Cypress Roadmap:

CapSense® Controllers

Q1 2017
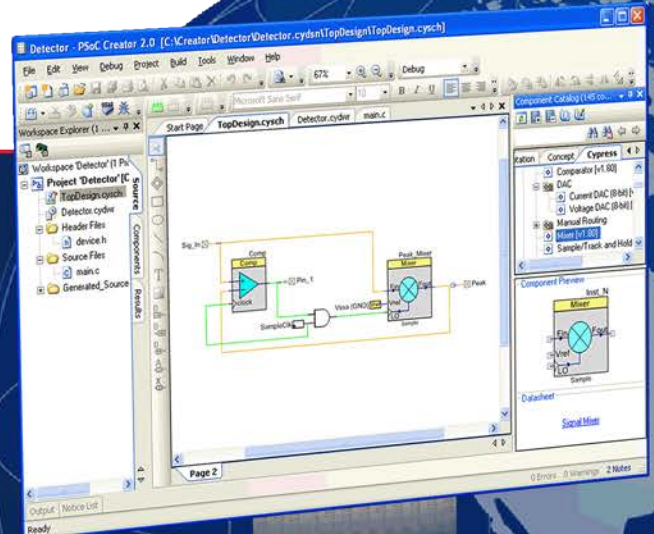
CapSense® Portfolio

CapSense Express™		CapSense Plus™	PSoC®	
Configurable Controllers[1]		**Programmable Controllers**[2]	**Programmable System-on-Chip**[2]	
CY8CMBR3106S 11 Buttons, 2 Sliders Proximity, Liquid Tolerance SmartSense_EMCplus™[3]	**CY8CMBR3116** 16 Buttons, 8 LEDs Proximity, Liquid Tolerance SmartSense_EMCplus		**CY8C4246/7** 96 Buttons, 19 Sliders 64, 128KB Flash Proximity, Liquid Tolerance SmartSense_EMCplus	**CY8C56xx/58xx** 62 Buttons, 12 Sliders 64, 128, 256KB Flash Proximity, Liquid Tolerance SmartSense_EMCplus
CY8CMBR3108 8 Buttons, 4 LEDs Proximity, Liquid Tolerance SmartSense_EMCplus	**CY8CMBR3110** 10 Buttons, 5 LEDs Proximity, Liquid Tolerance SmartSense_EMCplus	**CY8C20xx7** 31 Buttons, 6 Sliders 16, 32KB Flash Proximity, Liquid Tolerance SmartSense™ Auto-tuning	**CY8C52xx/54xx** 62 Buttons, 12 Sliders 32, 64, 128, 256KB Flash Proximity, Liquid Tolerance SmartSense_EMCplus	**CY8C36xx/38xx** 62 Buttons, 12 Sliders 32, 64KB Flash Proximity, Liquid Tolerance SmartSense_EMCplus
CY8CMBR3102 2 Buttons, Proximity SmartSense_EMCplus	**CY8CMBR2110** 10 Buttons, 10 LEDs SmartSense Auto-tuning	**CY8C20xx6A/S** 33 Buttons, 6 Sliders 16, 32KB Flash, 2KB SRAM SmartSense Auto-tuning	**CY8C32xx/34xx** 62 Buttons, 12 Sliders 16, 32, 64KB Flash Proximity, Liquid Tolerance SmartSense_EMCplus	**CY8C4xx8-BL** 36 Buttons, 7 Sliders 256KB Flash, BLE[4] Proximity, Liquid Tolerance SmartSense_EMCplus
	CY8CMBR2016 16 Buttons SmartSense Auto-tuning	**CY8C20xx6H** 25 Buttons, 5 Sliders 8, 16KB Flash SmartSense Auto-tuning Haptics	**CY8C21x34/B** 24 Buttons, 4 Sliders 8KB Flash Proximity, Liquid Tolerance SmartSense Auto-tuning	**CY8C41xx/42xx** 36 Buttons, 7 Sliders 16, 32KB Flash Proximity, Liquid Tolerance SmartSense_EMCplus	**CY8C41xxS** 36 Buttons, 7 Sliders 64KB Flash, 4th Gen Proximity, Liquid Tolerance SmartSense_EMCplus
CY8CMBR2044 4 Buttons, 4 LEDs SmartSense Auto-tuning	**CY8CMBR2010** 10 Buttons, 10 LEDs SmartSense Auto-tuning		**CY8C20x36A** 33 Buttons, 6 Sliders 8KB Flash SmartSense Auto-tuning	**CY8C28xx** 44 Buttons, 8 Sliders 16KB Flash Proximity, Liquid Tolerance SmartSense Auto-tuning	**NEW** **CY8C41xxPS** Q117 38 Buttons, 7 Sliders 32KB Flash, 4th Gen Proximity, Liquid Tolerance SmartSense_EMCplus
CY8CMBR3002 2 Buttons, 2 LEDs SmartSense_EMCplus	**CY8C201xx** 10 Buttons, 5 LEDs 2 Sliders	**CY8C20x34** 25 Buttons, 6 Sliders 8KB Flash	**CY8C40xx** 16 Buttons, 3 Sliders 8, 16KB Flash Proximity, Liquid Tolerance SmartSense_EMCplus	**CY8C40xxS** 36 Buttons, 7 Sliders 32KB Flash, 4th Gen Proximity, Liquid Tolerance SmartSense_EMCplus

