Features

- **Complete Module for Standalone Use:**
    - **Atmel XMEGA256A3BU MCU**
    - **Projected Capacitive Multi Touch Controller**
    - **2.8in LCD**
    - **USB Connectivity**
    - **SD Card**
    - **Expansion Header for Development (*PCB Rev A2*)**
- **MCU:**
    - **ATXMEGA256A3BU**
    - **256KBytes Flash / 8Kbytes Boot**
    - **16KBytes RAM**
    - **4KBytes EEPROM**
    - **USB 2.0 Full speed (12Mbps) and low speed (1.5Mbps)**
- **Storage:**
    - **SD/MMC**
- **Touch:**
    - **Atmel maXTouch mXT143E Touch Controller**
    - **Supports up to 8 touches**
- **Display:**
    - **Displaytech SDT028ATFT 2.8in LCD**
    - **320x240 resolution**
    - **20 ms typical response time**
    - **SPI interface via ILI9341 / ILI9320 (or compatible)**
    - **Optional support for 18-bit parallel interface**
    - **White LED backlight**
- **Cover Panel:**
    - **1.2mm Soda Lime Glass**
    - **Optional 0.7mm Gorilla Glass™**
- **Expansion Header: (*PCB Rev A2*)**
    - **Hirose DF40C series mezzanine connector**
    - **I2C, SPI and USART Buses**
    - **Interrupts**
    - **I/O**
    - **ADC, DAC, Analog Comparator**
    - **Timer OC, PWM/AWeX**

PDA TM2801: 2.8in PCAP Touch Module

1303-5-6

Contents

1 Module Overview

1.1 PCB Connections

Figure 1 - PCB Connectors (10-01034-A1)
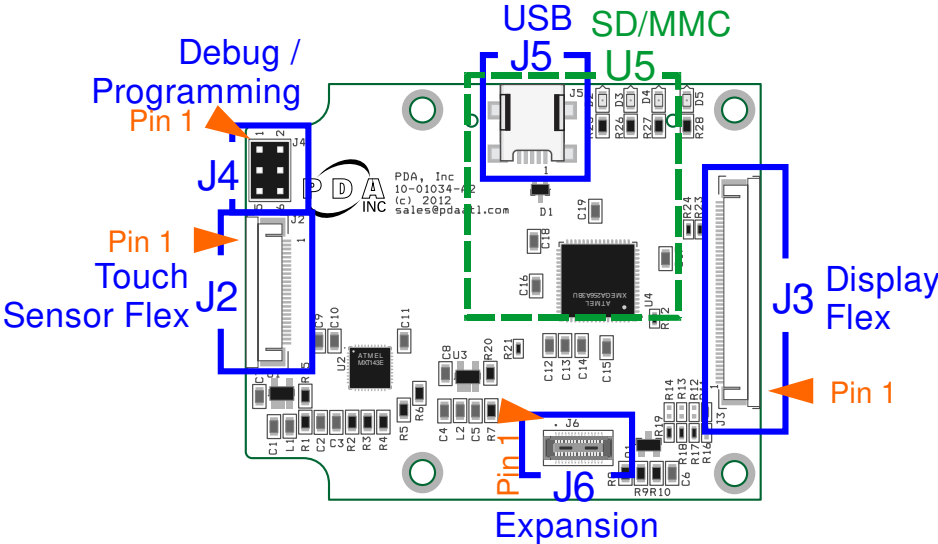
Figure 2 – Main PCB Connectors (10-01034-A2)

NOTE: The SD/MMC Slot (U5) is on the underside of the PCB
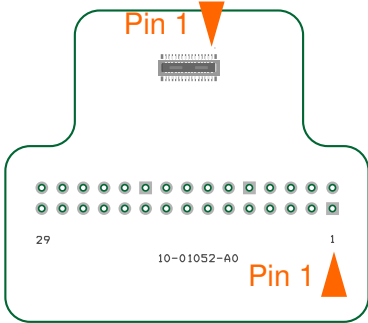
Figure 3 – Expansion PCB (10-01052-A0)

The following abbreviations and notations are used for the pin descriptions below.   Note signal direction is given *with respect to the touch module and on-board MCU* – not the device connected:

MXT	maXTouch touchscreen	LCD	LCD Panel
SD	SD/MMC	USB	Universal Serial Bus
Exp	Expansion (PCB Rev A2 or greater)	XMega Port	Identification of XMega Port/Pin

I	Input only	OD	Open drain output
O	Output only, push-pull	P	Power or Ground

1.2 Debug Connector J1

Connector J1 carries signals used to debug the MaXTouch Touchscreen Controller. Debug Connector is only present on the 10-01034-A1 revision PCB. As of the 10-01034-A2 revision PCB, these signals are accessible on the Expansion connector.

Pin	Type	Description
1	P	+5Vdc
2	-	*N/C*
3	O	~MXT_CHG [1]
4	-	N/C
5	I	I^{2}C SDA [2]

Pin	Type	Description
6	I/O	I^{2}C SCL [2]
7	I	~MXT_RESET [1]
8	P	GND
9	O	MXT DBG DATA
10	O	MXT DBG CLK

NOTE 1 – Pulled up through 47kΩ resistor
NOTE 2 – Pulled up through 3.3kΩ resistor

1.3 Touch Sensor Flex Connector J2

Connector J2 connects to the touch sensor flex and carries signals used by the maXTouch controller to detect input on the touch sensor.

