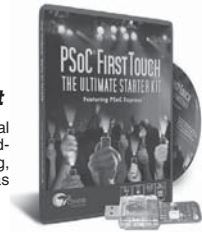




# PSoC® FirstTouch™ Embedded Design Starter Kit



## Easy and Affordable Starter Kit to Accelerate Mixed-Signal Embedded Application Development

The Cypress PSoC FirstTouch starter kit provides a quick, easy, and affordable way for embedded customers to evaluate the integration, flexibility, and real mixed-signal programmability of PSoC mixed-signal arrays. Without writing a single line of C or Assembly code, you can experience the power of PSoC mixed-signal arrays. Right-out-of-the box you can see a single PSoC device perform several designs — Cypress CapSense™ touch sensing, temperature sensing, light sensing, and CapSense™ proximity sensing. And with Cypress's PSoC Express visual embedded system design tool, you can modify these designs as you wish or even create your own applications.

### ADVANTAGES - Embedded Designs Available for Use Right Out of the Box

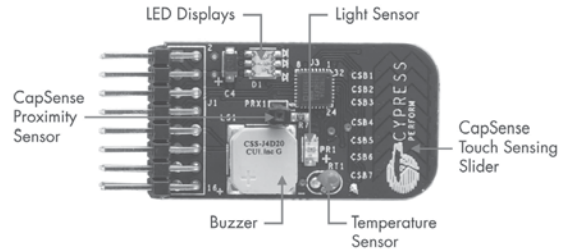
#### Highly Integrated Programmable Kit Optimized for Embedded Applications

- Integrates four embedded applications in a single thumbdrive form factor
- General purpose I/O pins accessible for further evaluation and development
- Detachable multifunction expansion card enables adding PSoC functionality to existing system boards
- USB connectivity for convenient plug and play operation

#### Rapid Time to Market for Embedded Applications

- Design embedded control applications in minutes
- No C or Assembly code necessary with PSoC Express design software
- Accommodates last-minute design changes
- Real mixed-signal programmability provides complete analog and digital functionality on-chip

| Design | Functionality  | Applications   |
|--------|--|--|
|        | Controls LED color depending on a finger's position on the CapSense touch sensing slider | White goods, handsets, consumer electronics, computers and computer peripherals  |
|        | Controls LED color and buzzer based on ambient temperature variation                     | Air conditioning, alarm systems, system and industrial fan control               |
|        | Controls LED intensity based on ambient light variation                                  | Consumer electronics, PCs, monitors, mobile phones                               |
|        | Controls LED color based on proximity to a proximity sensor                              | White goods, handsets, consumer electronics, computers, and computer peripherals |



Visit [www.cypress.com/FirstTouch](http://www.cypress.com/FirstTouch) for more information.

**428-2018-ND FirstTouch™ Starter Kit \$37.16**

## PSoC® Mini Programming Kit

This evaluation kit allows a user to program PSoC devices via the MiniProg programming unit. A MiniEval board is also included in the kit. The MiniEval board is programming and evaluation board which allows socket programming of DIP devices. The MiniEval also includes LEDs and a POT for simple evaluation and demonstration, but does not include a prototyping area. The MiniProg1 utilizes a 5-pin ISSP header to program PSoC Devices on the MiniEval board or directly on a users target board.

#### CY3210-MiniProg1 Kit Includes:

- MiniProg Programming Unit • MiniEval Socket Programming and Evaluation Board • Device Samples • Cable • Software

#### CY3217 Kit Includes:

- MiniProg Programming Unit • USB Cable • Software

|             |                           |         |
|-------------|---------------------------|---------|
| 428-1585-ND | MiniProg1 Demo Board..... | \$71.60 |
| 428-2021-ND | MiniProg Demo Board.....  | \$30.59 |

## PSoC® Evaluation Kit

#### CY3210-PSoCEval1:

The PSoC Evaluation Kit features an evaluation board and 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 MiniProg1 programming unit will program PSoC devices directly on the evaluation board, or on other boards via a 5-pin header. The MiniProg1 is small and compact, and connects to the users PC via a provided USB 2.0 Cable

#### Kit Includes:

- Evaluation board with LCD module • MiniProg1 Programming unit • PSoC Designer Software CD • CY8C29466-24PXI Samples • USB 2.0 Cable • Getting Started Guide

|             |  |          |
|-------------|--|----------|
| 428-1584-ND | Evaluation Kit for PSoC with MiniProg1 ..... | \$142.70 |
|-------------|--|----------|

## EZ-Color™ Evaluation Kit

#### CY3261A-RGB:

The CY3261A-RGB board is a preprogrammed HB LED color mix board with seven pre-set colors using the CY8CLED16 EZ-Color HB LED Controller. The board is accompanied by a CD containing the color selector software application, PSoC® Express 3.0, PSoC Programmer, and a suite of documents, schematics, and firmware examples. The color selector software application can be installed on a host PC and is used to control the EZ-Color HB LED controller using the included USB cable. The application enables you to select colors via a CIE 1931 chart or entering coordinates.

#### Kit Includes:

- RGB Industrial Lighting Demo Board • Power Supply • Software • Documentation

|             |                                   |          |
|-------------|-----------------------------------|----------|
| 428-1953-ND | Evaluation Kit for EZ-Color ..... | \$184.89 |
|-------------|-----------------------------------|----------|

## PSoC® Development Kit

#### CY3215-DK:

The PSoC Development Kit includes an In-Circuit Emulator (ICE) which consists of a base unit, USB 2.0 cable, and power supply. The base unit is connected to the host PC via the USB port. The ICE is driven by the Debugger subsystem of PSoC Designer. This software interface allows the user to run, halt, and single step the processor. It also allows the user to set complex event points. Event points can start and stop the trace memory on the ICE, as well as break the program execution. In addition to the Development Kit, different Emulation Pods are available to support the range of devices in the PSoC family. The ICE-cube also serves as a single-site device programmer via an ISSP (In-System Serial Programming) Cable and MiniEval board included in the kit. The MiniEval board is a programming and evaluation board that connects to the ICE-Cube via an ISSP Cable and allows programming of DIP devices. There are also other Programming boards available for programming other packages.

#### System Requirements:

- 500MHz Processor • 256MB Ram • 150MB Free Space • USB Port • Windows®, NT4.0, 2000, Me, XP • Internet Explorer 6.0 • Adobe Acrobat Reader

#### Development Kit Includes:

- ICE-Cube Unit • Emulation Pod for CY8C29466-24PXI • CY8C29466-24PXI Samples • PSoC Designer Software CD • ISSP Cable • MiniEval Socket Programming and Evaluation board • Backward compatibility cable (for connecting to legacy Pods) • Power Supply European Plug Adapter • USB 2.0 Cable • Getting Started Guide • Development Kit Registration form • Image Craft C-Compiler License

|             |                                |          |
|-------------|--------------------------------|----------|
| 428-1583-ND | Development Kit for PSoC ..... | \$496.33 |
|-------------|--------------------------------|----------|

## CapSense™ Successive Approximation (CSA) Training Kit

#### CY3203A-CAPSENSE:

The CY3203A CapSense Training Kit includes software, hardware and example projects to help designers learn how to implement PSoC® CapSense in their own design using the CY8C20x34 family. A training board is included that is hardwired for buttons and sliders as well as LCD control and I²C communication.

