# NXH25T120L2Q1PG

# Q1 3-Phase TNPC Module

The NXH25T120L2Q1PG/PTG is a case power module containing a three channel T−type neutral−point clamped (TNPC) circuit. Each channel has a two 1200 V, 25 A IGBTs with inverse diodes and two 650 V, 20 A IGBTs with inverse diodes. The module contains an NTC thermistor.

### Features

- Low Package Height
- Compact 82.5 mm x 37.4 mm x 12 mm Package
- Press−fit Pins
- Options with Pre−applied Thermal Interface Material (TIM) and Without Pre−applied TIM
- Thermistor

### Typical Applications

- Solar Inverters
- UPS

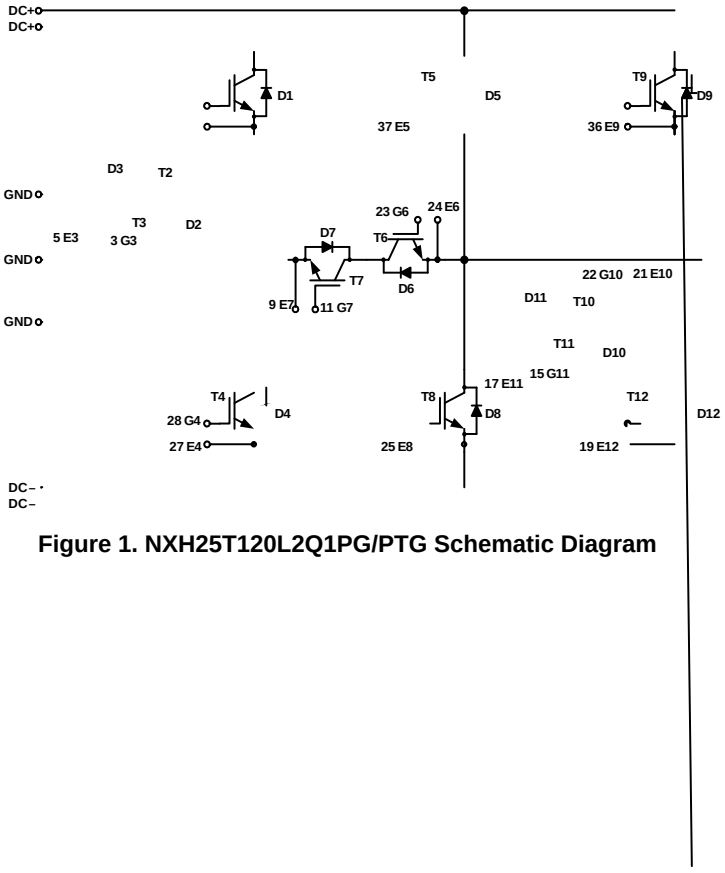



**Figure 1. NXH25T120L2Q1PG/PTG Schematic Diagram**

**Table 1. MAXIMUM RATINGS** (Note 1)

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| **HALF BRIDGE IGBT** | | | |
| 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) | $I_C$ | 25 | A |
| Pulsed Collector Current ($T_J$ = 175°C) | $I_{Cpulse}$ | 75 | A |
| Maximum Power Dissipation ($T_J$ = 175°C) | $P_{tot}$ | 81 | W |
| Short Circuit Withstand Time @ $V_{GE}$ = 15 V, $V_{CE}$ = 600 V, $T_J \leq$ 150°C | $T_{sc}$ | 5 | μs |
| Minimum Operating Junction Temperature | $T_{JMIN}$ | −40 | °C |
| Maximum Operating Junction Temperature | $T_{JMAX}$ | 150 | °C |
| **NEUTRAL POINT IGBT** | | | |
| Collector−Emitter Voltage | $V_{CES}$ | 650 | V |
| Gate−Emitter Voltage | $V_{GE}$ | ±20 | |

