



54-B-PMC-11
Projected Capacitive Controller
3 PSoC
Specification Guide

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Document Revision History

Revision	Page	Content	Revised By	Date
1.0	1-14	Technical Specification	Bhushan Vaidya	05/14/2009

Product Overview

54-B-PMC-11

Touch International's 54-B-PMC-11 projected capacitive controller is one of several options the Extreme Touch product line has to offer. Designed to interface with computer systems through a wide variety of standard interfaces, the controller is compatible with USB, I2C and Serial communications. Combined with Touch International's proprietary firmware, the controller can easily be tuned to your custom design, as well as a range of different applications. Now featuring multi-touch and gesture (two finger touch) capabilities, the 54-B-PMC-11 controller can help take your product application to the next level.

Features

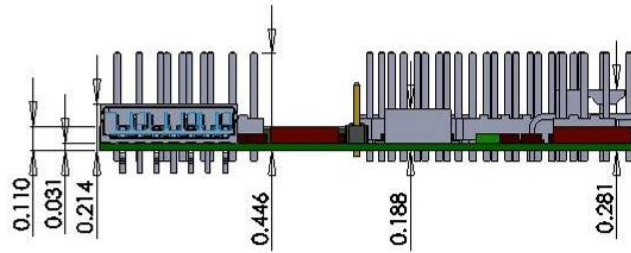
Motion Detection Method	Capacitive sensing using a Sigma-Delta modulator.
X/Y Position Reporting	Absolute Position
Touch Force	No contact pressure required.
Calibration	No need for calibration.
Chip Set Solution	Available
Touch	Single Touch and Gesture (Two finger touch)
Interface	HID Complaint
RoHS	Complaint
REACH	Complaint

Specifications

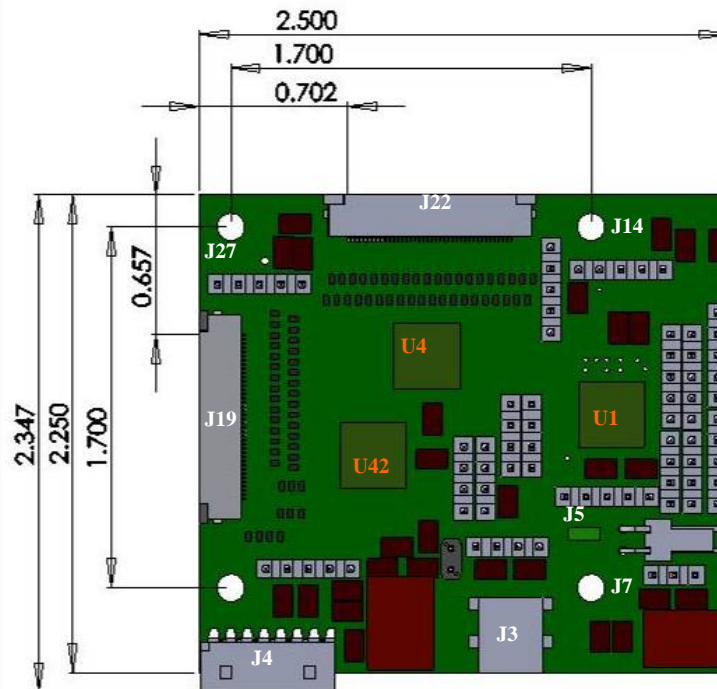
Controller Size	2.5" x 2.347" (63.50mm x 59.614mm)
Power Requirements	5 ~ 9V DC unregulated power, typical 60mA
Operating Temperature	-40 to 85°C
Storage Temperature	-40 to 85°C
Relative Humidity	35°C at 95% RH Non-Condensing.
Interface	USB 2.0, 1.1 Compliant (Standard) Optional: USB – UART RS-232 Serial Communication Protocol: No parity, 8 data bits, 1 stop bit, 115200 baud, no flow control. I2C Communication
Communication Cables	A Plug/5-Pin Mini-B Plug (USB & USB - UART); TI# 1300264
Resolution	2048 x 2048
Report Rate	Approx. 20 - 40 Points/Sec.
Mean Time Between Failure	> 5,600,000 Hrs.
Maximum Screen Size Supported:	22" Diagonal (Requires 2 controllers for 19" and 22" Screen Size)
Supported Operating Systems	Windows 2000, XP, Vista and 7; Linux Ubuntu; Mac OSX 10.x (Leopard)

Controller Drawings

Side View*



Top View*



*Note: All headers are optional. Contact your sales representative for more information.

