

# ADS117L11 400-kSPS, Wide-Bandwidth, 16-Bit, Delta-Sigma ADC

## 1 Features

- Programmable data rate:
  - Up to 400 kSPS (wideband filter)
  - Up to 1.067 MSPS (low-latency filter)
- Selectable digital filter:
  - Wideband or low-latency
- AC accuracy with dc precision:
  - Dynamic range: 97.2 dB (200 kSPS)
  - THD: –110 dB
  - INL: 5 ppm of FS
  - Offset drift: 50 nV/°C
  - Gain drift: 0.6 ppm/°C
- Power-scalable architecture:
  - High-speed mode: 400 kSPS, 18.6 mW
  - Low-speed mode: 50 kSPS, 3.3 mW
- Input and reference precharge buffers
- Internal or external clock

## 2 Applications

- **Test and measurement:**
  - Data acquisition (DAQ)
  - Shock and vibration instruments
  - Acoustics and dynamic strain gauges
- **Factory automation and control:**
  - Analog input modules
- **Medical:**
  - Pulse oximetry
- **Grid infrastructure:**
  - Power quality analyzer

## 3 Description

The ADS117L11 is a 16-bit, delta-sigma ( $\Delta\Sigma$ ), analog-to-digital converter (ADC) with data rates up to 400 kSPS using the wideband filter and up to 1067 kSPS using the low-latency filter. The device offers an excellent combination of ac performance and dc precision with low power consumption (18.6 mW in high-speed mode).

The device integrates input and reference buffers to reduce signal loading. The low-drift modulator achieves excellent dc precision with low in-band noise for outstanding ac performance. The power-scalable architecture provides two speed modes to optimize data rate, resolution, and power consumption.

The digital filter is configurable for wideband or low-latency operation, allowing wideband ac performance or data throughput for dc signals to be optimized, all in one device.

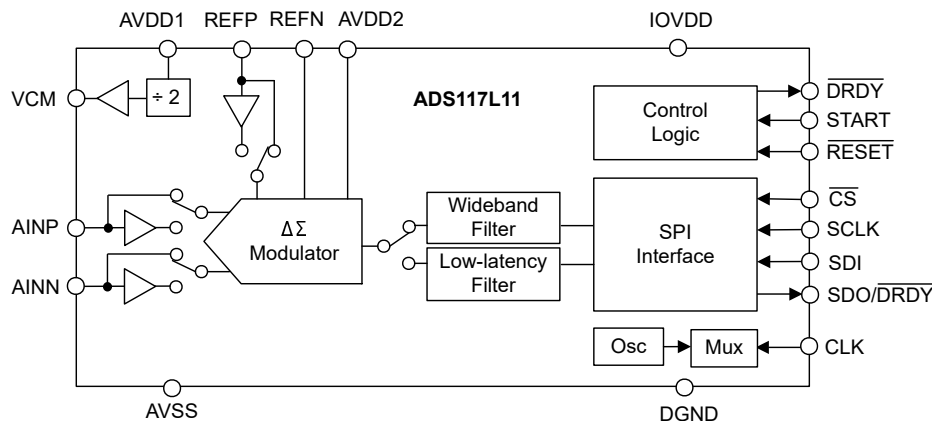
The serial interface features daisy-chain capability to reduce the SPI I/O over an isolation barrier. Input and output data and register settings are validated by a cyclic-redundancy check (CRC) feature to enhance operational reliability.

The small 3-mm × 3-mm WQFN package is designed for limited space applications. The device is fully specified for operation over the –40°C to +125°C temperature range.

### Device Information<sup>(1)</sup>

PART NUMBER	PACKAGE	BODY SIZE (NOM)
ADS117L11	WQFN (20)	3.00 mm × 3.00 mm

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



**Simplified Block Diagram**



## 4 Device and Documentation Support

### 4.1 Documentation Support

#### 4.1.1 Related Documentation

For related documentation see the following:

- Texas Instruments, [ADS127L11 in Simultaneous-Sampling Systems 24-bit ADC application brief](#)
- Texas Instruments, [ADS127L11 24-bit ADC CRC Calculator](#)
- Texas Instruments, [IEPE Vibration Sensor Interface Reference Design for PLC Analog Input design guide](#)
- Texas Instruments, [THS4551 Low-Noise, Precision, 150-MHz, Fully Differential Amplifier data sheet](#)
- Texas Instruments, [REF60xx High-Precision Voltage Reference with Integrated ADC Drive Buffer data sheet](#)
- Texas Instruments, [Design Methodology for MFB Filters in ADC Interface Applications application note](#)
- Texas Instruments, [QFN and SON PCB Attachment application report](#)

#### 4.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on [ti.com](#). Click on *Subscribe to updates* 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.

