## 1 General description

The 74AUP2G32 provides dual 2-input OR function. Schmitt trigger action at all inputs makes the circuit tolerant to slower input rise and fall times across the entire $V_{CC}$ range from 0.8 V to 3.6 V.

This device ensures a very low static and dynamic power consumption across the entire $V_{CC}$ range from 0.8 V to 3.6 V.

This device is fully specified for partial power-down applications using $I_{OFF}$. The $I_{OFF}$ circuitry disables the output, preventing a damaging backflow current through the device when it is powered down.

## 2 Features and benefits

- Wide supply voltage range from 0.8 V to 3.6 V
- High noise immunity
- Complies with JEDEC standards:
  - JESD8-12 (0.8 V to 1.3 V)
  - JESD8-11 (0.9 V to 1.65 V)
  - JESD8-7 (1.2 V to 1.95 V)
  - JESD8-5 (1.8 V to 2.7 V)
  - JESD8-B (2.7 V to 3.6 V)
- ESD protection:
  - HBM JESD22-A114F Class 3A exceeds 5000 V
  - MM JESD22-A115-A exceeds 200 V
  - CDM JESD22-C101E exceeds 1000 V
- Low static power consumption; $I_{CC} = 0.9 \mu A$ (maximum)
- Latch-up performance exceeds 100 mA per JESD 78 Class II
- Inputs accept voltages up to 3.6 V
- Low noise overshoot and undershoot < 10 % of $V_{CC}$
- $I_{OFF}$ circuitry provides partial Power-down mode operation
- Multiple package options
- Specified from -40 °C to +85 °C and -40 °C to +125 °C
3 Ordering information

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package</th>
<th>Temperature range</th>
<th>Name</th>
<th>Description</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>74AUP2G32DC</td>
<td>VSSOP8</td>
<td>-40 °C to +125 °C</td>
<td>plastic very thin shrink small outline package; 8 leads; body width 2.3 mm</td>
<td>SOT765-1</td>
<td></td>
</tr>
<tr>
<td>74AUP2G32GT</td>
<td>XSON8</td>
<td>-40 °C to +125 °C</td>
<td>plastic extremely thin small outline package; no leads; 8 terminals; body 1 x 1.95 x 0.5 mm</td>
<td>SOT833-1</td>
<td></td>
</tr>
<tr>
<td>74AUP2G32GF</td>
<td>XSON8</td>
<td>-40 °C to +125 °C</td>
<td>extremely thin small outline package; no leads; 8 terminals; body 1.35 x 1 x 0.5 mm</td>
<td>SOT1089</td>
<td></td>
</tr>
<tr>
<td>74AUP2G32GM</td>
<td>XQFN8</td>
<td>-40 °C to +125 °C</td>
<td>plastic, extremely thin quad flat package; no leads; 8 terminals; body 1.6 x 1.6 x 0.5 mm</td>
<td>SOT902-2</td>
<td></td>
</tr>
<tr>
<td>74AUP2G32GN</td>
<td>XSON8</td>
<td>-40 °C to +125 °C</td>
<td>extremely thin small outline package; no leads; 8 terminals; body 1.2 x 1.0 x 0.35 mm</td>
<td>SOT1116</td>
<td></td>
</tr>
<tr>
<td>74AUP2G32GS</td>
<td>XSON8</td>
<td>-40 °C to +125 °C</td>
<td>extremely thin small outline package; no leads; 8 terminals; body 1.35 x 1.0 x 0.35 mm</td>
<td>SOT1203</td>
<td></td>
</tr>
<tr>
<td>74AUP2G32GX</td>
<td>X2SON8</td>
<td>-40 °C to +125 °C</td>
<td>plastic thermal enhanced extremely thin small outline package; no leads; 8 terminals; body 1.35 x 0.8 x 0.35 mm</td>
<td>SOT1233</td>
<td></td>
</tr>
</tbody>
</table>

4 Marking

<table>
<thead>
<tr>
<th>Type number</th>
<th>Marking code [1]</th>
</tr>
</thead>
<tbody>
<tr>
<td>74AUP2G32DC</td>
<td>p32</td>
</tr>
<tr>
<td>74AUP2G32GT</td>
<td>p32</td>
</tr>
<tr>
<td>74AUP2G32GF</td>
<td>pG</td>
</tr>
<tr>
<td>74AUP2G32GM</td>
<td>p32</td>
</tr>
<tr>
<td>74AUP2G32GN</td>
<td>pG</td>
</tr>
<tr>
<td>74AUP2G32GS</td>
<td>pG</td>
</tr>
<tr>
<td>74AUP2G32GX</td>
<td>pG</td>
</tr>
</tbody>
</table>

