MC1322X Development Kits

Overview

Freescale has created the most complete set of hardware platforms for evaluating the MC1322X Platform in Package™ (PiP) solution, allowing developers to select the hardware and software platform that best meets their needs. The unique PiP design integrates the 2.4 GHz transceiver, ARM7TDMI, memory, I/O and RF matching components into a single package, significantly reducing the component cost and solution size. The MC1322X development kits are the ideal platforms for more complex 802.15.4 and ZigBee® applications, providing plenty of memory and expansion capabilities.

1322X-SRB (Sensor Reference Board)

The 1322X-SRB contains an MC13224 PiP, an MMA7260Q three-axis acceleration sensor, MPXV5010G pressure sensor and a temperature sensor. The SRB provides a complete platform for evaluating the MC13224 PiP.

1322X-NCB (Network Coordinator Board)

The 1322X-NCB contains the MC13224 IC and a graphic LCD, creating the ideal demonstration platform for network coordinators. The LCD enables network monitoring by providing status messages.

1322X-LPB (Low Power Board)

The 1322X-LPB contains the MC13224 and is ideal for power measurements. The small form factor supports both AAA batteries and coin cell use and has the optional buck converter enabled to provide a low power option.

1322X-USB

The 1322X-USB is programmed to function as an 802.15.4/ZigBee packet sniffer and can be used with the Daintree Sensor Network Analyzer software. The device can also be reprogrammed to support customer applications, providing a small form factor device for PC connectivity.

Features

- MC13224 802.15.4 2.4 GHz PiP
- MMA7260Q three-axis acceleration sensor (1322X-SRB only)
- MPXV5010G pressure sensor (1322X-SRB only)
- Temperature sensor (1322X-SRB only)
- Printed F antenna
- SMA connector (1322X-NCB only)
- Color graphic LCD display (1322X-NCB only)
- Speaker
- Joystick, buttons and LEDs
- J-TAG interface for debug and programming
- Nexus debug interface (1322X-NCB only)
- Supports on-chip buck converter (1322X-LPB only)
- Onboard expansion capabilities for external application-specific development
- LEDs and switches for demonstration monitoring and control
- Connections for battery or external power supply

1322X Evaluation Kit

- USB port to interface with PC
- Cables, batteries and power adapters
- Scalable software support for easy development of customer-specific network topologies

MC1322X Development Kits

Feature	1322X USB Kit	1322X Developer Starter Kit	1322X Network Starter Kit	1322X ZigBee EVK
1322X-SRB	N/A	1	1	4
1322X-NCB	N/A	1	1	3
1322X-LPB	N/A	N/A	1	2
1322X-USB	1	N/A	1	1
J-Link JTAG Debugger	No	Yes	Yes	Yes
IAR IDE	IAR 32K Edition	IAR 32K Edition	1322XNSK-IAR	1322XEVK-SFTW
BeeKit™ with BeeStack™ ZigBee® Protocol Stack	BeeKit with 90-day evaluation of BeeStack	BeeKit with 90-day evaluation of BeeStack	BeeKit with 90-day evaluation of BeeStack	1322XEVK-SFTW only
Batteries, Cables and Power Adapters	Yes	Yes	Yes	Yes
Pre-Programmed Demonstration Application	None	Weather Station Demo, Synkro Demo	802.15.4 Network Demo	ZigBee environment demonstration (ZeD)
RoHS Compliant	Yes	Yes	Yes	Yes
MSRP USD—Part #	$79—1322XUSB	$379—1322XDSK-DBG	$579—1322XNSK-DBG $2599—1322XNSK-IAR	$1999—1322XEVK $3999—1322XEVK-SFTW

MC1321X Development Kits

Overview

Freescale offers several different development kits for evaluating the MC1321X system in package (SiP), allowing developers to select the hardware and software platform that best meets their needs. The MC13213 device contains a 2.4 GHz RF transceiver and MC9S08GT60 MCU with 60K of flash and 4K of RAM in a 64-pin 9 mm x 9 mm LGA package. The development boards can be programmed with example demonstration applications or may also be programmed with custom applications.

1321X-SRB

The 1321X-SRB contains an MC13213 IC, an MMA7260Q three-axis acceleration sensor and a temperature sensor. The SRB provides a complete platform for evaluating the MC13213 SiP.

1321X-NCB

The 1321X-NCB contains the MC13213 IC and an LCD, creating the ideal demonstration platform for network coordinators. The LCD enables network monitoring by providing status messages.