**Table 3. ELECTRICAL CHARACTERISTICS** $T_J$ = 25°C unless otherwise noted

| Parameter | Test Conditions | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **NEUTRAL POINT IGBT CHARACTERISTICS** | | | | | | |
| Collector−Emitter Cutoff Current | $V_{GE}$ = 0 V, $V_{CE}$ = 650 V | $I_{CES}$ | – | – | 200 | μA |
| Collector−Emitter Saturation Voltage | $V_{GE}$ = 15 V, $I_C$ = 20 A, $T_J$ = 25°C | $V_{CE(sat)}$ | – | 1.49 | – | V |
| | $V_{GE}$ = 15 V, $I_C$ = 20 A, $T_J$ = 125°C | | – | 1.61 | – | |
| Gate−Emitter Threshold Voltage | $V_{GE}$ = $V_{CE}$, $I_C$ = 1.65 mA | $V_{GE(TH)}$ | 4.70 | 5.68 | 6.50 | V |
| Gate Leakage Current | $V_{GE}$ = 20 V, $V_{CE}$ = 0 V | $I_{GES}$ | – | – | 200 | nA |
| Turn−on Delay Time | $T_J$ = 25°C<br>$V_{CE}$ = 350 V, $I_C$ = 15 A<br>$V_{GE}$ = ±15V, $R_G$ = 15 Ω | $t_{d(on)}$ | – | 33 | – | ns |
| Rise Time | | $t_r$ | – | 18 | – | |
| Turn−off Delay Time | | $t_{d(off)}$ | – | 126 | – | |
| Fall Time | | $t_f$ | – | 43 | – | |
| Turn−on Switching Loss per Pulse | | $E_{on}$ | – | 250 | – | μJ |
| Turn off Switching Loss per Pulse | | $E_{off}$ | – | 180 | – | |
| Turn−on Delay Time | $T_J$ = 125°C<br>$V_{CE}$ = 350 V, $I_C$ = 15 A<br>$V_{GE}$ = ±15 V, $R_G$ = 15 Ω | $t_{d(on)}$ | – | 31 | – | ns |
| Rise Time | | $t_r$ | – | 19 | – | |
| Turn−off Delay Time | | $t_{d(off)}$ | – | 138 | – | |
| Fall Time | | $t_f$ | – | 29 | – | |
| Turn off Switching Loss per Pulse | | $E_{off}$ | – | 220 | – | |

