

# NXH160T120L2Q1PG, NXH160T120L2Q1SG

## Q1PACK Module

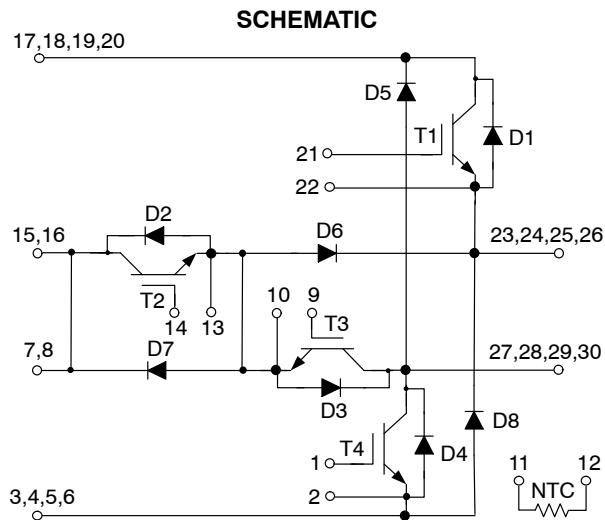
This high-density, integrated power module combines high-performance IGBTs with rugged anti-parallel diodes.

### Features

- Extremely Efficient Trench with Fieldstop Technology
- Low Switching Loss Reduces System Power Dissipation
- Module Design Offers High Power Density
- Low Inductive Layout
- Q1PACK Package with Press-Fit and Solder Pins

### Typical Applications

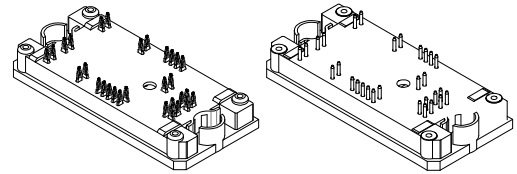
- Solar Inverters
- Uninterruptable Power Supplies



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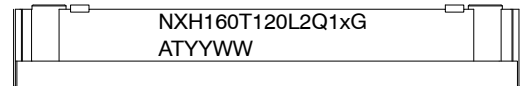
### PACKAGE PICTURE



**Q1PACK  
CASE 180AD  
PRESS FIT**

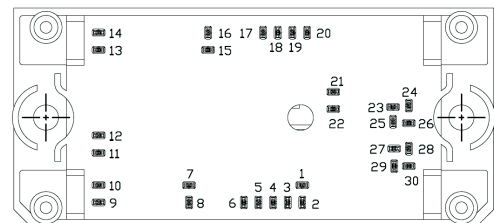
**Q1PACK  
CASE 180AQ  
SOLDER PINS**

### DEVICE MARKING



x = P or S  
G = Pb-Free Package  
AT = Assembly & Test Site Code  
YYWW = Year and Work Week Code

### PIN ASSIGNMENTS



### ORDERING INFORMATION

See detailed ordering and shipping information on page 14 of this data sheet.

# NXH160T120L2Q1PG, NXH160T120L2Q1SG

**Table 1. ABSOLUTE MAXIMUM RATINGS**

| Rating  | Symbol           | Value    | Unit             |
|---|------------------|----------|------------------|
| <b>HALFBRIDGE IGBT INVERSE DIODE (D1, D4)</b>   |                  |          |                  |
| Peak Repetitive Reverse Voltage   | $V_{RRM}$        | 1200     | V                |
| Forward Current, DC @ $T_h = 80^\circ\text{C}$  | $I_F$            | 20       | A                |
| Repetitive Peak Forward Current<br>$T_{\text{pulse}}$ limited by $T_{J\text{max}}$                              | $I_{FRM}$        | 80       | A                |
| Power Dissipation per Diode<br>$T_j = T_{J\text{max}}$ $T_h = 80^\circ\text{C}$                                 | $P_{\text{tot}}$ | 51       | W                |
| Maximum Junction Temperature  | $T_J$            | 150      | $^\circ\text{C}$ |
| <b>HALFBRIDGE IGBT (T1, T4)</b>   |                  |          |                  |
| Collector-emitter voltage   | $V_{CES}$        | 1200     | V                |
| Collector current @ $T_h = 80^\circ\text{C}$  | $I_C$            | 140      | A                |
| Pulsed Collector Current, $T_{\text{pulse}}$ Limited by $T_{J\text{max}}$                                       | $I_{CM}$         | 480      | A                |
| Power Dissipation per IGBT<br>$T_j = T_{J\text{max}}$ $T_h = 80^\circ\text{C}$                                  | $P_{\text{tot}}$ | 280      | W                |
| Gate-emitter voltage  | $V_{GE}$         | $\pm 20$ | V                |
| Short Circuit Withstand Time<br>$V_{GE} = 15\text{ V}$ , $V_{CE} = 600\text{ V}$ , $T_J \leq 150^\circ\text{C}$ | $T_{SC}$         | 10       | $\mu\text{s}$    |
| Maximum Junction Temperature  | $T_J$            | 150      | $^\circ\text{C}$ |
| <b>NP DIODE (D6, D7)</b>  |                  |          |                  |
| Peak Repetitive Reverse Voltage   | $V_{RRM}$        | 650      | V                |
| Forward Current, DC @ $T_h = 80^\circ\text{C}$  | $I_F$            | 58       | A                |
| Repetitive Peak Forward Current, $T_{\text{pulse}}$ limited by $T_{J\text{max}}$                                | $I_{FRM}$        | 200      | A                |
| Power Dissipation Per Diode<br>$T_j = T_{J\text{max}}$ $T_h = 80^\circ\text{C}$                                 | $P_{\text{tot}}$ | 89       | W                |
| Maximum Junction Temperature  | $T_J$            | 150      | $^\circ\text{C}$ |
| <b>NP IGBT (T2, T3)</b>   |                  |          |                  |
| Collector-emitter voltage   | $V_{CES}$        | 650      | V                |
| Collector current @ $T_h = 80^\circ\text{C}$  | $I_C$            | 83       | A                |
| Pulsed collector current, $T_{\text{pulse}}$ limited by $T_{J\text{max}}$                                       | $I_{CM}$         | 235      | A                |
| Power Dissipation Per IGBT<br>$T_j = T_{J\text{max}}$ $T_h = 80^\circ\text{C}$                                  | $P_{\text{tot}}$ | 117      | W                |
| Gate-emitter voltage  | $V_{GE}$         | $\pm 20$ | V                |
| Short Circuit Withstand Time<br>$V_{GE} = 15\text{ V}$ , $V_{CE} = 400\text{ V}$ , $T_J \leq 150^\circ\text{C}$ | $T_{sc}$         | 5        | $\mu\text{s}$    |
| Maximum Junction Temperature  | $T_J$            | 150      | $^\circ\text{C}$ |
| <b>NP INVERSE DIODE (D2, D3)</b>  |                  |          |                  |
| Peak Repetitive Reverse Voltage   | $V_{RRM}$        | 650      | V                |
| Forward Current, DC @ $T_h = 80^\circ\text{C}$  | $I_F$            | 17       | A                |
| Repetitive Peak Forward Current, $T_{\text{pulse}}$ limited by $T_{J\text{max}}$                                | $I_{FRM}$        | 68       | A                |
| Power Dissipation Per Diode<br>$T_j = T_{J\text{max}}$ $T_h = 80^\circ\text{C}$                                 | $P_{\text{tot}}$ | 28       | W                |
| Maximum Junction Temperature  | $T_J$            | 150      | $^\circ\text{C}$ |
| <b>HALFBRIDGE DIODE (D5, D8)</b>  |                  |          |                  |
| Peak Repetitive Reverse Voltage   | $V_{RRM}$        | 1200     | V                |
| Forward Current, DC @ $T_h = 80^\circ\text{C}$ (per diode)  | $I_F$            | 45       | A                |
| Repetitive Peak Forward Current, $T_{\text{pulse}}$ limited by $T_{J\text{max}}$                                | $I_{FRM}$        | 180      | A                |
| Power Dissipation Per Diode<br>$T_j = T_{J\text{max}}$ $T_h = 80^\circ\text{C}$                                 | $P_{\text{tot}}$ | 78       | W                |

# NXH160T120L2Q1PG, NXH160T120L2Q1SG

**Table 1. ABSOLUTE MAXIMUM RATINGS**

| Rating  | Symbol       | Value                    | Unit      |
|---|--------------|--------------------------|-----------|
| <b>HALFBRIDGE DIODE (D5, D8)</b>                |              |                          |           |
| Junction Temperature                            | $T_J$        | 150                      | °C        |
| <b>THERMAL PROPERTIES</b>                       |              |                          |           |
| Operating Temperature under switching condition | $T_{VJ\ OP}$ | -40 to ( $T_{jmax}-25$ ) | °C        |
| Storage Temperature range                       | $T_{stg}$    | -40 to 125               | °C        |
| <b>INSULATION PROPERTIES</b>                    |              |                          |           |
| Isolation test voltage, t = 1 sec, 60 Hz/50 Hz  | $V_{is}$     | 3000                     | $V_{RMS}$ |
| Creepage distance                               |              | 12.7                     | mm        |
| Clearance                                       |              | 8.06                     | mm        |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

**Table 2. ELECTRICAL CHARACTERISTICS** ( $T_J = 25^\circ\text{C}$  unless otherwise specified)

| Parameter   | Test Conditions   | Symbol        | Min  | Typ          | Max       | Unit             |
|---|---|---------------|------|--------------|-----------|------------------|
| <b>HALFBRIDGE IGBT INVERSE DIODE (D1, D4) CHARACTERISTICS</b> |   |               |      |              |           |                  |
| Forward voltage   | $I_F = 7\text{ A}, T_j = 25^\circ\text{C}$<br>$I_F = 7\text{ A}, T_j = 125^\circ\text{C}$   | $V_F$         | -    | 1.46<br>1.49 | 2.7<br>-  | V                |
| Thermal Resistance – chip-to-heatsink                         | Thermal grease,<br>Thickness = 2 Mil $\pm$ 2%, $\lambda = 1\text{ W/mK}$  | $R_{thJH}$    |      | 1.864        |           | °C/W             |
| <b>HALFBRIDGE IGBT (T1, T4) CHARACTERISTICS</b>               |   |               |      |              |           |                  |
| Collector-emitter saturation voltage                          | $V_{GE} = 15\text{ V}, I_C = 160\text{ A}, T_j = 25^\circ\text{C}$<br>$V_{GE} = 15\text{ V}, I_C = 160\text{ A}, T_j = 125^\circ\text{C}$ | $V_{CE(sat)}$ | -    | 2.06<br>2.10 | 2.50<br>- | V                |
| Gate-emitter threshold voltage                                | $V_{GE} = V_{CE}, I_C = 6\text{ mA}$  | $V_{GE(TH)}$  | 5.0  | 5.80         | 6.50      | V                |
| Collector-emitter cutoff current                              | $V_{GE} = 0\text{ V}, V_{CE} = 1200\text{ V}$   | $I_{CES}$     | -    | -            | 800       | $\mu\text{A}$    |
| Gate leakage current  | $V_{GE} = 20\text{ V}, V_{CE} = 0\text{ V}$   | $I_{GES}$     | -    | -            | 800       | nA               |
| Turn-on delay time  | $T_j = 125^\circ\text{C}$<br>$V_{CE} = 350\text{ V}, I_C = 100\text{ A}$<br>$V_{GE} = \pm 15\text{ V}, R_G = 4\ \Omega$                   | $t_{d(on)}$   | -    | 55           | -         | ns               |
| Rise time   |   | $t_r$         | -    | 50           | -         |                  |
| Turn-off delay time   |   | $t_{d(off)}$  | -    | 430          | -         |                  |
| Fall time   |   | $t_f$         | -    | 105          | -         |                  |
| Turn on switching loss  |   | $E_{on}$      | -    | 2.73         | -         |                  |
| Turn off switching loss                                       | $E_{off}$   | -             | 3.58 | -            |           |                  |
| Input capacitance   | $V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 10\text{ kHz}$  | $C_{ies}$     | -    | 38164        | -         | pF               |
| Output capacitance  |   | $C_{oes}$     | -    | 644          | -         |                  |
| Reverse transfer capacitance                                  |   | $C_{res}$     | -    | 784          | -         |                  |
| Gate charge total   | $V_{CE} = 600\text{ V}, I_C = 160\text{ A}, V_{GE} = 15\text{ V}$   | $Q_g$         | -    | 1664         | -         | nC               |
| Thermal Resistance – chip-to-heatsink                         | Thermal grease,<br>Thickness = 2 Mil $\pm$ 2%, $\lambda = 1\text{ W/mK}$  | $R_{thJH}$    |      | 0.337        |           | °C/W             |
| <b>NP DIODE (D6, D7) CHARACTERISTICS</b>                      |   |               |      |              |           |                  |
| Forward voltage   | $V_{GE} = 0\text{ V}, I_F = 150\text{ A}, T_j = 25^\circ\text{C}$<br>$V_{GE} = 0\text{ V}, I_F = 150\text{ A}, T_j = 125^\circ\text{C}$   | $V_F$         | -    | 2.15<br>2.36 | 2.60<br>- | V                |
| Reverse leakage current                                       | $V_{CE} = 650\text{ V}, V_{GE} = 0\text{ V}$  | $I_r$         | -    | -            | 200       | $\mu\text{A}$    |
| Reverse recovery time   | $T_j = 125^\circ\text{C}$<br>$V_{CE} = 350\text{ V}, I_C = 100\text{ A}$<br>$V_{GE} = \pm 15\text{ V}, R_G = 4\ \Omega$                   | $t_{rr}$      | -    | 225          | -         | ns               |
| Reverse recovery charge                                       |   | $Q_{rr}$      | -    | 6.15         | -         | $\mu\text{C}$    |
| Peak reverse recovery current                                 |   | $I_{rrm}$     | -    | 85           | -         | A                |
| Peak rate of fall of recovery current                         |   | $di/dt_{max}$ | -    | 1315         | -         | A/ $\mu\text{s}$ |
| Reverse recovery energy                                       |   | $E_{rr}$      | -    | 1.336        | -         | mJ               |
| Thermal Resistance – chip-to-heatsink                         | Thermal grease,<br>Thickness = 2 Mil $\pm$ 2%, $\lambda = 1\text{ W/mK}$  | $R_{thJH}$    | -    | 1.07         | -         | °C/W             |

