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## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China





ZigBee

# Wireless Connectivity

Product Summary

Freescale Semiconductor offers embedded designers the silicon, software and hardware to implement a complete 250 Kb/s, 2.4 GHz wireless network from simple to complex. With five protocol stack alternatives to choose from—the broadest IEEE® 802.15.4-based protocol offering in the market—Freescale draws on extensive RF and wireless experience accumulated from more than 50 years of developing semiconductor products. BeeKit graphical user interface (GUI) development software supports five protocol stacks, including simple media access controller (SMAC), IEEE 802.15.4 MAC, SynkroRF, BeeStack Consumer (ZigBee® RF4CE) and BeeStack (ZigBee/ZigBee Pro).

## BeeKit Codebases

### IEEE 802.15.4-Compliant MAC (approx. 17–40 KB memory)

- IEEE 802.15.4-compliant physical layer (PHY) and MAC software
- Compliant to all IEEE 802.15.4 specifications
- Supports beacons and non-beacons networks
- Guaranteed time slots (GTS)
- Advanced Encryption Standard (AES) encryption

### SynkroRF (approx. 32 KB memory)

- 802.15.4 based, easy to use
- Provides complete network stack API with Black Box design option
- Channel agility with dynamic interference avoidance
- Supports larger data transfers with fragmentation
- Low latency transmission features for enhanced performance in noisy environments

### BeeStack Consumer (ZigBee RF4CE) (approx. 40 KB memory)

- Wireless for home entertainment control and monitoring
- Reliable data delivery with CSMA-CA and message acknowledgement
- Additional interference avoidance techniques implemented
- Power saving modes
- Increased battery life
- Lower standby current
- Allows designs to meet Energy Star requirements
- Support for acknowledged, non-acknowledged, unicast and broadcast messages
- Support for non-secure and secure communications with AES 128-bit and CCM encryption
- Simple mechanism for pairing
- Only authorized paired devices can communicate
- Support for interoperability through standardized profiles
- Supports ZigBee Remote Control Profile
- Supports ZigBee Input Device Profile

### BeeStack (ZigBee/ZigBee Pro) (approx. 64–128 KB memory)

- Complete wireless networking standard—from antenna to application program interface (API)
- Supports ZigBee 2007
- Supports ZigBee Pro
- Supports ZigBee Smart Energy, Home Automation and Health Care profiles
- Provides interoperability among end products
- Established routing algorithm
- Network recovery and healing
- Wireless embedded or dongle options

## MC1323x System on Chip

Product	Supply Voltage V	Supply Current at 1% Duty Cycle, CPU at 1 MHz (Typ) mA	Standby Current (Typ) µA	Frequency Band GHz	Sensitivity at 1% PER (Typ) dBm	Data Rate (Spec) Kb/s	MAC Options	Packages	Flash	RAM	Core	Interfaces and Peripherals	2013 MSRP (10 Ku)
MC13234CHT	1.8–3.6	27 TX, 34 RX, 22 PPD RX	0.5–.75	2.4–2.5	-94	250	SMAC, IEEE 802.15.4, SynkroRF, ZigBee RF4CE, ZigBee/ZigBee Pro	48 LGA	128 KB	8 KB	HCS08	Timers, KBI, SCI/UART, I <sup>2</sup> C, SPI, CMT, RTC	\$2.62
MC13237CHT	1.8–3.6	27 TX, 34 RX, 22 PPD RX	0.5–.75	2.4–2.5	-94	250	SMAC, IEEE 802.15.4, SynkroRF, ZigBee RF4CE, ZigBee/ZigBee Pro	48 LGA	128 KB	8 KB	HCS08	Timers, KBI, SCI/UART, I <sup>2</sup> C, SPI, CMT, RTC, 12-bit ADC	\$2.83

## MC13234CHT Development Tools Summary

Feature	MC13234CHT Developer Starter Kit	MC13234CHT Network Starter Kit
1323X-MRB	2	4
1323X-RCM	0	1
1323X-REM	2	3
USB Multilink	Yes	Yes
CodeWarrior IDE	CodeWarrior Special Edition	CodeWarrior Special Edition, CodeWarrior Standard Edition (13234NSK-SFTW only)
BeeKit	Yes	Yes
Freescale Network Analyzer	Yes	Yes
Out-of-Box Application	Range Demo	RF4CE Home Entertainment Control
RoHS Compliant	Yes	Yes
Price	\$279: 13234DSK-BDM	\$529: 13234NSK-BDM \$999: 13234NSK-SFTW

All MSRP shown are 10K U price points unless otherwise specified. MSRPs are subject to change.