**Table 3. ELECTRICAL CHARACTERISTICS** $T_J$ = 25°C unless otherwise noted

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|

## TYPICAL CHARACTERISTICS – HALF BRIDGE IGBT AND DIODE

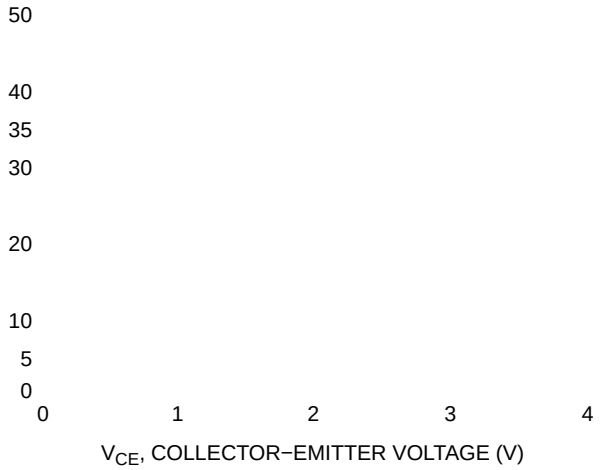



**Figure 2. Typical Output Characteristics**

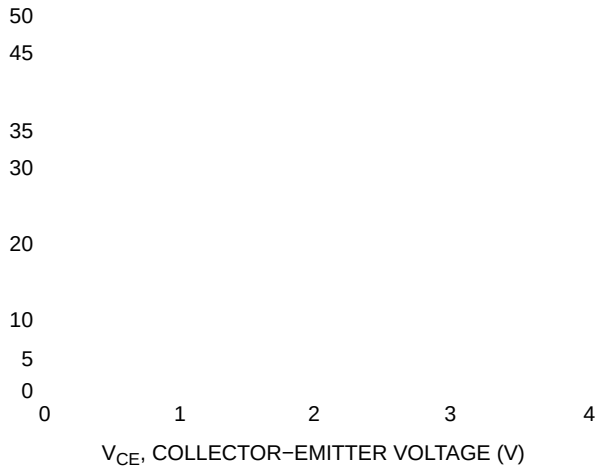



**Figure 3. Typical Output Characteristics**

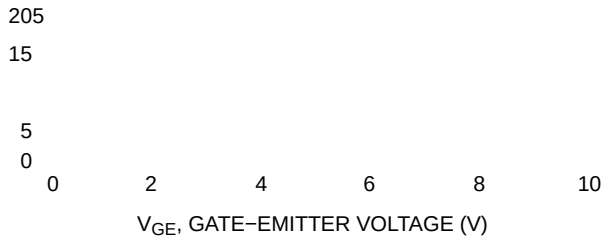
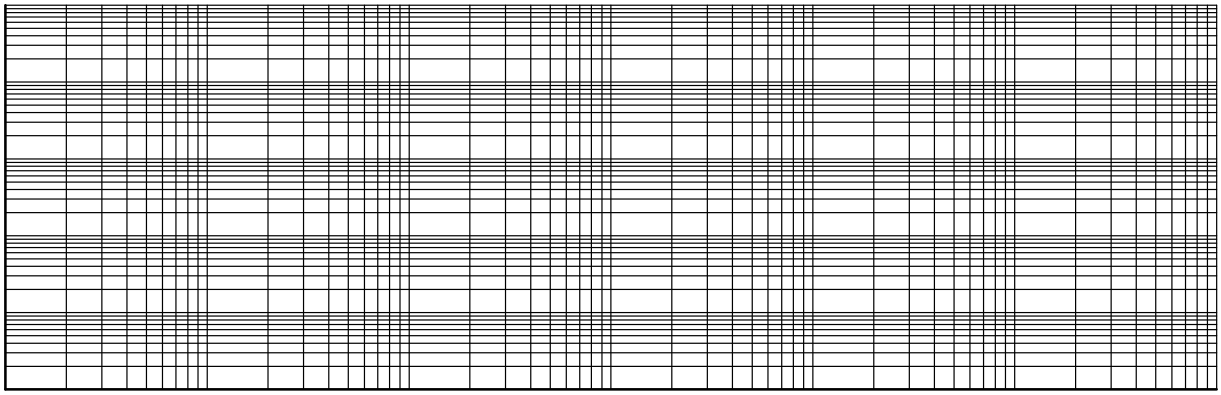
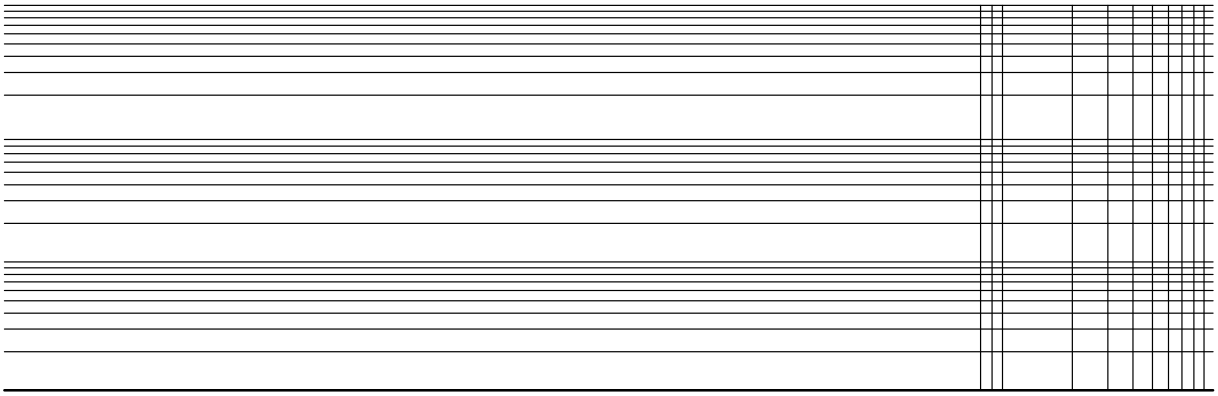



