

ATMEL

SMART RF

RF WIRELESS

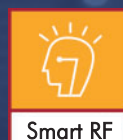
DATA/CONTROL SOLUTIONS

FOR INDUSTRIAL

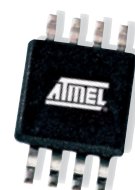
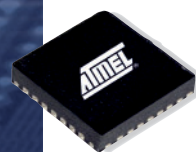
AND CONSUMER

APPLICATIONS

IN THE ISM BANDS



Smart RF



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)

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

Headsets

Wireless Audio/Video

High-speed Data Communications

Wireless USB

Infotainment and Conference Systems

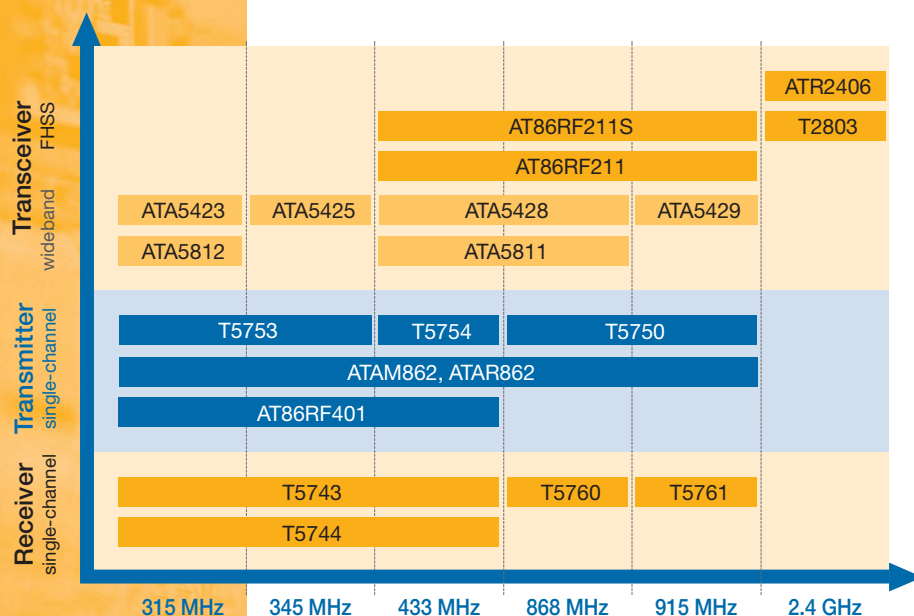
Wireless Communications

- 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 wire-

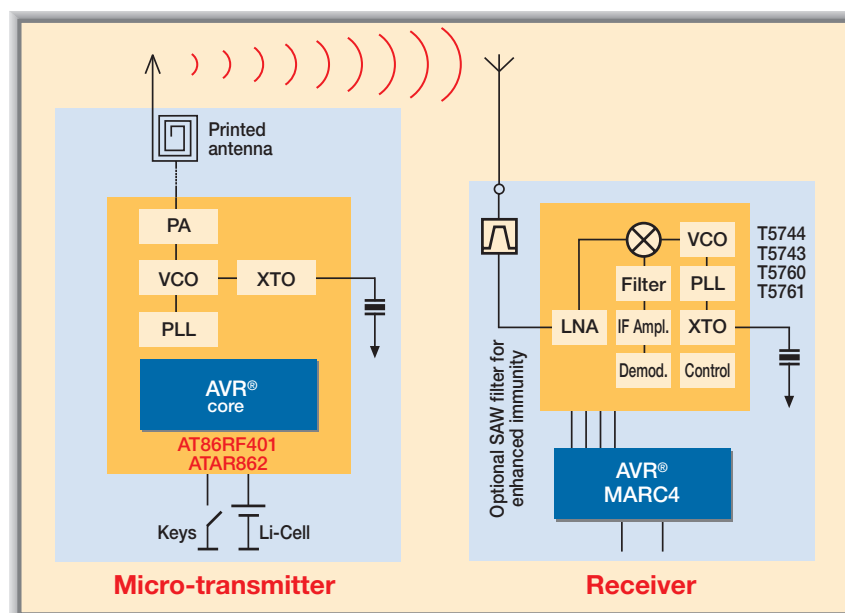


less data transfer, control or gaming are also possible.

