



Wi-Fi Module from Freescale and Qualcomm

Make it easy to connect anything to the internet

M A Y . 2 0 1 5



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Wi-Fi Module for IoT

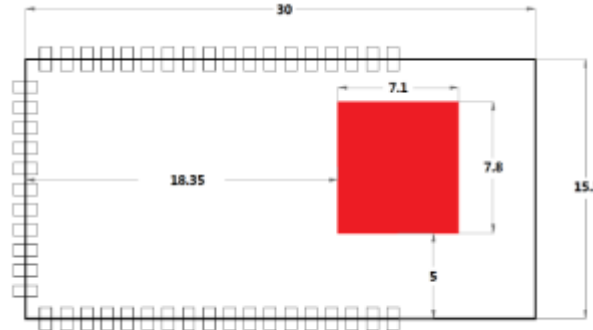
- A joint development by Freescale and Qualcomm.



Top view



Bottom view



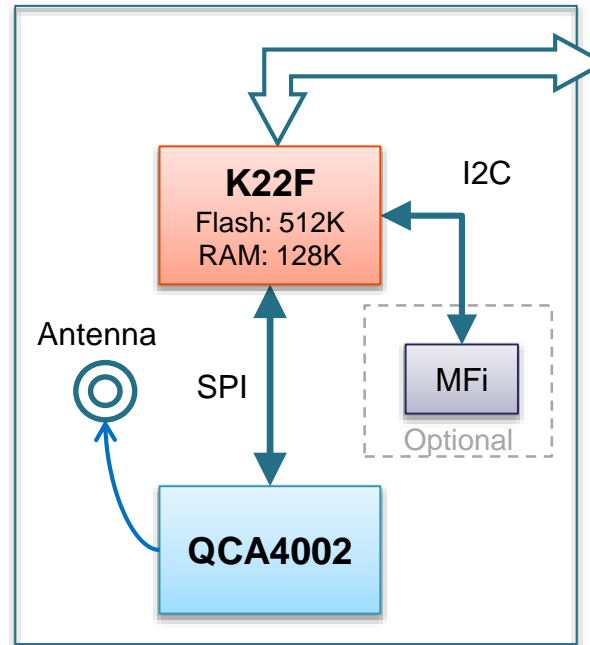
支持外接天线和片上天线

Figure-5 QFM-2202 clearance area for base board 净空区域



Module Configuration

- Operation voltage: 3.3V
- Working temperature: 0~85°C
- Power consumption
 - Tx@18dBm 260mA
 - Tx@0dBm 130mA
 - Rx 100mA
 - Listen 90mA
 - Sleep 130uA
 - Host off 50uA
 - Chip power down 5uA
- CPU: Cortex-M4 @ 120MHz
 - Flash: 512KB
 - RAM: 128KB
- Wi-Fi Connectivity
 - Support for IEEE 802.11b/g/n
 - Single Stream 1x1
 - Band 2.4 GHz
 - Single Rx front end for multiple applications
 - Green Tx power saving mode
 - Low power listen mode
 - Data rates up to 150 Mbps
 - Internet protocols:
IPv4/IPv6, TCP/UDP, ARP/NDP, DHCPv4, ICMPv6
 - Security protocols:
WPS, WPA, WPA2, WAPI, WEP, TKIP



