

## AN44203

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**Associated Project:** No  
**Associated Part Family:** CY8C201xx  
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**Software Version:** PSoC Express™ 3.0  
**Associated Application Notes:** AN42137

### Application Note Abstract

This application note explains the different ways of configuring CapSense Express™ devices during production.

### Introduction

CapSense Express supports IOs configurable as capacitive sensing inputs. It also supports GPIOs for LED drive, interrupt output, wakeup on interrupt input, and other digital IO functionality. CapSense Express devices are offered as register configurable parts with these functions. All the parameters governing the performance of these functions are configured by writing to their corresponding device registers using I<sup>2</sup>C™ communication.

An easy to use software tool is available for quick design of CapSense Express devices to suit different application needs. This tool is supported in PSoC Express™ 3.0. The final step in the design process using this tool is to generate the I2C data stream (.IIC file), which corresponds to the configuration settings. The data stream is downloaded to the device and configured to the desired functionality.

This application note describes different ways of downloading the I2C configuration data stream to the CapSense Express device in the final production boards.

### CapSense Express Configuration

The I2C configuration file (.IIC) consists of I2C commands for the desired configuration. These commands include the register address and data that is written to the register. The I2C commands are sent to the CapSense Express device to write the configuration data to the corresponding device registers.

Refer to the application note [AN42137](#), for details on using the PSoC Express 3.0 software tool to configure a CapSense Express device and generate the I2C configuration file.

### Configuring CapSense Express

To configure the CapSense Express device, use any of the following methods:

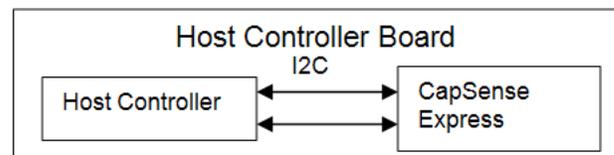
1. Host controller (on power up)
2. External memory (on power up)
3. Module tester
4. Distributors

#### Host Controller

This method is used when the CapSense Express device is part of the host controller's board.

The .IIC file generated by the software tool is embedded in the host controller's startup or power up routine. Refer to application note AN44207, *API for Register Configuration* to understand how the I2C data stream is embedded in the host controller's code and communicates with the CapSense Express device.

Figure 1. Configure Using Host Controller



When the host controller board is powered, the controller sends the I2C commands over the I2C interface to configure the CapSense Express device. The device acts as an I2C slave device and receives I2C commands at 50 kHz, 100 kHz, and 400 kHz.

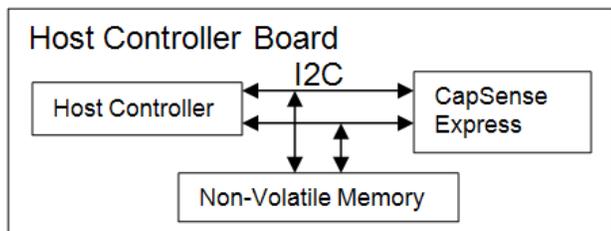
When using this method, take care of the device POR settings and I2C timing. Refer to the device data sheets for POR specifications and application note AN44208 for I2C timing details.

### External Memory

This method is used when the CapSense Express device is a part of the host controller's board or on a separate module board.

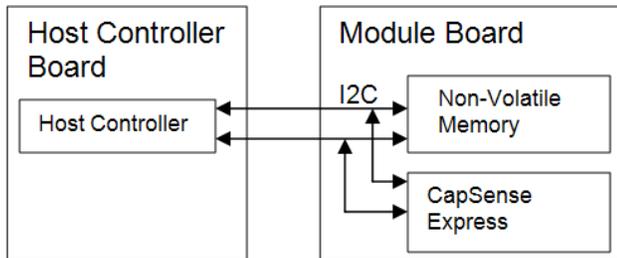
If the host controller board uses an external memory such as EEPROM to store configuration settings and controller parameters, use the same non-volatile external memory to store I2C configuration data for the CapSense Express device.

Figure 2. Configure Using External Memory



On power up, the host controller reads the I2C commands from external memory. It then sends these commands to the CapSense Express device to configure it for the desired functionality. External memory devices support serial interfaces such as I2C, SPI, and MicroWire among others. Therefore, these devices are used to communicate with the CapSense Express devices for configuration.

Figure 3. Configure on a Separate Module Using External Memory



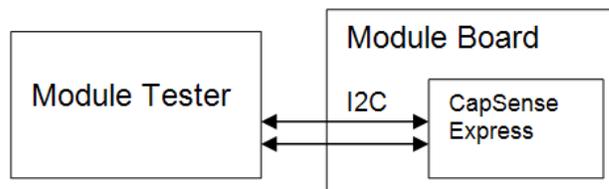
To configure a CapSense Express device, which is on a separate module and is integrated with the host controller board, an external memory on the module is used on power up.

### Module Tester

This method is used when the CapSense Express device is on a separate module board, which is integrated with the host controller board.

A module tester tests the functionality of any module board integrated with a host controller board. The module tester checks all devices mounted on the module for proper electrical and functional behavior.

Figure 4. Configure on a Separate Module Using Module Tester



When a CapSense Express device is mounted on a module board, the module tester sends the I2C data stream to the device. The module board is then integrated with the host controller board and the CapSense Express device wakes up with the desired configuration whenever the module is powered.

### Distributors

This method is used to configure the CapSense Express device by the distributors, using third party programming tools.

Several third party programming tools are used to program non-volatile memories such as EEPROM, FLASH, and Microcontrollers. These tools support the necessary interfaces to program these devices. Therefore, CapSense Express, which uses I<sup>2</sup>C interface for configuration and communication, is supported by the third party tools for configuring in production.

### Summary

CapSense Express devices are configurable parts that support registers used to configure all the parameters controlling the performance of the offered functionalities. These registers are configured in production boards using the host controller, an external memory, a module tester, or a third party programming tool depending on where and how the CapSense Express device is used in the end system.

## About the Author

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