

# UCC33420-Q1 Ultra-Small, Low-EMI, Efficient 3kV<sub>RMS</sub> Basic Isolation DC/DC Power Module

## 1 Features

- High-efficiency DC/DC power module with integrated transformer technology
- AEC-Q100 qualified with the following results:
  - Device temperature Grade 1: –40°C to 125°C ambient operating temperature
- Functional Safety-Capable (Documentation will be available to aid functional safety system design)
- Input voltage: 4.5V to 5.5V
- Regulated selectable output voltage 5.0V, 5.5V
- Maximum output power of 1.5W
- Adaptive spread spectrum modulation (SSM)
- Meets CISPR32 Class B emission
- Robust isolation barrier:
  - Isolation rating: 3kV<sub>RMS</sub>
  - Surge capability: 6.5kV<sub>PK</sub>
  - Working voltage: 1188V<sub>PK</sub>
  - 200V/nS common mode transient immunity
- Strong magnetic fields immunity
- Overload and short circuit protection
- Thermal shutdown
- Low inrush current soft-start
- Enable pin with fault reporting mechanism
- 12-pin VSON-FCRLF package with > 4.2mm creepage and clearance
- Planned Safety-related certifications:
  - Basic isolation per DIN EN IEC 60747-17 (VDE 0884-17)
  - 3kV<sub>RMS</sub> isolation for 1 minute per UL 1577
  - UL certification per IEC 62368-1, and IEC 60601-1 end equipment standards
  - CQC approval per GB4943.1-2022

## 2 Applications

- HV battery monitoring circuits
- Isolated bias for isolated voltage and current sensors
- Isolated bias for digital isolators,
- Isolated bias for isolated RS-485, RS-422 and CAN transceivers
- Isolated bias for MCU Power

## 3 Description

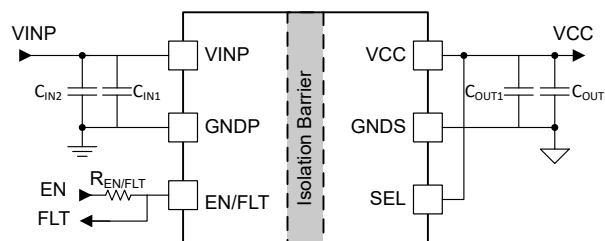
UCC33420-Q1 is an automotive qualified DC/DC power module with 3kV<sub>RMS</sub> isolation rating designed to provide efficient, isolated power to isolated circuits that require a bias supply with a well-regulated output voltage. The device integrates a transformer and DC/DC controller with a proprietary architecture to provide 1.5W (typical) of isolated power with low EMI.

The UCC33420-Q1 integrates protection features for increased system robustness. The device also has an enable pin, fault reporting mechanism, and regulated 5.0V with a selectable headroom output voltage of 5.5V. The UCC33420-Q1 is a low-profile, miniaturized solution offered in a VSON package with 1.00mm height (typical).

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

PART NUMBER	PACKAGE	BODY SIZE (NOM)
UCC33420-Q1	VSON-FCRLF (12)	4.0mm × 5.00mm

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



**Simplified Application**

**ADVANCE INFORMATION**



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. ADVANCE INFORMATION for preproduction products; subject to change without notice.

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ADVANCE INFORMATION

## 4 Device and Documentation Support

### 4.1 Device Support

### 4.2 Documentation Support

#### 4.2.1 Related Documentation

For related documentation see the following:

- [Isolation Glossary](#)

### 4.3 Receiving Notification of Documentation Updates

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

### 4.4 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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### 4.5 Trademarks

TI E2E™ is a trademark of Texas Instruments.

All trademarks are the property of their respective owners.

### 4.6 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.

### 4.7 Glossary

[TI Glossary](#) This glossary lists and explains terms, acronyms, and definitions.

