# imall

Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from, Europe, America and south Asia, supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of "Quality Parts, Customers Priority, Honest Operation, and Considerate Service", our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip, ALPS, ROHM, Xilinx, Pulse, ON, Everlight and Freescale. Main products comprise IC, Modules, Potentiometer, IC Socket, Relay, Connector. Our parts cover such applications as commercial, industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832 Email & Skype: info@chipsmall.com Web: www.chipsmall.com Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China





# CY3218-CAPEXP1 CapSense<sup>®</sup> Express<sup>™</sup> Evaluation Kit Guide

Doc. # 001-54702 Rev. \*D

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



#### Copyrights

© Cypress Semiconductor Corporation, 2011-2015. The information contained herein is subject to change without notice. Cypress Semiconductor Corporation assumes no responsibility for the use of any circuitry other than circuitry embodied in a Cypress product. Nor does it convey or imply any license under patent or other rights. Cypress products are not warranted nor intended to be used for medical, life support, life saving, critical control or safety applications, unless pursuant to an express written agreement with Cypress. Furthermore, Cypress does not authorize its products for use as critical components in life-support systems where a malfunction or failure may reasonably be expected to result in significant injury to the user. The inclusion of Cypress products in life-support systems application implies that the manufacturer assumes all risk of such use and in doing so indemnifies Cypress against all charges.

Any Source Code (software and/or firmware) is owned by Cypress Semiconductor Corporation (Cypress) and is protected by and subject to worldwide patent protection (United States and foreign), United States copyright laws and international treaty provisions. Cypress hereby grants to licensee a personal, non-exclusive, non-transferable license to copy, use, modify, create derivative works of, and compile the Cypress Source Code and derivative works for the sole purpose of creating custom software and or firmware in support of licensee product to be used only in conjunction with a Cypress integrated circuit as specified in the applicable agreement. Any reproduction, modification, translation, compilation, or representation of this Source Code except as specified above is prohibited without the express written permission of Cypress.

Disclaimer: CYPRESS MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARD TO THIS MATE-RIAL, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Cypress reserves the right to make changes without further notice to the materials described herein. Cypress does not assume any liability arising out of the application or use of any product or circuit described herein. Cypress does not authorize its products for use as critical components in life-support systems where a malfunction or failure may reasonably be expected to result in significant injury to the user. The inclusion of Cypress' product in a life-support systems application implies that the manufacturer assumes all risk of such use and in doing so indemnifies Cypress against all charges.

Use may be limited by and subject to the applicable Cypress software license agreement.

PSoC Designer and CapSense Express are trademarks and PSoC and CapSense are registered trademarks of Cypress Semiconductor Corp. All other trademarks or registered trademarks referenced herein are property of the respective corporations.

# Contents



1.	Introdu	ction	5
	1.1	Overview	5
	1.2	Kit Contents	5
	1.3	Default Jumper Settings	5
	1.4	Additional Resources	6
	1.5	Documentation Conventions	6
2.	Getting	Started	7
	2.1	Hardware	7
		2.1.1 Power Supply System	8
		2.1.2 Mechanical and CapSense Buttons	9
		2.1.3 CapSense Controller	9
		2.1.4 I2C Interface	10
3.	Installa	tion	11
	3.1	Install Hardware	11
	3.2	Install Software	11
		3.2.1 Before You Begin	11
		3.2.2 Installing Software	11
4.	Create	Project with CY3218-CAPEXP1	21
	4.1	Functional Description	21
	4.2	Create New Project	21
	4.3	Configure the Driver	25
	4.4	Configure Button and LED Behavior	25
	4.5	Pin Assignment	31
	4.6	Verify Output	33
5.	Tune C	Y3218-CAPEXP1	34
	5.1	Monitor CapSense Signal	34
	5.2	Tune Buttons	35
6.	Technic	cal References	37
	6.1	CY3218-CAPEXP1 Kit Schematic	37
	-	6.1.1 Schematic Page 1	37
		6.1.2 Schematic Page 2	38
		6.1.3 Schematic Page 3	
		6.1.4 Schematic Page 4	
	6.2	CY3218-CAPEXP1 Board Layout	40
		6.2.1 PDCR-9458 Top Layer	40
		6.2.2 PDCR-9458 Bottom Layer	41
		-	



