Welcome!
Texas Instruments New Product Update

- This webinar will be recorded and available at www.ti.com/npu
- Phone lines are muted
- Please post questions in the chat or contact your TI sales contact or field applications engineer

INTRODUCTION TO MULTI-PROTOCOL (BLE, ZIGBEE, THREAD) CERTIFIED SIP MODULES

New Product Update

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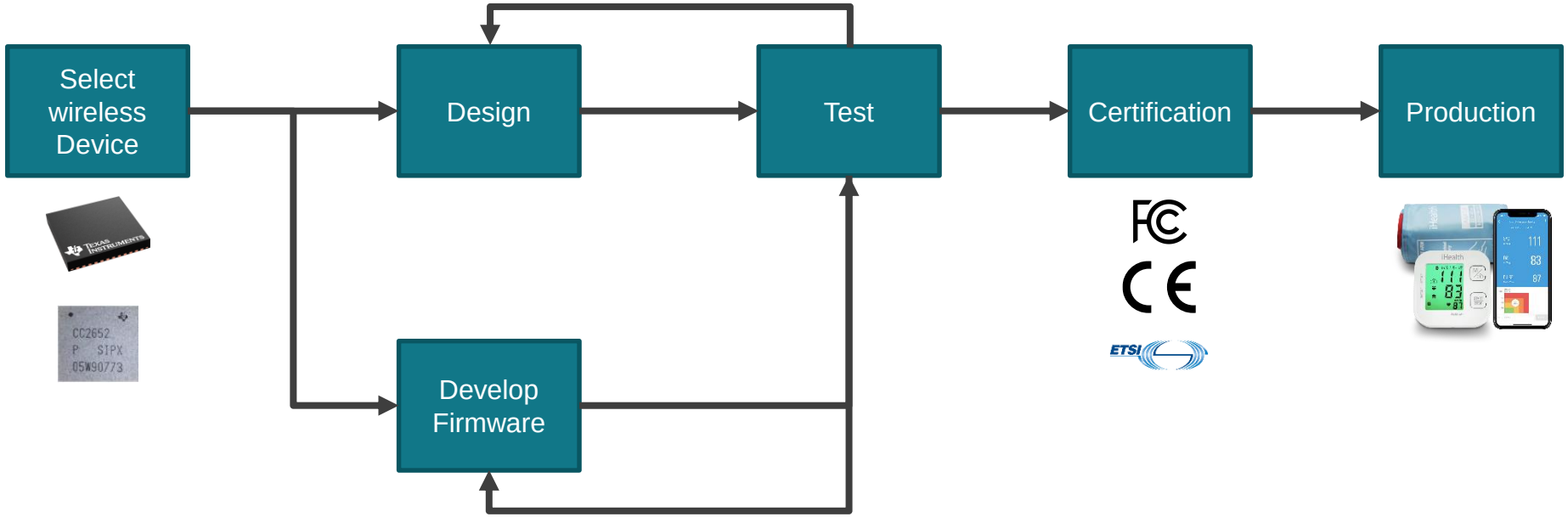
Agenda

- Development Life Cycle and Options
- Why Certified Modules
- How modules save time to market
- Why TI modules – specifically SIP
- Chip Down vs SIP System Cost
- Success stories
- How to get started

Wireless Development | Life Cycle

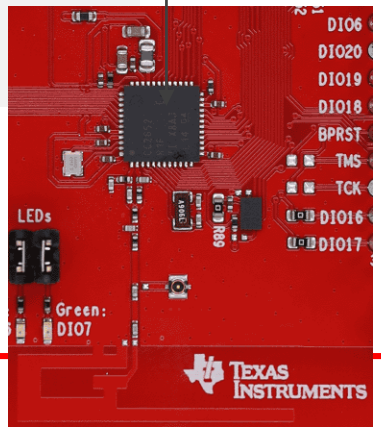


Device Selection | Options

Chip Down

Customers to:

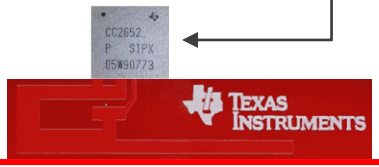
- Source all external components
- Lower cost per unit (~40% cheaper than modules at 1ku)
- Design, tune and certify products
- Required 4-layer PCBs for optimal performance
- Suited for high volume



Wireless Modules

Customers to:

- Integrated components and wireless optimized for quick time to market
- Lower cost barrier of entry
- Certified modules for qualification savings
- Supports 2-layer PCBs
- Low to mid volume



Benefits | Why Certified Modules?