1321X Evaluation Kit

MC1321X Development Kits

Feature	1321X Consumer Starter Kit	1321X Developer's Starter Kit	1321X Network Starter Kit	1321X ZigBee Development Kit
1321X-SRB	1	2	2	4
1321X-NCB	1	N/A	1	3
CodeWarrior™ IDE	Special Edition	Special Edition	Special Edition	Special Edition, Standard Edition (1321XEVK-SFTW only)
BeeKit™ with BeeStack™ ZigBee® Protocol Stack	BeeKit with 90-day evaluation of Bee-Stack	BeeKit with 90-day evaluation of Bee-Stack	BeeKit with 90-day evaluation of Bee-Stack	BeeKit with 90-day evaluation of Bee-Stack, Full Node Locked Version (1321XEVK-SFTW only)
ZigBee Packet Analyzer Hardware	No	No	No	Yes
Protocol Analyzer	No	No	No	Daintree Standard Edition
Batteries, Cables and Power Adapters	Yes	Yes	Yes	Yes
Pre-programmed Demonstration Application	Synkro Demo	Accelerometer Demo	802.15.4 Network Demo	ZigBee Environment Demonstration (ZeD)
RoHS Compliant	Yes	Yes	Yes	Yes
MSRP USD—Part #	$399—1321XCSK-BDM	$249—1321XDSK $349—1321XDSK-BDM	$499—1321XNSK $549—1321XNSK-BDM	$1749—1321XEVK $3299—1321XEVK-SFTW

Features

- MC13213 ZigBee-compliant 2.4 GHz SiP
- MMA7260Q three-axis acceleration sensor (1321X-SRB only)
- Temperature sensor (1321X-SRB only)
- Printed F antenna
- Onboard expansion capabilities for external application-specific development
- Programmable 60K flash with 4K of RAM
- Onboard BDM port for flash reprogramming and in-circuit hardware debugging
- LEDs and switches for demonstration monitoring and control
- LCD for demonstration messaging (1321X-NCB only)
- Connections for battery or external power supply
- RS232 and USB ports to interface with PC
- USB multilink BDM debugger/programmer (BDM kits only)
- Cables, batteries and power adapters
- Scalable software support for easy development of customer-specific network topologies

1320X-QE128 Development Kit

Overview

The MC1320X-QE128-DSK is based on the MC13202 2.4 GHz RF transceiver and the HC9S08QE128 MCU. This platform combines RF capabilities of the MC13202 with the low power and increased memory option of the QE MCU. This is an attractive solution for customers that wish to remain in the S08 MCU family, but require more flash memory then offered in the MC1321X family. The HC9S08QE128 board provides 128K of flash and 8K of RAM and an extensive peripheral set to provide enough headroom for complex ZigBee applications. In addition the QE low power consumption is ideal for applications that require extended battery life. Like all of the 802.15.4 development kits, it is supported by Freescale's BeeKit Wireless Connectivity Toolkit and supports the SMAC, MAC and BeeStack protocol stacks.

1320X-QE128-EVB

Features

- Two 1320X-QE128-EVB development boards
- MC13202 802.15.4-compliant 2.4 GHz transceiver
- MC9S08Q128 MCU daughter card
- Printed F antenna
- Onboard expansion capabilities for external application specific development
- Programmable 60K flash with 4K of RAM
- Onboard BDM port for flash reprogramming and in-circuit hardware debugging
- LEDs and switches for demonstration monitoring and control
- 2 x 16 character LCD for demonstration messaging
- Connections for battery or external power supply
- RS232 and USB ports to interface with PC
- 16-pin and 10-pin user headers for selected GPIO and data interfaces
- USB multilink BDM debugger/ programmer (BDM kits only)
- Cables, batteries and power adapters
- Scalable software support for easy development of customer-specific network topologies

Ordering Information

Part Number	Description
1320X-QE128-DSK MSRP USD $349	1320X-QE128 Developers Starter Kit
1320X-QE-DSK-BDM MSRP USD $399	1320X-QE128 Developers Starter Kit

All prices shown are subject to change.

Overview

IEEE® 802.15.4 provides a solid foundation for wireless control and monitoring applications, enabling developers to take their applications to new levels of functionality. However, with this increased functionality comes increased complexity for the developer. Freescale steps in with an extensive portfolio of development kits based on our 802.15.4 platforms. Whether the customer is developing simple point-to-point applications or a complex mesh network using ZigBee technology, Freescale's development kits provide the flexibility for whatever wireless application is needed. The development kits combine the hardware, software, tools and accessories needed to help streamline the development process.