[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.
5 Functional diagram

Figure 1. Logic symbol
Figure 2. IEC logic symbol
Figure 3. Logic diagram (one gate)

6 Pinning information

6.1 Pinning

Figure 4. Pin configuration SOT765-1
Figure 5. Pin configuration SOT833-1, SOT1089, SOT1116 and SOT1203
6.2 Pin description

Table 3. Pin description

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SOT765-1, SOT833-1, SOT1089, SOT1116, SOT1203 and SOT1233</td>
<td>SOT902-2</td>
</tr>
<tr>
<td>1A, 2A</td>
<td>1, 5</td>
<td>7, 3</td>
</tr>
<tr>
<td>1B, 2B</td>
<td>2, 6</td>
<td>6, 2</td>
</tr>
<tr>
<td>GND</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>1Y, 2Y</td>
<td>7, 3</td>
<td>1, 5</td>
</tr>
<tr>
<td>VCC</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

7 Functional description

Table 4. Function table

\( H = \text{HIGH} \) voltage level; \( L = \text{LOW} \) voltage level.

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>nA</td>
<td>nB</td>
</tr>
<tr>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>L</td>
<td>H</td>
</tr>
<tr>
<td>H</td>
<td>L</td>
</tr>
<tr>
<td>H</td>
<td>H</td>
</tr>
</tbody>
</table>
8 Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>V&lt;sub&gt;CC&lt;/sub&gt;</td>
<td>supply voltage</td>
<td></td>
<td>-0.5</td>
<td>+4.6</td>
<td>V</td>
</tr>
<tr>
<td>I&lt;sub&gt;I&lt;/sub&gt;</td>
<td>input clamping current</td>
<td>V&lt;sub&gt;I&lt;/sub&gt; &lt; 0 V</td>
<td>-50</td>
<td>-</td>
<td>mA</td>
</tr>
<tr>
<td>V&lt;sub&gt;I&lt;/sub&gt;</td>
<td>input voltage</td>
<td></td>
<td>-0.5</td>
<td>+4.6</td>
<td>V</td>
</tr>
<tr>
<td>I&lt;sub&gt;OK&lt;/sub&gt;</td>
<td>output clamping current</td>
<td>V&lt;sub&gt;O&lt;/sub&gt; &lt; 0 V</td>
<td>-50</td>
<td>-</td>
<td>mA</td>
</tr>
<tr>
<td>V&lt;sub&gt;O&lt;/sub&gt;</td>
<td>output voltage</td>
<td>Active mode and Power-down mode</td>
<td>-0.5</td>
<td>+4.6</td>
<td>V</td>
</tr>
<tr>
<td>I&lt;sub&gt;O&lt;/sub&gt;</td>
<td>output current</td>
<td>V&lt;sub&gt;O&lt;/sub&gt; = 0 V to V&lt;sub&gt;CC&lt;/sub&gt;</td>
<td>-</td>
<td>±20</td>
<td>mA</td>
</tr>
<tr>
<td>I&lt;sub&gt;CC&lt;/sub&gt;</td>
<td>supply current</td>
<td>-</td>
<td>+50</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>I&lt;sub&gt;GND&lt;/sub&gt;</td>
<td>ground current</td>
<td>-50</td>
<td>-</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>T&lt;sub&gt;stg&lt;/sub&gt;</td>
<td>storage temperature</td>
<td></td>
<td>-65</td>
<td>+150</td>
<td>°C</td>
</tr>
<tr>
<td>P&lt;sub&gt;tot&lt;/sub&gt;</td>
<td>total power dissipation</td>
<td>T&lt;sub&gt;amb&lt;/sub&gt; = -40 °C to +125 °C</td>
<td></td>
<td>250</td>
<td>mW</td>
</tr>
</tbody>
</table>

[1] The minimum input and output voltage ratings may be exceeded if the input and output current ratings are observed.

[2] For VSSOP8 packages: above 110 °C the value of P<sub>tot</sub> derates linearly with 8.0 mW/K.