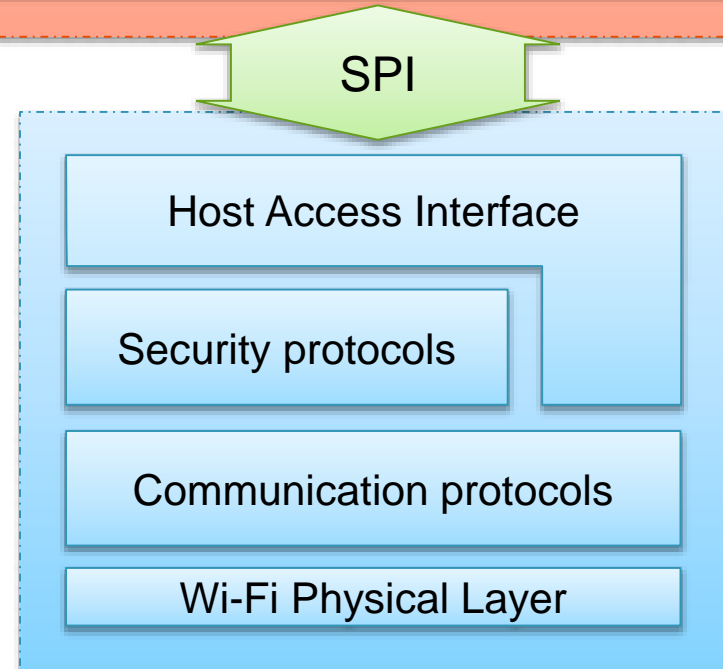
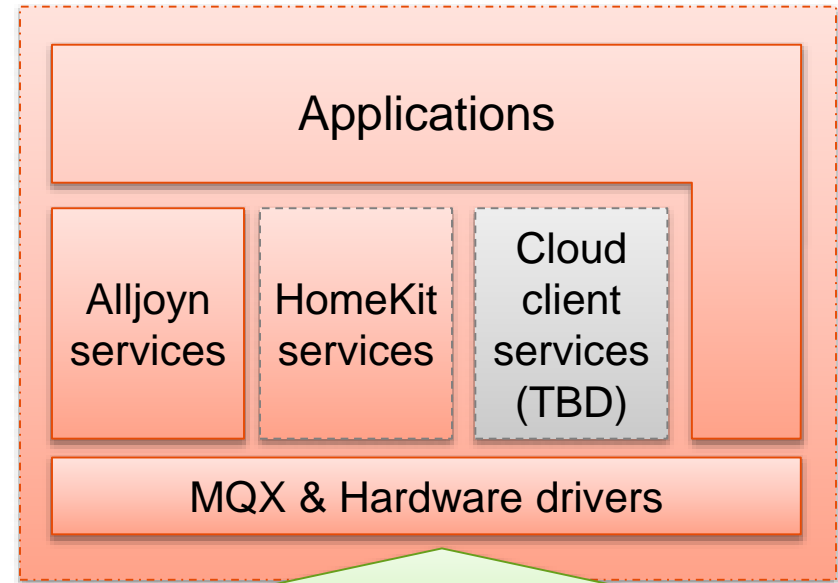
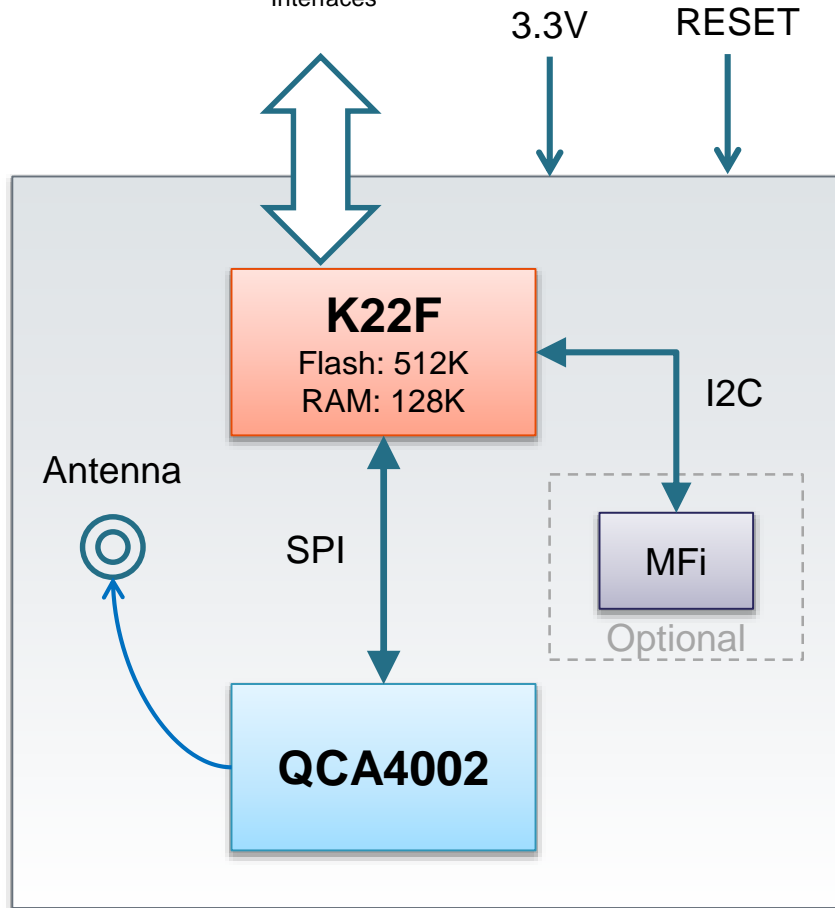
External interface:

- USB OTG x1
 - SPI x1
 - I2C x1
 - I2S x1
 - UART x2
 - 16-bit ADC x 2
 - 12-bit DAC x1
 - Dedicated GPIO x 1
 - JTAG/SWD
- Featured software / stack
 - RTOS: MQX
 - IoT Software framework: Alljoyn
 - iOS Homekit framework & MFi support (to be ready in Aug'15)
 - Firmware upgrade via WiFi and UART
 - MCU connection interface drivers
 - Evaluation board
 - IDE tool chain: IAR EWARM

Block diagram

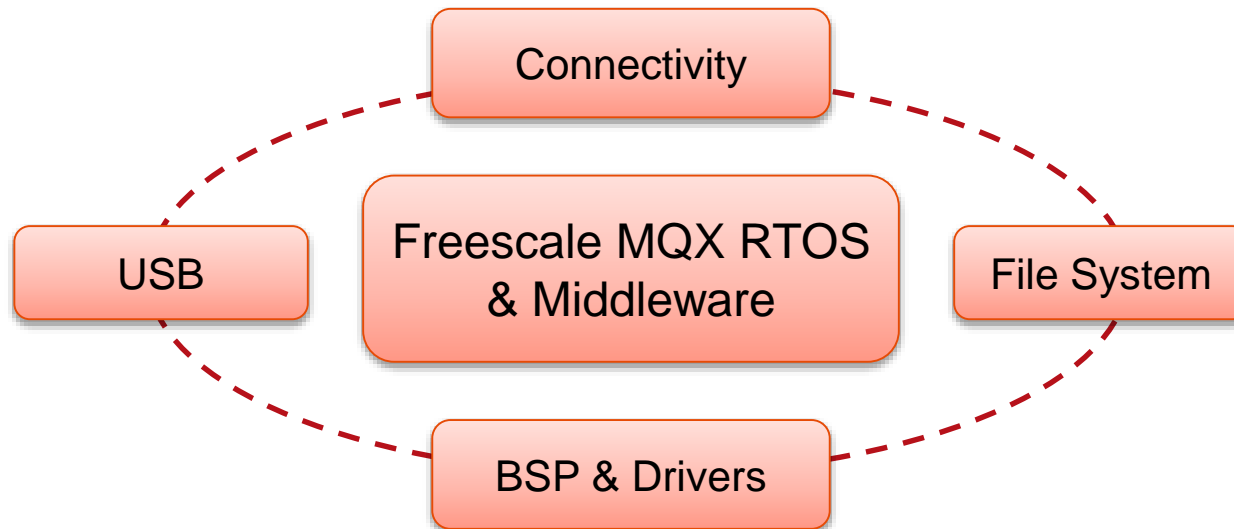
K22 User Application Space

- Flash >256K
 - SRAM >80K
- Peripheral Interfaces



Freescale MQX RTOS

- Full-featured, scalable, proven RTOS with TCP/IP, USB, Graphics, Security and File Systems plug-ins
- Makes application code more stable, more maintainable and easier to upgrade – reduces time-to-market!
- Compatible with CodeWarrior, IAR, Green Hills IDEs