Pin	Type	Description
1	I/O	X1
2	I/O	X3
3	I/O	X5
4	I/O	X7
5	I/O	X9
6	I/O	X11
7	P	GND
8	I/O	Y0
9	I/O	Y1
10	I/O	Y2
11	I/O	Y3
12	I/O	Y4
13	I/O	Y5

Pin	Type	Description
14	I/O	Y6
15	I/O	Y7
16	I/O	Y8
17	I/O	Y9
18	I/O	Y10
19	P	GND
20	I/O	X12
21	I/O	X10
22	I/O	X8
23	I/O	X6
24	I/O	X4
25	I/O	X2
26	I/O	X0

1.4 Display Flex Connector J3

Connector J3 connects to the LCD panel flex and carries signals between the host and the LCD panel.

Pin	Type	Description	Pin	Type	Description
1	P	Vin	24	O	GND (DB8)
2	P	LED_K1 (Backlight Cathode)	25	O	GND (DB7)
3	P	LED_K2 (Backlight Cathode)	26	O	GND (DB6)
4	P	LED_K3 (Backlight Cathode)	27	O	GND (DB5)
5	P	LED_K4 (Backlight Cathode)	28	O	GND (DB4)
6	-	*N/C (IM0)*	29	O	GND (DB3)
7	-	*N/C (IM1)*	30	O	GND (DB2)
8	-	*N/C (IM2)*	31	O	GND (DB1)
9	-	*N/C (IM3)*	32	O	GND (DB0)
10	-	*N/C (FMARK)*	33	O	~CS [1]
11	O	GND (VSYNC)	34	O	WR
12	O	GND (HSYNC)	35	O	RS / SCL
13	O	GND (DOTCLK)	36	O	GND (RD)
14	O	GND (ENABLE)	37	O	RESET [1]
15	O	GND (DB17)	38	I	SDO
16	O	GND (DB16)	39	O	SDI
17	O	GND (DB15)	40	P	Vdd
18	O	GND (DB14)	41	P	GND
19	O	GND (DB13)	42	-	*Reserved (RES1)*
20	O	GND (DB12)	43	-	*Reserved (mXT ~CHG)* [1]
21	O	GND (DB11)	44	-	*Reserved (SDA)* [2]
22	O	GND (DB10)	45	-	*Reserved (SCL)* [2]
23	O	GND (DB9)			

NOTE 1 – Pulled up through 47kΩ resistor
NOTE 2 – Pulled up through 3.3kΩ resistor

1.5 Programming/Debug J4

Connector J4 connects to the MCU's PDI programming and debug interface.

Pin	Type	Description	Pin	Type	Description
1	I/O	PDI_DAT	4	-	*N/C*
2	P	V_{dd}	5	I	~RESET / PDI_CK
3	-	*N/C*	6	P	GND

1.6 Universal Serial Bus (USB) J5

Connector J5 connects to the MCU's USB interface.

Pin	Type	Description
1	P	+5V$_{BUS}$
2	I/O	D-
3	I/O	D+
4	-	*N/C*
5	P	GND

Pin	Type	Description
6	P	GND
7	P	GND
8	P	GND
9	P	GND

1.7 Expansion J6

Connector J6 (Hirose DF40-C-30DS-0.4V(51)) provides access to many system signals as well as additional I/O and signals to support development and prototyping.   The Expansion Interface PCB (10-01052-A0) can be used to access these signals.   Signals on the Expansion PCB follow the same sequence as shown in the table below. See section 2.7 for additional details.

Note: Some signals provided through the Expansion Interface are used by the system – these signals are indicated via gray highlighting in the table below.   Care should be taken when using this interface and these pins in particular to ensure the effect on system operation is understood and no damage will occur. Refer to the Atmel XMega256A3BU datasheet for details on available pin functions.

Pin	Type	Description	MXT	LCD	SD	XMega Port
1	P	Vin				
2	P	Vin				
3	I/O	I^{2}C SDA [2]	•			C0
4	O	I^{2}C SCL [2]	•			C1
5	I	~MXT_CHG [1]	•			C2
6	O	WR		•		C3
7	O	~CS [1]		•		C4
8	O	MOSI		•	•	C5
9	I	MISO		•	•	C6
10	O	SCK		•	•	C7
11	I/O	*INT, TC, I^{2}C: SDA*				E0
12	I/O	*INT, TC, I^{2}C SCL,USART: XCK*				E1
13	I/O	*INT, TC, USART: RXD*				E2
14	I/O	*INT, TC, USART: TXD*				E3
15	O	~SD_CS [1]			•	B0

Pin	Type	Description	MXT	LCD	SD	XMega Port
16	I	~SD_Detect [1]			•	B1
17	O	~RESET_LCD [1]		•		B2
18	I/O	*INT, ADC, AC, DAC*				B3
19	I/O	*INT, ADC, AC, DAC, JTAG*				B4
20	I/O	*INT, ADC, AC, DAC, JTAG*				B5
21	I/O	*INT, ADC, AC, DAC, JTAG*				B6
22	I/O	*INT, ADC, AC, DAC, JTAG*				B7
23	O	LED_EN		•		F0
24	I	XMEGA: ~RESET / PDI_CK				•
25	I/O	XMEGA: PDI_DAT				•
26	O	~RESET_MXT [1]	•			A7
27	O	MXT DBG DATA	•			
28	O	MXT DBG CLK	•			
29	P	GND				
30	P	GND				

NOTE 1 – Pulled up through 47kΩ resistor
NOTE 2 – Pulled up through 3.3kΩ resistor

1.8 SD/MMC U5

The SD/MMC Connector U5 connects to the MCU's SPI and I/O.