**Figure 4. Typical Transfer Characteristics**


**Figure 5. Diode Forward Characteristics**

## TYPICAL CHARACTERISTICS – HALF BRIDGE IGBT AND DIODE





## TYPICAL CHARACTERISTICS – NEUTRAL POINT IGBT AND DIODE

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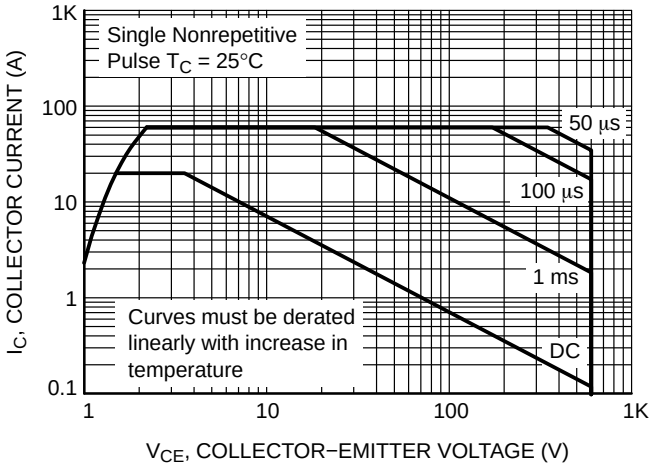



**Figure 19. FBSOA**

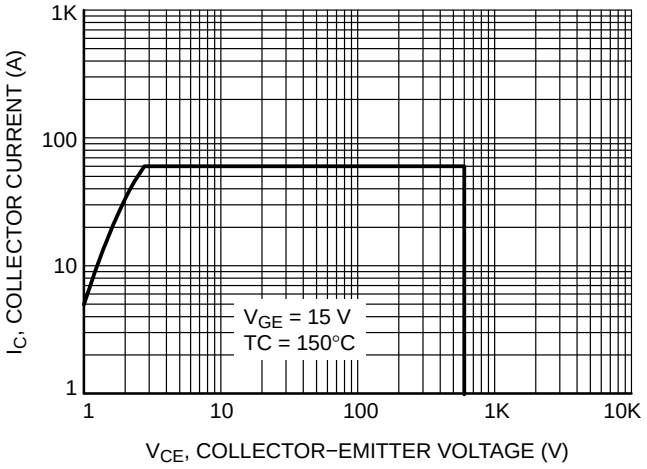



**Figure 20. RBSOA**

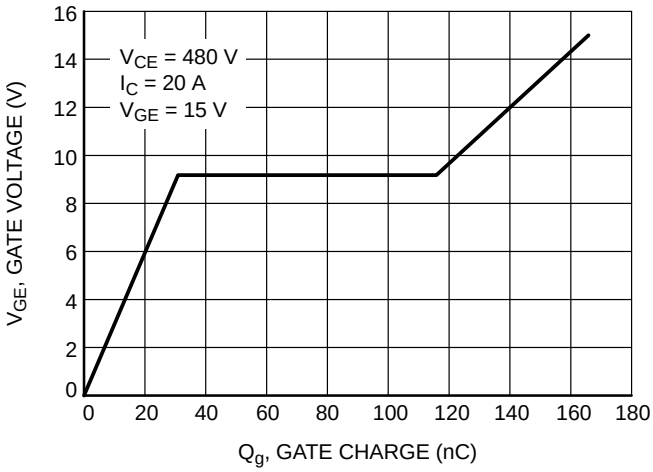
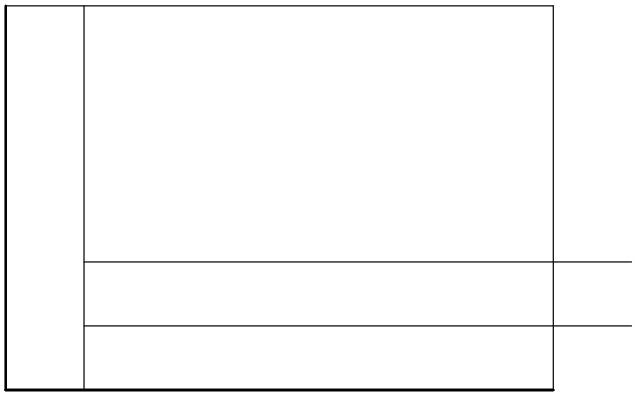
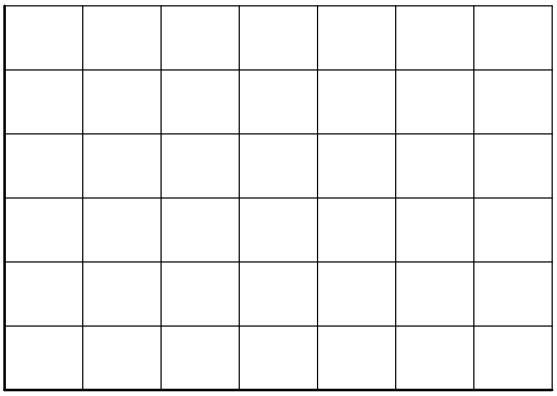