Free of charge for Freescale MCUs (\$95K est. value)

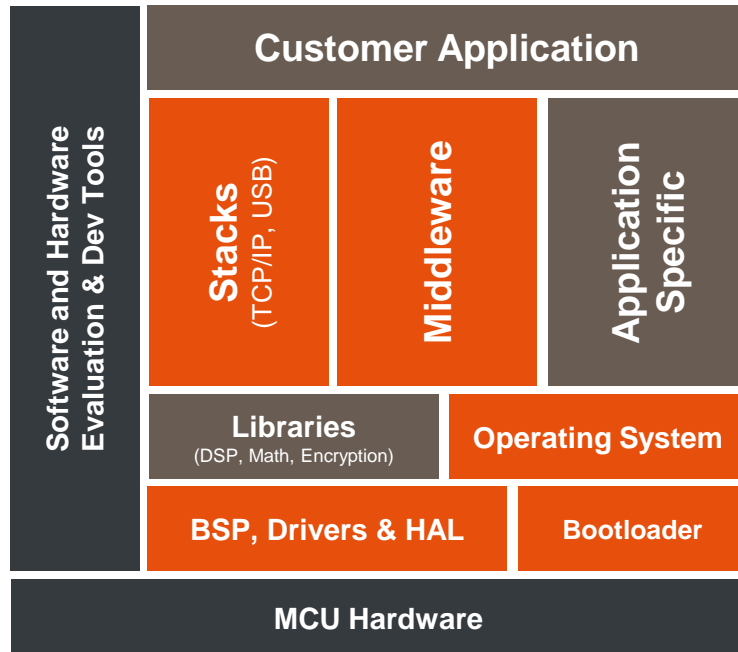
Freescale MQX™ Software Solutions



Commercial-grade MCU software platform at no cost with optional support packages



Enabling the development of connected and intelligent applications of the future



Product Features

- MQX™ Real Time Operating System Kernel
 - Deterministic multi-tasking preemptive scheduler
 - Extensive inter-task synchronization, message passing, and much more
- MQX™ Real Time Communication Suite
 - Now with optional IPv6 add-on package*
 - Broad networking protocol support (TCP, UDP, ICMP, HTTP, DHCP, FTP, Telnet, ...)
 - Fully re-entrant, responsive, designed for embedded systems
- MQX™ File System
 - Embedded FAT file system compatible with FAT-12, FAT-16, or FAT-32 file systems
- NAND Flash File System (FFS)
- MQX™ USB Host/Device Stack
 - USB 1.0/2.0; low-/full-/high-speed
- Board Support Packages
 - Pre-configured MQX Kernel, stacks, and peripheral drivers for Freescale HW



