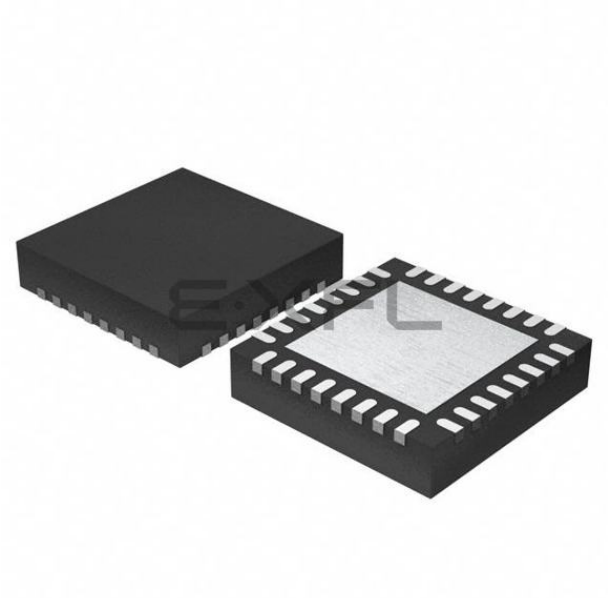


Welcome to E-XFL.COM

## Embedded - Microcontrollers - Application Specific: Tailored Solutions for Precision and Performance

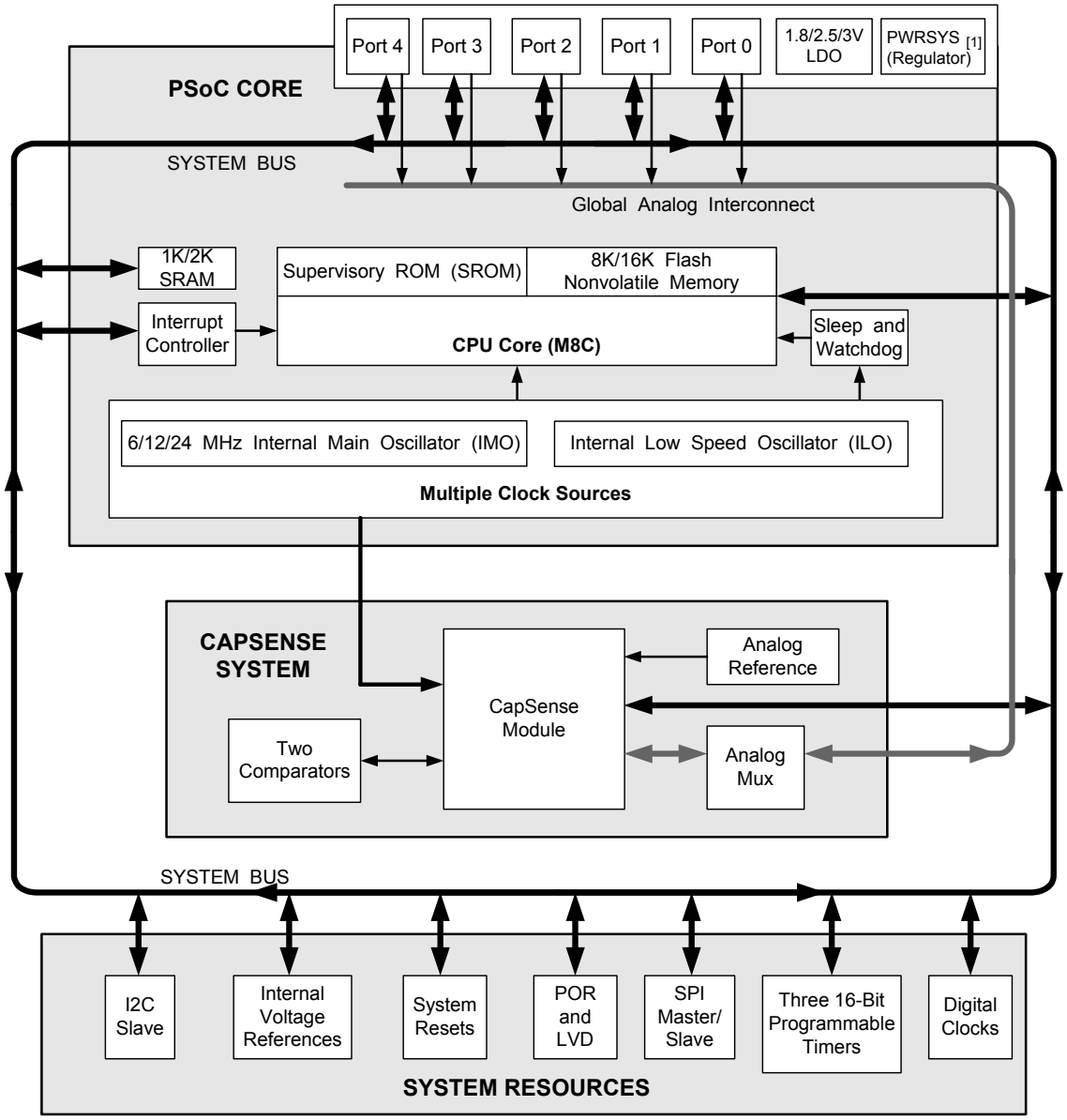
**Embedded - Microcontrollers - Application Specific** represents a category of microcontrollers designed with unique features and capabilities tailored to specific application needs. Unlike general-purpose microcontrollers, application-specific microcontrollers are optimized for particular tasks, offering enhanced performance, efficiency, and functionality to meet the demands of specialized applications.