## 5 Revision History

DATE	REVISION	NOTES
January 2024	*	Advance Information Release

## 6 Mechanical and Packaging 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.

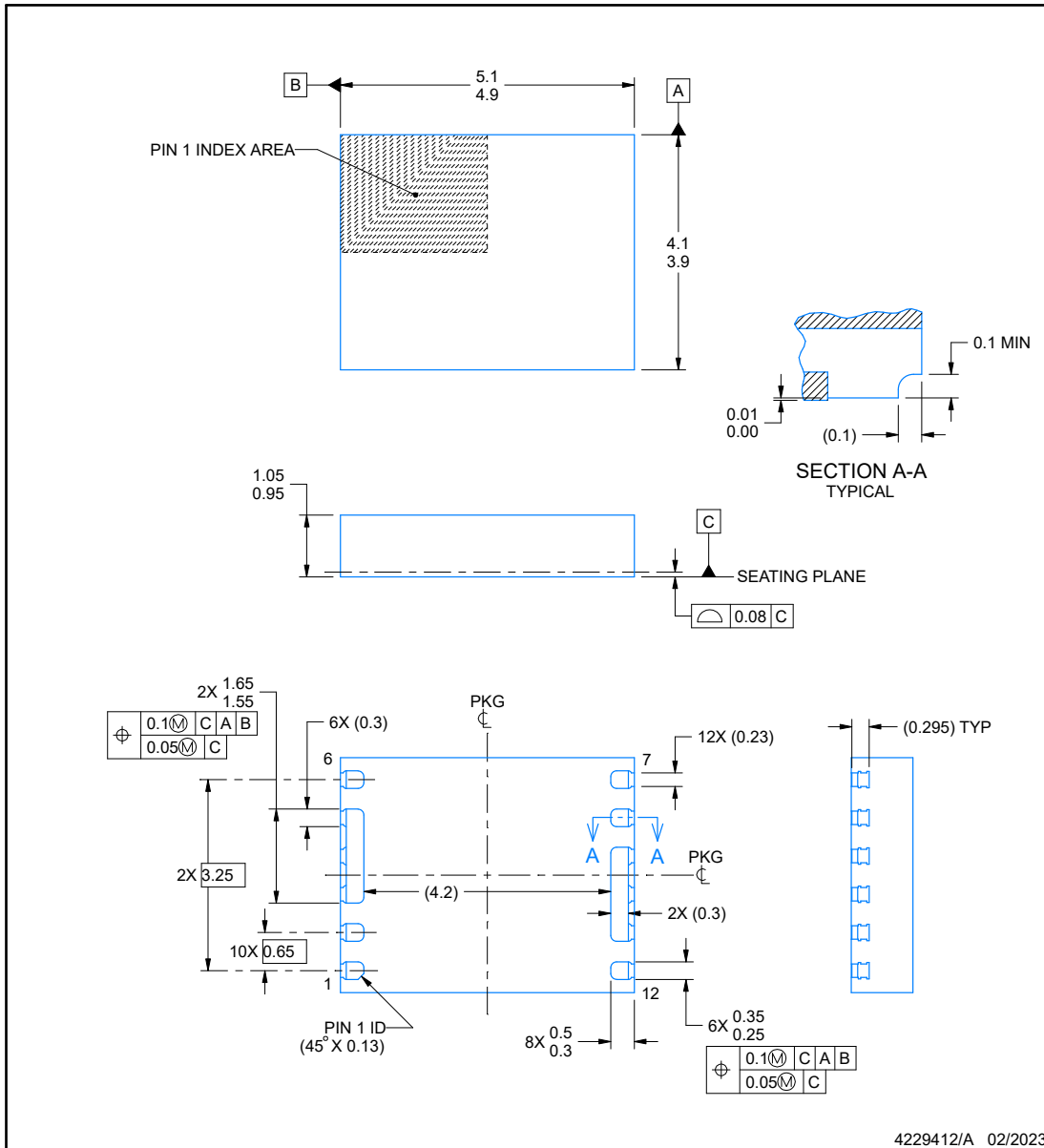