Target applications



Industry Automation

- Industry control
- Surveillance monitor



Finance PoS

- ePoS
- SmartPoS



Car Infotainment

- GPS screen
- Multimedia player



Home Appliance

- White goods
- Small appliance



Smart lighting

- LED controller
- Advertisement panel



Controller

- Joystick
- Handheld console

Cloud connection

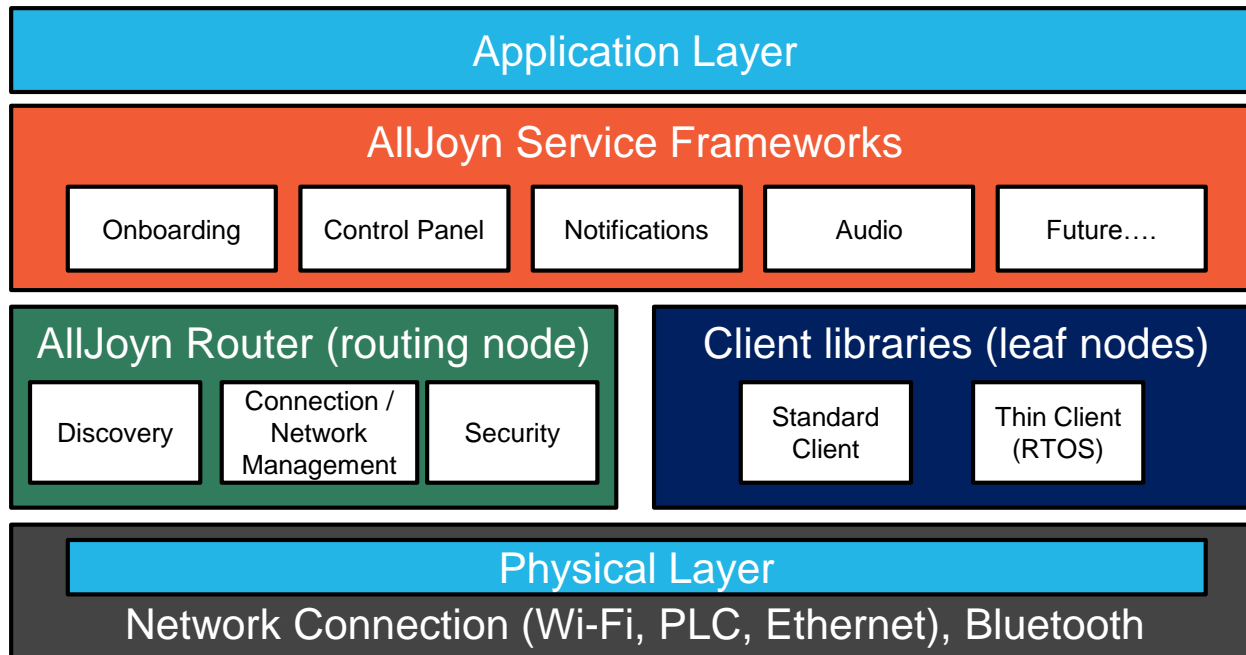
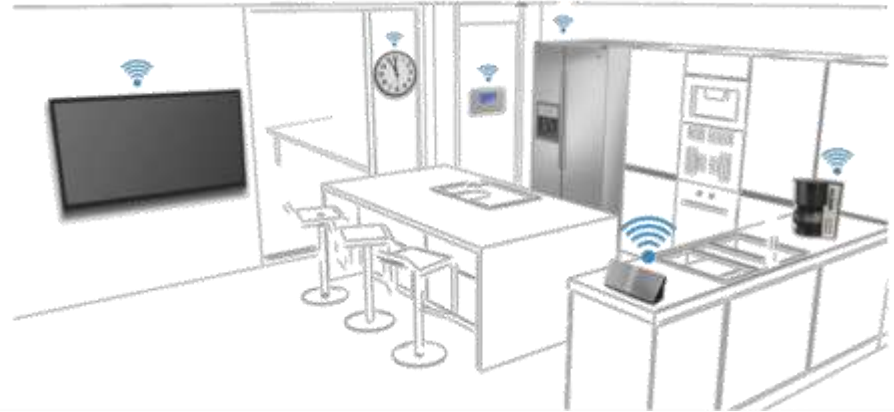


Alljoyn

- AllJoyn is an open source project, initially developed by Qualcomm Innovation Center, Inc. which provides a universal software framework and core set of system services that enable interoperability among connected products and software applications across manufacturers to create dynamic proximal networks.
- Benefits:
 - Cross-platform, cross-brand, cross-physical layers
 - Bridging ecosystems for individual markets and product categories
 - Discover new use cases and create new business models
 - Interoperable across leading OS and embed devices like small home appliances that don't run an OS
 - Bearer agnostic
 - Devices can interact regardless of how they are connected – Wi-Fi, Ethernet, Powerline, etc.

AllJoyn Service Frameworks

- The AllJoyn Core Framework includes a set of service frameworks that, by design, are very simple and address the desire for users to interact with their nearby things.





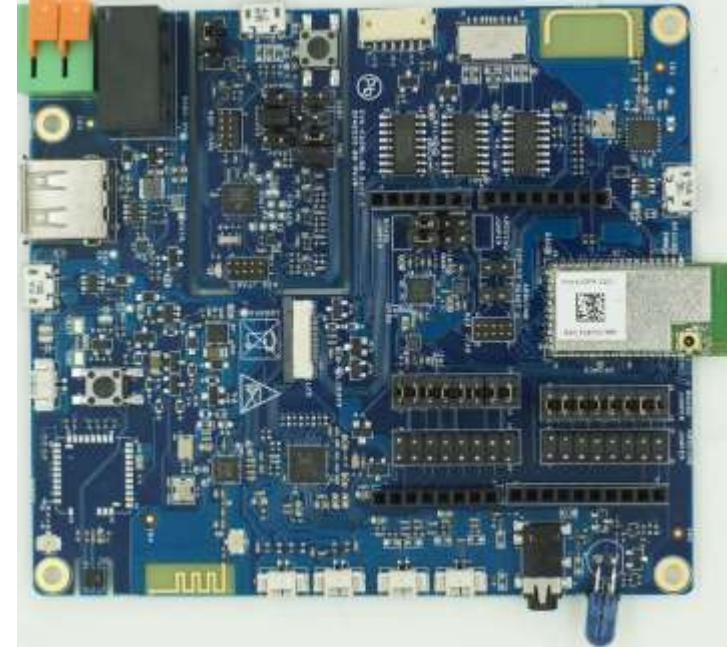
HomeKit

- HomeKit regulates how the intelligent appliances connect to the iOS devices and communicate to each other.
- HomeKit is a framework in iOS 8 for communicating with and controlling connected accessories in a user's home. You can enable users to discover HomeKit accessories in their home and configure them, or you can create actions to control those devices. Users can group actions together and trigger them using Siri.
- Home Kit allows third-party apps to perform three major functions:
 - Discover accessories and add them to a persistent, cross-device home configuration database.
 - Display, edit, and act upon the data in the home configuration database.
 - Communicate with configured accessories and services to get them to perform actions, such as turning on the lights in the living room.

