## FEATURES

- Controlled Baseline
  - One Assembly/Test Site
  - One Fabrication Site
- Extended Temperature Performance of 55°C to 125°C
- Enhanced Diminishing Manufacturing Sources (DMS) Support
- Enhanced Product-Change Notification
- Qualification Pedigree\(^{(1)}\)
- Low Quiescent Current = 5 µA (Max)
- Integrated Voltage Reference = 1.242 V
- Input Common-Mode Range = 200 mV
- Voltage Reference Initial Accuracy = 1%
- Open-Drain Logic Compatible Output (TLV3011)
- Push-Pull Output (TLV3012)
- Low Supply Voltage = 1.8 V to 5.5 V
- Fast Response Time = 6-µs Propagation Delay With 100-mV Overdrive (TLV3011: \(R_{\text{PULLUP}} = 10 \, \text{kΩ}\))
- Microsize Package: SOT23-6

\(^{(1)}\) Component qualification in accordance with JEDEC and industry standards to ensure reliable operation over an extended temperature range. This includes, but is not limited to, Highly Accelerated Stress Test (HAST) or biased 85/85, temperature cycle, autoclave or unbiased HAST, electromigration, bond intermetallic life, and mold compound life. Such qualification testing should not be viewed as justifying use of this component beyond specified performance and environmental limits.

## APPLICATIONS

- Battery-Powered Level Detection
- Data Acquisition
- System Monitoring
- Oscillators
- Sensor Systems
  - Smoke Detectors
  - Light Sensors
  - Alarms

## DESCRIPTION

The TLV3011 and TLV3012 are low-power, open-drain output comparators. The devices feature an uncommitted on-chip voltage reference, have 5-µA (max) quiescent current, input common-mode range 200 mV beyond the supply rails, and single-supply operation from 1.8 V to 5.5 V. The integrated 1.242-V series voltage reference offers low 100-ppm/°C (max) drift, is stable with up to 10-nF capacitive load, and can provide up to 0.5 mA (typ) of output current.

The TLV3011 and TLV3012 are available in the tiny SOT23-6 package for space-conservative designs. The devices are specified for the temperature range of 55°C to 125°C.

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Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.
This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

### PACKAGE ORDERING INFORMATION

<table>
<thead>
<tr>
<th>$T_A$</th>
<th>PACKAGE(1)</th>
<th>ORDERABLE PART NUMBER</th>
<th>TOP SIDE MARKING</th>
</tr>
</thead>
<tbody>
<tr>
<td>-55°C TO 125°C</td>
<td>DBV-SOT</td>
<td>TLV3011AMDBVREP</td>
<td>BTV</td>
</tr>
<tr>
<td></td>
<td>DBV-SOT</td>
<td>TLV3012AMDBVREP(2)</td>
<td>TBD</td>
</tr>
</tbody>
</table>

(1) Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

(2) Product Preview

#### Pin Configurations

![Top View](image)

Note: Pin 1 is determined by orienting package marking as shown.

(1) Product Preview

### ABSOLUTE MAXIMUM RATINGS(1)

over operating free-air temperature range (unless otherwise noted)

<table>
<thead>
<tr>
<th></th>
<th>MIN</th>
<th>MAX</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>7</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Signal input terminals</td>
<td>Voltage(2)</td>
<td>$-0.5$ (V+) $+0.5$ V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Current(2)</td>
<td>±10 mA</td>
<td></td>
</tr>
<tr>
<td>Output short circuit(3)</td>
<td>Continuous</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>$-55$</td>
<td>125°C</td>
<td></td>
</tr>
<tr>
<td>$T_{stg}$ Storage temperature range</td>
<td>$-65$</td>
<td>150°C</td>
<td></td>
</tr>
<tr>
<td>$T_J$ Junction temperature</td>
<td>150°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead ambient temperature (soldering, 10 s)</td>
<td>300°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ESD rating (Human-Body Model)</td>
<td>2000 V</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2) All voltage values are with respect to the network ground terminal.