**Figure 21. Gate Voltage vs. Gate Charge**

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





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

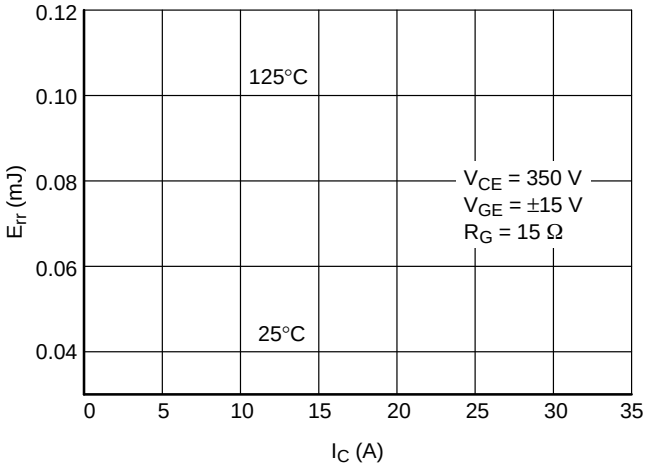



**Figure 34. Typical Reverse Recovery Energy vs. $I_C$**

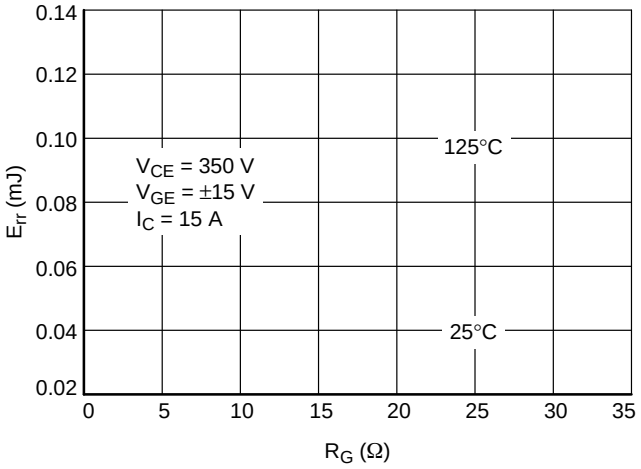



**Figure 35. Typical Reverse Recovery Energy vs. $R_G$**

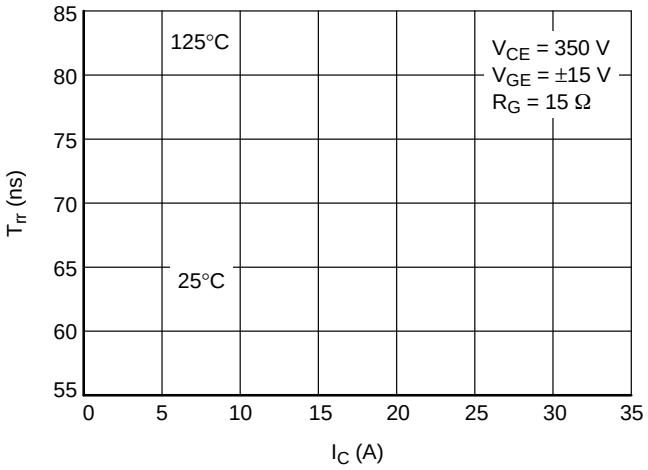



