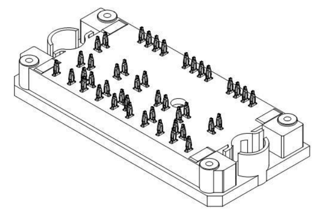
# Q1 3-Phase TNPC Module

# NXH40T120L3Q1

The NXH40T120L2Q1 is a power module containing a three channel T−type neutral−point clamped (TNPC) circuit. Each channel has two 1200 V, 40 A IGBTs with inverse diodes and two 650 V, 25 A IGBTs with inverse diodes. The module contains an NTC thermistor.



**Q1 3−TNPC**
**CASE 180AS**
Solder pins follow similar pattern

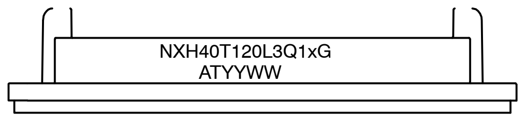
### Features

- Low Package Height
- Compact 82.5 mm x 37.4 mm x 12 mm Package
- Options with Press−fit Pins and Solder Pins
- Options with Pre−applied Thermal Interface Material (TIM) and without Pre−applied TIM
- Thermistor
- This Device is Pb−Free and is RoHS Compliant

### Applications

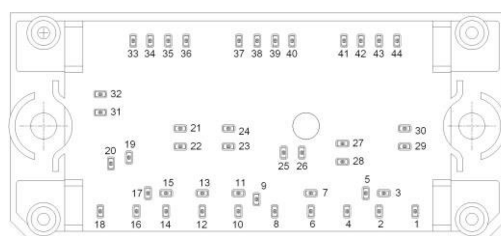
- Solar Inverters
- UPS
- Energy Storage Systems

### MARKING DIAGRAM




| | |
|---|---|
| NXH40T120L3Q1x | = Device Code |
| A | = Assembly Site Code |
| T | = Test Site Code |
| YYWW | = Year and Work Week Code |
| G | = Pb−Free Package |

### PIN CONNECTIONS



### ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

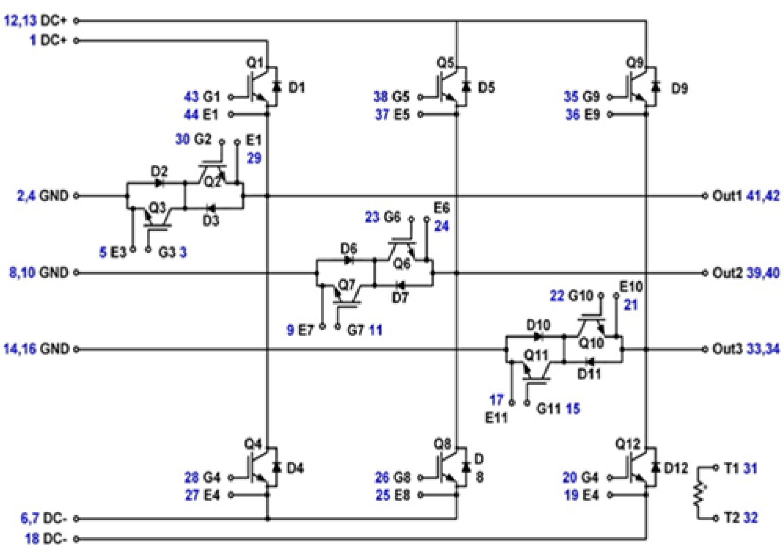



**Figure 1. NXH40T120L3Q1 Schematic Diagram**

**MAXIMUM RATINGS** (Note 1)

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| **IGBT (Q1, Q4, Q5, Q8, Q9, Q12)** | | | |
| Collector – Emitter Voltage | $V_{CES}$ | 1200 | V |
| Gate – Emitter Voltage | $V_{GE}$ | ±20 | V |
| Continuous Collector Current @ $T_C$ = 80°C ($T_J$ = 175°C) | $I_C$ | 40 | A |
| Pulsed Collector Current ($T_J$ = 175°C) | $I_{Cpulse}$ | 120 | A |
| Maximum Power Dissipation ($T_J$ = 175°C) | $P_{tot}$ | 145 | W |
| Minimum Operating Junction Temperature | $T_{JMIN}$ | −40 | °C |
| Maximum Operating Junction Temperature | $T_{JMAX}$ | 175 | °C |
| **DIODE (D1, D4, D5, D8, D9, D12)** | | | |
| Peak Repetitive Reverse Voltage | $V_{RRM}$ | 1200 | V |
| Continuous Forward Current @ $T_C$ = 80°C ($T_J$ = 175°C) | $I_F$ | 25 | A |
| Repetitive Peak Forward Current ($T_J$ = 175°C) | $I_{FRM}$ | 75 | A |
| Maximum Power Dissipation ($T_J$ = 175°C) | $P_{tot}$ | 55 | W |
| Minimum Operating Junction Temperature | $T_{JMIN}$ | – 40 | °C |
| Maximum Operating Junction Temperature | $T_{JMAX}$ | 175 | °C |
| **IGBT+DIODE (Q2+D2, Q3+D3, Q6+D6, Q7+D7, Q10+D10, Q11+D11)** | | | |
| Collector – Emitter Voltage | $V_{CES}$ | 650 | V |
| Gate – Emitter Voltage | $V_{GE}$ | ±20 | V |
| Continuous Collector Current @ $T_C$ = 80°C ($T_J$ = 175°C) | $I_C$ | 42 | A |
| Pulsed Collector Current ($T_J$ = 175°C) | $I_{Cpulse}$ | 126 | A |
| Maximum Power Dissipation ($T_J$ = 175°C) | $P_{tot}$ | 146 | W |
| Minimum Operating Junction Temperature | $T_{JMIN}$ | −40 | °C |
| Maximum Operating Junction Temperature | $T_{JMAX}$ | 175 | °C |
| **THERMAL PROPERTIES** | | | |
| Storage Temperature range | $T_{stg}$ | – 40 to 150 | °C |
| **INSULATION PROPERTIES** | | | |
| Isolation Test Voltage, t = 1 sec, 60 Hz | $V_{is}$ | 3000 | $V_{RMS}$ |
| Creepage Distance | | 12.7 | 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.

1. Refer to ELECTRICAL CHARACTERISTICS, RECOMMENDED OPERATING RANGES and/or APPLICATION INFORMATION for Safe Operating parameters.

**RECOMMENDED OPERATING CONDITIONS**

| Rating | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| Module Operating Junction Temperature | $T_J$ | −40 | 150 | °C |

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

**ELECTRICAL CHARACTERISTICS** ($T_J$ = 25°C Unless Otherwise Noted)

| Parameter | Test Conditions | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **IGBT CHARACTERISTICS (Q1, Q4, Q5, Q8, Q9, Q12)** | | | | | | |
| Collector−Emitter Cutoff Current | $V_{GE}$ = 0 V, $V_{CE}$ = 1200 V | ICES | – | – | 400 | μA |
| Collector−Emitter Saturation Voltage | $V_{GE}$ = 15 V, $I_C$ = 40 A, $T_J$ = 25°C | VCE(sat) | – | 1.85 | 2.20 | V |
| | $V_{GE}$ = 15 V, $I_C$ = 40 A , $T_J$ = 150°C | | – | 2.25 | – | |
| Gate−Emitter Threshold Voltage | $V_{GE}$ = $V_{CE}$, $I_C$ = 1.5 mA | VGE(TH) | 4.50 | – | 6.50 | V |
| Gate Leakage Current | $V_{GE}$ = 20 V, $V_{CE}$ = 0 V | IGES | – | – | 800 | nA |
| Turn−on Delay Time | $T_J$ = 25°C<br>$V_{CE}$ = 350 V, $I_C$ = 28 A,<br>$V_{GE}$ = ±15 V, $R_G$ = 8 Ω | td(on) | – | 63 | – | ns |
| Rise Time | | $t_r$ | – | 22 | – | |
| Turn−off Delay Time | | td(off) | – | 199 | – | |
| Fall Time | | $t_f$ | – | 23 | – | |
| Turn−on Switching Loss per Pulse | | Eon | – | 560 | – | μJ |
| Turn off Switching Loss per Pulse | | Eoff | – | 338 | – | |
| Turn−on Delay Time | $T_J$ = 125°C<br>$V_{CE}$ = 350 V, $I_C$ = 28 A,<br>$V_{GE}$ = ±15 V, $R_G$ = 8 Ω | td(on) | – | 59 | – | ns |
| Rise Time | | $t_r$ | – | 24 | – | |
| Turn−off Delay Time | | td(off) | – | 225 | – | |
| Fall Time | | $t_f$ | – | 80 | – | |
| Turn – on Switching Loss per Pulse | | Eon | – | 757 | – | μJ |
| Turn off Switching Loss per Pulse | | Eoff | – | 910 | – | |
| Input Capacitance | $V_{CE}$ = 20 V $V_{GE}$ = 0 V, f = 1 MHz | Cies | – | 7753 | – | pF |
| Output Capacitance | | Coes | – | 227 | – | |
| Reverse Transfer Capacitance | | Cres | – | 127 | – | |
| Total Gate Charge | $V_{CE}$ = 350 V, $I_C$ = 40 A, $V_{GE}$ = ±15 V | $Q_g$ | – | 536 | – | nC |
| Thermal Resistance – chip−to−heatsink | Thermal grease, Thickness ≤ 2.25 Mil, λ = 2.9 W/mK | RthJH | – | 1.01 | – | °C/W |
| **DIODE CHARACTERISTICS (D1, D4, D5, D8, D9, D12)** | | | | | | |
| Diode Forward Voltage | $I_F$ = 20 A, $T_J$ = 25°C | $V_F$ | – | 2.4 | 2.7 | V |
| | $I_F$ = 20 A, $T_J$ = 150°C | | – | 1.7 | – | |
| Reverse Recovery Time | $T_J$ = 25°C<br>$V_{CE}$ = 350 V, $I_C$ = 28 A,<br>$V_{GE}$ = ±15 V, $R_G$ = 16 Ω | trr | – | 43 | – | ns |
| Reverse Recovery Charge | | Qrr | – | 756 | – | μC |
| Peak Reverse Recovery Current | | IRRM | – | 35 | – | A |
| Peak Rate of Fall of Recovery Current | | di/dt | – | 750 | – | A/μs |
| Reverse Recovery Energy | | Err | – | 104 | – | μJ |
| Reverse Recovery Time | $T_J$ = 125°C<br>$V_{CE}$ = 350 V, $I_C$ = 28 A,<br>$V_{GE}$ = ±15 V, $R_G$ = 16 Ω | trr | – | 129 | – | ns |
| Reverse Recovery Charge | | Qrr | – | 2702 | – | μC |
| Peak Reverse Recovery Current | | IRRM | – | 45 | – | A |
| Peak Rate of Fall of Recovery Current | | di/dt | – | 407 | – | A/μs |
| Reverse Recovery Energy | | Err | – | 428 | – | μJ |
| Thermal Resistance – chip−to−heatsink | Thermal grease, Thickness ≤ 2.25 Mil, λ = 2.9 W/mK | RthJH | – | 1.63 | – | °C/W |