(3) Short circuit to ground
## ELECTRICAL CHARACTERISTICS

over operating free-air temperature range (unless otherwise noted)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITIONS</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offset Voltage</td>
<td>V&lt;sub&gt;CM&lt;/sub&gt; = 0 V, I&lt;sub&gt;0&lt;/sub&gt; = 0 V</td>
<td>0.5</td>
<td>15</td>
<td>mV</td>
<td></td>
</tr>
<tr>
<td>dV&lt;sub&gt;DS&lt;/sub&gt;/dT</td>
<td>I&lt;sub&gt;A&lt;/sub&gt; = −55°C to 125°C</td>
<td>±12</td>
<td></td>
<td>µV/°C</td>
<td></td>
</tr>
<tr>
<td>PSRR</td>
<td>V&lt;sub&gt;S&lt;/sub&gt; = 1.8 V to 5.5 V</td>
<td>100</td>
<td>1000</td>
<td>µV/V</td>
<td></td>
</tr>
<tr>
<td>Input Bias Current</td>
<td>V&lt;sub&gt;CM&lt;/sub&gt; = V&lt;sub&gt;S&lt;/sub&gt;/2</td>
<td>±10</td>
<td></td>
<td>pA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V&lt;sub&gt;CM&lt;/sub&gt; = V&lt;sub&gt;S&lt;/sub&gt;/2</td>
<td>±10</td>
<td></td>
<td>pA</td>
<td></td>
</tr>
<tr>
<td>Input Voltage Range</td>
<td>V&lt;sub&gt;CM&lt;/sub&gt; = −0.2 V to (V+) − 1.5 V</td>
<td>60</td>
<td>74</td>
<td>dB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V&lt;sub&gt;CM&lt;/sub&gt; = −0.2 V to (V+) + 0.2 V</td>
<td>54</td>
<td>62</td>
<td>dB</td>
<td></td>
</tr>
<tr>
<td>Input Impedance</td>
<td>Common mode</td>
<td>10&lt;sup&gt;12&lt;/sup&gt;</td>
<td>I 2</td>
<td>Ω</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Differential</td>
<td>10&lt;sup&gt;13&lt;/sup&gt;</td>
<td>I 4</td>
<td>Ω</td>
<td></td>
</tr>
</tbody>
</table>

### Switching Characteristics

#### Propagation delay time

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Condition</th>
<th>Low to high</th>
<th>High to low</th>
</tr>
</thead>
<tbody>
<tr>
<td>f</td>
<td>10 kHz, V&lt;sub&gt;STEP&lt;/sub&gt; = 1 V, input overdrive = 10 mV</td>
<td>12 µs</td>
<td>6 µs</td>
</tr>
<tr>
<td>f</td>
<td>10 kHz, V&lt;sub&gt;STEP&lt;/sub&gt; = 1 V, input overdrive = 100 mV</td>
<td>13.5 µs</td>
<td>6.5 µs</td>
</tr>
</tbody>
</table>

#### Rise time

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Condition</th>
<th>Parameter</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>t&lt;sub&gt;r&lt;/sub&gt;</td>
<td>TLV3011</td>
<td>t&lt;sub&gt;r&lt;/sub&gt;</td>
<td>TLV3012&lt;sup&gt;(2)&lt;/sup&gt;</td>
</tr>
<tr>
<td>C&lt;sub&gt;L&lt;/sub&gt; = 10 pF</td>
<td>See (1)</td>
<td>C&lt;sub&gt;L&lt;/sub&gt; = 10 pF</td>
<td>100 ns</td>
</tr>
</tbody>
</table>