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

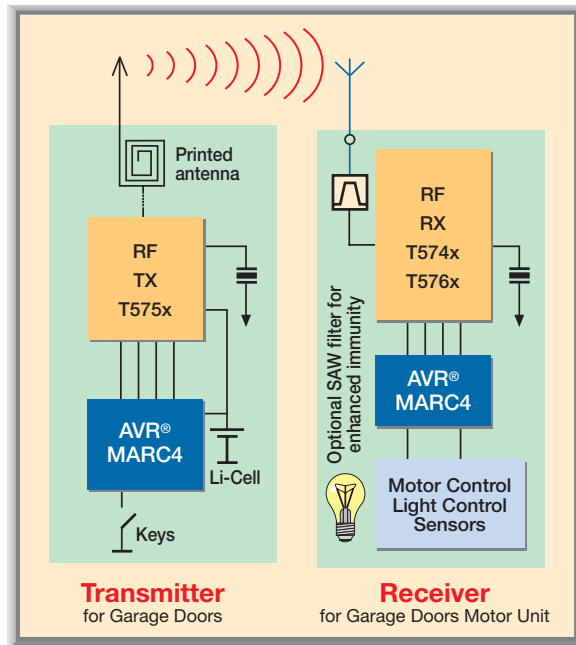
- Complete Radio Product Portfolio Covers All ISM Bands from 250 MHz to 2.4 GHz
- Compliant to FCC CFR 46, Part 15 (US) and EN300 328/400 (Europe)
- Low Cost and Low Power Consumption
- Fast Data Rates (1.152 Mbit/s Maximum)
- Using Atmel's SiGe PAs, the Maximum Output Power of 14 dBm Can Be Increased 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

ONE-WAY RF TRANSMITTER

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

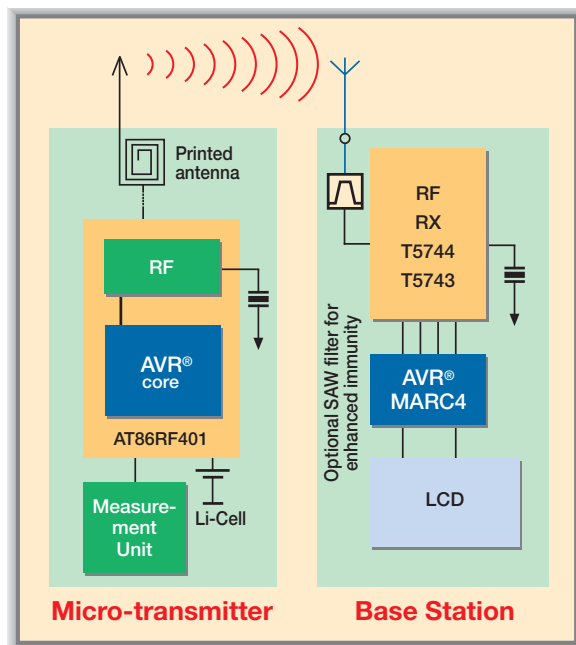


Key Benefits

- 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

AVR-MICRO-TRANSMITTER SYSTEM

(Next Integration Level of One-way RF Transmitter Systems, e.g., Outside-temperature Data Transmission)



Key Benefits

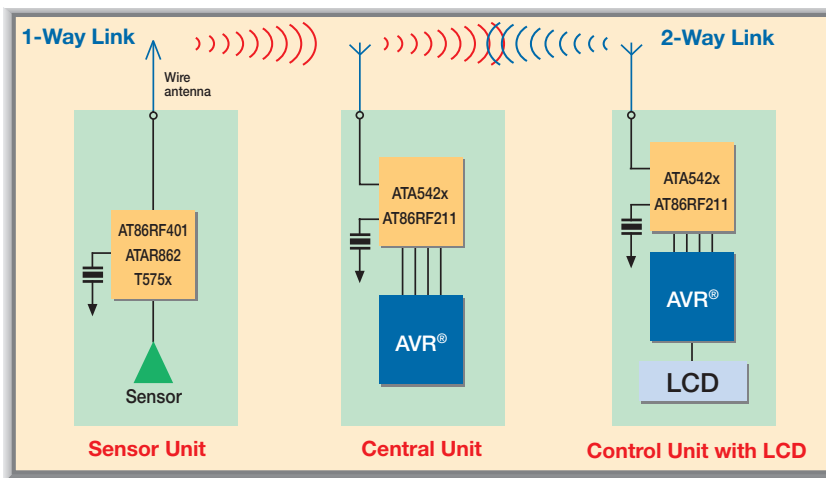
- Tiny Micro-transmitter Package
- Only One IC in the Sensor Unit
- AVR Core with 2-kbyte Flash Memory
- AVR on Receiver Side with Integrated LCD Driver
- AVR Tools Can Be Used
- Suitable for Different ISM Bands

