CY3218-CAPEXP2 CapSense™ Express Evaluation Kit Quick Start

Doc. # 001-44863 Rev. *A

Cypress Semiconductor
198 Champion Court
San Jose, CA 95134-1709
Phone (USA): 800.858.1810
Phone (Intnl): 408.943.2600
http://www.cypress.com

Getting Started

1. Review Kit Contents

Each CY3218-CAPEXP2 CapSense Express Demonstration Kit contains:

- CY3218-CAPEXP2 CapSense Express Demonstration Board
- Kit CD, which includes:
  - PSoC Programmer
  - .NET Framework 2.0 (for Windows 2000 and Windows XP)
  - PSoC Express 3
  - CapSense Express Extension Pack
  - CapSense Express Kit Documentation
- Retractable USB Cable (A to Mini-B)
- PSoC CY3240-I2USB Bridge Board
- AAA Battery

2. Explore the Board

> **Caution: Do not touch the board anywhere other than the edges or the buttons.** Touching the board in the wrong area could lead to a short and an unresponsive board. If this happens, follow the instructions in Section 2 to reset the power to the board.

2.1. Insert the AAA battery into the battery holder on the back of the board.
2.2. Remove the jumper from J2 (back of board, left side, center).
2.3. Slide your finger across the slider. Notice how the LEDs illuminate in a clockwise direction as you move your finger from the left to the right across the slider.
2.4. Press the mechanical button at the bottom of the board. All four LEDs light up.
2.5. Turn the board off by replacing the jumper on J2. Note that replacing the jumper disables battery operation.

3. Install Software

Install PSoC Express Development Software

3.1. Insert the Kit CD, wait for the installer to start, and install the following software in the order listed:

a. Install PSoC Programmer.

b. Install .NET Framework 2.0.

c. Install PSoC Express 3.

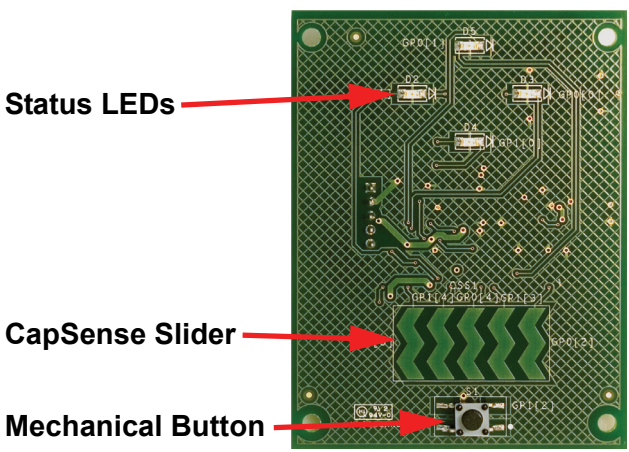
d. Install CapSense Express Extension Pack.

e. Install CapSense Express Kit Documentation.

4. CY3218-CAPEXP2 Board Features

- One 5-Segment CapSense Slider
- 4 Status LEDs (Green)
- 1 Power LED (Red)
- 1 Mechanical Switch
- I^2C Header
- AAA Battery Holder

Top of Board



Use the CY3218-CAPEXP2 Evaluation Kit to evaluate the CapSense slider, LED drive, digital input, and I2C features of the CapSense Express device. Via the CapSense Express Configuration Tool in PSoC Express, the four status LEDs can be controlled by the CapSense slider and the mechanical button. The CapSense Express device mounted on the board is in the 16-QFN package. The board is powered with a AAA battery mounted in the battery holder. A boost converter converts the input voltage in the range of 0.9V-1.5V to the device operating voltage of 3.3V. The board can also be powered using an I2C to USB bridge connected to the I2C header.

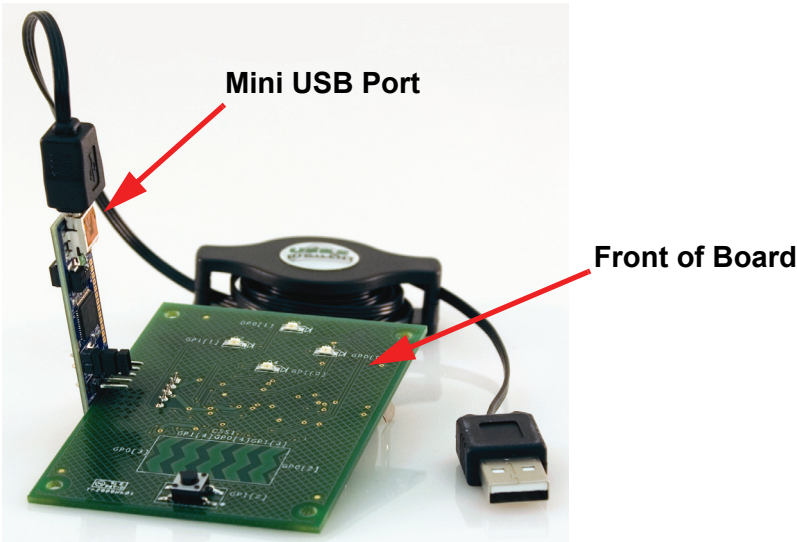
5. Tune the CY3218-CAPEXP2 CapSense Express Board