Pin	Type	Description
1	O	~SD_CS (SD DAT3) [1]
2	O	MOSI (SD CMD)
3	P	GND
4	P	V_{dd}
5	O	SCK (SD CLK)
6	P	GND
7	I	MISO (SD DAT0)
8	-	*N/C (SD DAT1)*

Pin	Type	Description
9	-	*N/C (SD DAT2)*
10	I	~SD_Detect (SD C/D) [1]
11	P	GND
12	-	*N/C (SD W/P)*
13	P	GND (SD SHELL)
14	P	GND (SD SHELL)
15	P	GND (SD SHELL)
16	P	GND (SD SHELL)

NOTE 1 – Pulled up through 47kΩ resistor

1.9 XMEGA U4

The MCU's pins are assigned as shown below. Note a pin's functionality within the system is indicated in the columns located to the right of the description.

Pin	Type	Description	MXT	LCD	SD	USB	Exp
1	-	*N/C*					
2	-	*N/C*					
3	O	LED-	•	•			
4	-	*N/C*					
5	O	~RESET_MXT [1]	•				•
6	O	~SD_CS [1]			•		•
7	I	~SD_Detect [1]			•		•
8	O	~RESET_LCD [1]		•			•
9	-	*Expansion Interface[3] (B3)*					•
10	-	*Expansion Interface[3] (B4)*					•
11	-	*Expansion Interface[3] (B5)*					•
12	-	*Expansion Interface[3] (B6)*					•
13	-	*Expansion Interface[3] (B7)*					•
14	P	GND					
15	P	V_{dd}					
16	I/O	I^2C SDA [2]	•				•
17	O	I^2C SCL [2]	•				•
18	I	~MXT_CHG [1]	•				•
19	O	WR		•			•
20	O	~CS [1]		•			•
21	O	MOSI		•	•		•
22	I	MISO		•	•		•
23	O	SCK		•	•		•
24	P	GND					
25	P	V_{dd}					
26	-	*Reserved (RES1)*					
27	-	*N/C*					
28	O	LED D4					
29	O	LED D5					
30	O	LED D2					
31	O	LED D3					
32	I/O	D-				•	
33	I/O	D+				•	

Pin	Type	Description	MXT	LCD	SD	USB	Exp
34	P	GND					
35	P	V_{dd}					
36	-	*Expansion Interface[3] (E0)*					•
37	-	*Expansion Interface[3] (E1)*					•
38	-	*Expansion Interface[3] (E2)*					•
39	-	*Expansion Interface[3] (E3)*					•
40	-	*N/C*					
41	-	*N/C*					
42	-	*N/C*					
43	-	*N/C*					
44	P	GND					
45	P	V_{dd}					
46	O	LED_EN		•			•
47	-	*N/C*					
48	-	*N/C*					
49	-	*N/C*					
50	-	*N/C*					
51	-	*N/C*					
52	P	GND					
53	P	V_{dd}					
54	-	*N/C*					
55	-	*N/C*					
56	I/O	PDI_DAT					•
57	I	~RESET / PDI_CK					•
58	-	*N/C*					
59	-	*N/C*					
60	P	GND					
61	P	V_{dd}					
62	-	*N/C*					
63	-	*N/C*					
64	-	*N/C*					
65	P	GND (Thermal Pad)					

NOTE 1 – Pulled up through 47kΩ resistor
NOTE 2 – Pulled up through 3.3kΩ resistor
NOTE 3 – Expansion Interface not available on PCB Rev A1

2   Overview of the 2.8in PCAP Touch Module

2.1   Introduction

The 2.8in PCAP Touch Module is a touchscreen module offering best-in-class projected capacitance multi-touch functionality combined with a 2.8in LCD panel.

With an onboard Atmel XMEGA256A3BU MCU, the module offers standalone operation based on a subset of functionality available from the Atmel XMEGA A3BU Xplained MCU Board and Atmel mXT143E Xplained Module. The module has been designed to effectively reproduce the combined schematic of these Xplained boards:

PDA TM2801 2.8in	**=**	Atmel XMEGA A3BU Xplained MCU Board
		Atmel mXT143E Routing Board
		PDA TM2800 mXT143E Xplained Board
		+ Expansion Interface
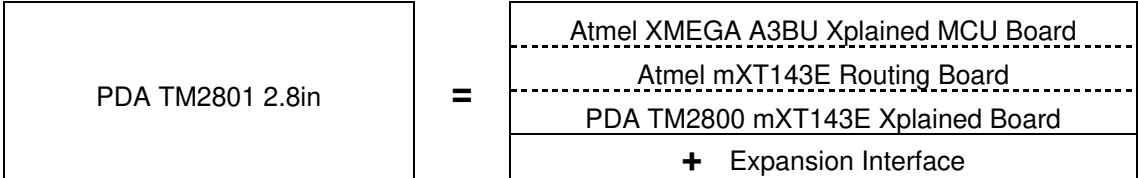
As shown in Figure 4 below, the module MCU offers access to the touchscreen controller, display interface, USB and storage for easy development and integration.

