

CC335x SimpleLink™ 2.4GHz and 5GHz Dual-Band Wi-Fi 6 and Bluetooth® Low Energy Companion IC

1 Features

Key Features

- Wi-Fi 6 (802.11ax)
- Bluetooth® Low Energy 5.4 in CC33x1 devices
- Companion IC to any processor or MCU host capable of running a TCP/IP stack
- Integrated 2.4/5GHz PA for complete wireless solution with up to +20.5dBm output power.
- Operating temperature: –40°C to +105°C
- Application throughput up to 50Mbps

Extended Features

- Wi-Fi 6
 - 2.4GHz and 5GHz, 20MHz, single spatial stream
 - MAC, baseband, and RF transceiver with support for IEEE 802.11 a/b/g/n/ax
 - OFDMA, Trigger frame, MU-MIMO (downlink), basic service set coloring, and target wake time (TWT) for improved efficiency
 - Hardware-based encryption and decryption supporting WPA2 and WPA3
 - Excellent interoperability
 - Support for 4-bit SDIO or SPI host interfaces
- Bluetooth Low Energy 5.4
 - LE coded PHYs (long range), LE 2M PHY (high speed) and advertising extension
 - Host controller interface (HCI) transport with option for UART or shared SDIO
- Enhanced security
 - Secured host interface
 - Firmware authentication
 - Anti-rollback protection
- Multirole support (for example, concurrent STA and AP) to connect with Wi-Fi devices on different RF channels (Wi-Fi networks)
- Optional antenna diversity or selection
- 3-wire or 1-wire PTA for external coexistence with additional 2.4GHz radios (for example, Thread or Zigbee)
- Power management
 - V_{MAIN} , V_{IO} , V_{pp} : 1.8V
 - V_{PA} : 3.3V
- Clock sources
 - 40-MHz XTAL fast clock

- Internal slow clock or external 32.768kHz slow clock
- Small package size
 - Easy to design with 40-pin, 5mm × 5mm quad flat no-leaded (QFN) package, 0.4mm pitch

2 Applications

- [Grid infrastructure](#)
 - [Electricity meter](#)
 - [String inverter](#)
 - [Micro inverter](#)
 - [Energy storage power conversion system \(PCS\)](#)
 - [EV charging infrastructure](#)
- [Building and home automation](#)
 - [HVAC controller](#)
 - [HVAC gateway](#)
 - [Thermostat](#)
 - [Building security gateway](#)
 - [Garage door system](#)
 - [IP network camera and video doorbell](#)
 - [Wireless security camera](#)
- [Appliances](#)
 - [Refrigerator and freezer](#)
 - [Oven](#)
 - [Washer and dryer](#)
 - [Residential water heater and heating system](#)
 - [Air purifier and humidifier](#)
 - [Coffee machine](#)
 - [Air conditioner indoor unit](#)
 - [Vacuum robot](#)
 - [Robotic lawn mower](#)
- [Medical](#)
 - [Infusion pump](#)
 - [Electronic hospital bed and bed control](#)
 - [Multiparameter patient monitor](#)
 - [Blood pressure monitor](#)
 - [CPAP machine](#)
 - [Telehealth systems](#)
 - [Ultrasound scanner](#)
 - [Ultrasound smart probe](#)
 - [Electric toothbrush](#)
- [Retail automation and payment](#)
- [Printers](#)



3 Description

The SimpleLink™ Wi-Fi CC33xx family of devices is where affordability meets reliability, enabling engineers to connect more applications with confidence. CC33xx are single-chip Wi-Fi 6 and Bluetooth Low Energy 5.4 devices. The CC3350 and CC3351 are the first dual-band devices in this pin-to-pin compatible family.

- [CC3350](#): A 2.4GHz and 5GHz Wi-Fi 6 companion IC
- [CC3351](#): A 2.4GHz and 5GHz Wi-Fi 6 and Bluetooth low energy 5.4 companion IC

The CC335x offers Wi-Fi 6 and BLE while maintaining compatibility with Wi-Fi 4 (802.11 a/b/g/n) and Wi-Fi 5 (802.11ac). These CC335x are the 10th-generation connectivity combination chip from Texas Instruments. As such, the CC335x is based on proven technology. These devices are ideal for use in cost-sensitive embedded applications with a Linux or RTOS host running TCP/IP. CC335x brings the efficiency of Wi-Fi 6 to embedded device applications for the internet of things (IoT), with a small PCB footprint and highly optimized bill of materials.

