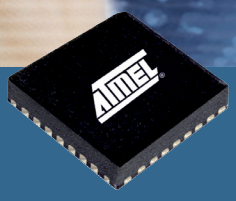
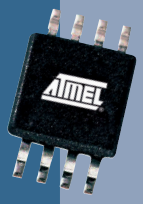


Smart RF

RF Wireless Data/Control Solutions

for Industrial and Consumer Applications
in the ISM Bands



ATMEL

Atmel Smart RF

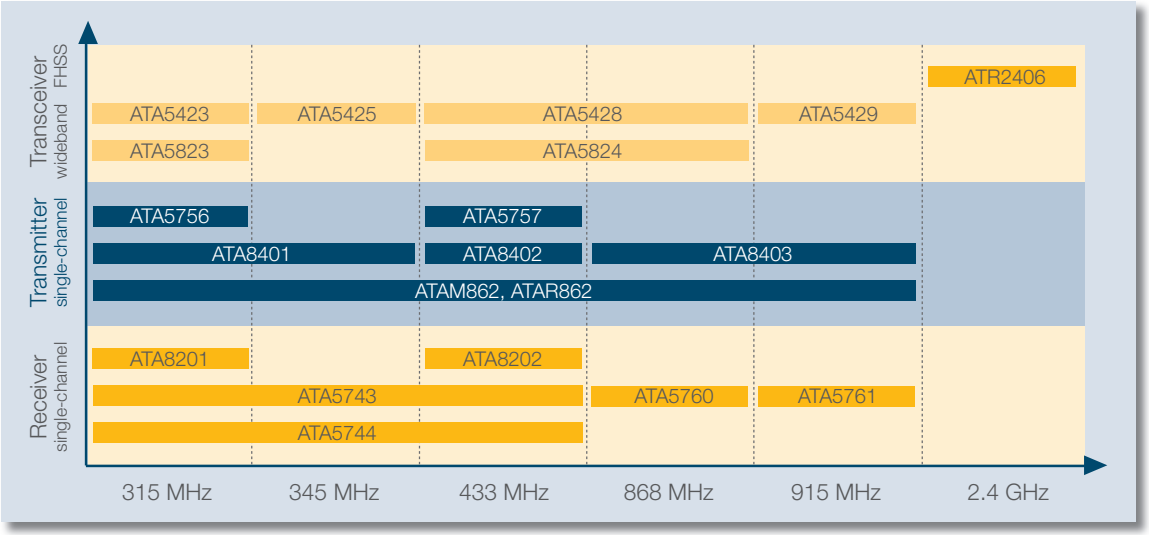
Atmel offers a broad range of integrated circuits for a variety of RF applications in the ISM bands. The product portfolio includes single-channel transmitter ICs, receiver and transceiver ICs, as well as multi-channel transceiver circuits and transmitters with an integrated MARC4 4-bit or AVR® microcontroller.

The frequency range spans from 250-450 MHz to 868-870 MHz, 902-928 MHz and 2.4 GHz, thus enabling all kinds of applications in the industrial and consumer area.

All Atmel ISM products provide a high integration level and enable easy implementation.

Applications

- **Home Automation**
  - Door Opening Systems (Garage Doors)
  - Weather Stations: Lights, Humidity, Wind, Radiation
  - Heating/Air Conditioning Monitoring
  - Blinds, Roller Shutters
  - Wall Sockets
  - TV, Hi-fi, Video Remote Controls
  - Emergency Systems for Elderly People
  - Computer Peripherals (Mouse, Keyboard, Joystick, etc.)
  - Intercom
- **Automatic Meter Reading**
  - Gas, Water, Electricity
- **Advanced Toys and Gaming**
  - Toys (Remote-controlled Cars)
  - Gaming (Wireless Game Controller)
- **Headsets**
- **Wireless Audio/Video**
- **High-speed Data Communications**
- **Industrial**
  - Measurements: Lights, Humidity, Wind, Radiation
  - Production Monitoring and Controlling
  - Remote Control (e.g., Cranes)
  - Logistics/Stock Management (Wireless Handheld Terminals, e.g. Bar Code Readers)
  - Telematics
- **Wireless USB**
- **Infotainment and Conference Systems**
- **Wireless Communications**
  - Walkie-Talkie
- **Electronic Point of Sales Systems**
- **Alarm and Security Systems**
  - Wireless Warning Systems (Tension, Temperature, Heart Problems etc.)
  - Alarm Systems, Smoke and Presence Detectors



System Solutions

An ISM system consists typically of at least two RF nodes. The most simple system has a transmitter on one side and a receiver on the other side. For many applications such as remote controls for lights, garage doors, air conditioning systems etc., this is sufficient.