# NXH160T120L2Q1PG, NXH160T120L2Q1SG

**Table 2. ELECTRICAL CHARACTERISTICS** ( $T_J = 25^\circ\text{C}$  unless otherwise specified)

| Parameter                             | Test Conditions   | Symbol        | Min      | Typ          | Max       | Unit                   |
|---------------------------------------|---|---------------|----------|--------------|-----------|------------------------|
| <b>NP IGBT (T2, T3)</b>               |   |               |          |              |           |                        |
| Collector-emitter saturation voltage  | $V_{CE} = 15\text{ V}, I_C = 150\text{ A}, T_J = 25^\circ\text{C}$<br>$V_{CE} = 15\text{ V}, I_C = 150\text{ A}, T_J = 125^\circ\text{C}$ | $V_{CE(sat)}$ | –<br>–   | 1.65<br>1.84 | 2.0<br>–  | V                      |
| Gate-emitter threshold voltage        | $V_{GE} = V_{CE}, I_C = 8\text{ mA}$  | $V_{GE(TH)}$  | 5.0      | 6.10         | 6.90      | V                      |
| Collector-emitter cutoff current      | $V_{GE} = 0\text{ V}, V_{CE} = 650\text{ V}$  | $I_{CES}$     | –        | –            | 400       | $\mu\text{A}$          |
| Gate leakage current                  | $V_{GE} = 20\text{ V}, V_{CE} = 0\text{ V}$   | $I_{GES}$     | –        | –            | 800       | nA                     |
| Turn-on delay time                    | $T_J = 125^\circ\text{C}$<br>$V_{CE} = 350\text{ V}, I_C = 100\text{ A}$<br>$V_{GE} = \pm 15\text{ V}, R_G = 4\ \Omega$                   | $t_{d(on)}$   | –        | 46           | –         | ns                     |
| Rise time                             |   | $t_r$         | –        | 48           | –         |                        |
| Turn-off delay time                   |   | $t_{d(off)}$  | –        | 250          | –         |                        |
| Fall time                             |   | $t_f$         | –        | 105          | –         |                        |
| Turn on switching loss                |   |               | $E_{on}$ | –            | 1.245     | –                      |
| Turn off switching loss               |   | $E_{off}$     | –        | 2.525        | –         |                        |
| Input capacitance                     | $V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 10\text{ kHz}$  | $C_{ies}$     | –        | 19380        | –         | pF                     |
| Output capacitance                    |   | $C_{oes}$     | –        | 570          | –         |                        |
| Reverse transfer capacitance          |   | $C_{res}$     | –        | 496          | –         |                        |
| Gate charge total                     | $V_{CE} = 480\text{ V}, I_C = 150\text{ A}, V_{GE} = 15\text{ V}$   | $Q_g$         | –        | 790          | –         | nC                     |
| Thermal Resistance – chip-to-heatsink | Thermal grease,<br>Thickness = 2 Mil $\pm$ 2%, $\lambda = 1\text{ W/mK}$  | $R_{thJH}$    | –        | 0.81         | –         | $^\circ\text{C/W}$     |
| <b>NP INVERSE DIODE (D2, D3)</b>      |   |               |          |              |           |                        |
| Forward voltage                       | $V_{GE} = 0\text{ V}, I_F = 15\text{ A}, T_J = 25^\circ\text{C}$<br>$V_{GE} = 0\text{ V}, I_F = 15\text{ A}, T_J = 125^\circ\text{C}$     | $V_F$         | –<br>–   | 1.60<br>1.59 | 2.20<br>– | V                      |
| Thermal Resistance – chip-to-heatsink | Thermal grease,<br>Thickness = 2 Mil $\pm$ 2%, $\lambda = 1\text{ W/mK}$  | $R_{thJH}$    |          | 3.43         |           | $^\circ\text{C/W}$     |
| <b>HALFBRIDGE DIODE (D5, D8)</b>      |   |               |          |              |           |                        |
| Forward voltage                       | $V_{GE} = 0\text{ V}, I_F = 150\text{ A}, T_J = 25^\circ\text{C}$<br>$V_{GE} = 0\text{ V}, I_F = 150\text{ A}, T_J = 125^\circ\text{C}$   | $V_F$         | –<br>–   | 2.50<br>2.80 | 3.50<br>– | V                      |
| Reverse leakage current               | $V_{CE} = 1200\text{ V}, V_{GE} = 0\text{ V}$   | $I_r$         | –        | –            | 200       | $\mu\text{A}$          |
| Reverse recovery time                 | $T_J = 125^\circ\text{C}$<br>$V_{CE} = 350\text{ V}, I_C = 100\text{ A}$<br>$V_{GE} = \pm 15\text{ V}, R_G = 4\ \Omega$                   | $t_{rr}$      | –        | 405          | –         | ns                     |
| Reverse recovery charge               |   | $Q_{rr}$      | –        | 15.5         | –         | $\mu\text{C}$          |
| Peak reverse recovery current         |   | $I_{rrm}$     | –        | 220          | –         | A                      |
| Peak rate of fall of recovery current |   | $di/dt_{max}$ | –        | 5440         | –         | $\text{A}/\mu\text{s}$ |
| Reverse recovery energy               |   | $E_{rr}$      | –        | 5.225        | –         | mJ                     |
| Thermal Resistance – chip-to-heatsink | Thermal grease,<br>Thickness = 2 Mil $\pm$ 2%, $\lambda = 1\text{ W/mK}$  | $R_{thJH}$    | –        | 1.213        | –         | $^\circ\text{C/W}$     |
| <b>THERMISTOR CHARACTERISTICS</b>     |   |               |          |              |           |                        |
| Nominal resistance                    |   | $R_{25}$      | –        | 22           | –         | k $\Omega$             |
| Nominal resistance                    | $T = 100^\circ\text{C}$   | $R_{100}$     | –        | 1486         | –         | $\Omega$               |
| Deviation of R25                      |   | DR/R          | –5       | –            | 5         | %                      |
| Power dissipation                     |   | $P_D$         | –        | 200          | –         | mW                     |
| Power dissipation constant            |   |               | –        | 2            | –         | mW/K                   |
| B-value                               | B(25/50), tol $\pm$ 3%  |               | –        | 3950         | –         | K                      |
| B-value                               | B(25/100), tol $\pm$ 3%   |               | –        | 3998         | –         | K                      |