Device Information

PART NUMBER	WI-FI 2.4/5-GHz SISO	BLUETOOTH LOW ENERGY
CC3350ENJARSBR	✓	
CC3351ENJARSBR	✓	✓

ADVANCE INFORMATION

4 System Diagram

Figure 4-1 shows a basic system diagram for the CC3351.

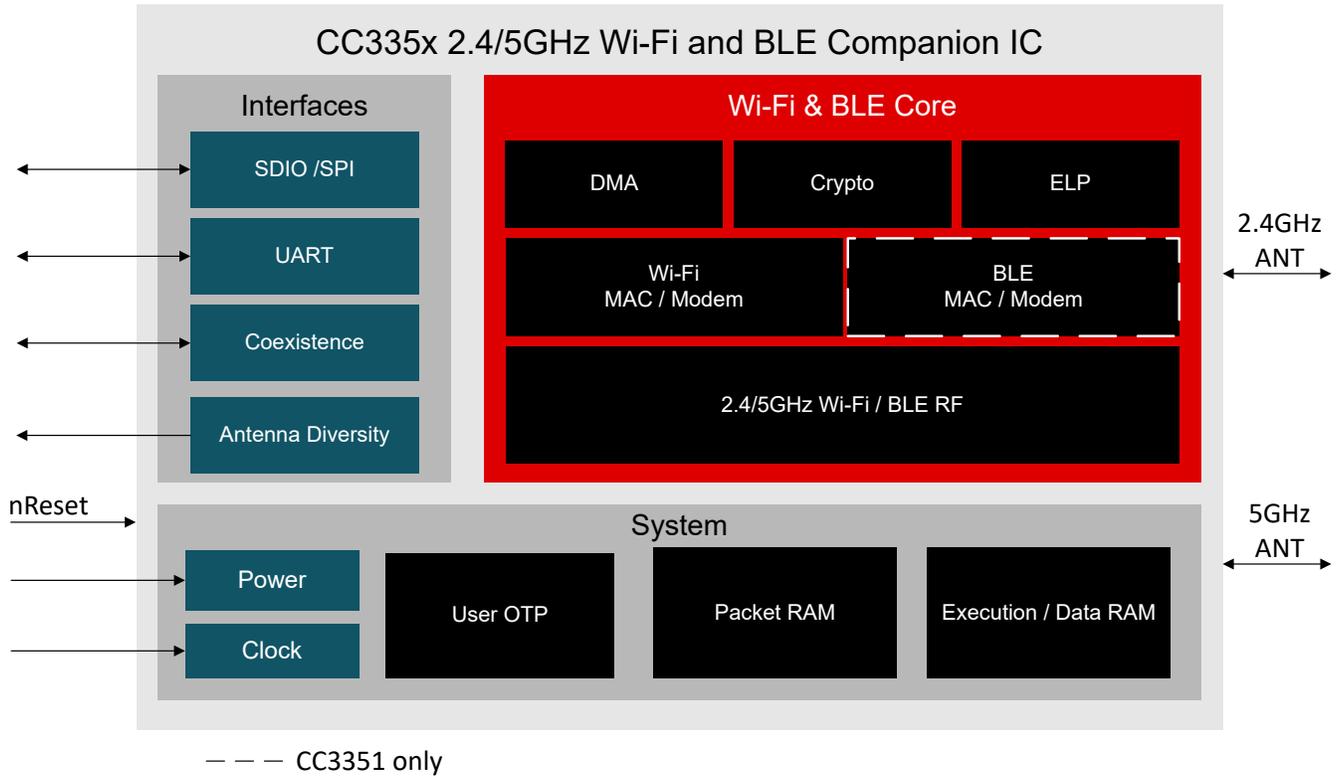


Figure 4-1. CC3351 High-Level System Diagram

ADVANCE INFORMATION

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5 Pin Configuration and Functions

5.1 Pin Diagram

Figure 5-1 shows pin assignments for the 40-pin WQFN package.