**ELECTRICAL CHARACTERISTICS** ($T_J$ = 25°C Unless Otherwise Noted) (continued)

| Parameter | Test Conditions | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **IGBT CHARACTERISTICS (Q2, Q3, Q6, Q7, Q10, Q11)** | | | | | | |
| Collector−Emitter Cutoff Current | $V_{GE}$ = 0 V, $V_{CE}$ = 650 V | ICES | – | – | 250 | µA |
| Collector−Emitter Saturation Voltage | $V_{GE}$ = 15 V, $I_C$ = 50 A, $T_J$ = 25°C | VCE(sat) | – | 1.50 | – | V |
| | $V_{GE}$ = 15 V, $I_C$ = 50 A , $T_J$ = 150°C | | – | 1.53 | – | |
| Gate−Emitter Threshold Voltage | $V_{GE}$ = $V_{CE}$, $I_C$ = 1.65 mA | VGE(TH) | 2.60 | 4.40 | 6.40 | V |
| Gate Leakage Current | $V_{GE}$ = 20 V, $V_{CE}$ = 0 V | IGES | – | – | 400 | nA |
| Turn−on Delay Time | $T_J$ = 25°C<br>$V_{CE}$ = 350 V, $I_C$ = 28 A,<br>$V_{GE}$ = ±15 V, $R_G$ = 16 Ω | td(on) | – | 54 | – | ns |
| Rise Time | | $t_r$ | – | 15 | – | |
| Turn−off Delay Time | | td(off) | – | 157 | – | |
| Fall Time | | $t_f$ | – | 12 | – | |
| Turn−on Switching Loss per Pulse | | Eon | – | 416 | – | µJ |
| Turn off Switching Loss per Pulse | | Eoff | – | 321 | – | |
| Turn−on Delay Time | $T_J$ = 125°C<br>$V_{CE}$ = 350 V, $I_C$ = 28 A,<br>$V_{GE}$ = ±15 V, $R_G$ = 16 Ω | td(on) | – | 52 | – | ns |
| Rise Time | | $t_r$ | – | 16 | – | |
| Turn−off Delay Time | | td(off) | – | 178 | – | |
| Fall Time | | $t_f$ | – | 18 | – | |
| Turn – on Switching Loss per Pulse | | Eon | – | 671 | – | µJ |
| Turn off Switching Loss per Pulse | | Eoff | – | 444 | – | |
| Input Capacitance | $V_{CE}$ = 20 V $V_{GE}$ = 0 V, f = 1 MHz | Cies | – | 3137 | – | pF |
| Output Capacitance | | Coes | – | 146 | – | |
| Reverse Transfer Capacitance | | Cres | – | 17 | – | |
| Total Gate Charge | $V_{CE}$ = 350 V, $I_C$ = 40 A, $V_{GE}$ = ±15 V | $Q_g$ | – | 180 | – | nC |
| Thermal Resistance – chip−to−heatsink | Thermal grease, Thickness ≤ 2.25 Mil, λ = 2.9 W/mK | RthJH | – | 0.995 | – | °C/W |
| **DIODE CHARACTERISTICS (D2, D3, D6, D7, D10, D11)** | | | | | | |
| Diode Forward Voltage | $I_F$ = 20 A, $T_J$ = 25°C | $V_F$ | – | 1.28 | – | V |
| | $I_F$ = 20 A, $T_J$ = 150°C | | – | 1.18 | – | |
| Combined IGBT + Diode Voltage Drop | $I_F$ = 20 A, $T_J$ = 25°C | $V_F$ | – | 3.05 | 3.4 | V |
| Reverse Recovery Time | $T_J$ = 25°C<br>$V_{CE}$ = 350 V, $I_C$ = 28 A,<br>$V_{GE}$ = ±15 V, $R_G$ = 8 Ω | trr | – | 69 | – | ns |
| Reverse Recovery Charge | | Qrr | – | 1267 | – | µC |
| Peak Reverse Recovery Current | | IRRM | – | 41 | – | A |
| Peak Rate of Fall of Recovery Current | | di/dt | – | 1599 | – | A/µs |
| Reverse Recovery Energy | | Err | – | 244 | – | µJ |
| Reverse Recovery Time | $T_J$ = 125°C<br>$V_{CE}$ = 350 V, $I_C$ = 28 A,<br>$V_{GE}$ = ±15 V, $R_G$ = 8 Ω | trr | – | 111 | – | ns |
| Reverse Recovery Charge | | Qrr | – | 2323 | – | µC |
| Peak Reverse Recovery Current | | IRRM | – | 40 | – | A |
| Peak Rate of Fall of Recovery Current | | di/dt | – | 470 | – | A/µs |
| Reverse Recovery Energy | | Err | – | 510 | – | µJ |

**ELECTRICAL CHARACTERISTICS** ($T_J$ = 25°C Unless Otherwise Noted) (continued)

| Parameter | Test Conditions | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **THERMISTOR CHARACTERISTICS** | | | | | | |
| Nominal resistance | T = 25°C | R25 | | 22 | | kΩ |
| Nominal resistance | T = 100°C | R100 | | 1468 | | Ω |
| Deviation of R25 | | R/R | −5 | | 5 | % |
| Power dissipation | | $P_D$ | | 200 | | mW |
| Power dissipation constant | | | | 2 | | mW/K |
| B−value | B(25/50), tolerance ±3% | | | 3950 | | K |
| B−value | B(25/100), tolerance ±3% | | | 3998 | | K |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

## ORDERING INFORMATION

| Orderable Part Number | Marking | Package | Shipping |
|---|---|---|---|
| NXH40T120L3Q1PG | NXH40T120L3Q1PG | Q1 3−Phase TNPC − Case 180AS<br>Press−fit Pins (Pb−Free) | 21 Units / Blister Tray |
| NXH40T120L3Q1SG | NXH40T120L3Q1SG | Q1 3−Phase TNPC − Case 180BN<br>Solder Pins (Pb−Free) | 21 Units / Blister Tray |
| NXH40T120L3Q1PTG | NXH40T120L3Q1PTG | Q1 3−Phase TNPC − Case 180AS<br>Press−fit Pins (Pb−Free) | 21 Units / Blister Tray |