Functional Description

When a finger moves along the capacitive slider, corresponding LEDs are lit in a circular progression. Additionally, pressing the pushbutton switch causes all of the LEDs to be lit.

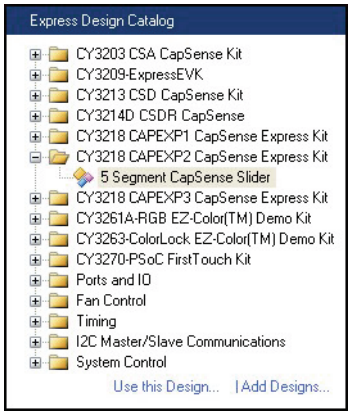
Tuning Steps

5.1. Connect your computer to the CapSense test board ISSP Connector (J5)  using the CY3240-I2USB Bridge Board and a USB cable. When connected correctly, the USB connector on the CY3240-I2USB Bridge Board is visible when viewing the front of the CY3218-CAPEXP2 board.



5.2. Launch PSoc Express.

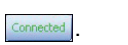
5.3. From the Express Design Catalog, open the **CY3218 CAPEXP2 CapSense Express Kit** folder.



5.4. Double-click **5 Segment CapSense Slider** to open the design.

5.5. Name the design **FiveSegmentSlider** and save the design in the location of your choice.

5.6. Click **Monitor** to open the Monitor view.

5.7. The Monitor Status indicator shows Connected 

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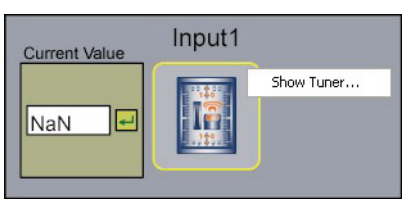
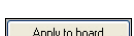
5.8. Right-click **Input1** and select **Show Tuner**.



The Monitor Status indicator changes to Running 

, and the CapSense Express window opens.

5.9. If your board is programmed with another design, click **Apply to board** 

in the lower-right area of the CapSense Express window. When the Configure through USB2IIC Bridge status dialog appears, click **OK**. If your board is already programmed with the correct design, the Apply to board button is grayed out.

5.10. Test the board by moving your finger across the slider. The LEDs above the slider turn on each time the corresponding slider segment is touched. Press the mechanical button at the bottom of the board to turn on all four LEDs.

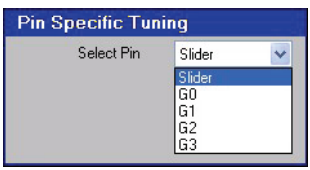
Notice how the Pin Status and Latched Value indicators change from OFF to ON when a slider segment is touched.

Pin Assignment (16-QFN)	GP0[4] Sldr0	GP0[3] Sldr1	GP0[2] Sldr2	GP1[4] Sldr3	GP1[3] Sldr4	GP0[1] G0	GP0[0] G1	GP1[0] G2	GP1[1] G3	GP1[2] G4
Pin Type	Capsens	Capsens	Capsens	Capsens	Capsens	GPOutp	GPOutp	GPOutp	GPOutp	GPInput
Inversion	No	No	No	No	No	Yes	Yes	Yes	Yes	No
Interrupt	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Latch Direction	Rising	Rising	Rising	Rising	Rising	Rising	Rising	Rising	Rising	Rising
Drive Mode	Resistiv	Resistiv	Resistiv	Resistiv	Resistiv	Strong D	Strong D	Strong D	Strong D	Open Dra
Finger Threshold	100	100	100	100	100	100	100	100	100	100
IDAC Settings	14	14	14	14	14	14	14	14	14	14
GPIO Output	Output L	Output L	Output L	Output L	Output L	Output L	Output L	Output L	Output L	Logic 1
Pin Status	OFF	ON	ON	OFF	OFF	OFF	ON	ON	OFF	OFF
Latched Value	OFF	ON	ON	OFF	OFF	OFF	ON	ON	OFF	OFF