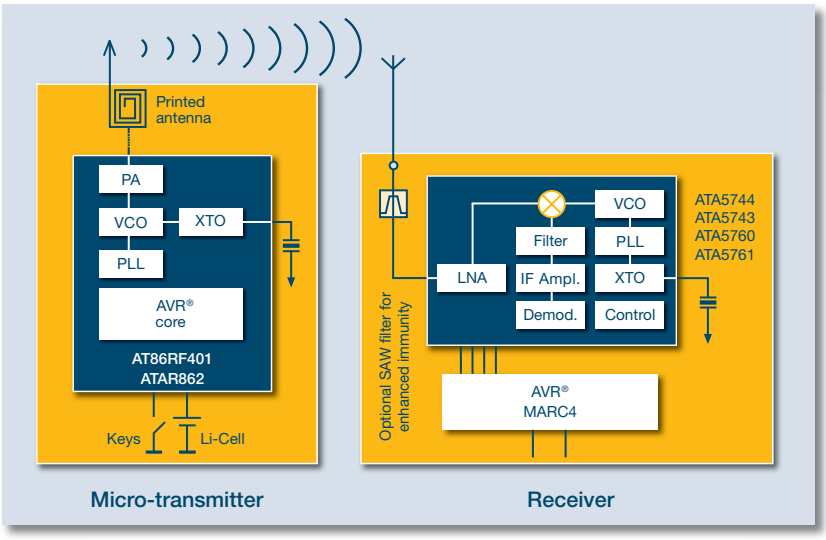
For mobile or handheld end products, a highly integrated system allows the manufacturing of very small transmitters. This solution is based on one-way communication, but using a micro-transmitter on the transmitter side.

Two-way communication systems may have a very simple link with low data transmission rates, but high data rates of up to 1 Mbit/s as required for wireless data transfer, control or gaming are also possible.

The system diagram shows a typical one-way link application with an AVR® micro-transmitter. By replacing the transmitter and the receiver by a transceiver on each side, a two-way communication system can easily be designed.

Atmel's ISM System Benefits

- Complete Radio Product Portfolio Covers All ISM Bands from 250 MHz to 2.4 GHz
- Compliant to FCC CFR 46, Part 15 (US) and EN300 328/400 (Europe)
- Low Cost and Low Power Consumption
- Fast Data Rates (1.152 Mbit/s Maximum)
- Using Atmel's SiGe PAs, the Maximum Output Power of 14 dBm Can Be Increased up to 35 dBm for Extended Link Ranges
- Atmel Provides All Further Devices Needed for a Complete ISM System Solution: MARC4 4-Bit and AVR Microcontrollers, SiGe Pas, EEPROM, Flash etc. as well as Application Support and Design Kits



Standard ISM System
Using a Micro-transmitter

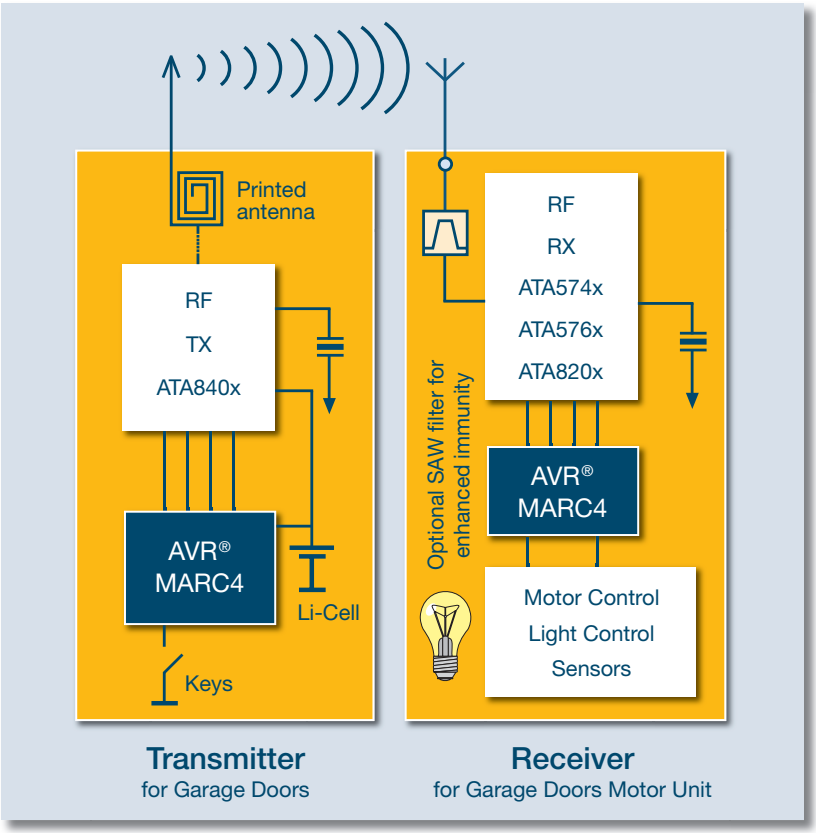
Atmel Applications

One-way RF Transmitter

(e.g. Remote Control for Garage Door Openers)