BeeKit

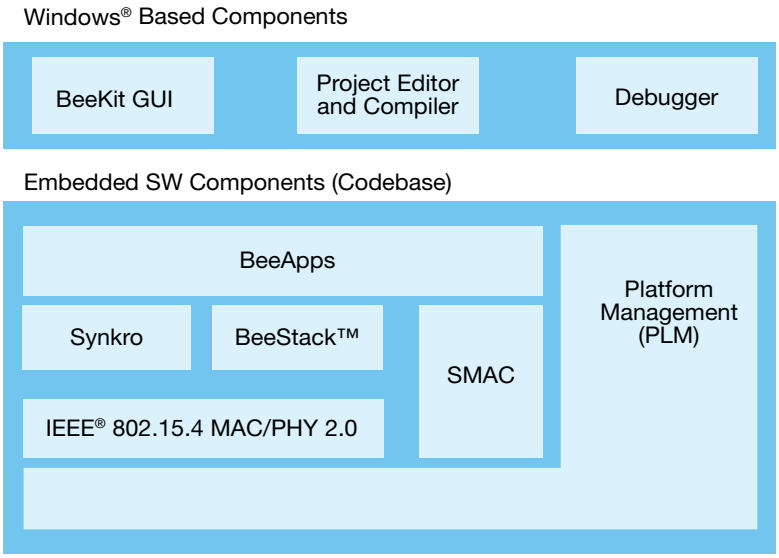
Freescale's 802.15.4 protocol stacks allow application developers to enhance their product offerings and take their applications to new levels of functionality. However, with this increased functionality comes increased complexity as developers now have to concern themselves with issues such as network and protocol management options. Freescale stepped in to specifically develop the BeeKit Wireless Connectivity Toolkit to help minimize these issues. BeeKit provides a development environment where these design considerations can be managed in a straightforward, uncomplicated approach.

BeeKit offers a graphical users interface which includes Codebases for Freescale's Simple MAC (SMAC), IEEE 802.15.4 MAC, Synkro and BeeStack. BeeKit comes in all of Freescale's development kits and may also be downloaded from the Web. Simple MAC, IEEE 802.15.4 MAC and Synkro are complimentary. BeeStack is available as a 90-day evaluation version inside each development kit and as downloaded from the Web. A BeeStack license may purchased as a node locked license or floating license for $995 MSRP USD and $1495 MSRP USD respectively.

BeeStack

ZigBee technology provides the ideal solution for larger, more complex networking, a robust and reliable option for self-forming and self-healing mesh networks. Since ZigBee is an open standard, it also allows for interoperability of products from different vendors. BeeStack

BeeKit™



is Freescale's ZigBee protocol stack that delivers a reliable and robust platform for ZigBee development.

BeeStack Features

- Supports ZigBee 2007
- Supports ZigBee Pro
- Supports Smart Energy Profile
- Supports tree and mesh networks

Technical Features

- Operating system support
  - Windows® 2000
  - Windows® XP
- Networking protocol code components and network application samples (code bases)
  - Simple MAC (SMAC)
  - 802.15.4 MAC
  - BeeStack (ZigBee protocol stack)
  - Synkro
- Target processor architectures supported
  - MC13224 (ARM7)
  - MC13213 (HCS08)
  - MC13212 (HCS08)
  - MC13211 (HSC08)
  - MC9S08GT60
- Development kits supported
  - 1322XDSK
  - 1322XNSK
  - 1322XEVK
  - 1321XCSK
  - 1321XDSK
  - 1321XNSK
  - 1321XEVK
  - 1320XRFC
  - 1320XEQ128DSK plus MC68EVB908GB60E
- Integrated development environments (IDE)
  - CodeWarrior Development Studio for HCS08
  - IAR EWARM for ARM7

Freescale's Wireless Portfolio

Overview

Freescale's portfolio of 802.15.4 platforms lets the developer choose the best platform for their technical requirements and cost objectives. Whether they simply need to add a wireless transceiver to their existing design or create standalone wireless functionality, Freescale has the solution to meet their needs.