**PACKAGE OUTLINE**

**RAQ0012B**

**VSON-FCRLF - 1.05 mm max height**

PLASTIC SMALL OUTLINE - NO LEAD



**NOTES:**

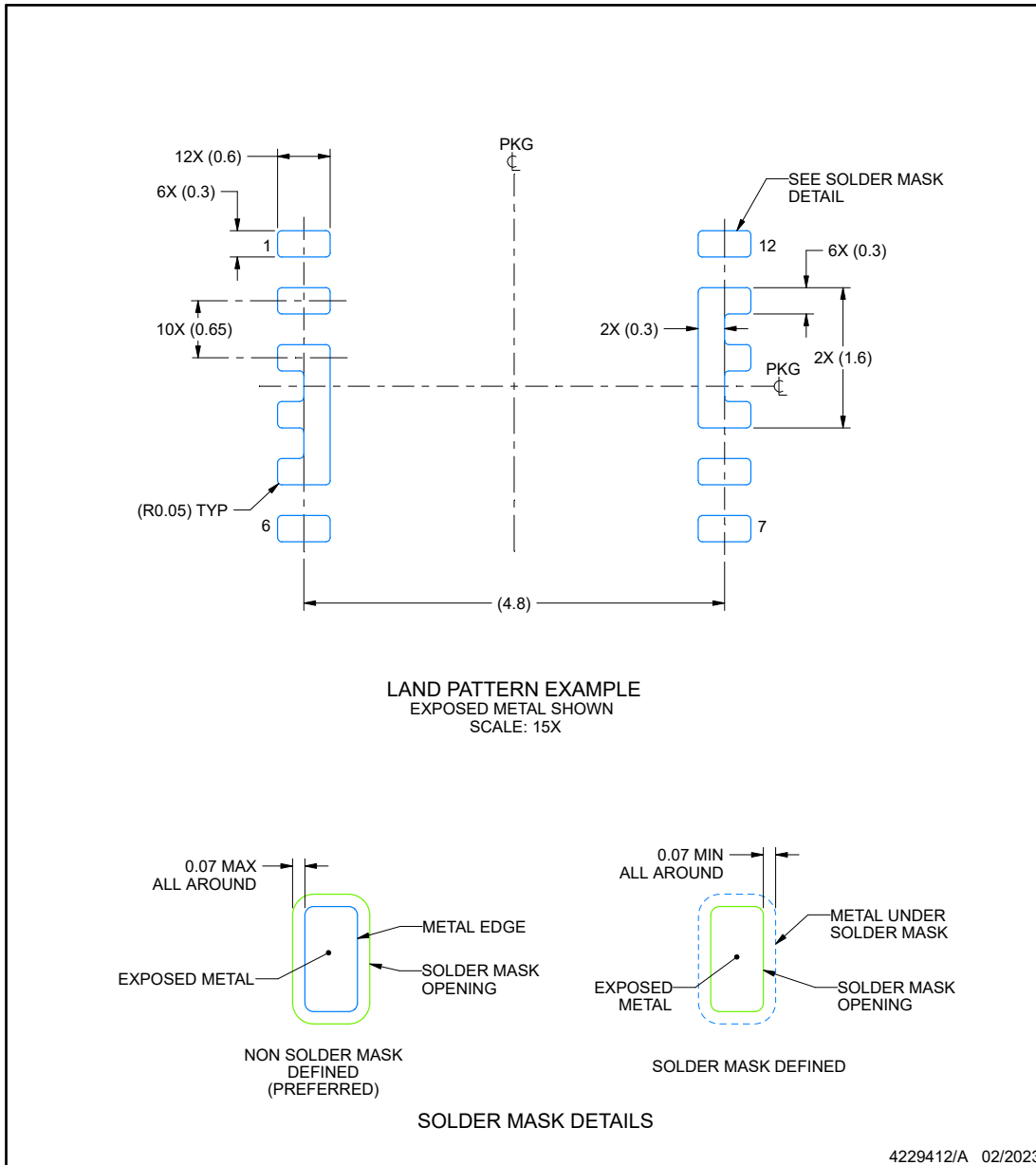
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.