#### 4.3 Support Resources

[TI E2E™ support forums](#) are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

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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.

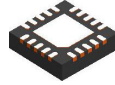
#### 4.6 Glossary

[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.

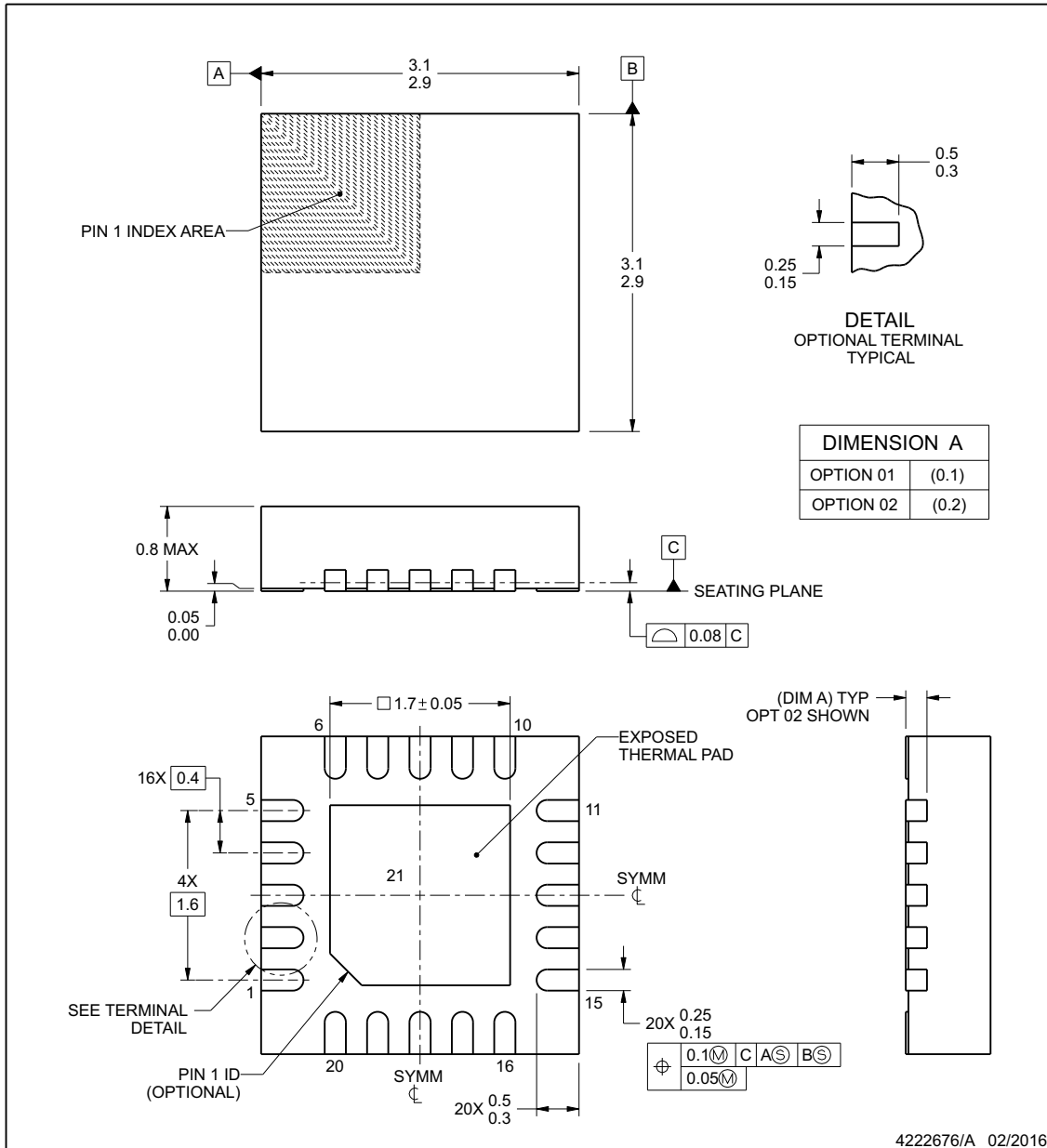
**5.1 Mechanical Data**



**RUK0020B**

**PACKAGE OUTLINE**  
**WQFN - 0.8 mm max height**

PLASTIC QUAD FLATPACK - NO LEAD



**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. The package thermal pad must be soldered to the printed circuit board for thermal and mechanical performance.