#### Kit Includes:

- Training Board (CY8C20x34) • PSoC Designer and Example Project CD • CSA User Module • Mini Programmer Unit • LCD Module • USB Cable

|             |                                       |          |
|-------------|---------------------------------------|----------|
| 428-1924-ND | Evaluation Kit for CapSense CSA ..... | \$110.42 |
|-------------|---------------------------------------|----------|

## CapSense™ Sigma-Delta (CSD) Training Kit

#### CY3213A-CAPSENSE:

The CY3213A CapSense Training Kit includes software, hardware and example projects to help designers learn how to implement PSoC® CapSense in their own design using the CY8C21x34 family. A training board is included that is hardwired for buttons and sliders as well as LCD control and I²C communication.

#### Kit Includes:

- Training Board (CY8C21x34) • PSoC Designer and Example Project CD • CSD User Module • Mini Programmer Unit • LCD Module • USB Cable

|             |   |          |
|-------------|---|----------|
| 428-1925-ND | Evaluation Kit for CapSense Sigma Delta ..... | \$110.42 |
|-------------|---|----------|

Free shipping on orders over \$200 CAD! All prices in Canadian dollars and include duty and brokerage fees.

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(C091) 683



# PSoC® (Programmable System on Chip) Microcontrollers



The Programmable System-on-Chip (PSoC) microcontrollers integrate a microcontroller and the analog and digital components that typically surround it in an embedded system. Easy-to-use development tools enable designers to select the precise peripheral functionality they desire, including analog functions such as amplifiers, ADCs, DACs,

filters and comparators and digital functions such as timers, counters, PWMs, SPI and UARTs. The PSoC family's analog features include rail-to-rail inputs, programmable gain amplifiers and up to 14-bit ADCs with exceptionally low noise, input leakage and voltage offset. PSoC devices include up

to 32KB of flash memory, 2KB of SRAM, an 8x8 multiplier with 32-bit accumulator, power and sleep monitoring circuits, and hardware I<sup>2</sup>C USB and CapSense Technology communications. Operating Voltage from 2.4V – 5.25V Temperature Range: -40°C – 85°C

C

| Analog Blocks | Digital Blocks | Flash | SRAM | HW Comm Bus           | I/O | Vcc        | Package     | Digi-Key Part No. | 1                       | Price Each 25         | 100              | Cypress Part No.  |                  |        |             |       |      |      |                  |
|---------------|----------------|-------|------|-----------------------|-----|------------|-------------|-------------------|-------------------------|-----------------------|------------------|-------------------|------------------|--------|-------------|-------|------|------|------------------|
| 1 CapSense    | 0              | 8K    | 512  | I <sup>2</sup> C      | 28  | 2.4 – 5.25 | 32-QFN      | 428-1914-ND       | 5.08                    | 2.73                  | 2.19             | CY8C20434-12LXKI  |                  |        |             |       |      |      |                  |
| 4             | 4              | 4K    | 256  | I <sup>2</sup> C      | 6   | 2.4 – 5.25 | 8-SOIC      | 428-1682-ND       | 2.21                    | 1.36                  | 1.11             | CY8C21123-24SXI   |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             | 428-1683-ND       | 2.58                    | 1.59                  | 1.29             | CY8C21223-24SXI   |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             | 428-1684-ND       | 2.64                    | 1.63                  | 1.32             | CY8C21323-24PVXI  |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             | 428-1685-ND       | 2.95                    | 1.82                  | 1.48             | CY8C21323-24LFXI  |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             | 428-1611-ND       | 3.50                    | 2.73                  | 2.19             | CY8C21234-24SXI   |                  |        |             |       |      |      |                  |
|               |                | 8K    | 512  | I <sup>2</sup> C      | 12  | 2.4 – 5.25 | 16          | 16-SOIC           | 428-1612-ND             | 3.77                  | 2.92             | 2.36              | CY8C21334-24PVXI |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             |                   | 428-1613-ND             | 4.05                  | 3.11             | 2.53              | CY8C21434-24LFXI |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             |                   | 428-2061-ND <b>NEW!</b> | 4.55                  | 3.65             | 2.84              | CY8C21434-24LTXI |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             |                   | 428-1614-ND             | 4.07                  | 3.17             | 2.45              | CY8C21534-24PVXI |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             |                   | 428-1615-ND             | 4.39                  | 3.42             | 2.75              | CY8C21634-24LFXI |        |             |       |      |      |                  |
| 6             | 4              | 4K    | 256  | I <sup>2</sup> C      | 6   | 2.4 – 5.25 | 8-DIP       | 428-1602-ND       | 3.66                    | 2.20                  | 1.84             | CY8C24123A-24PXI  |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             | 428-1603-1-ND†    | 3.39                    | 2.03                  | 1.70             | CY8C24123A-24SXIT |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             | 428-1603-2-ND‡    | 4057.58/2,500           |                       |                  | CY8C24123A-24SXIT |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             | 428-1604-ND       | 4.57                    | 2.74                  | 2.29             | CY8C24223A-24PXI  |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             | 428-1605-ND       | 4.16                    | 2.50                  | 2.08             | CY8C24223A-24PVXI |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             | 16K               | 1K                      | I <sup>2</sup> C, USB | 50               | 3 – 5.25          | 56               | 56-QFN | 428-1651-ND | 6.82  | 5.31 | 4.27 | CY8C24794-24LFXI |
|               |                |       |      |                       |     |            |             |                   |                         |                       |                  |                   |                  |        | 428-1917-ND | 8.87  | 5.31 | 4.27 | CY8C24894-24LFXI |
|               |                |       |      |                       |     |            |             |                   |                         |                       |                  |                   |                  |        | 428-1915-ND | 11.02 | 6.80 | 5.51 | CY8C24994-24BVXI |
|               |                |       |      |                       |     |            |             |                   |                         |                       |                  |                   |                  |        | 428-1916-ND | 11.02 | 6.80 | 5.51 | CY8C24994-24LFXI |
|               |                |       |      |                       |     |            |             |                   |                         |                       |                  |                   |                  |        | 428-1640-ND | 7.38  | 5.11 | 4.58 | CY8C26233-24PVXI |
| 6             | 2              | 16K   | 1K   | I <sup>2</sup> C, USB | 49  | 56-QFN     | 428-1917-ND | 8.87              | 5.31                    | 4.27                  | CY8C24894-24LFXI |                   |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            | 428-1915-ND | 11.02             | 6.80                    | 5.51                  | CY8C24994-24BVXI |                   |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            | 428-1916-ND | 11.02             | 6.80                    | 5.51                  | CY8C24994-24LFXI |                   |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            | 428-1640-ND | 7.38              | 5.11                    | 4.58                  | CY8C26233-24PVXI |                   |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            | 428-1643-ND | 7.63              | 5.29                    | 4.74                  | CY8C26443-24PVXI |                   |                  |        |             |       |      |      |                  |
| 12            | 8              | 8K    | 256  | —                     | 24  | 3 – 5.25   | 28-SSOP     | 428-1643-ND       | 7.63                    | 5.29                  | 4.74             | CY8C26443-24PVXI  |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             | 428-1644-ND       | 7.67                    | 5.31                  | 4.76             | CY8C26443-24SXI   |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             | 428-1593-ND       | 6.20                    | 3.73                  | 3.11             | CY8C27143-24PXI   |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             | 428-1594-ND       | 6.70                    | 4.03                  | 3.36             | CY8C27243-24SXI   |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             | 428-1595-ND       | 6.70                    | 4.03                  | 3.36             | CY8C27243-24SXI   |                  |        |             |       |      |      |                  |
| 12            | 8              | 16K   | 256  | I <sup>2</sup> C      | 6   | 3 – 5.25   | 8-DIP       | 428-1593-ND       | 6.20                    | 3.73                  | 3.11             | CY8C27143-24PXI   |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             | 428-1594-ND       | 6.70                    | 4.03                  | 3.36             | CY8C27243-24SXI   |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             | 428-1595-ND       | 6.70                    | 4.03                  | 3.36             | CY8C27243-24SXI   |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             | 428-1596-ND       | 7.32                    | 4.40                  | 3.67             | CY8C27443-24PXI   |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             | 428-1597-ND       | 7.05                    | 4.23                  | 3.53             | CY8C27443-24PVXI  |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             | 24                | 2K                      | I <sup>2</sup> C      | 44               | 3 – 5.25          | 44               | 48-QFN | 428-1598-ND | 7.05  | 4.23 | 3.53 | CY8C27443-24SXI  |
|               |                |       |      |                       |     |            |             |                   |                         |                       |                  |                   |                  |        | 428-1600-ND | 7.48  | 4.49 | 3.74 | CY8C27643-24PVXI |
|               |                |       |      |                       |     |            |             |                   |                         |                       |                  |                   |                  |        | 428-1601-ND | 8.66  | 5.20 | 4.33 | CY8C27643-24LFXI |
|               |                |       |      |                       |     |            |             |                   |                         |                       |                  |                   |                  |        | 428-1586-ND | 10.89 | 6.54 | 5.45 | CY8C29466-24PXI  |
|               |                |       |      |                       |     |            |             |                   |                         |                       |                  |                   |                  |        | 428-1587-ND | 9.49  | 5.96 | 4.75 | CY8C29466-24PVXI |
| 12            | 16             | 32K   | 2K   | I <sup>2</sup> C      | 24  | 3 – 5.25   | 28-SSOP     | 428-1587-ND       | 9.49                    | 5.96                  | 4.75             | CY8C29466-24PVXI  |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             | 428-1588-ND       | 9.49                    | 5.70                  | 4.75             | CY8C29466-24SXI   |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             | 428-1589-ND       | 10.58                   | 6.35                  | 5.29             | CY8C29566-24AXI   |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             | 428-1590-ND       | 9.96                    | 5.98                  | 4.98             | CY8C29666-24PVXI  |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             | 428-1591-ND       | 11.35                   | 6.82                  | 5.68             | CY8C29666-24LFXI  |                  |        |             |       |      |      |                  |
|               |                |       |      |                       |     |            |             | 428-1592-ND       | 12.14                   | 7.28                  | 6.07             | CY8C29866-24AXI   |                  |        |             |       |      |      |                  |