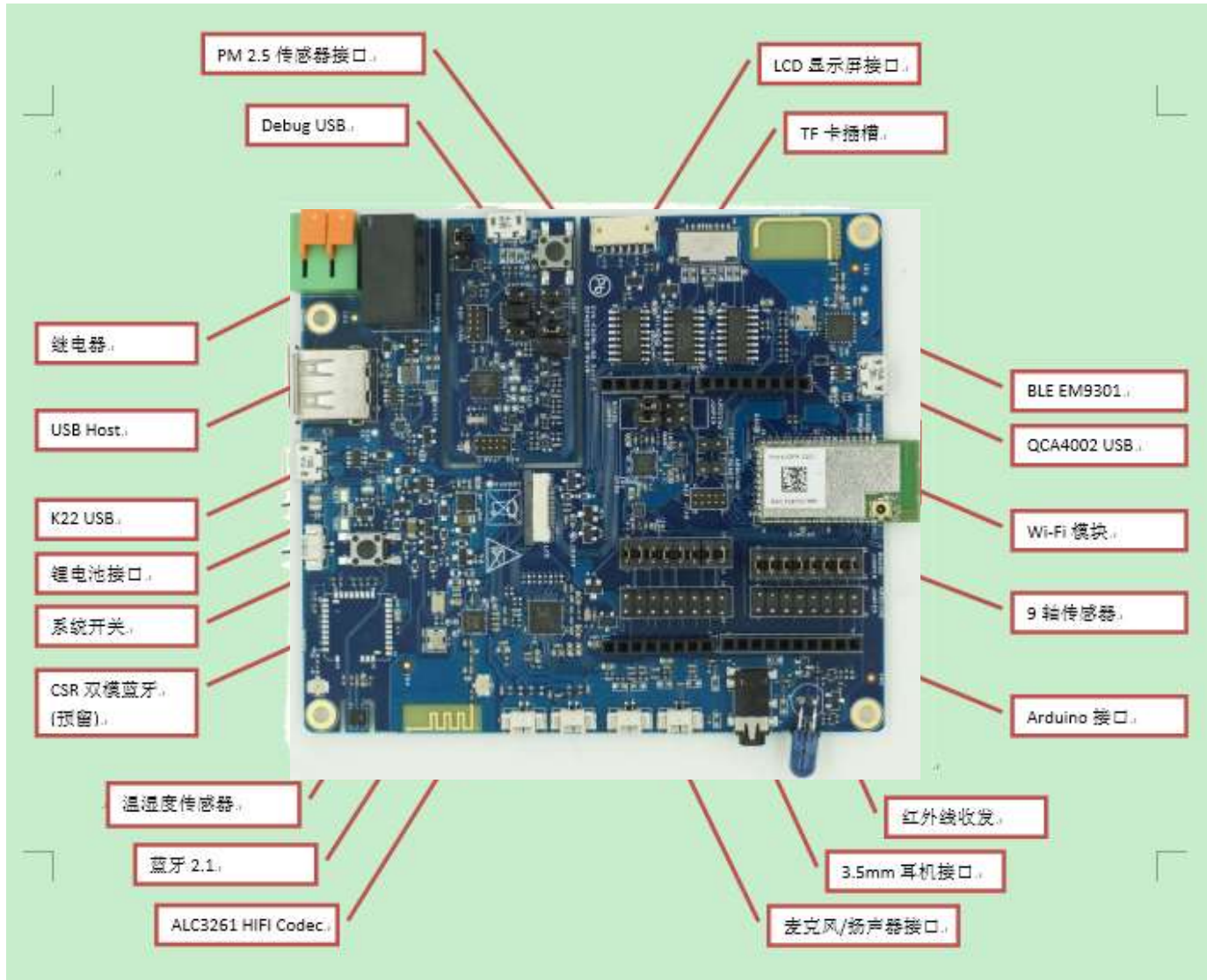


Evaluation board

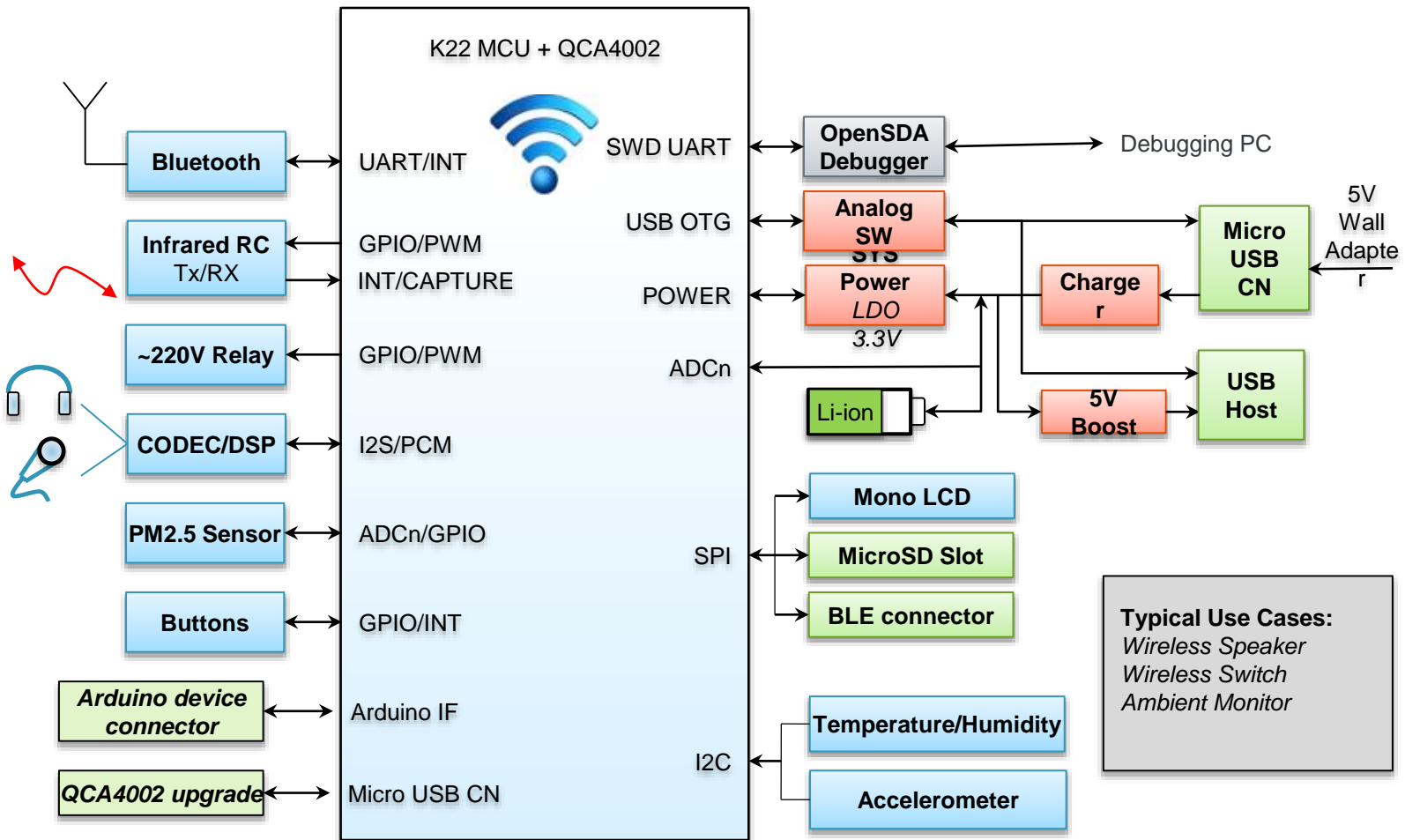
- Bluetooth 2.1: *HCI: RDA BT RDA5876A*
- Smart IR remote control: Support self-learning
- 220V Relay
- HIFI codec: *Realtek ALC5642-CG*
- PM2.5 sensor: *Sharp GP2Y1010AU0F*
- Accelerometer sensor: *Freescale MMA8563FCR1*
- Temperature/Humidity sensor: *Sensirion SHTxx*
- BLE SPI Interface: for external *EM9301 module*
- Micro SD Slot
- MONO LCD: 128x64 pixels
- Li-ion Battery connector
- Build-in OpenSDA Debugger