Jumper Configuration

Header J7

USB Communication Shunt J7 pins 1 and 2

RS232 Communication Shunt J7 pins 2 and 3

Header J5 Connect the Cypress PSoC MiniProg device into J5 to program the U1 PSoC

Header J14 Connect the Cypress PSoC MiniProg device into J14 to program the U4 PSoC

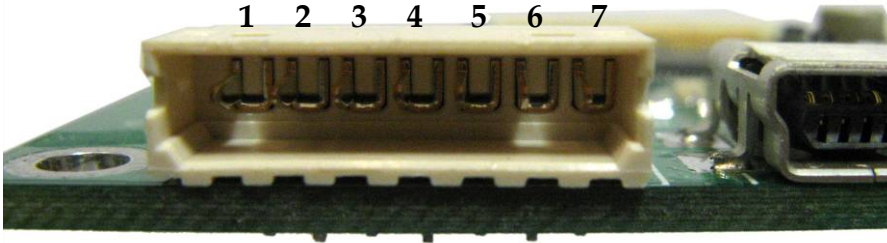
Header J27 Connect the Cypress PSoC MiniProg device into J27 to program the U42 PSoC

Interface Specifications - Connection to the Host Computer

RS232 Communication (TI# 1300210)

The cable is 8' long with a DB-9 female connector at one end and a 1x7 header female connector at the other to connect to the controller.

J4



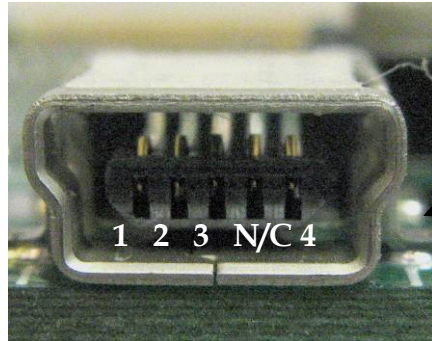
Pin #	J4
1	N/C
2	TxD
3	RxD
4	N/C
5	GND
6	N/C
7	GND

Interface Specifications - Connection to the Host Computer

USB Communication (TI# 1300264)

The USB cable is 6' long with a USB4P (A) male connector at one end and a Mini USB5P (B) at the other to connect to the controller.

J3



Pin #	J3
1	VBUS
2	D-
3	D+
4	GND
Shell	GND

Interface Specifications - Connection to the Host Computer

USB-UART Communication (TI# 1300264)

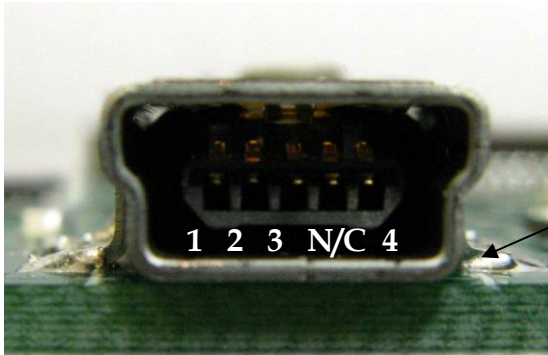
This protocol emulates RS-232 over the USB bus. The primary advantage of using this method is that PC applications will use the USB connection as an RS-232 COM connection, making it very simple to debug.

This method uses a standard Windows[®] driver that is included with all versions Microsoft[®] Windows from Windows 98SE through Windows 7.

The USB cable is also 6' long with a USB4P (A) male connector at one end and a Mini USB5P (B) at the other to connect to the controller.