### Output

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Condition</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>V&lt;sub&gt;OL&lt;/sub&gt;</td>
<td>V&lt;sub&gt;S&lt;/sub&gt; = 5 V</td>
<td>160</td>
<td>200</td>
<td>mV</td>
<td></td>
</tr>
<tr>
<td>V&lt;sub&gt;OH&lt;/sub&gt;</td>
<td>TLV3012&lt;sup&gt;(2)&lt;/sup&gt;</td>
<td>I&lt;sub&gt;OUT&lt;/sub&gt; = −5 mA</td>
<td>90</td>
<td>200</td>
<td>mV</td>
</tr>
<tr>
<td>Short-circuit current</td>
<td>TLV3012&lt;sup&gt;(2)&lt;/sup&gt;</td>
<td>I&lt;sub&gt;OUT&lt;/sub&gt; = 5 mA</td>
<td>See Typical Characteristics</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Voltage Reference

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Condition</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>V&lt;sub&gt;OUT&lt;/sub&gt;</td>
<td>Output voltage</td>
<td>1.208</td>
<td>1.242</td>
<td>1.276</td>
<td>V</td>
</tr>
<tr>
<td>dV&lt;sub&gt;OUT&lt;/sub&gt;/dT</td>
<td>Initial accuracy</td>
<td>±1%</td>
<td></td>
<td></td>
<td>ppm/°C</td>
</tr>
<tr>
<td>dV&lt;sub&gt;OUT&lt;/sub&gt;/dI&lt;sub&gt;LOAD&lt;/sub&gt;</td>
<td>Sourcing</td>
<td>0 mA &lt; I&lt;sub&gt;SOURCE&lt;/sub&gt; ≤ 0.5 mA</td>
<td>0.36</td>
<td>1</td>
<td>mV/mA</td>
</tr>
<tr>
<td></td>
<td>Sinking</td>
<td>0 mA &lt; I&lt;sub&gt;SINK&lt;/sub&gt; ≤ 0.5 mA</td>
<td>6.6</td>
<td></td>
<td>mV/mA</td>
</tr>
<tr>
<td>I&lt;sub&gt;LOAD&lt;/sub&gt;</td>
<td>Output current</td>
<td>0.5</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>dV&lt;sub&gt;OUT&lt;/sub&gt;/dV&lt;sub&gt;IN&lt;/sub&gt;</td>
<td>Line regulation</td>
<td>1.8 V ≤ V&lt;sub&gt;IN&lt;/sub&gt; ≤ 5.5 V</td>
<td>10</td>
<td>100</td>
<td>µV/V</td>
</tr>
</tbody>
</table>

### Noise

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Condition</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference voltage noise</td>
<td>f = 0.1 Hz to 10 Hz</td>
<td>0.2</td>
<td></td>
<td></td>
<td>mV&lt;sub&gt;pp&lt;/sub&gt;</td>
</tr>
</tbody>
</table>

### Power Supply

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Condition</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>V&lt;sub&gt;S&lt;/sub&gt;</td>
<td>Specified voltage</td>
<td>1.8</td>
<td>5.5</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Operating voltage range</td>
<td>1.8</td>
<td>5.5</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>I&lt;sub&gt;0&lt;/sub&gt;</td>
<td>Quiescent current</td>
<td>V&lt;sub&gt;S&lt;/sub&gt; = 5 V, V&lt;sub&gt;O&lt;/sub&gt; = High</td>
<td>2.8</td>
<td>5</td>
<td>µA</td>
</tr>
</tbody>
</table>

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(1) I<sub>r</sub> dependent on R<sub>PULLUP</sub> and C<sub>LOAD</sub>
(2) Product Preview
ELECTRICAL CHARACTERISTICS (continued)

over operating free-air temperature range (unless otherwise noted)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITIONS</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating range</td>
<td></td>
<td>–55</td>
<td>125</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Storage range</td>
<td></td>
<td>–65</td>
<td>150</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Thermal resistance</td>
<td>SOT23-6</td>
<td></td>
<td></td>
<td>200</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

TYPICAL CHARACTERISTICS

**QUIESCENT CURRENT vs TEMPERATURE**

![Graph showing quiescent current vs temperature](image1)

**QUIESCENT CURRENT vs OUTPUT SWITCHING FREQUENCY**

![Graph showing quiescent current vs output switching frequency](image2)

