TPS7A87
Dual, 500-mA, Low-Noise (3.8 µVRMS), LDO Voltage Regulator

1 Features

- Two Independent LDO Channels
- Low Output Noise: < 3.8 μV_{RMS} (10 Hz–100 kHz)
- Low Dropout: 100 mV_{MAX} at 0.5 A
- Wide Input Voltage Range: 1.4 V to 6.5 V
- Wide Output Voltage Range: 0.8 V to 5.2 V
- High Power-Supply Ripple Rejection:
  - 75 dB at DC
  - 40 dB at 100 kHz
  - 40 dB at 1 MHz
- 1.0% Accuracy Over Line, Load, and Temperature
- Excellent Load Transient Response
- Adjustable Start-Up In-Rush Control
- Selectable Soft-Start Charging Current
- Independent Open-Drain Power-Good (PG) Outputs
- Stable with a 10-µF or Larger Ceramic Output Capacitor
- 4-mm × 4-mm, 20-Pin WQFN Package

2 Applications

- High-Speed Analog Circuits:
  - VCO, ADC, DAC, LVDS
- Imaging: CMOS Sensors, Video ASICs
- Test and Measurement
- Instrumentation and Medical
- Professional Audio

3 Description

The TPS7A87 is a dual, low-noise (3.8 μV_{RMS}), low-dropout (LDO) voltage regulator capable of sourcing 500 mA per channel with only 100 mV of maximum dropout.

The TPS7A87 provides the flexibility of two independent LDOs and approximately 30% smaller solution size than two single-channel LDOs. Each output is adjustable with external resistors from 0.8 V to 5.2 V. The wide input-voltage range of the TPS7A87 supports operation as low as 1.4 V and up to 6.5 V.

With 1% output voltage accuracy (over line, load, and temperature) and soft-start capabilities to reduce in-rush current, the TPS7A87 is ideal for powering sensitive analog low-voltage devices [such as voltage-controlled oscillators (VCOs), analog-to-digital converters (ADCs), digital-to-analog converters (DACs), CMOS sensors, and video ASICs].

The TPS7A87 is designed to power noise-sensitive components such as those found in instrumentation, medical, video, professional audio, test and measurement, and high-speed communication applications. The very low 3.8-μV_{RMS} output noise and wideband PSRR (40 dB at 1 MHz) minimizes phase noise and clock jitter. These features maximize clocking devices, ADCs, and DACs performances.

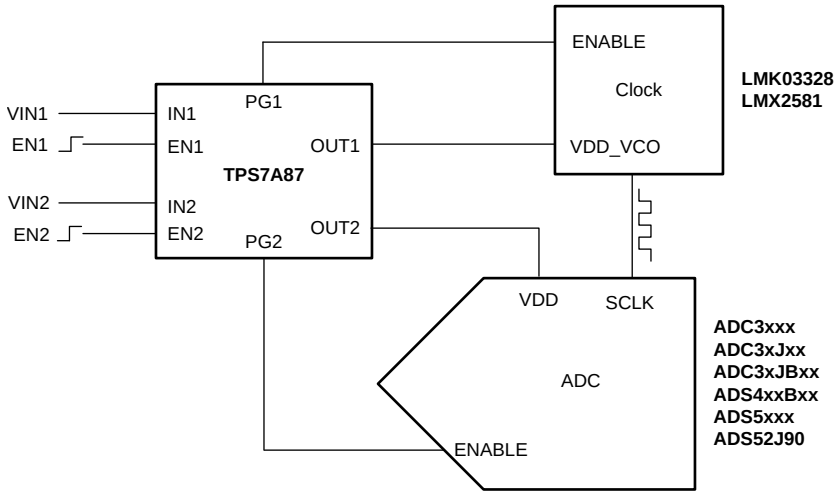
Device Information[1]

PART NUMBER	PACKAGE	BODY SIZE (NOM)
TPS7A87	WQFN (20)	4.00 mm × 4.00 mm

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

PRODUCT PREVIEW

Typical Application Diagram



An IMPORTANT NOTICE at the end of this data sheet addresses availability, warranty, changes, use in safety-critical applications, intellectual property matters and other important disclaimers. PRODUCT PREVIEW Information. Product in design phase of development. Subject to change or discontinuance without notice.

4 Device and Documentation Support

4.1 Device Support

4.1.1 Development Support

4.1.1.1 Evaluation Modules

An evaluation module (EVM) is available to assist in the initial circuit performance evaluation using the TPS7A87. The summary information for this fixture is shown in Table 4.

Table 1. Design Kits & Evaluation Modules(1)

Name	Part #
TPS7A87 Low-Dropout Voltage Regulator Evaluation Module	TPS7A87EVM-TBD

(1) For the most current package and ordering information see the Package Option Addendum at the end of this document, or see the device product folder at www.ti.com.

The EVM can be requested at the Texas Instruments web site (www.ti.com) through the TPS7A87 product folder.

4.1.1.2 Spice Models

Computer simulation of circuit performance using spice is often useful when analyzing the performance of analog circuits and systems. A spice model for the TPS7A87 is available through the TPS7A87 product folder under simulation models.

4.1.2 Device Nomenclature

Table 2. Ordering Information(1)

PRODUCT	DESCRIPTION
TPS7A87xx**YYYZ**	**YYY** is the package designator. **XX** represents the output voltage. 01 is the adjustable output version. **Z** is the package quantity.