PDA 2.8in PCAP Touch Module
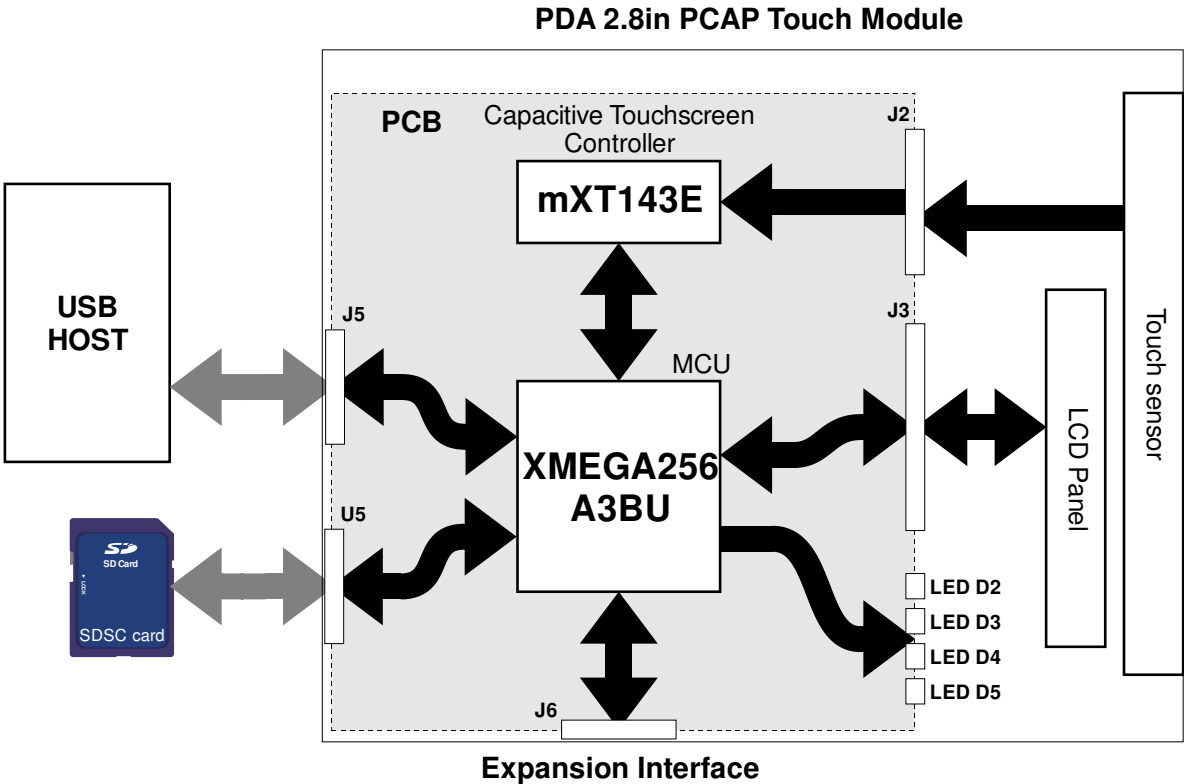
Figure 4 - Functional Block Diagram

2.2 Understanding Unfamiliar Concepts

Throughout this document, the functionality of the module sub-system will be outlined and summarized. However, the user is encouraged to refer to the resources and documents below in order to gain a more thorough understanding of each sub-system.

• Atmel XMega256A3BU (www.atmel.com)

• Atmel maXTouch mXT143E Datasheet (www.atmel.com)

• Displaytech SDT028ATFT Datasheet (www.displaytech-us.com)

• For a basic overview of I^{2}C communication, refer to Section 5 of this document

• Universal Serial Bus (www.usb.org)

• Secure Digital Card (www.sdcard.org)

2.3 XMEGA A3BU Microcontroller

The module is designed around the Atmel XMEGA256A3BU microcontroller. This microcontroller has a variety of features and flexibility and provides a good starting point for development and evaluation of the PDA TM2801 touch module. For additional details, see the XMEGA documentation available from Atmel's website (www.atmel.com).

The MCU is directly connected to all of the module sub-systems, providing a capable full-featured platform for development.

2.3.1 Atmel Software Framework

The Atmel Software Framework or ASF (http://asf.atmel.com) contains example projects targeting the XMEGA256A3BU MCU and its various features. This provides an excellent resource, in combination with the XMEGA documentation, for the user to become acquainted with the capabilities of the MCU. Of particular interest with this module, the ASF contains sample code for implementing the USB device interface available on the XMEGA256A3BU.

2.4 LCD Panel

The module MCU has a direct connection to the LCD panel interface (Connector J3) which includes a serial interface to the ILI9341 (or ILI9320 or compatible) display driver IC and LED backlight control. The LCD Backlight control is performed using the LED_EN and LED- signals (XMEGA U4 Pins 46 and 3, respectively) as shown in Figure 5 below:
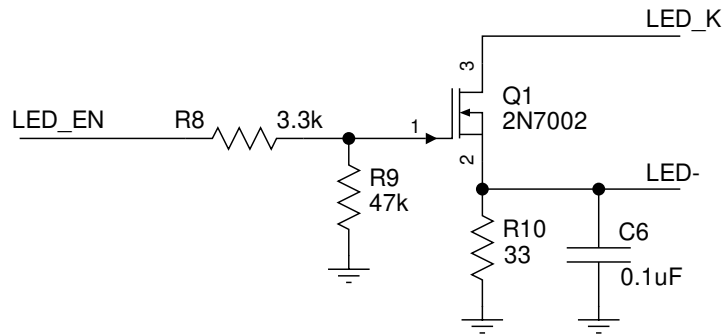
Figure 5 - LED Backlight Control

2.4.1 Atmel Software Framework

The Atmel Software Framework includes projects targeting the ILI9341 Display Driver IC.

2.5   maXTouch Capacitive Touchscreen Controller

The module touch screen interface is based on the Atmel maXTouch mXT143E Touch Controller.