Key Benefits

– Tiny Transmitter Package
– Intelligent Receivers with Automatic Decoding
– Frequency Range 315 to 928 MHz
– Crystal Sharing with MARC4 Device Saves BOM
– Printed PCB Antenna Allows Small Housings
– MARC4 Enables Long Battery Lifetime

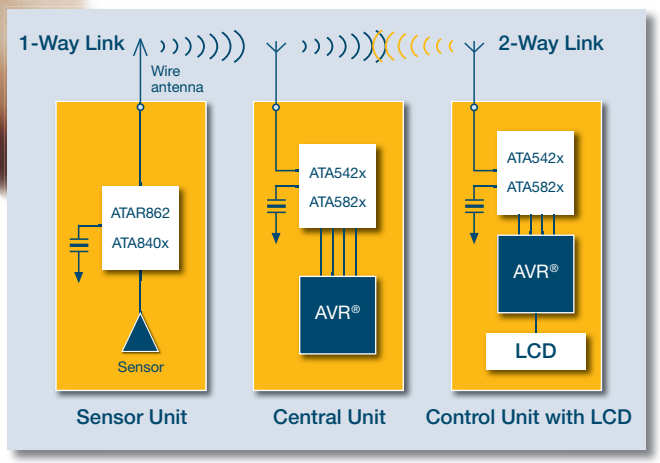


Transceiver System

(Uni- and Bi-directional RF Link for Alarm Systems)

Key Benefits

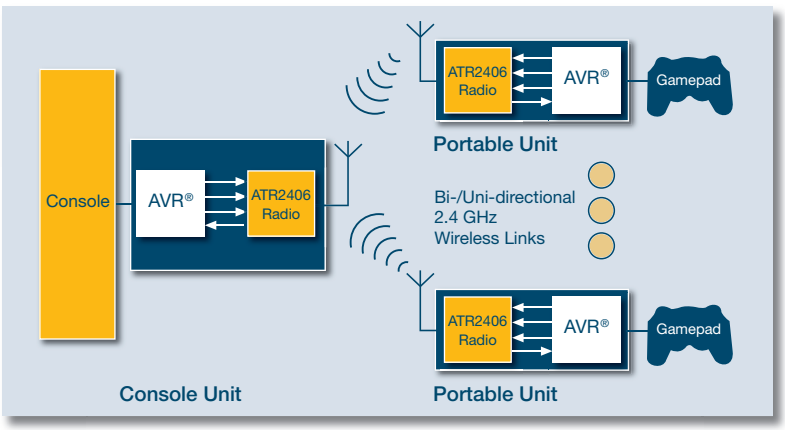
- Bi-directional Circuits for Central and Control Units
- Uni-directional Circuits for Sensors
- Very Robust by Design
- Low Current Consumption Enables Extended Battery Life
- Long Distances Due to High Output Power
- Suitable for Several ISM Bands
- Small Housing Since the RF Transmitter Integrates the AVR Microcontroller



Wireless Game Controller System

Key Benefits

- 2.4-GHz Transceiver for World-wide Usage
- Frequency Hopping Spread Spectrum (FHSS) Supported to Minimize Interferences with Other 2.4-GHz Systems such as Bluetooth® or WLAN
- Well Suited for Multi-user Support (Point-to-multipoint)
- Data Rates up to 1.152 Mbit/s
- Low Average Power Consumption Due to Burst Mode Operation



Atmel Product Overview

Transmitter ICs

Part No.	Frequency Range [MHz]	Modulation ASK/FSK		Data Rate [1] [kHz]	V_S [V]	I_{sleep} Max. [µA]	I_{active} Typ. [mA]	$I_{transmit}$ Typ. [mA]	P [dBm]	Package
ATA8401	310-350	X	X	32	2.0-4.0	0.35	3.7	9	8	TSSOP8
ATA8402	429-439	X	X	32	2.0-4.0	0.35	3.7	9	7.5	TSSOP8
ATA8403	868-928	X	X	32	2.0-4.0	0.35	3.6	8.5	5.5	TSSOP8
ATA5756	313-317	X	X	20	2.0-3.6	0.35	3.6	8.4	6	TSSOP10
ATA5757	432-448	X	X	20	2.0-3.6	0.35	3.6	8.8	6	TSSOP10