TRANSCEIVER SYSTEM

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

Key Benefits

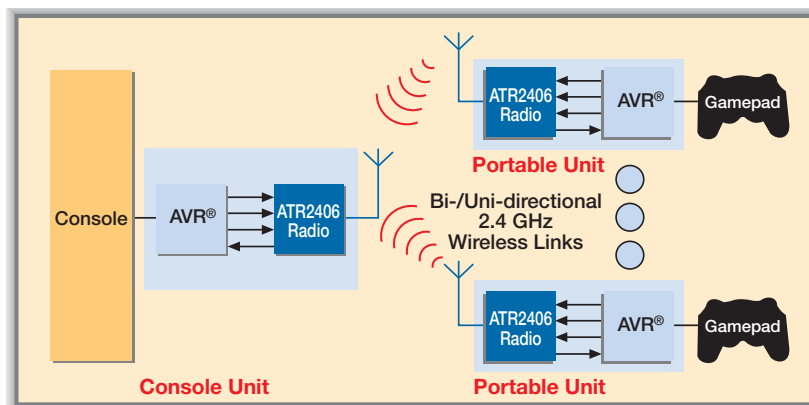
- Bi-directional Circuits for Central and Control Units
- Uni-directional Circuits for Sensors
- Very Robust by Design
- Low Current Consumption Enables Extended Battery Life
- Long Distances Due to High Output Power
- Suitable for Several ISM Bands
- Small Housing Since the RF Transmitter Integrates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



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
U2741B	300-450	X	X	20	2.0-5.5	0.35	4.7	10	3	SSO16
U2745B	310-440	X		20	2.2-4.0	2	4.7	10	3	SSO16
T5750	868-928	X	X	32	2.0-4.0	0.35	3.6	8.5	5.5	TSSOP8
T5753	310-350	X	X	32	2.0-4.0	0.35	3.7	9	8	TSSOP8
T5754	429-439	X	X	32	2.0-4.0	0.35	3.7	9	7.5	TSSOP8

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
AT86RF401	250-450	AVR	X		10	2.0-3.5	0.5	13	18	6	TSSOP20
ATAx862 ²⁾ -R3	310-330	MARC4	X	X	32	2.0-4.0	0.35	3.7	9.5	8	SSO24
ATAx862 ²⁾ -R4	429-439	MARC4	X	X	32	2.0-4.0	0.35	3.7	9.5	7.5	SSO24
ATAx862 ²⁾ -R8	868-928	MARC4	X	X	32	2.0-4.0	0.35	3.6	9	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]	V _S [V]	I _{off} [μA]	I _{active} [mA]	Sensitivity [dBm] ASK	Sensitivity [dBm] FSK	Package
U3741BM	300-450	X	X	10/3.2	4.5-5.5	190	7	-110	-98.5	SO20
U3742BM	300-450	X	X	10/3.2	4.5-5.5	190	7	-110	-98.5	SO20
U3745BM	310-440	X		10/—	4.5-5.5	190	7	-110	—	SO20
T5743	300-450	X	X	10/10	4.5-5.5	170	7.5	-110	-104	SO20
T5744	300-450	X		10/—	4.5-5.5	190	7	-110	—	SO20 SSO20
T5760	868-870	X	X	10/10	4.5-5.5	170	7.6	-112	-106	SO20
T5761	902-928	X	X	10/10	4.5-5.5	170	7.6	-112	-106	SO20

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]	V _S [V]	I _{off} [mA]	I _{active} [mA] at 10 dBm	Sensitivity [dBm] ASK	Sensitivity [dBm] FSK	P [dBm]	Package
ATA5811	433-435 868-870	X	X	10/20	2.4-3.6	0.01	15.8 17.3	-116.5 -114	-109.5 -107	10	QFN48
ATA5812 ATA5423 ³⁾	314-316	X	X	10/20	2.4-3.6	0.01	15.7	-117.5	-110.5	10	QFN48
ATA5425 ³⁾	345	X	X	10/20	2.4-3.6	0.01	15.7	-117.5	-110.5	10	QFN48
ATA5428 ³⁾	433-435 868-870	X	X	10/20	2.4-3.6	0.01	15.8 17.3	-116.5 -114	-109.5 -107	10	QFN48
ATA5429 ³⁾	915	X	X	10/20	2.4-3.6	0.01	17.3	-114	-107	10	QFN48

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

³⁾ Available end of 2004

Multi-channel Transceiver ICs

Part No.	Frequency Range [MHz]	Modulation	Data Rate [kbit/s]	Output Power [dBm]	Rx Sensitivity [dBm]	V _S [V]	IIP3 [dBm]	Package
AT86RF211	433, 868, 915	FSK	64	14	-99	2.4-3.75	-15	TQFP48
AT86RF211S	433, 868, 915	FSK	100	16	-99	2.4-3.75	-15	TQFP48
ATR2406	2,400-2,483	GFSK	0-1,152	3	-93	3.0-4.6	-15	QFN32
T2803	2,400-2,483	GFSK	0-1,152	3	-78	3.0-4.6	-7	QFN48