5.11. Press the mechanical button at the bottom of the board to turn on all four LEDs.

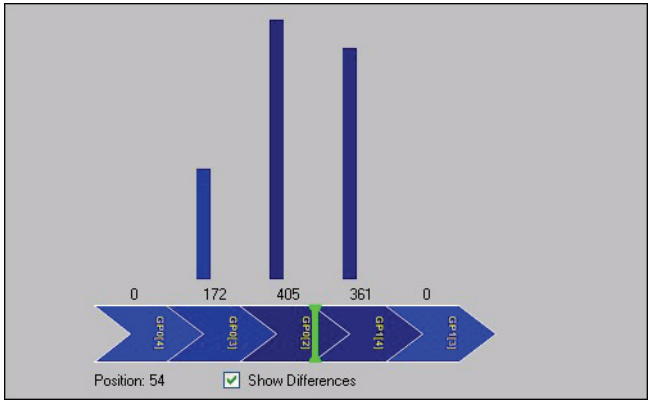
Tune the Slider

5.12. From the **Select Pin** menu, select **Slider**.

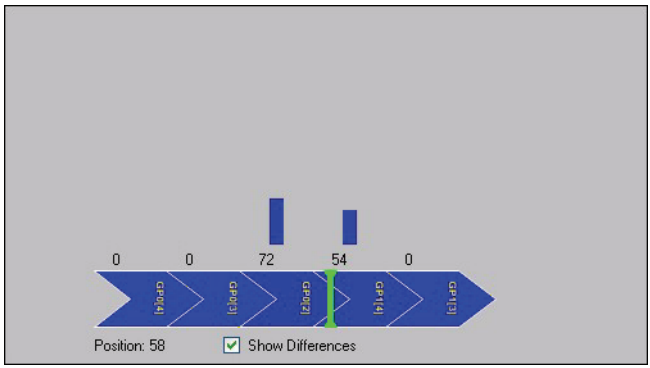


5.13. Check **Show Differences**.

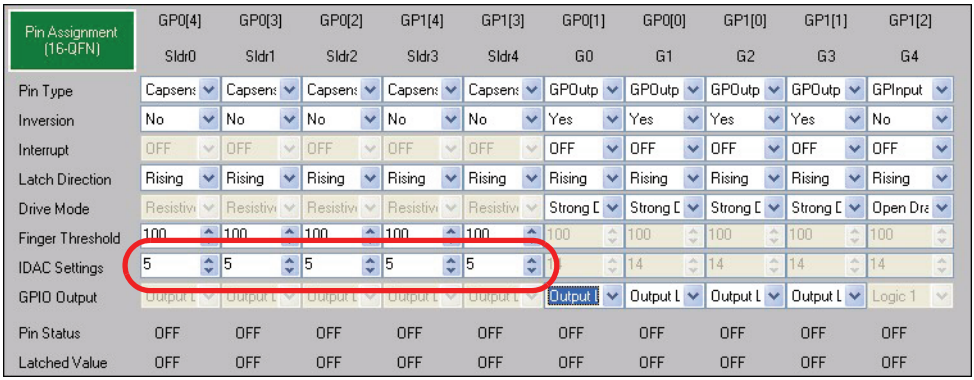
5.14. Slide your finger across the slider. Notice the difference bars above the green position bar. Also notice how the LEDs illuminate in a clockwise direction as you move your finger from the left to the right across the slider.



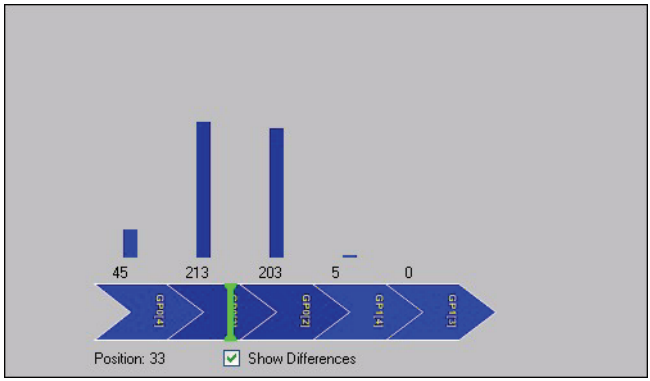
5.15. Cover the slider with a piece of paper and then touch the slider (with the paper between our finger and the slider). Notice how the Difference Count Value changes. Add additional pieces of paper to increase the thickness over the button. With enough sheets of paper added, the Difference variable does not rise above the Finger Threshold, and the button does not register a Hit. With 16 sheets of paper over the slider, the difference bars are very low and the LEDs do not light up.



