SMART ARM-based Microcontrollers

SMARTCARD XPRO

USER GUIDE

Preface

Atmel® SMARTCARD Xplained Pro is an extension board to the Atmel Xplained Pro evaluation platform. Atmel SMARTCARD Xplained Pro is designed to connect with SAM L22 Xplained Pro.

Table of Contents

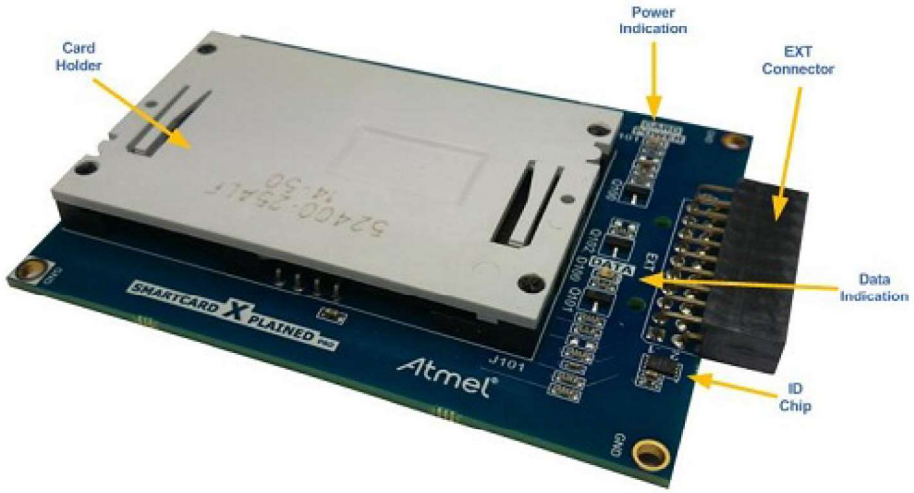
1. Introduction

1.1. Features

- SAM L22 Xplained Pro support
- Smart Card read/write capability using serial-com from XPRO Expansion headers
- ISO-7816 Smart card interface
- EMV Level 1, Class B (3.3V operation)

1.2. Kit Overview

The main purpose of this kit is to provide a complete demonstration of the smart card application. The extension kit will be used along with the SAM L22 Xplained Pro kit using a ISO7816 module on the SAM L22 chip. It has ID chip to store the board details to identify the extension board when seen from Atmel Studio.



2. Getting Started

2.1. Three Steps to Start Exploring the Atmel Xplained Pro Platform

1. Download and install Atmel Studio.
2. Launch Atmel Studio.
3. Connect the SMARTCARD Xplained Pro to the Xplained Pro MCU board and connect a USB cable to the DEBUG USB port on the Xplained Pro MCU board.

2.2. Connecting the SMARTCARD Xplained Pro to the Xplained Pro MCU Board

SMARTCARD Xplained Pro is designed to be connected to the Xplained Pro header marked EXT3. It is compatible with EXT2 as well. Refer to the pin-out of your Xplained Pro evaluation kit to find out which Xplained Pro EXT headers that can be used.

Once the Xplained Pro MCU board is powered, the green power LED will be lit and Atmel Studio will auto-detect which Xplained Pro MCU and extension board(s) are connected. Atmel Studio will present relevant information like datasheets and kit documentation. The kit landing page in Atmel Studio also have the option to launch Atmel Software Framework (ASF) example applications for the kit. The target device is programmed and debugged by the on-board Embedded Debugger. No external programmer or debugger tool is needed.

2.3. Design Documentation and Related Links

The following list contains links to the most relevant documents and software for SMARTCARD Xplained Pro.

