



wireless



Ultimate Long-Range, Low-Power Solutions

Wireless & RF Selector Guide

- Excels in harsh environments
- Long range > 2-mile range in dense urban environments
- Up to 30 miles outdoor LOS
- Multi-year battery operation up to 20 years
- Scalable network with tens of thousands of nodes per gateway

www.semtech.com/wireless-rf



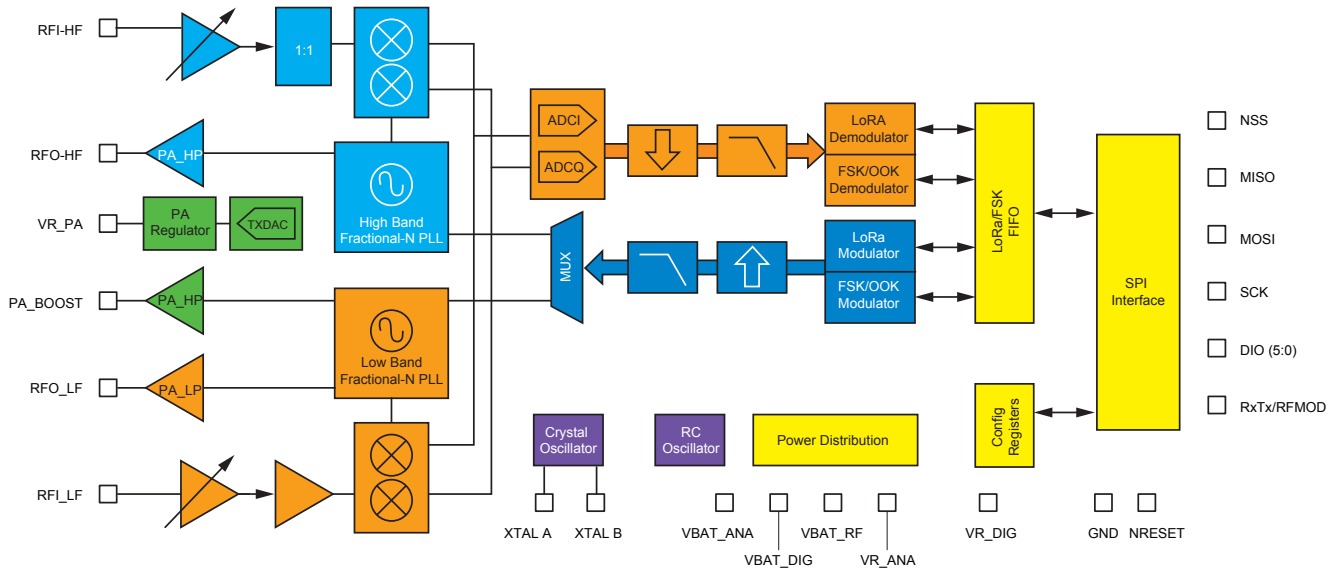
LoRa® — The Ultimate Long-Range Solutions

Ideal for eliminating repeaters, reducing infrastructure cost, extending battery lifetime, and improving network capacity

LoRa PRODUCTS

- Long range of up to 30 miles outdoor line of sight
- Deep indoor coverage for hard to reach areas
- Bi-directional communication link with adaptive data rates
- Low power sensors with extended battery lifetime of up to 20 years
 - 100nA sleep mode
 - 9.7mA active receive mode
- LoRa, IEEE 802.15.4g and WMBus compliant.
- GFSK modes supported by a single radio
- Scalable, multi-channel, high-capacity gateways powered by SX1301
- Available for any environment
- LoRa modulation offers 30dB improvement over FSK for co-channel interference rejection
- Programmable registers for maximum flexibility
- Footprint-compatible ICs for global coverage
- Supported by over 400 members of LoRa Alliance™ that defines the open LoRaWAN protocol
- Large and growing online developer community for LoRa-based products
- Public, semi-private and private networks available worldwide