**Figure 36. Typical Reverse Recovery Time vs. $I_C$**

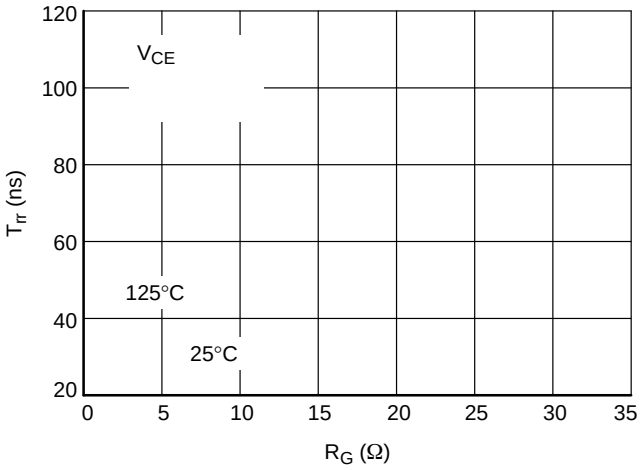



**Figure 37. Typical Reverse Recovery Time vs. $R_G$**

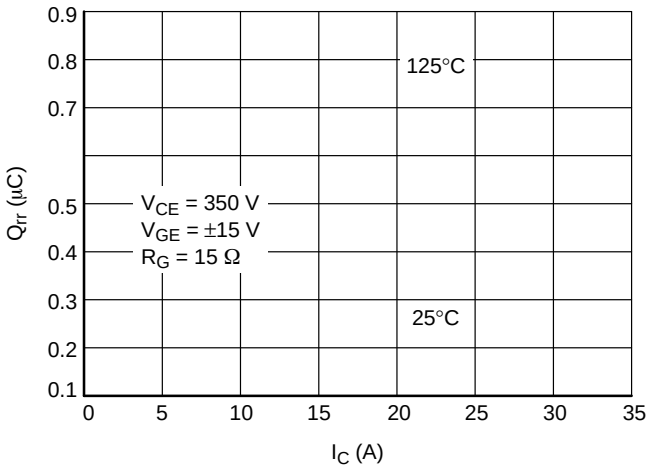



**Figure 38. Typical Reverse Recovery Charge vs. $I_C$**

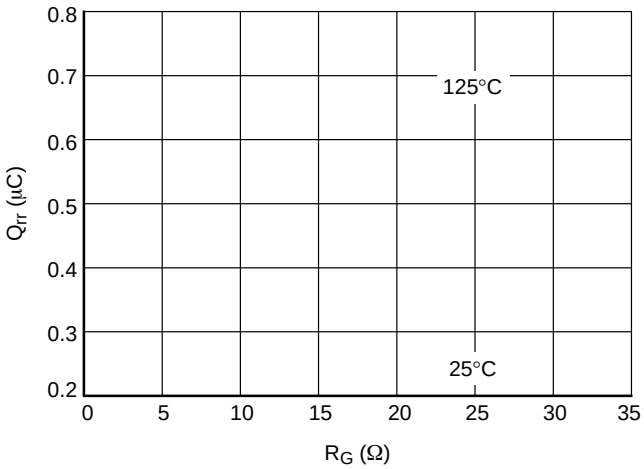



**Figure 39. Typical Reverse Recovery Charge vs. $R_G$**

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

$I_C$ (A)

