Cypress Roadmap: CapSense® Controllers

Q1 2015
## CapSense® Portfolio

### CapSense Express™

<table>
<thead>
<tr>
<th>Configurable Controllers¹</th>
<th>Programmable Controllers²</th>
<th>Programmable System-on-Chip²</th>
</tr>
</thead>
<tbody>
<tr>
<td>CY8CMBR3106S 11 Buttons, 2 Sliders Proximity, Liquid Tolerance SmartSense_EMCPplus™³</td>
<td>CY8C28xx 44 Buttons, 8 Sliders 16KB Flash Proximity, Liquid Tolerance SmartSense™ Auto-tuning</td>
<td>CY8C4246/7-L 96 Buttons, 19 Sliders 256KB Flash, Proximity, Liquid Tolerance SmartSense_EMCPplus³</td>
</tr>
<tr>
<td>CY8CMBR3110 10 Buttons, 5 LEDs Proximity, Liquid Tolerance SmartSense_EMCPplus¹</td>
<td>CY8C20xx7 31 Buttons, 6 Sliders 16, 32KB Flash Proximity, Liquid Tolerance SmartSense Auto-tuning</td>
<td>NEW CY8C4246/7-M 55 Buttons, 11 Sliders 128KB Flash, Proximity, Liquid Tolerance SmartSense_EMCPplus³</td>
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<td>CY8CMBR3108 8 Buttons, 4 LEDs Proximity, Liquid Tolerance SmartSense_EMCPplus³</td>
<td>CY8C20xx6A/S 33 Buttons, 6 Sliders 16, 32KB Flash, 2KB SRAM SmartSense Auto-tuning</td>
<td>NEW CY8C52xx/54xx 62 Buttons, 12 Sliders 32, 64KB Flash Proximity, Liquid Tolerance SmartSense_EMCPplus³</td>
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<td>CY8CMBR3102 2 Buttons, Proximity SmartSense_EMCPplus⁴</td>
<td>CY8C20xx6H 25 Buttons, 5 Sliders 8, 16KB Flash SmartSense Auto-tuning Haptics</td>
<td>NEW CY8C4xx8-BL 36 Buttons, 7 Sliders 256KB Flash, BLE⁴ Proximity, Liquid Tolerance SmartSense_EMCPplus³</td>
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<td>CY8C21xx34/B 24 Buttons, 4 Sliders 8KB Flash Proximity, Liquid Tolerance SmartSense Auto-tuning</td>
<td>NEW CY8C4xx7-BL 36 Buttons, 7 Sliders 128KB Flash, BLE⁴ Proximity, Liquid Tolerance SmartSense_EMCPplus³</td>
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<td>CY8CMBR3002 2 Buttons, 2 LEDs SmartSense_EMCPplus³</td>
<td>CY8C20x34 33 Buttons, 6 Sliders 8KB Flash SmartSense Auto-tuning</td>
<td>CY8C40xx 16 Buttons, 3 Sliders 8, 16KB Flash Proximity, Liquid Tolerance SmartSense_EMCPplus³</td>
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<td>CY8C201xx 10 Buttons, 5 LEDs 2 Sliders</td>
<td>CY8C32xx/34xx 62 Buttons, 12 Sliders 16, 32, 64KB Flash Proximity, Liquid Tolerance SmartSense EMCPplus³</td>
<td>Q315 CY8C56xx/58xx 62 Buttons, 12 Sliders 64, 128, 256KB Flash Proximity, Liquid Tolerance SmartSense_EMCPplus³</td>
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</tbody>
</table>

¹ Standard products that are configured for target applications with a graphical user interface
² Microcontroller-based products that can be freely programmed to implement additional functions
³ SmartSense Electromagnetic Compatible = SmartSense Auto-tuning + high noise immunity
⁴ Bluetooth Low Energy

### CapSense Plus™

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<tr>
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<tr>
<td>CY8CMBR3110 16 Buttons, 8 LEDs Proximity, Liquid Tolerance SmartSense_EMCPplus³</td>
<td>CY8C52xx/54xx 62 Buttons, 12 Sliders 32, 64, 128, 256KB Flash Proximity, Liquid Tolerance SmartSense_EMCPplus³</td>
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<tr>
<td>CY8CMBR2110 10 Buttons, 10 LEDs SmartSense Auto-tuning</td>
<td>CY8C32xx/34xx 62 Buttons, 12 Sliders 16, 32, 64KB Flash Proximity, Liquid Tolerance SmartSense_EMCPplus³</td>
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<td>CY8CMBR2016 16 Buttons SmartSense Auto-tuning</td>
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<td>CY8CMBR2010 10 Buttons, 10 LEDs SmartSense Auto-tuning</td>
<td>CY8C41xx/42xx 36 Buttons, 7 Sliders 16, 32, 32KB Flash Proximity, Liquid Tolerance SmartSense_EMCPplus³</td>
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### PSoC®