[1] 32 kHz means 32 kBit/s Manchester coding or 64 kBit/s NRZ coding

Micro-transmitter ICs

Part No.	Frequency Range [MHz]	µC Core	Modulation ASK/FSK		Data Rate [1] [kHz]	V_S [V]	I_{sleep} Max. [µA]	I_{active} Typ. [mA]	$I_{transmit}$ Typ. [mA]	P [dBm]	Package
ATAx862 [2]-3	310-350	MARC4	X	X	32	2.0-4.0	0.35	3.7	9.0	8	SSO24
ATAx862 [2]-4	429-439	MARC4	X	X	32	2.0-4.0	0.35	3.7	9.0	7.5	SSO24
ATAx862 [2]-8	868-928	MARC4	X	X	32	2.0-4.0	0.35	3.6	8.5	5.5	SSO24

[1] 32 kHz means 32 kBit/s Manchester coding or 64 kBit/s NRZ coding [2] ATAR862 = ROM version, ATAM862 = Flash/MTP, replaces T48C862

Receiver ICs

Part No.	Frequency Range [MHz]	Modulation ASK/FSK		Data Rate [1] [kHz] ASK/FSK	V_S [V]	I_{sleep} [µA]	I_{active} [mA]	Sensitivity [dBm] ASK	Sensitivity [dBm] FSK	Package
ATA5743	300-450	X	X	10/10	4.5-5.5	170	7.5	-110	-104	SO20/SSO20
ATA5744	300-450	X		10/—	4.5-5.5	190	7.1	-110	—	SO20 SSO20
ATA5760	868-870	X	X	10/10	4.5-5.5	170	7.8	-112	-106	SO20
ATA5761	902-928	X	X	10/10	4.5-5.5	170	7.8	-112	-106	SO20
ATA8201	313-317	X	X	10/20	2.7-3.3 4.5-5.5	2 (max)	6.7	-114	-108	QFN24
ATA8202	433-435	X	X	10/20	2.7-3.3 4.5-5.5	2 (max)	6.7	-113	-107	QFN24

[1] 32 kHz means 32 kBit/s Manchester coding or 64 kBit/s NRZ coding

Wideband Transceiver ICs

Part No.	Frequency Range [MHz]	Modulation ASK/FSK		Data Rate [1] [kHz] ASK/FSK	V_S [V]	I_{sleep} [mA]	I_{TX} [mA] at 10 dBm	I_{RX} [mA] at 10 dBm	Sensitivity [dBm] ASK	Sensitivity [dBm] FSK	P [dBm]	Package
ATA5423	312.5-317.5	X	X	10/20	2.4-3.6 or 4.4-4.6	0.01	15.7	10.5	-117.5	-110.5	10	QFN48
ATA5425	342.5-347.5	X	X	10/20	2.4-3.6 or 4.4-4.6	0.01	15.7	10.5	-117.5	-110.5	10	QFN48
ATA5428	431.5-436.5 862-872	X	X	10/20	2.4-3.6 or 4.4-4.6	0.01	15.8 17.3	10.5 10.3	-116.5 -114	-109.5 -107	10	QFN48
ATA5429	912.5-917.5	X	X	10/20	2.4-3.6 or 4.4-4.6	0.01	17.3	10.3	-113	-106	10	QFN48
ATA5823	312.5-317.5	X	X	10/20	2.15-3.6 or 4.4-5.25	0.01	15.7	10.5	-116.5	-110	10	QFN48
ATA5824	431.5-436.5 862-872	X	X	10/20	2.15-3.6 or 4.4-5.25	0.01	15.8	10.5 10.3	-111.5 -113	-109 -108.5	10	QFN48

[1] 20 kHz means 20 kBit/s Manchester coding or 40 kBit/s NRZ coding

Multi-channel Transceiver ICs

Part No.	Frequency Range [MHz]	Modulation	Data Rate [kbit/s]	Output Power [dBm]	Rx Sensitivity [dBm]	V_s	IIP3	Package
ATR2406	2.400-2.483	GFSK	0-1, 152	3	-93	3.0-4.6	-15	QFN32