Development Kits with Software

Part No.	Application	Ordering No.	Remarks
AT86RF211/ AT86RF211S	AVR mother boards for RF evaluation/development	AT86RF211-DK	RF modules ordered separately
AT86RF401	RF evaluation kit AVR transmitter	AT86RF401E-EK1 AT86RF401U-EK1	433.92 MHz 315 MHz
AT86RF401, T5744	RF development kit AVR transmitter + RX	ATAK4015744E ATAK4015744U	433.92 MHz/no SAW 315 MHz/no SAW
ATR2406	AVR-based development kit	ATR2406-DEV-KIT	2 RF modules included
T5750/T5760/ MARC4/AVR	RF development kit 868.3 MHz	ATAK5750-60-N ATAK5750-60-S	No SAW SAW
T5750/T5761/ MARC4/AVR	RF development kit 915 MHz	ATAK5750-61-N	No SAW
T5753/T5743/ MARC4/AVR	RF development kit 315 MHz 300 kHz IF-BW	ATAK5753-43P3-S	SAW
T5753/T5743/ MARC4/AVR	RF development kit 315 MHz 600 kHz IF-BW	ATAK5753-43P6-S	SAW
T5754/T5743/ MARC4/AVR	RF development kit 433.92 MHz 300 kHz IF-BW	ATAK5754-43P3-S	SAW
T5754/T5743/ MARC4/AVR	RF development kit 433.92 MHz 600 kHz IF-BW	ATAK5754-43P6-S	SAW

Development Boards

Part No.	Application	Ordering No.	Remarks
ATA5811	RF transceiver board 433 MHz 868 MHz	ATAB5811-4L ATAB5811-8L	P = + 5 dBm
	RF transceiver board 433 MHz 868 MHz	ATAB5811-4H ATAB5811-8H	P = + 10 dBm
ATA5812	RF transceiver board 315 MHz	ATAB5812-3L ATAB5812-3H	P = + 5 dBm P = + 10 dBm
AT86RF211/ AT86RF211S	UHF FSK transceiver board 868 and 915 MHz	AT86RF211DB-BIBAND	Same hardware for 868 and 915 MHz, printed antenna
AT86RF211/ AT86RF211S	UHF FSK transceiver board 433, 868 and 915 MHz	AT86RF211DB-433TRI	Only a few passives changed to swap frequencies
AT86RF211/ AT86RF211S	UHF FSK transceiver board 868 or 915 MHz	AT86RF211DB-868LNA or AT86RF211DB-915LNA	LNA, SAW filter printed antenna and inductors
AT86RF211/ AT86RF211S	UHF FSK transceiver board 433, 868 or 915 MHz	AT86RF211DB-433107 or AT86RF211DB-868107 or AT86RF211DB-915107	SAW and IF filters used, all devices are SMD components
AT86RF211/ AT86RF211S	UHF FSK transceiver board 433, 868 or 915 MHz	AT86RF211DB-433LT or AT86RF211DB-868LT or AT86RF211DB-915LT	SAW and IF filters used, low-cost lead-through components
ATR2406	ISM transceiver board 2.4 GHz, 1.152 Mb/s	ATR2406-DEV-BOARD	Low-cost reference design
T5744	UHF ASK receiver board 300-450 MHz	ATAB5744-N4 ATAB5744-S4 ATAB5744-N3 ATAB5744-S3	433.92 MHz/no SAW 433.92 MHz/SAW 315 MHz/no SAW 315 MHz/SAW
T5743P3	UHF ASK/FSK receiver board 300-450 MHz, IF bandwidth 300 kHz	ATAB5743P3-S4 ATAB5743P3-S3	433.92 MHz/SAW 315 MHz/SAW
T5743P6	UHF ASK/FSK receiver board 300-450 MHz, IF bandwidth 600 kHz	ATAB5743P6-S4 ATAB5743P6-S3	433.92 MHz/SAW 315 MHz/SAW
T5750	UHF ASK/FSK transmitter board 868.3/915 MHz	ATAB5750-8 ATAB5750-9	868.3 MHz 915 MHz
T5753	UHF ASK/FSK transmitter board 315 MHz	ATAB5753	
T5754	UHF ASK/FSK transmitter board 433.92 MHz	ATAB5754	
T5760	UHF ASK/FSK receiver board 868.3 MHz	ATAB5760-N ATAB5760-S	No SAW SAW
T5761	UHF ASK/FSK receiver board 915 MHz	ATAB5761-N	No SAW

