



# Anaren Integrated Radio (AIR)

Low-power RF modules, firmware & development tools that make it easy to 'go wireless'

## 2541 System on Chip Series

The A2541R24C is a surface-mount radio module featuring *Bluetooth*<sup>®</sup> SMART technology that incorporates the Texas Instruments ultra-low-power CC2541 SoC, crystals, a U.FL connector and a DC/DC converter, all in one of the industry's smallest packages: 11x19x2.5mm. The module is pre-loaded with either TI's BLE-Stack or Em-Ware software from Emmoco and is certified with the Bluetooth SIG, US (FCC), Canada (IC), and compliant with European (ETSI) and other global standards.



A2541R24C

### Features

#### General:

- 2.4-GHz RF transceiver incorporating *Bluetooth* SMART technology
- Excellent receiver sensitivity and robustness to interference (-89/-94dBm typical in BLE LGM/HGM mode with <0.1% BER)
- Programmable output power up to +1dBm
- Supports data rates up to 2 Mbps
- Wide input voltage range (2.0V – 3.6V)
- Industry-standard U.FL connector
- Available in tape & reel and matrix tray
- Module weight approximately 0.7 grams
- Certified/compliant for use in USA, Canada, Europe, and many other global locations

#### Current Consumption: (Typ @ TC = 25°C, VDD = 3.0V)

- Active mode RX (CPU Idle): 14 mA
- Active mode TX (CPU Idle): 13 mA @0dBm, with 3 low power/sleep modes from 0.5uA to 270 uA
- Features TI TPS62730 step-down converter for optimal power usage (approximately a reduction of 30% when radio operating at 3.0V and 40% at 3.6V)

#### Microcontroller:

- High-performance and low-power 8051 Microcontroller core with code prefetch
- 256KB in-system programmable flash and 8KB RAM with retention in all power modes

#### Firmware:

- Available with Emmoco firmware, designed for easy implementation of embedded-mobile-connectivity

#### Development:

- Evaluation Module (EM) available for quick-connection to the TI Development Kit (CC2540DK)
- B-SMART™ BoosterPack kit available for use with TI LaunchPad and other development kits
- Emmoco software and tools enable easy communication between an embedded device and *Bluetooth* SMART Ready phones and tablets
- Emmoco's Em-Builder tools and Schema concept generate code that makes sharing data between embedded and mobile devices easy

### Benefits

- Minimal RF engineering experience necessary
- Minimal *Bluetooth*<sup>®</sup> experience necessary
- Easy to implement, short design cycle
- No additional "Intentional Radiator" certification required (FCC 15.247, IC RSS-210, EN 300 328)  
FCC ID: X7J-A12062101 // IC: 8975A-A12062101
- Minimal real estate required
- Easily implemented on a two layer PCB
- No additional harmonic filtering required
- 100% RF-tested in production
- Common footprint for similar products in family
- No additional DC decoupling required
- Accurate Digital RSSI support
- Operating temperature -40 to +85°C

#### PLEASE NOTE:

- Additional information on the Texas Instruments CC2541 device can be found in the company's latest datasheet release at <http://www.ti.com>
- Additional information on Emmoco's development environment and tools can be found at <http://www.emmoco.com>

### Applications

Industrial controls and monitoring, remote controls, home/building automation, lighting systems, low power wireless sensor networks, and consumer electronics, sports monitoring, health & wellness

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This product is not to be used in any implantable medical device or external medical device intended to regulate or monitor biological functions, including but not limited to devices such as pacemakers, defibrillators, cardiac resynchronization devices, pressure sensors, biochemical stimulators and neurostimulators. ANAREN MAKES NO WARRANTY OF FITNESS OR MERCHANTABILITY OF THIS PRODUCT FOR ANY USE OF THIS TYPE. Anaren shall not be responsible for any consequential damages arising from the sale or use of this product for any use of this type. The ultimate user of the product assumes all risk of personal injury or death arising from a prohibited use.





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## Product overview

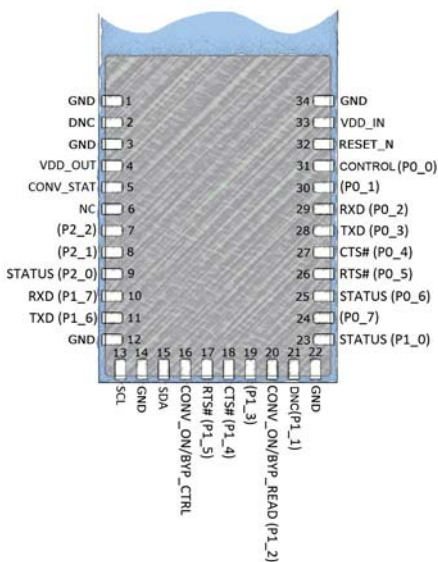
The A2541R24C is a high-performance, FCC & IC certified and ETSI-compliant SOC module featuring *Bluetooth*<sup>®</sup> SMART technology that incorporates the Texas Instruments CC2541 transceiver chip in one of the industry's smallest package (11 x 19 x 2.5 mm). The module incorporates two crystals, TPS62730 step-down converter and the required RF matching and filtering for regulatory compliance. The modules operate in the global unlicensed 2.4GHz ISM/SRD frequency band. These radio modules are ideal for achieving low power wireless connectivity without having to deal with extensive Protocol, RF design and regulatory compliance, allowing quick time to market. The modules are 100% RF-tested to provide consistent performance.