For more information, either contact the TI support team or look up the Cypress USB-UART protocol on their web page www.cypress.com

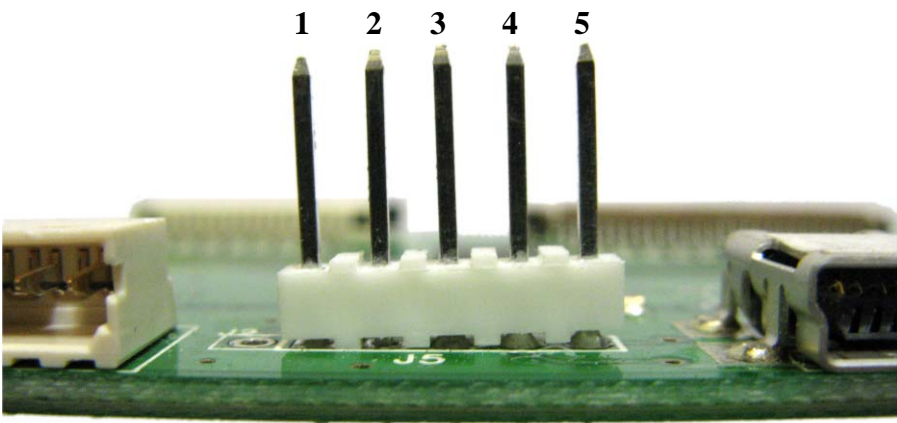
J3



Pin #	J3
1	VBUS
2	D-
3	D+
4	GND
Shell	GND

Interface Specifications - Connection to the Host Computer

I2C Communication

	Pin #	Name
	1	VDD
	2	GND
	3	XRES
	4	SCLK
	5	SDATA

Notes:

- *The I2C connector is labeled ISSP and J5 on the PC board.*
- *Pin 3 is used only for programming the PSoC and is typically not used for I2C communication.*

Interface Specifications (USB)

Communication with the Host Computer

USB Communication
USB Communication between the controller and the host computer is based upon USB HID class protocols as presented in “Universal Serial Bus Revision 2.0 specification” and “USB Class Definition for Human Interface Devices (HID)”.

USB Communication
Single Finger Touch and/or Touch is released from the screen.

The Controller is programmed with dual touch firmware.

The value of bit # 0 of the first byte will be 1, which will activate the selected mouse button.

For the entire Data Byte Format, refer to Table 1A and 1B.

Table 1A: 54-B-PMC-11- USB Data Byte Format
(With single finger touch on the screen)

	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
BYTE 1	0	0	0	0	0	0	0	1
BYTE 2	X _{1 3}	X _{1 2}	X _{1 1}	X _{1 0}	0	0	0	0
BYTE 3	0	X _{1 10}	X _{1 9}	X _{1 8}	X _{1 7}	X _{1 6}	X _{1 5}	X _{1 4}
BYTE 4	Y _{1 3}	Y _{1 2}	Y _{1 1}	Y _{1 0}	0	0	0	0
BYTE 5	0	Y _{1 10}	Y _{1 9}	Y _{1 8}	Y _{1 7}	Y _{1 6}	Y _{1 5}	Y _{1 4}

Table 1B: 54-B-PMC-11- USB Data Byte Format
(Single transaction only when touch is released from the screen)

	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
BYTE 1	0	0	0	0	0	0	0	0
BYTE 2	X _{1 3}	X _{1 2}	X _{1 1}	X _{1 0}	0	0	0	0
BYTE 3	0	X _{1 10}	X _{1 9}	X _{1 8}	X _{1 7}	X _{1 6}	X _{1 5}	X _{1 4}
BYTE 4	Y _{1 3}	Y _{1 2}	Y _{1 1}	Y _{1 0}	0	0	0	0
BYTE 5	0	Y _{1 10}	Y _{1 9}	Y _{1 8}	Y _{1 7}	Y _{1 6}	Y _{1 5}	Y _{1 4}

Interface Specifications (USB Cont):