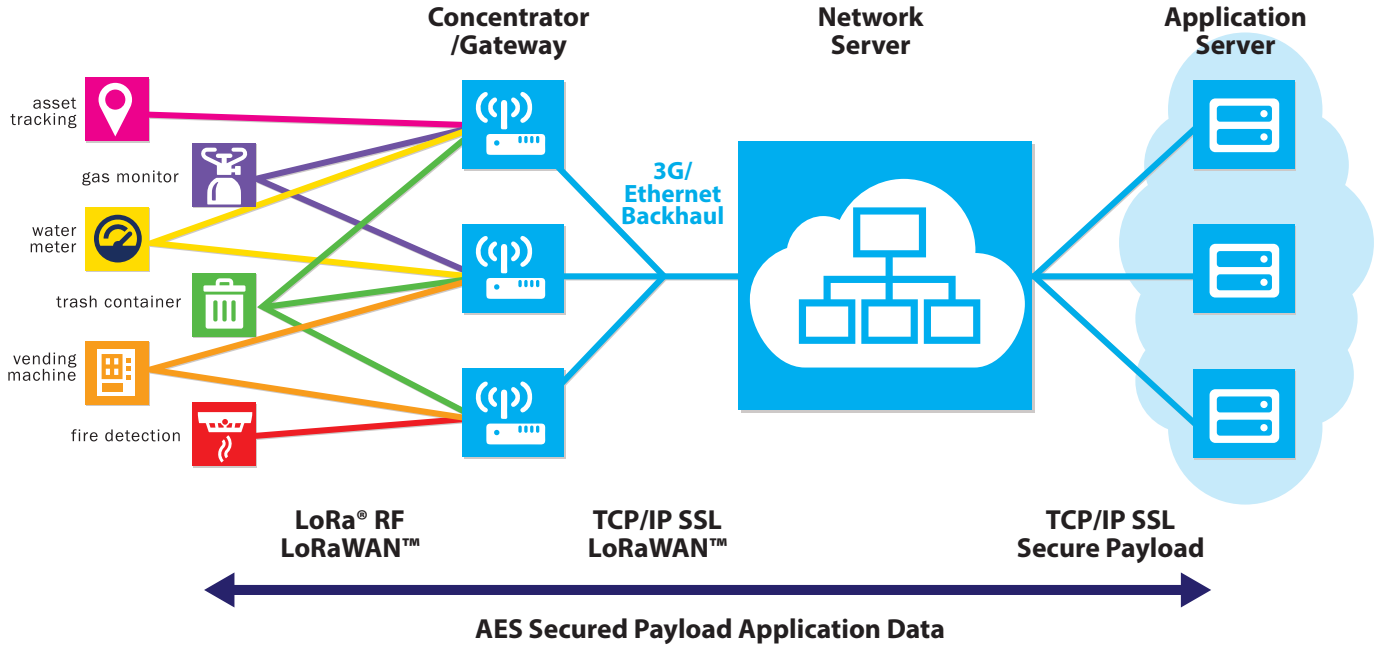
SX1276 BLOCK DIAGRAM



| LoRa Products | | | | | | | |
|---------------|-----------------------|------------------|-----------------|-------------------|----------------|-----------------------|----------------|
| Part Number | Frequency Range (MHz) | Link Budget (dB) | RXCcurrent (mA) | FSK Max DR (kbps) | LoRa DR (kbps) | Max Sensitivity (dBm) | TX Power (dBm) |
| SX1272 | 862–1020 | 158 | 10 | 300 | 0.3–40 | -138 | + 20 |
| SX1273 | 862–1020 | 150 | 10 | 300 | 1.7–40 | -130 | + 20 |
| SX1276 | 137–1020 | 168 | 11 | 300 | 0.018–40 | -148 | + 20 |
| SX1277 | 137–1020 | 158 | 11 | 300 | 1.7–40 | -138 | + 20 |
| SX1278 | 137–525 | 168 | 11 | 300 | 0.018–40 | -148 | + 20 |
| SX1279 | 137–960 | 168 | 11 | 300 | 0.018–40 | -148 | +20 |

LoRa[®] Gateway/Concentrator Solution

The ultimate long-range, high capacity solution for IoT and M2M networks



KEY FEATURES OF SEMTECH'S LoRa WIRELESS RF TECHNOLOGY

- Long Range** Penetrates in dense urban and deep indoor environments, connecting to sensors up to 30 miles away in rural areas
- Low Power** Designed specifically for low power consumption extending battery lifetime up to 20 years
- High Capacity** Supports millions of messages per basestation
- Geolocation** Enables GPS free, low power tracking applications
- Standardized** LoRaWAN specification ensures global interoperability among applications, IoT solution providers and telecom operators
- Secure** Embedded end-to-end AES-128 encryption of data for optimal privacy and protection
- Low Cost** Reduces costs three ways: infrastructure investment, operating expenses and end-node sensors

PICOCELL SOLUTIONS

- LoRa PicoCell Platforms are designed for a variety of indoor applications
- SX1308 pico cell IC is coupled with a SX1255 or SX1257 LoRa RF transceiver, and is expected to help bring low cost LoRaWAN networks to market for consumers and private enterprises