Docun	nent R	evision History	45
Revis	ion H	listory	45
	6.4	CY3218-CAPEXP1 Pin Assignment	44
	6.3	CY3218-CAPEXP1 Bill of Material (BOM)	43
		6.2.4 PDCR-9458 Bottom Silk Screen	
		6.2.3 PDCR-9458 Top Silk Screen	41



### 1.1 Overview

The CY3218-CAPEXP1 CapSense<sup>®</sup> Express<sup>™</sup> Evaluation Kit is used to evaluate the CapSense Express device. This kit demonstrates the following features: CapSense buttons, LED drive, digital input, and I2C. The CapSense Express device is configured via a system-level project in PSoC<sup>®</sup> Designer<sup>™</sup>. A 16-pin QFN CY8C20110 device is mounted on the board. The board is powered with a AAA battery. A boost converter converts the input, in the range of 1.1 V to 1.5 V, to the device operating voltage of 3.3 V. The board can also be powered using the CY3240-I2USB bridge connected to the I2C header.

## 1.2 Kit Contents

The CY3218-CAPEXP1 CapSense Express Evaluation Kit includes:

- CY3218-CAPEXP1 CapSense Express Evaluation Board
- USB A to Mini-B cable
- AAA battery
- 1 mm acrylic overlay
- Quick Start Guide
- Kit CD, which includes
  - PSoC Designer IDE
  - Bridge Control Panel software
  - CapSense Express datasheets
  - Kit release notes
  - □ Kit user guide
  - □ Software release notes
  - Code example documentation
  - □ Hardware design files
  - □ Sample silicon CY8C20110-LDX2I (5 numbers)

#### 1.3 Default Jumper Settings

Jumper (J2) on the CY3218-CAPEXP1 CapSense Express Evaluation Kit board configures the power setting for the board.

- Default position for J2: Jumper on pin 1 and 2; this enables powering the board via the CY3240-I2USB bridge.
- To power the board via battery, remove the jumper at J2.



## 1.4 Additional Resources

Visit http://www.cypress.com for additional learning resources in the form of datasheets, technical reference manual, and application notes.

Getting Started with CapSense

This guide is an ideal starting point for those new to capacitive touch sensing (CapSense) as well as for learning key design considerations and layout best practices to ensure design success.

## 1.5 Documentation Conventions

Convention	Usage	
Courier New	Displays file locations, user entered text, and source code: C:\cd\icc\	
Italics	Displays file names and reference documentation: Read about the <i>sourcefile.hex</i> file in the <i>PSoC Designer User Guide</i> .	
[Bracketed, Bold]	Displays keyboard commands in procedures: [Enter] or [Ctrl] [C]	
File > Open	Represents menu paths: File > Open > New Project	
Bold	Displays commands, menu paths, and icon names in procedures: Click the <b>File</b> icon and then click <b>Open</b> .	
Times New Roman	Displays an equation: 2+2=4	
Text in gray boxes	Describes cautions or unique functionality of the product.	

Table 1-1. Document Conventions for Guides



#### 2.1 Hardware

Top View

The following figure illustrates the CY3218-CAPEXP1 CapSense Express Evaluation Kit board features.

Bottom View



Figure 2-1 shows the block diagram of the CY3218-CAPEXP1 CapSense Express Evaluation Kit. The block diagram has two main sections, power supply and CapSense controller. The power supply section is based on the onboard battery power. The 1.5 V battery voltage is converted into 3.3 V with boost converter because the CapSense controller does not work below 2.4 V. The connector J2 provides an option to power the kit from the onboard battery or an external power source, which must be connected to the J5 connector. An LED indicates the power status of the kit.

The status on touching the three CapSense buttons is indicated using the three LEDs connected to the GPIOs of CapSense Express. A mechanical switch, which demonstrates the capability of CapSense Express to read the status of external digital signals, is also provided with the kit. The CapSense Express controller can be configured and controlled through the I2C interface; therefore, a 5-pin header is provided for the I2C interface.