Performance (vertical axis)

Integration (horizontal axis)

[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

Production   Sampling   Development   Concept
Status
Availability   QQYY   QQYY

PSoC® 4000 S-Series
PSoC MCU Family

Applications

Consumer devices (wearable, mobile, personal care)
Small home appliances (coffee machine, juicer)

Features

32-Bit MCU Subsystem
48-MHz ARM® Cortex®-M0+ CPU
Up to 32KB Flash, 4KB SRAM
Real-time clock capability with a WCO[1]

Programmable Analog Blocks
One 10-bit, 46.8-ksps Single-Slope ADC[2]
Two low-power comparators (CMP)
One CapSense® block that supports low-power operation and
  mutual-capacitance sensing
Two 7-bit IDACs[3] configurable as a single 8-bit IDAC

Programmable Digital Blocks
Five 16-bit timer, counter, PWM (TCPWM) blocks
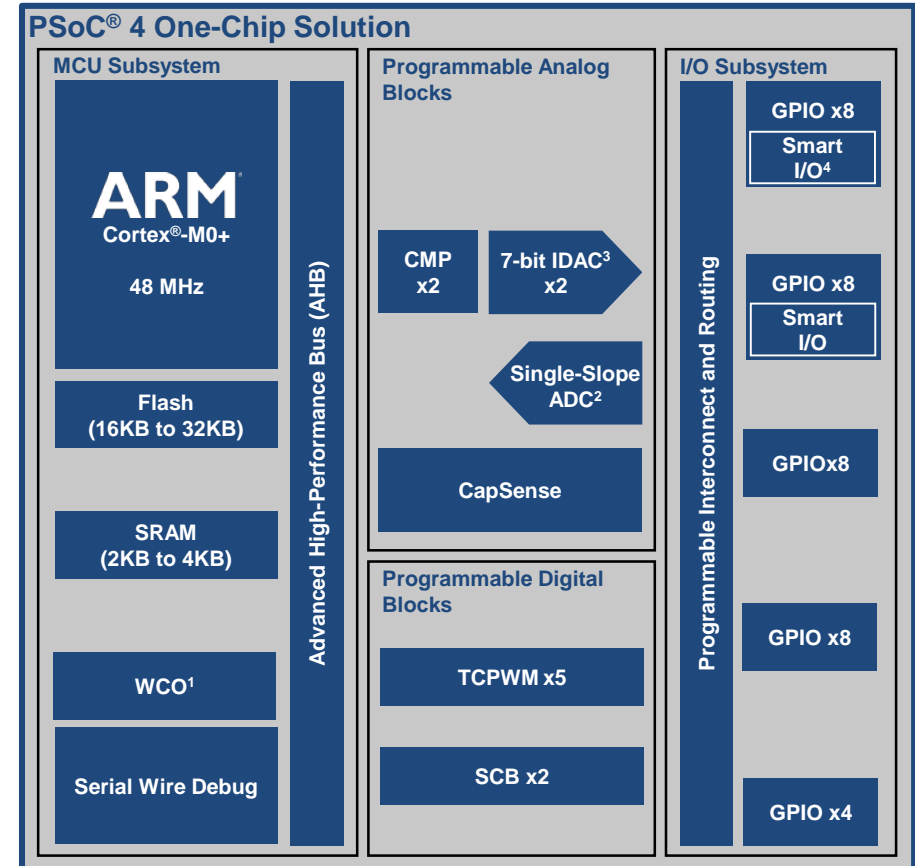Two serial communication blocks (SCBs) that are configurable
  as I²C, SPI or UART

Packages
25-ball WLCSP, 24-pin QFN, 32-pin QFN, 48-pin TQFP
Up to 36 GPIOs, including 16 Smart I/Os[4]

Block Diagram

PSoC® 4 One-Chip Solution

MCU Subsystem

ARM Cortex®-M0+ 48 MHz

Flash (16KB to 32KB)

SRAM (2KB to 4KB)

WCO[1]

Serial Wire Debug

Advanced High-Performance Bus (AHB)

Programmable Analog Blocks

CMP x2

7-bit IDAC[3] x2

Single-Slope ADC[2]

CapSense

Programmable Digital Blocks

TCPWM x5

SCB x2

I/O Subsystem

GPIO x8

Smart I/O[4]

GPIO x8

Smart I/O

GPIOx8

GPIO x8

GPIO x4

Programmable Interconnect and Routing

Collateral

Datasheet: PSoC 4000S

Availability

Production: Now

[1] Watch crystal oscillator
[2] A simple ADC used to measure slow-moving signals
[3] Current output digital-to-analog converter
[4] Embedded programmable digital logic in the I/O subsystem

PSoC® 4100 S-Series
Intelligent Analog Family

CYPRESS
EMBEDDED IN TOMORROW™

Applications

Home appliances (washing machine, dishwasher)
Industrial applications

Features

32-Bit MCU Subsystem
48-MHz ARM® Cortex®-M0+ CPU
Up to 64KB Flash, 8KB SRAM
Real-time clock capability with a WCO[1]

Programmable Analog Blocks
One 12-bit, 1-Msps SAR[2] ADC
One 10-bit, 46.8-ksps Single-Slope ADC[3]
Two opamps configurable as PGAs[4], comparators, etc.
Two low-power comparators (CMP)
One CapSense® block that supports low-power operation with
   self- and mutual-capacitance sensing
Two 7-bit IDACs[5] configurable as a single 8-bit IDAC