# NXH160T120L2Q1PG, NXH160T120L2Q1SG

## TYPICAL CHARACTERISTICS – HALF BRIDGE IGBT AND NEUTRAL POINT FORWARD DIODE

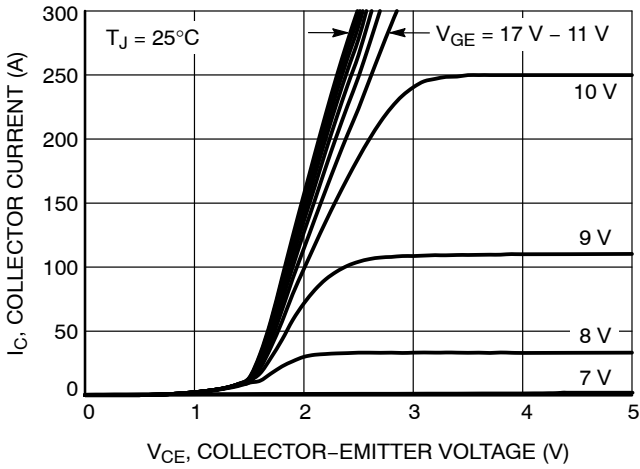


Figure 1. Typical Output Characteristics

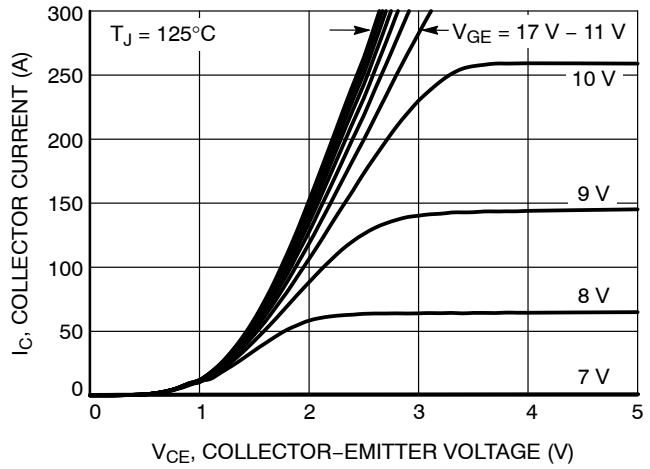


Figure 2. Typical Output Characteristics

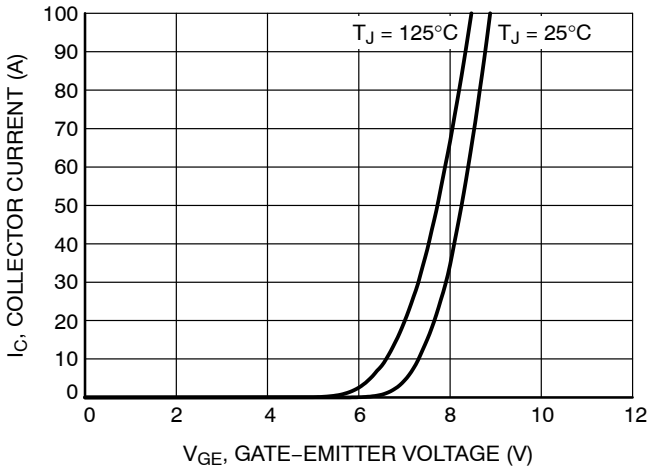


Figure 3. Typical Transfer Characteristics

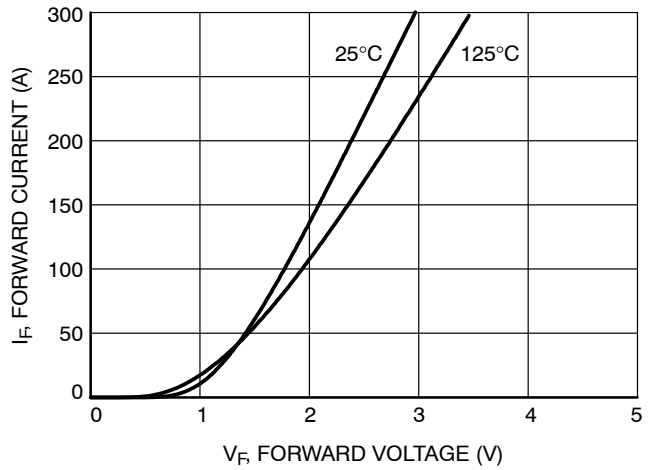


Figure 4. Diode Forward Characteristics

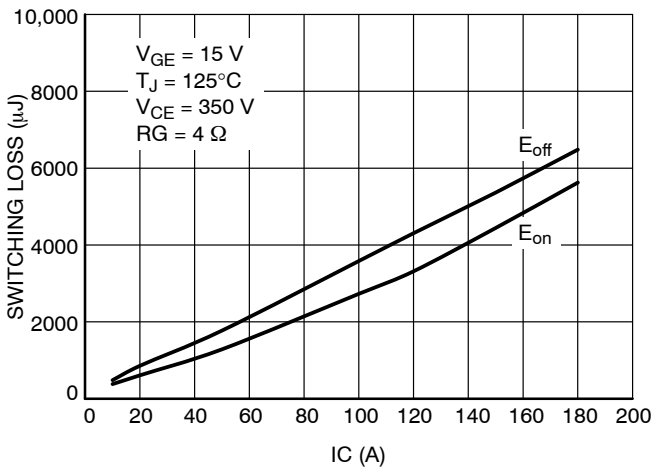


Figure 5. Typical Switching Loss vs.  $I_C$

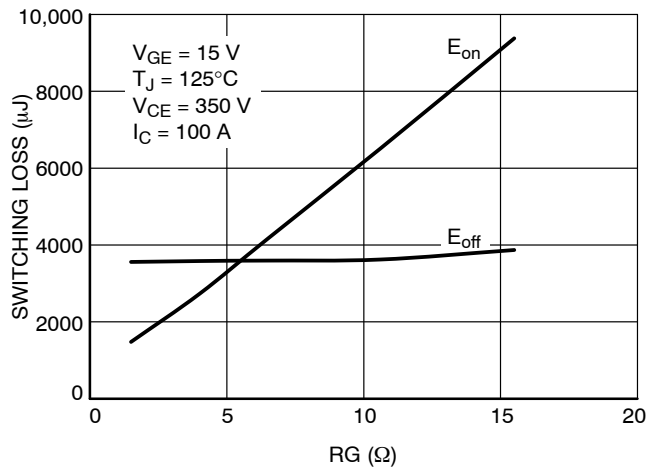
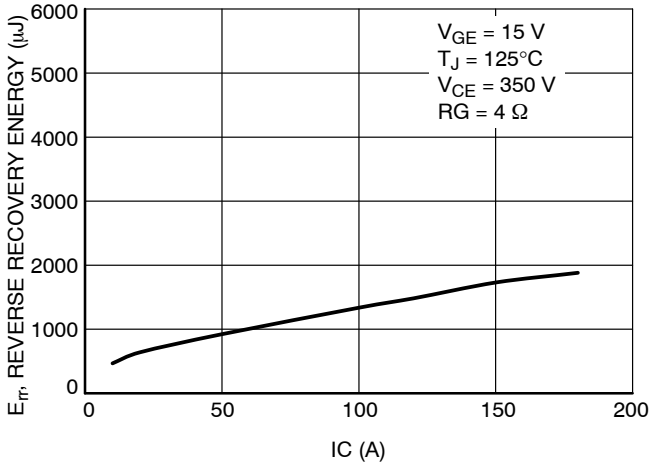


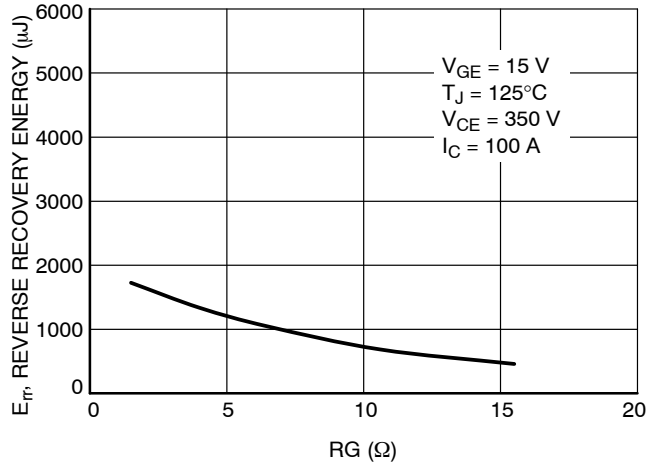
Figure 6. Typical Switching Loss vs.  $R_G$

# NXH160T120L2Q1PG, NXH160T120L2Q1SG

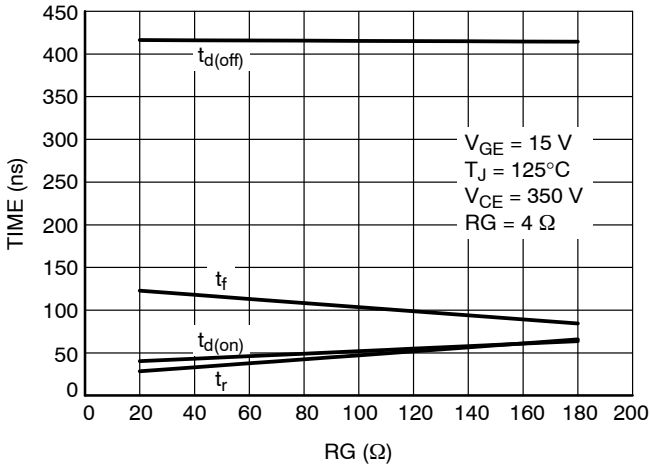
## TYPICAL CHARACTERISTICS – HALF BRIDGE IGBT AND NEUTRAL POINT FORWARD DIODE



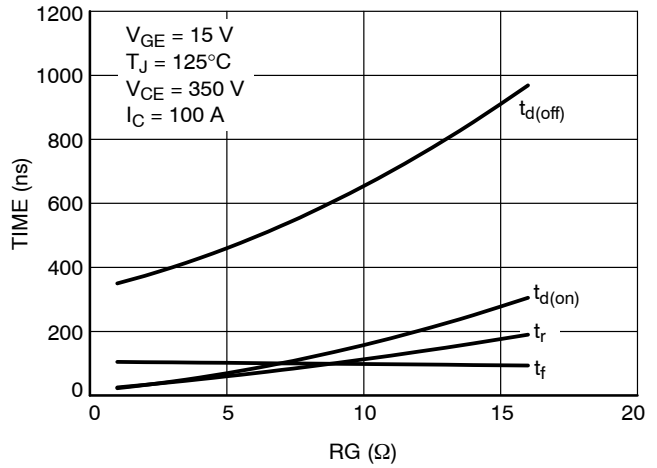
**Figure 7. Typical Reverse Recovery Energy Loss vs. IC**



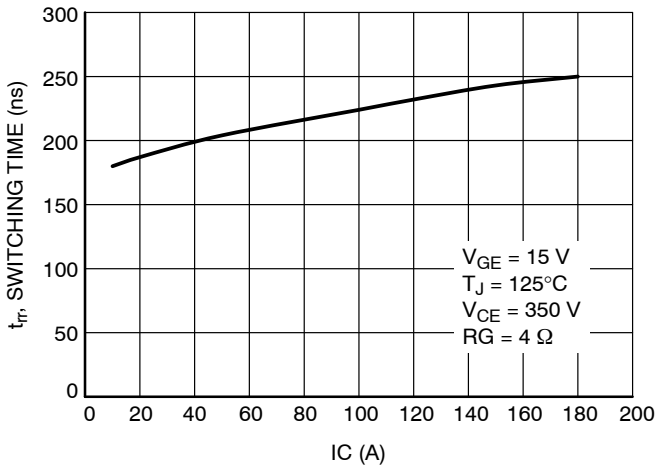
**Figure 8. Typical Reverse Recovery Energy Loss vs. RG**



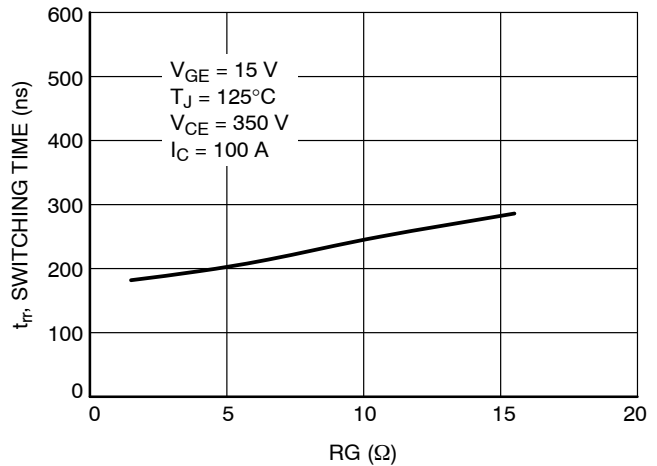
**Figure 9. Typical Switching Time vs. IC**



**Figure 10. Typical Switching Time vs. RG**



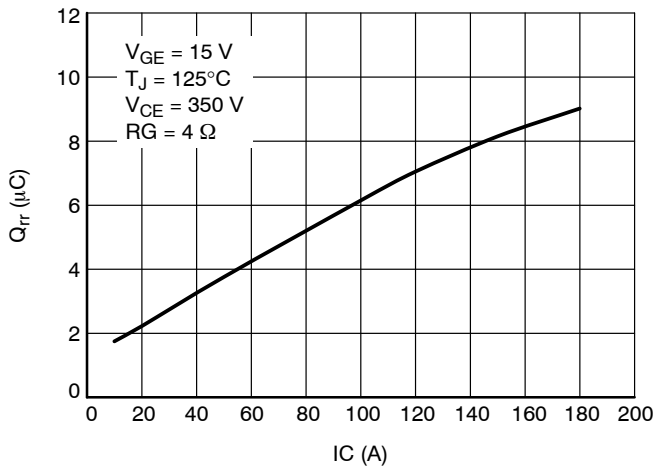
**Figure 11. Typical Reverse Recovery Time vs. IC**



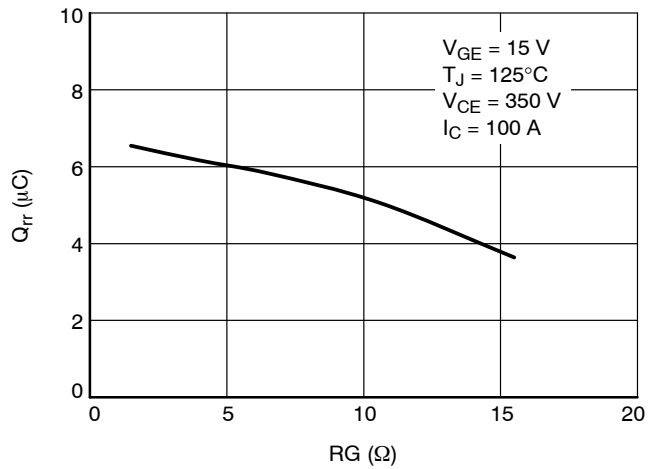
**Figure 12. Typical Reverse Recovery Time vs. RG**