#### Figure 2-1. CY3218-CAPEXP1 CapSense Express Evaluation Kit Block Diagram

#### 2.1.1 Power Supply System

The CY8C20110 chip is a low-power CapSense Express Controller, which can be powered from a single 1.5 V AAA battery. The CapSense Express controller can work only from 2.4 V to 5.5 V power supply; therefore, a boost converter is used in the kit to generate the 3.3 V power supply required from the 1.5 V battery.





Boost Regulator, 0.9V to 1.5V Input, 3.3V, 200mA Output

The jumper J2 provides power on/off control for the kit. When the jumper is inserted, the Enable Input (EN) pin of the boost converter is connected to ground, which cuts off power to the kit. Removing the jumper J2 connects the EN pin to VDD, to power the kit. The LED turns on when the kit is powered.



#### 2.1.2 Mechanical and CapSense Buttons

Figure 2-3. Input Schematic (CapSense Button and Mechanical Button)





CapSense Rectangular Buttons with Curved Edges







Keypad Backlight LEDs, Green

#### 2.1.3 CapSense Controller

The CapSense Express controller chip is connected to two input sections and two output sections. The CapSense rectangular button and mechanical button provides input to the chip. The output is provided through the status LEDs and backlighting LEDs, which turn green. The mechanical button provides the signal with mechanical on/off, similar to the CapSense rectangular button.





#### Figure 2-5. CapSense Controller Schematic

#### 2.1.4 I2C Interface

The CY3218-CAPEXP1 CapSense Express Evaluation Kit has the 5-pin header J5 for I2C interface. The I2C interface is used to connect the CapSense controller with the host system to monitor the sensor status and configure the CapSense controller according to system requirements. The sensor is also tuned during the design stage using the I2C interface and the CY3240-I2USB Bridge tool.

I2C communication needs pull-up resistors, both SCL and SDA signals, on the master or slave side. The kit hardware has footprints R13 and R15 (no-load components by default) to populate pull-up resistors if they are not available on the master side.

The CapSense Express controller supports 50 kHz, 100 kHz, and 400 kHz data transfer speed for the I2C interface.



Figure 2-6. I2C Interface Schematic

I2C Interface



## 3.1 Install Hardware

**CAUTION** Make sure you do not touch the board anywhere other than the edges or on the buttons. Touching the board in the wrong area can lead to a short and an unresponsive board. If this happens, reset power to the board. To do this, disconnect the battery supply by placing the jumper on J2. To power the board again, remove the jumper from J2.

The CY3218-CAPEXP1 CapSense Express Evaluation Kit is preprogrammed with demonstration firmware. These instructions assume that your board is not reconfigured from the factory settings. If it has, follow the instructions given in Create Project with CY3218-CAPEXP1 chapter on page 21 to configure the board.

- 1. Unpack the CY3218-CAPEXP1 CapSense Express Evaluation Kit.
- 2. Insert the AAA battery into the battery holder.
- 3. Remove the jumper from J2 (back, left, and center of board). The red LED, D1, on the back of the board lights up.
- 4. Touch a button on the board. The LED in the center of the button and the LED above the button lights up.
- 5. Press the mechanical button at the bottom of the board; the three LEDs above the buttons turn on.
- 6. Turn the board off by replacing the jumper on J2. Note that replacing the jumper disables battery operation.

#### 3.2 Install Software

Install the software required to load and run the code examples.

#### 3.2.1 Before You Begin

All Cypress software installations require administrator privileges, but this is not required to run the installed software.

- 1. Shut down all Cypress software that is currently running.
- 2. Disconnect ICE-Cube or MiniProg1 devices from your computer.

Note that CapSense Express runs on an older version of PSoC Designer (PD5.0). Therefore, both versions of PSoC Designer are required - PD5.0 for CapSense Express and PD5.1 for all other devices.

#### 3.2.2 Installing Software

To use the CY3218-CAPEXP1 CapSense Express Evaluation Kit, you need:

- PSoC Designer 5.0 SP6
- PSoC Programmer 3.13.3 or later
- Bridge Control Panel 1.3 or later (packaged with PSoC Programmer)



If PSoC Designer (versions older than PD5.0 SP6), PSoC Programmer (versions older than PP3.13.3), and Bridge Control Panel (versions older than BCP1.3) are currently installed, uninstall the same before reinstalling. To uninstall, go to **Start > Control Panel > Add or Remove Programs** and click the **Remove** button adjacent to the particular software. Follow the instructions to uninstall.