The touch controller scans the touch sensor and signals the MCU with an active low interrupt signal (~MXT_CHG) when new touch data is available.   Data communication with the maXTouch controller is performed over an I^{2}C interface (XMEGA U4 Pins 16, 17).   The I^{2}C address of the touch controller is set to 0x4A.

NOTE: Pull-up resistors for the I^{2}C SCL and SDA lines are located at R4 and R3 respectively. A pull-up resistor for the ~MXT_CHG interrupt signal is located at R6.

2.5.1 maXTouch Controller Interface

Details of the maXTouch communication protocol are beyond the scope of this document.   However information is provided below to facilitate evaluation and initial development.

The module is pre-loaded with a configuration already optimized for this touch sensor and panel, so the developer need only focus on interfacing with the device.   When developing the maXTouch controller interface during evaluation and development, care should be taken to avoid changing the maXTouch configuration or committing changes to NV storage on the maXTouch controller.

To get started with development, the user is *strongly* encouraged to leverage existing code available from the resources outlined in the following sections.

2.5.1.1   Atmel Software Framework

The Atmel Software Framework (http://asf.atmel.com) contains examples of code for interfacing with devices in the maXTouch family of touch controllers.   Many of the code examples found in the ASF are targeted for the mXT143E Xplained module and support the XMEGA256A3BU as the host MCU. With very minor modification, these projects are directly applicable to this module.

2.5.1.2   Linux Kernel / Android

While the Linux or Android OS may not be applicable to XMEGA256A3BU, there is a growing code base in the Linux and Android communities that can interface with maXTouch touchscreen controllers.   These drivers provide an excellent starting point for development with embedded firmware running on the XMEGA.

The Linux Kernel (www.kernel.org) has included basic support for maXTouch devices since version 2.6.36.   The mainline driver has undergone considerable evolution since then.

In addition, Atmel maintains patches (www.github.com/atmel-maxtouch/linux) which provide numerous out-of-cycle improvements to the mainline Linux Kernel driver.

2.6 SD/MMC Connector

The module includes a SD/MMC Connector (Connector U5) to provide optional removable storage in the user's developments.   This feature is currently experimental.

2.6.1 Atmel Software Framework

The Atmel Software Framework (in additional to many online resources) includes example projects that implement SD/MMC support.

2.7 Expansion Interface

As of PCB revision A2, the Debug connector is replaced with an Expansion Connector [(Connector J6)](Connector J6).   In addition to the signals previously available through the Debug Connector, the expansion interface provides broader access to system signals, spare I/O and a selection signals to support prototyping and development.   The Main PCB uses the Hirose DF40-C-30DS-0.4V(51)   mezzanine connector.

The accompanying Expansion PCB (10-01052-A0) uses the Hirose DF40-C-30DP-0.4V(51) mezzanine connector. Signals on the Expansion PCB are routed one-to-one from the mezzanine connector to an array of through-holes suitable for direct soldering or populating with any configuration of connectors featuring 0.025in terminals with 0.100in pitch.

Note: Some signals provided through the Expansion Interface are used by the system for communication with the LCD, Touchscreen Controller and SD/MMC interface and are of varying criticality to normal operation. Care should be taken when using this interface. Refer to section 1.7 for details on which signals are used elsewhere as well as the Atmel XMega256A3BU datasheet for details on available pin functions.

3 Getting Started

As previously noted, the module was designed to effectively consolidate the functionality of the XMEGA A3BU Xplained and mXT143E Xplained board into a single, standalone module. This configuration provides a quick, easy way to evaluate the performance of the touchscreen and display as well as offering a convenient platform for development.

In addition, Atmel provides free development tools and coding resources to support development using Atmel Studio (www.atmel.com) and the Atmel Software Framework (http://asf.atmel.com).

The following sections outline the process of setting up and programming the module.

3.1 Hardware Setup

The module is powered by the USB connector even if the USB interface to a host is not being used. Therefore, the module can be powered either by connecting to a USB host or by connecting USB power supply.

3.2 Demo Firmware

The module is pre-loaded with example firmware to demonstrate basic touchscreen and display functionality. This demo firmware will begin as soon as the device is powered up.

3.3 Loading Firmware

The user is encouraged to experiment with the various sample projects available in the Atmel Software Framework (http://asf.atmel.com). In order demonstrate the functionality of the module, several of the example projects from the ASF have been compiled for the XMEGA256A3BU and binary images (HEX files) are available for download from the PDA website. See details below.

3.3.1 Programming Tools

Before the example HEX files can be loaded, you must first ensure that the necessary programmer (supporting PDI programming) with associated driver/software is installed on your development system. Consult the manual and/or support resources for your programmer for instructions on installation and use.

The programmer should be connected to the 6-pin PDI connector J4.

3.3.2 Programming the Example Code

Download the example HEX files from http://www.pdaatl.com/modules/2.8in/tm2801demo.zip and unzip to a working folder. Files are named according to the example project.

4 Specifications

For complete specifications, refer to the datasheets listed in section 2.2 for the various sub-system components outlined in Sections 2.4 and 2.5.