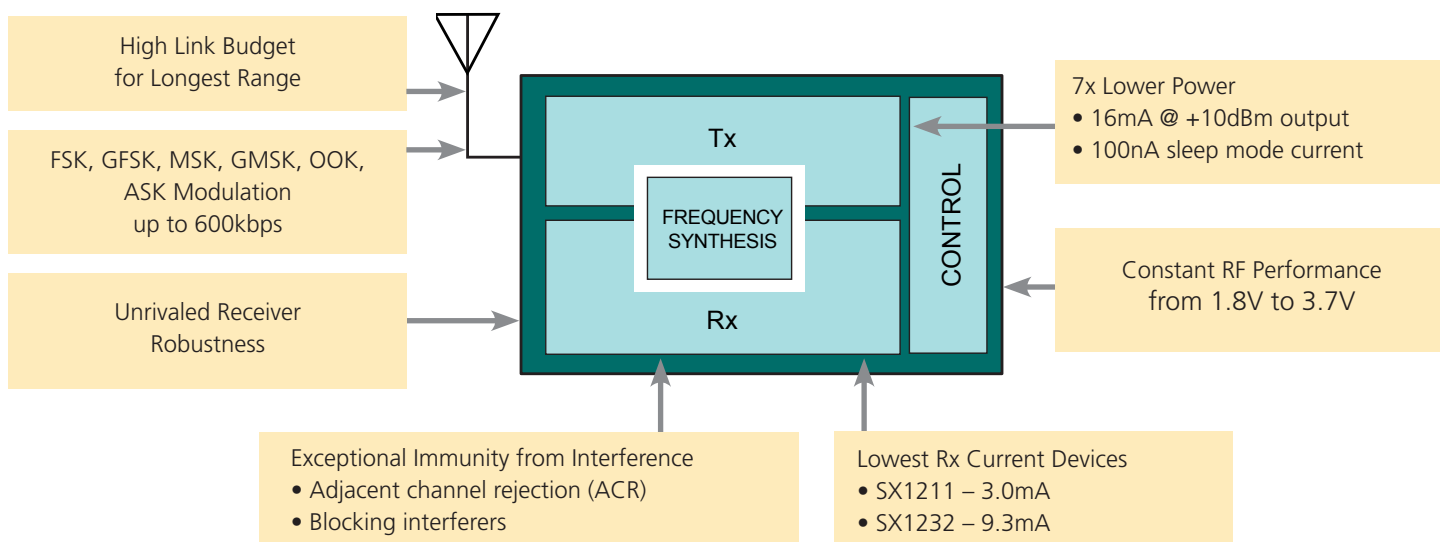
GATEWAY SOLUTIONS

- Multi-channel, multi-modem receiver including LoRa and FSK modems
- Inherent two-way communication
- Receives simultaneously different data rates on same channel

| RF ICs and for Gateway and Pico cells | | | | | |
|---------------------------------------|-------|-----------------------|------------|-----------|-----------------------|
| Part Number | Tx/Rx | Operating Temp. Range | LoRa Modem | FSK Modem | Capacity |
| SX1301 | Tx/Rx | -40– 85°C | 9 | 1 | Varies by application |
| SX1308 | Tx/Rx | 0–70°C | 9 | 1 | Varies by application |

| RF Transceivers | | | | |
|-----------------|-------|------------|----------|----|
| Part Number | Tx/Rx | Band (MHz) | Tx Power | NF |
| SX1257 | Tx/Rx | 860–1000 | -20–8 | 7 |
| SX1255 | Tx/Rx | 400–510 | -20–8 | 7 |