## TYPICAL CHARACTERISTICS – HALF BRIDGE IGBT (Q1, Q4, Q5, Q8, Q9, Q12) AND DIODE (D1, D4, D5, D8, D9, D12)

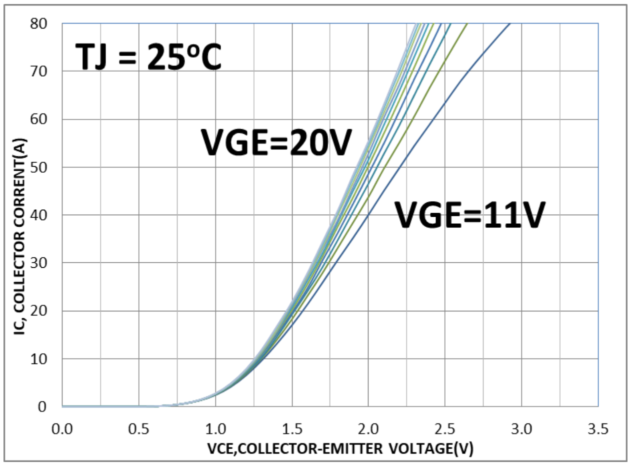



**Figure 2. Typical Output Characteristics**

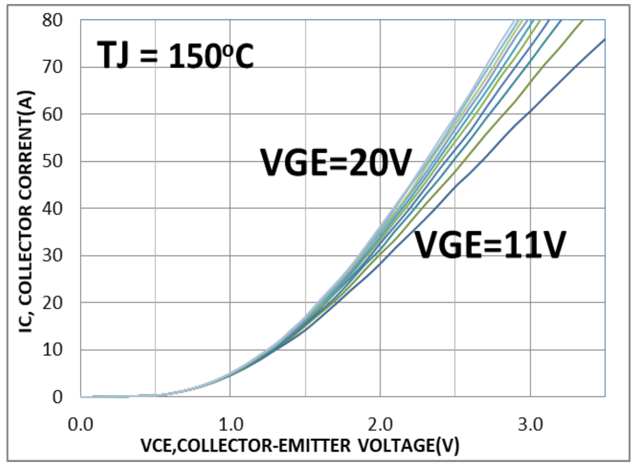



**Figure 3. Typical Output Characteristics**

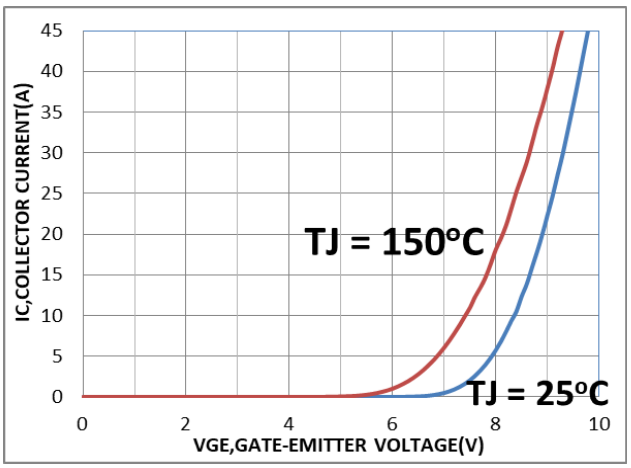



**Figure 4. Typical Transfer Characteristics**

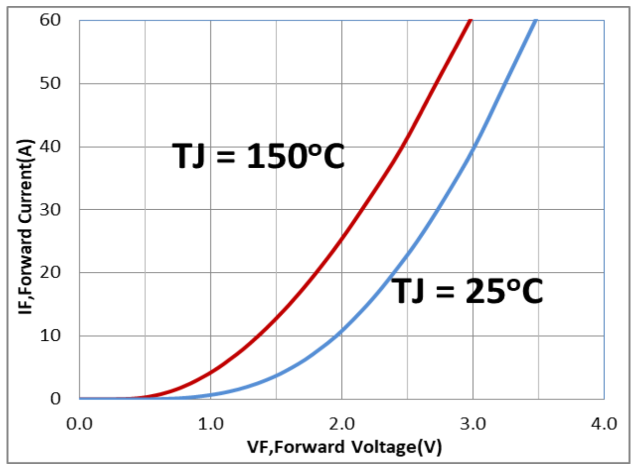



**Figure 5. Diode Forward Characteristics**

## TYPICAL CHARACTERISTICS – HALF BRIDGE IGBT (Q1, Q4, Q5, Q8, Q9, Q12) AND DIODE (D1, D4, D5, D8, D9, D12)

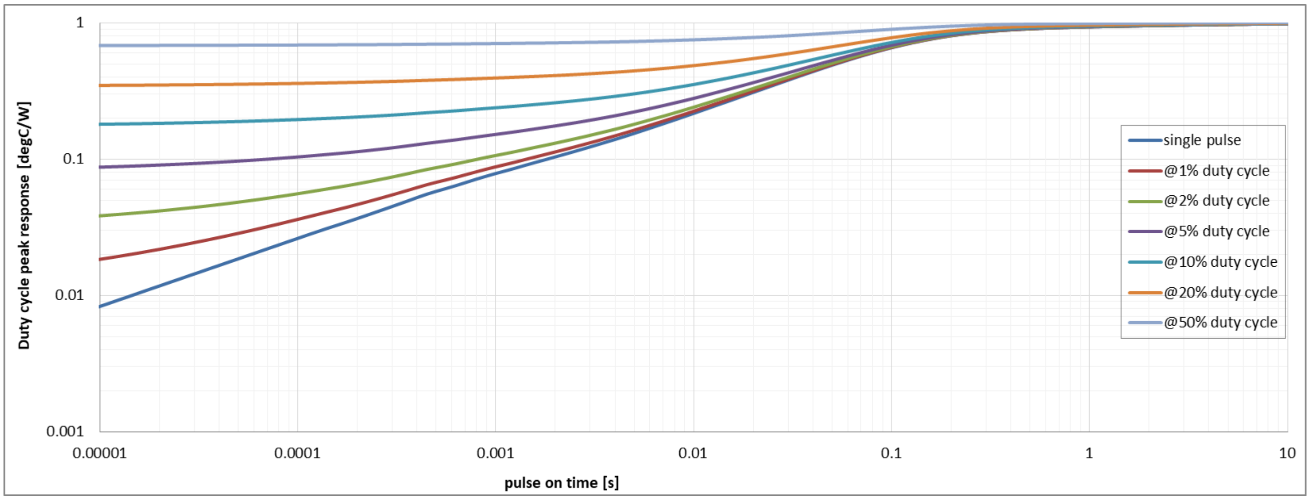



**Figure 6. Transient Thermal Impedance (Half Bridge IGBT)**

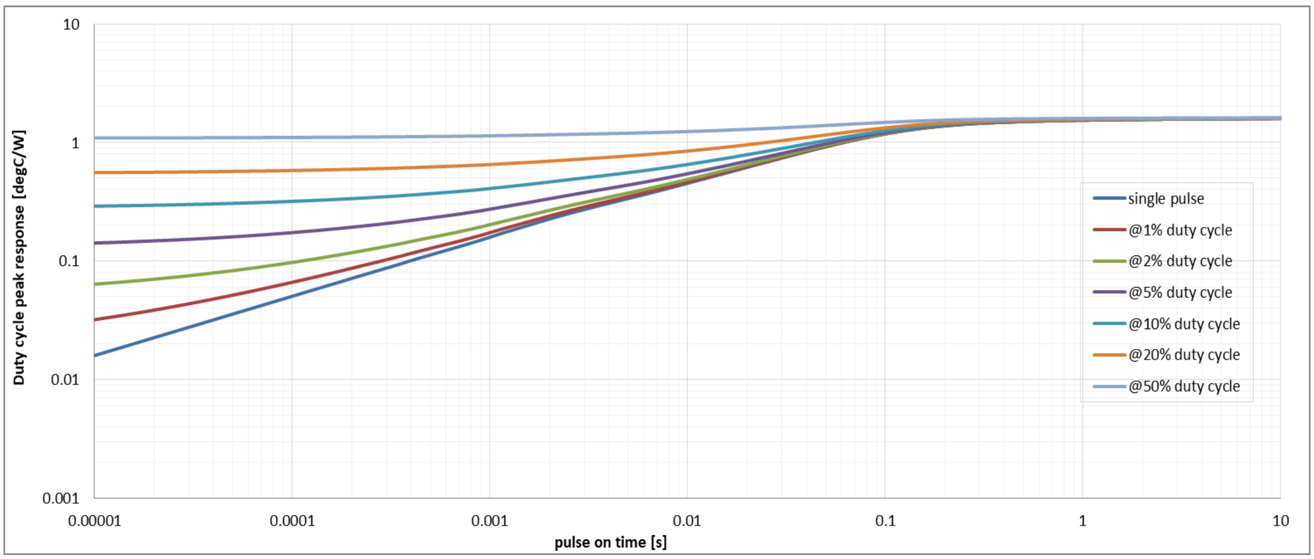



**Figure 7. Transient Thermal Impedance (Half Bridge Diode)**

## TYPICAL CHARACTERISTICS – HALF BRIDGE IGBT (Q1, Q4, Q5, Q8, Q9, Q12) AND DIODE (D1, D4, D5, D8, D9, D12)

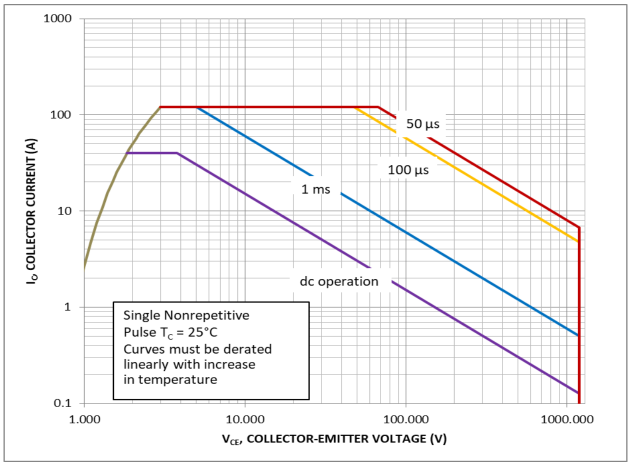



Figure 8. FBSOA

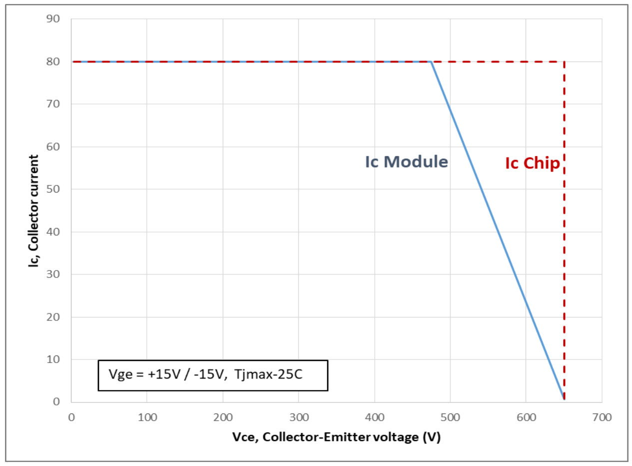



Figure 9. RBSOA

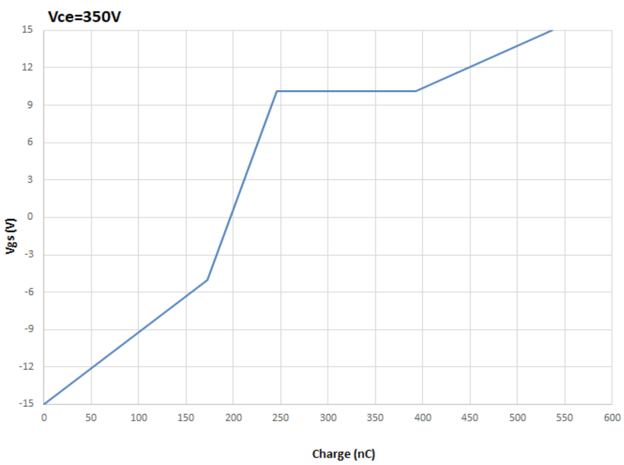



Figure 10. Gate Voltage vs. Gate Charge

## TYPICAL CHARACTERISTICS – NP IGBT + DIODE (Q2+D2, Q3+D3, Q6+D6, Q7+D7, Q10+D10, Q11+D11)

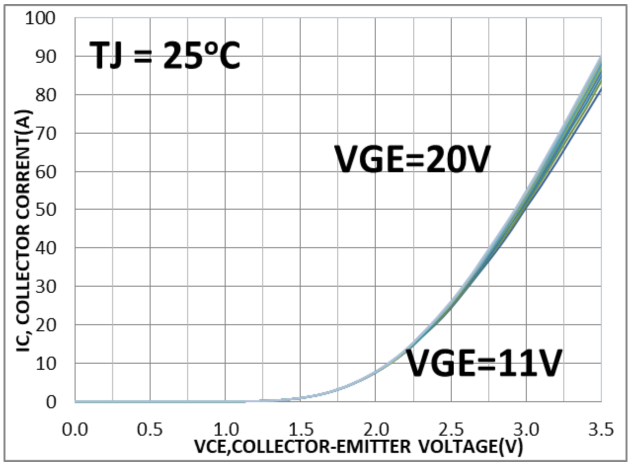



**Figure 11. Typical Output Characteristics ($I_C$ versus $V_{DT}$)**

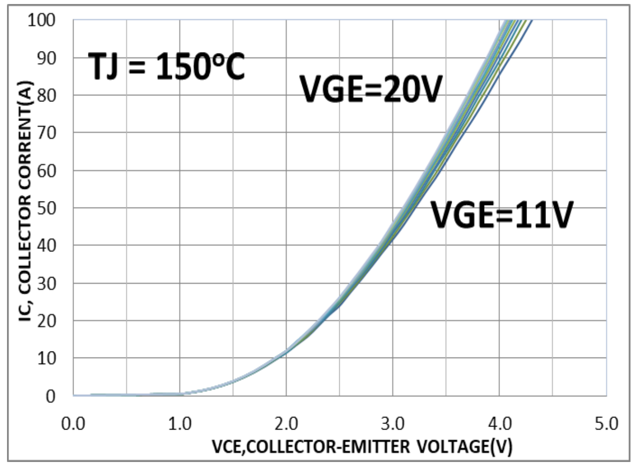



**Figure 12. Typical Output Characteristics ($I_C$ versus $V_{DT}$)**

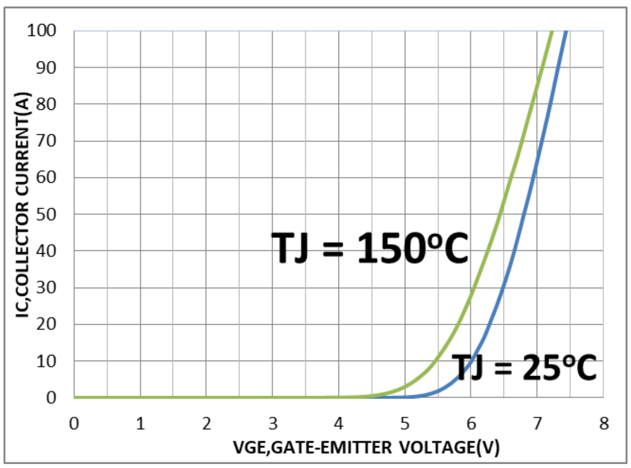