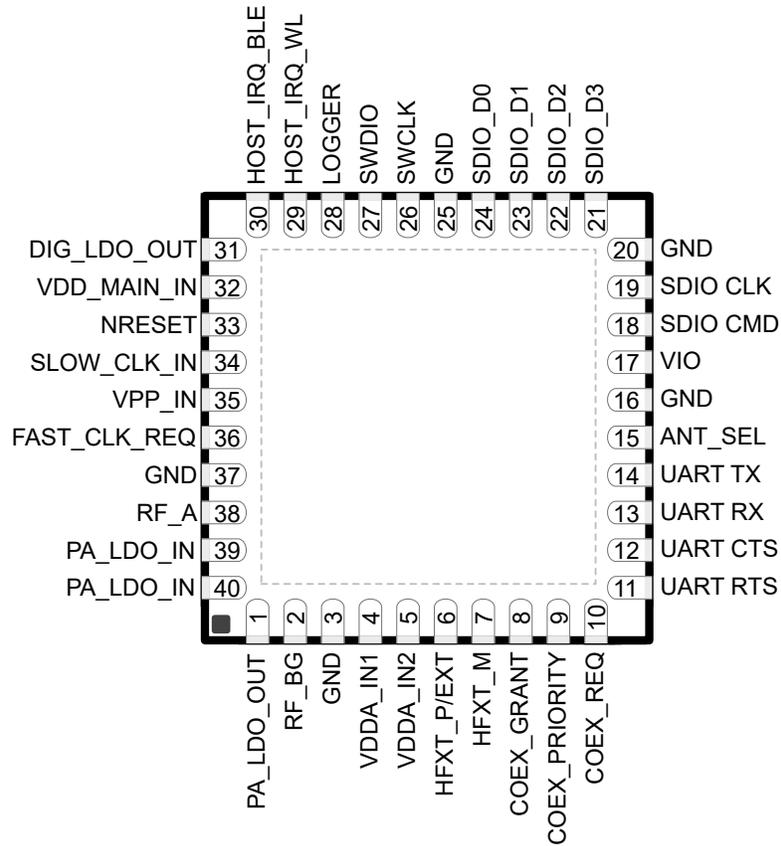


Figure 5-1. CC3351 Pin Diagram

ADVANCE INFORMATION

5.2 Pin Attributes

Table 5-1. Pin Attributes

PIN	SIGNAL NAME	TYPE	DIR (I/O)	VOLTAGE LEVEL	SHUTDOWN STATE ¹	STATE AFTER POWER-UP	DESCRIPTION
1	PA_LDO_OUT	Analog					RF power amplifier LDO output
2	RF_BG	RF	I/O				Bluetooth Low Energy and WLAN 2.4GHz RF port
3	GND	GND					GND
4	VDDA_IN1	POW					1.8V supply for analog domain
5	VDDA_IN2	POW					1.8V supply for analog domain
6	HFXT_P	Analog		Sine			XTAL_P
7	HFXT_M	Analog					XTAL_N
8	COEX_GRANT ²	Digital	O	V _{IO}	PD	PD	External coexistence interface - grant
9	COEX_PRIORITY ²	Digital	I	V _{IO}	PU	PU	External coexistence interface - priority
10	COEX_REQ ²	Digital	I	V _{IO}	PU	PU	External coexistence interface - request
11	UART RTS	Digital	O	V _{IO}	PU	PU	Device RTS signal - flow control for BLE HCI
12	UART CTS	Digital	I	V _{IO}	PU	PU	Device CTS signal - flow control for BLE HCI
13	UART RX	Digital	I	V _{IO}	PU	PU	UART RX for BLE HCI
14	UART TX	Digital	O	V _{IO}	PU	PU	UART TX for BLE HCI
15	ANT_SEL ²	Digital	O	V _{IO}	PD	PD	Antenna select control line
16	GND	GND					GND
17	VIO	POW					1.8V IO supply
18	SDIO CMD	Digital	I/O	V _{IO}	HiZ	HiZ	SDIO command or SPI PICO
19	SDIO CLK	Digital	I	V _{IO}	HiZ	HiZ	SDIO clock or SPI clock
20	GND	GND					GND
21	SDIO D3	Digital	I/O	V _{IO}	HiZ	PU	SDIO data D3 or SPI CS
22	SDIO D2	Digital	I/O	V _{IO}	HiZ	HiZ	SDIO data D2
23	SDIO D1	Digital	I/O	V _{IO}	HiZ	HiZ	SDIO data D1
24	SDIO D0	Digital	I/O	V _{IO}	HiZ	HiZ	SDIO data D0 or SPI POCI
25	GND	GND					GND
26	SWCLK	Digital	I	V _{IO}	PD	PD	Serial wire debug clock
27	SWDIO	Digital	I/O	V _{IO}	PU	PU	Serial wire debug I/O