Programmable Digital Blocks
Five 16-bit timer, counter, PWM (TCPWM) blocks
Three serial communication blocks (SCBs) that are configurable
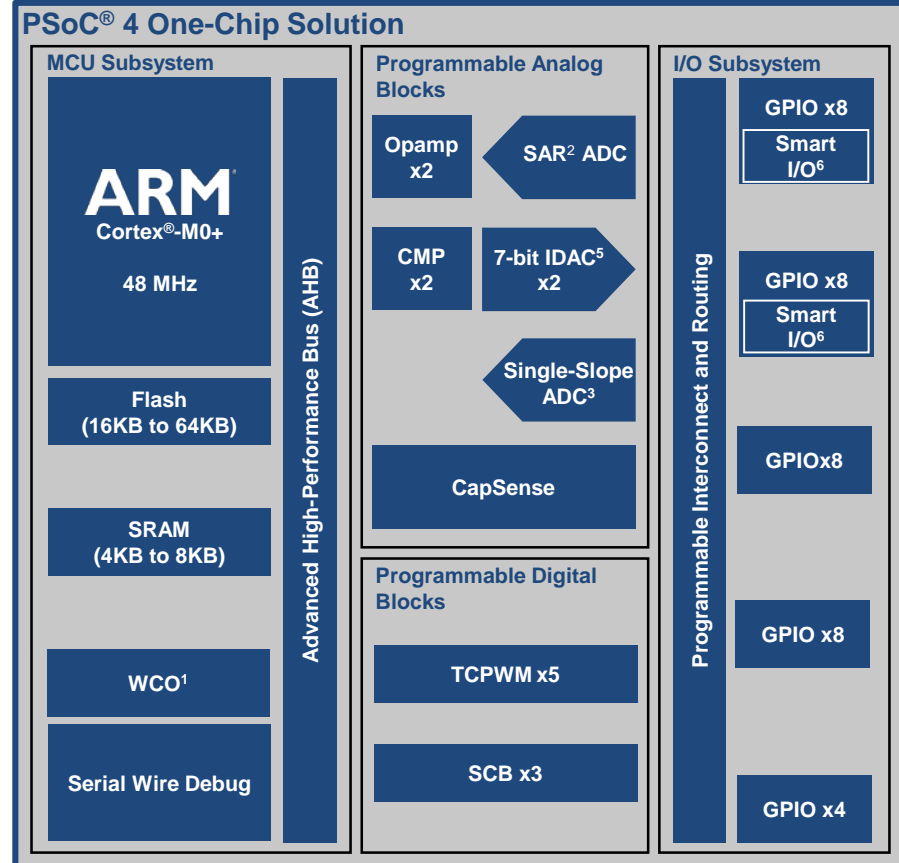   as I²C, SPI or UART

Packages
35-ball WLCSP, 32-pin QFN, 40-pin QFN, 48-pin TQFP
Up to 36 GPIOs, including 16 Smart I/Os[6]

Block Diagram

PSoC® 4 One-Chip Solution

MCU Subsystem

ARM
Cortex®-M0+
48 MHz

Flash
(16KB to 64KB)

SRAM
(4KB to 8KB)

WCO[1]

Serial Wire Debug

Advanced High-Performance Bus (AHB)

Programmable Analog Blocks

Opamp x2

SAR[2] ADC

CMP x2

7-bit IDAC[5] x2

Single-Slope ADC[3]

CapSense

Programmable Digital Blocks

TCPWM x5

SCB x3

Programmable Interconnect and Routing

I/O Subsystem

GPIO x8
Smart I/O[6]

GPIO x8
Smart I/O[6]

GPIOx8

GPIO x8

GPIO x4

Collateral

Datasheet: PSoC 4100S

Availability

Production: Now

---

[1] Watch crystal oscillator
[2] Successive approximation register
[3] A simple ADC used to measure slow-moving signals
[4] Programmable gain amplifier
[5] Current output digital-to-analog converter
[6] Embedded programmable digital logic in the I/O subsystem

PSoC® 4100P S-Series
Intelligent Analog Family

CYPRESS EMBEDDED IN TOMORROW™

Applications

Consumer products
Industrial applications

Features

32-Bit MCU Subsystem
48-MHz ARM® Cortex®-M0+ CPU with a DMA controller
Up to 32KB flash, 4KB SRAM
Real-time clock capability with a WCO[1]

Programmable Analog Blocks
One 12-bit, 1-Msps SAR[2] ADC
One 10-bit, 11.6-Ksps Single-Slope ADC[3]
Four opamps configurable as PGAs[4], comparators, TIAs, etc.
Two low-power comparators (CMP)
One CapSense® block that supports low-power operation with
  self- and mutual-capacitance sensing
One 13-bit Voltage output digital-to-analog converter (VDAC)
Two 7-bit IDACs[5] configurable as a single 8-bit IDAC

