Arm Cordio-E154 radio IP

Complete 802.15.4 solution
- 2.4 GHz RF transceiver
- Modem and protocol processing logic
- MAC layer firmware

IP Implementation
- TSMC 55nm LP/ULP process
- TSMC 40nm LP/ULP process
- UMC 55nm ULP process
- Native sub 1-volt solution

IEEE 802.15.4 specification
- 802.15.4-2006 version of MAC and PHY
- 2400 – 2484 MHz, O-QPSK PHY
- Optional AES-128 encryption engine

Full featured link layer firmware
- Delivered as source code
- Optimized for energy and memory efficiency
- Supports single processor or dual-processor solutions
- Arm AMBA® APB peripheral device

System clock and power
- Low power 32 MHz and 32.768 kHz XTAL oscillators with internal RC modes
- Bypass option for 32 kHz clock available

Overview
Arm® Cordio®-E154 radio IP is a complete self-contained radio subsystem supporting the IEEE 802.15.4 protocol available at TSMC 55nm LP/ULP, TSMC 40nm LP/ULP and UMC 55nm ULP process nodes. The solution consists of the RF 2.4GHz transceiver, modem, protocol processing logic along with MAC layer firmware. The RF front end is delivered as a hard macro, the digital bits delivered as RTL, and MAC layer firmware as source code. The design is optimized for low-power end node IoT devices and enables designers who want a silicon proven and qualified/certified solution for reduced risk and reduced time to market.

Implementation highlights
- RTL for modem and protocol processing logic
- Designed as an AMBA peripheral
- Link layer firmware available as source code
- Zigbee/Thread compliant platform

Standard features
- MAC features to support Zigbee 3.0 and Thread
- Scan
- Data send and receive
- Data poll
- Association and disassociation
- MAC security

Low external BOM count
- 11 external components
- Single antenna pin with integrated PA, LNA and RX/TX switch
- Integrated crystal oscillator load capacitors and integrated PLL filter

Cordio software
- 802.15.4 MAC layer firmware
- Flexible architecture to support different memories for firmware
Design deliverables

- GDSII files for the RF front end
- RF transceiver integrated with pad ring for ease of integration and floor planning
- RTL for modem and protocol processing logic
- Test benches, timing and physical abstraction models
- Scripts for simulation and synthesis with Cadence tools
- Integration manual and release notes

Support deliverables

- Evaluation kit: An Arm mbed™-enabled platform with a demonstration chip containing the Cordio-E154 radio IP, sample
- Zigbee/Thread compliant hardware platform through third party stacks
- Reference design, PCB layout and antenna guidance
- Radio control tool, RF test guidance
- Production test & radio calibration algorithm

### Arm Cordio-E154 radio IP specification

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Radio standard</td>
<td>2.4 GHz standard-compliant 802.15.4 IP platform</td>
</tr>
<tr>
<td>Native voltage</td>
<td>950 mV (nominal)</td>
</tr>
<tr>
<td>TX power</td>
<td>-21 dBm up to 5 dBm</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>-101 dBm</td>
</tr>
<tr>
<td>Power consumption</td>
<td>Active RX: 6.7mW @1V</td>
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<tr>
<td></td>
<td>Active TX: 7.2mW @1V</td>
</tr>
<tr>
<td></td>
<td>Sleep mode: 500nW @1V</td>
</tr>
<tr>
<td>Temperature range</td>
<td>-40°C to 90°C</td>
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</tbody>
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