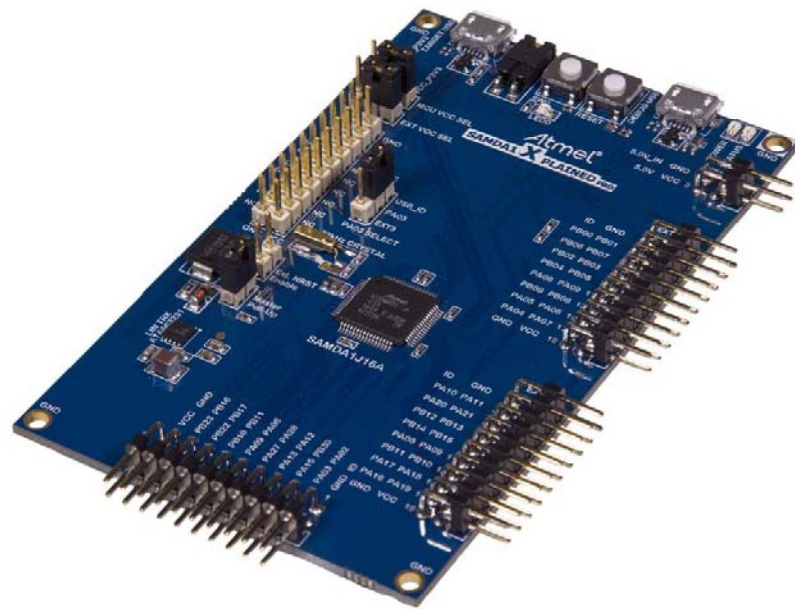# SAMDA1 Xplained Pro

USER GUIDE

Preface

The Atmel® SAMDA1 Xplained Pro evaluation kit is a hardware platform to evaluate the SAMDA1J16A microcontroller.

Supported by the Atmel Studio integrated development platform, the kit provides easy access to the features of the Atmel SAMDA1J16A and explains how to integrate the device in a custom design.

The Xplained Pro MCU series evaluation kits include an on-board EmbeddedDebugger, and no external tools are necessary to program or debug the SAMDA1J16A.

The Xplained Pro extension kits offer additional peripherals to extend the features of the board and ease the development of custom designs.

