APPLICATION NOTE

Atmel RFID Kits Overview

ATAN0075

RFID Kits Introduction

Atmel[®] offers several design and evaluation kits for a fast and easy way to test the LF-RFID technology but also developing the final product. The most important one is the Atmel ATA2270-EK3. It provides a complete self-contained tool to begin using RFID systems, even for users who are short on RFID experience. It supplies an LCD and control buttons to enable interaction with the RFID system. This stand-alone but also PC-GUI based system supports many of Atmel's RFID tag chips.

The second group of kits is based on two readers supplied by an external company. One of them is working at 125kHz (Atmel ATARFID-EK1) the other one at 134.2kHz (Atmel ATARFID-EK2) targeting access control applications and animal ID applications.

Third kit is the Atmel ATA6286-EK3. The evaluation kit for Atmel's active RFID solution. This works at 2 frequency bands: 125kHz and 433MHz.

Atmel

1. Atmel ATA2270-EK3 and Atmel ATA2270-U3

The Atmel[®] ATA2270-EK3 is an evaluation kit that supports a limited number of configurations in stand-alone mode. Support during the entire development phase is provided by the PC interface and the application software. Both tools enable full control of the tag configuration. This kit is AVR[®] ATmega128-based and provides all necessary source and object codes. An API (Advanced Programming Interface) allows control of the kit by user-written software. Registered kit users have access to an Atmel FTP server for firmware and software upgrades and also layout data in Gerber format with BOMs. For users having the predecessor kit ATA2270-EK2 the new reader daughter board (see Figure 1-3 on page 3) in the Atmel ATA2270-EK3 kit is available separately. The kit part number is ATA2270-U3











Figure 1-3. Atmel ATA2270-EK3 Reader Daughter Board



Figure 1-4. LCD Display with Unique Format Read Selection in Stand-alone Mode



Figure 1-5. LCD Display with Unique Format Write Selection in Stand-alone Mode



Figure 1-6. LCD Display with Animal ID Read Selection in Stand-alone Mode





Figure 1-7. LCD Display with Animal ID Write Selection in Stand-alone Mode



Figure 1-8. Atmel ATA2270-EK Graphical User Interface, Example for Atmel ATA5577

Data Bit X Rate M		on PSK-	CF AOR		Block PWD	SS Fa Term W		e Init Delay
• RF/32 •	Manchest	ter 👻 RF/2	-	1-2	•			
Block 0							Lock Bit	Write Config
Register								
Soft Modulation	Clamp Voltage	Mod Voltage	Clk-Detect Threshold	Gap-Detect Threshold	Write Damping	D	emod Delay –	Downlink Protocol
Off -	Medium 👻	Medium 👻	Medium 👻	Medium 👻	WD & Low Attenua	tion - N	one 👻	Fixed Bit Length
Lock Write 01 V 02 V 03 V 04 V 05 V	Write Tag Read Tag Auto	Block Da				Rav ACL MFC	/ Lo	Read Tag t ID (hex): afer # (dec): e # (dec):
06	Rd -> Wr	6	-					
	Block 0 Register Soft Modulation Off Memory Lock Write 0 V V V V V V V V V V V V V V V V V V	RF/32 Manchest Block 0 Register Soft Modulation Clamp Votage Off Ørege Off Block 3 Memory Block 3 Lock Write Ørege 01 Ørege 03 Ørege 04 Ørege	RF/32 Manchester RF/2 Block 0 Register Soft Modulation Clamp Voltage Off Veltage Medium Medium Block 3 Block 3 Block 3 Memory Read Dat 1 1 V Block Dat 1 V Read Tag 4 Auto 5	RF/32 Manchester RF/2 Block 0 Register Soft Modulation Clamp Voltage Voltage Off Medium Block 3 Memory Read Tag Auto Read Tag	RF/32 Manchester RF/2 1-2 Block 0 Register Soft Modulation Clamp Voltage Voltage Voltage Threshold Off Medium Medium Medium Block 3 Memory Lock Write Block Data 1 Q Q Write Tag 3 Q Auto 5	RF/32 Manchester RF/2 Ingut Block 0 Register Soft Modulation Clamp Mod Clk-Detect Gap-Detect Write Damping Off Votage Votage Medium Medium Wedium WD & Low Attenua Block 3 Block 3 Medium Medium Medium Reset Tag 1 Votage 1 ADR Wakeup 2 3 4 3 02 Write Tag 4 5 5 5 5 5	RF/32 Manchester RF/2 I - 2 Image: Ima	RF/32 Manchester RF/2 Image: Im



Figure 1-9. Atmel ATA2270-EK Graphical User Interface, Unique-ID Specific

Cunique Format	
Write Data (hex) Version 00 Data 00000002 RF/32 RF/64 Lock Auto Mrite to Tag	1111111111 0000 0 0001 1 0000 0 0110 0
Read Data (hex) Version 01 Data 06B135BB Rd -> Wr Auto Reading	1011 1 0001 1 0011 0 0101 0 1011 1 1011 1 1011 0

Figure 1-10. Atmel ATA2270-EK Graphical User Interface, Animal ID Application Specific

IS011784/785 Write	
(dec) (dec)	to Increment 🔽 Send to Tag
ISO11784/785 Read Complete Structure Animal Country Code National Code CRC CRC Correct (dec) (dec) (hex) verified	Read from Tag
Read Log File	
	Start



2. Atmel ATARFID-EK1 and Atmel ATARFID-EK2

The Atmel[®] kits ATARFID-EK1 and ATARFID-EK2 are based on a commercial reader/programmer supplied by the company GIS. The first version in the EK1 kit operates at 125kHz. It is best suited for access control, industrial, and any kind of consumer applications. This kit supports the very common Manchester and Biphase data coding but also FSK data coding. The EK2 kit operates at 134.2kHz according to the animal ID standards ISO 11784 and 11785 (FDX-A and FDX-B). Both kits allow the user to not only read the tags but also configure and program them. The readers have a USB connection and a PC-based user interface. Sample tags complete this kit. The PC software can be downloaded from the GIS website.