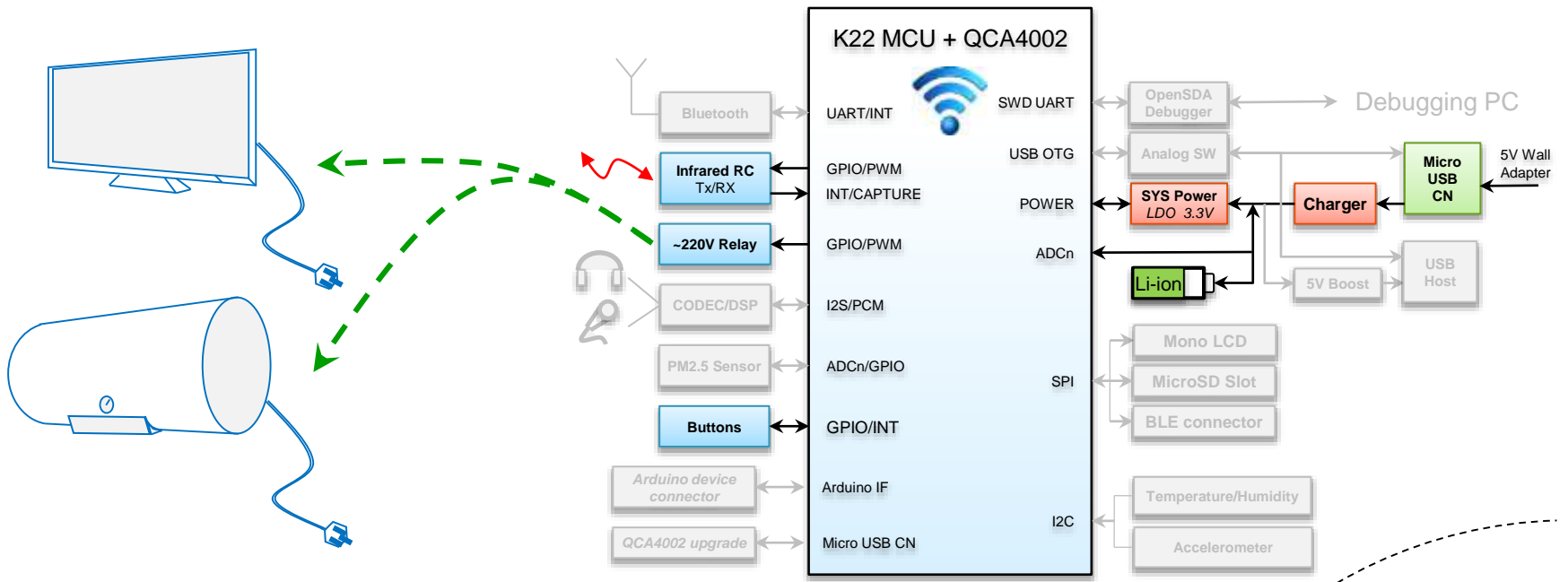
Evaluation Board



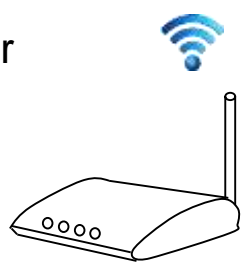
Evaluation Board



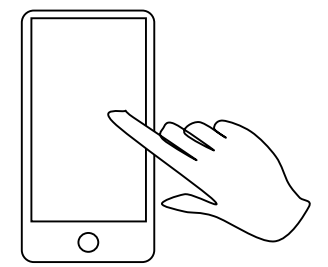
Appliance remote control



- 1) Mobile phone sends commands to home router
- 2) Router relay commands to Wi-Fi Module
- 3) Wi-Fi module activates the 220V relay
- 4) Wi-Fi module activates infrared controller