Table 5-1. Pin Attributes (continued)

PIN	SIGNAL NAME	TYPE	DIR (I/O)	VOLTAGE LEVEL	SHUTDOWN STATE ¹	STATE AFTER POWER-UP	DESCRIPTION
28	LOGGER ³	Digital	O	V _{IO}	PU	PU	Tracer (UART TX debug logger)
29	HOST_IRQ_WL ³	Digital	O	V _{IO}	PD	0	Interrupt request to host for WLAN
30	HOST_IRQ_BLE ³	Digital	O	V _{IO}	PD	PD	Interrupt request to host for BLE (in shared SDIO mode)
31	DIG_LDO_OUT	Analog	O				Digital LDO output to decoupling capacitor
32	VDD_MAIN_IN	POW					1.8V supply input for SRAM and digital
33	nRESET	Digital	I	V _{IO}	PD	PD	Reset line for enabling or disabling device (active low)
34	SLOW_CLK_IN	Digital	I	V _{IO}	PD	PD	32.768kHz RTC clock input
35	VPP_IN	POW					1.8V OTP programming input supply
36	FAST_CLK_REQ	Digital	O	V _{IO}	PD	PD	Fast clock request from the device
37	GND	GND					GND
38	RF_A	RF					WLAN 5GHz RF port
39	PA_LDO_IN	POW					3.3V supply for PA
40	PA_LDO_IN	POW					3.3V supply for PA

1. All digital I/Os (with the exception of SDIO signals) are Hi-Z when the device is in Shutdown mode with internal PU/PD according to the "shutdown state" column.
2. See software release notes for support level.
3. LOGGER and HOST_IRQ_WL pins are sensed by the device during boot, see [CC33xx Hardware Integration](#).

6 Applications, Implementation, and Layout

Note

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes, as well as validating and testing their design implementation to confirm system functionality.

Figure 6-1 shows the reference schematic for the CC335x using an optimized bill of materials.