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1.   Introduction
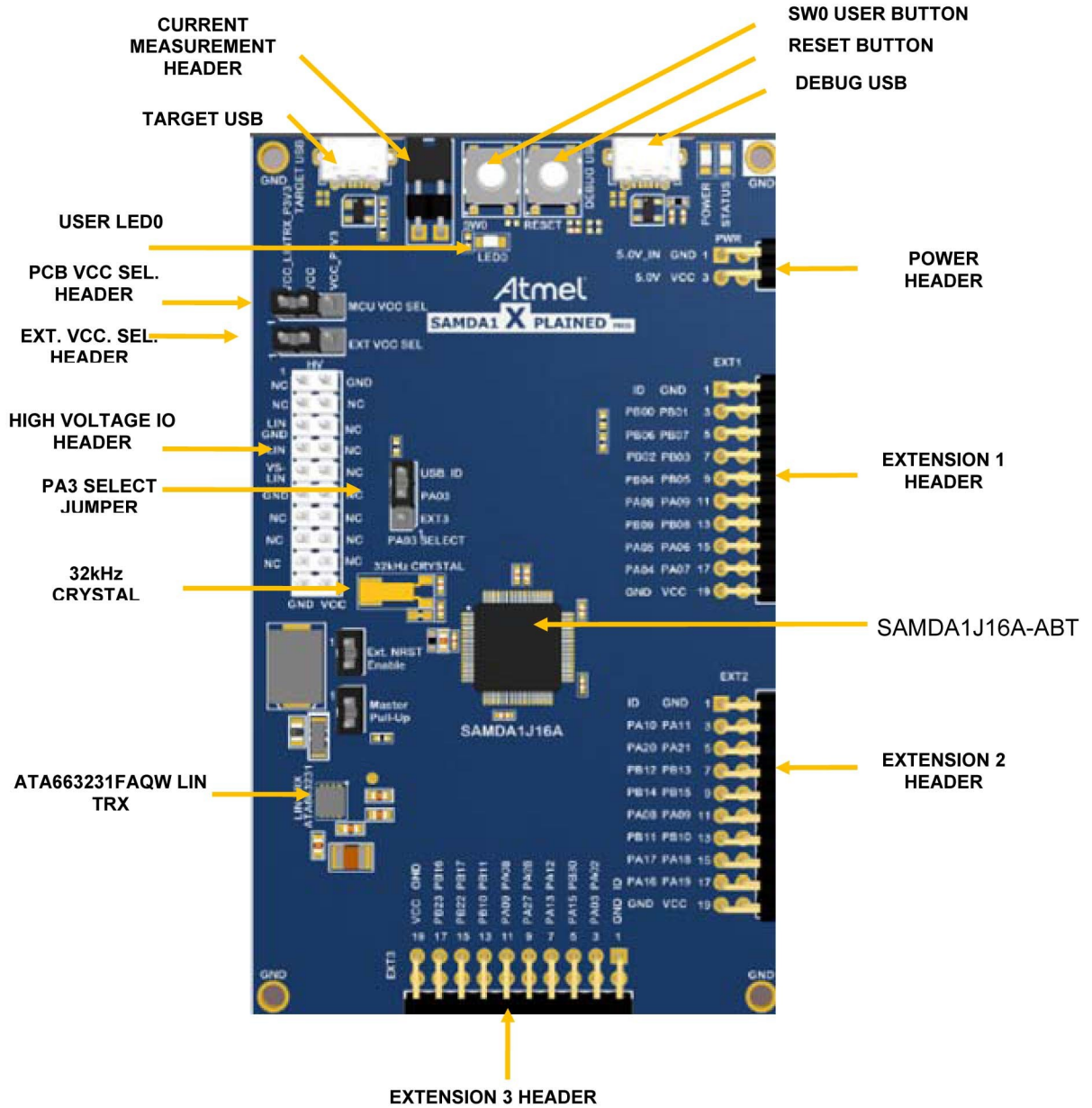
1.1.   Features

- Atmel SAMDA1J16A microcontroller
- Embedded debugger (EDBG)
    - USB interface
    - Programming and debugging on board SAMDA1J16A through Serial Wire Debug (SWD)
    - Virtual COM-port interface to target via UART
    - Atmel Data Gateway Interface (DGI) to target via SPI and TWI
    - Four GPIOs connected to target for code instrumentation
- Digital I/O
    - Two mechanical buttons (user and reset button)
    - One user LED
    - Three extension headers
- Four possible power sources
    - External power (3.3/5V)
    - External power (12V)
    - Embedded debugger USB (5V)
    - Target USB (5V)
- 32kHz crystal
- USB interface, device and reduced host mode
- On-board LIN Transceiver as System-Base Chip (SBC)
    - LIN Slave/Master configurable
    - Intregrated VREG regulates external VS_LIN (12V) to 3.3V

1.2.   Kit Overview

The SAMDA1 Xplained Pro evaluation kit is a hardware platform to evaluate the Atmel SAMDA1J16A.

The kit offers a set of features that enables the user to get started using SAMDA1J16A peripherals right away and to get an understanding of how to integrate the device in their own design.

Figure 1-1. Xplained Pro Evaluation Kit Overview

SW0 USER BUTTON

RESET BUTTON

DEBUG USB

CURRENT MEASUREMENT HEADER

TARGET USB

USER LED0

PCB VCC SEL. HEADER

EXT. VCC. SEL. HEADER

HIGH VOLTAGE IO HEADER

PA3 SELECT JUMPER

32kHz CRYSTAL

ATA663231FAQW LIN TRX

POWER HEADER

EXTENSION 1 HEADER

SAMDA1J16A-ABT

EXTENSION 2 HEADER

EXTENSION 3 HEADER

2. Getting Started

2.1. Quick-start

There are three steps to start exploring the Atmel Xplained Pro Platform:

- Download and install Atmel Studio
- Launch Atmel Studio
- Connect a Micro-B cable to the DEBUG USB port

2.2. Connecting the Kit

When connecting Atmel SAMDA1 Xplained Pro to your computer for the first time, the operating system will do a driver software installation. The driver file supports both 32-bit and 64-bit versions of Microsoft® Windows® XP and Windows 7.