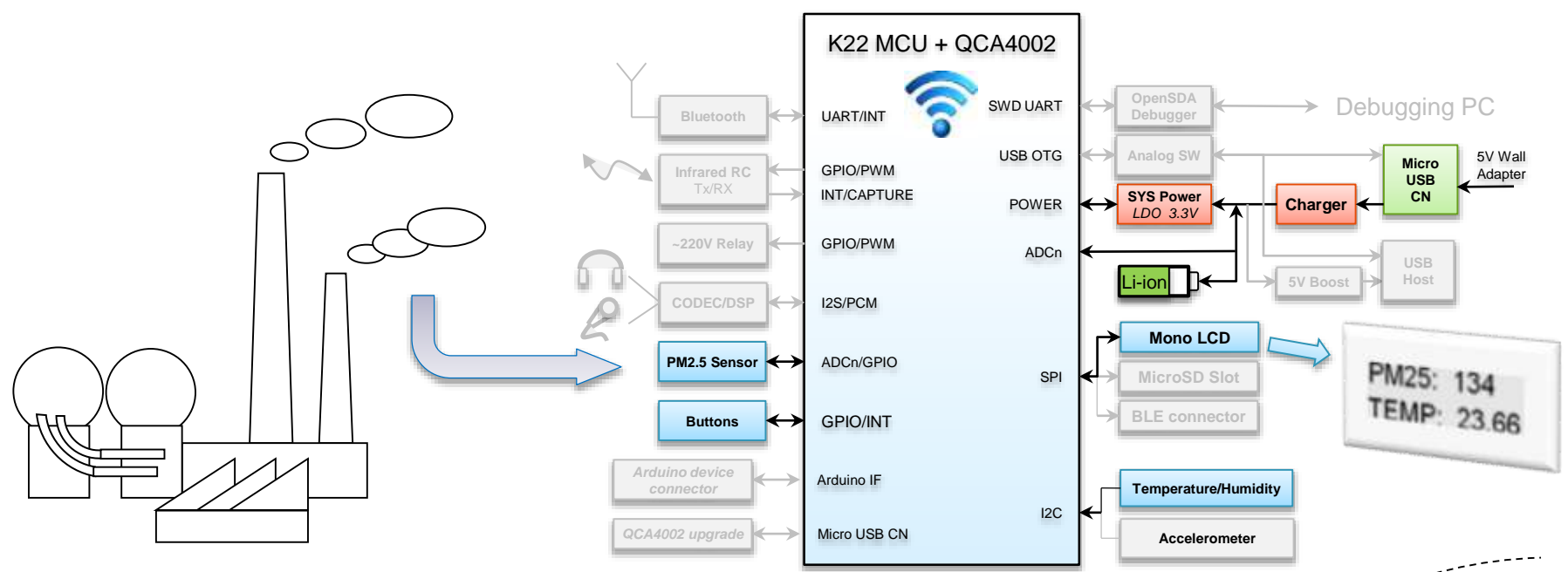


Home

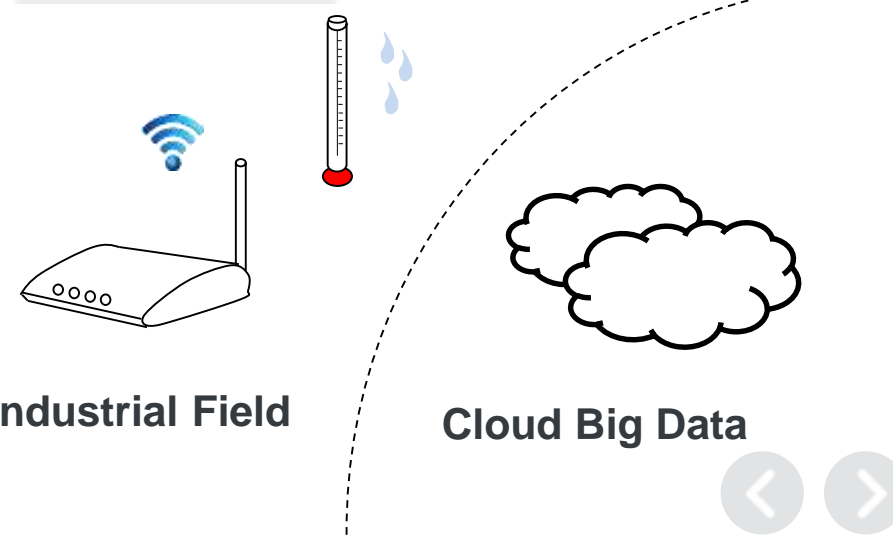


Mobile Phone Access

Ambient remote monitoring

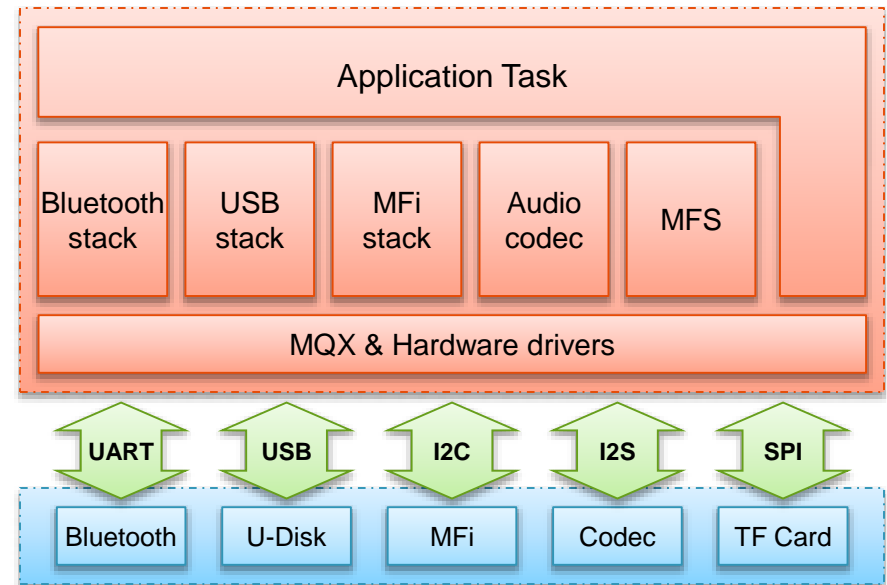


- 1) 探测节点采集温湿度、PM2.5等数据
- 2) 探测节点将数据通过WiFi传至无线路由器
- 3) 数据被进一步传送至云端



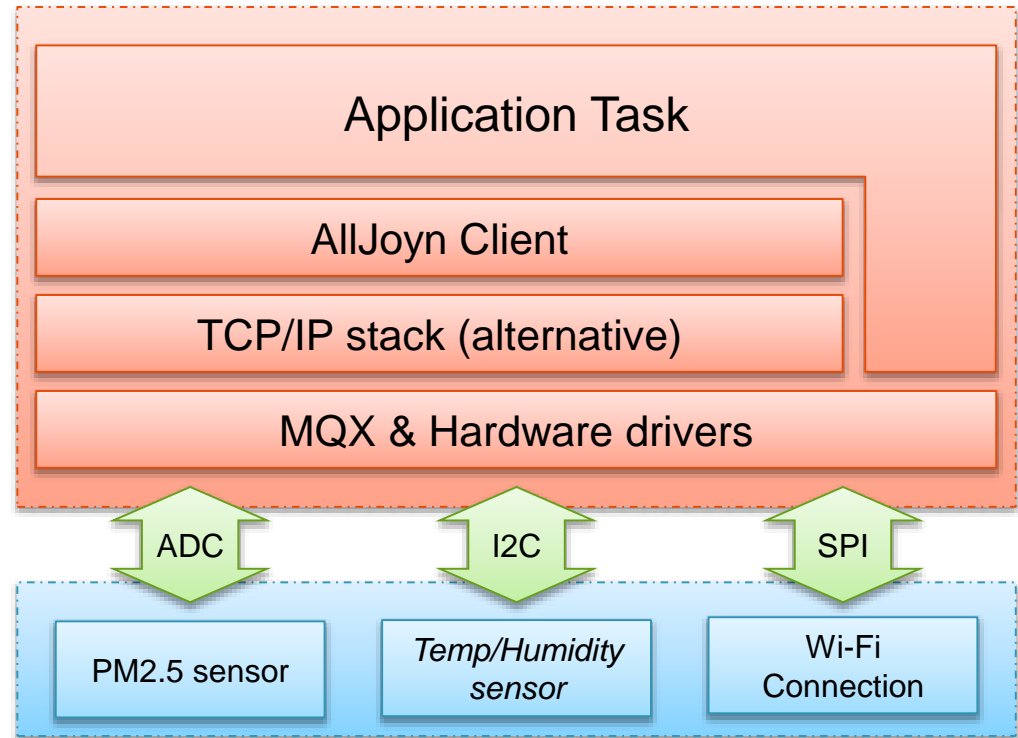
Music play demo on the evaluation board

- Features:
 - Bluetooth Profile Support: HFP A2DP AVRCP
 - Local Music Player: Play from U-Disk or TF Card
 - MFi Audio Support
- Demo 1: Reading audio data from U-Disk or TF card
 - Read audio file from external storage
 - Decode audio data by Audio codec lib
 - Send PCM stream to I2S
 - If connect iPhone/iPod/iPad by USB, MFI stack controls authentication
- Demo 2: Connecting phone with Bluetooth
 - Receive audio data stream from phone
 - Decode audio data by audio codec lib
 - Send PCM out with I2S.



Ambient monitor demo on the evaluation board

- Features:
 - PM2.5 sensor
 - Temperature / Humidity sensor
 - Alljoyn Support