4.1 Mechanical Specifications

Drawings and CAD models available upon request.
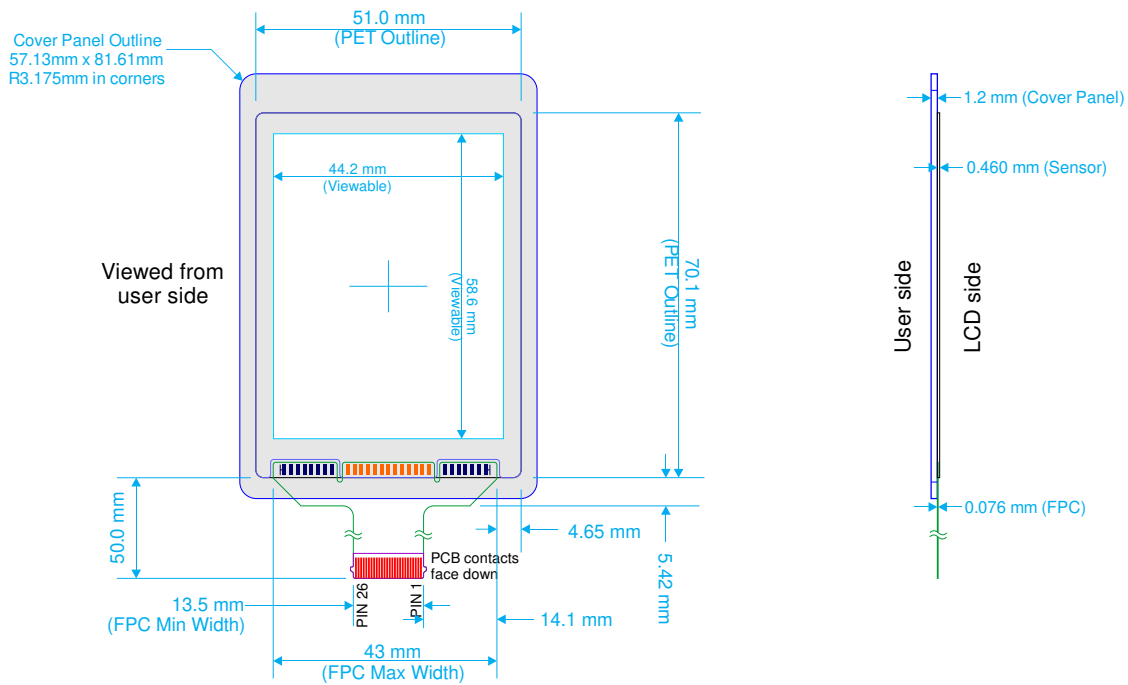

Figure 6 - Sensor Only Dimensions

Sensor (P/N: 21-00001-A0) may be purchased individually.
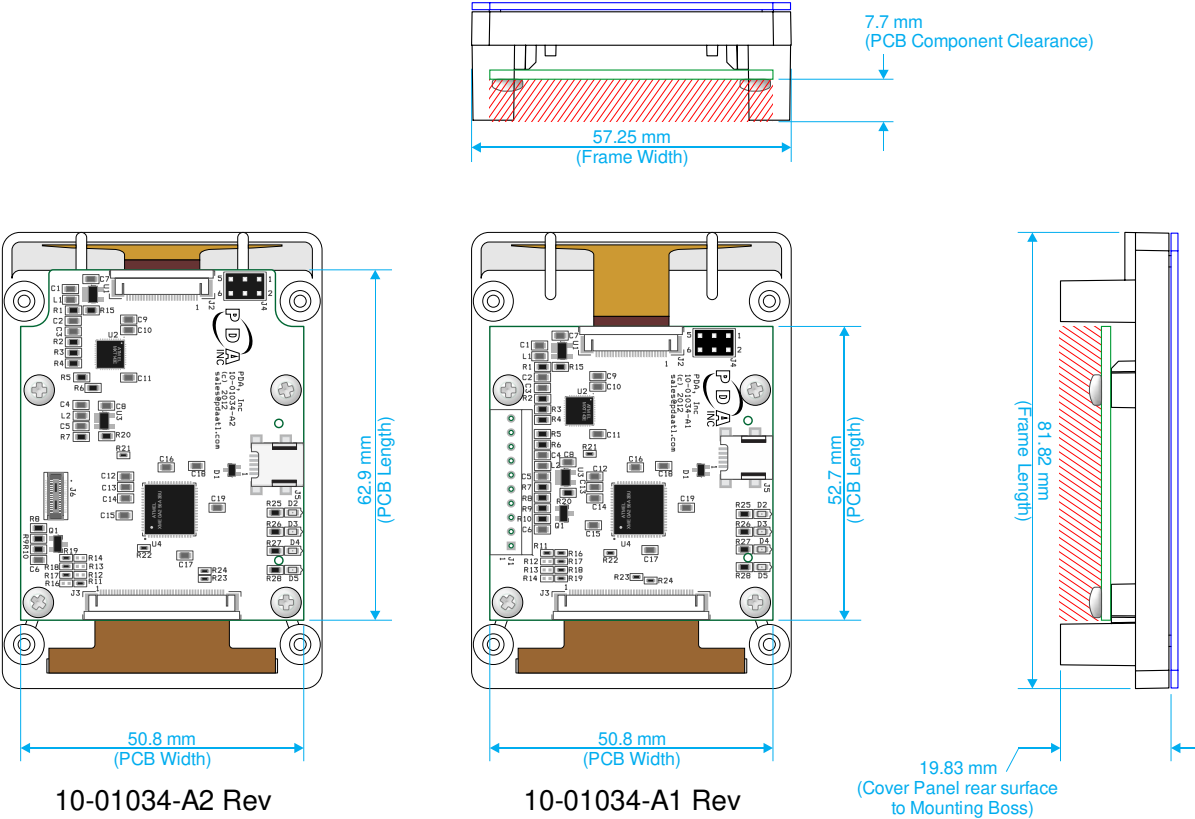Minimum order quantities apply. Contact PDA for details.

