

ATA2270-EK1

User Guide







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Section 1

ATA2270-EK1 Serial API Specification

1.1 System Requirements

The computer must be able to send commands via a serial port connection. This can be a virtual COM port.

Recommend minimum system:

- 16 MB RAM
- 12 MB free hard disk space
- Windows XP
- 115200 baud RS-232 port (COM port)
- Compact Framework .Net

RS232 PC Communication

An Application Programming Interface (API) to the PC for the ATA2270-EK1 was needed to support customer requirements. The API described in the following section and implemented in the firmware v3.0 and later provides this functionality. Because this provides complete, low-level access to the reader it presents a very powerful tool. The user needs to be aware that sending the wrong command/payloads can result in the tag entering an unknown and unrecoverable mode. These commands should be used with the utmost precaution to insure they are being used correctly. Consult the datasheet on each tag before using this API.

1.2 Command Format

The commands will be sent over the RS232 serial interface as follows: 38.4kBaud, 8 data bits, and 1 stop bit. The baud rate can be changed on the ATA2270-EK1 kit via the PC menu. Commands MUST be sent in ASCII format. This can be done using a simple HyperTerminal window or through any custom GUI application that a customer develops. The ATA2270-EK1 will respond with an acknowledge message. User MUST send ENTER (carriage return) after each command. Each complete transaction should be less than 256 bytes.

To use HyperTerminal remember to turn on the echo typed characters and send line ends with line feeds to make it more readable.

1.2.1 Command Format (PC to Reader)

Table 1-1. Command Format (PC to Reader)

Byte 1-2	Byte 3-5	Byte 6-9	Byte 10 – Byte N	Byte N+1
Op Code	Command	Bits in Payload	Payload	Carriage Return

1.2.1.1 Respond Format (Reader to PC)

Table 1-2. Respond Format (Reader to PC)

Byte 1-2	Byte 3-6	Byte 7 – Byte N	Byte N+1
Ack Code	Bytes in Payload	Payload	Carriage Return

Errors will contain the following response.

Table 1-3. Common Error Responses

Parameter	Values	Comments
Ack Code	ER	2 chars
Bytes in Payload	calculated	4 chars
Payload	Various	Possibly some cause

See specific commands in the following sections to explain the accepted parameters and typical response.



1.3 Reader System Commands

These will control the RF field and the Reader platform. They do not change the configuration of the Tag in any way. The settings for the tag should be decoupled from the configuration of the Reader.

1.3.1 Get Revision Information

This command will return the current revision of the software currently being used on the kit.

Table 1-4. Command Format

Parameter	Values	Comments
Op Code	CM	2 chars
Command	REV	3 chars
Bits in Payload	Don't Care	4 chars
Payload	N/A	

Table 1-5. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	calculated	4 chars
Payload	SW vX.X + "compile date"	

1.3.2 LCD Message

This command can be used to send a custom message to the LCD screen while using the RS232 link. This message will be held until a new message is received. Sending a zero byte payload will clear the LCD. Because this is only for simple messages, it is limited to 18 characters at a time. This is displayed in a message box in the center of the LCD.

Table 1-6. Command Format

Parameter	Values	Comments
Op Code	CM	2 chars
Command	LCD	3 chars
Bits in Payload	Non-Zero	4 chars
Payload	user message	max 18 chars

Table 1-7. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	calculated	4 chars
Payload		

1.3.3 Play Sound

This allows command of the sound element to be controlled from the PC. The user can play a Beep or a Buzz in order to provide audio feedback to the user. It is also possible to set the global sound state either On or Off. A zero byte payload will return the current status.

Table 1-8. Command Format

Parameter	Values	Comments
Op Code	CM	2 chars
Command	SND	3 chars
Bits in Payload	Non-Zero	4 chars
Payload	ON, OFF, BEEP, BUZZ	Max 4 chars

Table 1-9. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	calculated	4 chars
Payload		

1.3.4 RF Field Control

This command can be used to turn the RF Field ON or OFF. A zero byte payload will return the current status.

Table 1-10. Command Format

Parameter	Values	Comments
Op Code	CM	2 chars
Command	RFC	3 chars
Bits in Payload	Non-Zero	4 chars
Payload	ON, OFF	max 3 chars



Table 1-11. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	calculated	4 chars
Payload		

1.3.5 Output Enable Control

This determines if the demodulated output is sent to the uC to be decoded. A zero byte payload will return the current status.

Table 1-12. Command Format

Parameter	Values	Comments
Op Code	CM	2 chars
Command	OEC	3 chars
Bits in Payload	Non-Zero	4 chars
Payload	ON, OFF	max 3 chars

Table 1-13. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	calculated	4 chars
Payload		

1.3.6 Standby Control

This is used to put the Reader into a low power mode. When turned ON, the reader can not communicate with a Tag but the AVR uC will still process commands. A zero byte payload will return the current status.