† Cut Tape ‡ Tape and Reel

## CapSense Express™



The CapSense Express Family, supported by PSoC Express™ Visual Embedded System Design Tool and the CapSense Express Configuration Tool, is the quickest and easiest to use for touch sensing functionality.

The CapSense Express family supports up to ten general purpose I/Os for buttons, multi-segment sliders, LEDs and other general purpose functions, all configured via I<sup>2</sup>C registers.

| Analog Blocks | Digital Blocks | Flash | SRAM | HW Comm Bus      | I/O | Vcc        | Package | Digi-Key Part No. | 1    | Price Each 25 | 100  | Cypress Part No. |
|---------------|----------------|-------|------|------------------|-----|------------|---------|-------------------|------|---------------|------|------------------|
| 1 CapSense    | 0              | 2K    | 512  | I <sup>2</sup> C | 10  | 2.4 – 5.25 | 16-QFN  | 428-2046-ND       | 2.71 | 2.16          | 1.62 | CY8C20110-LDX2I  |
|               |                |       |      |                  | 10  |            | 16-SOIC | 428-2047-5-ND     | 2.48 | 1.99          | 1.55 | CY8C20110-SX2I   |
|               |                |       |      |                  | 4   |            | 16-QFN  | 428-2048-ND       | 2.10 | 1.68          | 1.31 | CY8C20140-LDX2I  |
|               |                |       |      |                  | 4   |            | 16-SOIC | 428-2049-5-ND     | 2.12 | 1.70          | 1.33 | CY8C20140-SX2I   |
|               |                |       |      |                  | 4   |            | 8-SOIC  | 428-2050-5-ND     | 2.07 | 1.66          | 1.29 | CY8C20142-SX1I   |
|               |                |       |      |                  | 6   |            | 16-QFN  | 428-2051-ND       | 2.21 | 1.77          | 1.38 | CY8C20160-LDX2I  |
|               |                |       |      |                  | 6   |            | 16-SOIC | 428-2052-5-ND     | 2.23 | 1.79          | 1.39 | CY8C20160-SX2I   |
|               |                |       |      |                  | 8   |            | 16-QFN  | 428-2053-ND       | 2.32 | 1.86          | 1.45 | CY8C20180-LDX2I  |
|               |                |       |      |                  | 8   |            | 16-SOIC | 428-2054-5-ND     | 2.35 | 1.88          | 1.46 | CY8C20180-SX2I   |
|               |                |       |      |                  | 10  |            | 16-QFN  | 428-2055-ND       | 2.57 | 2.06          | 1.60 | CY8C201A0-LDX2I  |
|               |                |       |      |                  | 10  |            | 16-SOIC | 428-2056-5-ND     | 2.63 | 2.10          | 1.64 | CY8C201A0-SX2I   |

## Port Expanders



| Flash       | I/O | Vcc        | Package  | Digi-Key Part No. | 1    | Price Each 25 | 100  | Cypress Part No. |
|-------------|-----|------------|----------|-------------------|------|---------------|------|------------------|
| 3KB EEPROM  | 28  | 3.0 – 5.25 | 28-SSOP  | 428-2015-5-ND     | 3.91 | 3.13          | 2.44 | CY8C9520A-24PVXI |
| 11KB EEPROM | 48  |            | 48-SSOP  | 428-2016-5-ND     | 6.99 | 5.59          | 4.35 | CY8C9540A-24PVXI |
| 27KB EEPROM | 100 |            | 100-TQFP | 428-2017-ND       | 6.56 | 5.25          | 4.09 | CY8C9560A-24AXI  |

## EZ-Color™ High-Brightness LED Controllers



Cypress' EZ-Color family of devices offers the ideal control solution for High Brightness LED applications requiring intelligent dimming control. EZ-Color devices combine the power and flexibility of PSoC® (Programmable System-on-Chip™); with Cypress' PriSM (Precise Illumination signal modulation) drive technology providing lighting designers a fully

customizable and integrated lighting solution platform. EZ-Color devices support up to 16 independent LED channels with up to 32 bits of resolution per channel, enabling lighting designers the flexibility to choose the LED array size and color quality. EZ-Color's virtually limitless analog and digital customization allow for simple integration of features.