Programmable Digital Blocks
Eight 16-bit Timer, Counter, PWM (TCPWM) blocks
Three serial communication blocks (SCBs) that are configurable
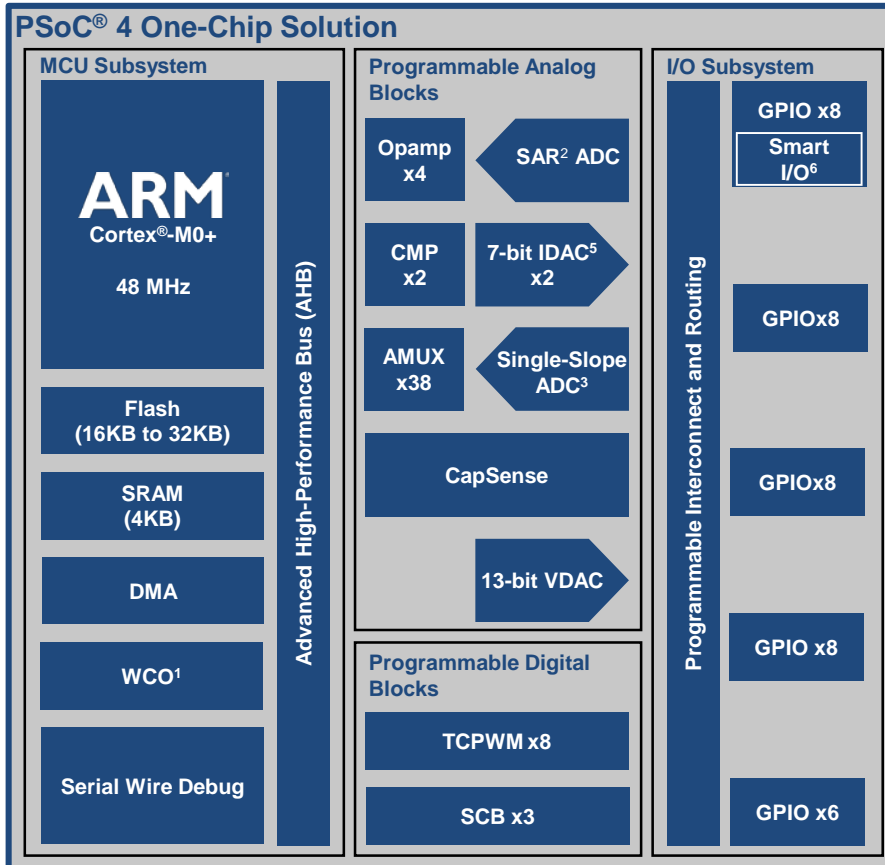 as I2C, SPI or UART

Packages
28-pin SSOP, 45-ball WLCSP, 48-pin QFN, 48-pin TQFP
Up to 38 GPIOs, including 8 Smart I/Os[6]

Collateral

Preliminary Datasheet: Contact Sales

Block Diagram

Availability

Sampling: Now
Production: Q2 2017

---

[1] Watch crystal oscillator
[2] Successive approximation register
[3] A simple ADC used to measure slow-moving signals
[4] Programmable gain amplifier
[5] Current output digital-to-analog converter
[6] Embedded programmable digital logic in the I/O subsystem

001-89681
Rev *P
Owner: IYM
BUM: JHNW
CapSense Roadmap
Product Overview   5

PSoC® 4100 BLE-Series
Intelligent Analog Family with Bluetooth Low Energy

CYPRESS
EMBEDDED IN TOMORROW™

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 AFE[1]
Four opamps, configurable as PGAs, comparators, filters, etc.
One 12-bit, 1-Msps SAR[2] ADC

CapSense® with SmartSense™ Auto-tuning
Industry's No. 1 capacitive-sensing solution with one Capacitive Sigma-Delta™ (CSD) controller with touchpad capability

Programmable digital logic
Four configurable TCPWM[3] blocks: 16-bit timer, counter or PWM
Two configurable serial communication blocks (SCBs[4]):
I2C master or slave, SPI master or slave, or UART
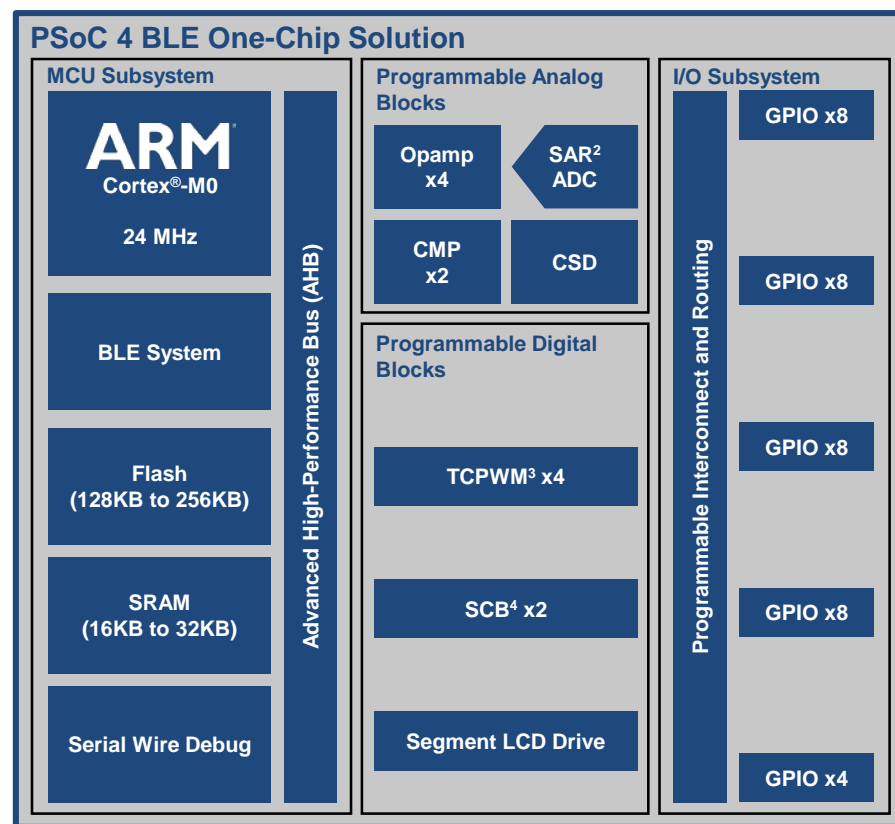
Packages
56-pin QFN, 68-pin CSP