## MC13237CHT Development Tools Summary

Feature	MC13237CHT Development Kit	MC13234CHT Tower Board	MC13234CHT Tower Kit
1323X-MRB-ADC	3	1	2
1323X-REM	3	0	0
TWR-RF-MRB	0	1	2
USB Multilink	Yes	No	No
CodeWarrior IDE	CodeWarrior Special Edition, CodeWarrior Standard Edition (13237ADC-SFTW only)	CodeWarrior Special Edition	CodeWarrior Special Edition
BeeKit	Yes	Yes	Yes
Freescall Network Analyzer	Yes	Yes	Yes
Out-of Box Application	Battery Monitor	None	Range Demo
RoHS Compliant	Yes	Yes	Yes
Price	\$399: 13237ADC-BDM \$899: 13237ADC-SFTW	\$169: TWR-13237	\$269: TWR-13237-KIT

## MC1320x Transceivers

Product	Supply Voltage V	Supply Current at 1% Duty Cycle (Typ) mA	Standby Current (Typ) $\mu$ A	Frequency Band GHz	Sensitivity @ 1% PER (Typ) dBm	Control Interface	Data Rate (Spec) Kb/s	TX/RX Switch	MAC Options	Packages	USD MSRP
MC13201FC	2.0–3.4	30 TX, 37 RX	0.2–0.675	2.4–2.5	-91	SPI	250	Yes	SMAC	32 QFN	\$1.25
MC13202FC	2.0–3.4	30 TX, 37 RX	0.2–0.675	2.4–2.5	-92	SPI	250	Yes	SMAC, IEEE 802.15.4, SynkroRF, RF4CE, ZigBee	32 QFN	\$1.43

## MC1320x Development Kit Features

Feature	1320x RF Daughter Card Kit
BeeKit	Yes
RoHS Compliant	Yes
USD MSRP – Part #	\$79: 1320xRFC

All MSRP shown are 10K U price points unless otherwise specified. MSRPs are subject to change.

## Development Software

**BeeKit Software Development Tool Complimentary to Freescale Customers<sup>1</sup>, Included in Hardware Development Kits or Downloadable from [freescale.com/ZigBee](http://freescale.com/ZigBee)**

### BeeKit

BeeKit is our simplified integrated development environment (IDE) for IEEE 802.15.4 and ZigBee technology solutions. BeeKit is a GUI for creating, modifying and updating wireless networking designs. The BeeKit offers a comprehensive code base of wireless networking libraries, application templates and sample applications. Easily scalable to support new code bases and functionality, BeeKit is a complementary tool to the CodeWarrior IDE and the IAR EAWARM, which support MCU application development. BeeKit includes SMAC, IEEE 802.15.4, SynkroRF and BeeStack (ZigBee RF4CE and ZigBee/ZigBee Pro) codebases. BeeKit supports the ZigBee Remote Control, ZigBee Input Device, ZigBee Home Automation, ZigBee Smart Energy, ZigBee Smart Energy 2 and ZigBee Health Care profiles.

### CodeWarrior for HC(S)08/RS08

### CodeWarrior

The CodeWarrior Development Studio for Microcontrollers is a single, integrated tool suite designed to help embedded engineers get started on the design fast track for the HC(S)08 MCU. CodeWarrior provides optimized tools to take full advantage of the Freescale MCU selected for design. Visit [freescale.com/CodeWarrior](http://freescale.com/CodeWarrior) for licensing details.

### IAR EWARM™



IAR Embedded Workbench for ARM® provides a full suite of development tools for ARM and the Freescale MC1322x family of Platform in a Package solutions. The integrated development environment offers a continuous workflow, efficient code generation and ease of use. The tools include an editor, compiler, linker, debugger, optional IAR J-Link and J-Trace hardware debug probes. Visit [IAR.com](http://IAR.com) for licensing details.

<sup>1</sup> Subject to license agreement and registration.

## Markets

### Consumer Electronics

- Remote control
- Blu-ray
- Digital TV
- Video player/recorder (VCR, DVR, others)
- Set-top box
- DTV
- Projector
- Satellite radio receiver
- Surround sound
- Consumer usage data
- Maintenance alerts
- Billing

### Smart Energy

- Automated metering
- Home area networks
- Lighting control
- HVAC
- Access control
- Demand response
- Security
- Irrigation control
- Window or fan control
- Load management
- Occupancy detection
- Water heater control

### Health and Wellness

- Home health
- Fitness monitoring
- Equipment/supplies tracking
- Independent living
- Child monitoring
- Drug access control
- Pulse oximetry
- Blood pressure monitor
- Fall warning
- Infusion pumps
- Glucose monitor

### General Market

- Gaming
- Security
- Flow detects
- Motion sensing
- Glass breakage
- Container monitoring
- Temperature status
- Animal locating
- Computer peripherals
- Cable replacement



For more information, visit [freescale.com/ZigBee](http://freescale.com/ZigBee)

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