For XSON8 and XQFN8 packages: above 118 °C the value of P<sub>tot</sub> derates linearly with 7.8 mW/K.

For X2SON8 package: above 118 °C the value of P<sub>tot</sub> derates linearly with 7.7 mW/K.

9 Recommended operating conditions

Table 6. Operating conditions

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>V&lt;sub&gt;CC&lt;/sub&gt;</td>
<td>supply voltage</td>
<td></td>
<td>0.8</td>
<td>3.6</td>
<td>V</td>
</tr>
<tr>
<td>V&lt;sub&gt;I&lt;/sub&gt;</td>
<td>input voltage</td>
<td></td>
<td>0</td>
<td>3.6</td>
<td>V</td>
</tr>
<tr>
<td>V&lt;sub&gt;O&lt;/sub&gt;</td>
<td>output voltage</td>
<td>Active mode</td>
<td>0</td>
<td>V&lt;sub&gt;CC&lt;/sub&gt;</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Power-down mode; V&lt;sub&gt;CC&lt;/sub&gt; = 0 V</td>
<td>0</td>
<td>3.6</td>
<td>V</td>
</tr>
<tr>
<td>T&lt;sub&gt;amb&lt;/sub&gt;</td>
<td>ambient temperature</td>
<td></td>
<td>-40</td>
<td>+125</td>
<td>°C</td>
</tr>
<tr>
<td>Δt/ΔV</td>
<td>input transition rise and fall rate</td>
<td>V&lt;sub&gt;CC&lt;/sub&gt; = 0.8 V to 3.6 V</td>
<td>0</td>
<td>200</td>
<td>ns/V</td>
</tr>
</tbody>
</table>
## 10 Static characteristics

Table 7. Static characteristics  
*At recommended operating conditions; voltages are referenced to GND (ground = 0 V).*