**Figure 13. Typical Transfer Characteristics**

## TYPICAL CHARACTERISTICS – NP IGBT + DIODE (Q2+D2, Q3+D3, Q6+D6, Q7+D7, Q10+D10, Q11+D11)

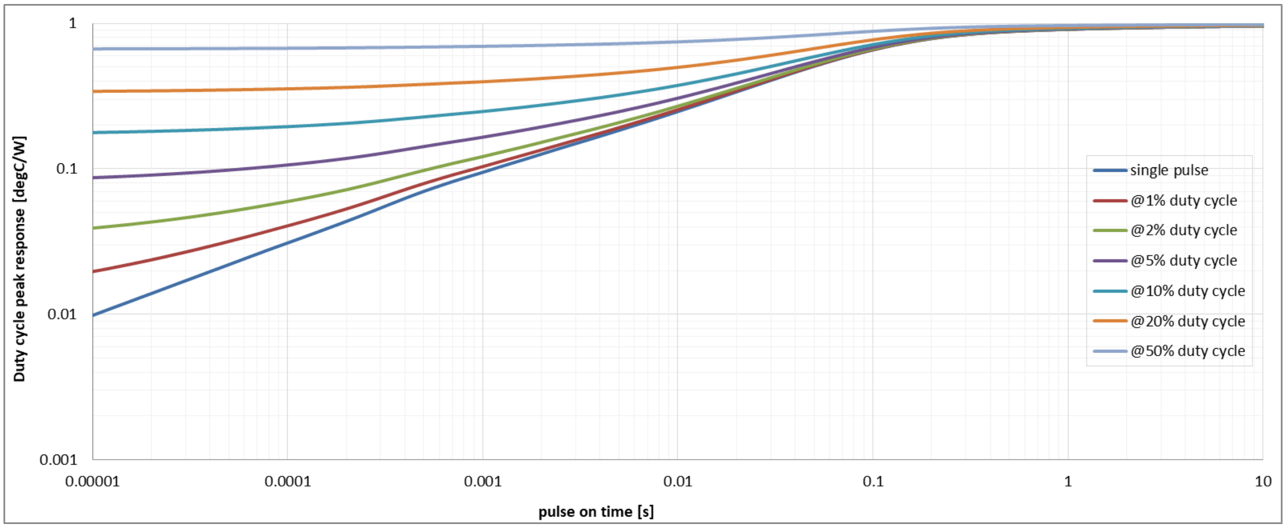



**Figure 14. Transient Thermal Impedance (Neutral Point IGBT + Diode)**

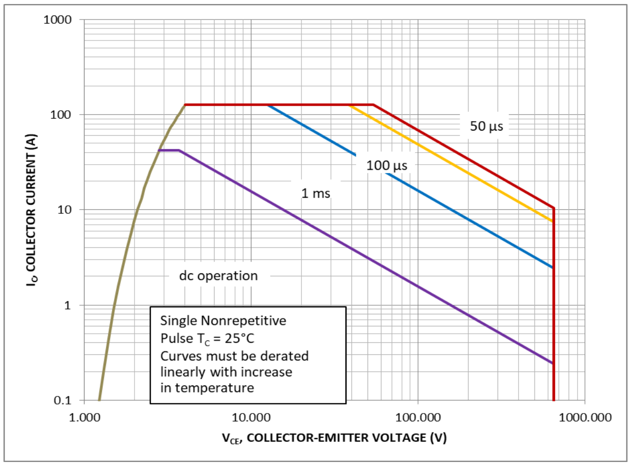



**Figure 15. FBSOA (NP IGBT + Diode)**

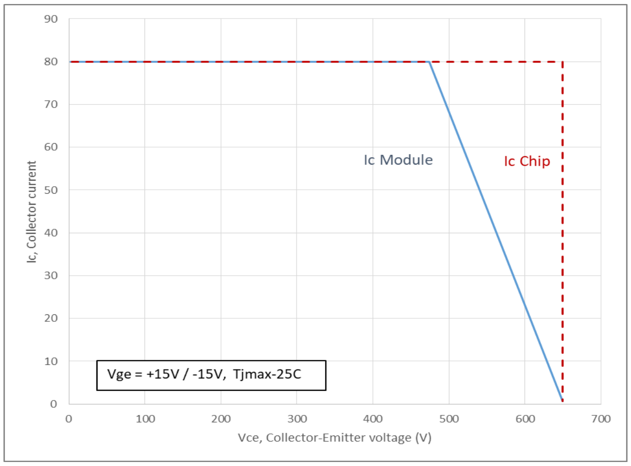



**Figure 16. RBSOA (NP IGBT + Diode)**

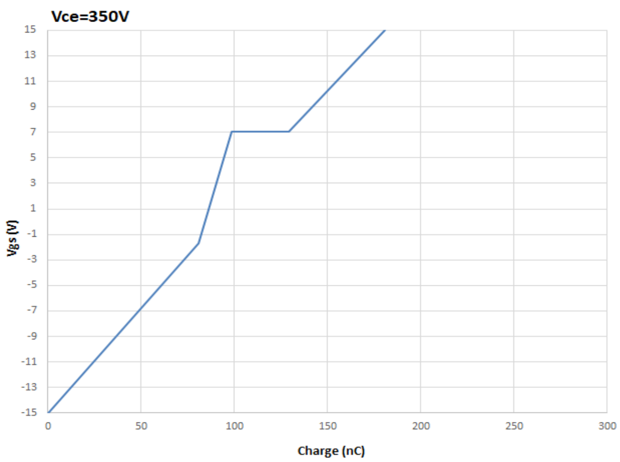



**Figure 17. Gate Voltage vs. Gate Charge**

## TYPICAL CHARACTERISTICS – HALF BRIDGE IGBT COMMUTATES NEUTRAL POINT DIODE

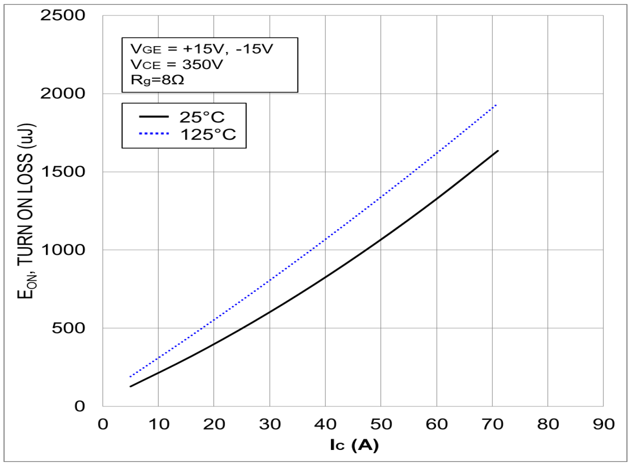



Figure 18. Typical Switching Loss $E_{ON}$ vs. $I_C$

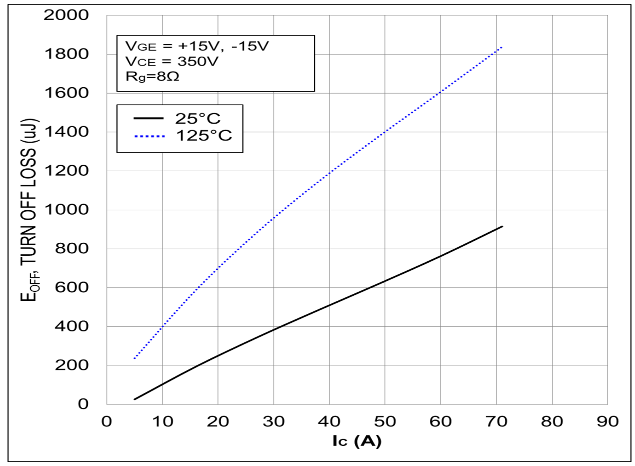



Figure 19. Typical Switching Loss $E_{OFF}$ vs. $I_C$

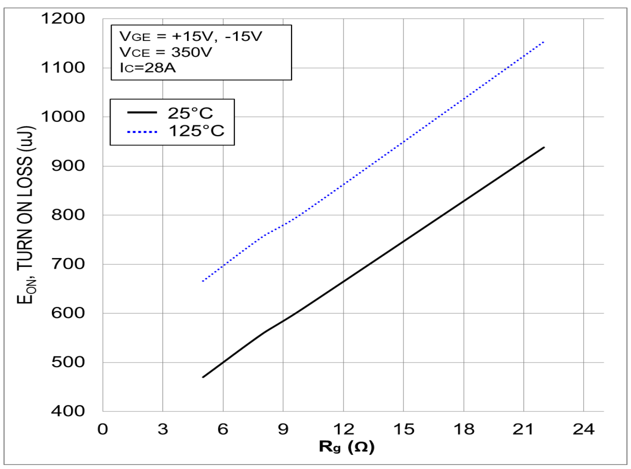



Figure 20. Typical Switching Loss $E_{ON}$ vs. $R_G$

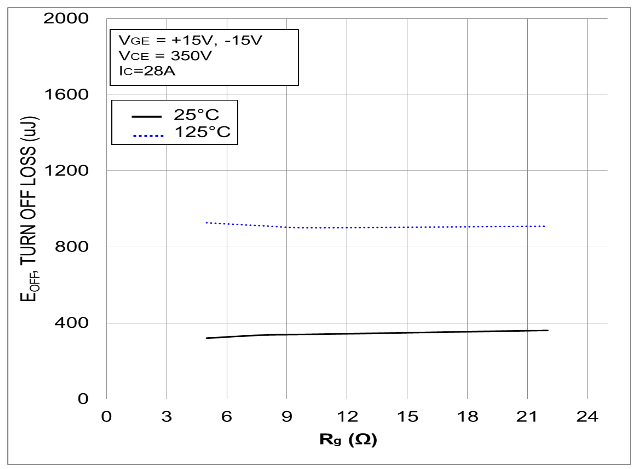



Figure 21. Typical Switching Loss $E_{OFF}$ vs. $R_G$

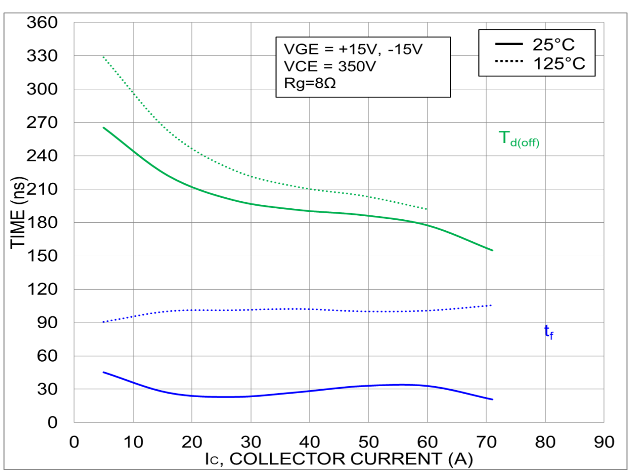



Figure 22. Typical Switching Time $T_{DOFF}$ vs. $I_C$

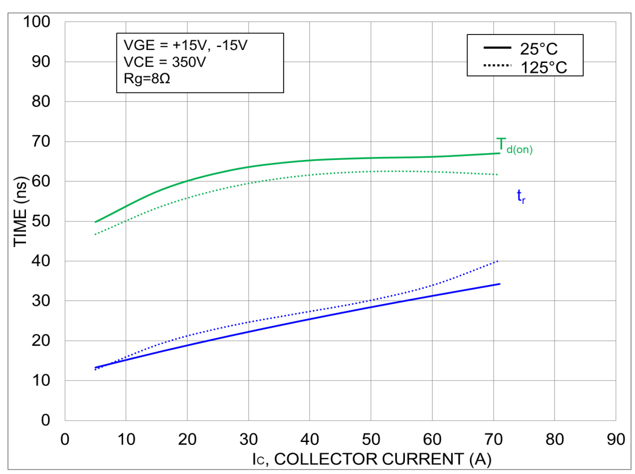



Figure 23. Typical Switching Time $T_{DON}$ vs. $I_C$

## TYPICAL CHARACTERISTICS – HALF BRIDGE IGBT COMMUTATES NEUTRAL POINT DIODE

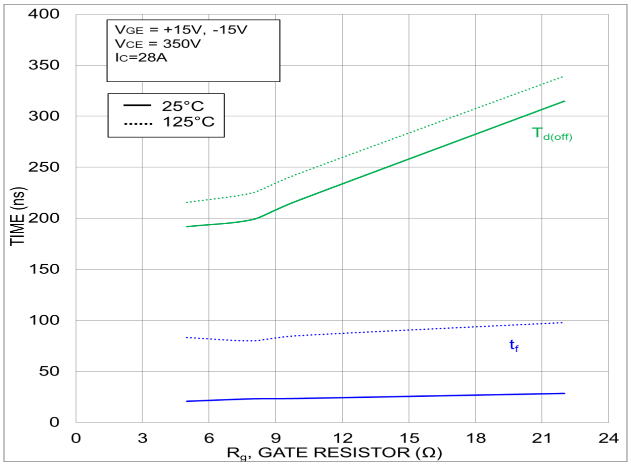



**Figure 24. Typical Switching Time $T_{DOFF}$ vs. $R_G$**

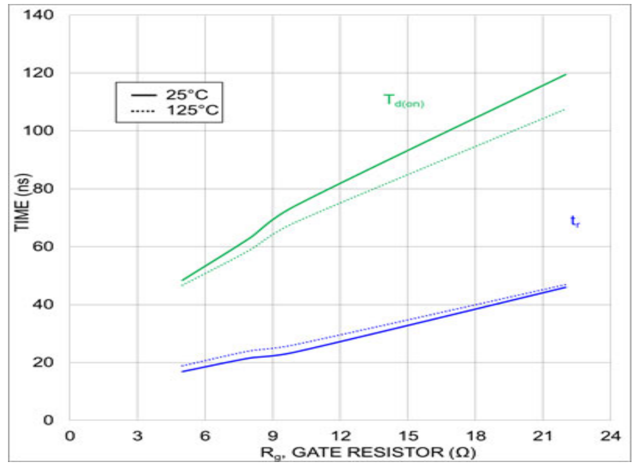



