TPS61021 3-A Boost Converter with 0.5-V Ultra Low Input Voltage

1 Features

- Input Voltage Range: 0.9 V to 3.6 V, Down to 0.5 V After Startup
- Output Voltage Range: 1.8 V to 4.0 V
- 91% Efficiency at V_{IN} = 2.4 V, V_{OUT} = 3.3 V and I_{OUT} = 1.5 A
- 2.0-MHz Switching Frequency
- I_{OUT} > 1.5 A at V_{OUT} = 3.3 V when V_{IN} > 1.8 V
- 30-µA Quiescent Current
- ±2% Output Voltage Accuracy
- PFM Operation Mode at Light Load
- True Disconnection Between Input and Output During Shutdown
- Over Voltage and Thermal Shutdown Protections
- 2-mm x 2-mm WSON Package

2 Applications

- Battery Powered IoT Devices
- Gaming Control
- Thermostat
- Portable Medical Equipment

3 Description

The TPS61021 provides a power supply solution for portable or smart devices powered by alkaline, NiMH, or Li-Mn batteries. The TPS61021 is capable of outputting 3.3-V voltage and 1.5-A current from a battery discharged to as low as 1.8 V. Capable of operating with 0.5-V input voltage enables the TPS61021 to extend the battery run time.

The TPS61021 operates at 2-MHz switching frequency at heavy load and enters power-save mode at light load to maintain high efficiency over the entire load current range. The device only consumes a 30-µA quiescent current in light load condition. During shutdown, the load is completely disconnected from the input. In addition, The TPS61021 provides 4.3-V output overvoltage protection, output short circuit protection, and thermal shutdown protection.

The TPS61021 offers a very small solution size due to low count of external components. It allows the use of small inductors and output capacitors with the 2-MHz switching frequency.

The TPS61021 is available in 2.0-mm x 2.0-mm WSON package.

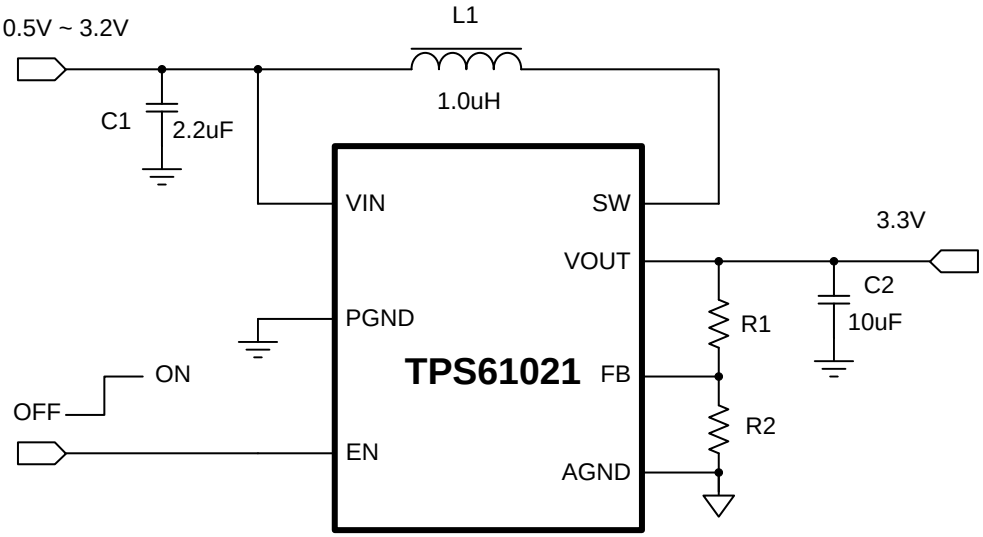
Device Information(1)

PART NUMBER	PACKAGE	BODY SIZE (NOM)
TPS61021	WSON (8)	2.00-mm x 2.00-mm

(1) For all available packages, see the orderable addendum at the end of the datasheet.

PRODUCT PREVIEW

Typical Application Circuit



4 Device and Documentation Support

4.1 Community Resources

The following links connect to TI community resources. Linked contents are provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's Terms of Use.

TI E2E™ Online Community ***TI's Engineer-to-Engineer (E2E) Community.*** Created to foster collaboration among engineers. At e2e.ti.com, you can ask questions, share knowledge, explore ideas and help solve problems with fellow engineers.