Robust, Low-Power Communications For Next-Generation ISM-Band Applications



Complete Line of Semtech G/F/MSK & OOK RF ICs

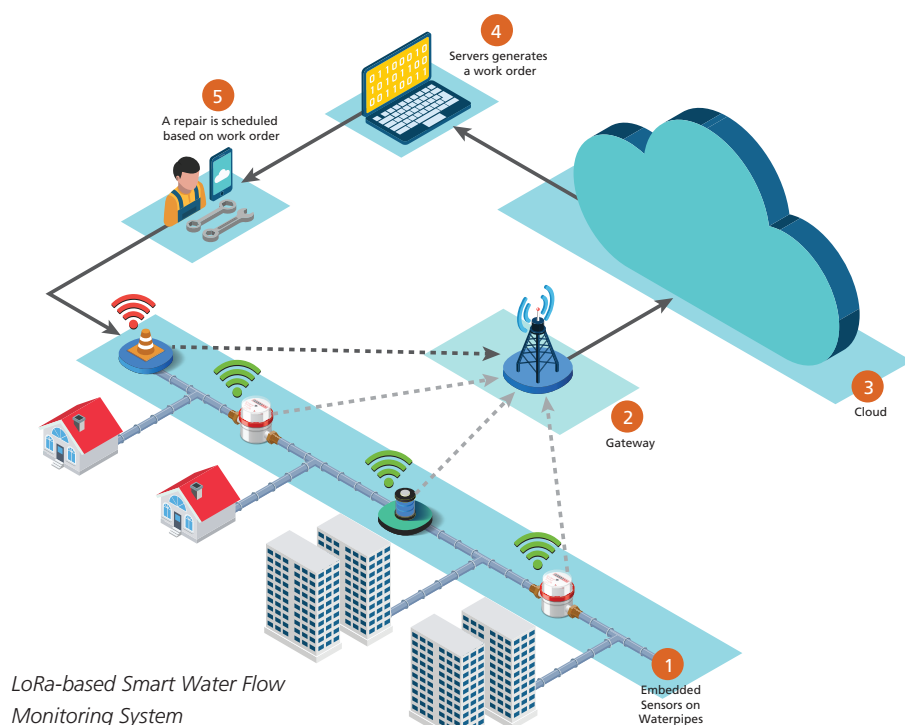
| Part Number | Tx/Rx | Band (MHz) | Tx Power (dBm) | Modulation | Max Bit Rate | Rx Sensitivity (dBm) | Link Budget (dB) | Tx Current | Rx Current (mA) |
|------------------------|-------|------------|----------------|---------------|---------------------------------|----------------------|------------------|---------------|-----------------|
| SX1230 | Tx | 290–1000 | -20 ~ 17 | G/F/MSK & OOK | 300kbps (FSK) 32.7kbps (OOK) | - | - | 33mA @ 10dBm | - |
| SX1243 | Tx | 310–928 | 10 | G/F/MSK & OOK | 100kbps (FSK) 10kbps (OOK) | - | - | 15mA @ 10dBm | - |
| SX1239 | Rx | 290–1000 | -20 ~ 17 | G/F/MSK & OOK | 300kbps (FSK) 32.7kbps (OOK) | -120 | - | - | 16 |
| SX1231 | Tx/Rx | 290–1000 | -20 ~ 17 | G/F/MSK & OOK | 300kbps (FSK) 32.7kbps (OOK) | -120 | 137 | 33mA @ 10dBm | 16 |
| SX1231H | Tx/Rx | 290–1000 | -20 ~ 20 | G/F/MSK & OOK | 600kbps (FSK) 32.7kbps (OOK) | -120 | 140 | 120mA @ 20dBm | 16 |
| SX1232 | Tx/Rx | 860–1000 | -20 ~ 20 | G/F/MSK & OOK | 300kbps (FSK) 32.7kbps (OOK) | -123 | 143 | 120mA @ 20dBm | 9.3 |
| SX1236 | Tx/Rx | 137–1020 | -20 ~ 20 | G/F/MSK & OOK | 300kbps (FSK) 32.7kbps (OOK) | -123 | 143 | 120mA @ 20dBm | 9.9 |
| SX1233 | Tx/Rx | 290–1000 | -20 ~ 17 | G/F/MSK & OOK | 600kbps (FSK) 32.7kbps (OOK) | -120 | 137 | 33mA @ 10dBm | 16 |
| ETSI Class 1 SX1235 | Tx/Rx | 860–1000 | -20 ~ 20 | G/F/MSK & OOK | 300kbps (FSK) | -123 | 143 | 120mA @ 20dBm | 9.3 |
| SX1211 | Tx/Rx | 862–960 | -8.5 ~ +12.5 | FSK/OOK/ASK | 200kbps (FSK) 32.7kbps (OOK) | -107 | 120 | 25mA @ 10dBm | 3 |

High Tx Power Devices

| Part Number | Tx/Rx | Band (MHz) | Tx Power (dBm) | Modulation | Max Bit Rate | Rx Sensitivity (dBm) | Link Budget (dB) | Tx Current | Rx Current (mA) |
|-------------|-------|------------|----------------|---------------|--------------|----------------------|------------------|---------------|-----------------|
| SX1238 | Tx/Rx | 902 – 928 | +27 | G/F/MSK & OOK | 300kbps | -124 | 151 | 408mA @ 27dBm | +20 |

Transform the Grid with LoRa-based Smart Meters and Smart Sensors

With over 20 years of experience providing RF communications and sensing ICs for battery-operated water and gas meters. Semtech offers the widest range of RF ICs for ultra long range, narrow-band, and wide-band machine-to-machine (M2M) communications.