**Figure 25. Typical Switching Time $T_{DON}$ vs. $R_G$**

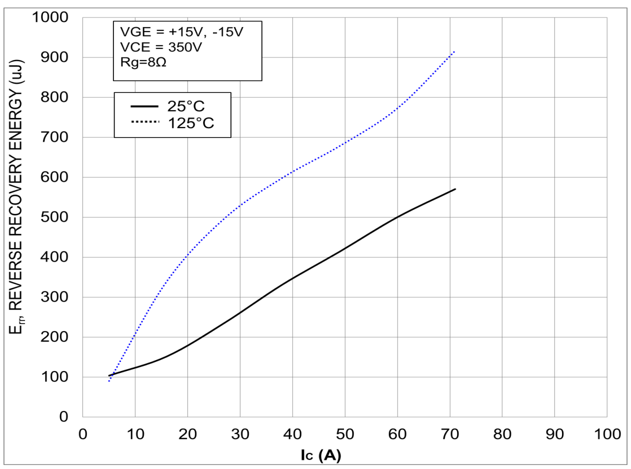



**Figure 26. Typical Reverse Recovery Energy Loss vs. $I_C$**

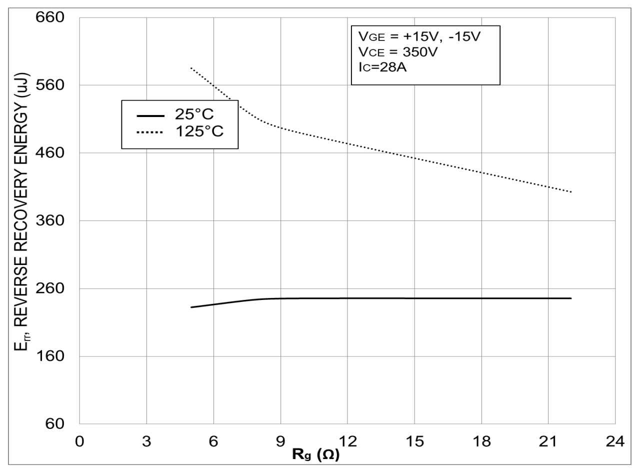



**Figure 27. Typical Reverse Recovery Energy Loss vs. $R_G$**

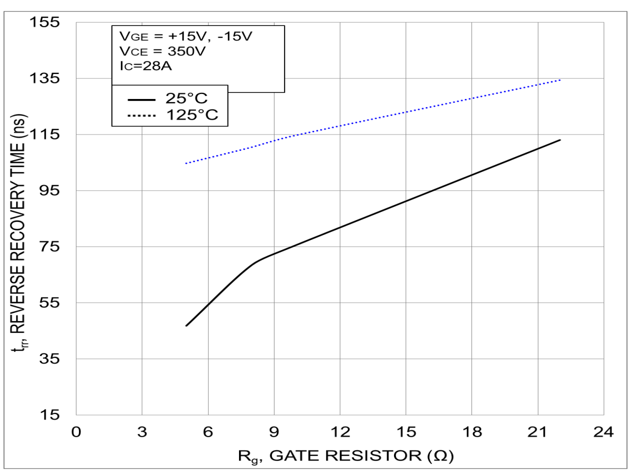



**Figure 28. Typical Reverse Recovery Time vs. $R_G$**

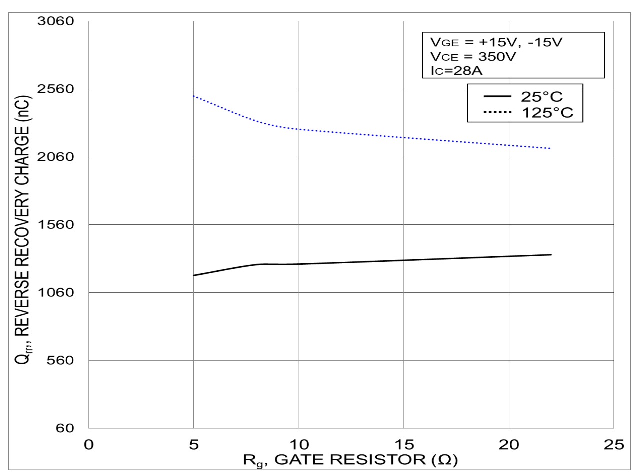



**Figure 29. Typical Reverse Recovery Charge vs. $R_G$**

## TYPICAL CHARACTERISTICS – HALF BRIDGE IGBT COMMUTATES NEUTRAL POINT DIODE

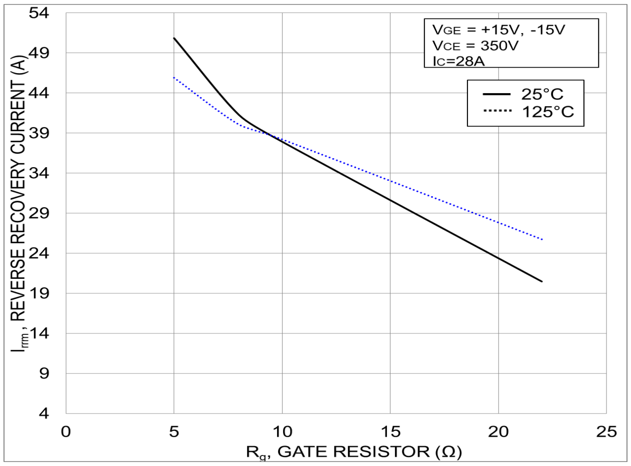



**Figure 30. Typical Reverse Recovery Peak Current vs. $R_G$**

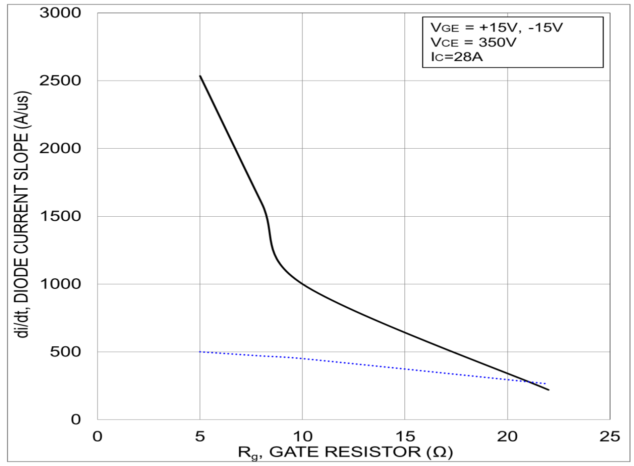



**Figure 31. Typical di/dt vs. $R_G$**

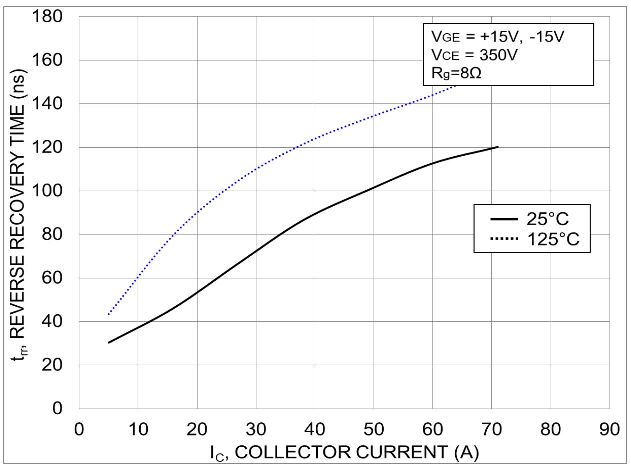



**Figure 32. Typical Reverse Recovery Time vs. $I_C$**

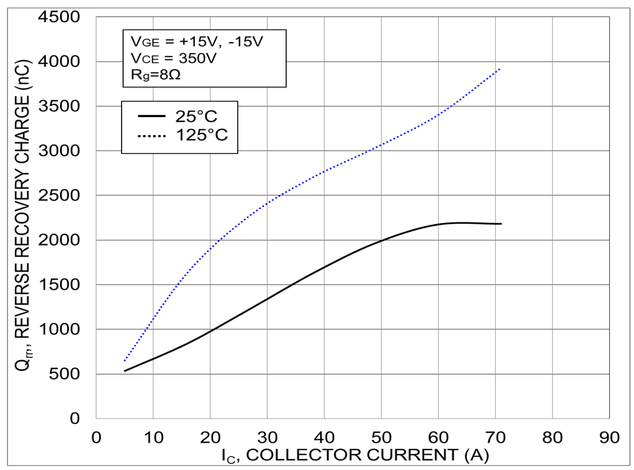



**Figure 33. Typical Reverse Recovery Charge vs. $I_C$**

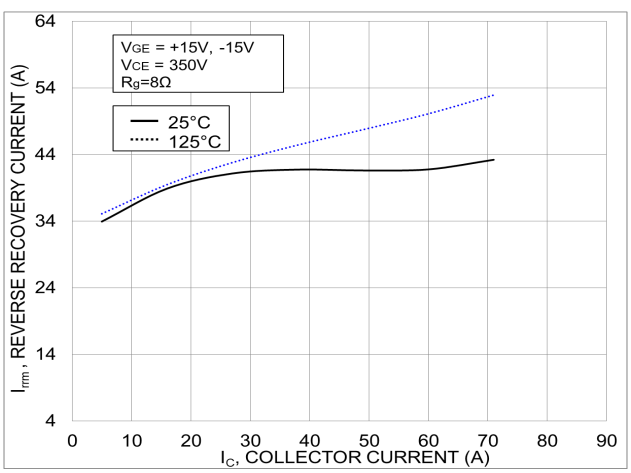



**Figure 34. Typical Reverse Recovery Current vs. $I_C$**

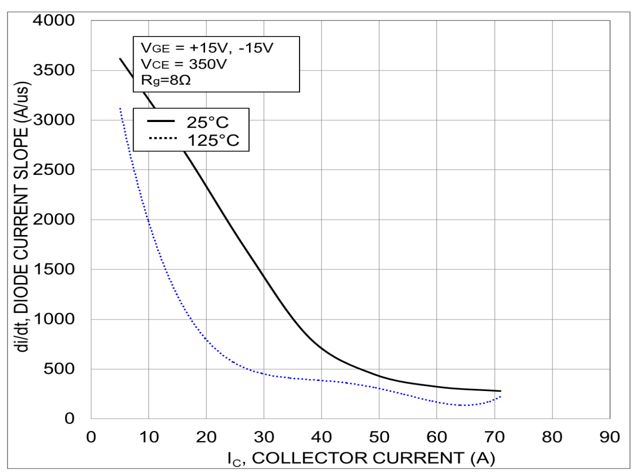



**Figure 35. Typical di/dt Current Slope vs. $I_C$**

## TYPICAL CHARACTERISTICS – NEUTRAL POINT IGBT COMMUTATES HALF BRIDGE DIODE

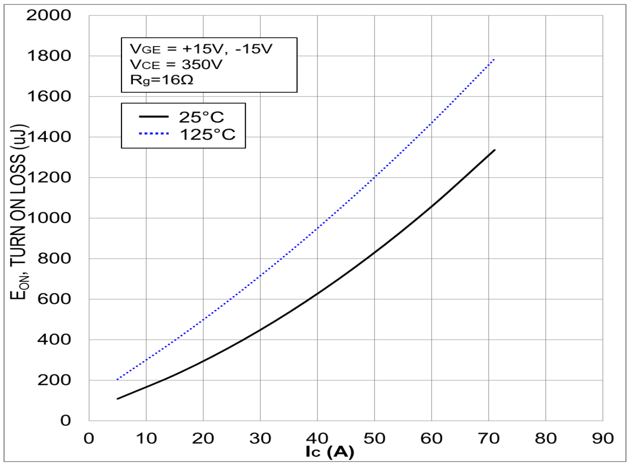



**Figure 36. Typical Turn ON Loss vs. $I_C$**

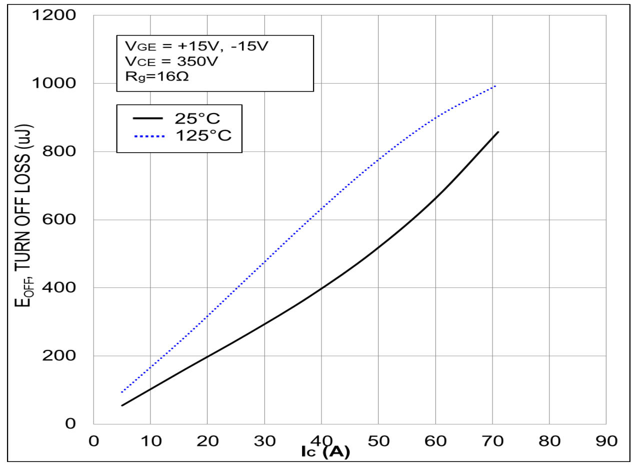



**Figure 37. Typical Turn OFF Loss vs. $I_C$**

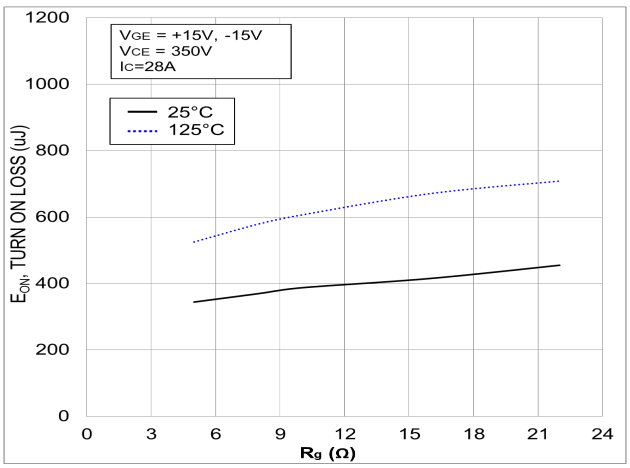