- Demo process:
 - Read PM2.5 data from sensor (GP2Y1010AU0F)
 - Read temperature / humidity data from sensor (SHT1x)
 - Send collected data to phone or tablet with AllJoyn service protocol via Wi-Fi connection



Documents

- 硬件文档
 - 产品规格书
 - 底板设计手册（原理图，layout, BoM)
- 软件文档
 - K22FSH上手指南
 - K22FSH开发包-安装配置手册
 - K22FSH开发包-演示程序用户手册
 - K22FSH开发包-编程手册



Qualifications

- FCC/CE
 - on going, to be ready in the mid of April



Product information

- Sample @ Dec, 2014
- Mass production @ Feb, 2015
- Lead time: 16 weeks
- Web site: <http://www.freescale.com/zh-Hans/webapp/sps/site/application.jsp?code=WIFI-MODULE-QFM-2220&fsrch=1&sr=2&pageNum=1>
- Ordering information

Part number	Description	Price @ 10Kpcs on web
QFM-2202	2.4G, Single Stream, low-power, embedded MCU with 512K flash, Alljoyn stack build-in Wi-Fi module.	\$6.99
QFM-2202-A	Same as QFM-2202, with MFi and HomeKit stack build-in Wi-Fi module.	\$7.29 + MFi *

* Need to get license from Apple



www.Freescale.com