**QUIESCENT CURRENT vs OUTPUT SWITCHING FREQUENCY**

![Graph showing quiescent current vs output switching frequency](image3)

**INPUT BIAS CURRENT vs TEMPERATURE**

![Graph showing input bias current vs temperature](image4)
TYPICAL CHARACTERISTICS (continued)

**OUTPUT LOW**

- **Output Current** vs **Output Low – V**

  - $V_s = 1.8\,V$
  - $V_s = 3\,V$
  - $V_s = 5\,V$

  ![Graph of Output Low vs Output Current](image)

**OUTPUT HIGH**

- **Output Current** vs **Output High – V**

  - $V_{oo} = 1.8\,V$
  - $V_{oo} = 3\,V$
  - $V_{oo} = 5\,V$

  ![Graph of Output High vs Output Current](image)

**PROPAGATION DELAY (t_{PLH})**

- vs **Capacitive Load**

  - $V_s = 1.8\,V$
  - $V_s = 3\,V$
  - $V_s = 5\,V$

  ![Graph of Propagation Delay vs Capacitive Load](image)

**PROPAGATION DELAY (t_{PHL})**

- vs **Capacitive Load**

  - $V_s = 1.8\,V$
  - $V_s = 3\,V$
  - $V_s = 5\,V$

  ![Graph of Propagation Delay vs Capacitive Load](image)

**PROPAGATION DELAY (t_{PLH})**

- vs **Input Overdrive**

  - $V_s = 1.8\,V$
  - $V_s = 3\,V$
  - $V_s = 5\,V$

  ![Graph of Propagation Delay vs Input Overdrive](image)

**PROPAGATION DELAY (t_{PHL})**

- vs **Input Overdrive**

  - $V_s = 1.8\,V$
  - $V_s = 3\,V$
  - $V_s = 5\,V$

  ![Graph of Propagation Delay vs Input Overdrive](image)
TYPICAL CHARACTERISTICS (continued)

![Graph of Propagation Delay (t_{PLH}) vs Temperature](image1)

**Figure 11.**

![Graph of Propagation Delay (t_{PHL}) vs Temperature](image2)

**Figure 12.**

![Graph of Propagation Delay (t_{PLH})](image3)

**Figure 13.**

![Graph of Propagation Delay (t_{PHL})](image4)

**Figure 14.**

![Graph of Propagation Delay (t_{PLH})](image5)

**Figure 15.**

![Graph of Propagation Delay (t_{PHL})](image6)

**Figure 16.**
TYPICAL CHARACTERISTICS (continued)

Figure 17. Reference Voltage vs Output Load Current (Sourcing)

Figure 18. Reference Voltage vs Output Load Current (Sinking)

Figure 19. Reference Voltage vs Temperature

Figure 20. Short-Circuit Current vs Supply Voltage

Figure 21. Reference Voltage Distribution
APPLICATION INFORMATION

The TLV3011 is a low-power, open-drain comparator with on-chip 1.242-V series reference. The open-drain output allows multiple devices to be driven by a single pullup resistor to accomplish an OR function, making the TLV3011 useful for logic applications.

The TLV3012 comparator with on-chip 1.242-V series reference has a push-pull output stage optimal for reduced power budget applications and features no shoot-through current.

A typical supply current of 2.8 µA and small packaging combine with 1.8-V supply requirements to make the TLV3011 and TLV3012 optimal for battery and portable designs.

Board Layout

Typical connections for the TLV3011 and TLV3012 are shown in Figure 22. The TLV3011 is an open-drain output device. A pullup resistor must be connected between the comparator output and supply to enable operation.

To minimize supply noise, power supplies should be capacitively decoupled by a 0.01-µF ceramic capacitor in parallel with a 1-µF electrolytic capacitor. Comparators are sensitive to input noise and precautions such as proper grounding (use of ground plane), supply bypassing, and guarding of high-impedance nodes minimize the effects of noise and help to ensure specified performance.