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>HIGH-level input voltage</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$V_{IH}$</td>
<td>$V_{CC} = 0.8 , \text{V}$</td>
<td>$0.70 \times V_{CC}$</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{CC} = 0.9 , \text{V}$ to 1.95 , \text{V}$</td>
<td>$0.65 \times V_{CC}$</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{CC} = 2.3 , \text{V}$ to 2.7 , \text{V}$</td>
<td>1.6</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{CC} = 3.0 , \text{V}$ to 3.6 , \text{V}$</td>
<td>2.0</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td><strong>LOW-level input voltage</strong></td>
<td>$V_{CC} = 0.8 , \text{V}$</td>
<td>-</td>
<td>-</td>
<td>$0.30 \times V_{CC}$</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>$V_{IL}$</td>
<td>$V_{CC} = 0.9 , \text{V}$ to 1.95 , \text{V}$</td>
<td>-</td>
<td>-</td>
<td>$0.35 \times V_{CC}$</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{CC} = 2.3 , \text{V}$ to 2.7 , \text{V}$</td>
<td>-</td>
<td>-</td>
<td>0.7</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{CC} = 3.0 , \text{V}$ to 3.6 , \text{V}$</td>
<td>-</td>
<td>-</td>
<td>0.9</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td><strong>HIGH-level output voltage</strong></td>
<td>$V_{I} = V_{IH}$ or $V_{IL}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$V_{OH}$</td>
<td>$I_{O} = -20 , \mu\text{A}; V_{CC} = 0.8 , \text{V}$ to 3.6 , \text{V}$</td>
<td>$V_{CC} - 0.1$</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_{O} = -1.1 , \text{mA}; V_{CC} = 1.1 , \text{V}$</td>
<td>$0.75 \times V_{CC}$</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_{O} = -1.7 , \text{mA}; V_{CC} = 1.4 , \text{V}$</td>
<td>1.11</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_{O} = -1.9 , \text{mA}; V_{CC} = 1.65 , \text{V}$</td>
<td>1.32</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_{O} = -2.3 , \text{mA}; V_{CC} = 2.3 , \text{V}$</td>
<td>2.05</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_{O} = -3.1 , \text{mA}; V_{CC} = 2.3 , \text{V}$</td>
<td>1.9</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_{O} = -2.7 , \text{mA}; V_{CC} = 3.0 , \text{V}$</td>
<td>2.72</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_{O} = -4.0 , \mu\text{A}; V_{CC} = 3.0 , \text{V}$</td>
<td>2.6</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td><strong>LOW-level output voltage</strong></td>
<td>$V_{I} = V_{IH}$ or $V_{IL}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$V_{OL}$</td>
<td>$I_{O} = 20 , \mu\text{A}; V_{CC} = 0.8 , \text{V}$ to 3.6 , \text{V}$</td>
<td>-</td>
<td>-</td>
<td>0.1</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_{O} = 1.1 , \text{mA}; V_{CC} = 1.1 , \text{V}$</td>
<td>-</td>
<td>-</td>
<td>$0.3 \times V_{CC}$</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_{O} = 1.7 , \text{mA}; V_{CC} = 1.4 , \text{V}$</td>
<td>-</td>
<td>-</td>
<td>0.31</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_{O} = 1.9 , \text{mA}; V_{CC} = 1.65 , \text{V}$</td>
<td>-</td>
<td>-</td>
<td>0.31</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_{O} = 2.3 , \text{mA}; V_{CC} = 2.3 , \text{V}$</td>
<td>-</td>
<td>-</td>
<td>0.31</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_{O} = 3.1 , \text{mA}; V_{CC} = 2.3 , \text{V}$</td>
<td>-</td>
<td>-</td>
<td>0.44</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_{O} = 2.7 , \text{mA}; V_{CC} = 3.0 , \text{V}$</td>
<td>-</td>
<td>-</td>
<td>0.31</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_{O} = 4.0 , \mu\text{A}; V_{CC} = 3.0 , \text{V}$</td>
<td>-</td>
<td>-</td>
<td>0.44</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>Input leakage current</td>
<td>$V_{I} = \text{GND to 3.6 V}; V_{CC} = 0 , \text{V}$ to 3.6 , \text{V}$</td>
<td>-</td>
<td>-</td>
<td>$\pm 0.1$</td>
<td>$\mu\text{A}$</td>
</tr>
<tr>
<td></td>
<td>Power-off leakage current</td>
<td>$V_{I}$ or $V_{O} = 0 , \text{V}$ to 3.6 , \text{V}; $V_{CC} = 0 , \text{V}$</td>
<td>-</td>
<td>-</td>
<td>$\pm 0.2$</td>
<td>$\mu\text{A}$</td>
</tr>
<tr>
<td></td>
<td>Additional power-off leakage current</td>
<td>$V_{I}$ or $V_{O} = 0 , \text{V}$ to 3.6 , \text{V}; $V_{CC} = 0 , \text{V}$ to 0.2 , \text{V}$</td>
<td>-</td>
<td>-</td>
<td>$\pm 0.2$</td>
<td>$\mu\text{A}$</td>
</tr>
<tr>
<td></td>
<td>Supply current</td>
<td>$V_{I} = \text{GND or } V_{CC}$; $I_{O} = 0 , \text{A}$; $V_{CC} = 0.8 , \text{V}$ to 3.6 , \text{V}$</td>
<td>-</td>
<td>-</td>
<td>0.5</td>
<td>$\mu\text{A}$</td>
</tr>
<tr>
<td>Symbol</td>
<td>Parameter</td>
<td>Conditions</td>
<td>Min</td>
<td>Typ</td>
<td>Max</td>
<td>Unit</td>
</tr>
<tr>
<td>--------</td>
<td>--------------------------------</td>
<td>----------------------------------</td>
<td>-------</td>
<td>------</td>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>ΔICC</td>
<td>additional supply current</td>
<td>$V_I = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A}; V_{CC} = 3.3 \text{ V}$</td>
<td>[1]</td>
<td>-</td>
<td>40</td>
<td>μA</td>
</tr>
<tr>
<td>C_I</td>
<td>input capacitance</td>
<td>$V_{CC} = 0 \text{ V} \text{ to} 3.6 \text{ V}; V_I = \text{GND or} V_{CC}$</td>
<td>-</td>
<td>0.6</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>C_O</td>
<td>output capacitance</td>
<td>$V_O = \text{GND}; V_{CC} = 0 \text{ V}$</td>
<td>-</td>
<td>1.3</td>
<td>-</td>
<td>pF</td>
</tr>
</tbody>
</table>

