# GenX³™ 300V IGBT

**IXGN400N30A3**

Ultra-Low-Vsat PT IGBT for up to 10kHz Switching

## Symbol | Test Conditions | Maximum Ratings
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\(V_{CES}\) | \(T_J = 25°C \) to \(150°C\) | 300 V
\(V_{CEG}\) | \(T_J = 25°C \) to \(150°C\), \(R_{GE} = 1M\Omega\) | 300 V
\(V_{GES}\) | Continuous | ±20 V
\(V_{GEM}\) | Transient | ±30 V
\(I_{C25}\) | \(T_C = 25°C\) (Chip Capability) | 400 A
\(I_{C110}\) | \(T_C = 110°C\) | 200 A
\(I_{RM}\) | Terminal Current Limit | 200 A
\(I_{CM}\) | \(T_C = 25°C\), \(1ms\) | 1200 A
\(S_{SOA}\) | \(V_{GE} = 15V\), \(T_{UJ} = 125°C\), \(R_G = 1Ω\) | \(I_{CM} = 400\) A
\(P_C\) | \(T_C = 25°C\) | 735 W
\(T_J\) | \(-55 \) ... \(+150°\) C
\(T_{JH}\) | 150 °C
\(T_{JL}\) | \(-55 \) ... \(+150°\) C
\(V_{BSOL}\) | 50/60Hz \(t = 1\) min | 2500 V~
\(I_{BSOL} ≤ 1mA\) \(t = 1\) s | 3000 V~
\(M_d\) | Mounting Torque | 1.5/13 Km/lb.in.
| Terminal Connection Torque (M4) | 1.3/11.5 Km/lb.in.

**Weight**

30 g

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**Symbol** | **Test Conditions** | **Characteristic Values** (\(T_J = 25°C\), Unless Otherwise Specified) | **Min.** | **Typ.** | **Max.**
--- | --- | --- | --- | --- | ---
\(B V_{CES}\) | \(I_C = 1mA\), \(V_{GE} = 0V\) | 300 V | V
\(V_{GEC}\) | \(I_C = 4mA\), \(V_{CE} = V_{GE}\) | 3.0 V | 5.0 V
\(I_{CES}\) | \(V_{CE} = V_{CES}\), \(V_{GE} = 0V\) | 50 μA \(T_J = 125°C\) | 2 mA
\(I_{GES}\) | \(V_{CE} = 0V\), \(V_{GE} = ±20V\) | | ±400 nA
\(V_{CE(Sat)}\) | \(I_C = 100A\), \(V_{GE} = 15V\), Note 1 | | 1.15 V
| \(I_C = 400A\) | | 1.70 V

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### IXGN400N30A3

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<th>Symbol</th>
<th>Test Conditions</th>
<th>Characteristic Values</th>
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<td>( I_c = 60A, V_{GE} = 10V )</td>
<td>( g_{ds} )</td>
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<td>( V_{CE} = 25V, V_{GE} = 0V )</td>
<td>( C_{ces} )</td>
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<td>( f = 1MHz )</td>
<td>( C_{ces} )</td>
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<td>( I_c = 100V, V_{GE} = 15V )</td>
<td>( Q_{gs(on)} )</td>
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<td>( V_{CE} = 0.5 \cdot V_{CES} )</td>
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<td>( t_d(on) ) Resistive Load, ( T_J = 25^\circ C )</td>
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<td>( t_d(on) ) Resistive Load, ( T_J = 125^\circ C )</td>
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Note 1. Pulse test, \( t \leq 300 \mu s \); duty cycle, \( d \leq 2\% \).
Fig. 1. Output Characteristics
@ $T_J = 25^\circ$C

Fig. 2. Output Characteristics
@ $T_J = 125^\circ$C

Fig. 3. Dependence of $V_{CE(sat)}$ on Junction Temperature

Fig. 4. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

Fig. 5. Input Admittance

Fig. 6. Transconductance
Fig. 7. Gate Charge

- $V_{CE} = 150\text{V}$
- $I_C = 100\text{A}$
- $I_G = 10\text{mA}$

Fig. 8. Capacitance

- $f = 1\text{MHz}$
- $C_{res}$
- $C_{des}$
- $C_{ies}$

Fig. 9. Reverse-Bias Safe Operating Area

- $T_J = 125^\circ\text{C}$
- $R_o = 1\Omega$
- $\frac{dv}{dt} < 10\text{V} / \text{ns}$

Fig. 10. Maximum Transient Thermal Impedance

- $Z_{thJC} - ^\circ\text{C} / \text{W}$
Fig. 11. Resistive Turn-on Rise Time vs. Junction Temperature
- $R_G = 1\Omega$, $V_{GE} = 15V$
- $V_{CE} = 240V$
- $I_C = 300A, 200A, 100A$
- $T_J = 25^\circ C$
- $T_J = 125^\circ C$

Fig. 12. Resistive Turn-on Rise Time vs. Collector Current
- $R_G = 1\Omega$, $V_{GE} = 15V$
- $V_{CE} = 240V$
- $T_J = 25^\circ C$
- $T_J = 125^\circ C$

Fig. 13. Resistive Turn-on Switching Times vs. Gate Resistance
- $I_C = 200A, 100A$

Fig. 14. Resistive Turn-off Switching Times vs. Junction Temperature
- $R_G = 1\Omega$, $V_{GE} = 15V$
- $V_{CE} = 240V$
- $I_C = 300A, 200A, 100A$

Fig. 15. Resistive Turn-off Switching Times vs. Gate Resistance
- $I_C = 100A, 200A, 300A$

Fig. 16. Resistive Turn-off Switching Times vs. Collector Current
- $T_J = 125^\circ C$
- $T_J = 25^\circ C$