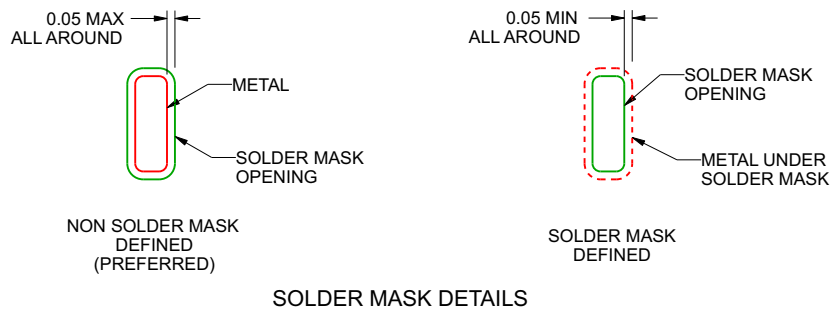
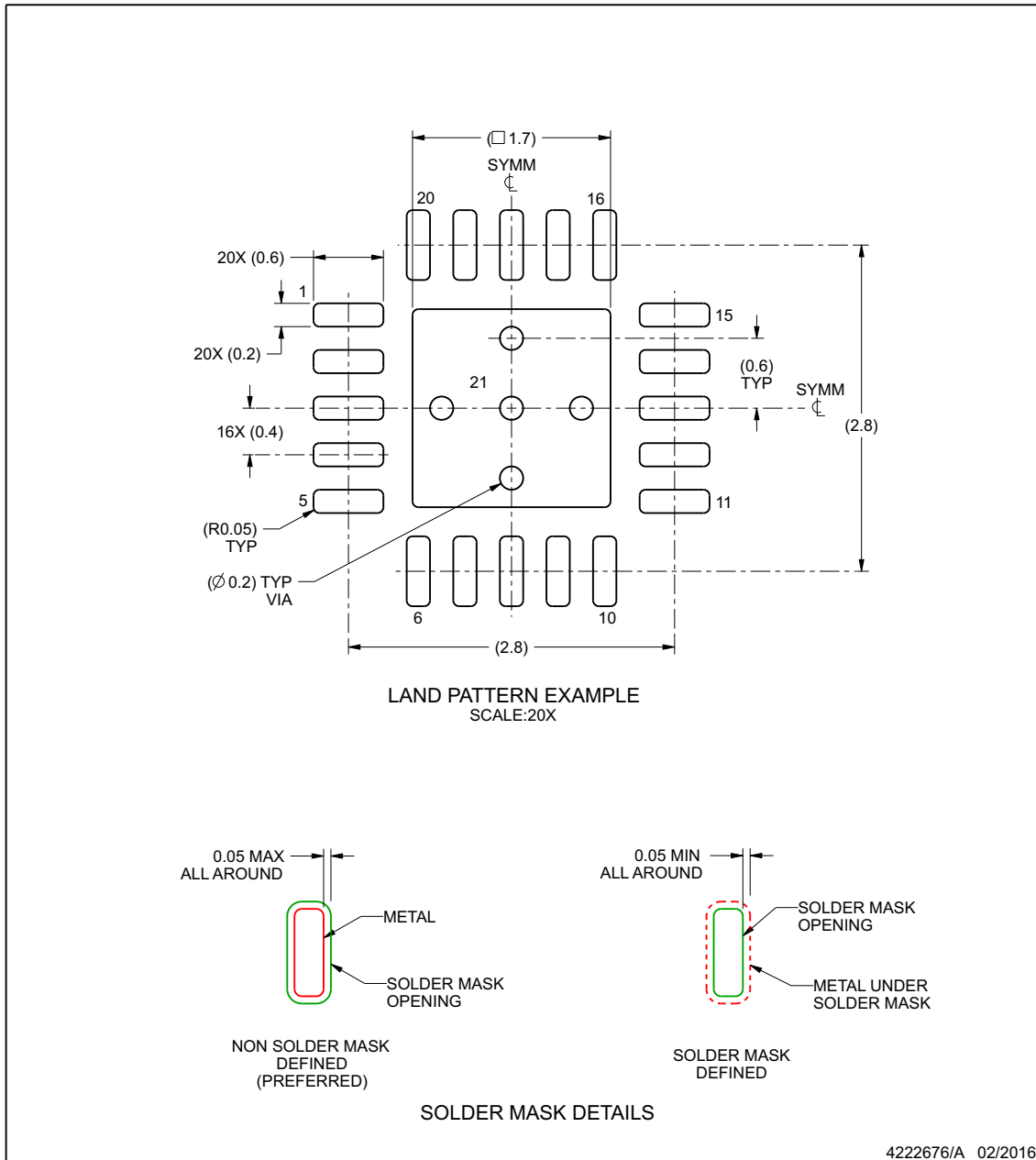
## EXAMPLE BOARD LAYOUT

**RUK0020B**

**WQFN - 0.8 mm max height**

PLASTIC QUAD FLATPACK - NO LEAD

ADVANCE INFORMATION



NOTES: (continued)

4. This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature number SLUA271 ([www.ti.com/lit/sluea271](http://www.ti.com/lit/sluea271)).
5. Vias are optional depending on application, refer to device data sheet. If any vias are implemented, refer to their locations shown on this view. It is recommended that vias under paste be filled, plugged or tented.