Bluetooth connectivity with Bluetooth 4.1 or Bluetooth 4.2[5]
Royalty-free stack and GUI-based Component to configure profiles
2.4-GHz BLE radio with integrated balun

Block Diagram

PSoC 4 BLE One-Chip Solution

MCU Subsystem
- ARM Cortex®-M0 24 MHz
- BLE System
- Flash (128KB to 256KB)
- SRAM (16KB to 32KB)
- Serial Wire Debug
- Advanced High-Performance Bus (AHB)

Programmable Analog Blocks
- Opamp x4
- SAR[2] ADC
- CMP x2
- CSD

Programmable Digital Blocks
- TCPWM[3] x4
- SCB[4] x2
- Segment LCD Drive

I/O Subsystem
- Programmable Interconnect and Routing
- GPIO x8
- GPIO x8
- GPIO x8
- GPIO x8
- GPIO x4

Collateral

Datasheet: PSoC 4 BLE (CY8C4XX7 BLE)

Availability

Production: Now

[1] Analog front end(s)
[2] Successive approximation register
[3] Timer, counter, PWM block
[4] Serial communication block programmable as I2C/SPI/UART
[5] Bluetooth 4.2 is only available in the 256KB flash option device

PSoC® 4200 BLE-Series
Programmable Digital Family with Bluetooth Low Energy

CYPRESS
EMBEDDED IN TOMORROW™

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 Cortex®-M0 with up to 256KB flash and 32KB SRAM

Programmable AFE[1]
Four opamps, configurable as PGAs, comparators, filters, etc.
One 12-bit, 1-Msps SAR[2] ADC

CapSense® with SmartSense™ Auto-tuning
Industry's No. 1 capacitive-sensing solution with one Capacitive Sigma-Delta™ (CSD) controller with touchpad capability

Programmable digital logic
Four universal digital blocks (UDBs[3]): custom digital peripherals
Four configurable TCPWM[4] blocks: 16-bit timer, counter or PWM
Two configurable serial communication blocks (SCBs[5]):
  I²C master or slave, SPI master or slave, or UART
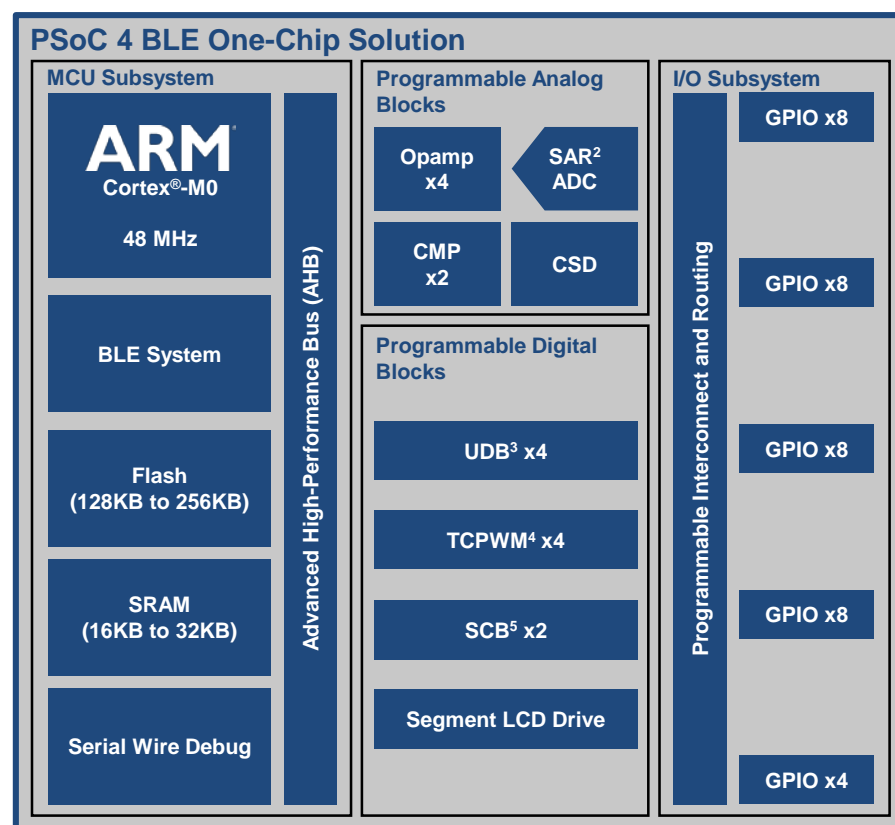
Packages
56-pin QFN, 68-pin CSP

Bluetooth connectivity with Bluetooth 4.1 or Bluetooth 4.2[6]
Royalty-free stack and GUI-based Component to configure profiles
2.4-GHz BLE radio with integrated balun