1. Xplained Pro products [1]- Atmel Xplained Pro is a series of small-sized and easy-to-use evaluation kits for Atmel AVR® 8- and 32-bit microcontrollers and SoC RF modules. It consists of a series of low-cost MCU and wireless boards for evaluation and demonstration of features and capabilities of different MCU and wireless families.
2. SMARTCARD Xplained Pro User Guide[2] - PDF version of this User Guide.
3. SMARTCARD Xplained Pro Design Documentation[3] - Package containing schematics, BOM, assembly drawings, 3D plots, layer plots, etc.
4. Atmel Studio[4] - Free Atmel IDE for development of C/C++ and assembler code for Atmel microcontrollers.
5. SMARTCARD-Xpro [5]- Product page with information and documentation.

[1] http://www.atmel.com/products/microcontrollers/avr/xplained.aspx
[2] http://www.atmel.com/tools/atsmartcard-xpro.aspx?tab=documents
[3] http://www.atmel.com/tools/atsmartcard-xpro.aspx?tab=documents
[4] http://www.atmel.com/microsite/atmel_studio6/default.aspx
[5] http://www.atmel.com/devices/atsmartcard.aspx

3. Xplained Pro

Xplained Pro is an evaluation platform that provides the complete Atmel microcontroller and SoC RF experience.

The platform consists of :

- Microcontroller (MCU) and RF evaluation kits
- Support a wide range of extension boards
- Atmel Software Framework (ASF) drivers and demo code integrated with Atmel Studio
- User guides, application notes, datasheets, and example code through Atmel Studio Xplained Pro MCU and extension boards can be purchased in the Atmel Web Store[6]

3.1. Hardware Identification System

All Xplained Pro compatible extension boards have an Atmel ATSHA204A CryptoAuthentication™ chip mounted. This chip contains information that identifies the extension with its name and some extra data. When an Xplained Pro extension board is connected to an Xplained Pro board the information is read and sent to Atmel Studio. The Atmel Kits extension, installed with Atmel Studio, will give relevant information, code examples, and links to relevant documents. Table 3.1 "Xplained Pro ID Chip Content" shows the data fields stored in the ID chip with example content.

Table 3-1. Xplained Pro ID Chip Content

Data field	Data type	Example content
Manufacturer	ASCII string	Atmel'\0'
Product Name	ASCII string	Segment LCD1 Xplained Pro'\0'
Product Revision	ASCII string	02'\0'
Product Serial Number	ASCII string	1774020200000010'\0'
Minimum Voltage [mV]	uint16_t	3000
Maximum Voltage [mV]	uint16_t	3600
Maximum Current [mA]	uint16_t	30

3.2. Standard Headers and Connectors

3.2.1. Xplained Pro Standard Extension Header

All Xplained Pro evaluation kits have one or more dual row, 20-pin, 100mil extension headers. Xplained Pro boards have male headers while Xplained Pro extension boards have their female counterparts. Note that all pins are not always connected. However, all the connected pins follow the defined pin-out described in Table 3.2 Xplained Pro Extension Header . The extension headers can be used to connect a wide variety of Xplained Pro extensions to Xplained Pro boards and to access the pins of the target MCU on Xplained Pro board directly.

[6] http://www.atmel.com/buy/inventory/default.aspx?parts=ATSMARTCARD-XPRO

Table 3-2. Xplained Pro Extension Header

Pin number	Name	Description
1	ID	Communication line to the ID chip on extension board
2	GND	Ground
3	ADC(+)	Analog to digital converter, alternatively positive part of differential ADC
4	ADC(-)	Analog to digital converter, alternatively negative part of differential ADC
5	GPIO1	General Purpose I/O
6	GPIO2	General Purpose I/O
7	PWM(+)	Pulse width modulation, alternatively positive part of differential PWM
8	PWM(-)	Pulse width modulation, alternatively negative part of differential PWM
9	IRQ/GPIO	Interrupt request line and/or general purpose I/O
10	SPI_SS_B/GPIO	Slave select for SPI and/or general purpose I/O
11	TWI_SDA	Data line for two-wire interface. Always implemented, bus type.
12	TWI_SCL	Clock line for two-wire interface. Always implemented, bus type.
13	USART_RX	Receiver line of Universal Synchronous and Asynchronous serial Receiver and Transmitter
14	USART_TX	Transmitter line of Universal Synchronous and Asynchronous serial Receiver and Transmitter
15	SPI_SS_A	Slave select for SPI. Should be unique if possible.
16	SPI_MOSI	Master out slave in line of Serial peripheral interface. Always implemented, bus type.
17	SPI_MISO	Master in slave out line of Serial peripheral interface. Always implemented, bus type.
18	SPI_SCK	Clock for Serial peripheral interface. Always implemented, bus type.
19	GND	Ground
20	VCC	Power for extension board