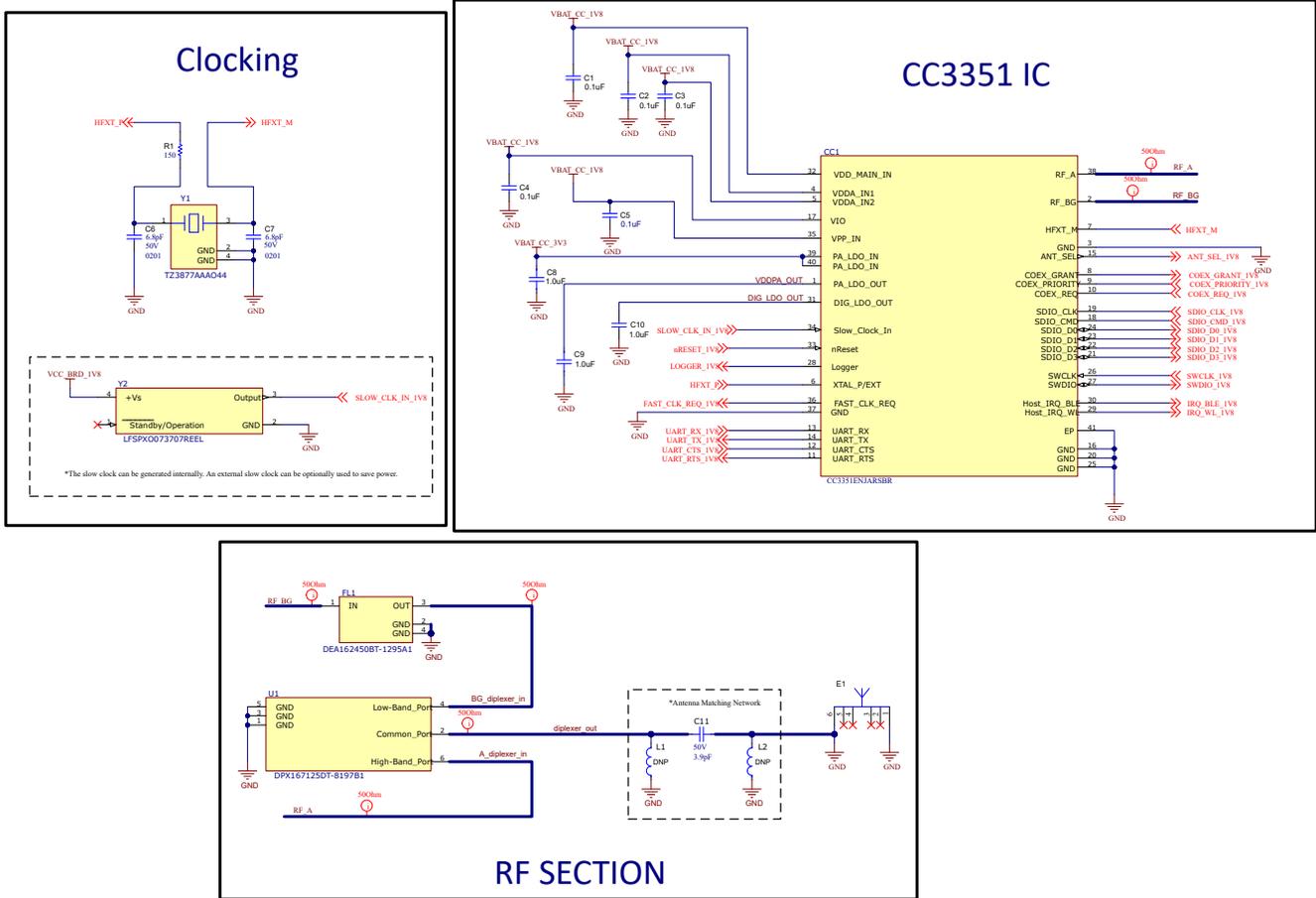


Figure 6-1. CC335x Reference Schematic

1. The slow clock can be generated internally. An external slow clock can be optionally used to save power.
2. For more information on antenna selection and matching, see the [CC33xx Hardware Integration](#).

7 Device and Documentation Support

TI offers an extensive line of development tools. Tools and software to evaluate the performance of the device, generate code, and develop solutions are listed below.

7.1 Third-Party Products Disclaimer

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7.2 Device Nomenclature Boilerplate

Device development evolutionary flow:

- X** Experimental device that is not necessarily representative of the final device's electrical specifications and may not use production assembly flow.
- P** Prototype device that is not necessarily the final silicon die and may not necessarily meet final electrical specifications.
- null** Production version of the silicon die that is fully qualified.

Support tool development evolutionary flow:

- TMDX** Development-support product that has not yet completed Texas Instruments internal qualification testing.
- TMDS** Fully-qualified development-support product.

X and P devices and TMDX development-support tools are shipped against the following disclaimer:

Device development evolutionary flow:

- TMX** Experimental device that is not necessarily representative of the final device's electrical specifications and may not use production assembly flow.
- TMP** Prototype device that is not necessarily the final silicon die and may not necessarily meet final electrical specifications.
- TMS** Production version of the silicon die that is fully qualified.

Support tool development evolutionary flow:

- TMDX** Development-support product that has not yet completed Texas Instruments internal qualification testing.
- TMDS** Fully-qualified development-support product.

TMX and TMP devices and TMDX development-support tools are shipped against the following disclaimer:

"Developmental product is intended for internal evaluation purposes."

Production devices and TMDS development-support tools have been characterized fully, and the quality and reliability of the device have been demonstrated fully. TI's standard warranty applies.

Predictions show that prototype devices (X or P) have a greater failure rate than the standard production devices. Texas Instruments recommends that these devices not be used in any production system because their expected end-use failure rate still is undefined. Only qualified production devices are to be used.

7.3 Tools and Software

Design Kits and Evaluation Modules

- [CC330x Reference Design Files](#) CC330x reference design CAD source files. TI recommends using this design as a reference when creating the layout in order to achieve the RF performance listed in this data sheet.
- [CC3351 BoosterPack plug-in module](#) The CC3301 BoosterPack™ plug-in module (BP-CC3351) is a test and development board that can be easily connected to TI LaunchPad™ development kits or processor boards; thus enabling rapid software development.
- [CC3351 M.2 card plug-in module](#) The CC3351 M.2 card plug-in module (M2-CC3351) is a test and development board that can be easily connected to TI processor boards or other processor boards with an M.2 Key E interface support; thus enabling rapid software development.