| LED Channels | Analog Blocks | Flash | SRAM | Package | Digi-Key Part No. | 1     | Price Each 25 | 100   | Cypress Part No. | Evaluation Kit |
|--------------|---------------|-------|------|---------|-------------------|-------|---------------|-------|------------------|----------------|
| 4            | 6             | 16KB  | 1KB  | 68-QFN  | 428-1947-ND       | 12.10 | 7.45          | 6.05  | CY8CLED04-68LFXI | 428-1953-ND    |
| 8            | 12            | 16KB  | 256B | 48-QFN  | 428-1948-ND       | 20.16 | 12.41         | 10.09 | CY8CLED08-48LFXI |                |
| 8            | 12            | 16KB  | 256B | 48-SSOP | 428-1949-5-ND     | 20.16 | 12.41         | 10.09 | CY8CLED08-48PVXI |                |
| 16           | 12            | 32KB  | 2KB  | 28-SSOP | 428-1950-5-ND     | 22.96 | 14.15         | 11.48 | CY8CLED16-28PVXI |                |
| 16           | 12            | 32KB  | 2KB  | 48-QFN  | 428-1951-ND       | 24.05 | 14.83         | 12.03 | CY8CLED16-48LFXI |                |
| 16           | 12            | 32KB  | 2KB  | 48-SSOP | 428-1952-5-ND     | 24.05 | 14.83         | 12.03 | CY8CLED16-48PVXI |                |

Digi-Reel® Most SMT cutdown parts are available on a Digi-Reel®. For Digi-Reel part number, change 1-ND to 6-ND or CT-ND to DKR-ND. See Digi-Key® Services on page 2 for additional information.

**Free shipping on orders over \$200 CAD! All prices in Canadian dollars and include duty and brokerage fees.**

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## PSoC® Express Development Kit

### CY3210-ExpressDK:

The PSoC Express development kit provides a feature-rich hardware platform for developing and testing designs created with PSoC Express. This kit contains a complete PSoC Express development environment including a large, full featured development board, fan modules, proto modules, 28-DIP samples, and a MiniProg Programmer.

**Kit Includes:** • Development Board • Four Fan Modules • Two Proto Modules • MiniProg Insystem Programmer • MiniEval PCB Evaluation Board • Power Supply • PSoC Express CD-ROM • Jumper Wire Kit • Cables • PSoC DIP Samples

|             |                                    |          |
|-------------|------------------------------------|----------|
| 428-1636-ND | PSoC Express Development Kit ..... | \$957.94 |
| 428-1637-ND | Fan Module Kit.....                | \$248.17 |
| 428-1638-ND | Proto Module Kit.....              | \$124.09 |

## PSoC® Express II Evaluation Kit

### CY3210-PSOCXPEVAL1:

The PSoC Express Evaluation Kit is an all-in-one evaluation kit for experiencing first-hand the speed and depth of design offerings with PSoC Express, the code-free embedded development environment.

**Kit Includes:** • Two PSoC Evaluation boards • MiniProg USB Programmer • Cables • Software

|             |  |          |
|-------------|--|----------|
| 428-1906-ND | Evaluation Kit for PSoC Express .....    | \$120.36 |
| 428-2025-ND | Evaluation Kit for PSoC Express II ..... | \$151.38 |

## PSoC® with USB Evaluation Kit

Special features of the board include both USB and capacitive touch sense development and debugging support. The evaluation board also includes an LCD module, Potentiometer, LEDs, an annunciator, and plenty of bread boarding space to meet all of your evaluation needs.

The PSoCEvalUSB board features an on-chip debugger and can be connected directly to an ICE-Cube (available in the CY3215-DK) for full-featured, in-circuit emulation and debugging.

**Kit Includes:** • PSoCEvalUSB Board • LCD Module • MiniProg1 programmer • USB mini cable • Documentation and Software

|             |  |          |
|-------------|--|----------|
| 428-1650-ND | Evaluation Kit for CY8C24794-24LFX1..... | \$122.83 |
|-------------|--|----------|

## CY3202-C iMAGEcraft C-Compiler

The CY3202-C iMAGEcraft C-Compiler is fully integrated into the PSoC® Designer IDE. PSoC Designer supports C source level debugging. In order to activate the compiler, you must enable and upgrade.

**Features:** • ANSI C-Compiler • Supports In-line Assembly and can Interface with Assembly Modules • Stack-Based • 7 Basic Data Types • Assemble and Linker • Math and String Libraries • C-Interrupt Service Routines • Librarian

|             |                            |          |
|-------------|----------------------------|----------|
| 428-1413-ND | iMAGEcraft C-Compiler..... | \$208.46 |
|-------------|----------------------------|----------|

## PSoC® ISSP (In-System Serial Programming) Programmer

The ISSP Programmer programs PSoC ICs with .hex files created with Cypress Semiconductor PSoC Designer™ software. The programmer programs a PSoC chip mounted on your PCB, one at a time. It connects to your PCB with a 5-wire cable and to your PC with a USB cable. Programming operation can be automated by incorporating the programmer into a PC-based test system. The tester software communicates with the programmer-control software through a command-line interface. The ISSP programmer can also be operated manually using the supplied Windows® GUI software.

**Functions:** • Program • Verify • Read • Flexible Connections to Target PSoC Devices: Devices can be inserted directly into ISSP, using an on-board 48-ZIF socket, connected via a test fixture or programmed in-system on a product circuit board.

**System Requirements:** • Windows®, NT, ME, 2000 or XP • CD-ROM • USB Port • 128 MB RAM

**Kit Includes:** • ISSP Programmer • ISSP Software CD-ROM • 6-Foot USB Cable • 2-Foot Programming Cable • 9V Power Supply • In-System Serial Programming (ISSP) CY3207ISSP User Guide

|             |                                     |          |
|-------------|-------------------------------------|----------|
| 428-1495-ND | PSoC USB In-System Programmer ..... | \$439.26 |
|-------------|-------------------------------------|----------|

## PSoC® SD Card Module Evaluation Kit

### CY3210-SDCARD:

The SD Card Module Evaluation Kit assesses the PSoC SD Card user module's ability to quickly and easily write to, read from and seamlessly integrate an SD card module into an embedded design. SD flash memory technologies are quickly becoming the preferred solution for portable, consumer and industrial electronic devices around the world for storing a large amount of information in a small, durable, portable form factor. Note: The SD Card user module and the example projects for this evaluation kit require the use of a C compiler.

**Kit Includes:** • CY3210-PSOCXPEVAL • SD Card Adapter Board • SD Memory Card • USB to SD Card Reader • MiniProg1 • USB Cable • Power Supply • Software

|             |                                      |          |
|-------------|--------------------------------------|----------|
| 428-1907-ND | Evaluation Kit for PSoC SD Card..... | \$322.62 |
|-------------|--------------------------------------|----------|

## PIR Motion Detection Evaluation Kit

The CY3236A-PIRMOTION EVK allows you to evaluate Cypress' PSoC® device's ability to control a Pyroelectric Infrared (PIR) sensor to implement motion sensing applications such as automatic lighting controls, automatic door openers, security systems, kiosk wake-up and activating wireless cameras. The CY3236A-PIRMOTION EVK includes all of the software, hardware, example projects and documentation you need to implement all of these PIR sensing control functions in one flexible and powerful PSoC device, the CY8C27443.

**Kit Includes:** • PIR Motion Sensor Board • Power Supply • Software • Design Files

|             |                                |          |
|-------------|--------------------------------|----------|
| 428-2022-ND | PIR Motion Evaluation Kit..... | \$160.07 |
|-------------|--------------------------------|----------|

## CapSense™ Proximity Detection Demonstration Kit

### CY3235-PROXDET:

The CapSense Proximity Detection Demonstration Kit allows quick and easy demonstration of a PSoC® CapSense-enabled device (CY8C21434) to accurately sense the proximity of a hand or finger along the length of a wire antenna. The kit also includes the I2C to USB Bridge, which allows hardware and software debugging of PSoC applications by seamlessly connecting your PC's USB port to your application's I2C interface.