## What Are Embedded - Microcontrollers - Application Specific?

Application-specific microcontrollers are engineered to

| Details | |
|---|---|
| Product Status | Active |
| Applications | Capacitive Sensing |
| Core Processor | M8C |
| Program Memory Type | FLASH (32kB) |
| Controller Series | CY8C20xx6A |
| RAM Size | 2K x 8 |
| Interface | I²C, SPI |
| Number of I/O | 28 |
| Voltage - Supply | 1.71V ~ 5.5V |
| Operating Temperature | -40°C ~ 85°C |
| Mounting Type | Surface Mount |
| Package / Case | 32-UFQFN Exposed Pad |
| Supplier Device Package | 32-QFN (5x5) |
| Purchase URL | https://www.e-xfl.com/product-detail/infineon-technologies/cy8c20466a-24lqxit |

## Logic Block Diagram




**Note**
1. Internal voltage regulator for internal circuitry

## Development Tools

PSoC Designer™ is the revolutionary integrated design environment (IDE) that you can use to customize PSoC to meet your specific application requirements. PSoC Designer software accelerates system design and time to market. Develop your applications using a library of precharacterized analog and digital peripherals (called user modules) in a drag-and-drop design environment. Then, customize your design by leveraging the dynamically generated application programming interface (API) libraries of code. Finally, debug and test your designs with the integrated debug environment, including in-circuit emulation and standard software debug features. PSoC Designer includes:

- Application editor graphical user interface (GUI) for device and user module configuration and dynamic reconfiguration
- Extensive user module catalog
- Integrated source-code editor (C and assembly)
- Free C compiler with no size restrictions or time limits
- Built-in debugger
- In-circuit emulation
- Built-in support for communication interfaces:
  - Hardware and software $I^2C$ slaves and masters
  - Full-speed USB 2.0
  - Up to four full-duplex universal asynchronous receiver/transmitters (UARTs), SPI master and slave, and wireless

PSoC Designer supports the entire library of PSoC 1 devices and runs on Windows XP, Windows Vista, and Windows 7.

### PSoC Designer Software Subsystems

#### Design Entry

In the chip-level view, choose a base device to work with. Then select different onboard analog and digital components that use the PSoC blocks, which are called user modules. Examples of user modules are analog-to-digital converters (ADCs), digital-to-analog converters (DACs), amplifiers, and filters. Configure the user modules for your chosen application and connect them to each other and to the proper pins. Then generate your project. This prepopulates your project with APIs and libraries that you can use to program your application.

The tool also supports easy development of multiple configurations and dynamic reconfiguration. Dynamic reconfiguration makes it possible to change configurations at run time. In essence, this lets you to use more than 100 percent of PSoC's resources for an application.

#### Code Generation Tools

The code generation tools work seamlessly within the PSoC Designer interface and have been tested with a full range of debugging tools. You can develop your design in C, assembly, or a combination of the two.