Temperature range: -40 °C to +85 °C

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{IH}$</td>
<td>HIGH-level input voltage</td>
<td>$V_{CC} = 0.8 \text{ V}$</td>
<td>$0.70 \times V_{CC}$</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>$V_{IL}$</td>
<td>LOW-level input voltage</td>
<td>$V_{CC} = 0.8 \text{ V}$</td>
<td>-</td>
<td>-</td>
<td>$0.30 \times V_{CC}$</td>
<td>V</td>
</tr>
<tr>
<td>$V_{OH}$</td>
<td>HIGH-level output voltage</td>
<td>$V_I = V_{IH} \text{ or} V_{IL}$</td>
<td>$V_{CC} - 0.1$</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>$V_{OL}$</td>
<td>LOW-level output voltage</td>
<td>$V_I = V_{IH} \text{ or} V_{IL}$</td>
<td>$0.7 \times V_{CC}$</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>$I_I$</td>
<td>input leakage current</td>
<td>$V_I = \text{GND to} 3.6 \text{ V}; V_{CC} = 0 \text{ V} \text{ to} 3.6 \text{ V}$</td>
<td>-</td>
<td>-</td>
<td>0.1</td>
<td>V</td>
</tr>
<tr>
<td>$I_{OFF}$</td>
<td>power-off leakage current</td>
<td>$V_I \text{ or} V_O = 0 \text{ V} \text{ to} 3.6 \text{ V}; V_{CC} = 0 \text{ V}$</td>
<td>-</td>
<td>-</td>
<td>$0.3 \times V_{CC}$</td>
<td>V</td>
</tr>
<tr>
<td>$ΔI_{OFF}$</td>
<td>additional power-off leakage current</td>
<td>$V_I \text{ or} V_O = 0 \text{ V} \text{ to} 3.6 \text{ V}; V_{CC} = 0 \text{ V} \text{ to} 0.2 \text{ V}$</td>
<td>-</td>
<td>-</td>
<td>0.37</td>
<td>V</td>
</tr>
<tr>
<td>$I_{CC}$</td>
<td>supply current</td>
<td>$V_I = \text{GND or} V_{CC}; I_O = 0 \text{ A}; V_{CC} = 0.8 \text{ V} \text{ to} 3.6 \text{ V}$</td>
<td>-</td>
<td>-</td>
<td>0.45</td>
<td>V</td>
</tr>
</tbody>
</table>
### Symbol | Parameter | Conditions | Min | Typ | Max | Unit
--- | --- | --- | --- | --- | --- | ---
$\Delta I_{CC}$ | additional supply current | $V_i = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A}; V_{CC} = 3.3 \text{ V}$ | - | - | 50 | $\mu$A