# NXH160T120L2Q1PG, NXH160T120L2Q1SG

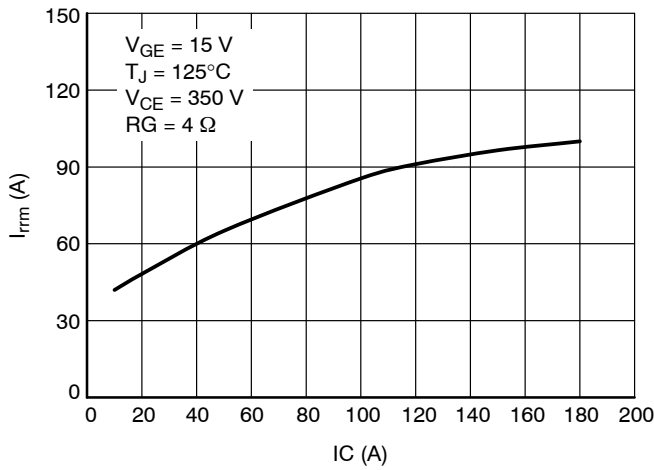
## TYPICAL CHARACTERISTICS – HALF BRIDGE IGBT AND NEUTRAL POINT FORWARD DIODE



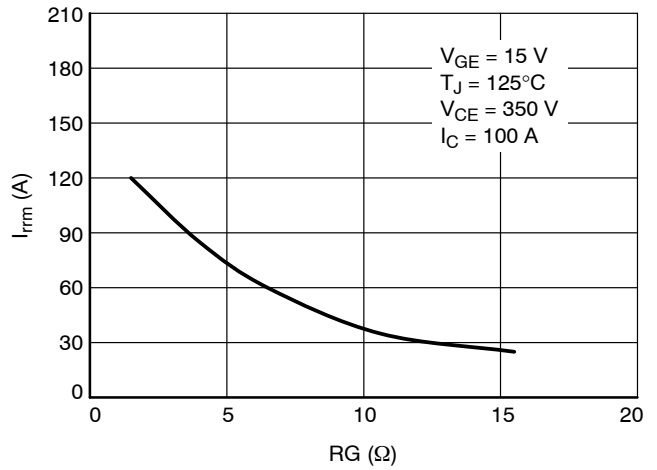
**Figure 13. Typical Reverse Recovery Charge vs. IC**



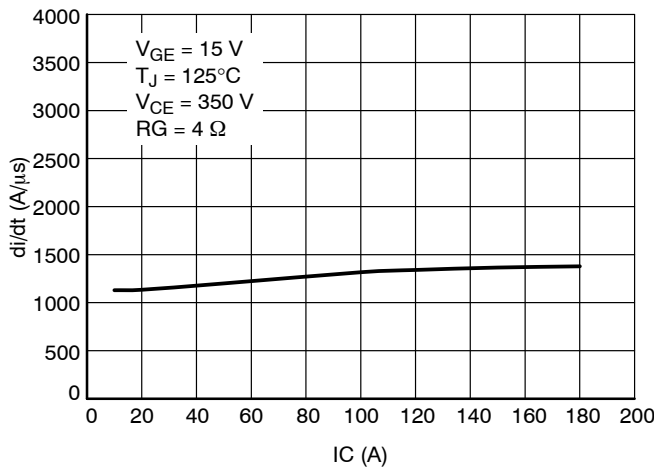
**Figure 14. Typical Reverse Recovery Charge vs. RG**



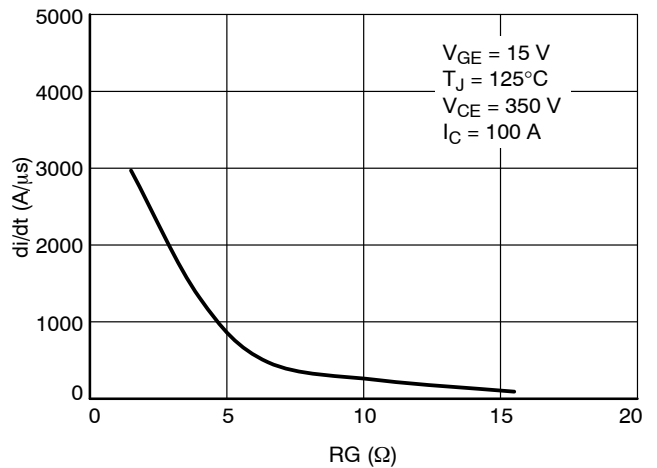
**Figure 15. Typical Reverse Recovery Current vs. IC**



**Figure 16. Typical Reverse Recovery Current vs. RG**



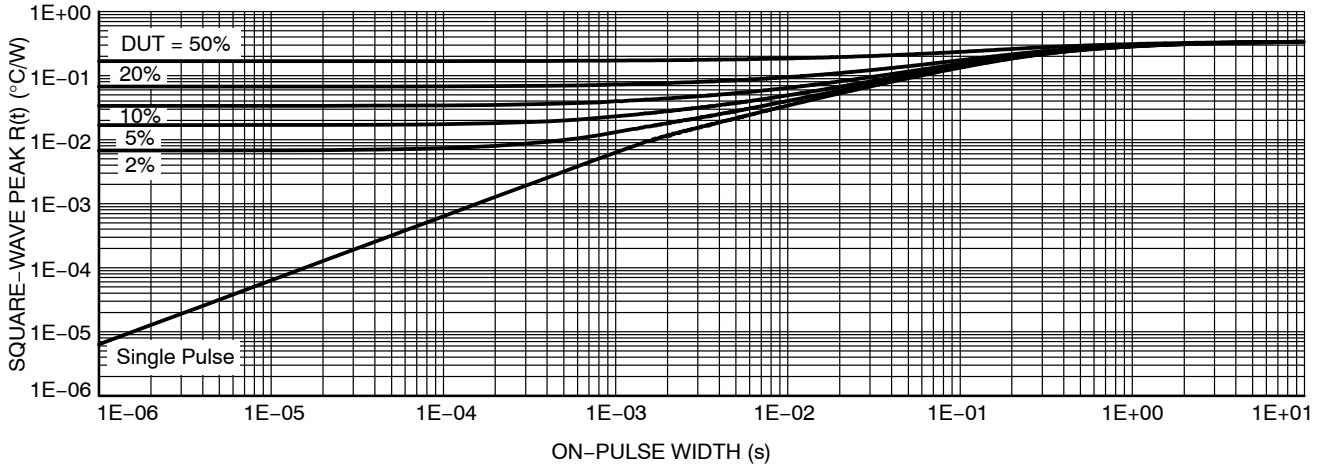
**Figure 17. Typical di/dt vs. IC**



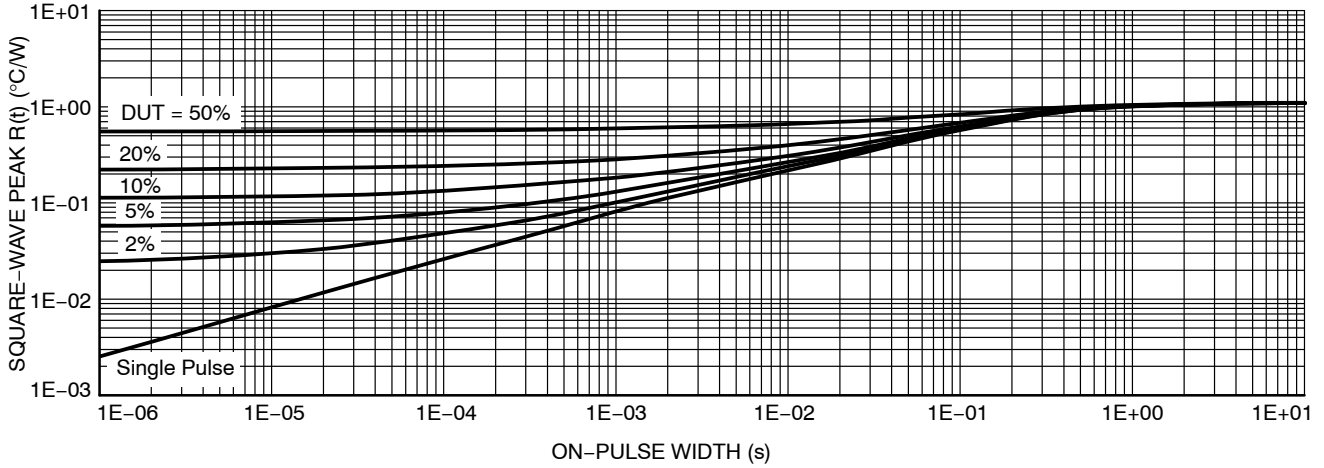
**Figure 18. Typical di/dt vs. RG**

# NXH160T120L2Q1PG, NXH160T120L2Q1SG

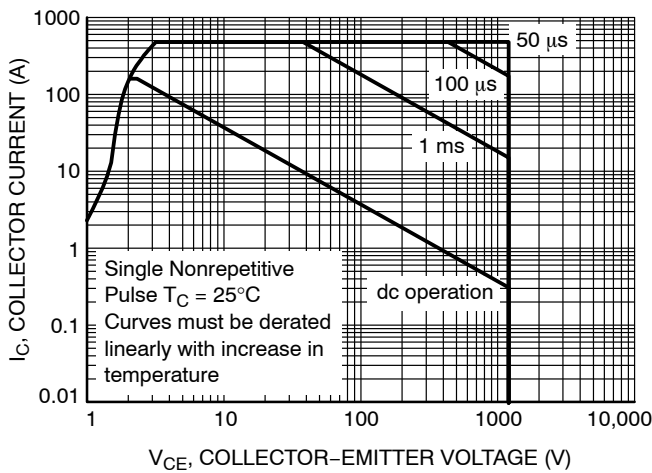
## TYPICAL CHARACTERISTICS – HALF BRIDGE IGBT AND NEUTRAL POINT FORWARD DIODE



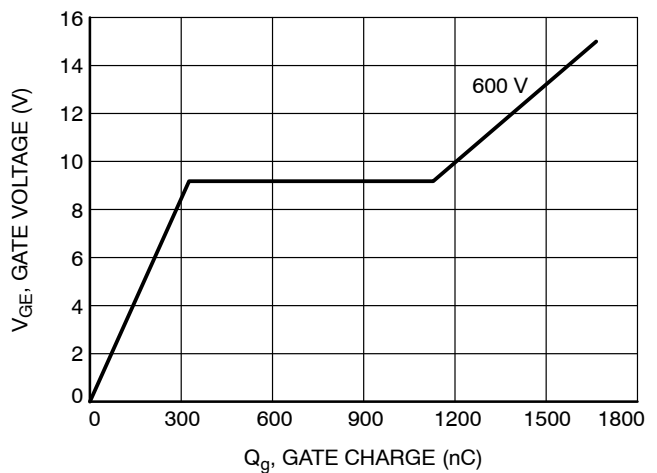
**Figure 19. Transient Thermal Impedance (Half Bridge IGBT)**