<table>
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<th>Programmed System-on-Chip²</th>
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<tr>
<td>CY8C4xx8-BL 36 Buttons, 7 Sliders 256KB Flash, BLE⁴ Proximity, Liquid Tolerance SmartSense_EMCPplus³</td>
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<td>CY8C4xx7-BL 36 Buttons, 7 Sliders 128KB Flash, BLE⁴ Proximity, Liquid Tolerance SmartSense_EMCPplus³</td>
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<tr>
<td>CY8C4xx8 16 Buttons, 3 Sliders 8, 16KB Flash Proximity, Liquid Tolerance SmartSense_EMCPplus³</td>
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1 Standard products that are configured for target applications with a graphical user interface
2 Microcontroller-based products that can be freely programmed to implement additional functions
3 SmartSense Electromagnetic Compatible = SmartSense Auto-tuning + high noise immunity
4 Bluetooth Low Energy

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### Integration

- **Performance**
- **CapSense Roadmap**
- **Owner:** JFMD
- **BUM:** GOPA
# CY8CMBR3xxx Family

## Applications
- Industrial control panels
- White goods, small home appliances
- Keypads
- Elevator controls
- TVs, monitors
- Music players
- Mobile phones, tablets

## Features
- Up to 16 buttons, or 8 buttons and 8 LEDs
- Up to two 5-segment sliders
- SmartSense™ Auto-tuning eliminates manual tuning
- Proximity sensing distance of up to 30 cm
- LED control
- Buzzer output
- Liquid tolerance
- Register-configurable with EZ-Click™ software tool
- Wide operating voltage: 1.7-5.5 V
- Packages: 8-pin SOIC, 16-pin QFN, 16-pin SOIC, 24-pin QFN

## Family Table

<table>
<thead>
<tr>
<th>MPN</th>
<th>CapSense Buttons</th>
<th>GPOs</th>
<th>Proximity Sensors</th>
<th>Communication Interface</th>
<th>Buzzer</th>
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<td>CY8CMBR3002-SX1I</td>
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</table>

## Collateral

- datasheet: [CY8CMBR3xxx](#)
- design guide: [CY8CMBR3xxx](#)

## Availability

- Sampling: Now
- Production: Now

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1. The ability of a capacitive sensing solution to work in the presence of water droplets or mist

2. External reset
PSoC® 4000
PSoC MCU Family

Applications
MCU and discrete analog replacement
User interface for button replacement
User interface for heating, ventilation, air conditioning

Features
32-bit MCU subsystem
16-MHz ARM® Cortex™-M0 CPU
Up to 16KB flash and 2KB SRAM

Programmable analog
Two IDACs\(^1\) (7-bit and 8-bit), digitally controlled current source
One comparator (CMP)

CapSense® with SmartSense™ Auto-tuning
One Cypress Capacitive Sigma-Delta™ (CSD) controller
Capacitive sensing supported on up to 16 pins

Programmable digital
One configurable 16-bit timer, counter or pulse-width modulator (TCPWM) block
One I\(^2\)C master or slave

Packages
8-pin SOIC, 16-pin SOIC, 16-QFN, 24-pin QFN

Collateral
Datasheet: PSoC 4000
Technical Reference Manual: PSoC 4000

Availability
Sampling: Now
Production: Now

\(^1\) Current-output digital-to-analog converter
Applications
User interface for home appliances
Digital and analog sensor hub
MCU and discrete analog replacement

Features
32-bit MCU Subsystem
24-MHz ARM® Cortex™-M0 CPU
Up to 32KB flash and 4KB SRAM

CapSense® with SmartSense™ Auto-tuning
Cypress Capacitive Sigma-Delta™ (CSD) controller
CapSense supported on up to 36 pins

Programmable Analog Blocks
Two comparators (CMPs)
Two opamps, programmed as PGAs, CMPs, filters, etc.
One 12-bit, 1-Msps SAR ADC
Two IDACs² (2x 8-bit, 2x 7-bit)

Programmable Digital Blocks
Four programmable 16-bit TCPWM³ blocks
Two SCBs⁴: I²C master or slave, SPI master or slave, or UART

Packages: 28-pin SSOP, 40-pin QFN, 44-pin TQFP, 48-pin LQFP

Collateral
Datasheet: PSoC 4 (CY8C4100)
Technical Reference Manual: PSoC 4

Availability
Sampling: Now
Production: Now

¹ Successive approximation register
² Current-output digital-to-analog converter
³ Timer, counter, PWM block
⁴ Serial communication block programmable as I²C/SPI/UART
**PSOC® 4200**
**Programmable Digital Family**