5.16. Change the IDAC setting for each segment from 14 to 5, and click **Apply to board**.'



5.17. Cover the slider with the paper again, and touch the slider. The difference bars are now higher. If the LEDs do not light, keep adjusting the IDAC settings lower until the LEDs light reliably.



5.18. Experiment with other materials such as plastic and wood.

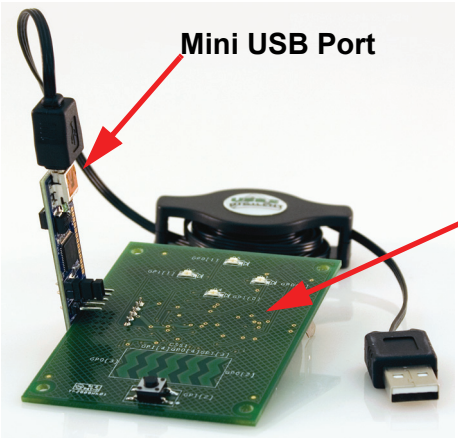
What's Next

Now that you know how easy it is to tune a CapSense slider with PSoC Express, learn how to create the project from scratch in Section 6.

6. Create a CY3218-CAPEXP2 CapSense Express Project

Start the Project

6.1. Connect your computer to the CapSense test board I^2C Connector (J5)  using the CY3240-I2USB Bridge Board and a USB cable. When connected correctly, the USB connector on the CY3240-I2USB Bridge Board is visible when viewing the front of the CY3218-CAPEXP2 board.



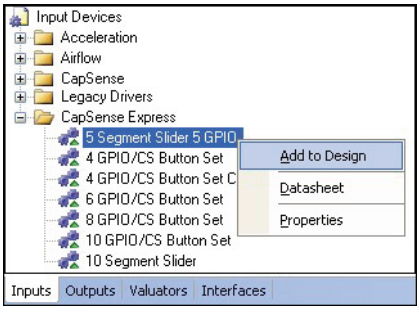
6.2. Launch PSoc Express.

6.3. Click **New Project**, name the project **FiveSegmentSlider**, and save the design in the location of your choice.

6.4. Select **View** > **Driver Catalog**.

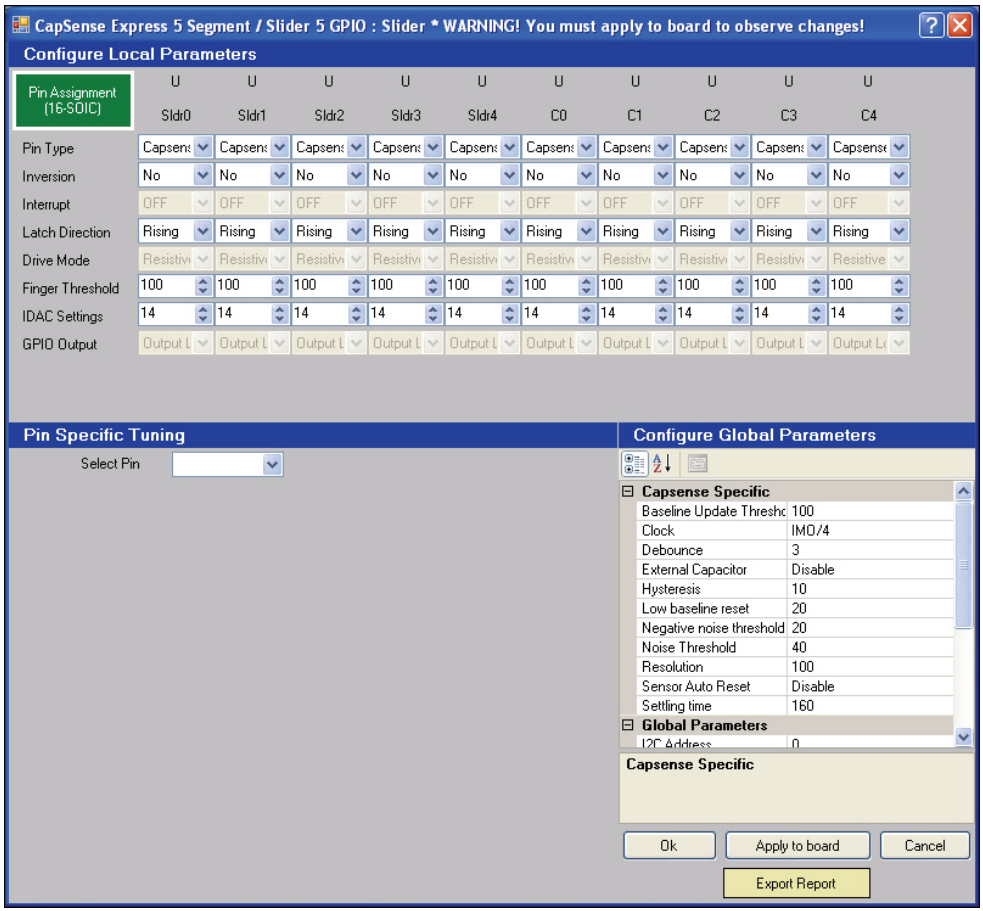
6.5. At the bottom of the Driver Catalog, select the **Inputs Tab**.