Follow these steps to install the software:

1. Insert the kit CD/DVD into your PC's CD/DVD-ROM drive. Click **Install PSoC Programmer 3.13.3...** on the installation startup screen.



2. Wait for the installer to copy all the necessary files to a temporary folder.





- 3. Click Next to install in the default location. To select a different location, click the Change button.

   PSoC Programmer InstallShield Wizard

   Welcome to the InstallShield Wizard for PSoC

   Programmer

   The InstallShield Wizard will install PSoC Programmer on your computer. To continue, click Next.

   Select folder where setup will install files.

   Install PSoC Programmer to:

   C:\...\Cypress

   Change...
- 4. Wait for the installation to complete.

PSoC Programmer - InstallShield Wizard	×
Setup Status	No.
The InstallShield Wizard is installing PSoC Programmer	
Installing	
	]
InstallShield	
	Cancel



5. The CyInstaller window for PSoC Programmer is displayed when the installer is ready. Select **Typical** in the **Installation Type** options list and click **Next** to proceed.



6. Read the Software License Agreement and select **I accept the terms in the license agreement**; click the **Next** button.





7. Wait for the installation to complete.



8. Click **Finish** to complete the installation. Select the **View Release Notes** option to open the release notes after the installer window closes.







9. Click Install PSoC Designer 5.0... in the installer startup screen.

**Note** If the installer does not start automatically, start it manually by executing *cyautorun.exe* in the CD/DVD's root directory.

10. Wait for the installer to copy all the necessary files to a temporary folder.

InstallShield Wizard			
PSoC Designer 5.0 Setup is preparing the InstallShield Wizard, which will guide you through the program setup process. Please wait.			
Extracting: PSoC Designer 5.0.msi			
Cancel			
×			



11. Read the Software License Agreement and select **I accept the terms of the license agreement**; click the **Next** button.

PSoC Designer 5.0 - InstallShield Wizard			
License Agreement Please read the following license agreement carefully.			
CYPRESS END USER LICENSE AGREEMENT PLEASE READ THIS END USER LICENSE AGREEMENT ("Agreement") CAREFULLY BEFORE DOWNLOADING, INSTALLING, OR USING THIS SOFTWARE AND ACCOMPANYING DOCUMENTATION ("Software"). BY DOWNLOADING, INSTALLING, OR USING THE SOFTWARE, YOU ARE AGREEING TO BE BOUND BY THIS AGREEMENT. IF YOU DO NOT AGREE TO ALL OF THE TERMS OF THIS AGREEMENT, PROMPTLY RETURN AND DO NOT USE THE SOFTWARE. IF YOU HAVE PURCHASED THE SOFTWARE, YOUR RIGHT TO RETURN THE SOFTWARE EXPIRES 30 DAYS AFTER YOUR PURCHASE AND APPLIES ONLY TO THE ORIGINAL PURCHASER.			
I accept the terms of the license agreement     Print     I do not accept the terms of the license agreement			
K Back Next > Cancel			

12. Click **Next** to proceed with the Installation.

PSoC Designer 5.0 - Installs	Shield Wizard	X
CYPRESS	PSoC Designer 5	
	Welcome to the PSoC Designer 5 Setup program. This program will install PSoC Designer 5 on your computer.	
	KBack Next> Cancel	



13. Click **Next** to install in the default location. To customize the install location, click on the **Browse** button and navigate to the respective directory.

PSoC Designer 5.0 - InstallShield Wizard	
Choose Destination Location Select folder where setup will install files.	CYPRESS
Welcome to the PSoC Designer 5 Setup program. This program will 5 on your computer.	install PSoC Designer
Destination Folder	
C:\Program Files\Cypress\	Browse
InstallShield —	Next > Cancel

14. Review the settings before starting the installation. Click **Back** to change the settings, if required. Otherwise, click **Next** to start the installation.