**Figure 20. Transient Thermal Impedance (Neutral Point Forward Diode)**



**Figure 21. Safe Operating Area**

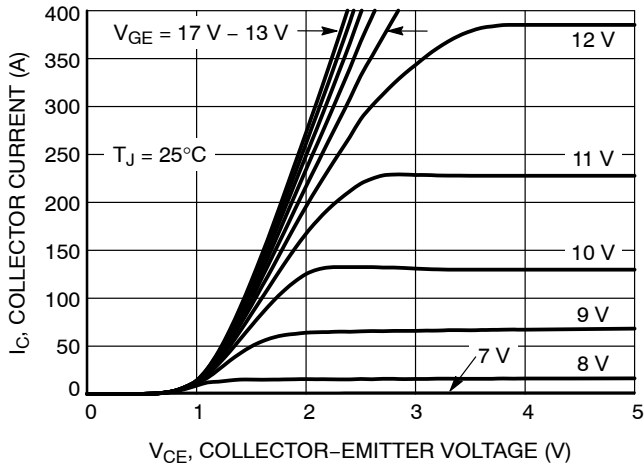


**Figure 22. Gate Voltage vs. Gate Charge**

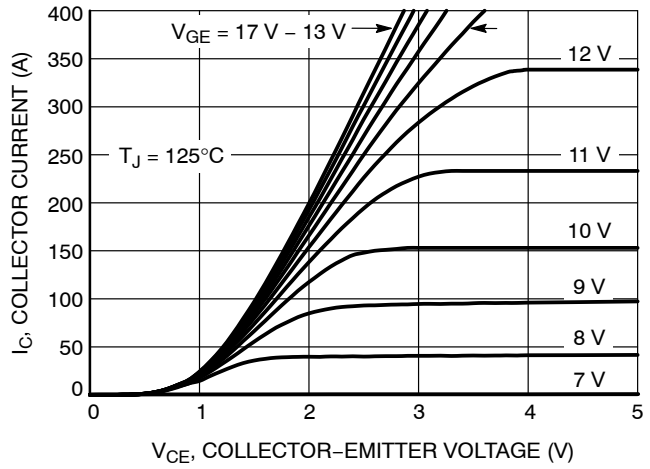


# NXH160T120L2Q1PG, NXH160T120L2Q1SG

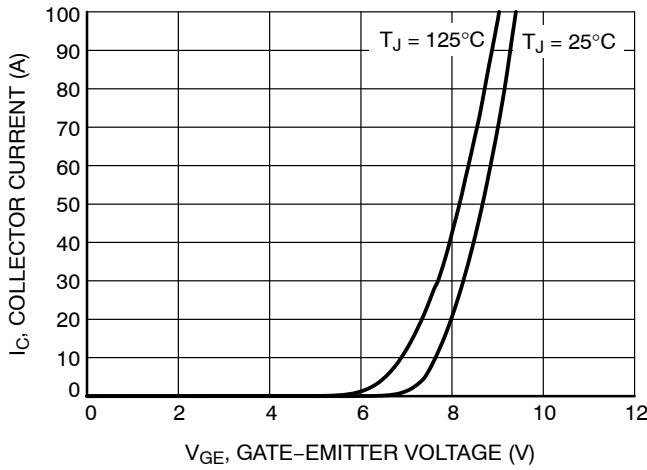
## TYPICAL CHARACTERISTICS – NEUTRAL POINT IGBT AND HALF BRIDGE FORWARD DIODE



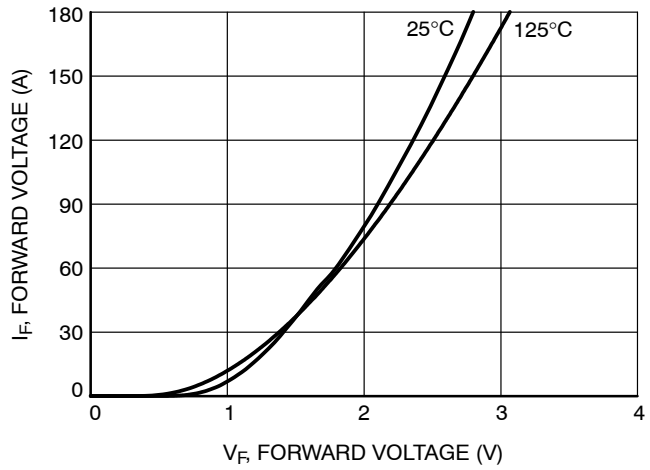
**Figure 23. Typical Output Characteristics**



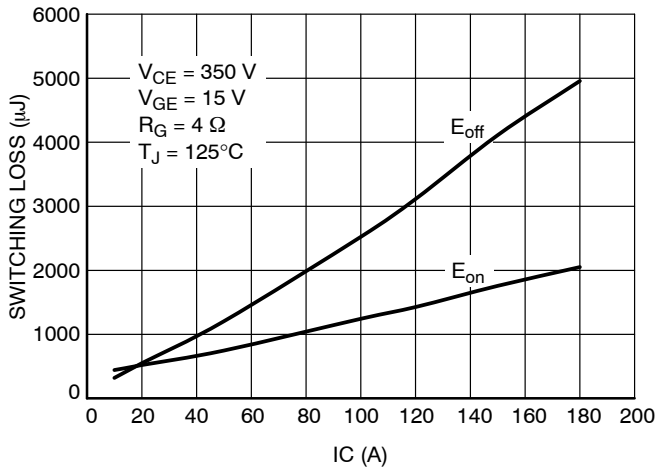
**Figure 24. Typical Output Characteristics**



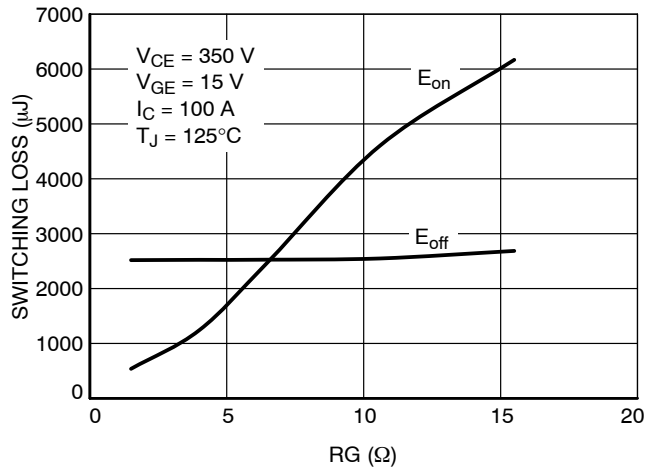
**Figure 25. Typical Transfer Characteristics**



**Figure 26. Diode Forward Characteristics**



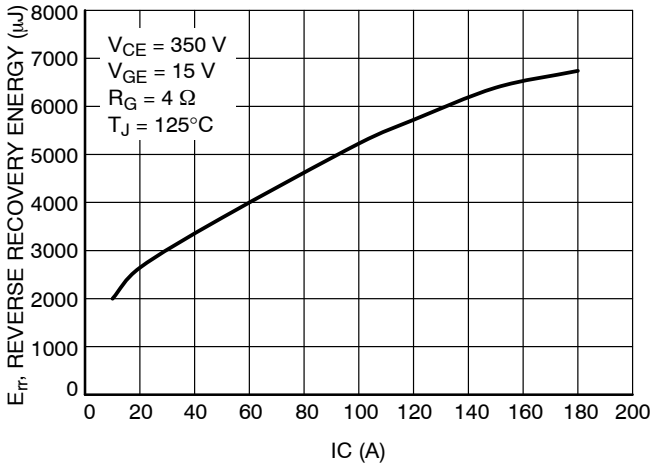
**Figure 27. Typical Switching Loss vs.  $I_C$**



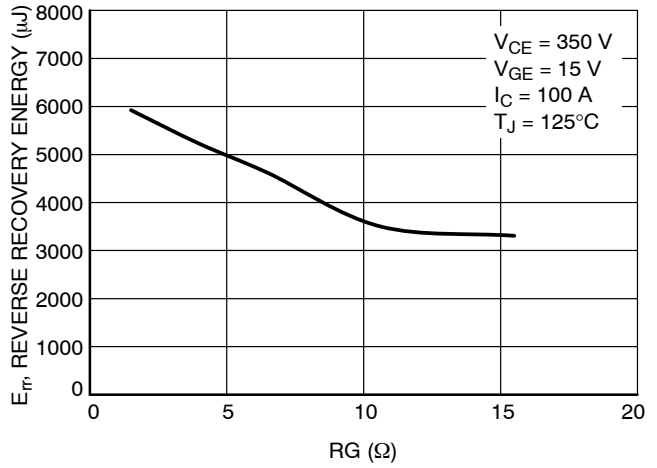
**Figure 28. Typical Switching Loss vs.  $R_G$**

# NXH160T120L2Q1PG, NXH160T120L2Q1SG

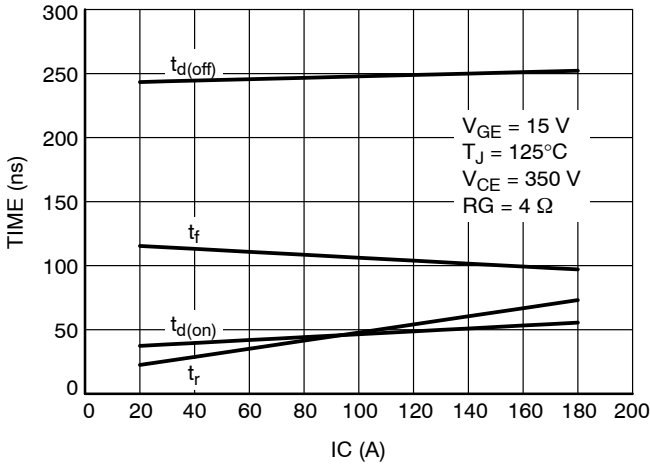
## TYPICAL CHARACTERISTICS – NEUTRAL POINT IGBT AND HALF BRIDGE FORWARD DIODE



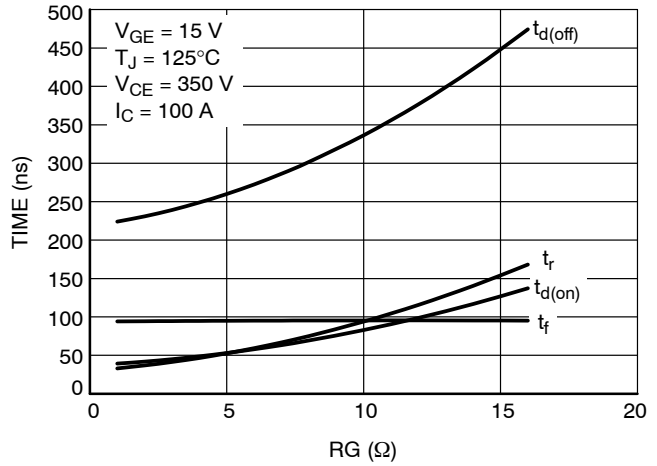
**Figure 29. Typical Reverse Recovery Energy Loss vs. IC**



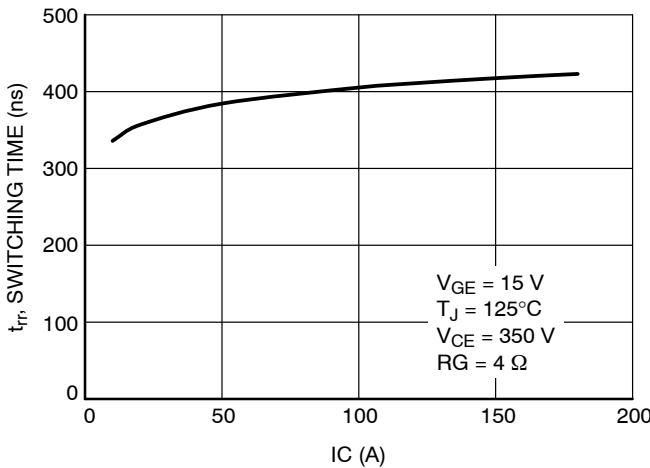
**Figure 30. Typical Reverse Recovery Energy Loss vs. R<sub>G</sub>**



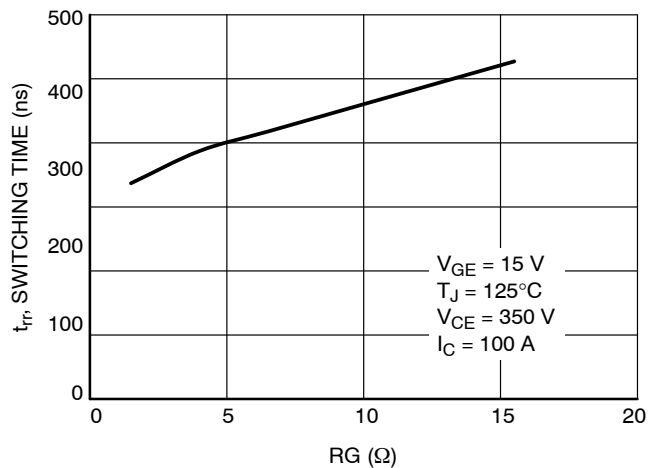
**Figure 31. Typical Switching Time vs. IC**