**Figure 40. Typical Reverse Recovery Current vs. $I_C$**

$R_G$

**Figure 41. Typical Reverse Recovery Current vs. $R_G$**

**TYPICAL CHARACTERISTICS –**

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

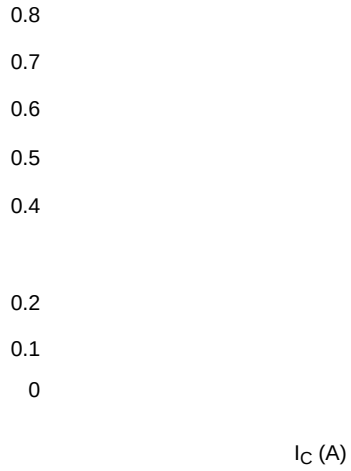



**Figure 56. Typical Reverse Recovery Energy vs. $I_C$**

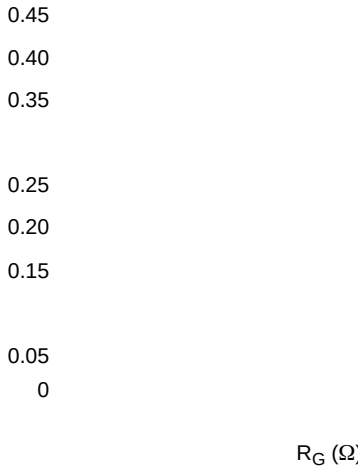



**Figure 57. Typical Reverse Recovery Energy vs. $R_G$**

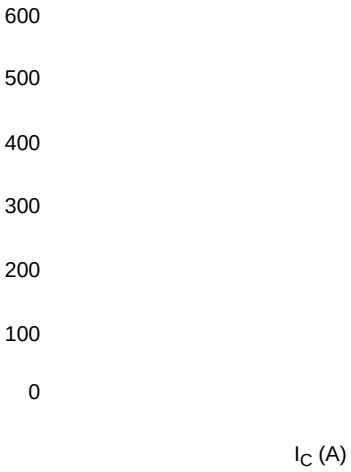



**Figure 58. Typical Reverse Recovery Time vs. $I_C$**

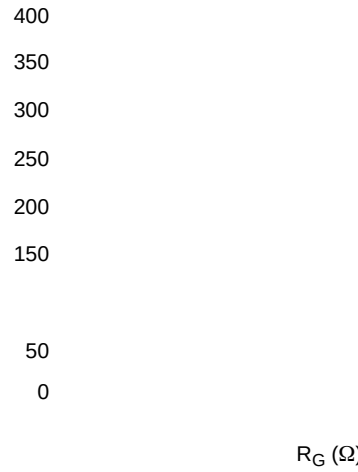



**Figure 59. Typical Reverse Recovery Time vs. $R_G$**

**Figure 60. Typical Reverse Recovery Charge vs. $I_C$**

**Figure 