Software

- [SimpleLink Wi-Fi Toolbox](#) SimpleLink Wi-Fi Toolbox is a collection of tools to help development and testing of the CC33xx. The Wi-Fi toolbox package provides all the capabilities required to debug and monitor WLAN/Bluetooth® Low Energy firmware with a host, perform RF validation tests, run pretest for regulatory certification testing, and debug hardware and software platform integration issues.
- [CC33xx device drivers](#) The CC33XX are single-chip Wi-Fi 6 and Bluetooth Low Energy 5.4 companion devices suitable for both Linux and RTOS based systems. CC33XX-SOFTWARE is a collection of software development sources aimed to facilitate quick setup, out-of-box experience, and accelerate development in Linux or RTOS environments.

7.4 Documentation Support

To receive notification of documentation updates, navigate to the device product folder on [ti.com](https://www.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.

Application Reports

- [CC33xx Production Line Guide](#) Texas Instruments™ provides many resources in order to assist users in quickly examining the functionality and performance of their devices. This document provides the necessary information to guide the user in production line testing for CC33xx. The device's functions can be checked using tools and software provided by Texas Instruments. Performance testing is more involved as external equipment is required for thorough examination.
- [SimpleLink CC33xx Security Features](#) This document describes the CC33xx security related features, which are made available to vendors through an ecosystem that incorporates simple and concise APIs, tools, and documentation

User's Guides

- [CC33xx WLAN Features User's Guide](#) This document provides information about CC33xx family of devices and Wi-Fi® features, as well as TI proprietary enhancements. The document does not provide the complete application programming interface (API) set, but a high-level overview of the features.
- [CC33xx Hardware Integration](#) This document describes how to integrate the CC330x into any system and the hardware requirements for this device. Layout and schematic considerations are listed here as well, which TI highly recommends following in order to achieve the device performance listed in this datasheet.

7.5 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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7.6 Trademarks

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7.7 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.

7.8 Glossary

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

8 Revision History

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

DATE	REVISION	NOTES
April 2024	*	Initial Release

9 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.