High-Link Budget

- 30dB higher than competing devices when using a low-cost BOM

High Rx Sensitivity Solutions

7x Lower Power Consumption

- 100nA sleep
- 2.5mA Rx
- 27mA @ +13dBm Tx

Support for Major Wireless Communications Protocols

- IEEE 802.15.4g
- Wireless M-Bus
- 6LoWPAN

Ultra-low Rx Current Consumption

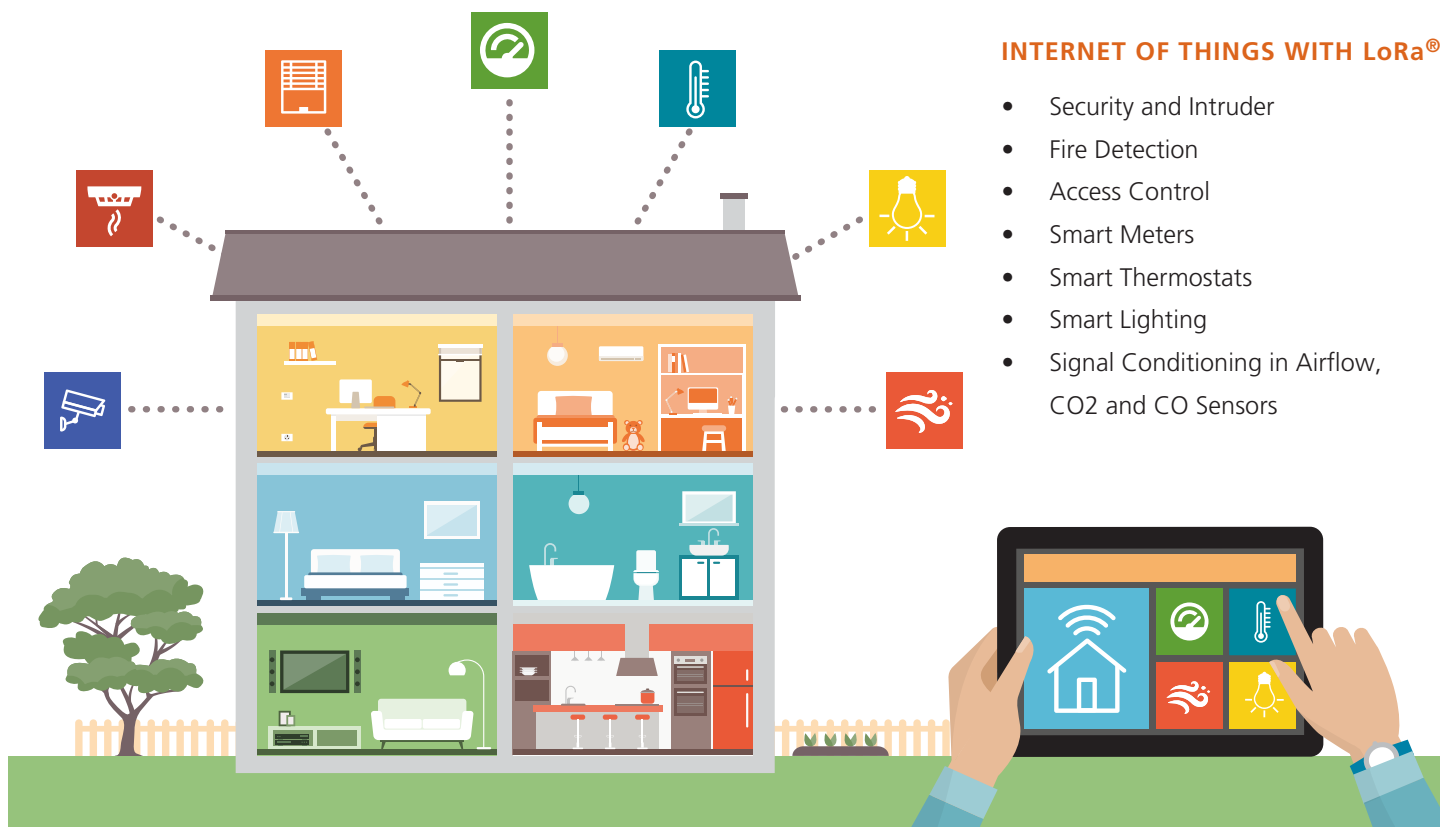
- <3mA
- Up to 7x lower than competing devices