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---

**$T_{amb} = -40 ^\circ C$ to $+125 ^\circ C$**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{IH}$</td>
<td>HIGH-level input voltage</td>
<td>$V_{CC} = 0.8 \text{ V}$</td>
<td>$0.75 \times V_{CC}$</td>
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<td>-</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{CC} = 0.9 \text{ V to } 1.95 \text{ V}$</td>
<td>$0.70 \times V_{CC}$</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$</td>
<td>1.6</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$</td>
<td>2.0</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>$V_{IL}$</td>
<td>LOW-level input voltage</td>
<td>$V_{CC} = 0.8 \text{ V}$</td>
<td>-</td>
<td>-</td>
<td>$0.25 \times V_{CC}$</td>
<td>V</td>
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<td></td>
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<td>$V_{CC} = 0.9 \text{ V to } 1.95 \text{ V}$</td>
<td>-</td>
<td>-</td>
<td>$0.30 \times V_{CC}$</td>
<td>V</td>
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<tr>
<td></td>
<td></td>
<td>$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$</td>
<td>-</td>
<td>-</td>
<td>0.7</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$</td>
<td>-</td>
<td>-</td>
<td>0.9</td>
<td>V</td>
</tr>
<tr>
<td>$V_{OH}$</td>
<td>HIGH-level output voltage</td>
<td>$V_i = V_{IH}$ or $V_{IL}$</td>
<td>$V_{CC} = 0.8 \text{ V}$</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_O = -20 \mu A; V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$</td>
<td>$V_{CC} = 0.11$</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_O = -1.1 \text{ mA}; V_{CC} = 1.1 \text{ V}$</td>
<td>$0.6 \times V_{CC}$</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
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<td></td>
<td>$I_O = -1.7 \text{ mA}; V_{CC} = 1.4 \text{ V}$</td>
<td>0.93</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
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<td></td>
<td>$I_O = -1.9 \text{ mA}; V_{CC} = 1.65 \text{ V}$</td>
<td>1.17</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_O = -2.3 \text{ mA}; V_{CC} = 2.3 \text{ V}$</td>
<td>1.77</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_O = -3.1 \text{ mA}; V_{CC} = 2.3 \text{ V}$</td>
<td>1.67</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_O = -2.7 \text{ mA}; V_{CC} = 3.0 \text{ V}$</td>
<td>2.40</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_O = -4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$</td>
<td>2.30</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>$V_{OL}$</td>
<td>LOW-level output voltage</td>
<td>$V_i = V_{IH}$ or $V_{IL}$</td>
<td>$V_{CC} = 0.8 \text{ V}$</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_O = 20 \mu A; V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$</td>
<td>-</td>
<td>-</td>
<td>0.11</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_O = 1.1 \text{ mA}; V_{CC} = 1.1 \text{ V}$</td>
<td>-</td>
<td>-</td>
<td>$0.33 \times V_{CC}$</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_O = 1.7 \text{ mA}; V_{CC} = 1.4 \text{ V}$</td>
<td>-</td>
<td>-</td>
<td>0.41</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_O = 1.9 \text{ mA}; V_{CC} = 1.65 \text{ V}$</td>
<td>-</td>
<td>-</td>
<td>0.39</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_O = 2.3 \text{ mA}; V_{CC} = 2.3 \text{ V}$</td>
<td>-</td>
<td>-</td>
<td>0.36</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_O = 3.1 \text{ mA}; V_{CC} = 2.3 \text{ V}$</td>
<td>-</td>
<td>-</td>
<td>0.50</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_O = 2.7 \text{ mA}; V_{CC} = 3.0 \text{ V}$</td>
<td>-</td>
<td>-</td>
<td>0.36</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_O = 4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$</td>
<td>-</td>
<td>-</td>
<td>0.50</td>
<td>V</td>
</tr>
<tr>
<td>$I_i$</td>
<td>input leakage current</td>
<td>$V_i = \text{GND to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 3.6 \text{ V}$</td>
<td>-</td>
<td>-</td>
<td>±0.75</td>
<td>$\mu$A</td>
</tr>
<tr>
<td>$I_{OFF}$</td>
<td>power-off leakage current</td>
<td>$V_i$ or $V_O = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V}$</td>
<td>-</td>
<td>-</td>
<td>±0.75</td>
<td>$\mu$A</td>
</tr>
<tr>
<td>$\Delta I_{OFF}$</td>
<td>additional power-off leakage current</td>
<td>$V_i$ or $V_O = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 0.2 \text{ V}$</td>
<td>-</td>
<td>-</td>
<td>±0.75</td>
<td>$\mu$A</td>
</tr>
<tr>
<td>$I_{CC}$</td>
<td>supply current</td>
<td>$V_i = \text{GND or } V_{CC}; I_O = 0 \text{ A}; V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$</td>
<td>-</td>
<td>-</td>
<td>1.4</td>
<td>$\mu$A</td>
</tr>
<tr>
<td>$\Delta I_{CC}$</td>
<td>additional supply current</td>
<td>$V_i = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A}; V_{CC} = 3.3 \text{ V}$</td>
<td>-</td>
<td>-</td>
<td>75</td>
<td>$\mu$A</td>
</tr>
</tbody>
</table>

[1] One input at $V_{CC} - 0.6$ V, other input at $V_{CC}$ or GND.
11 Dynamic characteristics

Table 8. Dynamic characteristics
Voltages are referenced to GND (ground = 0 V); for test circuit see Figure 9.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>25 °C</th>
<th>-40 °C to +125 °C</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Min</td>
<td>Typ[1]</td>
<td>Max</td>
</tr>
<tr>
<td>t_pd</td>
<td>propagation delay</td>
<td>nA or nB to nY; see Figure 8[2]</td>
<td></td>
<td></td>
<td>(85 °C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Min</td>
<td>Typ[1]</td>
<td>Max</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Max</td>
<td></td>
<td>Max</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Max</td>
<td></td>
<td>Max</td>
</tr>
</tbody>
</table>

**CL = 5 pF**

| t\_pd  | propagation delay | nA or nB to nY; see Figure 8[2] |         |                    | (85 °C)    | (125 °C) |
|--------|-----------------|------------|-------|--------------------|------------|
|        |                 |            | Min   | Typ[1]             | Max        |
|        |                 |            | Max   |                    | Max        |
|        |                 |            | Max   |                    | Max        |