6.6. Open the CapSense Express directory, right-click the **5 Segment Slider 5 GPIO** driver, and select **Add to Design**. The Add Input Driver window opens.



6.7. Name the driver **Slider** and click **OK**. The CapSense Express 5 Segment / Slider 5 GPIO : Slider window opens.

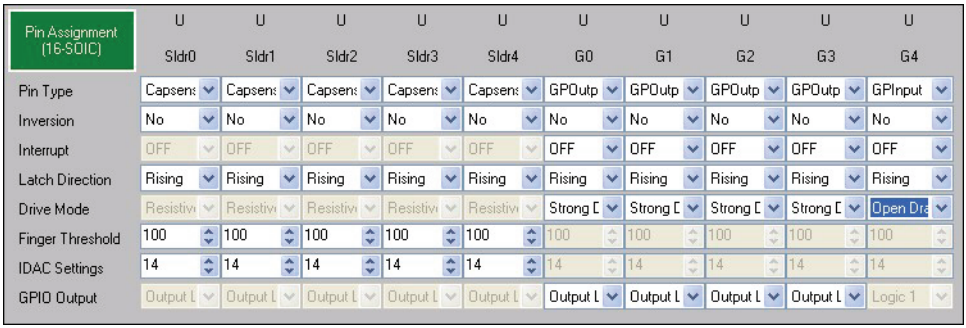
In PSoC Express, each CapSense slider, LED, and mechanical button requires a separate driver. The 5 Segment Slider 5 GPIO driver is a special driver that allows you to configure the slider, LED, and mechanical button in one interface. Each driver is listed in the Configure Local Parameters pane.



Configure the Drivers

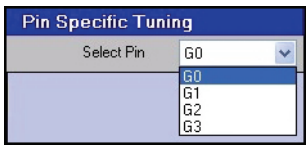
6.8. By default, all driver types in the Configure Local Parameters pane are set to CapSense Slider Sensor. To setup the LEDs, set the Pin Type for drivers C0 through C3 to **GPOutput** and the Drive Mode for each of those drivers to **Strong Drive**.

To setup the mechanical button, set the Pin Type for driver G4 to **GPInput**. Set the Drive Mode to **Open Drain Low**.

