TPS650330-Q1 Automotive Camera PMIC

1 Device Overview

1.1 Features

• Qualified for automotive applications
• AEC-Q100 grade 1 qualified
  - -40°C to +125°C ambient operating temperature range
• Three step-down converters:
  - BUCK1 \( V_{IN} \) range from 4 V to 18.3 V
  - BUCK1 output current up to 1500-mA
  - BUCK2 and BUCK3 \( V_{IN} \) range from 3.0 V to 5.5 V
  - BUCK2 and BUCK3 output current up to 1200-mA
  - Spread-Spectrum Clock (SSC) generation for reduced EMI
  - 2.3-MHz Forced fixed switching frequency PWM operation
• One low dropout (LDO) regulator:
  - \( V_{IN} \) range from 3.0 V to 5.5 V
  - Low noise
  - Adjustable output voltage via \( I^2C \)
  - Up to 300-mA output current
• 4.0-mm × 4.0-mm 24-Pin VQFN with wettable flanks

1.2 Applications

• Automotive camera modules
  - Surround view camera modules
  - Rear view camera modules
  - Driver monitor camera modules
  - Power over coax (POC) camera modules
  - E-Mirror camera modules

1.3 Description

The TPS650330-Q1 device is a highly integrated power management IC for automotive camera modules. This device combines three step down converters and one low-dropout (LDO) regulator. The BUCK1 step-down converter has an input voltage range up to 18.3 V for connections to Power over Coax (PoC). All converters operate in a forced fixed-frequency PWM mode. The LDO can supply 300 mA and operate with an input voltage range from 3.0 V to 5.5 V. The step-down converters and the LDO have separate voltage inputs that enable maximum design and sequencing flexibility.

The TPS650330-Q1 is available in a 24-pin VQFN package (4.0 mm × 4.0 mm).

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>PACKAGE</th>
<th>BODY SIZE (NOM)</th>
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<tbody>
<tr>
<td>TPS650330-Q1</td>
<td>VQFN (24)</td>
<td>4.0 mm × 4.0 mm</td>
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</table>

(1) For all available packages, see the orderable addendum at the end of the data sheet.
1.4 Application Circuit

VIN = 4V to 18.3V

Figure 1-1. TPS650330-Q1 Application Circuit
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## Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

<table>
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<tr>
<th>DATE</th>
<th>REVISION</th>
<th>NOTES</th>
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<tr>
<td>November 2017</td>
<td>*</td>
<td>Initial Release</td>
</tr>
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3 Device and Documentation Support

3.1 Receiving Notification of Documentation Updates
To receive notification of documentation updates, navigate to the device product folder on ti.com. In the upper right corner, click on Alert me to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

3.2 Community Resources

3.2.1 Third-Party Products Disclaimer
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3.3 Trademarks
All trademarks are the property of their respective owners.

3.4 Electrostatic Discharge Caution
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.

3.5 Glossary

TI Glossary This glossary lists and explains terms, acronyms, and definitions.
## PACKAGING INFORMATION

<table>
<thead>
<tr>
<th>Orderable Device</th>
<th>Status (1)</th>
<th>Package Type</th>
<th>Package Drawing</th>
<th>Pins</th>
<th>Package Qty</th>
<th>Eco Plan (2)</th>
<th>Lead finish/ Ball material (3)</th>
<th>MSL Peak Temp (3)</th>
<th>Op Temp (°C)</th>
<th>Device Marking (4/5)</th>
<th>Samples</th>
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<td>VQFN</td>
<td>RGE</td>
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<td>3000</td>
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<td>VQFN</td>
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<td>3000</td>
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<td>-40 to 125</td>
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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. **RoHS**: TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".
   - **RoHS Exempt**: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.
   - **Green**: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

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

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