(1) For the most current package and ordering information see the Package Option Addendum at the end of this document, or see the device product folder at www.ti.com.

4.2 Documentation Support

4.2.1 Related Documentation

Pros and Cons of Using a Feed-Forward Capacitor with a Low Dropout Regulator, SBVA042

How to Measure LDO Noise, SLYY076

4.3 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.

Design Support ***TI's Design Support*** Quickly find helpful E2E forums along with design support tools and contact information for technical support.

PRODUCT PREVIEW

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4.4 Trademarks

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4.5 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.

4.6 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.

PRODUCT PREVIEW

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
TPS7A8701RTJR	PREVIEW	QFN	RTJ	20	3000	TBD	Call TI	Call TI	-40 to 125		
TPS7A8701RTJT	PREVIEW	QFN	RTJ	20	250	TBD	Call TI	Call TI	-40 to 125		

(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.

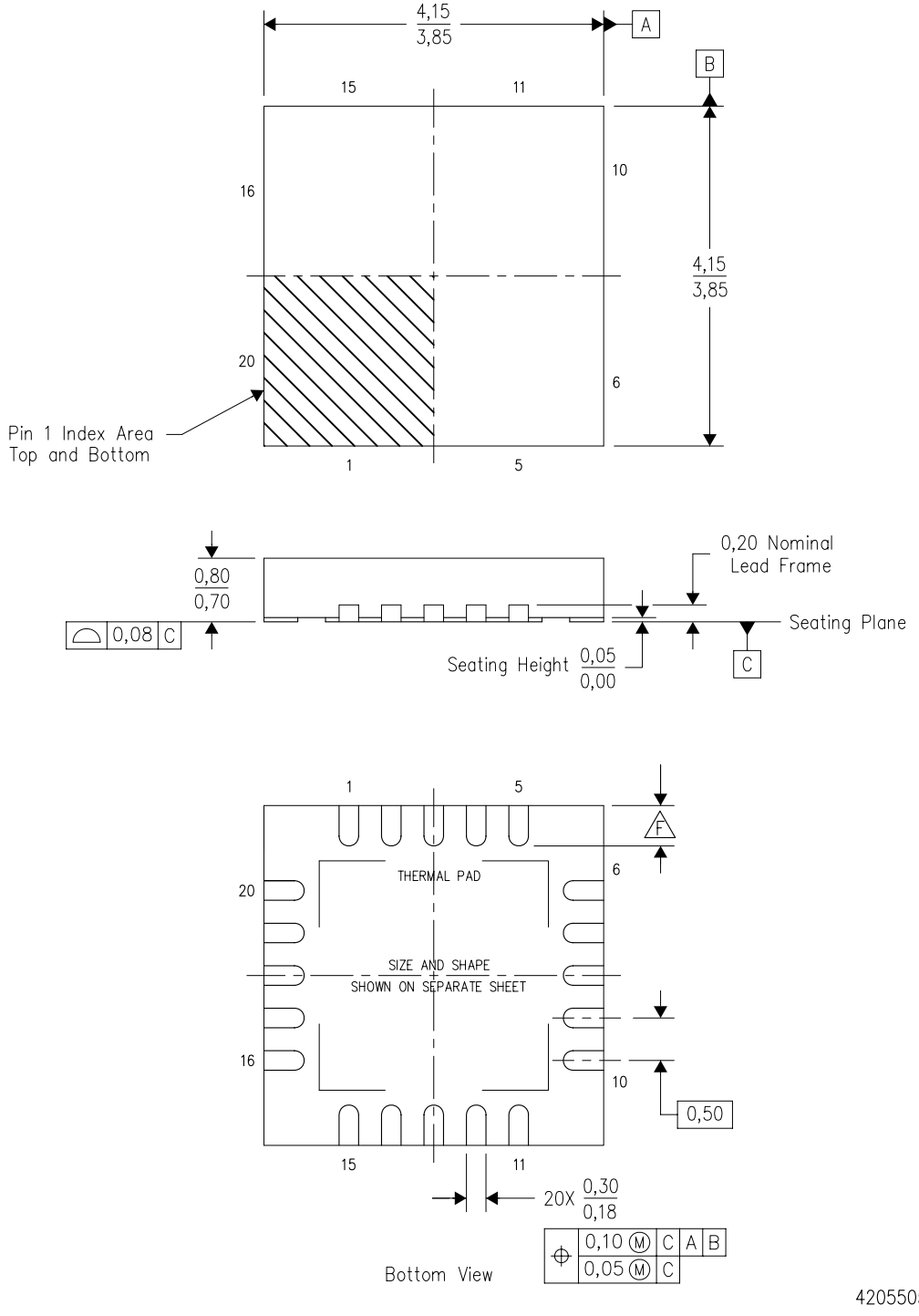
(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(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.

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RTJ (S–PWQFN–N20) PLASTIC QUAD FLATPACK NO–LEAD



NOTES:
A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5–1994.
B. This drawing is subject to change without notice.
C. QFN (Quad Flatpack No–Lead) package configuration.
D. The package thermal pad must be soldered to the board for thermal and mechanical performance.
E. See the additional figure in the Product Data Sheet for details regarding the exposed thermal pad features and dimensions.
F. Check thermal pad mechanical drawing in the product datasheet for nominal lead length dimensions.

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