Once connected the green power LED will be lit and Atmel Studio will autodetect which Xplained Pro evaluation- and extension kit(s) that's connected. You'll be presented with relevant information like datasheets and kit documentation. You also have the option to launch Atmel Software Framework (ASF) example applications. The target device is programmed and debugged by the on-board Embedded Debugger and no external programmer or debugger tool is needed. Refer to the Atmel Studio user guide for information regarding how to compile and program the kit.

2.3. Design Documentation and Related Links

The following list contains links to the most relevant documents and software for SAMDA1 Xplained Pro:

1. Xplained Pro products - Atmel Xplained Pro is a series of small-sized and easy-to-use evaluation kits for 8- and 32-bit Atmel microcontrollers. It consists of a series of low cost MCU boards for evaluation and demonstration of features and capabilities of different MCU families.
2. SAMDA1 Xplained Pro User Guide - PDF version of this User Guide.
3. SAMDA1 Xplained Pro Design Documentation - Package containing schematics, BOM, assembly drawings, 3D plots, layer plots etc.
4. EDBG User Guide - User guide containing more information about the onboard Embedded Debugger.
5. Atmel Studio - Free Atmel IDE for development of C/C++ and assembler code for Atmel microcontrollers.
6. IAR Embedded Workbench® for ARM®. This is a commercial C/C++ compiler that is available for ARM. There is a 30 day evaluation version as well as a code size limited kick-start version available from their website. The code size limit is 16KB for devices with M0, M0+ and M1 cores and 32KB for devices with other cores
7. Atmel sample store - Atmel sample store where you can order samples.

3. Xplained Pro

Xplained Pro is an evaluation platform that provides the full Atmel microcontroller experience. The platform consists of a series of Microcontroller (MCU) boards and extension boards that are integrated with Atmel Studio, have Atmel Software Framework (ASF) drivers and demo code, support data streaming and more. Xplained Pro MCU boards support a wide range of Xplained Pro extension boards that are connected through a set of standardized headers and connectors. Each extension board has an identification (ID) chip to uniquely identify which boards are mounted on a Xplained Pro MCU board. This information is used to present relevant user guides, application notes, datasheets and example code through Atmel Studio. Available Xplained Pro MCU and extension boards can be purchased in the Atmel Web Store.

3.1. Embedded Debugger

The SAMDA1 Xplained Pro contains the Atmel Embedded Debugger (EDBG) for on-board debugging. The EDBG is a composite USB device of three interfaces; a debugger, Virtual COM Port and Data Gateway Interface (DGI).

In conjunction with Atmel Studio, the EDBG debugger interface can program and debug the SAMDA1J16A. On the SAMDA1 Xplained Pro, the SWD interface is connected between the EDBG and the SAMDA1J16A. The Virtual COM Port is connected to a UART port on the SAMDA1J16A (see section Embedded Debugger Implementation for pinout), and provides an easy way to communicate with the target application through simple terminal software. It offers variable baud rate, parity and stop bit settings. Note that the settings on the target device UART must match the settings given in the terminal software.

The DGI consists of several physical data interfaces for communication with the host computer. See section Embedded Debugger Implementation for available interfaces and pinout. Communication over the interfaces is bidirectional. It can be used to send events and values from the SAMDA1J16A as a generic printf-style data channel. Traffic over the interfaces can be timestamped on the EDBG for more accurate tracing of events. Note that timestamping imposes an overhead that reduces maximal throughput. The DGI uses a proprietary protocol, and is thus only compatible with Atmel Studio.

The EDBG controls two LEDs on SAMDA1 Xplained Pro, a power LED and a status LED. Table 3-1 shows how the LEDs are controlled in different operation modes.