PSoC Designer 5.0 - InstallShield Wizard	
Start Copying Files Review settings before copying files.	CYPRESS
Setup has enough information to start copying the progr change any settings, click Back. If you are satisfied wit copying files.	am files. If you want to review or h the settings, click Next to begin
Current Settings:	
Installation Directory: U:\Program Files\Cypress\	
	<u>1000</u>
InstallShield	ack Next> Cancel



15. Wait for the PSoC Designer 5.0 installation to complete.

PSoC Designer 5.0 - InstallShield Wizard	
Setup Status	CYPRESS
Please wait while PSoC Designer 5.0 is installed.	
Validating install	
InstallShield	
	Cancel

16. Click **Yes** if you want a shortcut to PSoC Designer on your desktop; click **No** to continue with the installation.

Questio	n 🛛 🕅
2	Would you like to place a PSoC Designer shortcut on the desktop?
	Yes No

17. Click **Finish** to complete the installation. Select the **View Release Notes** option to open the Release Notes after completing the installation.





#### 3.2.2.1 PSoC Designer Overview

PSoC Designer is the revolutionary integrated design environment (IDE) that helps you to customize PSoC to meet your specific application requirements. PSoC Designer accelerates system bring-up and time-to-market. Develop your applications using a library of pre-characterized analog and digital peripherals in a drag-and-drop design environment. Then, customize your design leveraging the dynamically generated API libraries of code. Finally, debug and test your designs with the integrated debug environment including in-circuit emulation and standard software debug features.

## To open the application, click **Start > All Programs > Cypress > PSoC Designer <version>> PSoC Designer <version>**.

For instructions on creating and developing firmware projects for CapSense Controller in PSoC Designer, see the *IDE User Guide.pdf* available at the following location: <Install directory>:\PSoC Designer\<version>\Documentation\.



## 4.1 Functional Description

The board consists of three CapSense buttons; it has three status LEDs and three backlight LEDs associated with these CapSense buttons. The status LEDs light up when the CapSense buttons are touched. The backlight LEDs are initially lit 5 percent and glow to full brightness when the CapSense buttons are buttons are touched.

The completed project is available in <CD root>:\Program\ThreeCapSenseButtons\.

The CY3240-I2USB Bridge is used to transfer the configurations done in PSoC Designer to the PSoC device on the board. The CY8C20110 device used in this kit is an I2C communication enabled device for CapSense configuration, reading the status and data registers of the device, and so on. See the device datasheet for more details.

The I2USB Bridge is used to monitor and tune the CapSense parameters; these parameters can be transferred to the device from the GUI through the I2USB Bridge without reprogramming the device.

### 4.2 Create New Project

1. Connect your computer to the CapSense test board I2C connector (J5) using the CY3240-I2USB Bridge and a USB cable, as shown in Figure 4-1.

Figure 4-1. CY3240-I2USB Connection to CY3218-CAPEXP1 Kit





- 2. Ensure that the jumper J2 at the back of the board is open and the red LED, D1, is ON.
- 3. Launch PSoC Designer.
- 4. To create a new project, click on **File > New Project**.
- 5. Select the **System-level Project** icon in **Project types**; name the project 'ThreeCapSenseButtons' and save it to a location of your choice.

lew Project			?
Project types:			
Chip-level Project	ystem-level Project		
This begins with a <u>N</u> ame:	classic PSoC Express v3.0 project that also supports selecting an ThreeCapSenseButtons	nd placing user module	S.
Location:	C:\myProjects\CAPEXP1 Example Project SRVS	Bro	wse
Workspace na <u>m</u> e:	ThreeCapSenseButtons Create directory for w	vorkspace	
		<u>OK</u> Car	ncel

 Select View > All Driver Catalogs and then select the Inputs tab, as shown in the figure. Open CapSense Express > CY8C20110, right-click the 10 GPIO/CS Button Set driver, and select Add to Design. The Add Input Driver window opens.