Block Diagram

PSoC 4 BLE One-Chip Solution

MCU Subsystem

ARM®
Cortex®-M0
48 MHz

BLE System

Flash
(128KB to 256KB)

SRAM
(16KB to 32KB)

Serial Wire Debug

Advanced High-Performance Bus (AHB)

Programmable Analog Blocks

Opamp x4

SAR[2] ADC

CMP x2

CSD

Programmable Digital Blocks

UDB[3] x4

TCPWM[4] x4

SCB[5] x2

Segment LCD Drive

I/O Subsystem

Programmable Interconnect and Routing

GPIO x8

GPIO x8

GPIO x8

GPIO x8

GPIO x4

Collateral

Datasheet: PSoC 4 BLE (CY8C4XX7 BLE)

Availability

Production: Now

[1] Analog front end(s)
[2] Successive approximation register
[3] Universal digital block
[4] Timer/counter/PWM
[5] Serial communication block programmable as I²C/SPI/UART
[6] Bluetooth 4.2 is only available in the 256KB flash option device

PSoC® 4100 M-Series
Intelligent Analog Family

CYPRESS
EMBEDDED IN TOMORROW™

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 RTC
Up to 128KB Flash and 16KB SRAM

CapSense® with SmartSense™ Auto-tuning
Cypress Capacitive Sigma-Delta™ (CSD) controller
CapSense supported on up to 55 pins

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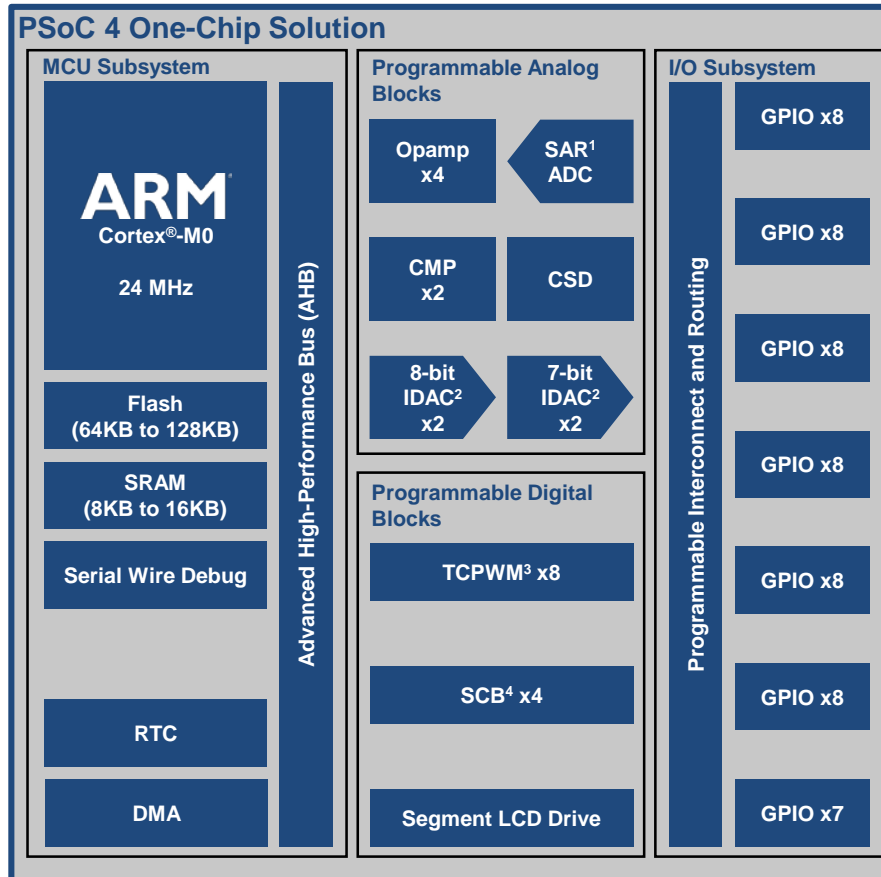Four IDACs[2] (2x 8-bit, 2x 7-bit)

Programmable Digital Blocks
Eight programmable 16-bit TCPWM[3] blocks
Four SCBs[4]: I2C master or slave, SPI master or slave, or UART

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

Block Diagram

PSoC 4 One-Chip Solution

MCU Subsystem

ARM Cortex®-M0 24 MHz

Flash (64KB to 128KB)

SRAM (8KB to 16KB)

Serial Wire Debug

RTC

DMA

Advanced High-Performance Bus (AHB)

Programmable Analog Blocks

Opamp x4

SAR[1] ADC

CMP x2

CSD

8-bit IDAC[2] x2

7-bit IDAC[2] x2

Programmable Digital Blocks

TCPWM[3] x8

SCB[4] x4

Segment LCD Drive

I/O Subsystem

Programmable Interconnect and Routing

GPIO x8
GPIO x8
GPIO x8
GPIO x8
GPIO x8
GPIO x8
GPIO x7

Collateral

Datasheet: PSoC 4 M-Series (CY8C4100)

Availability

Production: Now

[1] Successive approximation register
[2] Current-output digital-to-analog converter

[3] Timer/counter/PWM
[4] 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

CapSense® with SmartSense™ Auto-tuning
Cypress Capacitive Sigma-Delta™ (CSD) controller
CapSense supported on up to 55 pins