Figure 2-2. Content of the Atmel ATARFID-EK2: 134.2kHz Kit





Figure 2-3. GIS PC Software: Atmel ATARFID-EK1 and EK2 Main Menu



3. Active RFID Kit ATA6286-EK3

The Atmel[®] ATA6286-EK3 is a complete system evaluation kit for active RFID applications. Typically these are identification applications where a larger operating distance and/or a higher amount of data storage space is required compared to passive RFID solutions. The difference to a passive RFID system is that the tag ASSP is supplied by a battery in the tag. Also, the ASSP is not state-machine-based but uses an Atmel AVR[®] MCU core. Atmel's active RFID system uses a unique combination of two different frequency bands: low frequency at 125kHz for the trigger and activation channel as well as for the data downlink path, and ultra-high frequency at 434MHz for the return and uplink path.





Figure 3-2. Atmel ATA6286-EK3 Active Tag Front





Figure 3-3. Atmel ATA6286-EK3 Active Tag Back



Figure 3-4. Atmel ATA6286-EK3 Main Board





Figure 3-5. Atmel ATA6286-EK3 Trigger and Transmit Board



Figure 3-6. Atmel ATA6286-EK3 Receiver Board





4. **RFID Kits Overview**

4.1 General Features

General	ATA2270-EK3	ATARFID-EK1	ATARFID-EK2	ATA6286-EK3
Evaluation kit	x	х	x	x
Commercial third-party device		х	x	
PC-controlled	x	х	x	
Stand-alone	x ⁽¹⁾⁽²⁾			x
PC software	X	х	х	
Layout data and source code	X			
Serial interface (with USB converter option)	x			
USB interface	x ⁽³⁾	Х	x	х
Field frequency	125kHz/134.2kHz ⁽⁴⁾	125kHz	134.2kHz	125kHz + 434MHz
Data coding	Manchester/Biphase	Manchester/ Biphase/ FSK	Manchester/ Biphase/ FSK	Manchester
LCD display	X			X
LED indicator	X			
Keys and joystick	X			x
Buzzer	X			x

Notes: 1. One fixed mode

2. Continuously checks for 125kHz unique tags or 134.2kHz animal tags and indicates them with an LED signal when main board is switched off

- 3. For status information of the reader board
- 4. Exact reader frequencies are 125kHz and 133.3kHz

4.2 Kit Contents

Kit Contents	ATA2270-EK3	ATARFID-EK1	ATARFID-EK2	ATA6286-EK3
Main and interface board	x			2x
Reader antenna coil	x			
Compact reader		x	x	
Power supply 120V to 240V	x			2x
USB serial converter	x			
USB cable	X	x	x	
TX antenna coil				2x
Active tags				2x
Serial cable				x
RX antenna UHF				X

4.3 Supported RFID ASSP Devices

Supported RFID ASSP Devices	ATA2270-EK3	ATARFID-EK1	ATARFID-EK2	ATA6286-EK3
Atmel T5551/TK5551	x			
Atmel e5530/TK5530	х			
Atmel T5554	x ⁽¹⁾			
Atmel T5555 – "Q5"		x	x	
ATA5558	Х			
Atmel T5557 compatible	x ⁽²⁾			
Atmel T5557 extended	Х			
Atmel ATA5567 compatible	x ⁽²⁾			
Atmel ATA5567 extended	Х			
Atmel ATA5570	Х			
Atmel ATA5577	х	x	x	
Atmel ATA5575M1 and ATA5575M2	х	x (M1)	x (M2)	
Atmel ATA6286				x ⁽³⁾

Notes: 1. To use the Atmel T5554 select tag type T5551 in the software.

2. This mode is only supported in the PC application software. All tag modes are programmable in this tool.

3. LF-Trigger IC Atmel ATA5279, UHF receiver IC Atmel ATA8202.



5. Revision History

Please note that the page numbers referred to in the following section refer to the specific revision mentioned, not to this document.

Revision No.	History			
4980H-RFID-11/15	Update for new kit ATA2270-EK3			
4980G-RFID-02/15	Put document in the latest template			
4980F-RFID-06/13	Complete document update			
4980E-RFID-06/12	Complete document update			
4980D-RFID-03/11	Section 1 "Description" on page 1 changed			
	 Section 2 "LF-RFID Kit Comparison Chart - Table" on pages 2 to 3 changed 			
4980C-RFID-11/09	Section 1 "Description" on page 1 changed			
	Section 2 "LF-RFID Kit Comparison Chart - Table" on pages 2 to 3 changed			
4980B-RFID-12/08	Section 1 "Description" on page 1 changed			
	Section 2 "LF-RFID Kit Comparison Chart - Table" on pages 2 to 3 changed			



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