![Figure 22. Basic Connections of the TLV3011 and TLV3012](image)

Open-Drain Output (TLV3011)

The open-drain output of the TLV3011 is useful in logic applications. The value of the pullup resistor and supply voltage used affects current consumption due to additional current drawn when the output is in a low state. This effect can be seen in Figure 3.

External Hysteresis

Comparator inputs have no noise immunity within the range of specified offset voltage (±12 mV). For noisy input signals, the comparator output may display multiple switching as input signals move through the switching threshold. The typical comparator threshold of the TLV3011 and TLV3012 is ±0.5 mV. To prevent multiple switching within the comparator threshold of the TLV3011 or TLV3012, external hysteresis may be added by connecting a small amount of feedback to the positive input. Figure 23 shows a typical topology used to introduce hysteresis, described by this equation:

\[ V_{HYS} = \frac{V_+ \times R_1}{R_1 + R_2} \]
APPLICATION INFORMATION (continued)

V_{\text{HYST}} sets the value of the transition voltage required to switch the comparator output by increasing the threshold region, thereby reducing sensitivity to noise.

Applications

Battery-Level Detect

The low power consumption and 1.8-V supply voltage of the TLV3011 make it an excellent candidate for battery-powered applications. Figure 24 shows the TLV3011 configured as a low battery level detector for a 3-V battery.

Battery Okay trip voltage = 1.242 \frac{R_1 + R_2}{R_2}

When the battery voltage drops below 1.9 V, the Battery Okay output goes low.

(1) Use $R_{\text{PULLUP}}$ with the TLV3011 only.

Figure 24. TLV3011 Configured as Low Battery Level Detector
APPLICATION INFORMATION (continued)

Power-On Reset

The reset circuit shown in Figure 25 provides a time-delayed release of reset to the MSP430 microcontroller. Operation of the circuit is based on a stabilization time constant of the supply voltage, rather than on a predetermined voltage value. The negative input is a reference voltage created by the internal voltage reference. The positive input is an RC circuit that provides a power-up delay. When power is applied, the output of the comparator is low, holding the processor in the reset condition. Only after allowing time for the supply voltage to stabilize does the positive input of the comparator become higher than the negative input, resulting in a high output state, releasing the processor for operation. The stabilization time required for the supply voltage is adjustable by the selection of the RC component values. Use of a lower-valued resistor in this portion of the circuit does not increase current consumption, because no current flows through the RC circuit after the supply has stabilized.

Figure 25. TLV3011 or TLV3012 Configured as Power-Up Reset Circuit for the MSP430

The reset delay needed depends on the power-up characteristics of the system power supply. \( R_1 \) and \( C_1 \) are selected to allow enough time for the power supply to stabilize. \( D_1 \) provides rapid reset if power is lost. In this example, the \( R_1 \times C_1 \) time constant is 10 ms.

Relaxation Oscillator

The TLV3012 can be configured as a relaxation oscillator to provide a simple and inexpensive clock output (see Figure 26). The capacitor is charged at a rate of \( T = 0.69RC \) and discharges at a rate of 0.69RC. Therefore, the period is \( T = 1.38RC \). \( R_1 \) may be a different value than \( R_2 \).

Figure 26. TLV3012 Configured as Relaxation Oscillator
## Packaging Information

<table>
<thead>
<tr>
<th>Orderable Device</th>
<th>Status</th>
<th>Package Type</th>
<th>Package Drawing</th>
<th>Pins</th>
<th>Package Qty</th>
<th>Eco Plan</th>
<th>Lead/Ball Finish</th>
<th>MSL Peak Temp</th>
<th>Op Temp (°C)</th>
<th>Device Marking</th>
<th>Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>TLV3011AMDBVREP</td>
<td>ACTIVE</td>
<td>SOT-23</td>
<td>DBV</td>
<td>6</td>
<td>3000</td>
<td>Green (RoHS &amp; no Sb/Br)</td>
<td>CU NIPDAU</td>
<td>Level-1-260C-UNLIM</td>
<td>-55 to 125</td>
<td>BTV</td>
<td>Samples</td>
</tr>
<tr>
<td>V62/07604-01XE</td>
<td>ACTIVE</td>
<td>SOT-23</td>
<td>DBV</td>
<td>6</td>
<td>3000</td>
<td>Green (RoHS &amp; no Sb/Br)</td>
<td>CU NIPDAU</td>
<td>Level-1-260C-UNLIM</td>
<td>-55 to 125</td>
<td>BTV</td>
<td>Samples</td>
</tr>
</tbody>
</table>