**EXAMPLE BOARD LAYOUT**

**RAQ0012B**

**VSON-FCRLF - 1.05 mm max height**

PLASTIC SMALL OUTLINE - NO LEAD



NOTES: (continued)

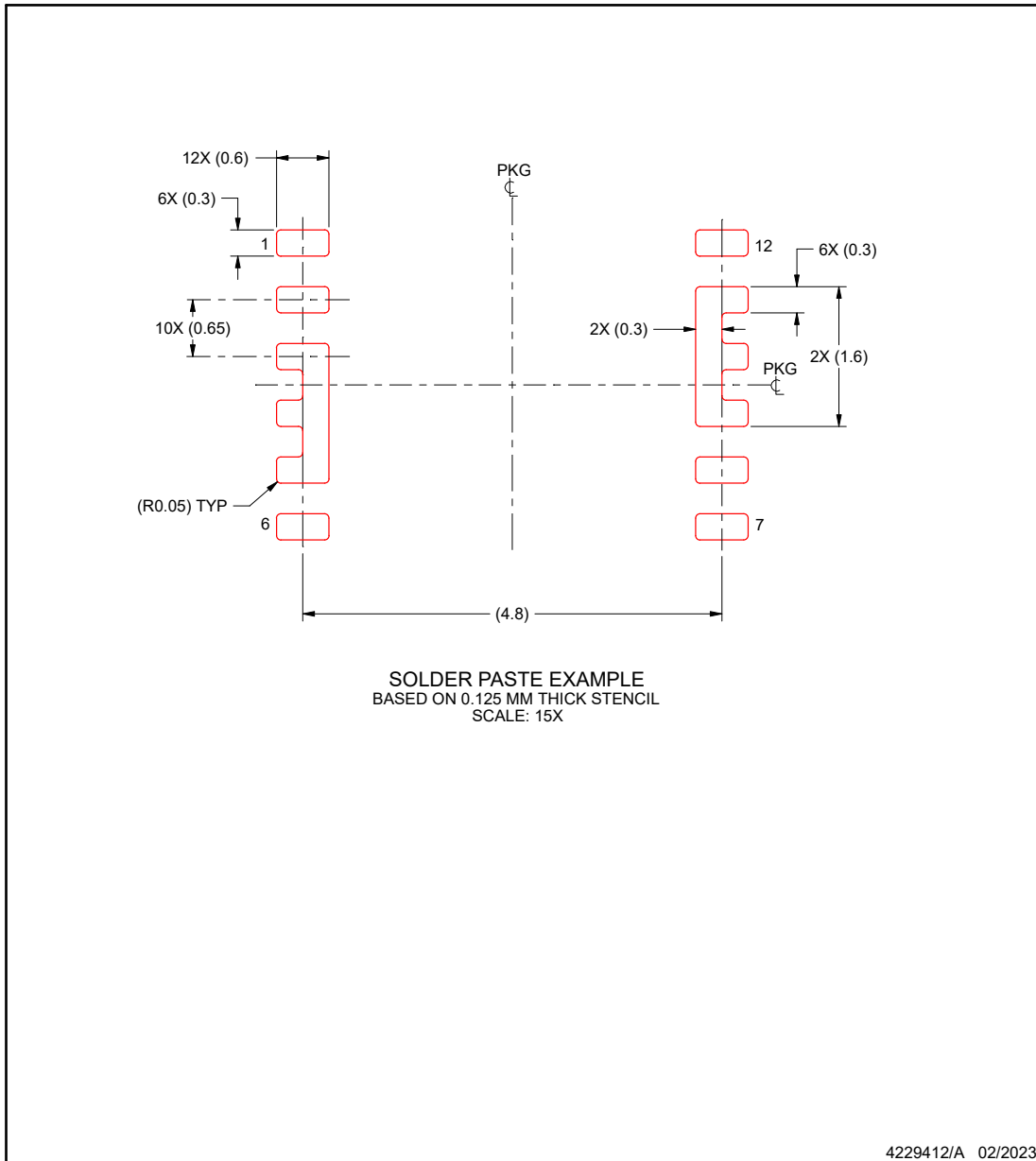
3. This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature number SLUA271 ([www.ti.com/lit/sluea271](http://www.ti.com/lit/sluea271)).
4. Vias are optional depending on application, refer to device data sheet. If any vias are implemented,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

## EXAMPLE STENCIL DESIGN

**RAQ0012B**

**VSON-FCRLF - 1.05 mm max height**

PLASTIC SMALL OUTLINE - NO LEAD



NOTES: (continued)

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

**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
PUCC33420QRAQRQ1	ACTIVE	VSON-FCRLF	RAQ	12	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.

**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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