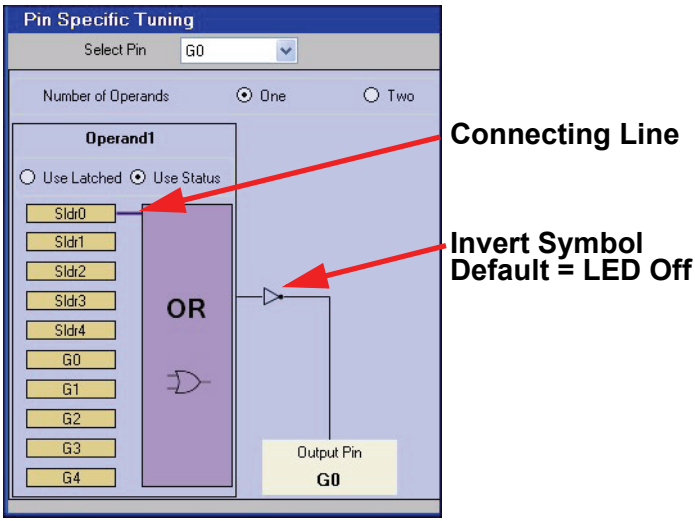


Configure Slider and LED Behavior

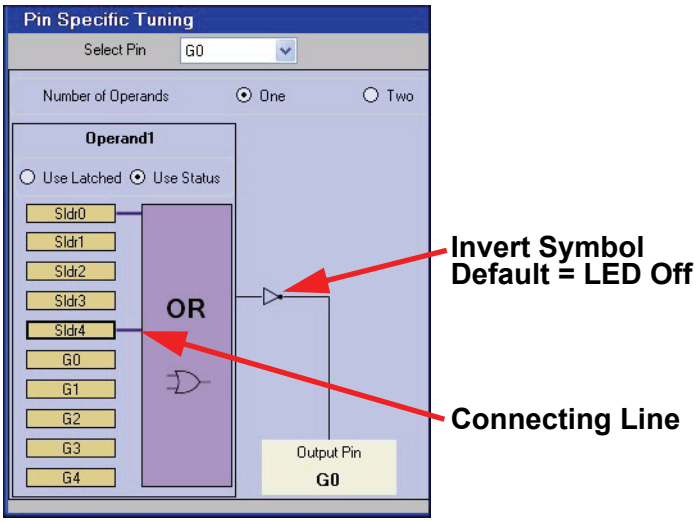
6.9. In the Pin Specific Tuning pane, choose **G0** from the **Select Pin** menu.



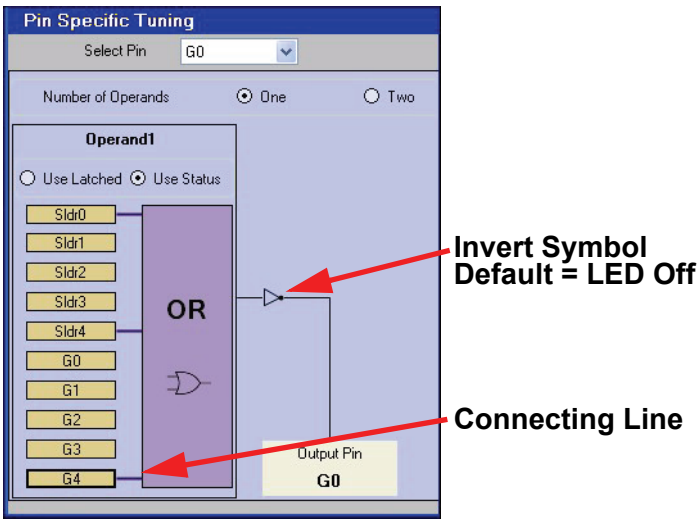
6.10. To assign an LED to a CapSense slider segment, simply click on the yellow box of the CapSense slider segment you want to assign to LED G0. For LED driver G0, select the CapSense slider segment Sldr0. A small line will then connect C0 to the purple OR box. To have the LED turn on when the slider segment is touched, click the little box to the right of the purple OR box. This will change the square to an invert symbol.



6.11. Since there are four LEDs and five slider segments, have the LED G0 turn on when the first and last slider segments are touched. To do this, simply click on the yellow **Sldr4** box.



6.12. To have the LED G0 turn on when the mechanical button is pressed, click the yellow G4 box.



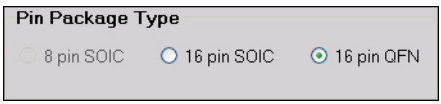
6.13. To assign the rest of the slider segments to the other LEDs, simply select each LED from the Select Pin menu, and click on the appropriate slider segment, and the G4 mechanical button. Remember to click the square box so the invert symbol is showing. Control the LEDs with the slider segments mechanical button according to the following table:

LED	Control
G0	Sldr0, Sldr4, & G4
G1	Sldr1 & G4
G2	Sldr2 & G4
G3	Sldr3 & G4

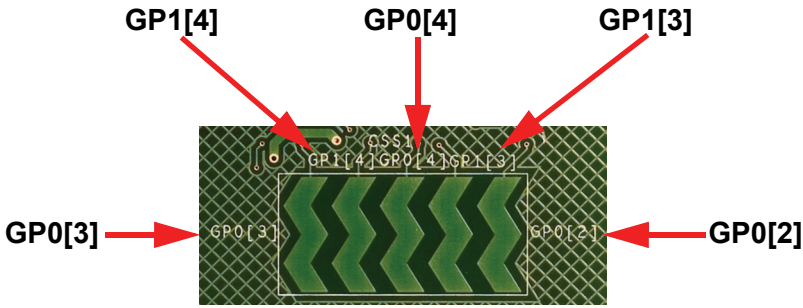
Assign Drivers to Pins

6.14. In the upper-left of the window, click the Pin Assignment (16-SOIC) button. The User Pin Assignment window opens.

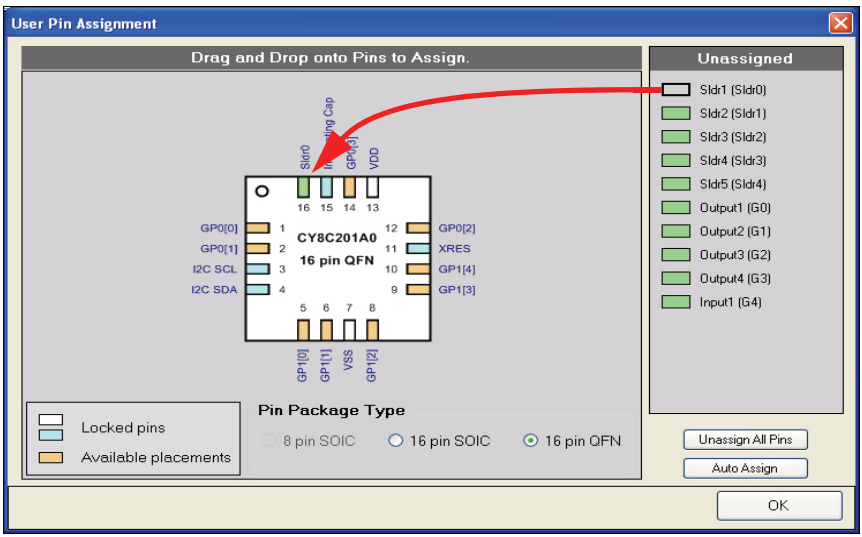
6.15. Select the **16 pin QFN** part for the Pin Package Type.



6.16. Assign each CapSense slider segment, LED, and mechanical button to the pin annotated on the board. For example, the leftmost slider segment, Sldr1, is labeled GP0[3].



Drag each driver from the Unassigned list to the appropriate pin (listed on page 16 for convenience).



Driver	Pin
Sldr1 (Sldr0)	GP0[4]
Sldr2 (Sldr1)	GP0[3]
Sldr3 (Sldr2)	GP0[2]
Sldr4 (Sldr3)	GP1[4]
Sldr5 (Sldr4)	GP1[3]
Output1 (G0)	GP0[1]
Output2 (G1)	GP0[0]
Output3 (G2)	GP1[0]
Output4 (G3)	GP1[1]
Input1 (G4)	GP1[2]

6.17. Click **OK** to close the User Pin Assignment window.

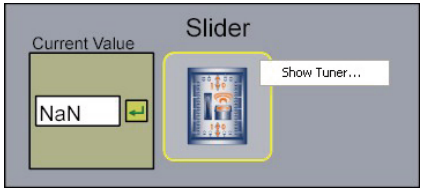
6.18. Click **Apply to board**. Wait for the Configure through USB2IIC Bridge status window appears and click **OK**.

6.19. Click **OK** to close the CapSense Express CapSense Express 5 Segment / Slider 5 GPIO : Slider window.

Monitor the Board

6.20. In the Design pane, select **Monitor**. The Monitor Status indicator shows Connected Connected.

6.21. Right-click **Slider** and select **Show Tuner**.



The Monitor Status indicator changes to Running Running, and the CapSense Express 5 Segment / Slider 5 GPIO : Slider window opens.

6.22. In the Pin Specific Tuning pane, check **Show Differences**.
6.23. Slowly move your finger from left to right across the slider. The LEDs light clockwise starting with the topmost LED on the board.
6.24. Press the mechanical button. All LEDs light at the same time.

What's Next

Congratulations! You have successfully recreated the factory installed program used in Section 5. To experiment with slider and LED behavior, select any LED (G3 through G8) from the Select Pin menu in the Pin Specific Tuning pane and set different slider segments to light different LEDs. You can also reverse the inversion so that an LED is on until a button is pressed. To tune the CapSense slider, follow the steps listed in Section 5.

7. Additional CapSense Resources

PSoC Data Sheets, Application Notes and Technical Articles

Cypress provides a wealth of information about CapSense Express, and more is frequently added. Many sample documents, schematics, layouts, guidelines, and other CapSense Express documents are available on the CD and at www.cypress.com (except where indicated). To find documentation online:

a. Go to www.cypress.com.
b. Click on the **Documentation** link.
c. Select the type of documentation you are looking for from the **Resource Types** list.
d. Type the part number or document number into the **Search in Design Resources** field.
e. Click the **Search** button  .