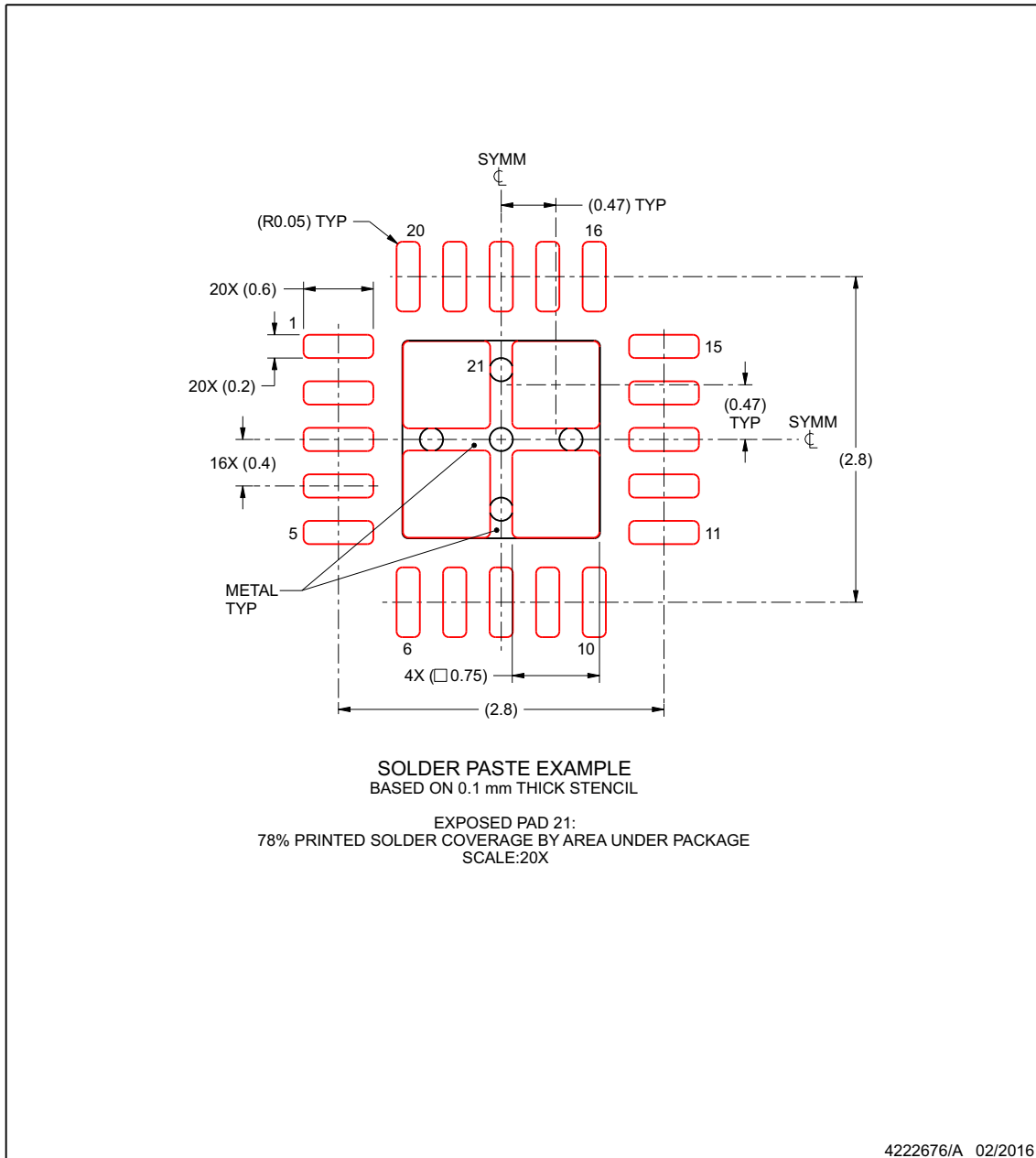
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## EXAMPLE STENCIL DESIGN

**RUK0020B**

**WQFN - 0.8 mm max height**

PLASTIC QUAD FLATPACK - NO LEAD



NOTES: (continued)

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

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**ADVANCE INFORMATION**

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
PADS117L11IRUKR	ACTIVE	WQFN	RUK	20	3000	TBD	Call TI	Call TI	-40 to 125		Samples

(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.

**OBSELETE:** 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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