Assemblers . The assemblers allow you to merge assembly code seamlessly with C code. Link libraries automatically use

## Thermal Impedances

**Table 27. Thermal Impedances per Package**

| Package | Typical $T_{JA}$ [21] |
|---|---|
| 24-QFN[22] | 20.90 °C/W |
| 32-QFN[22] | 19.51 °C/W |
| 48-QFN[22] | 17.68 °C/W |

## Capacitance on Crystal Pins

**Table 28. Typical Package Capacitance on Crystal Pins**

| Package | Package Capacitance |
|---|---|
| 32-pin QFN | 3.2 pF |
| 48-pin QFN | 3.3 pF |

## Solder Reflow Peak Temperature

This table lists the minimum solder reflow peak temperature to achieve good solderability.

**Table 29. Solder Reflow Peak Temperature**

| Package | Maximum Peak Temperature | Time at Maximum Peak Temperature |
|---|---|---|
| 24-pin QFN | 260 °C | 30 s |
| 32-pin QFN | 260 °C | 30 s |
| 48-pin QFN | 260 °C | 30 s |

**Notes**

21. $T_J = T_A$ + Power x $T_{JA}$.
22. To achieve the thermal impedance specified for the QFN package, the center thermal pad must be soldered to the PCB ground plane.
23. Higher temperatures may be required based on the solder melting point. Typical temperatures for solder are 220 ± 5 °C with Sn-Pb or 245 ± 5 °C with Sn-Ag-Cu paste. Refer to the solder manufacturer specifications.

## Development Tool Selection

### Software

PSoC Designer

At the core of the PSoC development software suite is PSoC Designer. Utilized by thousands of PSoC developers, this robust software has been facilitating PSoC designs for over half a decade. PSoC Designer is available free of charge at http://www.cypress.com.

PSoC Programmer

Flexible enough to be used on the bench in development, yet suitable for factory programming, PSoC Programmer works either as a standalone programming application or it can operate directly from PSoC Designer. PSoC Programmer software is compatible with both PSoC ICE-Cube In-Circuit Emulator and PSoC MiniProg. PSoC Programmer is available free of charge at http://www.cypress.com.

### Development Kits

All development kits are sold at the Cypress Online Store.

CY3215-DK Basic Development Kit

The CY3215-DK is for prototyping and development with PSoC Designer. This kit supports in-circuit emulation and the software interface enables users to run, halt, and single step the processor and view the content of specific memory locations. PSoC Designer supports the advance emulation features also. The kit includes:

- PSoC Designer software CD
- ICE-Cube In-Circuit Emulator
- ICE Flex-Pod for CY8C29x66A family
- Cat-5 adapter
- Mini-Eval programming board
- 110 ~ 240-V power supply, Euro-Plug adapter
- iMAGEcraft C Compiler (Registration required)
- ISSP cable
- USB 2.0 cable and Blue Cat-5 cable
- Two CY8C29466A-24PXI 28-PDIP chip samples

## Evaluation Tools

All evaluation tools are sold at the Cypress Online Store.

CY3210-MiniProg1

The CY3210-MiniProg1 kit enables the user to program PSoC devices via the MiniProg1 programming unit. The MiniProg is a small, compact prototyping programmer that connects to the PC via a provided USB 2.0 cable. The kit includes:

- MiniProg Programming Unit
- MiniEval Socket Programming and Evaluation Board
- 28-pin CY8C29466A-24PXI PDIP PSoC Device Sample
- 28-pin CY8C27443A-24PXI PDIP PSoC Device Sample
- PSoC Designer Software CD
- Getting Started Guide
- USB 2.0 Cable

CY3210-PSoCEval1

The CY3210-PSoCEval1 kit features an evaluation board and the MiniProg1 programming unit. The evaluation board includes an LCD module, potentiometer, LEDs, and plenty of bread-boarding space to meet all of your evaluation needs. The kit includes:

- Evaluation Board with LCD Module
- MiniProg Programming Unit
- 28-pin CY8C29466A-24PXI PDIP PSoC Device Sample (2)
- PSoC Designer Software CD
- Getting Started Guide
- USB 2.0 Cable

CY3280-20x66 Universal CapSense Controller

The CY3280-20X66 CapSense Controller Kit is designed for easy prototyping and debug of CY8C20xx6A CapSense Family designs with pre-defined control circuitry and plug-in hardware. Programming hardware and an I2C-to-USB bridge are included for tuning and data acquisition.