7. Name the driver **ThreeButtons** and click **OK.** The CapSense Express 10 GPIO/CS Button Set window opens.

lame: [breeButtons]		10 GPI0/CS Button Set 1.1 this Certified Concess Driver has been
incode and ing		modified.
escription:		
10 GPIO/CS E	Button Set	
	Functional I Driver Prope Driver Speci Interface Sc	<u>Description</u> erties ifications hematic
Functional Des	cription er with CY80 er to the <u>datash</u> withut with con	C20110 devices for more neet. This is a set of general-
Functional Des Use this drive information refe purpose input/c selected and r	cription er with CY8C er to the <u>datash</u> putput with con placed in desi	C20110 devices for more neet. This is a set of general- figurable driver provides 10
Functional Des Use this drive information refe purpose input/o selected and r operties:	cription er with CY8C er to the <u>datash</u> putput with con placed in desi	C20110 devices for more neet. This is a set of general- figurable drive mode. When ican this driver provides 10 P1010_CapSenseExpress_DriverPackage.
Functional Des Use this drive information refe purpose input/o selected and r operties: Property Editor Voltage	cription er with CY8C er to the <u>datash</u> output with con placed in desi	C20110 devices for more neet. This is a set of general- figurable drive mode. When ign this driver provides 10 PI010_CapSenseExpress_DriverPackage.
Functional Desi Use this drive information refe purpose input/o selected and r operties: Property-Editor Voltage 12C Address	cription er with CY8C er to the <u>datash</u> putput with con placed in desi	C20110 devices for more neet. This is a set of general- figurable drive mode. When ian this driver provides 10 PI010_CapSenseExpress_DriverPackage.
Functional Desi Use this drive information refe purpose input/c selected and r operties: Property Editor Voltage 12C Address 12C pin drive mode	cription er with CY8C er to the <u>datash</u> putput with con placed in desi	C20110 devices for more neet. This is a set of general- figurable driver mode. When ican this driver provides 10 PI010_CapSenseExpress_DriverPackage.
Functional Desi Use this drive information refe purpose input/c selected and r roperties: Property Editor Voltage 12C Address 12C pin drive mode Averaging Samples	cription er with CY80 er to the <u>datash</u> putput with con placed in desi 3 0 0	C20110 devices for more neet. This is a set of general- figurable driver mode. When ion this driver provides 10 PI010_CapSenseExpress_DriverPackage. 3V
Functional Desi Use this drive information refe purpose input/c selected and r roperties: Property Editor Voltage 12C Address 12C pin drive mode Averaging Samples Averaging Filter	cription er with CY80 er to the <u>datash</u> putput with con placed in desi 3 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	C20110 devices for more neet. This is a set of general- figurable driver mode. When ion this driver provides 10 PI010_CapSenseExpress_DriverPackage. 3V
Functional Desi Use this drive information refe purpose input/c selected and r roperties: Property Editor Voltage 12C Address 12C pin drive mode Averaging Samples Averaging Filter 12C Drop The Sample	cription er with CY8C er to the <u>datash</u> putput with con placed in desi 3 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	C20110 devices for more neet. This is a set of general- figurable driver mode. When ion this driver provides 10 PI010_CapSenseExpress_DriverPackage. 3V Ipen drain low
Functional Desi Use this drive information refe purpose input/o coloctod and r roperties: Property Editor Voltage 12C Address 12C pin drive mode Averaging Samples Averaging Filter 12C Drop The Sample Duto Coole 3:	cription er with CY8C er to the <u>datash</u> putput with con placed in desi 3 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	C20110 devices for more neet. This is a set of general- figurable driver mode. When ion this driver provides 10 PI010_CapSenseExpress_DriverPackage. 3V Ipen drain low isable nable

8. In the system-level project, each CapSense button, LED, and the mechanical button require a separate driver. The '10 GPIO/CS Button' driver is a special driver that allows you to configure all the buttons, LEDs, and the mechanical button in one interface. Based on the I/O requirements, drivers are available in the driver catalog.