4. Hardware User Guide

4.1. Headers and Connectors

4.1.1. SMARTCARD Xplained Pro Extension Header

SMARTCARD Xplained Pro implements one Xplained Pro Standard Extension Header on page 6 marked with EXT in silkscreen. This header makes it possible to connect the board to any SMARTCARD supporting Xplained Pro MCU board. The pin-out definition for the extension header can be seen in Table 4-1, "SMARTCARD Xplained Pro Extension Header".

Table 4-1. SMARTCARD Xplained Pro Extension Header

Pin on EXT	Function	Description
1	ID_DATA	Communication to the ID chip
2	GND	Ground
3	NC	
4	NC	
5	CARD_DETECT	Card Detect
6	NC	
7	GCLK	GCLK Signal
8	NC	
9	RESET	Card Reset (GPIO generated)
10	VCC_ENABLE	Card VCC Enable
11	NC	
12	NC	
13	XCK	USART Clock
14	I/O	USART Input/Output (Bidirectional)
15	NC	
16	NC	
17	NC	
18	NC	
19	GND	Ground
20	VCC_TARGET	Target supply voltage (3.3V)

5. Hardware Revision History and Known Issues

5.1. Identifying Product ID and Revision

The revision and product identifier of Xplained Pro boards can be found in two ways; through Atmel Studio or by looking at the sticker on the bottom side of the PCB.

By connecting an Xplained Pro board to a computer with Atmel Studio running, an information window will pop up. The first six digits of the serial number, which is listed under kit details, contain the product identifier and revision. Information about connected Xplained Pro extension boards will also appear in the Atmel Kits window.

The same information can be found on the sticker on the bottom side of the PCB. Most kits will print the identifier and revision in plain text as *A09-nnnn\rr* where *nnnn* is the identifier and *rr* is the revision. Boards with limited space have a sticker with only a QR-code which contains a serial number string.

The serial number string has the following format:

"nnnnrrssssssssss"

n = product identifier

r = revision

s = serial number

The kit identifier for SMARTCARD Xplained Pro is 2593.

6. Document Revision History

Doc. rev	Date	Comment
42650A	01/2016	Initial document release

7. Evaluation Board/kit Important Notice

This evaluation board/kit is intended for use for FURTHER ENGINEERING, DEVELOPMENT, DEMONSTRATION, OR EVALUATION PURPOSES ONLY. It is not a finished product and may not (yet) comply with some or any technical or legal requirements that are applicable to finished products, including, without limitation, directives regarding electromagnetic compatibility, recycling (WEEE), FCC, CE or UL (except as may be otherwise noted on the board/kit). Atmel supplied this board/kit "AS IS," without any warranties, with all faults, at the buyer's and further users' sole risk. The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user indemnifies Atmel from all claims arising from the handling or use of the goods. Due to the open construction of the product, it is the user's responsibility to take any and all appropriate precautions with regard to electrostatic discharge and any other technical or legal concerns. EXCEPT TO THE EXTENT OF THE INDEMNITY SET FORTH ABOVE, NEITHER USER NOR ATMEL SHALL BE LIABLE TO EACH OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. No license is granted under any patent right or other intellectual property right of Atmel covering or relating to any machine, process, or combination in which such Atmel products or services might be or are used. Mailing Address: Atmel Corporation 1600 Technology Drive San Jose, CA 95110 USA

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