Table 1-14. Command Format

Parameter	Values	Comments
Op Code	CM	2 chars
Command	SBC	3 chars
Bits in Payload	Non-Zero	4 chars
Payload	ON, OFF	max 3 chars



Table 1-15. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	calculated	4 chars
Payload		

1.3.7 Antenna Tuning Control

This is used to control the tuning array for the antenna. This will switch in capacitors to give a four stage tuning system. The capacitors will lower the resonant frequency when switched in. A zero byte payload will return the current status.

Table 1-16. Command Format

Parameter	Values	Comments
Op Code	CM	2 chars
Command	ATC	3 chars
Bits in Payload	Non-Zero	4 chars
Payload	HIGH, SHIGH, SLOW, LOW	max 5 chars

Table 1-17. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	calculated	4 chars
Payload		

1.3.8 Reader/Tag Selection

This command allows the user to select which components are being used. Currently only the 2270 is supported on the Reader side. The user must choose which tag is to be supported. A zero byte payload will return the current status.

Table 1-18. Command Format

Parameter	Values	Comments
Op Code	CM	2 chars
Command	SRT	3 chars
Bits in Payload	Non-Zero	4 chars
Payload	2270, 5530, 5551, 5557, 5567, 5577, 5570, 5558	4 chars



Table 1-19. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	calculated	4 chars
Payload	various	Current set value

1.3.9 Set Write Timings

Change the Write timings that are going to be used. Change each individually. To return current value without changing the parameter, send xxx=000.

Table 1-20. Command Format

Parameter	Values	Comments
Op Code	CM	2 chars
Command	SWT	3 chars
Bits in Payload	Don't Care	4 chars
Payload	SGPxxx, GPTxxx, ONExxx, ZROxxx, REFxxx	6 chars

Table 1-21. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	calculated	4 chars
Payload	various	Current set value

1.3.10 Set Read Timings

Change the Read timings that are going to be used. Change each individually. To return current value without changing the parameter, send xxx=000.

Table 1-22. Command Format

Parameter	Values	Comments
Op Code	CM	2 chars
Command	SRD	3 chars
Bits in Payload	Don't Care	4 chars
Payload	STLxxx, STHxxx, LTLxxx, LTHxxx, TTLxxx, TTHxxx	6 chars

Table 1-23. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	calculated	4 chars
Payload	various	Current set value

1.3.11 Set 5558 Tag ID

Change the 5558 Tag ID that is going to be used in other commands. This can be done in any 4-bit increment up to the entire 96-bit length. All remaining bits will be set to zero. A zero byte payload will return the current ID.

Table 1-24. Command Format

Parameter	Values	Comments
Op Code	CM	2 chars
Command	SID	3 chars
Bits in Payload	Non-Zero	4 chars
Payload	various	24 chars

Table 1-25. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	calculated	4 chars
Payload		

1.3.12 Tag in Field

This command will check for a tag being present. Returns the status of “No Tag” if the RF Field is off so it is the responsibility of the user to insure the RF Field is on prior to executing this command.

Table 1-26. Command Format

Parameter	Values	Comments
Op Code	CM	2 chars
Command	TIF	3 chars
Bits in Payload	Don't Care	4 chars
Payload	N/A	

Table 1-27. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	calculated	4 chars
Payload	Tag Present, No Tag	4 chars

1.3.13 Set Write Mode

This sets the type of write mode that will be used. This is only for tags that support multiple write modes (ATA5577). A zero byte payload will return the current mode.

Note: Change/calculate new write timing values after this command to insure proper functionality. This is not done automatically.

Table 1-28. Command Format

Parameter	Values	Comments
Op Code	CM	2 chars
Command	SWM	3 chars
Bits in Payload	Don't Care	4 chars
Payload	BSM, LLR, LZR, OFC	3 chars

Table 1-29. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	calculated	4 chars
Payload	BSM, LLR, LZR, OFC	4 chars



1.4 Downlink Commands (Write)

These commands are used to buffer and send data or commands to the tag via the serial port. The commands do not contain device specific information and the data structure for specific tags must be built on the PC side before sending the write command. This is only a simple pass through of bits using the different types of forward link encoding.

1.4.1 Basic Mode Write

This will use the PIE (pulse-interval encoding) format to send the exact bits in the payload to the Tag. This uses the timings set in the Write Timing parameters. There is NO verification in this process only a status that the command was received and the write was successfully attempted. Please read the data after to verify successful programming.