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4.2 Trademarks

E2E is a trademark of Texas Instruments.
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4.3 Electrostatic Discharge Caution

These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

4.4 Glossary

SLYZ022 — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

5 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
TPS61021DSGR	PREVIEW	WSON	DSG	8	3000	TBD	Call TI	Call TI	-40 to 85		
TPS61021DSGT	PREVIEW	WSON	DSG	8	250	TBD	Call TI	Call TI	-40 to 85		

(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 for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

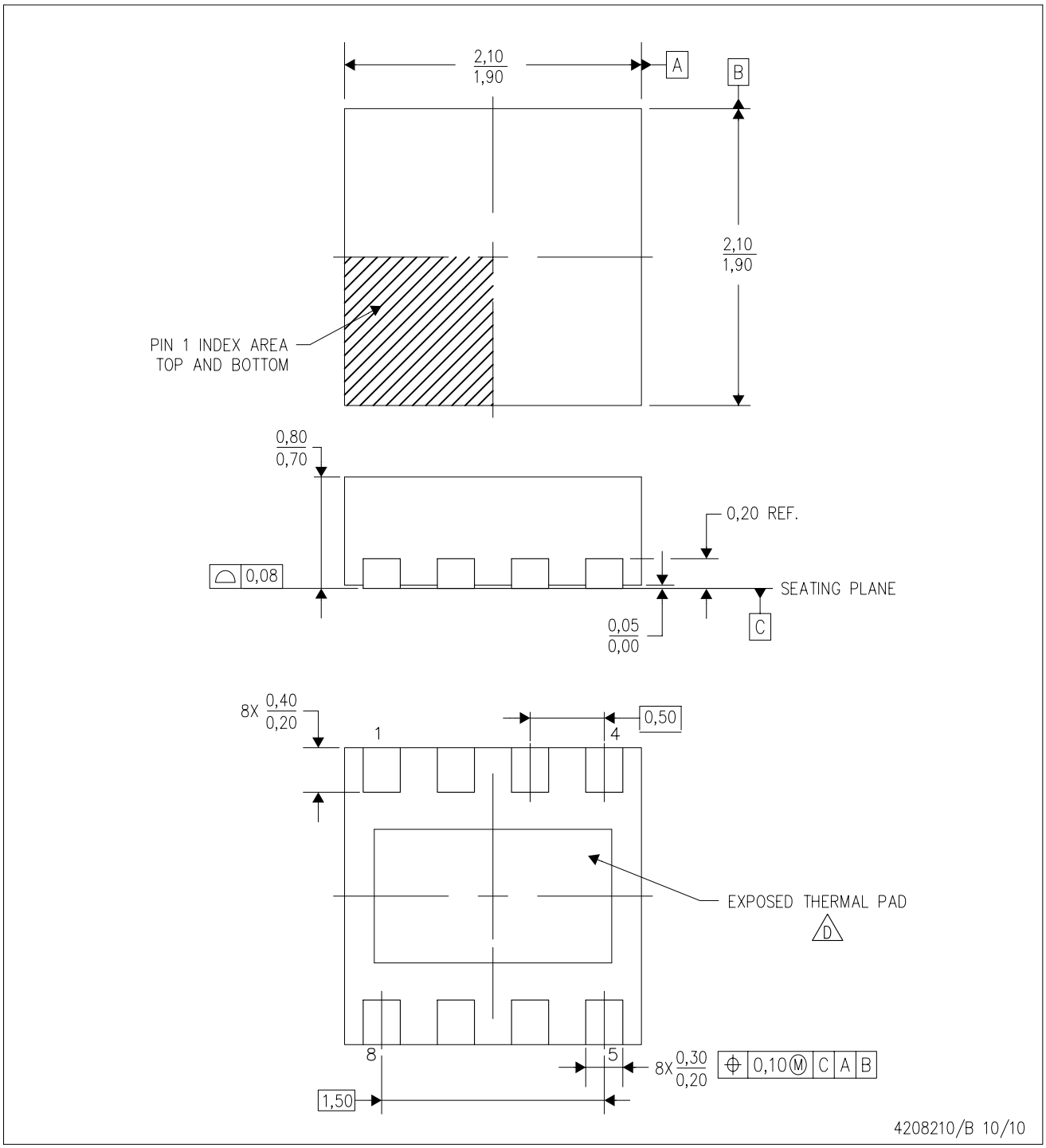
(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(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.

DSG (S–PWSON–N8) PLASTIC SMALL OUTLINE NO–LEAD



NOTES:
A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M–1994.
B. This drawing is subject to change without notice.
C. Quad Flatpack, No–Leads (QFN) package configuration.
D. The package thermal pad must be soldered to the board for thermal and mechanical performance. See the Product Data Sheet for details regarding the exposed thermal pad dimensions.
E. Falls within JEDEC MO–229.

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