**Kit Includes:** • Proximity Detection Demo Board with Antenna • I2C to USB Debugging/Communication Bridge • USB Cable • Software • Quick Start Guide

|             |   |         |
|-------------|---|---------|
| 428-1909-ND | Evaluation Kit for PSoC Proximity Detection ..... | \$91.00 |
|-------------|---|---------|

## PSoC® CapSense™ Kits

### CY3220-FPD:

This PSoC Demonstration Kit features a discrete button demonstration board for the Cypress CapSense solution. The board features eight CapSense buttons that control an LCD Module in a car radio configuration. The board is built using the CY8C21534-24PVXI PSoC, the only component necessary for sensing. The PSoC senses the presence of a finger or other capacitive element through 3mm ABS plastic.

**Kit Includes:** • Demonstration Board • User Guide • Documentation and Software CD • Power Supply

### CY3212-CAPSENSE:

This PSoC Training Kit includes software, hardware and example projects to help designers learn how to implement PSoC CapSense in their own design. A training board is included that is hard wired for buttons and sliders as well as LCD control and I2C communication.

**Kit Includes:** • Training board • PSoC Designer and Example Project CD • CSR User Module • Mini Programmer unit • LCD Module • USB Cable

|             |  |          |
|-------------|--|----------|
| 428-1652-ND | PSoC CapSense Demo Kit (CY3220-FPD) .....          | \$126.57 |
| 428-1705-ND | PSoC CapSense Training Kit (CY3212-CAPSENSE) ..... | \$145.18 |

## CapSense™ Express Evaluation Kits

The CapSense Express evaluation kits enable designers to replace mechanical buttons by implementing touch sensing designs in minutes with the newest CapSense Touch Sensing Family, CapSense Express. With Cypress' PSoC Express™ visual embedded system design tool and CapSense Express configuration tool, designers configure, monitor, and tune up to 10 I/O's for buttons, LEDs and other general purpose I/O's over I2C in a real time using a graphical user interface.

**CY3218-CAPEXP1 Kit Includes:** • CapSense Evaluation Board with CY8C20110-LDX2I • CY3240-I2USB Bridge Board • USB Cable • Battery

**CY3218-CAPEXP2 Kit Includes:** • CapSense Slider Evaluation Board with CY8C201A0-LDX2I • CY3240-I2USB Bridge Board • USB Cable • Battery

**CY3218-CAPEXP3 Kit Includes:** • CapSense Evaluation Board with CY8C20142-SX2I • CY3240-I2USB Bridge Board • USB Cable • Battery

|             |   |         |
|-------------|---|---------|
| 428-2043-ND | CapSense Evaluation Board Kit (CY3218-CAPEXP1) .....        | \$65.14 |
| 428-2044-ND | CapSense Slider Evaluation Board Kit (CY3218-CAPEXP2) ..... | \$65.14 |
| 428-2045-ND | CapSense Evaluation Board Kit (CY3218-CAPEXP3) .....        | \$65.14 |

## Universal CapSense™ Controller Kit

### CY3280-BK1:

Designed for easy development and debugging of any CapSense design. It includes pre-defined control circuitry and plug-in hardware, along with controller boards for both the CY8C20x34 and CY8C21x34 PSoC devices. It also offers a breadboard module and a module for implementing up to five buttons and a slider with sample overlays to encompass a wide variety of designs.

**Kit Includes:** • Universal CapSense Controller Boards • CapSense Linear Slider Module • CapSense Prototyping Module • CY3240-I2USB Board • CY3210 MiniProg1 Programmer • Software

|             |   |          |
|-------------|---|----------|
| 428-2033-ND | Universal CapSense Controller Kit ..... | \$219.63 |
|-------------|---|----------|

## PSoC® I2C to USB Bridge Kit

### CY3240-I2USB:

The I2C to USB Bridge is a quick and easy link from any design or application's I2C bus to a PC via USB for design testing, debugging and communication. The bridge is based on 1 of Cypress' CY8C24894, which contains 6 analog blocks supporting ADCs, DACs and filters, 4 digital blocks supporting PWMs, timers and counters, and a Full-Speed USB 2.0 peripheral.

### Kit Includes:

• I2C USB Bridge • I2C Slave Demonstration Board • USB Mini B Cable • Software CD

|             |  |         |
|-------------|--|---------|
| 428-1910-ND | Evaluation Kit for PSoC I2C to USB ..... | \$96.80 |
|-------------|--|---------|

## PSoC® I2C Port Expander Evaluation Kits

The I2C Port Expander Evaluation Kit allows you to easily assess the following value propositions of Cypress' I2C port expander ICs from other vendors and flexibly integrates I/O expansion, PWM functions and user EEPROM. The kit also includes the I2C to USB Bridge, which allows hardware and software debugging of PSoC applications by seamlessly connecting your PC's USB port to your application's I2C interface.

### CY3242-IOX Kit Includes:

• Port Expander Demo Board using containing CY8C9520/40/60 Port Expanders • I2C to USB Bridge • USB Cable • Documentation

### CY3242-IOXLITE Kit Includes:

• I2C Port Expander Demo Board using CY8C9520 Port Expander • USB Cable • Documentation

|             |                                     |          |
|-------------|-------------------------------------|----------|
| 428-1911-ND | CY3242-IOX Evaluation Kit .....     | \$800.35 |
| 428-2023-ND | CY3242-IOXLITE Evaluation Kit ..... | \$160.07 |

Free shipping on orders over \$200 CAD! All prices in Canadian dollars and include duty and brokerage fees.

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(C091) 685



## Emulation Kits and Accessories

For use with the 428-1583-ND (CY3215-DK) PSoC® Development Kit

### Emulation Kits

**Function:** Provides Connection Between ICE-Cube and Target  
**Contents:** 1 Flexcable, 1 Pod, 2 Pod Feet

| For Use With           | Digi-Key Part No. | Price Each |
|------------------------|-------------------|------------|
| CY8C21x23              | 428-1886-ND       | 246.92     |
| CY8C21x23 QFN Package  | 428-1871-ND       | 246.92     |
| CY8C21x34              | 428-1887-ND       | 246.92     |
| CY8C21x34 QFN Package  | 428-1872-ND       | 246.92     |
| CY8C24x23A             | 428-1883-ND       | 246.92     |
| CY8C24x23A QFN Package | 428-1868-ND       | 246.92     |
| CY8C24x94 QFN Package  | 428-1867-ND       | 246.92     |
| CY8C27xxx              | 428-1884-ND       | 246.92     |
| CY8C27xxx QFN Package  | 428-1869-ND       | 246.92     |
| CY8C29xxx              | 428-1885-ND       | 246.92     |
| CY8C29xxx QFN Package  | 428-1870-ND       | 246.92     |
| CY8C20334 QFN Package  | 428-1955-ND       | 286.64     |
| CY8C20434 QFN Package  | 428-1957-ND       | 286.64     |