Table 3-1. EDBG LED Control

Operation mode	Power LED	Status LED
Normal operation	Power LED is lit when power is applied to the board	Activity indicator, LED flashed every time something happens on the EDBG
Bootloader mode (idle)	The power LED and the status LED blink simultaneously	
Bootloader mode (firmware upgrade)	The power LED and the status LED blink in an alternating pattern	

For further documentation on the EDBG, see the EDBG User Guide.

3.2.   Hardware Identification System

All Xplained Pro compatible extension boards have an Atmel ATSHA204 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 MCU 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 the relevant documents. Table 3-2 shows the data fields stored in the ID chip with example content.

Table 3-2. 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'
Min. Voltage [mV]	uint16_t	3000
Max. Voltage [mV]	uint16_t	3600
Max. Current [mA]	uint16_t	30

3.3.   Power Supply

3.3.1.   Power Source Selection

The SAMDA1 Xplained Pro kit can be powered by: (1) USB, (2) an external power 5V or 3.3 VCC source through the 4-pin power header, marked PWR or by (3) a LIN 12VDC input connected to HV header VS_LIN pin. The 4-pin connector is described in section Xplained Pro Power Header.

The available power sources and specifications are listed in Table 3-3.

Table 3-3. Power Sources for SAMDA1 Xplained Pro

Option	Power input	Voltage Req.	Current Req.	Connector Marking
Option1	External Power 1 (PWR 4-pin connector)	5V ±2 % (±100mV) for USB host operation. 4.3V to 5.5V if USB host operation is not required	Recommended minimum is 1A to be able to provide enough current for connected USB devices and the board itself. Recommended maximum is 2A due to the input protection maximum current specification.	PWR
Option 2A	Embedded debugger USB	4.4V to 5.25V (according to USB spec)	500mA (according to USB spec)	DEBUG USB

Option	Power input	Voltage Req.	Current Req.	Connector Marking
Option 2B	Target USB	4.4V to 5.25V (according to USB spec)	500mA (according to USB spec)	TARGET USB
Option 3	External Power 2 (HV 20-pin connector)	8-16VDC VREG (HV) regulator drops it to 5VDC and then VREG (5V) drops it to 3.3VDC to power EDBG and SAMDA1A device.	800mA max 12VDC power source	HV

The kit will automatically detect which power sources are available and make a selection automatically based on the following criteria:

1. Option1: External power 5V is connected and detected. On board descrete high current output VREG is used to regulate Vsupply from 5V to 3.3V and distribute it on the PCB and to the extension modules/PCBs. It overrides USB power source.
2. USB power:
   – Option 2A: Embedded debugger USB plug is connected or/and
   – Option 2B: Target USB plug is connected
3. Option3: External 12VDC is connected to VS_LIN pin on HV header. It can override any other source of power supplied (5V or 3V provided on PWR 4-pin header or any USB connector). Use header MCU_VCC_SEL and EXT_VCC_SEL to select source of VCC from either (1) VS_LIN or (2) USB/PWR 4-pin header.

Note: External power is required when the 500mA through the USB connector is not enough to power a connected USB device in a USB host application.

Table 3-4 shows how MCU_VCC_SEL (MCU VCC Selection) and EXT_VCC_SEL (Extension VCC Selection) power headers can be used to select VCC source for SAMDA1J16A and EDBG MCUs.

To select VS_LIN (12VDC) as the source of power for SAMDA1 Xplained Pro PCB connect pin1-2 on MCU_VCC_SEL header using a jumper.

To select 5V from either of the USB connectors or select VCC_P5V or VCC_P3V3 from the 4-pin power header as the source of power for SAMDA1 Xplained Pro PCB connect pin 2-3 on EXT_VCC_SEL header using a jumper.