Freescale draws on extensive radio frequency (RF) and wireless experience from more than 50 years of radio products development. With our depth of experience in this area, we are qualified to offer a comprehensive IEEE 802.15.4 standard-compliant and ZigBee compliant platform solutions. Freescale makes wireless simple by providing a one-stop shop for customers, complete with RF transceivers, MCUs, sensors, network protocol stacks, including 802.15.4 and ZigBee, reference designs and a flexible development tool suite. Virtually any low-data-rate, monitoring, control or automation application that requires long battery life and networking capability can benefit from the wireless connectivity solutions provided by the IEEE 802.15.4 standard and ZigBee technology.

Software

While developers and users seek nirvana with of a single technology to solve all the market needs, this rarely happens. Wireless sensing and control is no exception, however 802.15.4 is a solid foundation and Freescale has developed a number of protocol stacks based on it to meet specific application needs. Freescale's 802.15.4 platform supports Freescale's simple MAC (SMAC), IEEE 802.15.4 MAC Synkro entertainment control platform, and BeeStack ZigBee protocol stack. These give developers the flexibility to build products optimized for different features, such as cost, performance, complexity and interoperability. Freescale developed solutions are delivered in conjunction with Freescale's BeeKit Wireless Connectivity Toolkit. The BeeKit provides a simple GUI approach to configure network settings, allowing the embedded designer to concentrate on building the application. BeeKit helps developers without extensive networking experience reduce development time.

SMAC

SMAC is a simple and cost effective start to wireless networking. Based on the 802.15.4 PHY, it provides commands to create simple point-to-point and star networks. The small code size , 2.5–4 K, allows a low-cost platform for many applications that need simple but effective wireless communication.

SMAC Features

- Small memory footprint
- Supports point-to-point and star networks with repeaters
- Support for over the air programming

IEEE 802.15.4 MAC

Freescale's fully compliant IEEE 802.15.4 MAC provides a robust building block for point-to-point, star and mesh networks. While the MAC is part of both the Synkro and BeeStack protocol stacks, it is often used as the foundation for proprietary stacks as well.

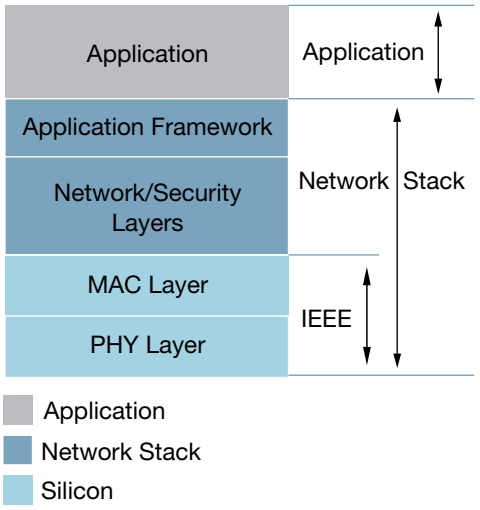
IEEE 802.15.4 MAC Features

- Fully compliant IEEE 802.15.4 MAC
- Supports optional features, including beaconed networks and guaranteed time (GTS)
- Supports peer-to-peer, star and mesh networks

Synkro

Freescale's Synkro Protocol is a lightweight networking stack built on top of the IEEE 802.15.4 standard. The protocol was created to control, monitor and automate consumer electronic products, including televisions, DVD players and recorders, set top boxes, audio video receivers, remote control and many more. Synkro overcomes the growing technology challenges that today's consumer electronic products face with 30 year old infrared (IR) technology by removing the line of sight and field of vision issues while providing a fast bidirectional link to enhance user experiences. Freescale's Synkro starts with 802.15.4, but incorporates improvements in interference avoidance by adding channel agility and low latency transmissions to address the specific needs of consumer electronics.

IEEE® 802.15.4 Protocol Stack Example



Synkro Features

- Lightweight networking stack built on the IEEE 802.15.4 standard
- Approximately 32 KB memory
- For RF control, monitor and automation of consumer electronics products
- Optimized memory with standard command tables
- Two development options
  - Cost-effective Synkro API using embedded processor running Synkro
  - Synkro BlackBox with complete access to API through serial command set
- Improved interference avoidance capabilities with channel agility and low latency transmissions
- Target applications
  - Televisions
  - DVD players and recorders
  - Set-top boxes
  - Audio/video receivers
  - Other consumer electronics applications

All prices shown are subject to change.

Learn More: For more information about 802.15.4/ZigBee products, please visit **www.freescale.com/802154**.

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Freescale IEEE® 802.15.4 Development Kits

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