USB Data Byte Format

<p>USB Communication Gesture (Two Finger Touch)</p>	<p>The data output to the USB will be 2 packets of 5 bytes and the data format is the same as Table 2A and 2B.</p> <p>There is not a selected mouse button to press. Bit 4 is always 1 for 'BYTE 1' in both 'packets'.</p> <p>Bit 5 is the finger identifier (0 for the first finger, and 1 for the second finger respectively) for 'BYTE 1' in both the 'packets'.</p>
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2 Finger Touch

Table 2A: 54-B-PMC-11- USB Data Byte Format
(With 2 fingers touch on the screen)

1st Packet

	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
BYTE 1	0	0	0	1	0	0	0	0
BYTE 2	X ₁ 3	X ₁ 2	X ₁ 1	X ₁ 0	0	0	0	0
BYTE 3	0	X ₁ 10	X ₁ 9	X ₁ 8	X ₁ 7	X ₁ 6	X ₁ 5	X ₁ 4
BYTE 4	Y ₁ 3	Y ₁ 2	Y ₁ 1	Y ₁ 0	0	0	0	0
BYTE 5	0	Y ₁ 10	Y ₁ 9	Y ₁ 8	Y ₁ 7	Y ₁ 6	Y ₁ 5	Y ₁ 4

Table 2B: 54-B-PMC-11- USB Data Byte Format

2nd Packet

	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
BYTE 1	0	0	1	1	0	0	0	0
BYTE 2	X ₂ 3	X ₂ 2	X ₂ 1	X ₂ 0	0	0	0	0
BYTE 3	0	X ₂ 10	X ₂ 9	X ₂ 8	X ₂ 7	X ₂ 6	X ₂ 5	X ₂ 4
BYTE 4	Y ₂ 3	Y ₂ 2	Y ₂ 1	Y ₂ 0	0	0	0	0
BYTE 5	0	Y ₂ 10	Y ₂ 9	Y ₂ 8	Y ₂ 7	Y ₂ 6	Y ₂ 5	Y ₂ 4

Note: Touch International's chipset is using the HID Microsoft Compliance mouse driver by default; however, you may use your own driver to control the gesture base using the Table 2A-2B format.

Interface Specifications (RS232)

Communication with the Host Computer

Data Byte Format for Gesture (Two Finger Touch)

Table 3A: 54-B-PMC-11– RS232 Data Byte Format (Single Touch)

	BIT 7	BIT6	BIT5	BIT 4	BIT3	BIT2	BIT1	BIT0
BYTE 1	1	0	1	0	1	0	1	0
BYTE 2	0	0	0	0	0	0	0	1
BYTE 3	0	0	0	0	0	X ₁ 10	X ₁ 9	X ₁ 8
BYTE 4	X ₁ 7	X ₁ 6	X ₁ 5	X ₁ 4	X ₁ 3	X ₁ 2	X ₁ 1	X ₁ 0
BYTE 5	0	0	0	0	0	Y ₁ 10	Y ₁ 9	Y ₁ 8
BYTE 6	Y ₁ 7	Y ₁ 6	Y ₁ 5	Y ₁ 4	Y ₁ 3	Y ₁ 2	Y ₁ 1	Y ₁ 0
BYTE 7	0	0	0	0	0	0	0	0
BYTE 8	1	1	1	1	1	1	1	1
BYTE 9	1	1	1	1	1	1	1	1
BYTE 10	1	1	1	1	1	1	1	1
BYTE 11	1	1	1	1	1	1	1	1
BYTE 12	-	-	-	-	-	-	-	-

Table 3B: 54-B-PMC-11– RS232 Data Byte Format (Dual Touch)