Table 3-4. Selecting VCC source (VS_LIN versus USB/EXT5V/EXT3.3V)

Power Header	Jumper Placement	Configuration	VCC Source
MCU_VCC_SEL	Pin 1-2 (VCC_LINTRX_P3V3 – to - VCC)	VCC(SAMDA1J16A)= VCC_LINTRX_P3V3 VCC(EDBG)= VCC_LINTRX_P3V3	VS_LIN
	Pin 2-3 (VCC_P3V3 – to - VCC)	VCC(SAMDA1J16A)= VCC_P3V3 VCC(EDBG)= VCC_P3V3	USB/ VCC_P5/ VCC_P3V3
EXT_VCC_SEL	Pin 1-2 (VCC_LINTRX_P3V3 – to - VCC)	VCC(EXT1/EXT2/EXT3)= VCC_LINTRX_P3V3	VS_LIN
	Pin 2-3 (VCC_P3V3 – to - VCC)	VCC(EXT1/EXT2/EXT3)= VCC_P3V3	USB/ VCC_P5/ VCC_P3V3

3.3.2.   Measuring SAM DA1 Power Consumption

As part of an evaluation of the SAMDA1 it can be of interest to measure its power consumption. Because the PCB has a separate power plane (VCC_MCU_P3V3) it is possible to measure the current consumption by measuring the current that is flowing into this plane. The VCC_MCU_P3V3 plane is connected via a jumper to the main power plane (VCC_TARGET_P3V3) and by replacing the jumper with an ammeter it is possible to determine the current consumption. To locate the current measurement header, refer to Figure 1-1.

> **Warning:**   Do not power the board without having the jumper or an ammeter mounted since this can cause SAMDA1 to be powered through its I/O pins and cause undefined operation of the device.

3.4.   Standard Headers and Connectors

3.4.1.   Xplained Pro Standard Extension Header

All Xplained Pro kits have one or more dual row, 20-pin, 100mil extension headers. Xplained Pro MCU boards have male headers while Xplained Pro extensions 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 3-5. The extension headers can be used to connect a wide variety of Xplained Pro extensions to Xplained Pro MCU boards and to access the pins of the target MCU on Xplained Pro MCU board directly.

Table 3-5. Xplained Pro Extension Header

Pin Number	Name	Description
1	ID	Communication line to the ID chip on extension board
2	GND	
3	ADC(+)	Analog to digital converter , alternatively positive part of differential ADC

Pin Number	Name	Description
4	ADC(-)	Analog to digital converter , alternatively neg. part of differential ADC
5	GPIO1	GPIO
6	GPIO2	GPIO
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.

3.4.2. Xplained Pro Power Header

The power header can be used to connect external power to the SAMDA1 Xplained Pro kit. The kit will automatically detect and switch to the external power if supplied. The power header can also be used as a power supply for external peripherals or extension boards. Care must be taken not to exceed the total current limitation if the on-board regulator for the 3.3V regulated output (85mA). To locate the current measurement header, refer to Figure 1-1.

Table 3-6. Power Header PWR

Pin number	Name	Description
1	VEXT_P5V0	External 5V input
2	GND	Ground

Pin number	Name	Description
3	VCC_P5V0	Unregulated 5V (output derived from one of the input sources: (1) Ext. 5V input, (2) USB Target, (3) USB EDBG
4	VCC_P3V3_CON	Regulated 3.3V (output – used as main power for the kit)

Warning: If the board is powered from a battery source it is recommended to use the PWR header. If there is a power source connected to EDBG USB, the EDBG is activated and it will consume more power.

4. Hardware User Guide

4.1. Connectors

This chapter describes the implementation of the relevant connectors and headers on SAMDA1 Xplained Pro and their connection to the SAMDA1J16A. The tables of connections in this chapter also describes which signals are shared between the headers and on-board functionality.

4.1.1. I/O Extension Headers

The SAMDA1 Xplained Pro headers EXT1, EXT2 and EXT3 offer access to the I/O of the microcontroller in order to expand the board e.g. by connecting extensions to the board. These headers all comply with the standard extension header specified in section Xplained Pro Standard Extension Header . All headers have a pitch of 2.54 mm.