**Figure 38. Typical Turn ON Loss vs. $R_G$**

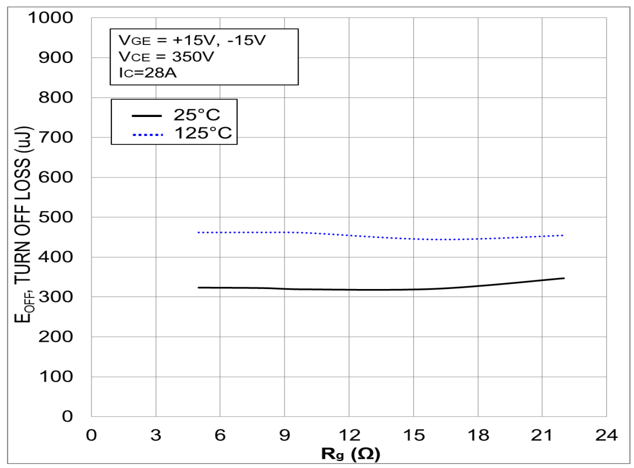



**Figure 39. Typical Turn OFF Loss vs. $R_G$**

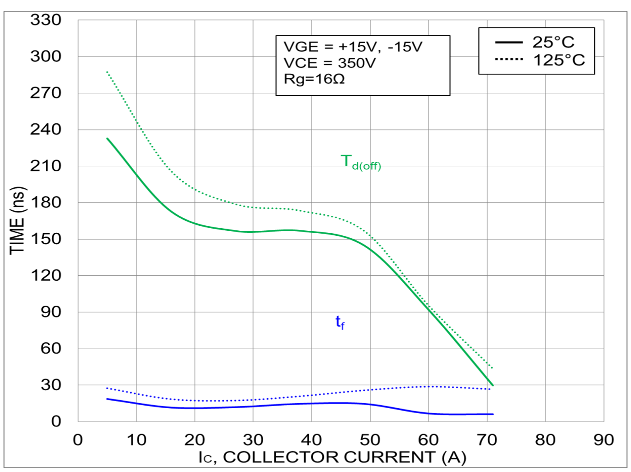



**Figure 40. Typical Turn−Off Switching Time vs. $I_C$**

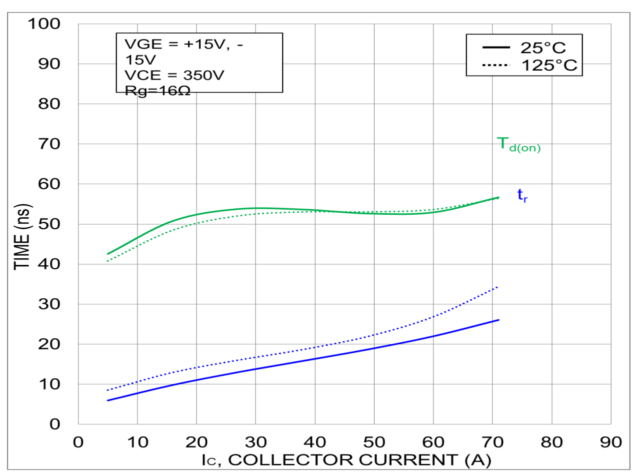



**Figure 41. Typical Turn−On Switching Time vs. $I_C$**

## TYPICAL CHARACTERISTICS – NEUTRAL POINT IGBT COMMUTATES HALF BRIDGE DIODE

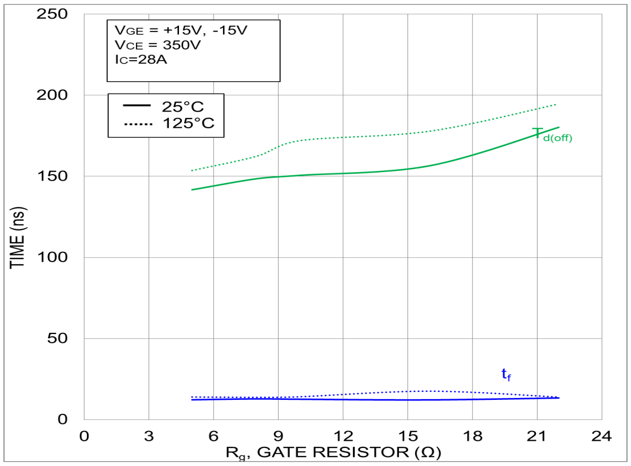



**Figure 42. Typical Turn−Off Switching Time vs. $R_G$**

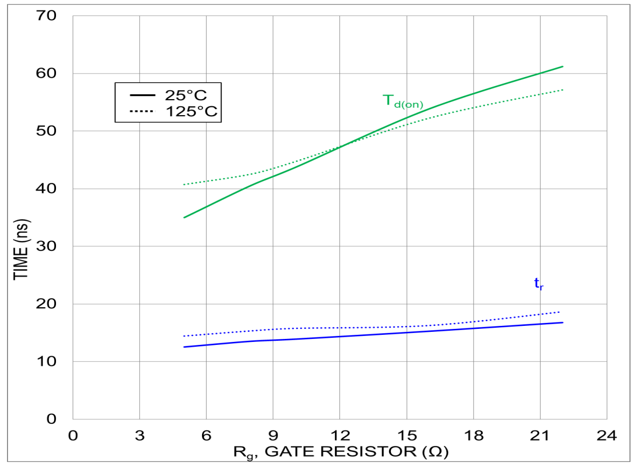



**Figure 43. Typical Turn−On Switching Time vs. $R_G$**

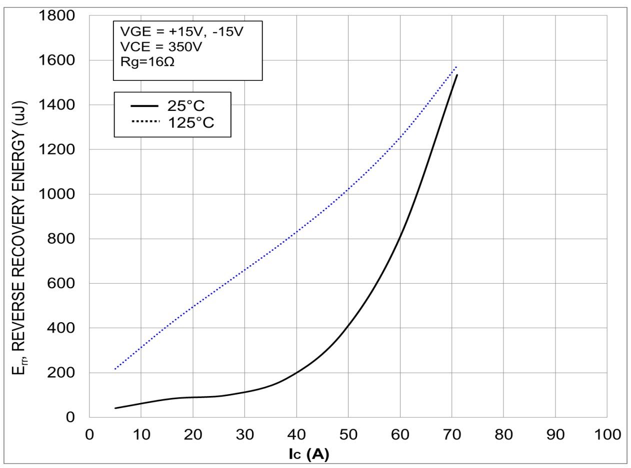



**Figure 44. Typical Reverse Recovery Energy Loss vs. $I_C$**

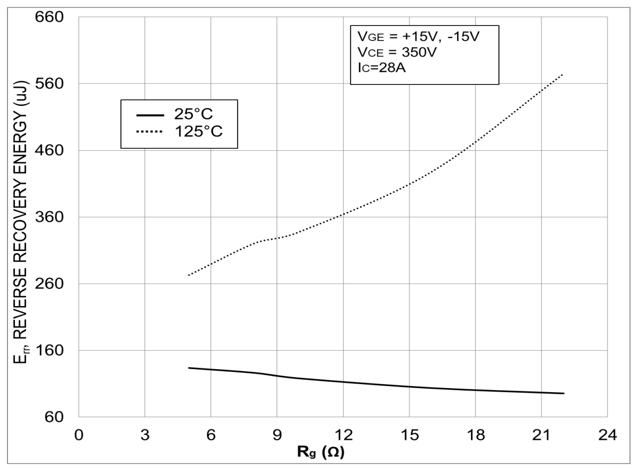



**Figure 45. Typical Reverse Recovery Energy Loss vs. $R_G$**

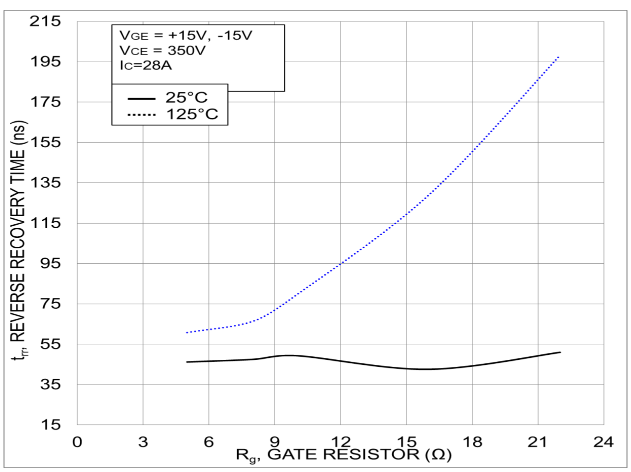



**Figure 46. Typical Reverse Recovery Time vs. $R_G$**

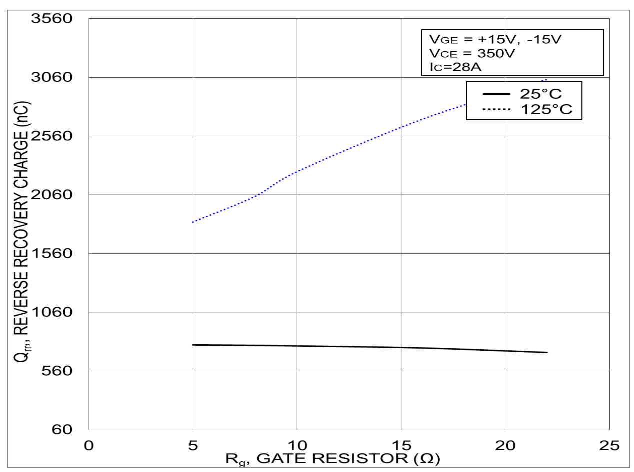



**Figure 47. Typical Reverse Recovery Charge vs. $R_G$**

## TYPICAL CHARACTERISTICS – NEUTRAL POINT IGBT COMMUTATES HALF BRIDGE DIODE

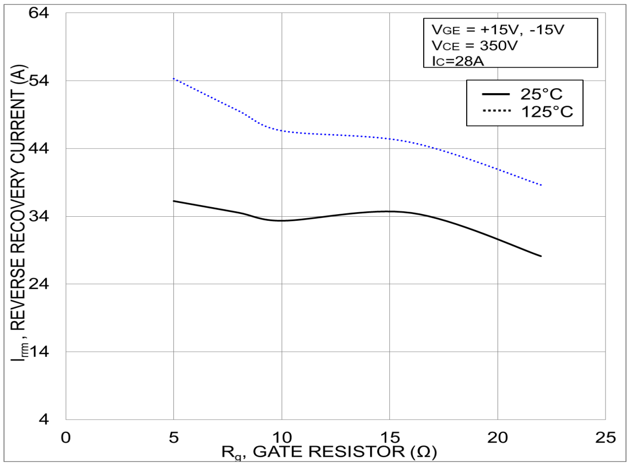



**Figure 48. Typical Reverse Recovery Peak Current vs. $R_G$**

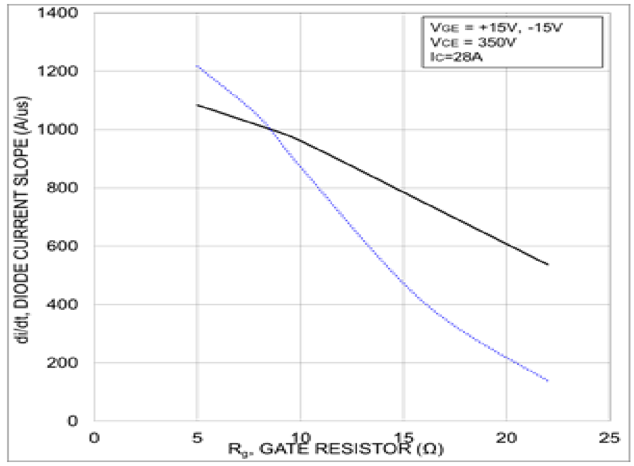



**Figure 49. Typical di/dt vs. $R_G$**

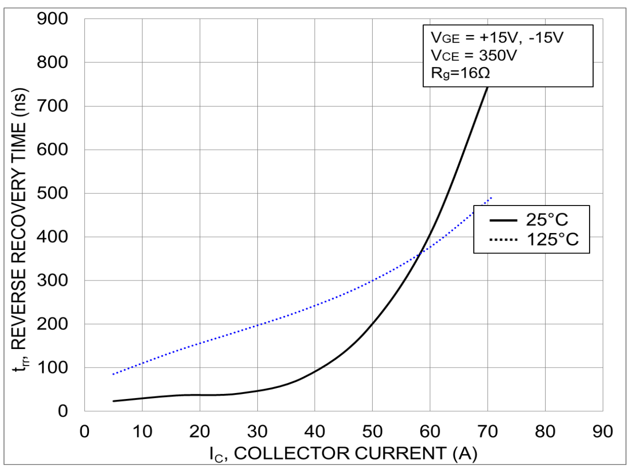



**Figure 50. Typical Reverse Recovery Time vs. $I_C$**

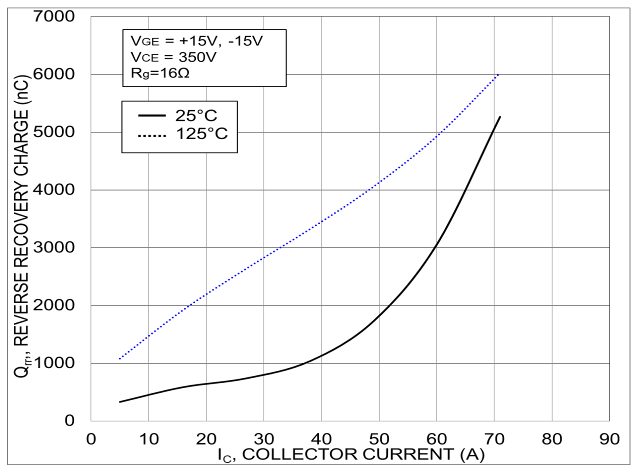