The kit includes:

- CY3280-20x66 CapSense Controller board
- CY3240-I2USB bridge
- CY3210 MiniProg1 Programmer
- USB 2.0 retractable cable
- CY3280-20x66 Kit CD

## Device Programmers

All device programmers are purchased from the Cypress Online Store.

CY3216 Modular Programmer

The CY3216 Modular Programmer kit features a modular programmer and the MiniProg1 programming unit. The modular programmer includes three programming module cards and supports multiple Cypress products. The kit includes:

- Modular Programmer Base
- Three Programming Module Cards
- MiniProg Programming Unit
- PSoC Designer Software CD
- Getting Started Guide
- USB 2.0 Cable

CY3207ISSP In-System Serial Programmer (ISSP)

The CY3207ISSP is a production programmer. It includes protection circuitry and an industrial case that is more robust than the MiniProg in a production programming environment. Note that CY3207ISSP needs special software and is not compatible with PSoC Programmer. The kit includes:

- CY3207 Programmer Unit
- PSoC ISSP Software CD
- 110 ~ 240 V Power Supply, Euro-Plug Adapter
- USB 2.0 Cable

## Accessories (Emulation and Programming)

**Table 30. Emulation and Programming Accessories**

| Part Number | Pin Package | Flex-Pod Kit[24] | Foot Kit[25] | Adapter[26] |
|---|---|---|---|---|
| CY8C20336H-24LQXI | 24-pin QFN | CY3250-20366QFN | CY3250-24QFN-FK | See note 24 |
| CY8C20446H-24LQXI | 32-pin QFN | CY3250-20466QFN | CY3250-32QFN-FK | See note 26 |

## Third Party Tools

Several tools have been specially designed by the following third-party vendors to accompany PSoC devices during development and production. Specific details for each of these tools can be found at http://www.cypress.com under Documentation > Evaluation Boards.

## Build a PSoC Emulator into Your Board

For details on how to emulate your circuit before going to volume production using an on-chip debug (OCD) non-production PSoC device, refer Application Note “Debugging - Build a PSoC Emulator into Your Board - AN2323” at http://www.cypress.com/?rID2748.

**Notes**

24. Flex-Pod kit includes a practice flex-pod and a practice PCB, in addition to two flex-pods.
25. Foot kit includes surface mount feet that can be soldered to the target PCB.
26. Programming adapter converts non-DIP package to DIP footprint. Specific details and ordering information for each of the adapters can be found at http://www.emulation.com.
27. Dual-function digital I/O pins also connect to the common analog mux.
28. This part is available in limited quantities for in-circuit debugging during prototype development. It is not available in production volumes.

## Document History Page

| Document Title: CY8C20336H/CY8C20446H Haptics Enabled CapSense® Controller<br>Document Number: 001-56223 | | | | |
|---|---|---|---|---|
| **Revision** | **ECN** | **Origin of Change** | **Submission Date** | **Description of Change** |
| ** | 2787411 | VZD/AESA | 10/15/2009 | New datasheet. |
| *A | 3016550 | KEJO/KPOL | 08/26/2010 | Added CY8C20346H part.<br>Updated 24-pin QFN and 32-pin QFN package diagrams.<br>Content and format updated to match latest template. |
| *B | 3089844 | JPM | 11/18/10 | In Table 26, modified $T_{LOW}$ and $T_{HIGH}$ min values to 42. Updated $T_{SS\_HIGH}$ min value to 50; removed max value. |
| *C | 3180479 | YVA | 02/23/11 | Removed CY8C20346H part<br>Changed title from CapSense Applications to Haptics Enabled CapSense Controller<br>Updated Table 29 with Time at Maximum Temperature information |
| *D | 3638625 | YLIU/BVI | 06/06/2012 | Updated $F_{SCLK}$ parameter in the SPI Slave AC Specifications table<br>Updated Getting Started and Designing with PSoC Designer sections.<br>Included Development Tools.<br>Updated Software under Development Tool Selection section.<br>Updated $F_{SCLK}$ parameter in the Table 26, “SPI Slave AC Specifications,” on page 24.<br>Changed $t_{OUT\_HIGH}$ to $t_{OUT\_H}$ in Table 25, “SPI Master AC Specifications,” on page 23<br>Updated package diagrams:<br>001-13937 to *D<br>001-13191 to *F |
| *E | 3822568 | DST | 11/27/2012 | Updated package diagrams:<br>001-13937 to *E<br>001-42168 to *E<br>001-13191 to *G |