(1) The marketing status values are defined as follows:
- **ACTIVE**: Product device recommended for new designs.
- **LIFEBUY**: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
- **NRND**: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
- **PREVIEW**: Device has been announced but is not in production. Samples may or may not be available.
- **OBSOLETE**: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check [http://www.ti.com/productcontent](http://www.ti.com/productcontent) for the latest availability information and additional product content details.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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OTHER QUALIFIED VERSIONS OF TLV3011-EP:

- Catalog: TLV3011

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
**TAPE AND REEL INFORMATION**

**REEL DIMENSIONS**

- **Device**: TLV3011AMDBVREP
- **Package Type**: SOT-23
- **Drawing**: DBV
- **Pins**: 6
- **SPQ**: 3000

<table>
<thead>
<tr>
<th>TAPE DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reel Diameter</td>
</tr>
<tr>
<td>A0: Dimension designed to accommodate the component width</td>
</tr>
<tr>
<td>B0: Dimension designed to accommodate the component length</td>
</tr>
<tr>
<td>K0: Dimension designed to accommodate the component thickness</td>
</tr>
<tr>
<td>W: Overall width of the carrier tape</td>
</tr>
<tr>
<td>P1: Pitch between successive cavity centers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sprocket Holes</td>
</tr>
<tr>
<td>User Direction of Feed</td>
</tr>
</tbody>
</table>

Pocket Quadrants

*All dimensions are nominal.*

<table>
<thead>
<tr>
<th>Device</th>
<th>Package Type</th>
<th>Package Drawing</th>
<th>Pins</th>
<th>SPQ</th>
<th>Reel Diameter (mm)</th>
<th>Reel Width W1 (mm)</th>
<th>A0 (mm)</th>
<th>B0 (mm)</th>
<th>K0 (mm)</th>
<th>P1 (mm)</th>
<th>W (mm)</th>
<th>Pin1 Quadrant</th>
</tr>
</thead>
<tbody>
<tr>
<td>TLV3011AMDBVREP</td>
<td>SOT-23</td>
<td>DBV</td>
<td>6</td>
<td>3000</td>
<td>179.0</td>
<td>8.4</td>
<td>3.2</td>
<td>3.2</td>
<td>1.4</td>
<td>4.0</td>
<td>8.0</td>
<td>Q3</td>
</tr>
</tbody>
</table>
TAPE AND REEL BOX DIMENSIONS

<table>
<thead>
<tr>
<th>Device</th>
<th>Package Type</th>
<th>Package Drawing</th>
<th>Pins</th>
<th>SPQ</th>
<th>Length (mm)</th>
<th>Width (mm)</th>
<th>Height (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TLV3011AMDBVREP</td>
<td>SOT-23</td>
<td>DBV</td>
<td>6</td>
<td>3000</td>
<td>203.0</td>
<td>203.0</td>
<td>35.0</td>
</tr>
</tbody>
</table>

*All dimensions are nominal*
NOTES:  
A. All linear dimensions are in millimeters. 
B. This drawing is subject to change without notice. 
C. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side. 
D. Falls within JEDEC MO-203 variation AB.
NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
4. Leads 1,2,3 may be wider than leads 4,5,6 for package orientation.
5. Reference JEDEC MO-178.
NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.
NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.

9. Board assembly site may have different recommendations for stencil design.
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