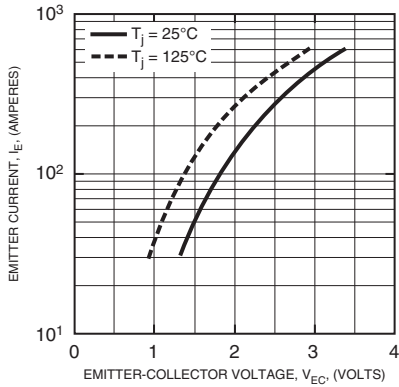
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (INVERTER PART - TYPICAL)



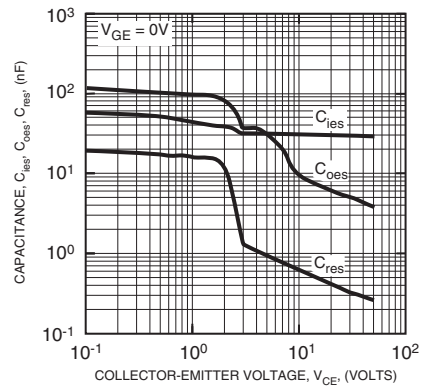
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (INVERTER PART - TYPICAL)



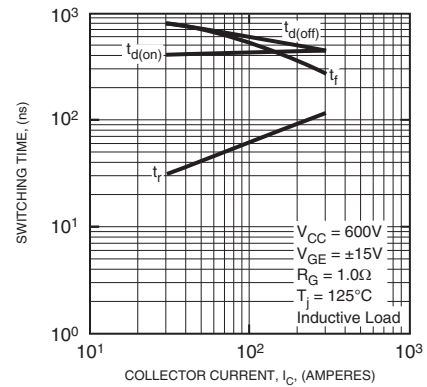
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (INVERTER PART - TYPICAL)



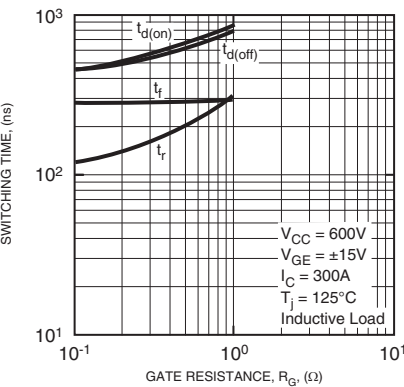
CAPACITANCE VS. VCE (INVERTER PART - TYPICAL)



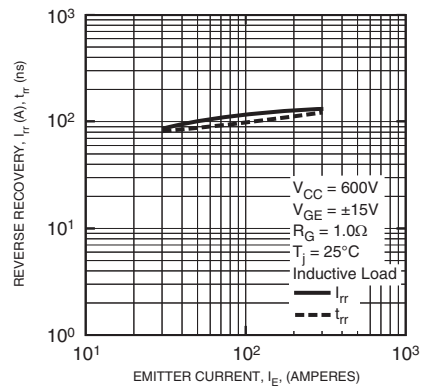
HALF-BRIDGE SWITCHING CHARACTERISTICS (INVERTER PART - TYPICAL)



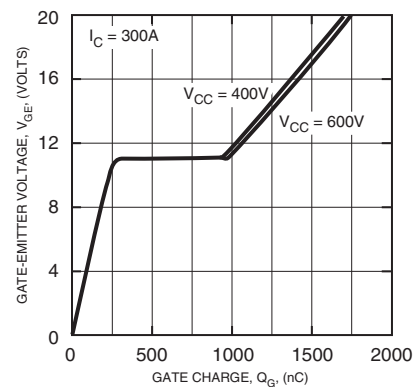
SWITCHING TIME VS. GATE RESISTANCE (INVERTER PART - TYPICAL)



REVERSE RECOVERY CHARACTERISTICS (INVERTER PART - TYPICAL)



GATE CHARGE VS. VGE (INVERTER PART)





QID1230015

Dual IGBTMOD™ NX-Series Module

300 Amperes/1200 Volts