in Assignment (16-SOIC) n Type	U		11																		
(16-SÓIC) n Type	CO		.0.		U		U		ាព		U		U		U		U		U		
п Туре			C1		C2		C3		C4		C5		C6		C7		C8		C9		
	Capsen:	~	Capsen:	~	Capsen	~	Capsen:	~	Capsen:	~	Capsen:	~	Capsen:	~	Capsen:	*	Capsens	~	Capsense	~	
version	No	*	No	Y	No	~	No	۲	No	×	No	<	No	~	No	Y	No	*	No	~	
terrupt	OFF	2	OFF	9	DFF	×	OFF	Y	OFF	1	OFF	Y	OFF	4	OFF	1	OFF	140	OFF		
tch Direction	Rising	~	Rising	~	Rising	~	Rising	¥	Rising	~	Rising	~	Rising	~	Rising	Y	Rising	×	Rising	*	
ive Mode	Resistiv	×	Resistiv	4	Resistiv	~	Resistiv	N.	Resistivi	4	Resistivi	1	Realston	4	Resistiv	4	Residev	Y.	Resistive	ų.	
nger Threshold	100	\$	100	\$	100	\$	100	\$	100	*	100	*	100	\$	100	*	100	\$	100	\$	
AC Settings	14	\$	14	\$	14	\$	14	-	14	\$	14	\$	14	\$	14	**	14	0	14	\$	
PID Dutout	Dubid1	~	Fubiot 1	4	Dutri/ 1	-	(Domot )	1	District 1	2	Butnial	24	flotnut I	10	Thistrant I	2	District 1	14	Daniati		
in Specific	Tuning								_		_		Co	nfi Vi	gure G	ilo	bal Pa	ran	neters		
in Specific	Tuning												Со	nfi	gure G	ilo	bal Pa	rar	neters		
<mark>in Specific</mark> Select P	Tuning n												Co	nfi }↓	gure G	ilo	bal Pa	rar	neters		
in Specific Select P	<u>Funing</u>		2	~									Co Ex	n fi }↓ terr	gure G	i <b>lol</b> itor	bal Pa	ran	neters e		
in Specific Select Pi	Tuning n			~							_		Co Ex Hy	n fi }↓ terr	gure G nal Capac resis	ilol itor	bal Pa Di 10	rar isabi	neters e		
in Specific Select Pi	Tuning n		1	~					_		_		Co ex Ex Hy Lo	n fi terr ster w b	gure G nal Capac resis paseline re	ilo itor eset	Dial Par Di 10 20	rar isabi ) )	neters e		
<mark>in Specific</mark> Select Pi	Tuning n			~									Co Ex Hy Lo Ne	n fi terr ster gat	gure G nal Capac resis paseline re tive noise Threshol	itor itor thre d	Dal Pa Di 10 20 20 20 20 40	ran isabl ) )	neters e		
in <mark>Specific</mark> Select P	l'uning n			~									Co Ex Hy Lo Ne Se	n fi terr ster gat	gure G nal Capac resis paseline re tive noise Threshol or Auto Re	ilol itor eset thre d eset	Dial Par Di 10 20 eshold 20 40 Di	ran isabi ) ) )	neters e e		
<mark>in Specific</mark> Select P	Tuning n			~									Ex Birl Lo Ne Se Se	n fi terr ster ster ster sgat ise nsc ttlin	gure G nal Capac resis baseline re tive noise Threshol or Auto Re ng time	itor eset thre d eset	Dal Pa	ran isabl ) ) ) isabl	e e		
<b>in Specific</b> Select P	Tuning n												Co Ex Hy Lo No Se Se Se	n fi terr ster gat ise nsc ttlin ob;	gure G nal Capac resis baseline re tive noise Threshol or Auto Re ing time al Paran	itor itor thre d eset	Dal Pa Di 10 20 eshold 20 40 Di 16 ers	rein isabl ) ) ) isabl	e e		
<b>in Specific</b> Select P	Tuning n			~									Co Ex Hy Lo No Se Se E I I 20	n fi terr ster ster ster ster ster ster ster	gure G mal Capac resis vaseline re tive noise Threshol or Auto Rø g time al Paran ddress	itor eset thre d eset	bal Pat Di 20 eshold 20 40 Di 16 ers	ran isabl ) ) isabl	e e		
in Specific Select P	Tuning n			<b>y</b>									Co Ex Hy Lo Ne Se Se 120 120 120	n fi terr ster ster sgat ise nsc ttlin chi chi	gure G mal Capac resis vaseline re tive noise Threshol or Auto Rø ng time al Paran ddress n drive m	itor eset thre d eset	bal Pat Di 20 20 40 Di 16 ers 0 0	rear isabl ) ) ) isabl SO	e e Drain Low		
in Specific Select P	Tuning n			<b>y</b>									Co Ex Hy Lo Ne Se Se I I I I I I Vo	n fi terr ster ster gat ise nsc ttlin cha cha cha	gure G nal Capac resis baseline re tive noise Threshol or Auto Re ng time al Param ddress n dirve m ge	itor eset d eset netr	Dal Pa Di 10 20 eshold 20 40 Di 16 ers 0 0 3.	ren isabl ) ) isabl 3V	e e Drain Low		
<b>in Specific</b> Select P	Tuning n			~									Ex Ex Hy Lo No Se Se Gi I20 I20 I20 I20 I20 I20 I20 I20 I20 I20	n fi terr ster ster gat ise nsc ttlin cha cha cha cha cha cha cha cha cha cha	gure G nal Capac resis baseline re tive noise Threshol or Auto Re og time al Paran ddress n dive m je I Specifi	itor eset d eset netr	Dal Pa Di 10 20 eshold 20 40 Di 16 ers 0 0 3.	rein isabl ) ) ) isabl 30	e e Drain Low		
<b>in Specific</b> Select P	Tuning n			~									Ex Hy Lo Ne Se Se GI 120 120 120 120 120 120 120 120 120 120	terr ster ster ster ster sob stillin ob cAc c pir tag	gure G mal Capac resis baseline re tive noise Threshol or Auto Re ng time al Paran ddress n dive mo je I Specifi Delay To	itor itor sset d esset netr	Dial Par Di 10 20 eshold 20 Di 10 10 11 errs 0 0 3.	rear isabl ) ) isabl 60 pen 3V	e e Drain Low		