### Applications
- User interface for home appliances
- Digital and analog sensor hub
- MCU and discrete analog replacement

### Features
- **32-bit MCU Subsystem**
  - 48-MHz ARM® Cortex™-M0 CPU
  - Up to 32KB flash and 4KB SRAM
- **CapSense® with SmartSense™ Auto-tuning**
  - Cypress Capacitive Sigma-Delta™ (CSD) controller
  - CapSense supported on up to 36 pins
- **Programmable Analog Blocks**
  - Two comparators (CMPs)
  - Two opamps, programmed as PGAs, CMPs, filters, etc.
  - One 12-bit, 1-Msps SAR\(^1\) ADC
  - Two IDACs\(^2\) (2x 8-bit, 2x 7-bit)
- **Programmable Digital Blocks**
  - Four Universal Digital Blocks (UDBs): custom digital peripherals
  - Four programmable 16-bit TCPWM\(^3\) blocks
  - Two SCBs\(^4\): I\(^2\)C master or slave, SPI master or slave, or UART

### Packages:
- 28-pin SSOP, 40-pin QFN, 44-pin TQFP, 48-pin LQFP

### Collateral
- Datasheet: [PSOC 4 (CY8C4200)](#)

### Availability
- Sampling: Now
- Production: Now

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\(^1\) Successive approximation register  
\(^2\) Current-output digital-to-analog converter  
\(^3\) Timer, counter, PWM block  
\(^4\) Serial communication block programmable as I\(^2\)C/SPI/UART
**Applications**
Sports and fitness monitors, wearable electronics, medical devices, home automation solutions, game controllers, sensor-based low-power systems for the Internet of Things (IoT)

**Features**

**32-bit MCU subsystem**
24-MHz ARM® Cortex™-M0 CPU
Up to 256KB flash and 32KB SRAM

**Programmable AFE¹**
Four opamps, configurable as PGAs, comparators, filters, etc.
One 12-bit, 1-Msps SAR² ADC

**CapSense® with SmartSense™ Auto-tuning**
One Cypress Capacitive Sigma-Delta™ (CSD) controller with touchpad capability

**Programmable digital logic**
Four configurable TCPWM³ blocks: 16-bit timer, counter or PWM
Two configurable serial communication blocks (SCBs⁴):
I²C master or slave, SPI master or slave, or UART

**Packages**
56-pin QFN, 68-pin CSP

**Bluetooth Smart connectivity with Bluetooth 4.1**
2.4-GHz BLE radio with integrated Balun

**Collateral**
Datasheet: [PSoC 4 BLE (CY8C4XX7 BLE)]

**Availability**
Sampling: Now
Production: 128KB Now, 256KB Q2 2015

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¹ Analog front end(s)  
² Successive approximation register  
³ Timer, counter, PWM block  
⁴ Serial communication block programmable as I²C/SPI/UART
**PSOC® 4200 BLE-Series**
Programmable Digital Family with Bluetooth Low Energy

### Applications
Sports and fitness monitors, wearable electronics, medical devices, home automation solutions, game controllers, sensor-based low-power systems for the Internet of Things (IoT)

### Features

**32-bit MCU subsystem**
48-MHz ARM® Cortex™-M0 CPU
Up to 256KB flash and 32KB SRAM

**Programmable AFE**
Four opamps, configurable as PGAs, comparators, filters, etc.
One 12-bit, 1-Msps SAR ADC

**CapSense® with SmartSense™ Auto-tuning**
One Cypress Capacitive Sigma-Delta™ (CSD) controller with touchpad capability

**Programmable digital logic**
Four Universal Digital Blocks (UDBs): custom digital peripherals
Four configurable TCPWM blocks: 16-bit timer, counter or PWM
Two configurable serial communication blocks (SCBs):
I²C master or slave, SPI master or slave, or UART

### Packages
56-pin QFN, 68-pin CSP

**Bluetooh Smart connectivity with Bluetooth 4.1**
2.4-GHz BLE radio with integrated Balun

### Collateral
Datasheet: PSoC 4 BLE (CY8C4XX7 BLE)

### Availability
Sampling: Now
Production: 128KB Now, 256KB Q2 2015

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1. Analog front end(s)
2. Successive approximation register
3. Timer, counter, PWM block
4. Serial communication block programmable as I²C/SPI/UART
PSOC® 4100 M-Series
Intelligent Analog Family

Applications
User interface and host processor for home appliances
Digital and analog sensor hub
MCU and discrete analog replacement

Features
32-bit MCU Subsystem
24-MHz ARM® Cortex®-M0 CPU with a DMA controller and RTC¹
Up to 128KB flash and 16KB SRAM
Up to 55 GPIOs supporting analog, digital and CapSense interfaces

CapSense® With SmartSense™ Auto-tuning
Cypress Capacitive Sigma-Delta™ (CSD) controller