Table 4-1. Extension Header EXT1

Pin on EXT1	SAMDA1 Pin	Function	Shared Functionality
1. [ID]	-		ID signal from extension board
2. [GND]	-		GND
3. [ADC(+)]	PB00	AIN[8]	
4. [ADC(-)]	PB01	AIN[9]	
5. [GPIO1]	PB06	GPIO	
6. [GPIO2]	PB07	GPIO	
7. [PWM(+)]	PB02	TC6/WO[0]	
8. [PWM(-)]	PB03	TC5/WO[1]	
9. [IRQ/GPIO]	PB04	EXTINT[4]	
10. [SPI_SS_B/GPIO]	PB05	GPIO	
11. [TWI_SDA]	PA08	SERCOM2 PAD[0] I²C SDA	EXT2, EXT3 and EDBG
12. [TWI_SCL]	PA09	SERCOM2 PAD[1] I²C SCL	EXT2, EXT3 and EDBG
13. [USART_RX]	PB09	SERCOM4 PAD[1] UART RX[1]	
14. [USART_TX]	PB08	SERCOM4 PAD[0] UART TX[1]	
15. [SPI_SS_A]	PA05	SERCOM0 PAD[1] SPI SS	
16. [SPI_MOSI]	PA06	SERCOM0 PAD[2] SPI MOSI	

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[1] The SERCOM4 module is shared between EXT1, 2 and 3 UART's, but uses different pins on EXT1 and EXT2/3.

Pin on EXT1	SAMDA1 Pin	Function	Shared Functionality
17. [SPI_MISO]	PA04	SERCOM0 PAD[0] SPI MISO	
18. [SPI_SCK]	PA07	SERCOM0 PAD[3] SPI SCK	
19. [GND]	-	-	GND
20. [VCC]	-	-	VCC

Table 4-2. Extension Header EXT2

Pin on EXT1	Device pin	Function	Shared Functionality
1. [ID]	-		ID signal from extension board
2. [GND]	-		GND
3. [ADC(+)]	PA10	AIN[18]	
4. [ADC(-)]	PA11	AIN[19]	
5. [GPIO1]	PA20	GPIO	
6. [GPIO2]	PA21	GPIO	
7. [PWM(+)]	PB12	TC4/WO[0]	
8. [PWM(-)]	PB13	TC4/WO[1]	
9. [IRQ/GPIO]	PB14	EXTINT[14]	
10. [SPI_SS_B/GPIO]	PB15	GPIO	
11. [TWI_SDA]	PA08	SERCOM2 PAD[0] I²C SDA	EXT1, EXT3, and EDBG
12. [TWI_SCL]	PA09	SERCOM2 PAD[1] I²C SCL	EXT1, EXT3, and EDBG
13. [USART_RX]	PB11	SERCOM4 PAD[3] UART RX[2]	EXT3
14. [USART_TX]	PB10	SERCOM4 PAD[2] UART TX[3]	EXT3
15. [SPI_SS_A]	PA17	SERCOM1 PAD[1] SPI SS	
17. [SPI_MOSI]	PA18	SERCOM1 PAD[2] SPI MOSI	
18. [SPI_MISO]	PA16	SERCOM1 PAD[0] SPI MISO	

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[2] The SERCOM4 module is shared between EXT1, 2 and 3 UART's, but uses different pins on EXT1 and EXT2/3
[3] The SERCOM4 module is shared between EXT1, 2 and 3 UART's, but uses different pins on EXT1 and EXT2/3

Pin on EXT1	Device pin	Function	Shared Functionality
19. [SPI_SCK]	PA19	SERCOM1 PAD[3] SPI SCK	
20. [GND]			GND
21. [VCC]			VCC