**Figure 32. Typical Switching Time vs. R<sub>G</sub>**



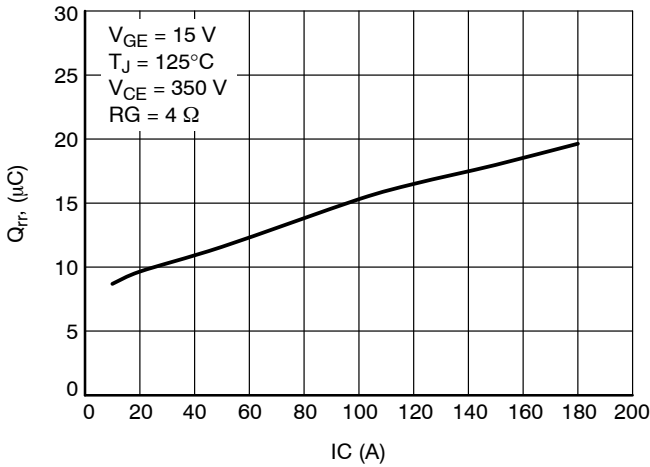
**Figure 33. Half Bridge Forward Diode Typical Reverse Recovery Time vs. IC**



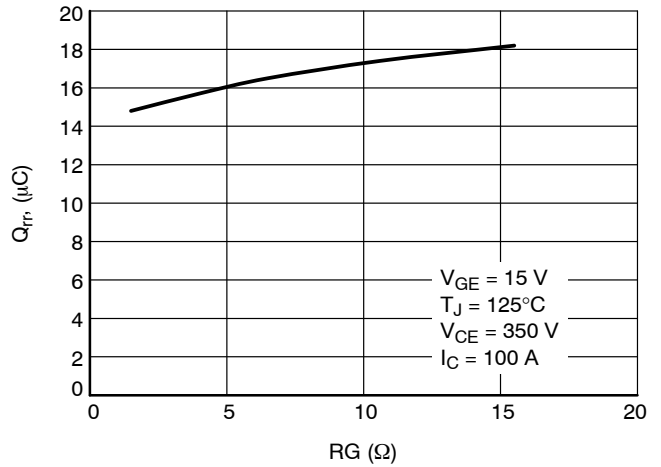
**Figure 34. Half Bridge Forward Diode Typical Reverse Recovery Time vs. R<sub>G</sub>**

# NXH160T120L2Q1PG, NXH160T120L2Q1SG

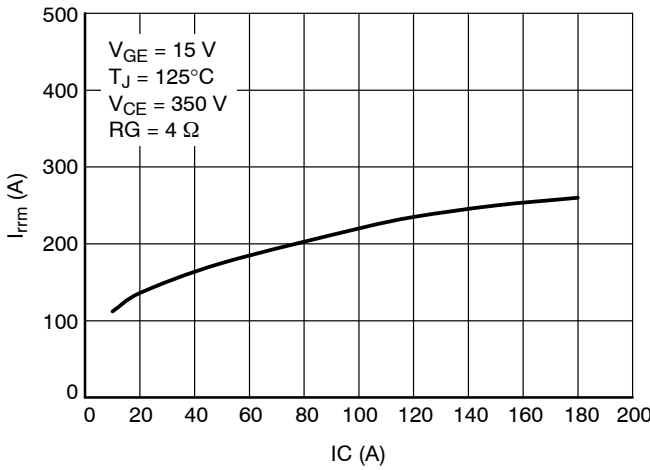
## TYPICAL CHARACTERISTICS – NEUTRAL POINT IGBT AND HALF BRIDGE FORWARD DIODE



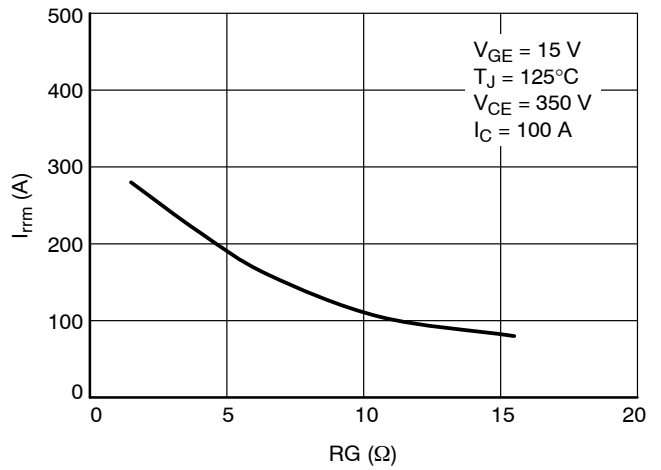
**Figure 35. Half Bridge Forward Diode Typical Reverse Recovery Charge vs. IC**



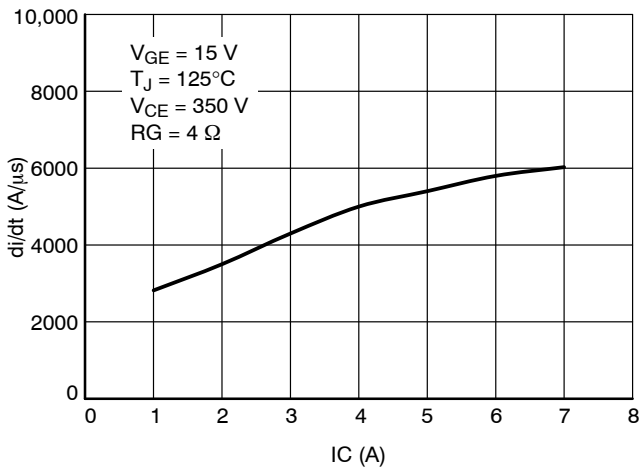
**Figure 36. Half Bridge Forward Diode Typical Reverse Recovery Charge vs. RG**



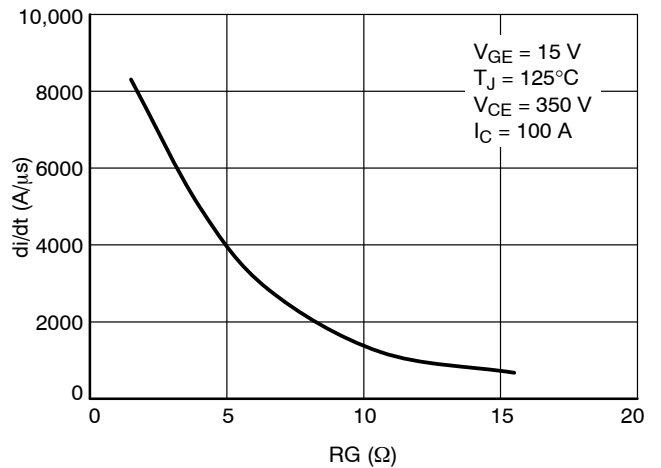
**Figure 37. Typical Reverse Recovery Current vs. IC**



**Figure 38. Typical Reverse Recovery Current vs. RG**



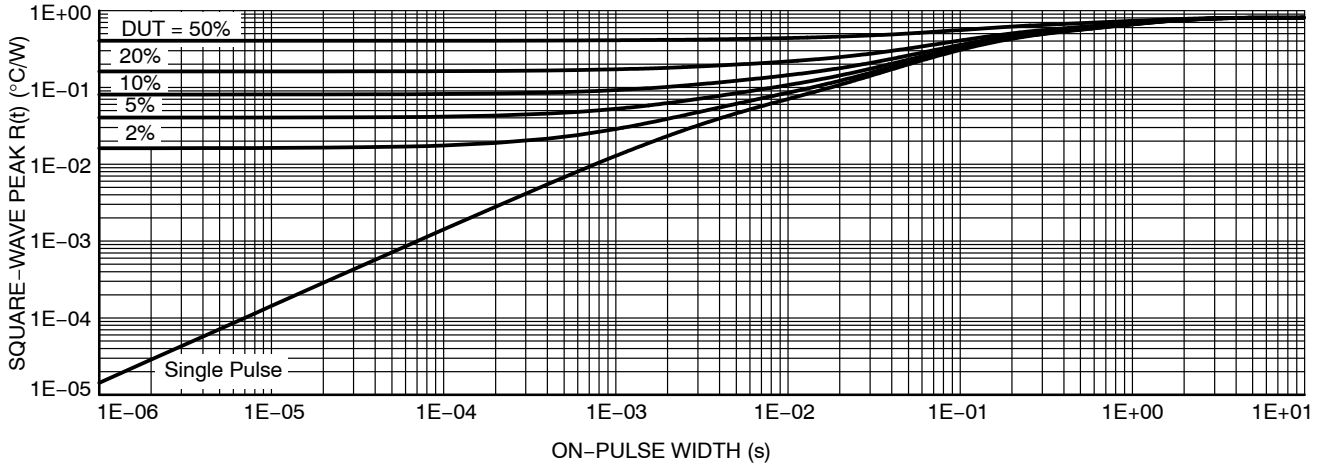
**Figure 39. Typical di/dt vs. IC**



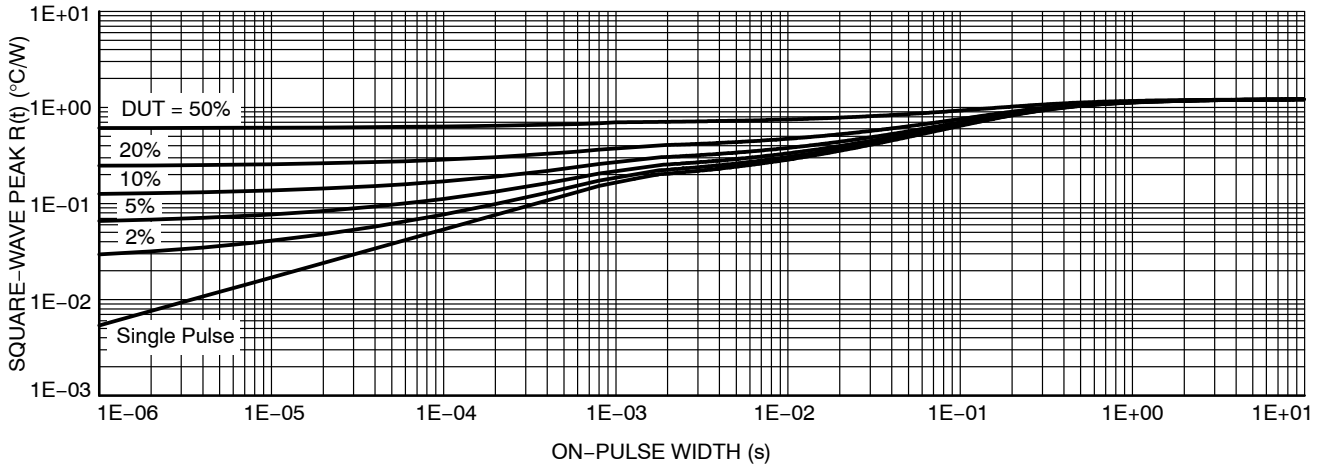
**Figure 40. Typical di/dt vs. RG**

# NXH160T120L2Q1PG, NXH160T120L2Q1SG

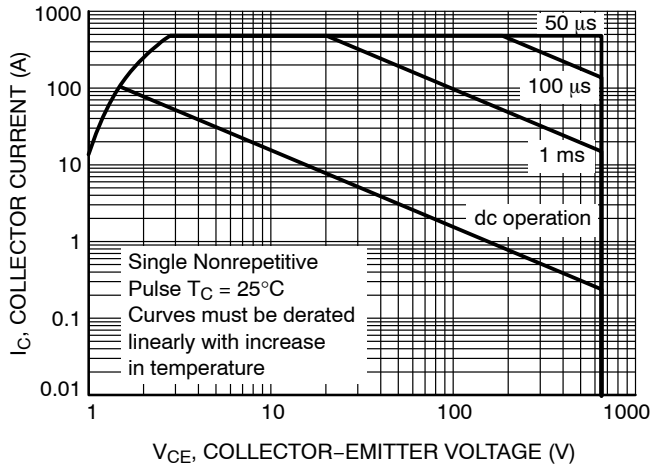
## TYPICAL CHARACTERISTICS – NEUTRAL POINT IGBT AND HALF BRIDGE FORWARD DIODE



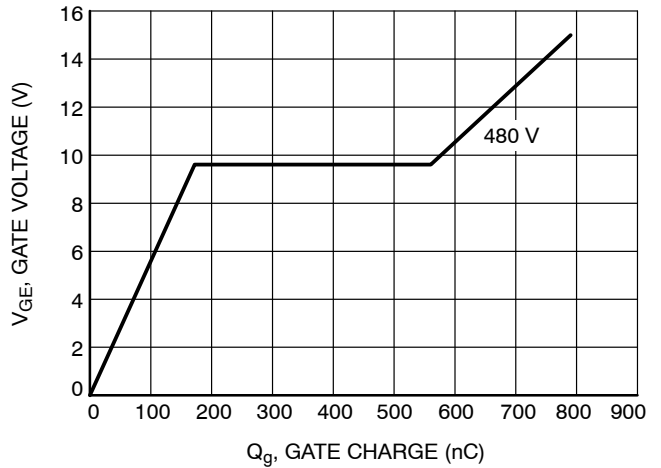
**Figure 41. Transient Thermal Impedance (Neutral Point IGBT)**