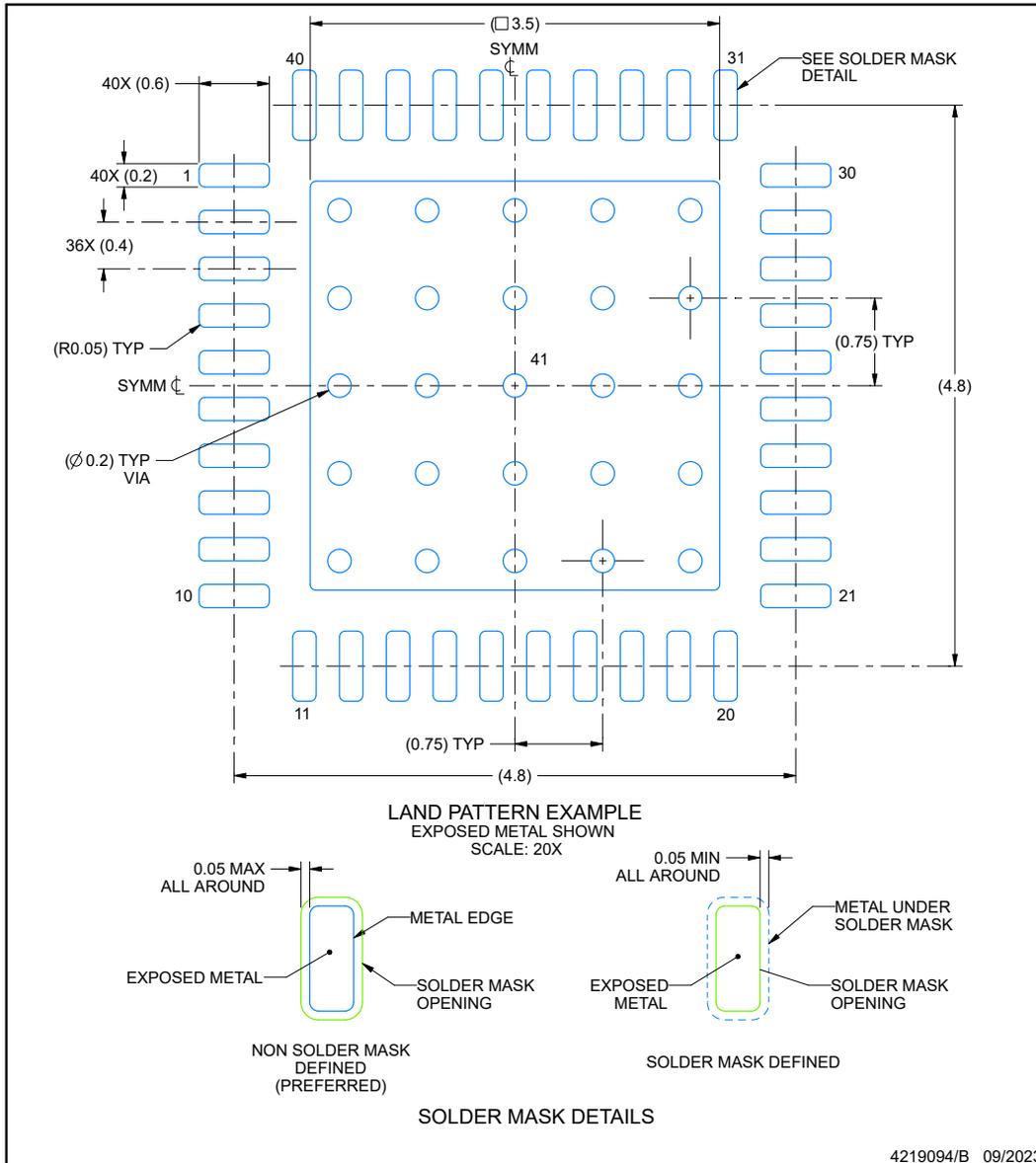
ADVANCE INFORMATION

EXAMPLE BOARD LAYOUT

RSB0040B

WQFN - 0.8 mm max height

PLASTIC QUAD FLATPACK - NO LEAD



NOTES: (continued)

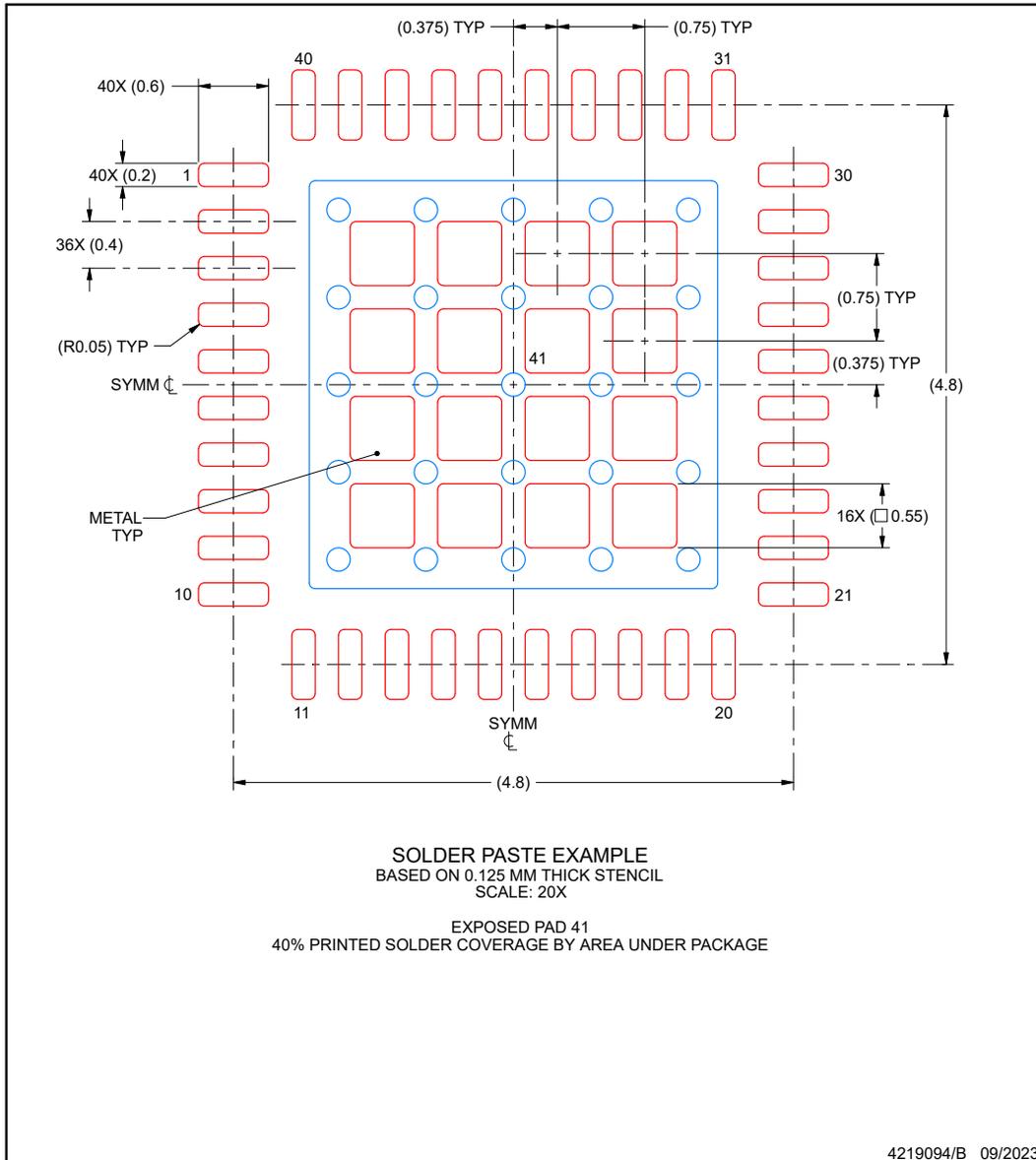
4. This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/sl原因271).
5. Vias are optional depending on application, refer to device data sheet. If any vias are implemented, refer to their locations shown on this view. It is recommended that vias under paste be filled, plugged or tented.