Programmable Analog Blocks
Six comparators (CMP)
Four opamps, programmable as PGAs, CMPs, filters, etc.
One 12-bit, 1-Msps SAR² ADC
Four IDACs³ (2x 8-bit, 2x 7-bit)

Programmable Digital Blocks
Eight programmable 16-bit TCPWM⁴ blocks
Four SCBs⁵: I²C master or slave, SPI master or slave, or UART

Two Controller Area Network (CAN) Controllers

Packages: 48-pin LQFP, 64-pin TQFP (0.8-mm pitch), 64-pin TQFP (0.5-mm pitch), 68-pin QFN

Datasheet: PSoC 4100M datasheet

Availability
Sampling: Now
Production: Q2 2015

¹ Real-time clock
² Successive approximation register
³ Current-output digital-to-analog converter
⁴ Timer, counter, PWM block
⁵ Serial communication block programmable as I²C/SPI/UART
PSoC® 4200 M-Series
Programmable Digital Family

Applications
User interface and host processor for home appliances
Digital and analog sensor hub
LED control and communication for lighting systems

Features
32-bit MCU Subsystem
48-MHz ARM® Cortex®-M0 CPU with a DMA controller and RTC
Up to 128KB flash and 16KB SRAM
Up to 55 GPIOs supporting analog, digital and CapSense interfaces

CapSense® With SmartSense™ Auto-tuning
Cypress Capacitive Sigma-Delta™ (CSD) controller

Programmable Analog Blocks
Six comparators (CMPs)
Four opamps, programmable as PGAs, CMPs, filters, etc.
One 12-bit, 1-Msps SAR ADC
Four IDACs³ (2x 8-bit, 2x 7-bit)

Programmable Digital Blocks
Four Universal Digital Blocks (UDBs): custom digital peripherals
Eight programmable 16-bit TCPWM³ blocks
Four SCBs⁴: I²C master or slave, SPI master or slave, or UART

Two Controller Area Network (CAN) Controllers

Packages:
- 48-pin LQFP
- 64-pin TQFP (0.8-mm pitch)
- 64-pin TQFP (0.5-mm pitch)
- 68-pin QFN

Collateral
Datasheet: PSoC 4200M datasheet

Availability
Sampling: Now
Production: Q2 2015

Notes:
1 Real-time clock
2 Successive approximation register
3 Current-output digital-to-analog converter
4 Timer, counter, PWM block
5 Serial communication block programmable as I²C/SPI/UART
PSoC® 4200 L-Series
Programmable Digital Family

Applications
User interface and host processor for home appliances
Digital and analog sensor hub
MCU and discrete analog replacement
LED control and communication for lighting systems

Features
32-bit MCU Subsystem
48-MHz ARM® Cortex®-M0 CPU with a DMA controller and RTC
Up to 256KB flash and 32KB SRAM
Up to 98 GPIOs supporting analog and digital interfaces
CapSense® With SmartSense™ Auto-tuning
Two Cypress Capacitive Sigma-Delta™ (CSD) controllers

Programmable Analog Blocks
Two comparators (CMPs)
Four opamps, configurable as PGAs, CMPs, filters, etc.
One 12-bit, 1-MspS SAR ADC
Four IDACs (2x 8-bit, 2x 7-bit)

Programmable Digital Blocks
Eight Universal Digital Blocks (UDBs): custom digital peripherals
Eight configurable 16-bit TCPWM blocks
Four SCBs: I2C master or slave, SPI master or slave, or UART
Full-Speed USB 2.0 Controller and Transceiver
Two Controller Area Network (CAN) Controllers

Packages: 48-pin TQFP, 64-pin TQFP, 68-pin QFN, 124-pin µBGA

Collateral
Preliminary Datasheet: Contact Sales

Availability
Sampling: Q3 2015
Production: Q4 2015

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1 Real-time clock
2 Successive approximation register
3 Current-output digital-to-analog converter
4 Timer, counter, PWM block
5 Serial communication block programmable as I2C/SPI/UART

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PSoC® 4 One-Chip Solution

MCU Subsystem
ARM Cortex-M0
48 MHz

Programmable Analog Blocks
Opamp x4
SAR² ADC
CMP x6
CSD x2
Flash
(64KB to 256KB)
SRAM
(8KB to 32KB)
Serial Wire Debug
CAN x2
Full-Speed USB 2.0
RTC¹
DMA

Programmable Digital Blocks
UDB x8
TCPWM⁴ x8
SCB⁵ x4
Segment LCD Drive

I/O Subsystem
GPIO x8
GPIO x8
GPIO x8
GPIO x8
GPIO x8
GPIO x8
GPIO x8
GPIO x8
GPIO x4
## PSoC Platform Packages

<table>
<thead>
<tr>
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