**CL = 10 pF**

| t\_pd  | propagation delay | nA or nB to nY; see Figure 8[2] |         |                    | (85 °C)    | (125 °C) |
|--------|-----------------|------------|-------|--------------------|------------|
|        |                 |            | Min   | Typ[1]             | Max        |
|        |                 |            | Max   |                    | Max        |
|        |                 |            | Max   |                    | Max        |

**CL = 15 pF**

| t\_pd  | propagation delay | nA or nB to nY; see Figure 8[2] |         |                    | (85 °C)    | (125 °C) |
|--------|-----------------|------------|-------|--------------------|------------|
|        |                 |            | Min   | Typ[1]             | Max        |
|        |                 |            | Max   |                    | Max        |
|        |                 |            | Max   |                    | Max        |

**CL = 30 pF**

| t\_pd  | propagation delay | nA or nB to nY; see Figure 8[2] |         |                    | (85 °C)    | (125 °C) |
|--------|-----------------|------------|-------|--------------------|------------|
|        |                 |            | Min   | Typ[1]             | Max        |
|        |                 |            | Max   |                    | Max        |
|        |                 |            | Max   |                    | Max        |
Symbol | Parameter | Conditions | 25 °C | -40 °C to +125 °C | Unit
--- | --- | --- | --- | --- | ---
 |  |  | Min | Typ | Max | Min | Max (85 °C) | Max (125 °C)
C_L = 5 pF, 10 pF, 15 pF and 30 pF
C_{PD} | power dissipation capacitance | | | | | |
 | f_i = 1 MHz; V_I = GND to V_CC | | | | | |
 | V_CC = 0.8 V | - | 2.6 | - | - | - | pF |
 | V_CC = 1.1 V to 1.3 V | - | 2.7 | - | - | - | pF |
 | V_CC = 1.4 V to 1.6 V | - | 2.7 | - | - | - | pF |
 | V_CC = 1.65 V to 1.95 V | - | 2.9 | - | - | - | pF |
 | V_CC = 2.3 V to 2.7 V | - | 3.3 | - | - | - | pF |
 | V_CC = 3.0 V to 3.6 V | - | 3.7 | - | - | - | pF |

[1] All typical values are measured at nominal V_CC.
[2] t_{PLH} is the same as t_{PHL}.
[3] C_{PD} is used to determine the dynamic power dissipation (P_D in μW).

\[ P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o) \]

Where:
- f_i = input frequency in MHz;
- f_o = output frequency in MHz;
- C_L = output load capacitance in pF;
- V_CC = supply voltage in V;
- N = number of inputs switching;
- \Sigma(C_L \times V_{CC}^2 \times f_o) = sum of the outputs.

11.1 Waveforms and test circuit

Measurement points are given in Table 9.
Logic levels: V_{OL} and V_{OH} are typical output voltage levels that occur with the output load.

Figure 8. The data input (nA or nB) to output (nY) propagation delays

<table>
<thead>
<tr>
<th>Supply voltage</th>
<th>Output</th>
<th>Input</th>
<th>t_r = t_f</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_CC</td>
<td>V_M</td>
<td>V_M</td>
<td>V_I</td>
</tr>
<tr>
<td>0.8 V to 3.6 V</td>
<td>0.5 \times V_CC</td>
<td>0.5 \times V_CC</td>
<td>V_CC</td>
</tr>
</tbody>
</table>
Test data is given in Table 10.

Definitions for test circuit:
- \( R_L \) = Load resistance.
- \( C_L \) = Load capacitance including jig and probe capacitance.
- \( R_T \) = Termination resistance should be equal to the output impedance \( Z_o \) of the pulse generator.
- \( V_{EXT} \) = External voltage for measuring switching times.