Atmel Design Tools

Development Kits with Software

Part. No.	Application	Ordering No.
ATAKSTK511-X	Functional Standalone UHF Radio System Consisting of a Transmitter, Receiver, and Interface Board	ATAKSTK511-3 (for 315 MHz) ATAKSTK511-4 (for 434 MHz) ATAKSTK511-8 (for 868 MHz) ATAKSTK511-9 (for 915 MHz)
ATAKSTK512-X	Remote Access Control Kit for Unidirectional Communication	ATAKSTK512-3 (for 315 MHz) ATAKSTK512-4 (for 434 MHz)
ATR2406-DEV-KIT	Complete Development Kit	ATR2406-DEV-KIT
ATR2406-DEV-KIT2	Complete Evaluation Kit	ATR2406-DEV-KIT2
Flamingo™ RF Design Kit	Flamingo™ RF Design Kit	ATAB-STK-F
RF Design Kit	RF Transceiver Evaluation Kit	ATAB-RFMB
RF Transceiver Kit	RF Transceiver Kit	ATAB542X-X-WB ATAB5423-3-WB (for 315 MHz) ATAB5425-3-WB (for 345 MHz) ATAB5426-4-WB (for 433 MHz) ATAB5428-8-WB (for 868 MHz) ATAB5429-9-WB (for 915 MHz)
ATA8201-EK	RX Evaluation Board	ATA8201-EK
ATA8202-EK	RX Evaluation Board	ATA8202-EK

Development Boards

Part. No.	Application	Ordering No.
ATA5423	Transceiver Base Station Board. Operating Frequency of 315 MHz	ATAB5423-3-B
ATA5428	Transceiver Base Station Board. Operating Frequency of 433 MHz	ATAB5428-4-B
	Transceiver Base Station Board. Operating Frequency of 868 MHz	ATAB5428-8-B
ATA5429	Transceiver Base Station Board. Operating Frequency of 915 MHz	ATAB5429-9-B
ATA5743P3	Reference Design for UHF ASK/FSK Receiver. Operating Frequency 315 MHz	ATAB5743P3-S3
	Reference Design for UHF ASK/FSK Receiver. Operating Frequency 433 MHz	ATAB5743P3-S4
ATA5743P6	Reference Design for UHF ASK/FSK Receiver. Operating Frequency 315 MHz	ATAB5743P6-S3
	Reference Design for UHF ASK/FSK Receiver. Operating Frequency 433 MHz	ATAB5743P6-S4
ATA5743P6	Reference Design for UHF ASK/FSK Receiver. Operating Frequency 315 MHz	ATAB5743SSOP6-S3
	Reference Design for UHF ASK/FSK Receiver. Operating Frequency 433 MHz	ATAB5743SSOP6-S4
ATA5744	Reference Design for UHF ASK Receiver Operating Frequency 315 MHz/No Saw	ATAB5744-N3
	Reference Design for UHF ASK Receiver Operating Frequency 433 MHz/No Saw	ATAB5744-N4
	Reference Design for UHF ASK Receiver Operating Frequency 315 MHz/Saw	ATAB5744-S3
	Reference Design for UHF ASK Receiver Operating Frequency 433 MHz/Saw	ATAB5744-S4
ATA5760	Reference Design for UHF ASK/FSK Receiver Operating Frequency 868 MHz/No Saw	ATAB5760-N
	Reference Design for UHF ASK/FSK Receiver Operating Frequency 868 MHz/Saw	ATAB5760-S
ATA5761	Reference Design for UHF ASK/FSK Receiver Operating Frequency 915 MHz/No Saw	ATAB5761-N
ATA8403	UHF ASK/FSK Transmitter Board. Operating Frequency 868 MHz	ATAB8403-8
	UHF ASK/FSK Transmitter Board. Operating Frequency 915 MHz	ATAB8403-9
ATA8401	UHF ASK/FSK Transmitter Board. Operating Frequency 315 MHz	ATAB8401
ATA8402	UHF ASK/FSK Transmitter Board. Operating Frequency 433 MHz	ATAB8402
ATA5756	Reference Design for UHF Transmitter. Operating Frequency 315 MHz	ATAB5756
ATA5757	Reference Design for UHF Transmitter. Operating Frequency 433 MHz	ATAB5757
ATA5823	Transceiver Base Station Board. Operating Frequency of 315 MHz	ATAB5823-3-B
ATA5824	Transceiver Base Station Board. Operating Frequency of 433 MHz	ATAB5824-4-B
	Transceiver Base Station Board. Operating Frequency of 868 MHz	ATAB5824-8-B
ATR2406	ISM Transceiver Board. 2.4 GHz, 1.152 Mb/s	ATR2406-DEV-BOARD
ATR2406	ISM Transceiver Board. 2.4 GHz + T7024, 1.152 Mb/s	ATR2406-DEV-BOARD2

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