**Figure 51. Typical Reverse Recovery Charge vs. $I_C$**

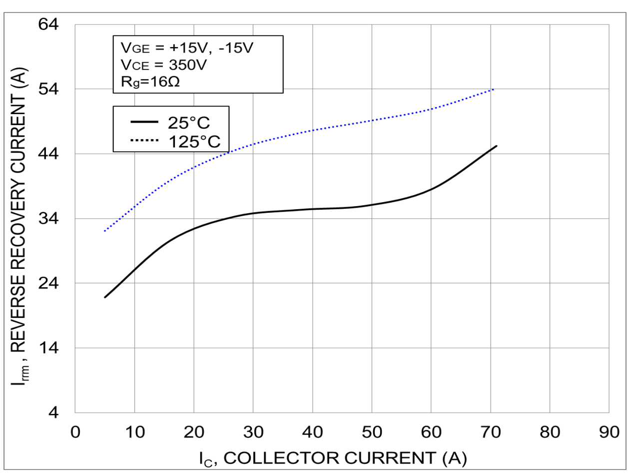



**Figure 52. Typical Reverse Recovery Current vs. $I_C$**

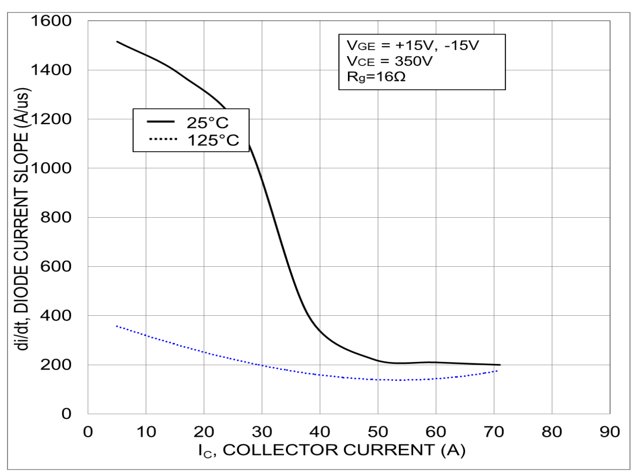
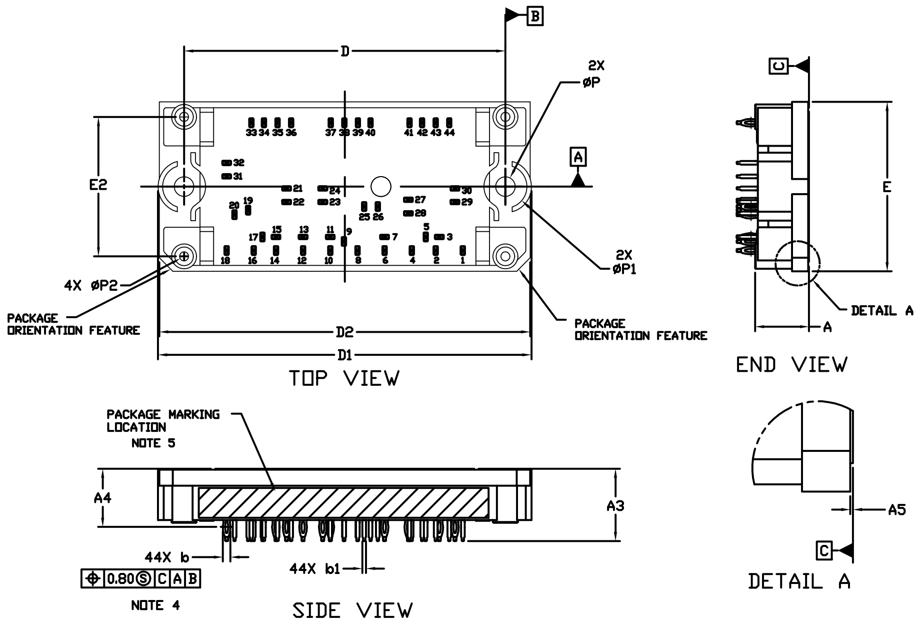



**Figure 53. Typical di/dt Current Slope vs. $I_C$**

**PIM44, 71x37.4**
CASE 180AS
ISSUE O

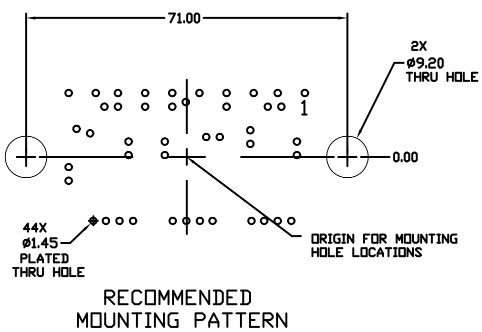
DATE 25 JUN 2018




| PIN | PIN POSITION X | Y | PIN | PIN POSITION X | Y |
|---|---|---|---|---|---|
| 1 | 26.10 | 14.10 | 23 | −4.85 | 3.40 |
| 2 | 20.10 | 14.10 | 24 | −4.85 | 0.40 |
| 3 | 20.90 | 11.10 | 25 | 4.30 | 4.40 |
| 4 | 14.80 | 14.10 | 26 | 7.30 | 4.40 |
| 5 | 17.90 | 11.10 | 27 | 14.05 | 2.90 |
| 6 | 8.80 | 14.10 | 28 | 14.05 | 5.90 |
| 7 | 8.80 | 11.10 | 29 | 24.35 | 3.40 |
| 8 | 2.80 | 14.10 | 30 | 24.35 | 0.40 |
| 9 | −0.20 | 12.10 | 31 | −26.10 | −2.25 |
| 10 | −3.20 | 14.10 | 32 | −26.10 | −5.25 |
| 11 | −3.20 | 11.10 | 33 | −20.65 | −14.10 |
| 12 | −9.20 | 14.10 | 34 | −17.85 | −14.10 |
| 13 | −9.20 | 11.10 | 35 | −14.85 | −14.10 |
| 14 | −15.20 | 14.10 | 36 | −11.85 | −14.10 |
| 15 | −15.20 | 11.10 | 37 | −3.10 | −14.10 |
| 16 | −20.10 | 14.10 | 38 | −0.10 | −14.10 |
| 17 | −18.20 | 11.10 | 39 | 2.90 | −14.10 |
| 18 | −26.10 | 14.10 | 40 | 5.70 | −14.10 |
| 19 | −21.35 | 5.20 | 41 | 14.30 | −14.10 |
| 20 | −24.35 | 6.20 | 42 | 17.10 | −14.10 |
| 21 | −12.85 | 0.40 | 43 | 20.10 | −14.10 |
| 22 | −12.85 | 3.40 | 44 | 23.10 | −14.10 |