**Figure 42. Transient Thermal Impedance (Half Bridge Forward Diode)**



**Figure 43. Safe Operating Area**



**Figure 44. Gate Voltage vs. Gate Charge**

# NXH160T120L2Q1PG, NXH160T120L2Q1SG

## TYPICAL CHARACTERISTICS – HALF BRIDGE INVERSE DIODE

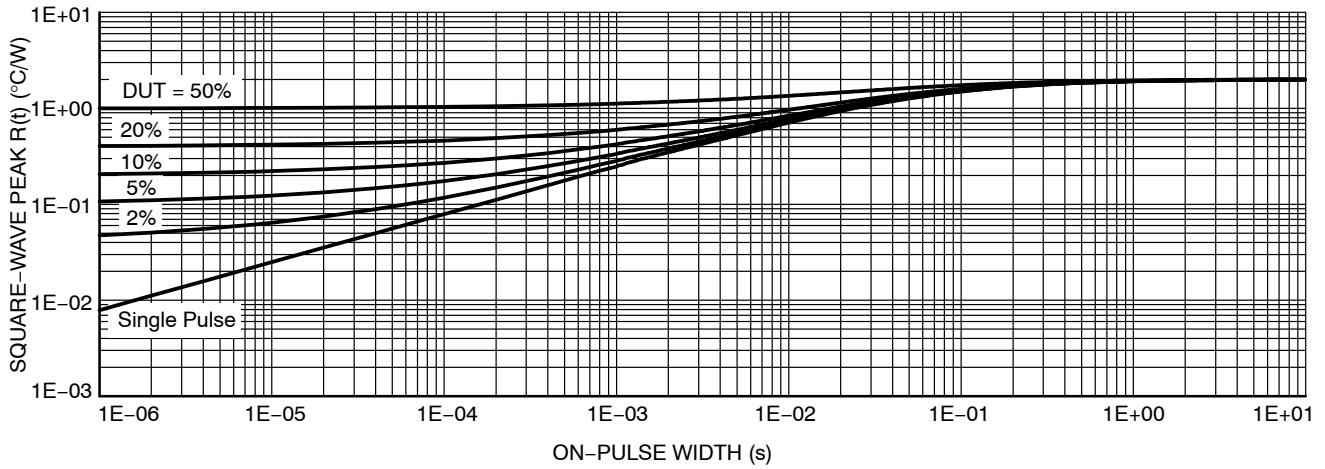


Figure 45. Transient Thermal Impedance

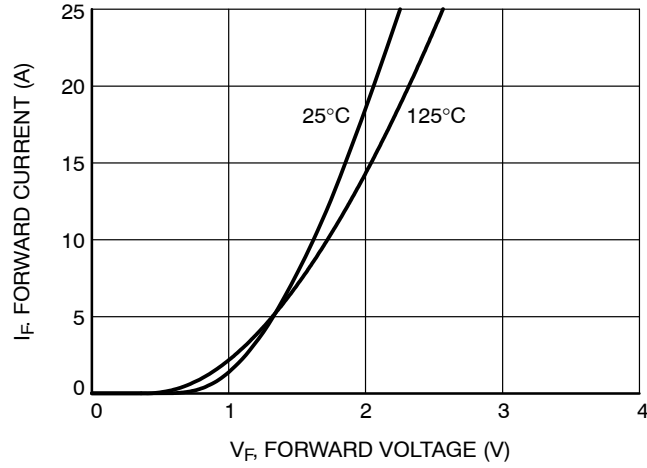


Figure 46. Diode Forward Characteristics

# NXH160T120L2Q1PG, NXH160T120L2Q1SG

## TYPICAL CHARACTERISTICS – NEUTRAL POINT INVERSE DIODE

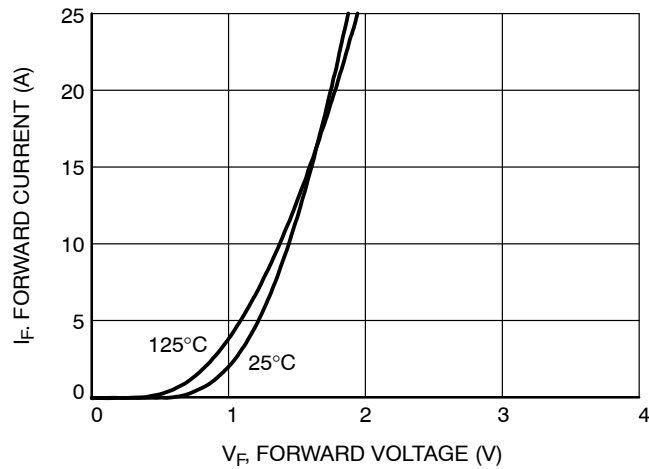


Figure 47. Diode Forward Characteristics

## TYPICAL CHARACTERISTICS – THERMISTOR

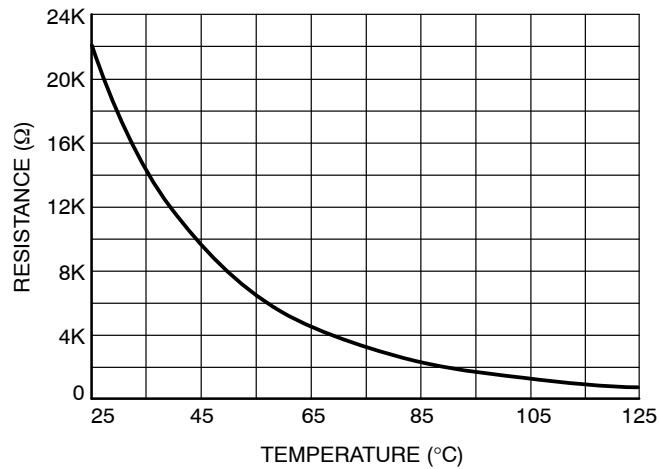


Figure 48. Thermistor Characteristics

### ORDERING INFORMATION

| Orderable Part Number         | Package  | Shipping                |
|-------------------------------|--|-------------------------|
| NXH160T120L2Q1PG (Press Fit)  | Q1PACK – Case 180AD<br>(Pb-Free and Halide-Free) | 21 Units / Blister Tray |
| NXH160T120L2Q1SG (Solder Pin) | Q1PACK – Case 180AQ<br>(Pb-Free and Halide-Free) | 21 Units / Blister Tray |

# MECHANICAL CASE OUTLINE

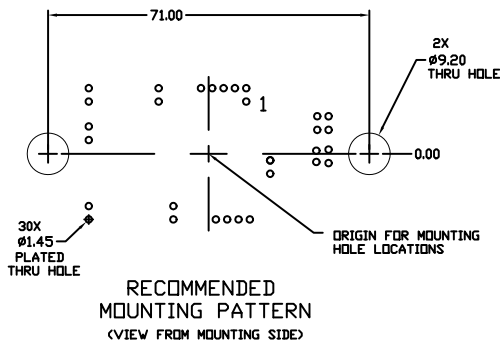
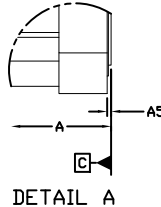
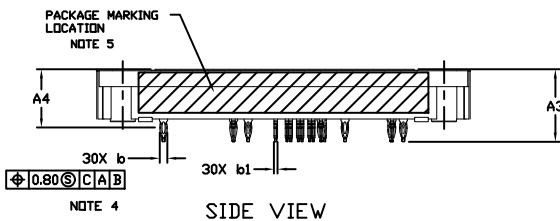
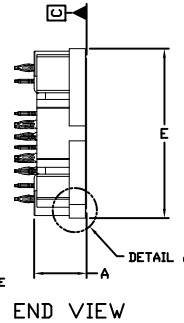
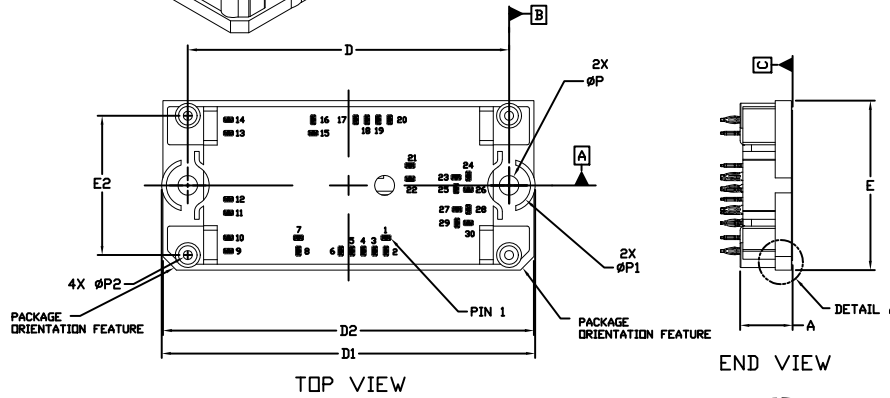
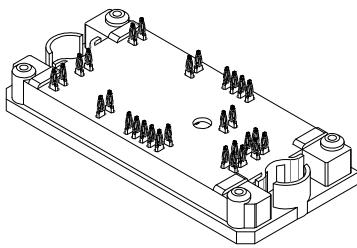
## PACKAGE DIMENSIONS

ON Semiconductor®



PIM30, 71x37.4  
CASE 180AD  
ISSUE E

DATE 28 NOV 2017



NOTES:

- DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
- CONTROLLING DIMENSION: MILLIMETERS
- DIMENSIONS b AND b1 APPLY TO THE PLATED TERMINALS AND ARE MEASURED AT DIMENSION A4.
- POSITION OF THE CENTER OF THE TERMINALS IS DETERMINED FROM DATUM B THE CENTER OF DIMENSION D, X DIRECTION, AND FROM DATUM A, Y DIRECTION. POSITIONAL TOLERANCE, AS NOTED IN DRAWING, APPLIES TO EACH TERMINAL IN BOTH DIRECTIONS.
- PACKAGE MARKING IS LOCATED AS SHOWN ON THE SIDE OPPOSITE THE PACKAGE ORIENTATION FEATURES.