Figure 9. Test circuit for measuring switching times

**Table 10. Test data**

<table>
<thead>
<tr>
<th>Supply voltage</th>
<th>Load</th>
<th>( V_{EXT} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( V_{CC} )</td>
<td>( C_L )</td>
<td>( R_L^{[1]} )</td>
</tr>
<tr>
<td>0.8 V to 3.6 V</td>
<td>5 pF, 10 pF, 15 pF and 30 pF</td>
<td>5 kΩ or 1 MΩ</td>
</tr>
</tbody>
</table>

\[1\] For measuring enable and disable times \( R_L = 5 \, kΩ \), for measuring propagation delays, set-up and hold times and pulse width \( R_L = 1 \, MΩ \).
12 Package outline

VSSOP8: plastic very thin shrink small outline package; 8 leads; body width 2.3 mm

Dimensions (mm are the original dimensions)

<table>
<thead>
<tr>
<th>Unit</th>
<th>Amax</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
<th>b_p</th>
<th>c</th>
<th>D(1)</th>
<th>e</th>
<th>H_E</th>
<th>L</th>
<th>L_p</th>
<th>Q</th>
<th>v</th>
<th>w</th>
<th>y</th>
<th>Z(1)</th>
<th>θ</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm</td>
<td>nom</td>
<td>0.15</td>
<td>0.85</td>
<td>0.27</td>
<td>0.23</td>
<td>2.1</td>
<td>2.4</td>
<td>3.2</td>
<td>0.40</td>
<td>0.21</td>
<td>0.2</td>
<td>0.18</td>
<td>0.17</td>
<td>0.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>min</td>
<td>0.00</td>
<td>0.60</td>
<td>0.17</td>
<td>0.08</td>
<td>1.9</td>
<td>2.2</td>
<td>3.0</td>
<td>0.15</td>
<td>0.19</td>
<td>0.18</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note
1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

Figure 10. Package outline SOT765-1 (VSSOP8)
XSON8: plastic extremely thin small outline package; no leads; 8 terminals; body 1 x 1.95 x 0.5 mm

Figure 11. Package outline SOT833-1 (XSON8)
XSON8: extremely thin small outline package; no leads; 8 terminals; body 1.35 x 1 x 0.5 mm

Figure 12. Package outline SOT1089 (XSON8)
Figure 13. Package outline SOT902-2 (XQFN8)
XSON8: extremely thin small outline package; no leads;
8 terminals; body 1.2 x 1.0 x 0.35 mm

Figure 14. Package outline SOT1116 (XSON8)
XSON8: extremely thin small outline package; no leads; 8 terminals; body 1.35 x 1.0 x 0.35 mm

![Diagram of the XSON8 package outline SOT1203](image)

**Dimensions**

<table>
<thead>
<tr>
<th>Unit</th>
<th>A(1)</th>
<th>A1</th>
<th>b</th>
<th>D</th>
<th>E</th>
<th>d1</th>
<th>L</th>
<th>L1</th>
</tr>
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<td>mm</td>
<td>max</td>
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<td>0.40</td>
<td>1.40</td>
<td>1.05</td>
<td>0.35</td>
<td>0.40</td>
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<tr>
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<td>0.15</td>
<td>1.35</td>
<td>1.00</td>
<td>0.55</td>
<td>0.35</td>
<td>0.30</td>
<td>0.35</td>
<td></td>
</tr>
<tr>
<td>min</td>
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<td>1.30</td>
<td>0.95</td>
<td>0.27</td>
<td>0.32</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note**

1. Including plating thickness.
2. Visible depending upon used manufacturing technology.

**Figure 15. Package outline SOT1203 (XSON8)**
X2SON8: plastic thermal enhanced extremely thin small outline package; no leads; 8 terminals; body 1.35 x 0.8 x 0.35 mm

Figure 16. Package outline SOT1233 (X2SON8)
13 Abbreviations

Table 11. Abbreviations

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>CDM</td>
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</tr>
<tr>
<td>DUT</td>
<td>Device Under Test</td>
</tr>
<tr>
<td>ESD</td>
<td>ElectroStatic Discharge</td>
</tr>
<tr>
<td>HBM</td>
<td>Human Body Model</td>
</tr>
<tr>
<td>MM</td>
<td>Machine Model</td>
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</table>

14 Revision history

Table 12. Revision history

<table>
<thead>
<tr>
<th>Document ID</th>
<th>Release date</th>
<th>Data sheet status</th>
<th>Change notice</th>
<th>Supersedes</th>
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<td>20170703</td>
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<td>74AUP2G32 v.7</td>
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<td>Modifications:</td>
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15 Legal information

15.1 Data sheet status

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[1] Please consult the most recently issued document before initiating or completing a design.
[2] The term 'short data sheet' is explained in section "Definitions".
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