	BIT 7	BIT6	BIT5	BIT 4	BIT3	BIT2	BIT1	BIT0
BYTE 1	1	0	1	0	1	0	1	0
BYTE 2	0	0	0	0	0	0	0	1
BYTE 3	0	0	0	0	0	X ₁ 10	X ₁ 9	X ₁ 8
BYTE 4	X ₁ 7	X ₁ 6	X ₁ 5	X ₁ 4	X ₁ 3	X ₁ 2	X ₁ 1	X ₁ 0
BYTE 5	0	0	0	0	0	Y ₁ 10	Y ₁ 9	Y ₁ 8
BYTE 6	Y ₁ 7	Y ₁ 6	Y ₁ 5	Y ₁ 4	Y ₁ 3	Y ₁ 2	Y ₁ 1	Y ₁ 0
BYTE 7	0	0	0	0	0	0	1	0
BYTE 8	0	0	0	0	0	X ₂ 10	X ₂ 9	X ₂ 8
BYTE 9	X ₂ 7	X ₂ 6	X ₂ 5	X ₂ 4	X ₂ 3	X ₂ 2	X ₂ 1	X ₂ 0
BYTE 10	0	0	0	0	0	Y ₂ 10	Y ₂ 9	Y ₂ 8
BYTE 11	Y ₂ 7	Y ₂ 6	Y ₂ 5	Y ₂ 4	Y ₂ 3	Y ₂ 2	Y ₂ 1	Y ₂ 0
BYTE 12	-	-	-	-	-	-	-	-

Table 3C: 54-B-PMC-11– RS232 Data Byte Format (No Touch)

	BIT 7	BIT6	BIT5	BIT 4	BIT3	BIT2	BIT1	BIT0
BYTE 1	1	0	1	0	1	0	1	0
BYTE 2	0	0	0	0	0	0	0	0
BYTE 3	1	1	1	1	1	1	1	1
BYTE 4	1	1	1	1	1	1	1	1
BYTE 5	1	1	1	1	1	1	1	1
BYTE 6	1	1	1	1	1	1	1	1
BYTE 7	0	0	0	0	0	0	0	0
BYTE 8	1	1	1	1	1	1	1	1
BYTE 9	1	1	1	1	1	1	1	1
BYTE 10	1	1	1	1	1	1	1	1
BYTE 11	1	1	1	1	1	1	1	1
BYTE 12	-	-	-	-	-	-	-	-

* BYTE 12 : Message Checksum

Description: The message checksum is a one byte checksum for the message. The 1 byte sum of the following bytes should add up to zero (message start byte, message data byte and message checksum byte).

Interface Specifications (I2C)