**Atmel Corporation**

2325 Orchard Parkway
San Jose, CA 95131, USA
Tel.: (1)408 441-0311
Fax: (1)408 487-2600

Regional Headquarters**Europe**

Atmel Sarl
Route des Arsenaux 41
Case Postale 80
CH-1705 Fribourg
Switzerland
Tel.: (41) 26-426-5555
Fax: (41) 26-426-5500

Asia

Room 1219
Chinachem Golden Plaza
77 Mody Road Tsimshatsui
East Kowloon
Hong Kong
Tel.: (852) 2721-9778
Fax: (852) 2722-1369

Japan

9F, Tonetsu Shinkawa Bldg.
1-24-8 Shinkawa
Chuo-ku, Tokyo 104-0033
Japan
Tel.: (81) 3-3523-3551
Fax: (81) 3-3523-7581

Product Contact

Theresienstrasse 2
P.O.B. 3535
D-74025 Heilbronn
Germany
Tel.: (49) 71 31-67-0
Fax: (49) 71 31-67-2340

Avenue de Rochepleine
BP 123
38521 Saint Egreve Cedex
France
Tel.: (33) 4-76-58-30-00
Fax: (33) 4-76-58-34-80

Literature Requests

www.atmel.com/literature

Web Site

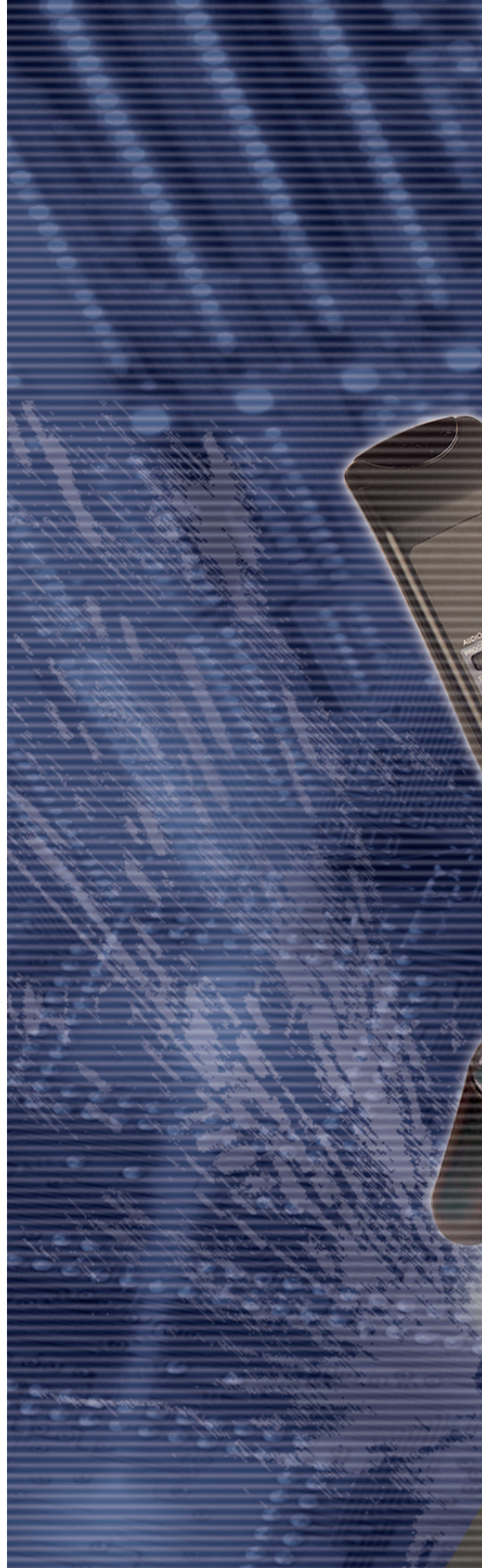
www.atmel.com

© Atmel Corporation 2004.

All rights reserved.

Atmel® and combinations thereof, and AVR are the registered trademarks of Atmel Corporation or its subsidiaries. The Bluetooth name and the Bluetooth trademarks are owned by Bluetooth SIG, and are used by Atmel Corporation under license. Other terms and product names may be the trademarks of others.

Rev.: 4617B-ISM-09/04/05M



Mouser Electronics

Authorized Distributor

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

[Atmel:](#)

[ATAB5744-N3](#) [ATAB5744-S3](#) [ATAB5750-8](#) [ATAB5750-9](#) [ATAB5753](#) [ATAB5754](#)