◆ RoHS Compliant

### Evaluation Pods

**Function:** Allows evaluation of a device family using 28-DIP connector



| Family    | Digi-Key Part No. | Price Each |
|-----------|-------------------|------------|
| C48C20x34 | 428-1994-ND       | 152.62     |
| C48C21x23 | 428-1995-ND       | 152.62     |
| C58C21x34 | 428-1996-ND       | 152.62     |

| Family    | Digi-Key Part No. | Price Each |
|-----------|-------------------|------------|
| CY8C24x23 | 428-1997-ND       | 152.62     |
| CY8C24x94 | 428-1998-ND       | 152.62     |
| CY8C27x43 | 428-1999-ND       | 152.62     |
| CY8C29x66 | 428-2000-ND       | 152.62     |

### Foot Kits

**Function:** Replacement Pod Feet **Contents:** 4 Pod Feet

| Package  | Digi-Key Part No. | Price Each |
|----------|-------------------|------------|
| 8-DIP    | 428-1890-ND       | 117.87     |
| 20-DIP   | 428-1888-ND       | 135.25     |
| 28-DIP   | 428-1889-ND       | 117.87     |
| 8-SOIC   | 428-1894-ND       | 135.25     |
| 16-SOIC  | 428-1891-ND       | 135.25     |
| 20-SOIC  | 428-1892-ND       | 135.25     |
| 28-SOIC  | 428-1893-ND       | 117.87     |
| 20-SSOP  | 428-1895-ND       | 117.47     |
| 28-SSOP  | 428-1896-ND       | 117.87     |
| 48-SSOP  | 428-1897-ND       | 117.46     |
| 44-TQFP  | 428-1899-ND       | 135.25     |
| 100-TQFP | 428-1898-ND       | 317.97     |
| 24-QFN   | 428-1873-ND       | 244.45     |
| 32-QFN   | 428-1874-ND       | 210.93     |
| 48-QFN   | 428-1875-ND       | 210.93     |
| 56-QFN   | 428-1876-ND       | 210.93     |

### Pod Kits

**Function:** Replacement Pod Kit  
**Contents:** 2 Pods

| For Use With                               | Digi-Key Part No. | Price Each |
|--|-------------------|------------|
| CY8C21x23                                  | 428-1904-ND       | 162.55     |
| CY8C21x23 QFN Package                      | 428-1881-ND       | 162.55     |
| CY8C21x34                                  | 428-1905-ND       | 140.64     |
| CY8C21x34 QFN Package                      | 428-1882-ND       | 162.55     |
| CY8C24x23A                                 | 428-1901-ND       | 162.55     |
| CY8C24x94 QFN Package                      | 428-1877-ND       | 162.55     |
| CY8C27xxx                                  | 428-1902-ND       | 140.61     |
| CY8C27xxx QFN Package                      | 428-1879-ND       | 162.55     |
| CY8C29xxx                                  | 428-1903-ND       | 162.55     |
| CY8C29xxx QFN Package                      | 428-1880-ND       | 162.55     |
| CY8C20334 QFN Package                      | 428-1956-ND       | 162.55     |
| CY8C20434 QFN Package                      | 428-1958-ND       | 162.55     |
| Replacement Flex Cable for CY3250 Pod Kits | 428-1866-ND       | 124.07     |

◆ RoHS Compliant

## CPLDs

Cypress offers a wide range of Programmable Logic Devices From PALs with 10 macrocells and 200 gates up to CPLDs with 3072 macrocells and 200,000 gates. Cypress also provides voltages ranging from 2.5V up to the typical 5.0V.

The Ultra37000™ family of CMOS CPLDs provides a range of high-density programmable logic solutions with unparalleled system performance. The Ultra37000 family is designed to bring the flexibility, ease of use, and performance of the 22V10 to high-density CPLDs. The architecture is based on a number of logic blocks that are connected by a Programmable Inter-connect Matrix (PIM). Each logic block features its own product term array, product term allocator, and 16 macrocells. The PIM distributes signals from the logic block outputs and

all input pins to the logic block inputs. All of the Ultra37000 devices are electrically erasable and In-System Reprogrammable (ISR).

The Delta39K™ ISR™ CPLD Family based on a 0.18 µm, six-layer metal CMOS logic process, offers a wide range of high-density solutions at unparalleled system performance. The Delta39K family is designed to combine the high speed, predictable timing, and ease of use of CPLDs with the high densities and low power of FPGAs. With devices ranging from 15,000 to 200,000 usable gates, the family features devices ten times the size of previously available CPLDs. Even at these large densities, the Delta39K family is fast enough to implement a fully synthesizable 64-bit, 66-MHz PCI core.

| Voltage                    | Memory Type | Tpd (ns) | Macrocells | Gates | Option Power | I/O | Package  | Digi-Key Part No. | Price Each |       |       | Cypress Part No.    |
|----------------------------|-------------|----------|------------|-------|--------------|-----|----------|-------------------|------------|-------|-------|---------------------|
|                            |             |          |            |       |              |     |          |                   | 1          | 25    | 100   |                     |
| <b>ULTRA 37000 CPLDs</b>   |             |          |            |       |              |     |          |                   |            |       |       |                     |
| 5.0                        | Flash       | 6        | 64         | 2,000 | Standard     | 69  | 100-TQFP | 428-1722-ND       | 12.20      | 10.99 | 9.74  | CY37064P100-125AXC  |
|                            |             | 6        | 64         | 2,000 | Standard     | 37  | 44-TQFP  | 428-1723-ND       | 9.93       | 7.95  | 6.71  | CY37064P44-125AXC   |
|                            |             | 7.5      | 192        | 5,700 | Standard     | 125 | 160-TQFP | 428-1724-ND       | 28.11      | 26.24 | 24.36 | CY37192P160-125AXC  |
|                            |             | 7.5      | 256        | 7,700 | Standard     | 133 | 160-TQFP | 428-1725-ND       | 40.20      | 37.53 | 34.85 | CY37256P160-125AXC  |
|                            |             | 6        | 64         | 200   | Standard     | 69  | 100-TQFP | 428-1936-ND       | 13.34      | 12.01 | 10.65 | CY37064P100-125AXI  |
| 3.3                        | Flash       | 8.5      | 64         | 200   | Standard     | 37  | 44-TQFP  | 428-1937-ND       | 9.93       | 7.95  | 6.71  | CY37064VP44-100AXC  |
| <b>DELTA 39K ISR CPLDs</b> |             |          |            |       |              |     |          |                   |            |       |       |                     |
| 2.5 - 3.3                  | Flash       | 7.2      | 512        | 30K   | Lp           | 136 | 208-PQFP | 428-1939-ND       | 60.98      | 56.92 | 52.85 | CY39030V208-125NTXC |

## Delta39K/Ultra37000 ISR Programming Kit

The Delta39K/Ultra37000 ISR Programming Kit enables users to program Ultra37000, Ultra37000V, Delta39K, and PSI CPLDs on board with our ISR Programming Software, the USBISR Programming Cable, and a personal computer. The USBISR Programming Cable connects to a USB 1.1/USB 2.0 of a PC into a standard 10-pin male connector mounted on the user's board. The ISR software provides an easy-to-use Graphical User Interface that accepts JEDEC or hex files as input. The JEDEC/hex files are used to compose platform independent STAPL.SVF files. STAPL/SVF files contain all the information needed to program the device. The ISR software is used to define how many devices are in the daisy chain and what operation is to be done on each Cypress device. The same chain can be used with other JTAG-compliant devices. The ISR User's Guide describes the operation of the ISR software. The application notes included with the kit describe all system design considerations for programming with this Programming Kit.