The A2541R24C has an RoHS-compliant ENIG finish and is packaged in 27-piece matrix trays or on 500-piece tape & reel for high-volume automated manufacturing.

## Pin diagram

Pin-out shown is for operation using the Emmoco firmware featuring *Bluetooth*<sup>®</sup> SMART technology. See TI CC2541 datasheet and A2541 User's Manual for detailed pin descriptions.

Viewed from top side



Where applicable:

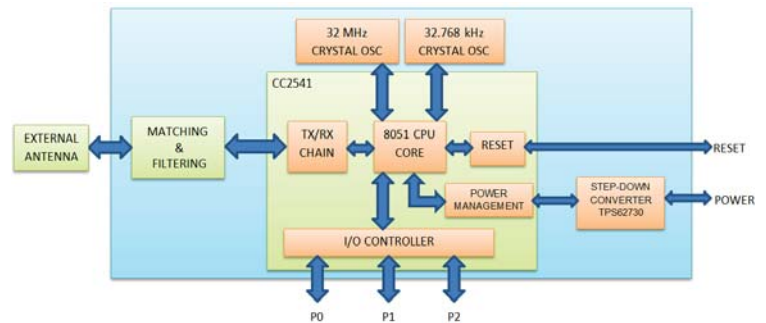
**NC** = "NO Connection"  
Pin is NOT connected internally.

**DNC** = "Do Not Connect"  
Pin reserved for internal use, ensure mating footprint pads are isolated.

**GND** = "Ground"  
Connect the maximum number possible (minimum one for proper operation).

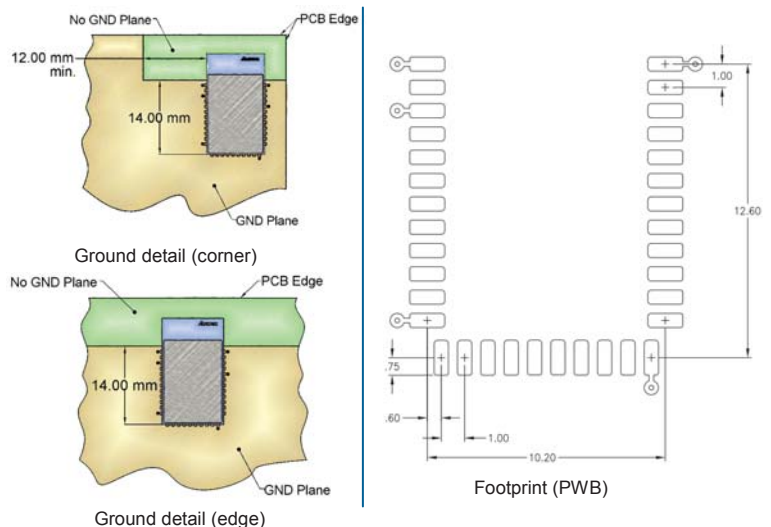
References in (parentheses) show native CC2541 pin function.

## Block diagram



## Layout information

Optional "No GND Plane" area shown for compatibility with PCB antenna model. See product User's Manual for detailed information.



## Nomenclature

**A2541R24C10GR**

1 2 3 4 5 6 7

- A (Anaren)
- 1 Chip series (CC1101, CC2500, CC2530, CC8520)
- 2 Function (R = radio only, E = Range Extender)
- 3 Frequency band (x 100MHz)
- 4 Form factor (A = Internal Antenna, C = Connector)
- 5 Design ID (10 = TI's BLE-Stack, 20 = Emmoco Em-Ware software stack)
- 6 Application (G = General)
- 7 Packaging (R = Reel, M = Matrix Tray)



Caution! ESD sensitive device. Precautions should be used when handling the device in order to prevent permanent damage.



The item described in this product brief is part of our total AIR Support solution. To learn more, visit our website or just ask us!

For more information see product User's Manual, available online.



**Anaren**<sup>®</sup> 1349a  
What'll we think of next?<sup>®</sup>

Anaren, Inc. | 6635 Kirkville Road | East Syracuse, NY 13057  
800.411.6596 | [www.anaren.com/air](http://www.anaren.com/air) | [AIR@anaren.com](mailto:AIR@anaren.com)