Table 4-3. Extension Header EXT3

Pin on EXT1	Device pin	Function	Shared Functionality
1. [ID]	-		Communication line to ID chip on extension board
2. [GND]	-		GND
3. [ADC(+)]	PA02	AIN[8]	
4. [ADC(-)]	PA03	AIN[9][4]	USB_ID
5. [GPIO1]	PB30	GPIO	Onboard LED0
6. [GPIO2]	PA15	GPIO	Onboard SW0
7. [PWM(+)]	PA12	TC2/WO[0]	
8. [PWM(-)]	PA13	TC2/WO[1]	
9. [IRQ/GPIO]	PA28	EXTINT[8]	
10. [SPI_SS_B/GPIO]	PA27	GPIO	
11. [TWI_SDA]	PA08	SERCOM2 PAD[0] I²C SDA	EXT1, EXT2, and EDBG
12. [TWI_SCL]	PA09	SERCOM2 PAD[1] I²C SCL	EXT1, EXT2, and EDBG
13. [USART_RX]	PB11	SERCOM4 PAD[3] UART RX[5]	LIN TRX: ATA663231-RXD pin
14. [USART_TX]	PB10	SERCOM4 PAD[2] UART TX[5]	LIN TRX: ATA663231-TXD pin
15. [SPI_SS_A]	PB17	SERCOM5 PAD[1] SPI SS	
16. [SPI_MOSI]	PB22	SERCOM5 PAD[2] SPI MOSI	EDBG
17. [SPI_MISO]	PB16	SERCOM5 PAD[0] SPI MISO	EDBG and LIN TRX: ATA663231-EN pin
18. [SPI_SCK]	PB23	SERCOM5 PAD[3] SPI SCK	EDBG

---

[4] PA03 can be used by USB ID or EXT3 PIN4 by changing the position of the jumper JS300 on J307.
[5] The SERCOM4 module is shared between EXT1, 2 and 3 UART's, but uses different pins on EXT1 and EXT2/3.

Pin on EXT1	Device pin	Function	Shared Functionality
19. [GND]	-	-	GND
20. [VCC]	-	-	VCC

Table 4-4. High Voltage (HV) Header

Pin on HV	Function	Shared Functionality
NC		-
[GND]	GND	-
NC		-
NC		-
[LIN_GND]	LIN GND pin	-
NC		-
[LIN]	LIN signal to/from ATA663231 LIN TRX	-
NC		-
[VS_LIN]	LIN voltage supply (e.g. 12VDC)	-
NC		-
[GND]	GND	-
NC		-
NC		-
NC		-
NC		-
NC		-
NC		-
NC		-
[GND]	GND	-
[VCC]	VCC	-

4.2. Peripherals

4.2.1. Crystal

The SAMDA1 Xplained Pro kit contains one crystal that can be used as clock source for the SAMDA1 device. The crystal has a cut-strap next to it that can be used to measure the oscillator safety factor. This is done by cutting the strap and adding a resistor across the strap. More information about oscillator allowance and safety factor can be found in appnote AVR4100.

Table 4-5. External 32.768kHz Crystals

Pin on SAMDA1	Function
PA00	XIN32
PA01	XOUT32

4.2.2.   Mechanical Buttons

SAMDA1 Xplained Pro contains two mechanical buttons. One button is the RESET button connected to the SAMDA1 reset line and the other is a generic user configurable button. When a button is pressed it will drive the I/O line to GND.

Table 4-6. Mechanical Buttons

Pin on SAMDA1	Function
RESETN	RESET
PA15	SW0

4.2.3.   LED

There is one yellow LED available on the SAMDA1 Xplained Pro board that can be turned on and off. The LEDcan be activated by driving the connected I/O line to GND.

Table 4-7. External 32.768kHz Crystals

Pin on SAMDA1	Function
PB30	Yellow LED0

4.2.4.   USB

The SAMDA1 Xplained Pro has a micro USB receptacle for use with the SAMDA1 USB module. To be able to detect when a USB cable is connected, a GPIO is used to detect the VBUS voltage on the connector. The USB ID line is used to detect if a host mode cable is connected and will automatically switch on the power to the USB connector. The I/O connected to USB ID can be used to read the status of the line or manually override the voltage output. For other modes on the USB ID lines, refer to the USB organization specifications.