**Features:** • Supports Cypress' Ultra37000™, Ultra37000V™, Delta39K™, and PSI™ families of products • STAPL (chain dependent and chain independent) programming language support • SVF programming language support • Standard JTAG programming interface • Multi-device programming • Easy to use interface that is compatible with Windows XP™, Windows 2000™, Windows ME™, Windows 98™, and Windows NT™ • Elimination of programming insertion which improves manufacturing efficiency, ability to program in the lab, on the manufacturing floor and at remote sites • Automatic test equipment (ATE) support via STAPL on ATE platforms.

**CY3950L Includes:** UltraISR™ Programming Cable for use with Ultra37000, Delta39K, and PSI CPLD families, ISR Programming, ISR Application Notes, and a Delta39K/Ultra37000™ Prototype Board.

428-2019-ND ISR Programming Kit.....\$127.81

## FTG Programming Kits

### CY3670

The CY3670 FTG programming kit provides users with a PC the ability to program Cypress EPROM Field-Programmable Clock Generators quickly and easily. The two setup requirements are a power connection and a serial port connection with the PC.

**Features:** • Supports multiple Cypress EPROM Field Programmable Clock Generators: CY2071AF, CY2291F, CY2292F, CY2292FZ, CY2907F8, and CY2907F14 • Separate device-specific socket adapters • Allows quick and easy prototyping • Compact design for ease of portability • Easy to use interface: Windows compatible • User-friendly CYClocks™ software for JEDEC file development  
**Kit Includes:** • Programmer Unit • Serial Port Cable • AC/DC Adapter • CD containing • CyClocks Software • CY\_FTG\_V2 Programmer Software • Data sheets of supported devices • Device-specific socket adapters for the CY2071AF and CY2292F (socket adapters for the other devices are ordered separately)

428-1457-ND FTG Programming Kit.....\$477.73  
 428-2042-ND Socket Adapter for CY2071AF.....\$162.55

### CY3672-USB

The CY3672 programming kit enables any user with a PC the ability to program Field Programmable Clock generators quickly and easily. The only two setup requirements are a power connection and a parallel port connection with the PC.

**Features:** • Supports Field Programmable Clock Generators: CY2077FS, CY2077FZ, CY22050F, CY22150F, CY22381F, CY22392F, CY22393F, CY22394F, and CY22395F • Allows quick and easy prototyping • Compact design for ease of portability • Easy to use Windows 95, 98, NT, 2K, ME, XP compatible interface • User friendly CYClocksRT™ software for JEDEC file development

**Kit Includes:** • Parallel Port cable • AC/DC adapter • CD containing: CyClocksRT, CY3672 programmer interface software, and data sheets

428-1918-ND FTG Programming Kit.....\$477.73

Free shipping on orders over \$200 CAD! All prices in Canadian dollars and include duty and brokerage fees.

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# CY7C6XXX Series Of USB Microcontrollers

Cypress offers the industry's broadest line of USB microcontrollers, as well as a full set of development tools, supporting cost-driven applications such as keyboards and mice, as well as high-performance applications like printers, scanners, xDSL modems, and digital cameras. Cypress has a wide range of solutions for Low-Speed USB applications, Full-Speed USB Applications and USB Hub Applications. Temperature range, commercial (0°F - 70°F).

The CY7C63xxx is a family of 8-bit RISC One Time Programmable (OTP) microcontrollers. In addition, the microcontroller features 96 - 256 bytes of internal RAM depending on the device. The Cypress USB Controller accepts a 6MHz ceramic resonator as its clock source. This clock signal is doubled within the chip to provide a 12MHz clock for the microprocessor.

The CY7C64013 is an 8-bit One Time Programmable microcontroller that is designed for full-speed USB applications. The instruction set has been optimized specifically for USB operations, although the microcontrollers can be used for a variety of non-USB embedded applications.

The CY7C647XX (EZ-USB FX1™) is a family of full-speed highly integrated, USB microcontrollers. The FX1 family integrates the USB transceiver, serial interface engine (SIE), enhanced 8051 microcontroller, and a programmable peripheral interface in a single chip. The General Programmable Interface (GPIF) and Master/Slave Endpoint FIFO (8- or 16-bit data bus) provides an easy and glueless interface to popular interfaces such as ATA, UTOPIA, EPP, PCMCIA, and most DSP/processors.

The CY7C68013-56PVC (EZ-USB FX2) is a single-chip integrated USB 2.0 Transceiver, Serial Interface Engine (SIE), and Enhanced 8051 Microprocessor, High Speed 480Mbps/sec. Enhanced 8051 microcontroller, and a programmable peripheral interface in a single chip. Integrated I<sup>2</sup>C-compatible controller, runs at 100 or 400kHz, 48MHz, 24MHz, or 12MHz 8051 operation. Four integrated FIFOs, brings glue and FIFO inside for lower system cost. Automatic conversion to and from 16-bit buses, master or slave operation. FIFOs can use externally supplied clock or asynchronous strobes. Easy interface to ASIC and DSP ICs, up to 40 general purpose I/Os.

The CY7C65 Series offers high-performance, fixed-function Universal Serial Bus (USB) hub devices which comply with USB Specification, Revision 1.1. Up to four downstream USB ports are available to expand the USB attachment points available in your PC system. These self-contained devices require no firmware development for your design, thereby reducing the design risk associated with some microcontroller solutions. These Application-Specific Standard Products (ASSP) can improve time-to-market in a number of USB designs, including standalone hubs, motherboard hubs, and monitor hubs.

The CY7C68001 (EZ-USB SX2™) USB interface device is designed to work with any external master, such as standard microprocessors, DSPs, ASICs, and FPGAs to enable USB 2.0 support for any peripheral device. SX2 has a built-in USB transceiver and Serial Interface Engine (SIE), along with a command decoder for sending and receiving USB data. The controller has four endpoints that share a 4KB FIFO space for maximum flexibility and throughput, as well as Control Endpoint 0. SX2 has three address pins and a selectable 8- or 16- bit data bus for command and data input or output.

The SL811HS is a single-chip, dual-speed USB Embedded Host controller that can operate as either a USB Host or USB peripheral device. The SL811HS can interface to devices such as microprocessors, microcontrollers, DSPs or directly to a variety of buses such as ISA, PCMCIA and others.

The CY7C67300 (EZ-Host™) is Cypress Semiconductor's first full-speed, low-cost multiport host/peripheral controller. EZ-Host is designed to easily interface to most high-performance CPUs to add USB host functionality. EZ-Host has its own 16-bit RISC processor to act as a coprocessor or operate in standalone mode. EZ-Host also has a programmable I/O interface block allowing a wide range of interface options.