RF ICs for Smart Energy Meters and Smart Sensors

| Part Number | Description | Link Budget (dB) | Rx Current (mA) | Evaluation Kit |
|-------------|---|------------------|-----------------|--|
| SX1232 | 860–11020MHz Low Power G/FSK/OOK/ASK RF Transceiver | 143 | 9.3 | SX1232-32SKA868/915 |
| SX1272 | 860–11020MHz Long Range LoRa G/FSK Transceiver | 158 | 10 | SX1272DVK1BAS (868MHz) SX1272DVK1CAS (915MHz) |
| SX1273 | 860–11020MHz Long Range LoRa G/FSK Transceiver | 150 | 10 | SX1272DVK |
| SX1276 | 138–11020MHz Long Range LoRa G/FSK Transceiver | 168 | 9.9 | SX1276DVK1IAS (169/868MHz) SX1276DVK1IAS (433/868MHz) SX1276DVK1IAS (490/915MHz) |
| SX1277 | 138–11020MHz Long Range LoRa G/FSK Transceiver | 158 | 9.9 | SX1276DVK |
| SX1278 | 138–1510MHz Long Range LoRa G/FSK Transceiver | 168 | 9.9 | SX1276DVK |
| SX1279 | 138–1960MHz Long Range LoRa G/FSK Transceiver | 168 | 9.9 | SX1276DVK |
| SX1231 | 290–11000MHz G/FSK/OOK/ASK RF Transceiver | 140 | 16 | SX1231SKB433/868/915 |
| SX1233 | 290–11000MHz G/FSK/OOK/ASK RF Transceiver | 140 | 16 | SX1233-33SKA868/915 |
| SX1211 | 862–1960 MHz Low Power FSK/OOK/ASK RF Transceiver | 125 | 3 | SX1211SKA868/915 |
| SX1212 | 310–510 MHz Low Power FSK/OOK/ASK RF Transceiver | 122.5 | 3 | SX1212SKA868/915 |

Green Solutions for Smart Homes and Buildings

Semtech breaks the cost and quality of service entry barriers for smart, energy-efficient residential and commercial buildings with 7x lower power consumption and unrivaled RF link robustness.



INTERNET OF THINGS WITH LoRa®

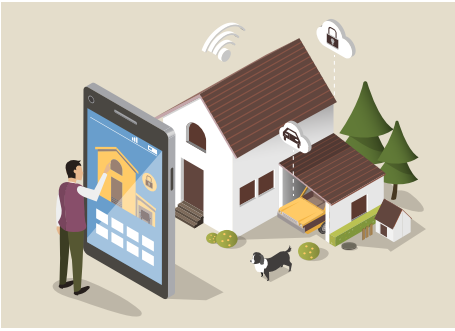
- Security and Intruder
- Fire Detection
- Access Control
- Smart Meters
- Smart Thermostats
- Smart Lighting
- Signal Conditioning in Airflow, CO2 and CO Sensors

RF ICs for Residential and Commercial Building Applications

| Part Number | Description | Package (mm) | Evaluation Kit |
|-------------|--|--------------|-----------------------------|
| SX1230 | 290MHz–11GHz FSK/OOK/ASK RF Transmitter | QFN 4x4 | SX1230SKA433/868/915 |
| SX1243 | 310MHz–1928MHz Low Cost FSK/OOK/ASK RF Transmitter | DFN 2x3 | SX1243SKA433/868/915 |
| SX1239 | 290MHz–11GHz FSK/OOK/ASK RF Receiver | QFN 5x5 | SX1231SKB433/868/915 |
| SX1231 | 290MHz–11GHz FSK/OOK/ASK RF Transceiver | QFN 5x5 | SX1231SKB433/868/915 |
| SX1231H | 290MHz–11GHz FSK/OOK/ASK RF Transceiver | QFN 5x5 | SX1231SKB433/868/915 |
| SX1232 | 868MHz & 915MHz FSK/OOK/ASK RF Transceiver | QFN 5x5 | SX1232-32SKA868/915 |
| SX1233 | 290MHz–11GHz FSK/OOK/ASK RF Transceiver | QFN 5x5 | SX1233-33SKA868/915 |
| SX1236 | 137–11000 Dual band/RF Input Transceiver | QFN 6x6 | SX1276DVK1JAS SX1276DVK1KAS |
| SX1211 | 862MHz–1960MHz FSK/OOK/ASK RF Transceiver | QFN 5x5 | SX1211SKA868/915 |
| SX1212 | 310MHz–1510MHz FSK/OOK/ASK RF Transceiver | QFN 5x5 | SX1212SKA433 |
| SX1208 | 290MHz–1510MHz GFSK/GMSK/OOK RF Transceiver | QFN 5x5 | - |

Design Ultra-Low Power, Highly-Secure RKE and Active RFID Systems

Semtech offers highly-integrated, cost-effective, turn-key RF solutions for emerging wireless applications requiring ultra-low power consumption, very high link budgets and secure data transmission.