| MOUNTING HOLE POSITION |        |        | MOUNTING HOLE POSITION |        |        |
|------------------------|--------|--------|------------------------|--------|--------|
| PIN                    | X      | Y      | PIN                    | X      | Y      |
| 1                      | 8.30   | 11.55  | 16                     | -7.800 | -14.50 |
| 2                      | 8.30   | 14.50  | 17                     | 1.60   | -14.50 |
| 3                      | 5.80   | 14.50  | 18                     | 4.10   | -14.50 |
| 4                      | 3.30   | 14.50  | 19                     | 6.60   | -14.50 |
| 5                      | 0.80   | 14.50  | 20                     | 9.10   | -14.50 |
| 6                      | -1.70  | 14.50  | 21                     | 13.60  | -4.40  |
| 7                      | -11.05 | 11.55  | 22                     | 13.60  | -1.45  |
| 8                      | -11.05 | 14.50  | 23                     | 23.80  | -1.80  |
| 9                      | -26.50 | 14.50  | 24                     | 26.50  | -2.05  |
| 10                     | -26.50 | 11.55  | 25                     | 23.80  | 0.70   |
| 11                     | -26.50 | 6.05   | 26                     | 26.50  | 0.95   |
| 12                     | -26.50 | 3.05   | 27                     | 24.00  | 5.30   |
| 13                     | -26.50 | -11.55 | 28                     | 26.50  | 5.30   |
| 14                     | -26.50 | -14.50 | 29                     | 24.00  | 8.30   |
| 15                     | -7.80  | -11.55 | 30                     | 26.50  | 8.30   |

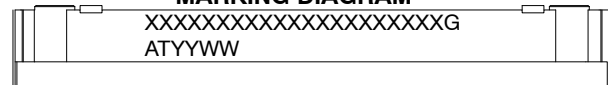
NOTE 4

| DIM | MILLIMETERS |       |
|-----|-------------|-------|
|     | MIN.        | NDM.  |
| A   | 11.10       | 12.10 |
| A3  | 15.50       | 16.50 |
| A4  | 12.88       | BSC   |
| A5  | 0.00        | 0.45  |
| b   | 1.61        | 1.71  |
| b1  | 0.75        | 0.85  |
| D   | 70.50       | 71.50 |
| D1  | 82.00       | 83.00 |
| D2  | 81.50       | 82.50 |
| E   | 36.90       | 37.90 |
| E2  | 30.30       | 31.30 |
| P   | 4.30        | 4.50  |
| P1  | 9.30        | 9.70  |
| P2  | 1.90        | 2.10  |

| PIN | PIN POSITION |        | PIN | PIN POSITION |       |
|-----|--------------|--------|-----|--------------|-------|
|     | X            | Y      |     | X            | Y     |
| 1   | 8.30         | -11.55 | 16  | -7.800       | 14.50 |
| 2   | 8.30         | -14.50 | 17  | 1.60         | 14.50 |
| 3   | 5.80         | -14.50 | 18  | 4.10         | 14.50 |
| 4   | 3.30         | -14.50 | 19  | 6.60         | 14.50 |
| 5   | 0.80         | -14.50 | 20  | 9.10         | 14.50 |
| 6   | -1.70        | -14.50 | 21  | 13.60        | 4.40  |
| 7   | -11.05       | -11.55 | 22  | 13.60        | 1.45  |
| 8   | -11.05       | -14.50 | 23  | 23.80        | 1.80  |
| 9   | -26.50       | -14.50 | 24  | 26.50        | 2.05  |
| 10  | -26.50       | -11.55 | 25  | 23.80        | -0.70 |
| 11  | -26.50       | -6.05  | 26  | 26.50        | -0.95 |
| 12  | -26.50       | -3.05  | 27  | 24.00        | -5.30 |
| 13  | -26.50       | 11.55  | 28  | 26.50        | -5.30 |
| 14  | -26.50       | 14.50  | 29  | 24.00        | -8.30 |
| 15  | -7.80        | 11.55  | 30  | 26.50        | -8.30 |

GENERIC

MARKING DIAGRAM\*



XXXXX = Specific Device Code  
G = Pb-Free Package  
AT = Assembly & Test Site Code  
YYWW = Year and Work Week Code

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

|                  |                           |  |
|------------------|---------------------------|--|
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| DESCRIPTION:     | PIM30 71X37.4 (PRESS FIT) | PAGE 1 OF 1  |

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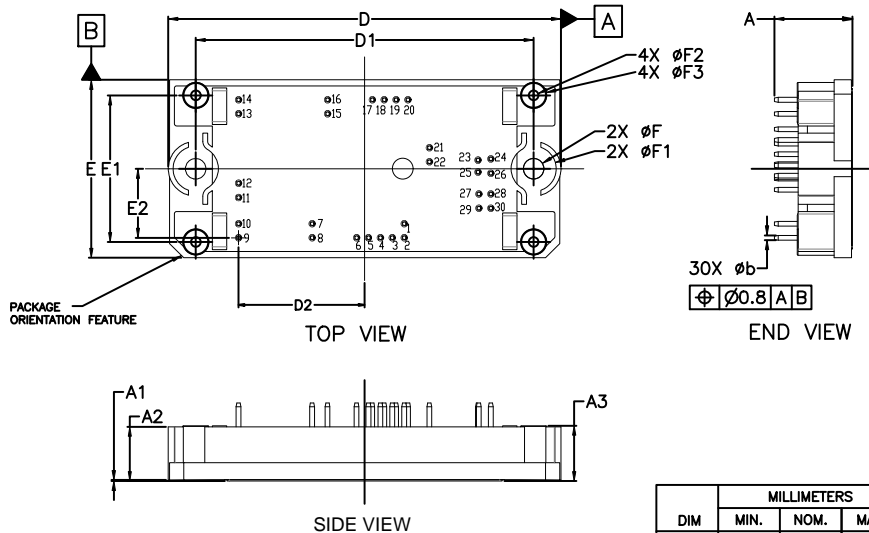
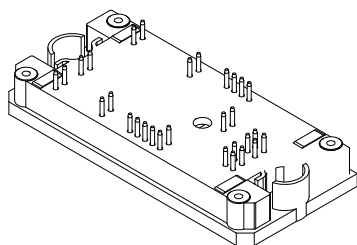
# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

ON Semiconductor®

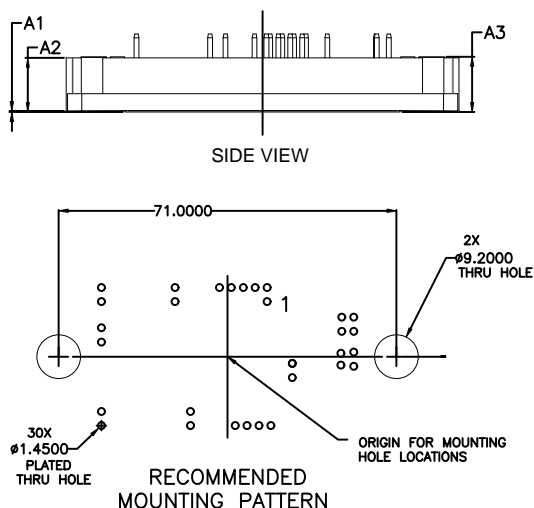


**PIM30, 71x37.4**  
**CASE 180AQ**  
**ISSUE A**

DATE 25 JUN 2018



| MOUNTING HOLE POSITION |        |        | MOUNTING HOLE POSITION |        |        |
|------------------------|--------|--------|------------------------|--------|--------|
| PIN                    | X      | Y      | PIN                    | X      | Y      |
| 1                      | 8.30   | 11.55  | 16                     | -7.800 | -14.50 |
| 2                      | 8.30   | 14.50  | 17                     | 1.60   | -14.50 |
| 3                      | 5.80   | 14.50  | 18                     | 4.10   | -14.50 |
| 4                      | 3.30   | 14.50  | 19                     | 6.60   | -14.50 |
| 5                      | 0.80   | 14.50  | 20                     | 9.10   | -14.50 |
| 6                      | -1.70  | 14.50  | 21                     | 13.60  | -4.40  |
| 7                      | -11.05 | 11.55  | 22                     | 13.60  | -1.45  |
| 8                      | -11.05 | 14.50  | 23                     | 23.80  | -1.80  |
| 9                      | -26.50 | 14.50  | 24                     | 26.50  | -2.05  |
| 10                     | -26.50 | 11.55  | 25                     | 23.80  | 0.70   |
| 11                     | -26.50 | 6.05   | 26                     | 26.50  | 0.95   |
| 12                     | -26.50 | 3.05   | 27                     | 24.00  | 5.30   |
| 13                     | -26.50 | -11.55 | 28                     | 26.50  | 5.30   |
| 14                     | -26.50 | -14.50 | 29                     | 24.00  | 8.30   |
| 15                     | -7.80  | -11.55 | 30                     | 26.50  | 8.30   |



| DIM | MILLIMETERS |       |       |
|-----|-------------|-------|-------|
|     | MIN.        | NOM.  | MAX.  |
| A   | 15.90       | 16.40 | 16.90 |
| A1  | ---         | 0.30  | 0.60  |
| A2  | 10.90       | 11.40 | 11.90 |
| A3  | 11.10       | 11.60 | 12.10 |
| b   | 0.90        | 1.00  | 1.10  |
| D   | 82.00       | 82.50 | 83.00 |
| D1  | 70.50       | 71.00 | 71.50 |
| D2  | 26.50 REF   |       |       |
| E   | 36.90       | 37.40 | 37.90 |
| E1  | 30.30       | 30.80 | 31.30 |
| E2  | 14.50 REF   |       |       |
| F   | 4.30        | 4.30  | 4.50  |
| F1  | 9.5 REF     |       |       |
| F2  | 2.0 REF     |       |       |
| F3  | 5.5 REF     |       |       |

NOTE 4

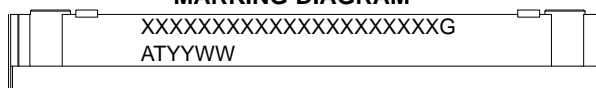
| PIN | PIN POSITION |        | PIN | PIN POSITION |       |
|-----|--------------|--------|-----|--------------|-------|
|     | X            | Y      |     | X            | Y     |
| 1   | 8.30         | -11.55 | 16  | -7.800       | 14.50 |
| 2   | 8.30         | -14.50 | 17  | 1.60         | 14.50 |
| 3   | 5.80         | -14.50 | 18  | 4.10         | 14.50 |
| 4   | 3.30         | -14.50 | 19  | 6.60         | 14.50 |
| 5   | 0.80         | -14.50 | 20  | 9.10         | 14.50 |
| 6   | -1.70        | -14.50 | 21  | 13.60        | 4.40  |
| 7   | -11.05       | -11.55 | 22  | 13.60        | 1.45  |
| 8   | -11.05       | -14.50 | 23  | 23.80        | 1.80  |
| 9   | -26.50       | -14.50 | 24  | 26.50        | 2.05  |
| 10  | -26.50       | -11.55 | 25  | 23.80        | -0.70 |
| 11  | -26.50       | -6.05  | 26  | 26.50        | -0.95 |
| 12  | -26.50       | -3.05  | 27  | 24.00        | -5.30 |
| 13  | -26.50       | 11.55  | 28  | 26.50        | -5.30 |
| 14  | -26.50       | 14.50  | 29  | 24.00        | -8.30 |
| 15  | -7.80        | 11.55  | 30  | 26.50        | -8.30 |

**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS b AND b1 APPLY TO THE PLATED TERMINALS AND ARE MEASURED AT DIMENSION A4.
4. POSITION OF THE CENTER OF THE TERMINALS IS DETERMINED FROM DATUM B THE CENTER OF DIMENSION D, X DIRECTION, AND FROM DATUM A, Y DIRECTION. POSITIONAL TOLERANCE, AS NOTED IN DRAWING, APPLIES TO EACH TERMINAL IN BOTH DIRECTIONS.
5. PACKAGE MARKING IS LOCATED AS SHOWN ON THE SIDE OPPOSITE THE PACKAGE ORIENTATION FEATURES.

**GENERIC**

**MARKING DIAGRAM\***



XXXXX = Specific Device Code  
G = Pb-Free Package  
AT = Assembly & Test Site Code  
YYWW = Year and Work Week Code

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

|                         |                       |  |
|-------------------------|-----------------------|--|
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| <b>DESCRIPTION:</b>     | <b>PIM30, 71x37.4</b> | <b>PAGE 1 OF 1</b>   |

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