EXAMPLE STENCIL DESIGN

RSB0040B

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.

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
XCC3350ENJARSBR	ACTIVE	WQFN	RSB	40	3000	TBD	Call TI	Call TI	-40 to 125		Samples
XCC3351ENJARSBR	ACTIVE	WQFN	RSB	40	3000	TBD	Call TI	Call TI	-40 to 105		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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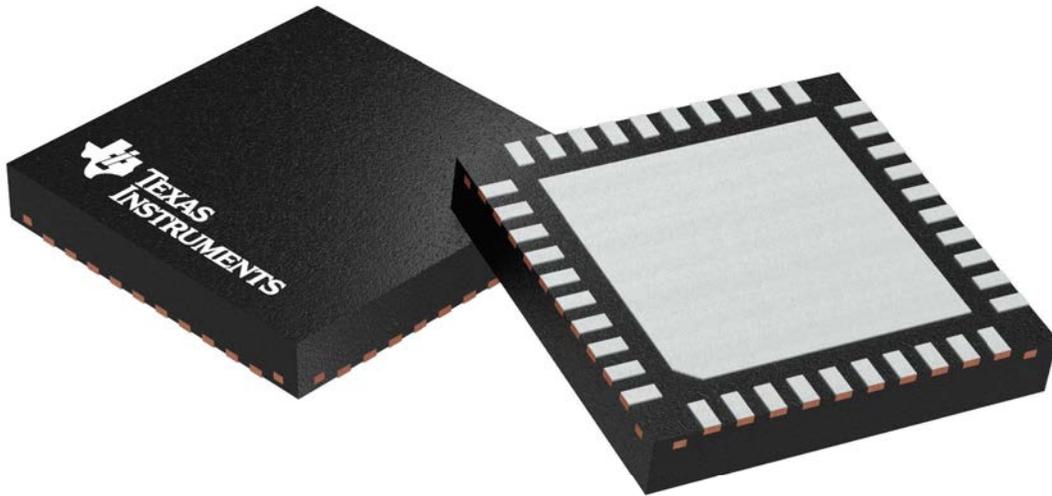
GENERIC PACKAGE VIEW

RSB 40

WQFN - 0.8 mm max height

5 x 5 mm, 0.4 mm pitch

PLASTIC QUAD FLATPACK - NO LEAD



Images above are just a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.

4207182/D

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