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

Programmable Digital Blocks
Four universal digital blocks (UDBs[3]): custom digital peripherals
Eight programmable 16-bit TCPWM[4] blocks
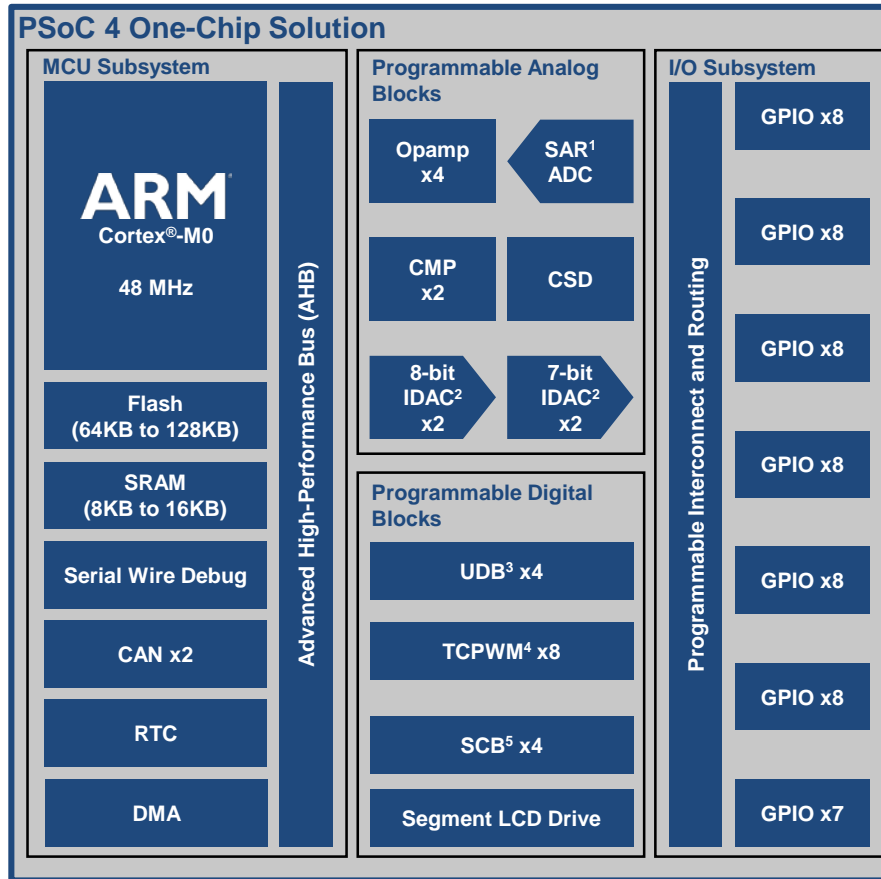Four SCBs[5]: I2C master or slave, SPI master or slave, or UART

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

Block Diagram

PSoC 4 One-Chip Solution

MCU Subsystem
- ARM Cortex®-M0 48 MHz
- Flash (64KB to 128KB)
- SRAM (8KB to 16KB)
- Serial Wire Debug
- CAN x2
- RTC
- DMA
- Advanced High-Performance Bus (AHB)

Programmable Analog Blocks
- Opamp x4
- SAR[1] ADC
- CMP x2
- CSD
- 8-bit IDAC[2] x2
- 7-bit IDAC[2] x2

Programmable Digital Blocks
- UDB[3] x4
- TCPWM[4] x8
- SCB[5] x4
- Segment LCD Drive

I/O Subsystem
- GPIO x8
- GPIO x8
- GPIO x8
- GPIO x8
- GPIO x8
- GPIO x8
- GPIO x7
- Programmable Interconnect and Routing

Collateral

Datasheet: PSoC 4 M-Series (CY8C4200)

Availability

Production: Now

[1] Successive approximation register
[2] Current-output digital-to-analog converter
[3] Universal digital block
[4] Timer/counter/PWM
[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[1]
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[2] ADC
Four IDACs[3] (2x 8-bit, 2x 7-bit)
Programmable Digital Blocks
Eight universal digital blocks (UDBs): custom digital peripherals
Eight configurable 16-bit TCPWM[4] blocks
Four SCBs[5]: 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
   VFBGA

Block Diagram

PSoC® 4 One-Chip Solution

MCU Subsystem

ARM Cortex®-M0 48 MHz

Advanced High-Performance Bus (AHB)

Flash (64KB to 256KB)
SRAM (8KB to 32KB)
Serial Wire Debug
CAN x2
Full-Speed USB 2.0
RTC[1]
DMA

Programmable Analog Blocks

Opamp x4 | SAR[2] ADC
CMP x6 | CSD x2
8-bit IDAC[3] x2 | 7-bit IDAC[3] x2

Programmable Digital Blocks

UDB x8
TCPWM[4] x8
SCB[5] x4
Segment LCD Drive

I/O Subsystem

Programmable Interconnect and Routing

GPIO x8
GPIO x8
GPIO x8
GPIO x8
GPIO x8
GPIO x8
GPIO x8
GPIO x8
GPIO x8
GPIO x8
GPIO x8
GPIO x8
GPIO x8
GPIO x4