Time to Market

- Enables fast-time to market with no external components required and available reference designs
- Each module is certified with key regulatory bodies around the world. You only need to certify the product
- RF design time takes significant time to tune the performance (1-6 man months)
- Decrease need for re-spins
- Utilize TI design reviews for expert help

Flexibility

- Integrated antenna module does not require the use of antenna reference designs
- Less PCB area needed (80% in area reduction) and enables 2-layer PCBs
- Comes with option to use external antenna for better performance

Hidden $ Save

- Single product SKU certification to reduce certification cost ($30k) & time
- RF Engineers and Design can cost about $100k to 200k/year
- Expensive RF equipment can cost more than $40k
- Provide path to chip-down in the future to reduce cost at high volumes

Wireless module

Design

Product

Chip Down vs SIP System Cost

Discrete design

Component	Count	Estimated 1k volume cost (including assembly cost for passives) CC2652R	Estimated 1k volume cost (including assembly cost for passives) CC2651R3
Capacitors	14	14 x 1c = 14c	14 x 1c = 14c
RF Inductors nH	4	4 x 3c = 12c	4 x 3c = 12c
DC/DC and bulk capacitors	3	3 x 5c = 15c	3 x 5c = 15c
DC/DC inductors µH	1	4c	4c
48MHz crystal, 10ppm	1	20c	20c
32kHz crystal, 50ppm	1	22c	
QFN device	1	$2.32	$1.978
Total		**$3.19**	**$2.628**

SIP design

CC2652RSIP 1k volume cost	CC2651R3SIPA 1k volume cost
$4.99	**$3.49**

Additional savings with SIP design:

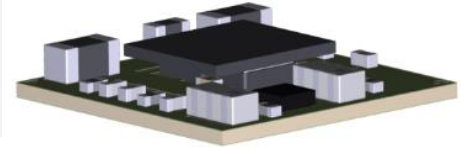
- Certification cost (~$30k)
- RF equipment cost (~$40k)
- RF design time (1-6 man months)
- Risk (re-spins of PCB often needed)
- Less PCB area needed
- Use 2-layer PCB without performance degradation
- Lower manufacturing and assembly cost due to single component vs multiple components on chip-down

A typical cost breakeven point for customers between certified package and chip-down is greater than 200k units

SIP Modules | How does it save time to market?

System Solution

- Reduce overall design by 80% with 7x7mm SIP for small form factor design
- More available GPIOs (up to 32) than competitor's QFN and SIP
- Integrated with up to +10dBm transmit power for long-range communication in harsh environments
- Integrated passives, crystals and antenna options

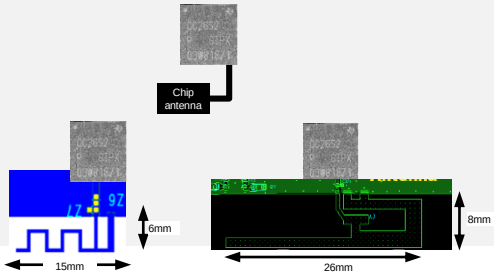


Certification

- Texas Instruments certifies the modules for FCC, CE, ETSI, and more for various regions around the world (2+ months savings)
- Customers copy our antenna reference designs if needed for external antenna. For internal antenna, follow our design guidelines.
- Customers certify final product with our wireless certification

Scalable Solution

- Broad silicon portfolio with scalable memory, IOs, peripherals and pin to pin compatible packages and temperature range up to 105C
- External antenna reference designs
- Integrated antenna has optional support for external antenna
- Common API from modules to chip-down for ease of migration



How to get started

Product Page

- CC2652RSIP
  - SIP wireless module for BLE 5.2
- CC2652PSIP
  - With integrated power amplifier up to +10dBm
- CC2651R3SIPA
  - Integrated Wireless Antenna

Software

- **Easy to use** SimpleLink™ SDK with Bluetooth Low Energy 5.2, Zigbee, Thread and Multiprotocol
- **BT SIG qualified** stacks

Resources

- Various Antenna reference guides available - Antenna Selection Quick Guide
- Get the LP-CC2652RSIP LaunchPad development kit
- Training / documentation
- CC-Antenna-DK2 and Antenna Measurements Summary
- Third Party Modules based on TI wireless technology

Thank you

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