CapSense Express DataSheets *(available on www.cypress.com)*

- *CY8C20110 Up to 10 IOs for touch sensing buttons, LEDs, and GPIOs*
- *CY8C201A0 Up to 10 IOs for touch sensing buttons/sliders, LEDs, and GPIOs*
- *CY8C20180 Up to 8 IOs for touch sensing buttons, LEDs, and GPIOs*
- *CY8C20160 Up to 6 IOs for touch sensing buttons, LEDs, and GPIOs*
- *CY8C20140 Up to 4 IOs for touch sensing buttons, LEDs, and GPIOs (16-Pin QFN/SOIC)*
- *CY8C20142 Up to 4 IOs for touch sensing buttons, LEDs, and GPIOs (8-Pin SOIC)*

CapSense Application Notes

- *AN44207, CapSense Express - API's for Register Configuration* (available on www.cypress.com)
- *AN44208, CapSense Express - I2C Communication Timing Information* (available on www.cypress.com)
- *AN42137, CapSense Express Software Tool*
- *AN44203, Configuring CapSense Express in Production*
- *AN44209, CapSense Express Power and Sleep Considerations*
- *AN2292, Layout Guidelines for PSoC™ CapSense*
- *AN2318, EMC Design Considerations for PSoC CapSense Applications*
- *AN2394, CapSense Best Practices*
- *AN2397, CapSense Data Viewing Tool*
- *AN2403, Signal-to-Noise Ratio Requirement for CapSense Applications*
- *AN14459, CapSense Device and Method Selection Guide*

CapSense Technical Articles

- *Designer's Guide to Rapid Prototyping of Capacitive Sensors on any Surface*
- *Controls & Sensors Touch Sensors Spread Out*
- *White Paper Cypress's CapSense Successive Approximation Algorithm*
- *The Art of Capacitive Touch Sensing*

Design Support

PSoC Development Software Online

All PSoC development software tools are available for download online. For PSoC Express, visit www.cypress.com/psocexpress. For PSoC Designer visit www.cypress.com/psocdesigner. For PSoC Programmer visit www.cypress.com/psocprogrammer.

PSoC Device Selector Guide

In the PSoC Application Notes section, search for AN2209—The Device Selection Guide for PSoC. It is a useful tool for determining exactly which PSoC device you should use for a specific design project.

PSoC Development Tools Selector Guide

In the PSoC Application Notes section, search for AN2402—The PSoC Development Tools Selector Guide. This is a complete catalog and description of all the development tools that support PSoC devices and when to use them in your design cycle—from concept to production.

PSoC On-Demand Training

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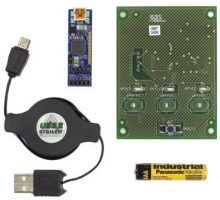
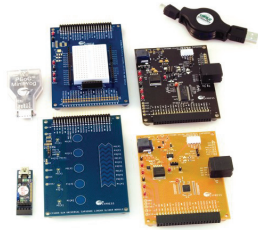
Online Technical Support

For knowledge base articles, customer forums, and online application support, visit www.cypress.com/support.

Additional CapSense Kits

	Evaluation Kits		Development Kit
CapSense Express: Quickest and Easiest to Use Touch Sensing	**CY3218 CAPEXP1/CAPEXP3 For Buttons** (Up to 10 or 4 IOs) 	**CY3218 CAPEXP2 For Sliders** (Up to 10 IOs) 	**CY3280-BK1 Universal CapSense** 
CapSense: Programmable Touch Sensing	**CY3203A CapSense CSA** 		
CapSense Plus: CapSense with Non-Touch Sensing Functionality (Motor Control, Power Management, Gyro Sensing, etc.)	**CY3213A CapSense CSD** 	**CY3214 PSoCEvalUSB** 	

For more information on these kits, please go to www.cypress.com/CapSense.

198 Champion Ct., San Jose, CA 95134
408.943.2600, www.cypress.com

RoHS Compliant

If you have questions, call the
Applications Hot Line 425.787.4814
www.cypress.com/support

Doc. # 001-44863 Rev. *A

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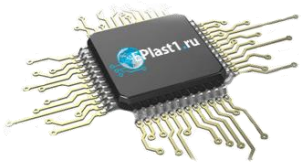
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)
Факс: 8 (812) 320-02-42
Электронная почта: org@eplast1.ru
Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.