## 4.3 Configure the Driver

By default, all I/Os in the Configure Local Parameters pane are set to CapSense Input. To set up backlight LEDs with PWM, set the Pin Type for C3 through C5 to **PWM** and the Drive Mode to **Strong Drive**. Similarly, to set up status LEDs, set the Pin Type for C6 through C8 to **GPOutput** and the Drive Mode to **Strong Drive**. For the mechanical button, set C9 to **GPInput** and set the Drive Mode to **Resistive Pull Up** and Inversion to **Yes**. Set the **Finger Threshold** of **C0** through **C2** CapSense inputs to **150**.

Pin Assignment	GP0[2] C0		GP1[4] C1		GP1[3] C2		GP1(0) G3		GP1(1) G4		GP0[1	1	GP0[0	1	GP0[3	1	GP1[2]		GP0[4]	
(16-QFN)											G5		GG		G7		G8		G9	
Pin Type	Capsen	~	Capsens	~	Capsen	~	PWM.	~	PWM	~	PWM.	~	GPOutp	*	GPOutp	¥	GPOutp	¥	GPInput	~
Inversion	No	*	No	*	No	~	No	~	No	~	No	*	No	*	No	*	No	*	Yes	*
Interrupt	OFF	Y	OFF	1	OFF	×	OFF	*	OFF	~	OFF	~	OFF	*	OFF	*	OFF	~	OFF	~
Latch Direction	Rising	×	Rising	~	Rising	~	Rising	¥	Rising	*	Rising	~	Rising	~	Rising	~	Rising	~	Rising	*
Drive Mode	Resistiv	×.	Resistivi	×	Resistry	×	Strong E	~	Strong E	~	Strong E	~	Strong E	*	Strong E	~	Strong E	~	Resistive	~
Finger Threshold	150	\$	150	\$	150	\$	100	1	100	-	100		100	-	100	1	100	1	100	1
IDAC Settings	14	\$	14	\$	14	\$	14	9	14	1	14	4	14	4	14	**	14	0	14	4.5
GPIO Output	Output L	×	Output I	1	Output I	N.	Output L	v	Output L	~	Output L	~	Output L	*	Output L	*	Output L	~	Logic T	×.

## 4.4 Configure Button and LED Behavior

1. In the Pin Specific Tuning pane, choose G3 from the Select Pin menu.



 Click on the yellow box of the CapSense button you want to assign to LED G3. For LED output pin G3, select the CapSense button C0. A small line connects C0 to the purple OR box. To turn the LED on when the button is touched, click the small box (highlighted in the following figure) to the right of the purple OR box.