61. Typical Reverse Recovery Charge vs. $R_G$**

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

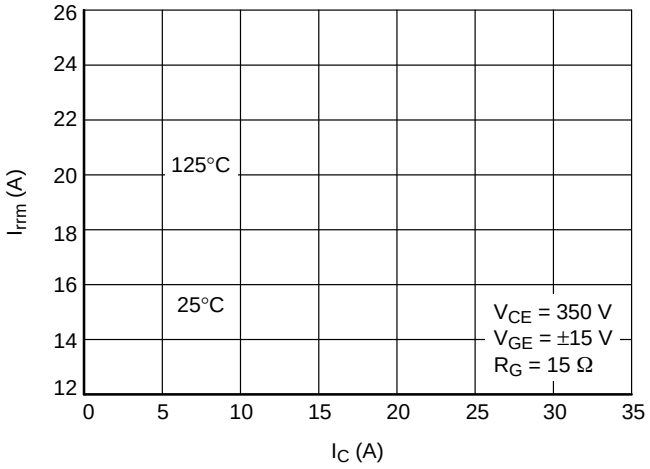



**Figure 62. Typical Reverse Recovery Current vs. $I_C$**

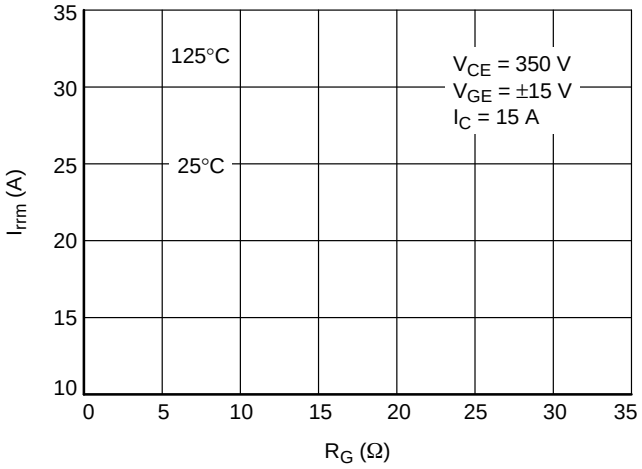



**Figure 63. Typical Reverse Recovery Current vs. $R_G$**

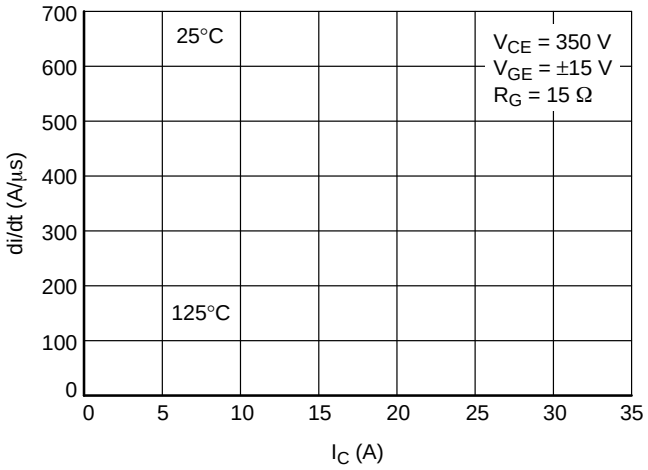



**Figure 64. Typical di/dt vs. $I_C$**

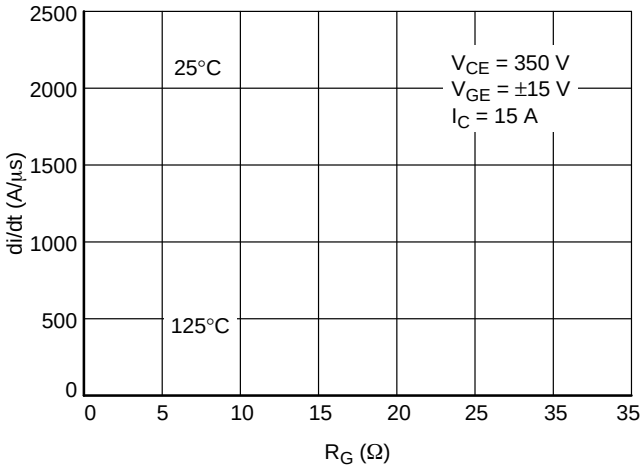



**Figure 65. Typical di/dt vs. $R_G$**

**PIM44, 71x37.4 (PRESSFIT PINS)**

CASE 180AS

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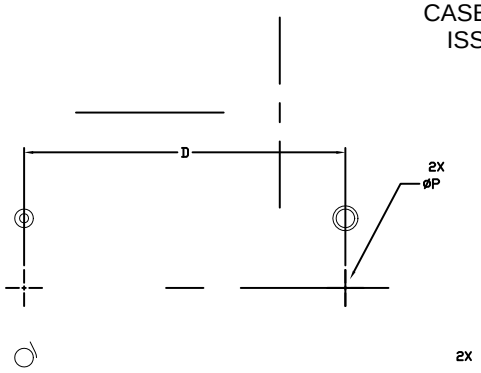
DATE 25 JUN 2018




TOP VIEW

TERMINALS AND AP$_{RES.}$