Collateral
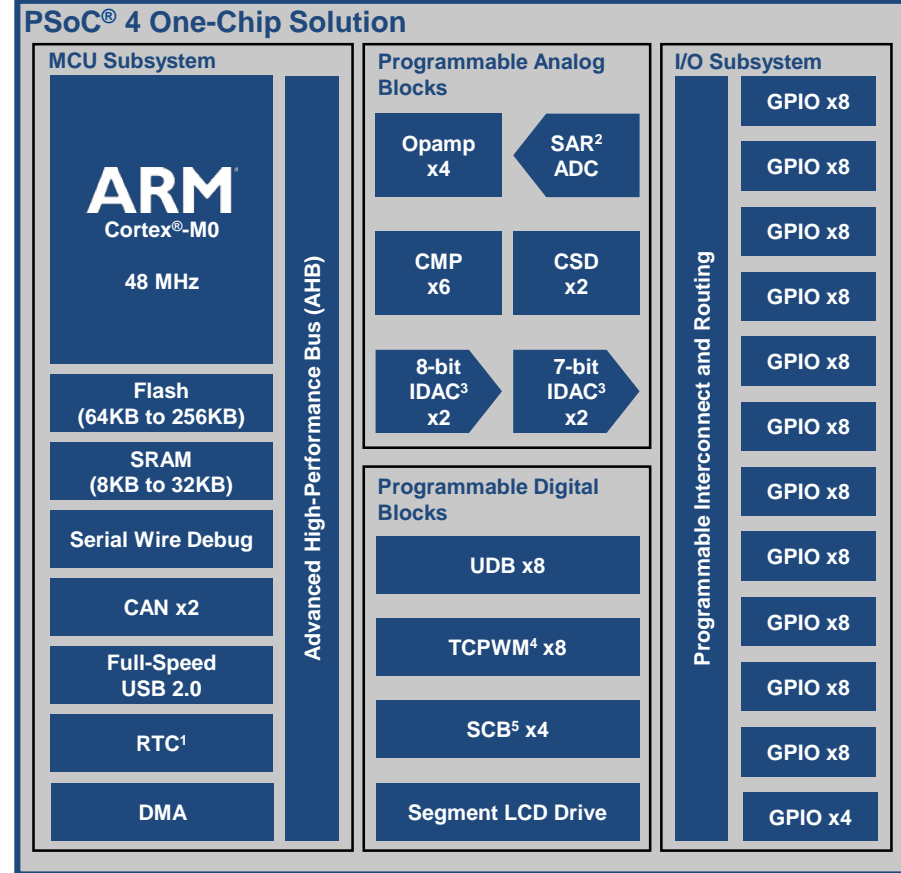
Datasheet: PSoC 4 L-Series

Availability

Production: Now

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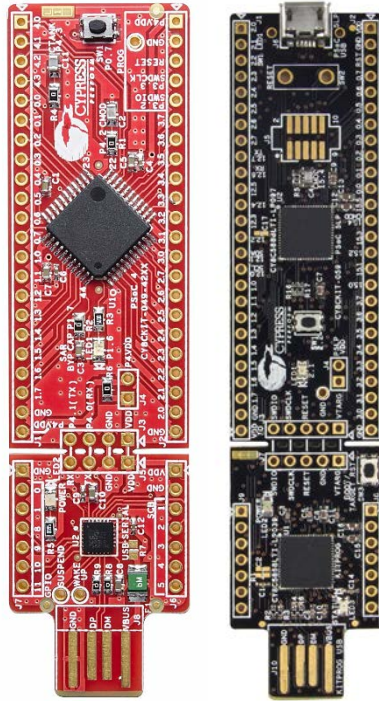[5] Serial communication block programmable as I²C/SPI/UART

Low-Cost PSoC® Development Kits

	PSoC Prototyping Kits	Bluetooth Low Energy (BLE) Pioneer Development Kit	PSoC 5LP Development Kit by SparkFun[1]
Kit Number	CY8CKIT-049 or CY8CKIT-059	CY8CKIT-042-BLE	DEV-13229
Key Features	Ultra-low-cost prototyping Breadboard-compatible Serial wire debug (SWD) or bootload for program/debug	Arduino form factor-compatible Access to all PSoC 4 BLE I/Os Full SWD program and debug	Arduino form factor-compatible Access to all PSoC 5LP I/Os Full SWD program and debug
Price	$4–$10	$49	$50

Learn more or buy a kit today at www.cypress.com/kits

[1] SparkFun is an online retail store that specializes in supporting the hobbyist market with kits and tools to develop small electronics products

PSoC Packages

Package	LQFP	PDIP			QFN							SOIC			
Pins	48	8	20	28	16	24	32	40	48	56	68	8	16	20	28
PSoC 1		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
PSoC 3									✓		✓				
PSoC 4	✓				✓	✓		✓	✓	✓	✓	✓	✓		
PSoC 5LP											✓				
CapSense					✓	✓	✓		✓				✓	✓	

Package	SSOP							TQFP				WLCSP			
Pins	8	16	20	24	28	32	48	44	48	64	100	30	32	68	72
PSoC 1	✓	✓	✓	✓	✓	✓	✓	✓			✓				
PSoC 3									✓		✓				✓
PSoC 4					✓			✓	✓	✓				✓	✓
PSoC 5LP											✓				
CapSense			✓				✓					✓			

Package	WLCSP	µBGA
Pins	99	124
PSoC 1	✓	
PSoC 3		
PSoC 4		✓
PSoC 5LP		
CapSense		