Communication with the Host Device

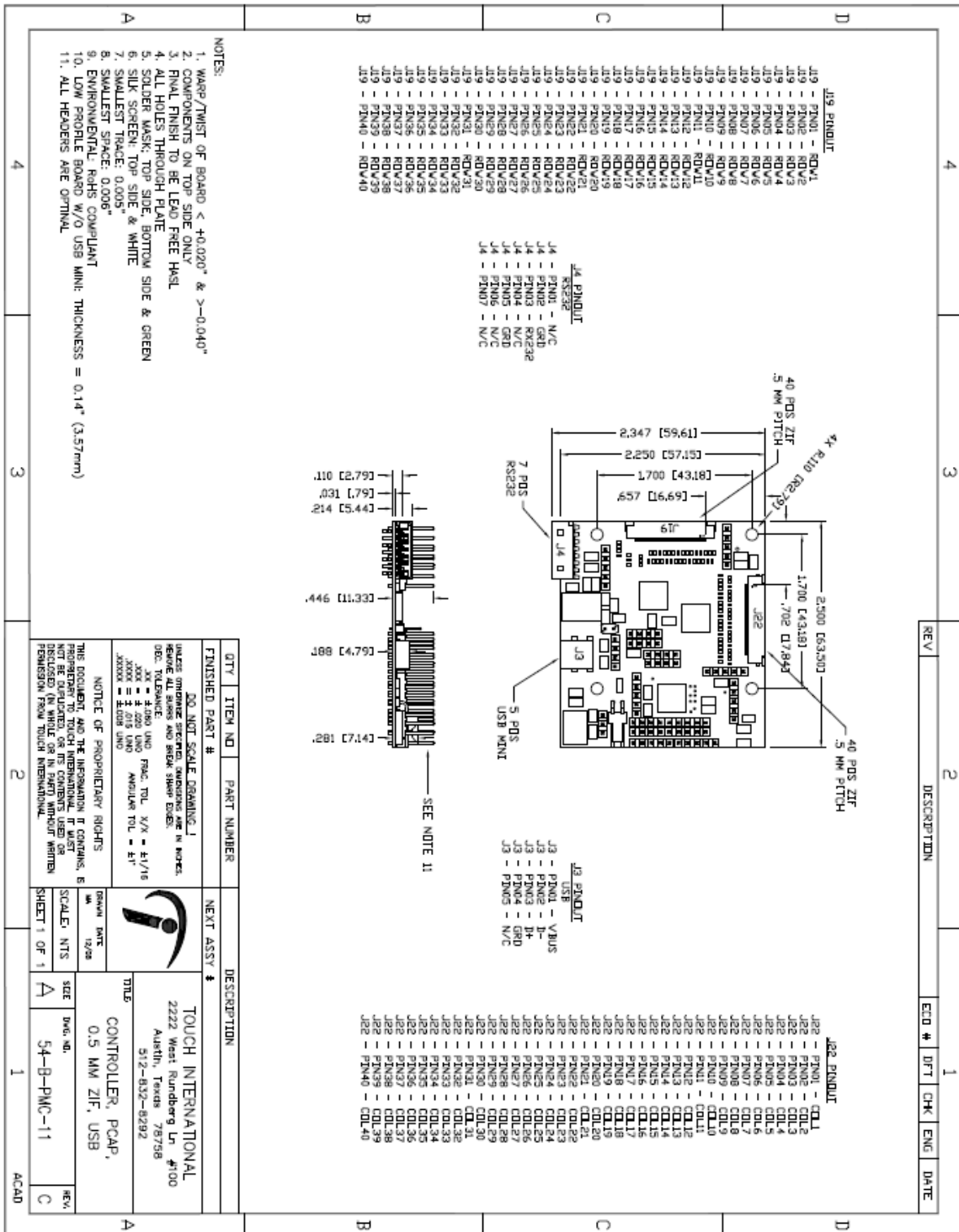
I2C Communication	I2C Address: 0x9 Clock: 400Khz Data Byte Format: Table 4A
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Table 4A: 54-B-PMC-11 - I2C Data Byte Format

	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
BYTE 1	0	0	0	0	0	X ₁ 10	X ₁ 9	X ₁ 8
BYTE 2	X ₁ 7	X ₁ 6	X ₁ 5	X ₁ 4	X ₁ 3	X ₁ 2	X ₁ 1	X ₁ 0
BYTE 3	0	0	0	0	0	Y ₁ 10	Y ₁ 9	Y ₁ 8
BYTE 4	Y ₁ 7	Y ₁ 6	Y ₁ 5	Y ₁ 4	Y ₁ 3	Y ₁ 2	Y ₁ 1	Y ₁ 0
BYTE 5	0	0	0	0	0	X ₂ 10	X ₂ 9	X ₂ 8
BYTE 6	X ₂ 7	X ₂ 6	X ₂ 5	X ₂ 4	X ₂ 3	X ₂ 2	X ₂ 1	X ₂ 0
BYTE 7	0	0	0	0	0	Y ₂ 10	Y ₂ 9	Y ₂ 8
BYTE 8	Y ₂ 7	Y ₂ 6	Y ₂ 5	Y ₂ 4	Y ₂ 3	Y ₂ 2	Y ₂ 1	Y ₂ 0
BYTE 9	-	-	-	-	-	-	-	-
BYTE 10	1	0	1	0	1	0	1	0

* BYTE 9: Counter

Drawing:



Ordering Information

Part Number	Description
54-B-PMC-11	Projected Capacitive Controller (3 PSoC)
<p style="text-align: center;">Contact TI sales representative for a complete list of TI's OEM and retail products.</p> <p style="text-align: center;">Touch International 2222 W. Rundberg Ln. Suite 200 Austin, TX 78758 Tel: 512.832.8292 Fax: 512.491.6381 technicalsupport@touchintl.com www.touchinternational.com</p>	