7.7 mm
(PCB Component Clearance)

57.25 mm
(Frame Width)

62.9 mm
(PCB Length)

52.7 mm
(PCB Length)

81.82 mm
(Frame Length)

50.8 mm
(PCB Width)

50.8 mm
(PCB Width)

19.83 mm
(Cover Panel rear surface
to Mounting Boss)

10-01034-A2 Rev

10-01034-A1 Rev

Figure 7 – Module Dimensions

4.2 Absolute Maximum Specifications

Parameter	Value
Operating temp	0°C to $+70^{o}$C
Storage temp	-40°C to $+85^{o}$C
Vdd	-0.5 to +3.6V
Max continuous pin current, any control or drive pin	±40 mA
Voltage forced onto any pin	-0.5V to (Vdd + 0.5) Volts

> ⚠ **CAUTION:** Stresses beyond those listed under *Absolute Maximum Specifications* may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or other conditions beyond those indicated in the operational sections of this specification are not implied. Exposure to absolute maximum specification conditions for extended periods may affect device reliability.

4.3 Recommended Operating Conditions

Parameter	Value
Vin	3.3V ±5 percent
Supply ripple + noise	±20 mV

4.4 DC Specifications

Vdd = 3.3, Ta = recommended range, unless otherwise noted

Parameter	Description	Min	Typ	Max	Units	Notes
V_{IL}	Low input logic level	- 0.5	–	0.3 Vdd	V	
V_{HL}	High input logic level	0.7 Vdd	–	Vdd + 0.5	V	
V_{OL}	Low output voltage	–	–	0.2Vdd	V	
V_{OH}	High output voltage	0.8Vdd	–	–	V	
I_{IL}	Input leakage current	–	–	1	µA	

4.5 I2C-compatible Bus Specifications

Parameter	Operation
Address (maXTouch 143E)	0x4A
Maximum bus speed (SCL)	400 kHz

I2C Specification	Version 2.1

4.6 Power Consumption

| Vdd (V)	Mode	Idd (mA)
3.3Vdc	mxt143E in free run and LCD backlight ON full.	60ma

4.7 Part Number

Part Number	Description
90-00003-A0	2.8" Touchscreen Module (PCB Rev A1)
90-00003-A1	2.8" Touchscreen Module with Expansion Interface (PCB Rev A2)

5 I2C Basics (I2C-compatible Operation)

5.1 Interface Bus

The device communicates with the host over an I^{2}C-compatible bus, in accordance with version 2.1 of the I^{2}C specification. The following sections give an overview of the bus; more detailed information is available from www.i2C-bus.org. Devices are connected to the I^{2}C-compatible bus as shown in Figure 8 both bus lines are connected to Vdd via pull-up resistors. The bus drivers of all I^{2}C-compatible devices must be open-drain type. This implements a wired "AND" function that allows any and all devices to drive the bus, one at a time. A low level on the bus is generated when a device outputs a zero.

Figure 8. I^{2}C-compatible Interface Bus
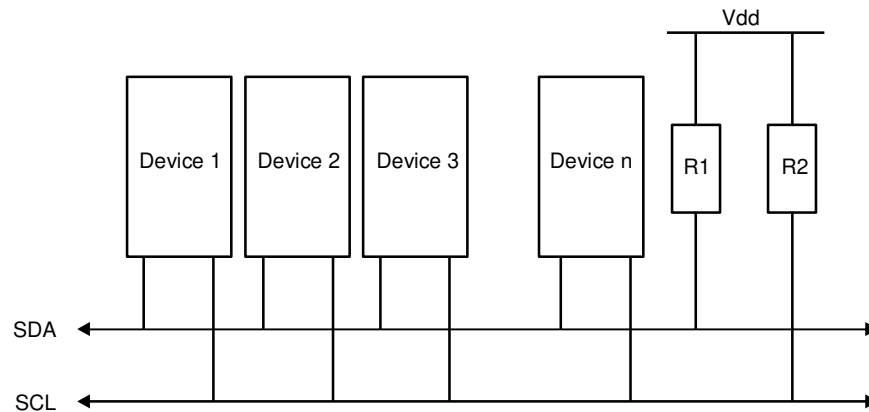
5.2 Transferring Data Bits

Each data bit transferred on the bus is accompanied by a pulse on the clock line. The level of the data line must be stable when the clock line is high; the only exception to this rule is for generating START and STOP conditions.

Figure 9. Data Transfer
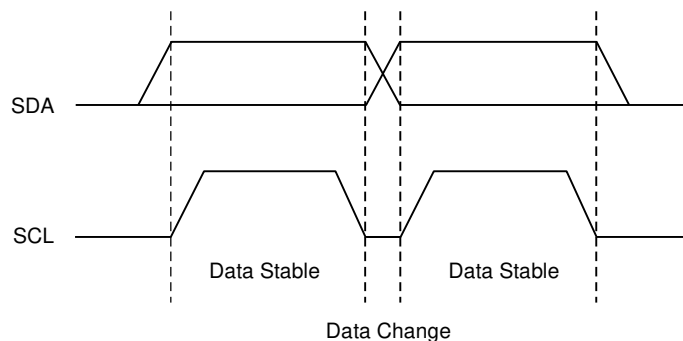
5.3 START and STOP Conditions

The host initiates and terminates a data transmission. The transmission is initiated when the host issues a START condition on the bus, and is terminated when the host issues a STOP condition. Between the START and STOP conditions, the bus is considered busy. As shown in Figure 10 START and STOP conditions are signaled by changing the level of the SDA line when the SCL line is high.