REMOTE KEYLESS ENTRY (RKE) SYSTEMS

- One-way and two-way, non-line-of-sight systems
- Garage door openers
- Car alarms and remote starters



DASH7 SUPPORT FOR ACTIVE RFID SYSTEMS

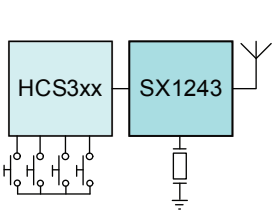
- Container shipment and asset tracking systems
- Patient monitoring systems
- Social alarms



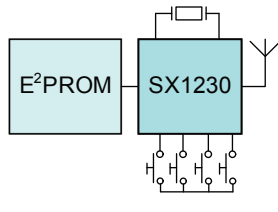
DESIGN SUPPORT TOOLS AND PARTNER SOLUTIONS

- Microchip RKE reference design
- Semtech wireless remote control energy harvesting reference design

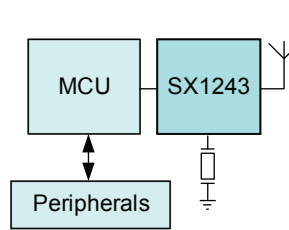
SEMTECH TURN-KEY RF SOLUTIONS BALANCE DESIGN COST AND FLEXIBILITY NEEDS (SX1243)



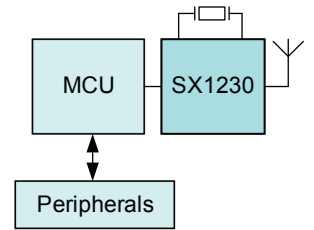
Rolling Code Reference Design



Static Payload Reference Design



Low-Cost Tx Solution



Fully Programmable Digital Tx

| RF ICs for Remote Keyless Entry and Active RFID Systems | | | | |
|---|--|--------------------------------------|--------------|----------------------|
| Part Number | Description | Application | Package (mm) | Evaluation Kit |
| SX1230 | 290MHz–11GHz FSK/OOK/ASK RF Transmitter | 1-way remote control (MCU-less mode) | QFN 4x4 | SX1230SKA433/868/915 |
| SX1243 | 310MHz–1928MHz Low Cost FSK/OOK/ASK RF Transmitter | 1-way remote control | DFN 2x3 | SX1243SKA433/868/915 |
| SX1239 | 290MHz–11GHz FSK/OOK/ASK RF Receiver | 1-way remote control | QFN 5x5 | SX1231SKB433/868/915 |
| SX1231 | 290MHz–11GHz FSK/OOK/ASK RF Transceiver | 2-way remote control | QFN 5x5 | SX1231SKB433/868/915 |
| SX1231H | 290MHz–11GHz FSK/OOK/ASK RF Transceiver | 2-way remote control | QFN 5x5 | SX1231SKB433/868/915 |
| SX1212 | 310MHz–1510MHz FSK/OOK/ASK RF Transceiver | DASH7 Technology | QFN 5x5 | SX1212-DK7A433 |