Table 1-30. Command Format

Parameter	Values	Comments
Op Code	WR	2 chars
Command	BSM	3 chars
Bits in Payload	calculate	4 chars, max2048
Payload	various	Hex data in ASCII

Table 1-31. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	calculated	4 chars
Payload		



1.4.2 Write Long Leading Reference

This will use the Long Leading Reference encoding format to send the exact bits in the payload to the Tag. This uses the timings set in the Write Timing parameters. There is NO verification in the process only a status that the command was received and the write was successfully attempted. Please read the data after to verify successful programming.

Note: Change/calculate new write timing values before using this command to insure proper functionality.

Table 1-32. Command Format

Parameter	Values	Comments
Op Code	WR	2 chars
Command	LLR	3 chars
Bits in Payload	calculate	4 chars, max2048
Payload	various	Hex data in ASCII

Table 1-33. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	calculated	4 chars
Payload		

1.4.3 Write Leading Zero Reference

This will use the Leading Zero Reference encoding format to send the exact bits in the payload to the Tag. This uses the timings set in the Write Timing parameters. There is NO verification in the process only a status that the command was received and the write was successfully attempted. Please read the data after to verify successful programming.

Note: Change/calculate new write timing values before using this command to insure proper functionality.

Table 1-34. Command Format

Parameter	Values	Comments
Op Code	WR	2 chars
Command	LZR	3 chars
Bits in Payload	calculate	4 chars, max2048
Payload	various	Hex data in ASCII



Table 1-35. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	calculated	4 chars
Payload		

1.4.4 Write 1of4 Coding

This will use the 1 of 4 encoding format to send the exact bits in the payload to the Tag. This uses the timings set in the Write Timing parameters. There is NO verification in the process only a status that the command was received and the write was successfully attempted. Please read the data after to verify successful programming.

Note: Change/calculate new write timing values before using this command to insure proper functionality.

Table 1-36. Command Format

Parameter	Values	Comments
Op Code	WR	2 chars
Command	OFC	3 chars
Bits in Payload	Calculate	4 chars, max2048
Payload	Various	Hex data in ASCII

Table 1-37. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	Calculated	4 chars
Payload		



1.5 Uplink Commands (Read)

These commands will receive, decode, and respond with data from tags. The User is required to have some knowledge about the tag being used and the mode in which it is configured. This will determine which of the following command are needed for a successful read to occur. It will also determine the Modulation Type needed in the next command.

1.5.1 Set Read Modulation Type

This command is used to select the (de)modulation type that will be used when performing all read functions. It does not perform a read in itself but is very important for other functions. Choose between Manchester, Bi-Phase1, or Bi-Phase2 (differential). A zero byte payload will return the current status.

Table 1-38. Command Format

Parameter	Values	Comments
Op Code	RD	2 chars
Command	SRM	3 chars
Bits in Payload	Don't Care	4 chars
Payload	MAN, BP1, BP2	Number of bits requested in ASCII

Table 1-39. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	Calculated	4 chars
Payload		

1.5.2 Read Unsynch Data

This is a very basic read routine that will not organize the data but simply synchronize with the valid Manchester edges and then returns the requested number of bits for further processing. This is perfect for use with any kind of data pattern (Header) synching. It uses the selected modulation type to decode the incoming data into logical values that are buffered and returned.

Table 1-40. Command Format

Parameter	Values	Comments
Op Code	RD	2 chars
Command	RUD	3 chars
Bits in Payload	Non-Zero	4 chars, max2048
Payload	Various	Number of bits requested in ASCII



Table 1-41. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	Calculated	4 chars
Payload	Various	Requested Hex data in ASCII

1.5.3 Read Terminator Synchronization

This routine will synchronize with the beginning of data using the terminator timing specified in the Read Timing variables. It will then use the selected modulation type to return the requested number of bits in the correct order.

Table 1-42. Command Format

Parameter	Values	Comments
Op Code	RD	2 chars
Command	RTS	3 chars
Bits in Payload	Non-Zero	4 chars, max2048
Payload	Various	Number of bits requested in ASCII

Table 1-43. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	calculated	4 chars
Payload	Various	Requested Hex data in ASCII

1.5.4 Read Sequence Start

This routine will synchronize with the beginning of data using the Sequence Start Data Pattern. It will then use the selected modulation type to return the requested number of bits in the correct order.

Table 1-44. Command Format

Parameter	Values	Comments
Op Code	RD	2 chars
Command	RSS	3 chars
Bits in Payload	Non-Zero	4 chars, max2048
Payload	various	Number of bits requested in ASCII



Table 1-45. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	calculated	4 chars
Payload	Various	Requested Hex data in ASCII

1.5.5 Read Start of Frame (SOF) Data

This routine will synchronize with the beginning of data using the SOF pattern. It will then use the selected modulation type to return the requested number of bits in the correct order.