Table 4-8. USB Connections

Pin on SAMDA1	Function
PA14	VBUS Detection
PA03	USB ID
PA24	USB D-
PA25	USB D+

4.2.5.   LIN Transceiver

SAMDA1 Xplained Pro includes an on-board LIN transceiver device (ATA663231FAQW). This device serves as a system-base chip (SBC) in the sense that it consists of a LIN TRX and a built-in voltage regulator which can regulate supply input voltage VS_LIN from 12V to 3.3V and can support up to 85mA load current. VREG output can also be used to supply VCC to SAMDA1 MCU and extention boards provided that the total current consumption does not exceed the maximum ATA663231FAQW current

output limit (85mA). To support a larger current demand, provided on-board independent VREG (Imax=0.7A) is available.

LIN TRX section is integrated with SAMDA1 MCU such that SAMDA1 Xplained Pro kit can be configured as either a LIN slave or a LIN master node.

Transceiver's LIN IOs: LIN, VS_LIN, LIN_GND, are connected directly to HV Header (J203) for in-system connection with external LIN nodes.

4.3. Embedded Debugger Implementation

SAMDA1 Xplained Pro contains an Embedded Debugger (EDBG) that can be used to program and debug the SAMDA1J16A using Serial Wire Debug (SWD). The Embedded Debugger also include a Virtual Com port interface over UART, an Atmel Data Gateway Interface over SPI and TWI and it monitors four of the SAMDA1 GPIOs. Atmel Studio can be used as a front-end for the Embedded Debugger.

4.3.1. Serial Wire Debug

The Serial Wire Debug (SWD) uses two pins and a reset line to communicate with the target. For further information on how to use the programming and debugging capabilities of the EDBG, see section Embedded Debugger.

Table 4-9. SWD Connections

Pin on SAMDA1	Function
PA30	SWD clock
PA31	SWD data
RESETN	Target Reset

4.3.2. Virtual COM Port

The Embedded Debugger acts as a Virtual Com Port gateway by using one of the SAMDA1J16A UARTs. For further information on how to use the Virtual COM port see section Embedded Debugger.

Table 4-10. Virtual COM Port Connections

Pin on SAMDA1	Function
PA22	SERCOM3 PAD[0] UART TXD (SAMDA1 TX line)
PA23	SERCOM3 PAD[1] UART RXD (SAMDA1 RX line)

4.3.3. Atmel Data Gateway Interface

The Embedded Debugger features an Atmel Data Gateway Interface (DGI) by using either a SPI or I²C port. The DGI can be used to send a variety of data from the SAMDA1 to the host PC. For further information on how to use the DGI interface see section Embedded Debugger.

Table 4-11. DGI Interface Connections when using SPI

Pin on SAMDA1	Function
PB31	SERCOM5 PAD[1] SPI SS (Slave select) (SAMDA1 is Master)
PB16	SERCOM5 PAD[0] SPI MISO (Master In, Slave Out)

Pin on SAMDA1	Function
PB22	SERCOM5 PAD[2] SPI MOSI (Master Out, Slave in)
PB23	SERCOM5 PAD[3] SPI SCK (Clock Out)

Table 4-12. DGI Interface Connections when using I²C

Pin on SAMDA1	Function
PA08	SERCOM2 PAD[0] SDA (Data line)
PA09	SERCOM2 PAD[1] SCL (Clock line)

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 a Xplained Pro MCU 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 (four digit) followed by the two bit 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 SAMDA1 Xplained Pro is 2379.

5.2. Revision 2

Revision 2 of SAMDA1 Xplained Pro (A09-2379/2) is the initial released version.

5.3. EC/FCC Certification

SAMDA1 Xplained Pro evaluation PCB has been tested to certify for FCC compliance in USA/Canada (i.e. FCC Verification Part 15B) and EC in the EU (i.e. EN55022, EN55024 and AOC certificate).

Note: In conjunction with the EC and FCC tests, SAMDA1 Xplained Pro was subjected to ESD testing. Upon ESD testing SAMDA1 Xplained Pro was restarted and resumed its normal operating condition.

6. Document Revision History

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

Revision No.	History
9400B-SAM-10/16	Corrected PB10 and PB11 port assignment on PAD[2] and PAD[3] respectively
9400A-SAM-09/15	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.

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