Application-Specific RF Evaluation Kits

| Tx/Rx Kits with LoRa® | | | | |
|-----------------------|---|-----------------------------|------------------------------------|---|
| Part Number | Description | Frequency band | Kit contents | Evaluation Kit |
| SX1272 | Low-Power RF Transceiver 860–1020MHz with LoRa Modem | 868MHz/915MHz | 2 SX1272 Demo units, PER | SX1272DVK1BAS (868MHz) SX1272DVK1CAS (915MHz) |
| SX1273 | Low-Power RF Transceiver 860–1020MHz with LoRa Modem | 868MHz/915MHz | 2 SX1272 Demo units, PER | Use SX1272 kit (SX1272 is a superset) |
| SX1276 | Low-Power RF Transceiver 138–1020MHz with LoRa Modem | 137MHz–1020MHz | 2 SX1276 Demo units, PER | SX1276DVK1IAS (169MHz and 868MHz) |
| | Low-Power RF Transceiver 138–1020MHz with LoRa Modem | 137MHz–1020MHz | 2 SX1276 Demo units, PER | SX1276DVK1JAS (433MHz and 868MHz) |
| | Low-Power RF Transceiver 138–1020MHz with LoRa Modem | 137MHz–1020MHz | 2 SX1276 Demo units, PER | SX1276DVK1KAS (490MHz and 915MHz) |
| SX1277 | Low-Power RF Transceiver 138–1020MHz with LoRa Modem | 137MHz–1020MHz | 2 SX1276 Demo units, PER | Use SX1276 kit (SX1276 is a superset) |
| SX1278 | Low-Power RF Transceiver 138–510MHz with LoRa Modem | 137MHz–510MHz | 2 SX1276 Demo units, PER | Use SX1276 kit (SX1276 is a superset) |
| G/F/MSK & OOK Kits | | | | |
| SX1211 | Ultra-Low Power RF Transceiver 862–960MHz | 868MHz/915MHz | Single USB dongle | SX1211SKA868/SX1211SKA915 |
| | Ultra-Low Power RF Transceiver 862–960MHz | 868MHz/915MHz | 2 USB dongle, PER | SX1211-11SKA868/SX1211-11SKA915 |
| | Ultra-Low Power RF Transceiver 862–960MHz | 868MHz/915MHz | 1 SM module | SM1211E868/SM1211E915 |
| SX1212 | Ultra-Low Power RF Transceiver 310–510MHz | 433MHz | Dash7 dev kit | SX1212-DK7A433 |
| | Ultra-Low Power RF Transceiver 310–510MHz | 433MHz | Single USB dongle | SX1212SKA433 |
| | Ultra-Low Power RF Transceiver 310–510MHz | 433MHz | 2 USB dongle, PER | SX1212-12SKA433 |
| | Ultra-Low Power RF Transceiver 310–510MHz | 433MHz | 1 SM module | SM1212E433 |
| SX1231 | Low-Power Integrated RF Transceiver 290–1000MHz | 433MHz/868MHz/ 915MHz | 1 SM module | SM1231E433A/SM1231E868A / SM1231E915A |
| | Low-Power Integrated RF Transceiver 290–1000MHz | 433MHz/868MHz/ 915MHz | 1 SM module + interface board | SX1231SKB433/SX1231SKB868/ SX1231SKB915 |
| | Low-Power Integrated RF Transceiver 290–1000MHz | 433MHz/868MHz/ 915MHz | 2 SM modules + interface boards | SX1231-31SKB433/SX1231-31SKB868/ SX1231-31SKB915 |
| SX1232 | Low-Power Integrated RF Transceiver 868/915MHz | 868MHz/915MHz | 2 SM modules + interface boards | SX1232-32SKA868/SX1232-32SKA915 |
| SX1233 | Low-Power Integrated RF Transceiver 290–1000MHz | 868MHz/915MHz | 1 SM module | SM1233E868B/SM1233E915B |
| | Low-Power Integrated RF Transceiver 290–1000MHz | 868MHz/915MHz | 1 SM module + interface board | SX1233SKA868/SX1233SKA915 |
| | Low-Power Integrated RF Transceiver 290–1000MHz | 868MHz/915MHz | 2 SM modules + interface boards | SX1233-33SKA868/SX1233-33SKA915 |
| SX1239 | Low-Power Integrated RF Receiver 290–1000MHz | 433MHz/868MHz/ 915MHz | 1 SM module | SM1231E433A / SM1231E868A / SM1231E915A |
| | Low-Power Integrated RF Receiver 290–1000MHz | 433MHz / 868MHz / 915MHz | 1 SM module + interface board | SX1231SKB433/SX1231SKB868 / SX1231SKB915 |
| | Low-Power Integrated RF Receiver 290–1000MHz | 433MHz/868MHz/ 915MHz | 2 SM modules + interface boards | SX1231-31SKB433/SX1231-31SKB868/ SX1231-31SKB915 |
| SX1243 | Low-Cost, Low-Current Integrated Transmitter 310–928MHz | 433MHz/868MHz/ 915MHz | USB Dongle with SM module | SX1243SKA433/SX1243SKA868/ SX1243SKA915 |



CORPORATE HEADQUARTERS • 200 Flynn Road, Camarillo, California 93012 • phone: (805) 498-2111 • www.semtech.com

Semtech and the Semtech logo are registered marks of Semtech Corporation. The LoRa® and LoRaWAN™ are trademarks of Semtech Corporation or its subsidiaries in the U.S. and/or other countries. All other trademarks and trade names mentioned may be marks and names of their respective companies. Semtech reserves the right to make changes to, or discontinue any products described in this document without further notice. Semtech makes no warranty, representation or guarantee, express or implied, regarding the suitability of its products for any particular purpose. ©2017 Semtech Corporation. All rights reserved. *WirelessRF-SG*

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Semtech:

[SX1243SKA433](#) [SX1232-32SKA868](#) [SM1233E915B](#) [SX1233SKA868](#) [SX1243SKA915](#) [SM1211E868](#)
[SM1233E868B](#) [SX1243SKA868](#) [SX1232-32SKA915](#) [SX1233-33SKA915](#) [SX1233SKA915](#) [SX1233-33SKA868](#)

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели,
кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: ocean@oceanchips.ru

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А