Table 1-46. Command Format

Parameter	Values	Comments
Op Code	RD	2 chars3 chars
Command	SOF	ASCII
Bits in Payload	Non-Zero	4 chars, max2048
Payload	various	Number of bits requested in ASCII

Table 1-47. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	calculated	4 chars
Payload	Various	Requested Hex data in ASCII

1.5.6 Search 5558 anti-collision

This routine will begin an anti-collision search and return the Tag ID if found. Multiple searches should be initiated in order to find all of the tags that may be in the field. When all the tags have been found, an error response will return “No tags Found”. It will use the selected modulation type.

Table 1-48. Command Format

Parameter	Values	Comments
Op Code	RD	2 chars
Command	SAC	3 chars
Bits in Payload	Don't Care	4 chars
Payload	N/A	



Table 1-49. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	calculated	4 chars
Payload	Various	Hex Tag ID in ASCII

1.6 Animal ID

These commands give some quick functions to use with the ISO 11784/785 standards for Animal ID. The purpose is to make dealing with these types of RFID tags a very easy process.

1.6.1 Read Complete Animal ID

This routine will read a tag that complies with the ISO 11784/785 standard and returns the extracted data. This gives the entire ISO code structure read from the tag. Each of the payload parameters are separated by a space for easy parsing.

Table 1-50. Command Format

Parameter	Values	Comments
Op Code	AN	2 chars
Command	RCA	3 chars
Bits in Payload	Don't Care	4 chars
Payload		

Table 1-51. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	calculated	4 chars
Payload	See format below	Requested data in ASCII

Table 1-52. Payload format

Parameter	Values	Comments
Animal Flag	0, 1	1 chars, binary
Data Flag	0, 1	1 chars, binary
Country Code	0000 – 1024	4 chars, decimal
National Code	0 - 274877906944	12 chars, decimal
CRC	transmitted	4 chars, hexadecimal
CRCverify	OK, NK	2 chars, ASCII
Trailer	000000	6 chars, hexadecimal if applicable

1.6.2 Read Simple Animal ID

This routine will read a tag that complies with the ISO 11784/785 standard and return the extracted data. This returns only the more important parts of the ISO code structure and requires that the Animal Flag be set to 1 before returning the data. Each of the payload parameters are separated by a space for easy parsing.

Table 1-53. Command Format

Parameter	Values	Comments
Op Code	AN	2 chars
Command	RSA	3 chars
Bits in Payload	Don't Care	4 chars
Payload		

Table 1-54. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	calculated	4 chars
Payload	See format below	Requested data in ASCII

Table 1-55. Payload format

Parameter	Values	Comments
Country Code	0000 – 1024	4 chars, decimal
National Code	0 - 274877906944	12 chars, decimal
CRCverify	OK, NK	2 chars, ASCII

1.6.3 Read Manufacturing Data

This routine will read the fixed manufacturing (traceability) data while in the ISO 11784/785 compliant mode. This is very useful to identify the tag history. This uses E0 (Atmel MFC code) to synchronize.

Note: The user must first send the read page 1 command. (i.e. wrbsm0002C) This is not done automatically.

Table 1-56. Command Format

Parameter	Values	Comments
Op Code	AN	2 chars
Command	RMD	3 chars
Bits in Payload	Don't Care	4 chars
Payload		



Table 1-57. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	calculated	4 chars
Payload	Mfg Data	64-bits of Mfg data in ASCII

1.6.4 Write Complete Animal ID

This routine will write data into a tag that complies with the ISO 11784/785 standard. User must provide the entire ISO code structure. Do not include spaces in the payload.

Table 1-58. Command Format

Parameter	Values	Comments
Op Code	AN	2 chars
Command	WCA	3 chars
Bits in Payload	Calculate	4 chars
Payload	See format below	

Table 1-59. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	calculated	4 chars
Payload		

Table 1-60. Payload format

Parameter	Values	Comments
Animal Flag	0, 1	1 chars
Data Flag	0, 1	1 chars
Country Code	0000 – 1024	4 chars
National Code	0 - 274877906944	12 chars
CRC	Calculated	4 chars
Trailer	00000000	8 chars, if applicable



1.6.5 Write Simple Animal ID

This routine will write data a tag that complies with the ISO 11784/785 standard. User must provide only Country Code and National ID. Do not include spaces in the payload. The Animal Flag will be set in this command as well.

Table 1-61. Command Format

Parameter	Values	Comments
Op Code	AN	2 chars
Command	WSA	3 chars
Bits in Payload	Calculate	4 chars
Payload	See format below	

Table 1-62. Response Format

Parameter	Values	Comments
Ack Code	OK	2 chars
Bytes in Payload	calculated	4 chars
Payload		

Table 1-63. Payload format

Parameter	Values	Comments
Country Code	0000 – 1024	4 chars
National Code	0 - 274877906944	12 chars





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