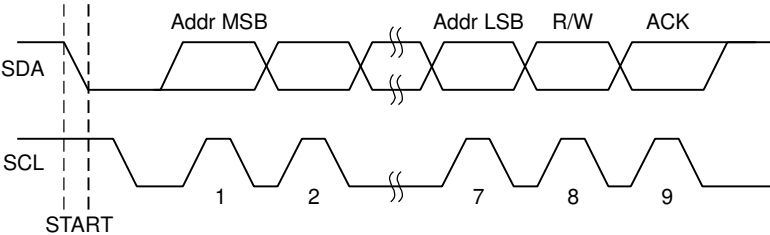**Figure 10.   START and STOP Conditions**
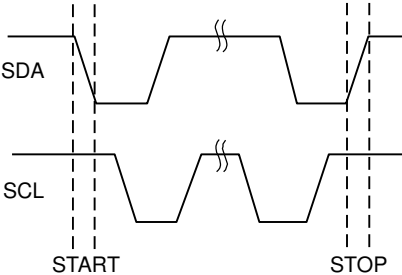
5.4 Address Byte Format

All address bytes are 9 bits long. They consist of 7 address bits, one READ/WRITE control bit and an acknowledge bit. If the READ/WRITE bit is set, a read operation is performed. Otherwise a write operation is performed. An address byte consisting of a slave address and a READ or a WRITE bit is called SLA+R or SLA+W, respectively. When the device recognizes that it is being addressed, it acknowledges by pulling SDA low in the ninth SCL (ACK) cycle.

The most significant bit of the address byte is transmitted first.

Figure 11.   Address Byte Format

5.5 Data Byte Format

All data bytes are 9 bits long, consisting of 8 data bits and an acknowledge bit. During a data transfer, the host generates the clock and the START and STOP conditions. The slave device is responsible for acknowledging the reception. An acknowledge (ACK) is signaled by the slave device pulling the SDA line low during the ninth SCL cycle. If the slave device leaves the SDA line high, a NACK is signaled.

Figure 12.   Data Byte Format
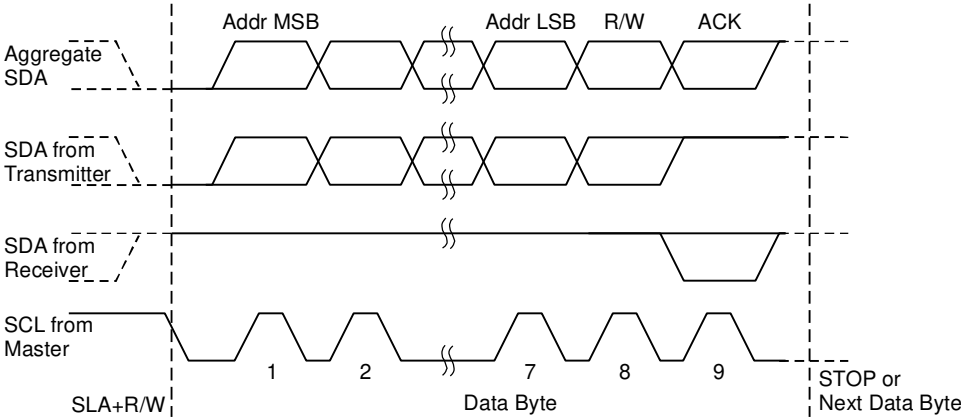
5.6 Combining Address and Data Bytes into a Transmission

A transmission consists of a START condition, an SLA+R or SLA+W, one or more data bytes and a STOP condition. The wired "ANDing" of the SCL line is used to implement handshaking between the host and the device. The device extends the SCL low period by pulling the SCL line low whenever it needs extra time for processing between the data transmissions.

Figure 13 shows a typical data transmission. Note that several data bytes can be transmitted between the SLA+R or SLA+W and the STOP.

Figure 13.   Byte Transmission
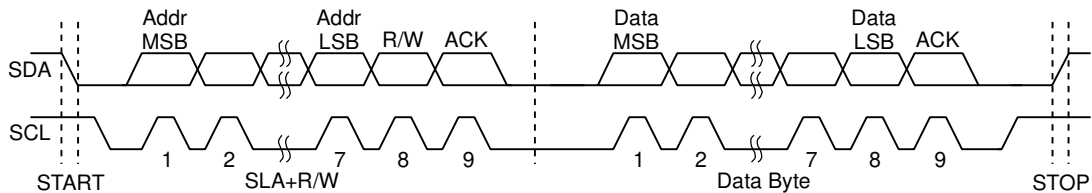
6   Revision History

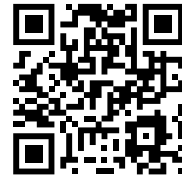| Revision No.	History
Rev 1210-1-1 – Oct 2012	Preliminary Draft
Rev 1210-2-2 – Oct 19, 2012	Initial Release
Rev 1211-3-3 – Nov 20, 2012	Add notes to Figure 4 regarding sensor orientation and pin 1 location. Add notes to Figure 1 identifying connectors and pin 1 locations.
Rev 1303-4-5 – Mar 28, 2013	Add details of new 10-01034-A2 PCB Rev with Expansion interface
Rev 1305-5-6 – May 30,2013	Update references to ILI9320 to include ILI9341 LCD driver IC

7   Notes

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