NOTE 4

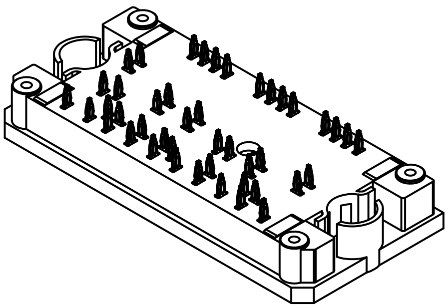
| PIN | PIN POSITION X | Y | PIN | PIN POSITION X | Y |
|---|---|---|---|---|---|
| 1 | 26.10 | −14.10 | 23 | −4.85 | −3.40 |
| 2 | 20.10 | −14.10 | 24 | −4.85 | −0.40 |
| 3 | 20.90 | −11.10 | 25 | 4.30 | −4.40 |
| 4 | 14.80 | −14.10 | 26 | 7.30 | −4.40 |
| 5 | 17.90 | −11.10 | 27 | 14.05 | −2.90 |
| 6 | 8.80 | −14.10 | 28 | 14.05 | −5.90 |
| 7 | 8.80 | −11.10 | 29 | 24.35 | −3.40 |
| 8 | 2.80 | −14.10 | 30 | 24.35 | −0.40 |
| 9 | −0.20 | −12.10 | 31 | −26.10 | 2.25 |
| 10 | −3.20 | −14.10 | 32 | −26.10 | 5.25 |
| 11 | −3.20 | −11.10 | 33 | −20.65 | 14.10 |
| 12 | −9.20 | −14.10 | 34 | −17.85 | 14.10 |
| 13 | −9.20 | −11.10 | 35 | −14.85 | 14.10 |
| 14 | −15.20 | −14.10 | 36 | −11.85 | 14.10 |
| 15 | −15.20 | −11.10 | 37 | −3.10 | 14.10 |
| 16 | −20.10 | −14.10 | 38 | −0.10 | 14.10 |
| 17 | −18.20 | −11.10 | 39 | 2.90 | 14.10 |
| 18 | −26.10 | −14.10 | 40 | 5.70 | 14.10 |
| 19 | −21.35 | −5.20 | 41 | 14.30 | 14.10 |
| 20 | −24.35 | −6.20 | 42 | 17.10 | 14.10 |
| 21 | −12.85 | −0.40 | 43 | 20.10 | 14.10 |
| 22 | −12.85 | −3.40 | 44 | 23.10 | 14.10 |




| DIM | MILLIMETERS MIN. | NOM. | MAX. |
|---|---|---|---|
| A | 11.50 | 12.00 | 12.50 |
| A3 | 15.50 | 16.00 | 16.50 |
| A4 | 12.83 BSC | | |
| A5 | 0.10 | 0.20 | 0.30 |
| b | 1.61 | 1.66 | 1.71 |
| b1 | 0.75 | 0.80 | 0.85 |
| D | 70.50 | 71.00 | 71.50 |
| D1 | 82.00 | 82.50 | 83.00 |
| D2 | 81.50 | 82.00 | 82.50 |
| E | 36.90 | 37.40 | 37.90 |
| E2 | 30.30 | 30.80 | 31.30 |
| P | 4.10 | 4.30 | 4.50 |
| P1 | 9.30 | 9.50 | 9.70 |
| P2 | 1.80 | 2.00 | 2.20 |

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.

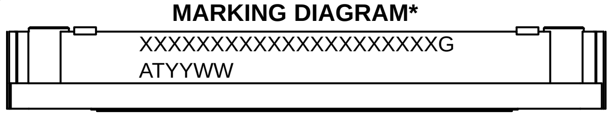
| DOCUMENT NUMBER: | 98AON92314G | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
|---|---|---|
| DESCRIPTION: | PIM44, 71x37.4 | PAGE 1 OF 2 |



**PIM44, 71x37.4**
CASE 180AS
ISSUE O

DATE 15 JUN 2018

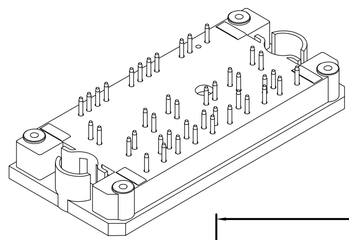
**GENERIC**
**MARKING DIAGRAM***




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

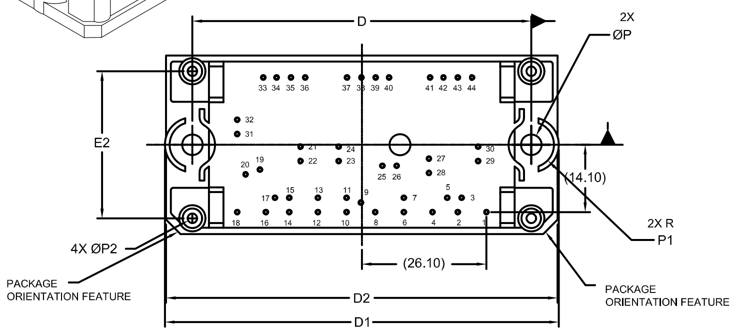
*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “ ▪”, may or may not be present. Some products may not follow the Generic Marking.

| DOCUMENT NUMBER: | 98AON92314G | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red. |
|---|---|---|
| DESCRIPTION: | PIM44, 71x37.4 | PAGE 2 OF 2 |

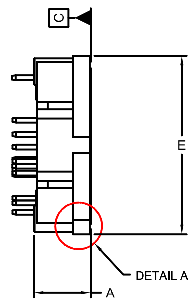


**PIM44, 71x37.4 (SOLDER PINS)**
CASE 180BN
ISSUE O

DATE 08 OCT 2019

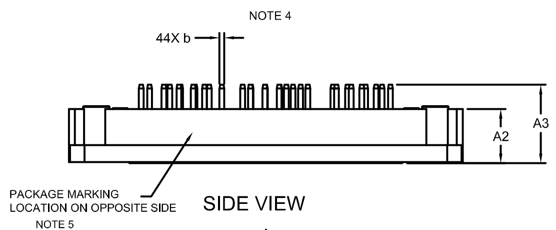



TOP VIEW

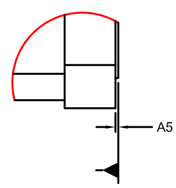



END VIEW

| DIM | MILLIMETERS MIN. | NOM. | MAX. |
|---|---|---|---|
| A | 11.50 | 12.00 | 12.50 |
| A2 | 10.90 | 11.40 | 11.90 |
| A3 | 15.90 | 16.40 | 16.90 |
| A5 | 0.00 | 0.30 | 0.60 |
| b | 0.90 | 1.00 | 1.10 |
| D | 70.50 | 71.00 | 71.50 |
| D1 | 82.00 | 82.50 | 83.00 |
| D2 | 81.50 | 82.00 | 82.50 |
| E | 36.90 | 37.40 | 37.90 |
| E2 | 30.30 | 30.80 | 31.30 |
| P | 4.30 | 4.40 | 4.50 |
| P1 | 4.55 | 4.75 | 4.95 |
| P2 | | 2.00 REF | |



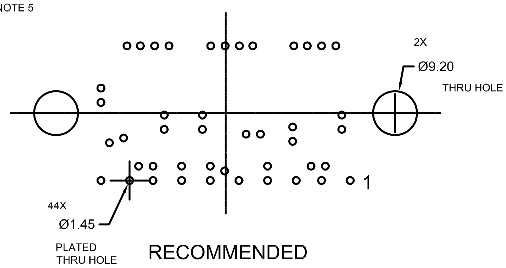

SIDE VIEW




DETAIL A

NOTE 4

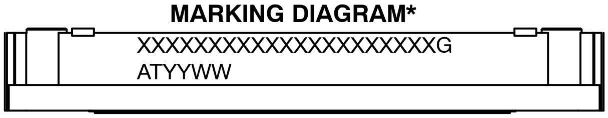
| PIN | PIN POSITION X | Y | PIN | PIN POSITION X | Y |
|---|---|---|---|---|---|
| 1 | 26.10 | -14.10 | 23 | -4.85 | -3.40 |
| 2 | 20.10 | -14.10 | 24 | -4.85 | -0.40 |
| 3 | 20.90 | -11.10 | 25 | 4.30 | -4.40 |
| 4 | 14.80 | -14.10 | 26 | 7.30 | -4.40 |
| 5 | 17.90 | -11.10 | 27 | 14.05 | -2.90 |
| 6 | 8.80 | -14.10 | 28 | 14.05 | -5.90 |
| 7 | 8.80 | -11.10 | 29 | 24.35 | -3.40 |
| 8 | 2.80 | -14.10 | 30 | 24.35 | -0.40 |
| 9 | -0.20 | -12.10 | 31 | -26.10 | 2.25 |
| 10 | -3.20 | -14.10 | 32 | -26.10 | 5.25 |
| 11 | -3.20 | -11.10 | 33 | -20.65 | 14.10 |
| 12 | -9.20 | -14.10 | 34 | -17.85 | 14.10 |
| 13 | -9.20 | -11.10 | 35 | -14.85 | 14.10 |
| 14 | -15.20 | -14.10 | 36 | -11.85 | 14.10 |
| 15 | -15.20 | -11.10 | 37 | -3.10 | 14.10 |
| 16 | -20.10 | -14.10 | 38 | -0.10 | 14.10 |
| 17 | -18.20 | -11.10 | 39 | 2.90 | 14.10 |
| 18 | -26.10 | -14.10 | 40 | 5.70 | 14.10 |
| 19 | -21.35 | -5.20 | 41 | 14.30 | 14.10 |
| 20 | -24.35 | -6.20 | 42 | 17.10 | 14.10 |
| 21 | -12.85 | -0.40 | 43 | 20.10 | 14.10 |
| 22 | -12.85 | -3.40 | 44 | 23.10 | 14.10 |




RECOMMENDED
MOUNTING PATTERN*

*FOR ADDITIONAL INFORMATION ON OUR Pb-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

**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.

NOTES:
1. DIMENSIONING AND TOLERANCING PERASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS b APPLIES TO THE PLATED TERMINALS AND IS MEASURED BETWEEN 1.00 AND 3.00 FROM THE TERMINAL TIP.
4. POSITION OF THE CENTER OF THE TERMINALS AND MOUNTING HOLES IS DETERMINED FROM DATUM B THE CENTER OF DIMENSION D, X DIRECTION, AND FROM DATUM A, Y DIRECTION. POSITIONAL TOLERANCE, AS NOTED IN THE DRAWING, APPLIES TO EACH TERMINAL IN BOTH DIRECTIONS.
5. PACKAGE MARKING IS LOCATED AS SHOWN ON THE SIDE OPPOSITE THE PACKAGE ORIENTATION FEATURES.

| DOCUMENT NUMBER: | 98AON12615H | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red. |
|---|---|---|
| DESCRIPTION: | PIM44, 71x37.4 (SOLDER PINS) | PAGE 1 OF 2 |

**PUBLICATION ORDERING INFORMATION**

**LITERATURE FULFILLMENT**:
**Email Requests to:** orderlit@onsemi.com

**onsemi Website:** www.onsemi.com

**TECHNICAL SUPPORT**
**North American Technical Support:**
Voice Mail: 1 800−282−9855 Toll Free USA/Canada
Phone: 011 421 33 790 2910

**Europe, Middle East and Africa Technical Support:**
Phone: 00421 33 790 2910
For additional information, please contact your local Sales Representative