The Wireless enCoRe™ II family brings the features and benefits of the enCoRe™ II to non-USB applications. The enCoRe™ II family has an integrated oscillator that eliminates the external crystal or resonator, reducing overall cost. Also integrated into this chip are other external components such as wake-up circuitry.



| EPROM Memory Size  | RAM | External Oscillator Speed | Configuration | USB Application Speed | Number I/O   | Core Arch. | Temperature Range       | Voltage    | Pin Count Package | Digi-Key Part No. | Price Each | 100        | Cypress Part No. |                   |             |       |       |      |                 |
|--|-----|---------------------------|---------------|-----------------------|--|------------|-------------------------|------------|-------------------|-------------------|------------|------------|------------------|-------------------|-------------|-------|-------|------|-----------------|
| <b>Low Speed USB Microcontrollers</b>                                  |     |                           |               |                       |  |            |                         |            |                   |                   |            |            |                  |                   |             |       |       |      |                 |
| 4K   | 128 | 6MHz Resonator            | OTP           | 1.5Mbps               | 12   | M-8        | 0°C - 70°C              | 4.0 - 5.25 | 20-SOIC           | 428-1313-ND       | 4.09       | 2.55       | 2.05             | CY7C63001A-SC     |             |       |       |      |                 |
|  |     |                           |               |                       | 12   | M-8        | 0°C - 70°C              | 4.0 - 5.25 | 20-DIP            | 428-1849-ND◆      | 3.28       | 2.63       | 2.22             | CY7C63001C-PXC    |             |       |       |      |                 |
|  |     |                           |               |                       | 12   | M-8        | 0°C - 70°C              | 4.0 - 5.25 | 20-SOIC           | 428-1850-ND◆      | 3.28       | 2.63       | 2.22             | CY7C63001C-SXC    |             |       |       |      |                 |
|  |     |                           |               |                       | 16   | M-8        | 0°C - 70°C              | 4.0 - 5.25 | 24-QSOP           | 428-1314-ND       | 4.84       | 2.98       | 2.42             | CY7C63101A-QC     |             |       |       |      |                 |
|  |     |                           |               |                       | 16   | M-8        | 0°C - 70°C              | 4.0 - 5.25 | 24-QSOP           | 428-1618-ND◆      | 4.84       | 2.98       | 2.42             | CY7C63101A-QXC    |             |       |       |      |                 |
| 3K   | 96  | 6MHz Resonator            | OTP           | 1.5Mbps               | 12   | M-8        | 0°C - 70°C              | 4.0 - 5.25 | 18-SOIC           | 428-1719-5-ND◆    | 3.28       | 2.63       | 2.22             | CY7C63231A-SXC    |             |       |       |      |                 |
| 8K   | 256 | 6MHz Resonator            | OTP           | 1.5Mbps               | 32   | M-8        | 0°C - 70°C              | 4.0 - 5.25 | 48-SSOP           | 428-1319-ND       | 5.31       | 3.29       | 2.66             | CY7C63413-PVC     |             |       |       |      |                 |
|  |     |                           |               |                       | 32   | M-8        | 0°C - 70°C              | 4.0 - 5.25 | 48-SSOP           | 428-1852-ND◆      | 4.78       | 3.82       | 2.98             | CY7C63413C-PVXC   |             |       |       |      |                 |
|  |     |                           |               |                       | 11   | M-8        | 0°C - 70°C              | 4.0 - 5.25 | 18-DIP            | 428-1854-ND◆      | 4.02       | 3.22       | 2.51             | CY7C63723C-PXC    |             |       |       |      |                 |
|  |     |                           |               |                       | 11   | M-8        | 0°C - 70°C              | 4.0 - 5.25 | 18-SOIC           | 428-1323-ND       | 4.47       | 2.80       | 2.24             | CY7C63723-SC      |             |       |       |      |                 |
|  |     |                           |               |                       | 11   | M-8        | 0°C - 70°C              | 4.0 - 5.25 | 18-SOIC           | 428-1855-ND◆      | 4.02       | 3.22       | 2.51             | CY7C63723C-SXC    |             |       |       |      |                 |
|  |     |                           |               |                       | 17   | M-8        | 0°C - 70°C              | 4.0 - 5.25 | 24-DIP            | 428-1324-ND       | 4.81       | 2.98       | 2.41             | CY7C63743-PC      |             |       |       |      |                 |
|  |     |                           |               |                       | 17   | M-8        | 0°C - 70°C              | 4.0 - 5.25 | 24-DIP            | 428-1856-ND◆      | 4.33       | 3.47       | 2.70             | CY7C63743C-PXC    |             |       |       |      |                 |
|  |     |                           |               |                       | 17   | M-8        | 0°C - 70°C              | 4.0 - 5.25 | 24-SOIC           | 428-1325-ND       | 4.81       | 2.98       | 2.41             | CY7C63743-SC      |             |       |       |      |                 |
|  |     |                           |               |                       | 17   | M-8        | 0°C - 70°C              | 4.0 - 5.25 | 24-SOIC           | 428-1622-ND◆      | 4.81       | 2.98       | 2.41             | CY7C63743-SXC     |             |       |       |      |                 |
|  |     |                           |               |                       | 17   | M-8        | 0°C - 70°C              | 4.0 - 5.25 | 24-SOIC           | 428-1857-ND◆      | 4.33       | 3.47       | 2.70             | CY7C63743C-SXC    |             |       |       |      |                 |
| <b>Medium Performance Full-Speed Microcontrollers — RoHS Compliant</b> |     |                           |               |                       |  |            |                         |            |                   |                   |            |            |                  |                   |             |       |       |      |                 |
| 8K   | 256 | 6MHz Xtal                 | OTP           | 12Mbps                | 19   | M-8        | 0°C - 70°C              | 4.0 - 5.25 | 28-SOIC           | 428-1634-ND       | 6.23       | 4.99       | 4.21             | CY7C64013A-SXC    |             |       |       |      |                 |
|  |     |                           |               |                       | 19   | M-8        | 0°C - 70°C              | 4.0 - 5.25 | 28-SOIC           | 428-1847-ND       | 7.04       | 5.63       | 4.38             | CY7C64013C-SXC    |             |       |       |      |                 |
|  |     |                           |               |                       | 19   | M-8        | 0°C - 70°C              | 4.0 - 5.25 | 28-DIP            | 428-1635-ND       | 6.25       | 5.01       | 4.23             | CY7C64013A-PXC    |             |       |       |      |                 |
| <b>EZ-USB FX1™ Full-Speed USB — RoHS Compliant</b>                     |     |                           |               |                       |  |            |                         |            |                   |                   |            |            |                  |                   |             |       |       |      |                 |
| —  | 16K | 24MHz Xtal                | RAM           | 12Mbps                | 40   | 8051       | 0°C - 70°C              | 3.3        | 128-TQFP          | 428-1678-ND       | 12.57      | 7.76       | 6.29             | CY7C64713-128AXC  |             |       |       |      |                 |
|  |     |                           |               |                       | 40   | 8051       | 0°C - 70°C              | 3.3        | 100-TQFP          | 428-1679-ND       | 11.85      | 7.39       | 5.93             | CY7C64713-100AXC  |             |       |       |      |                 |
|  |     |                           |               |                       | 24   | 8051       | 0°C - 70°C              | 3.3        | 56-QFN            | 428-1680-ND       | 10.73      | 6.71       | 5.37             | CY7C64713-56FXC   |             |       |       |      |                 |
| <b>USB 2.0 (High Speed) — RoHS Compliant</b>                           |     |                           |               |                       |  |            |                         |            |                   |                   |            |            |                  |                   |             |       |       |      |                 |
| —  | 16K | 24MHz Xtal                | RAM           | 12/480Mbps            | 40   | 8051       | 0°C - 70°C              | 3.3        | 100-TQFP          | 428-1667-ND       | 19.77      | 12.23      | 9.89             | CY7C68013A-100AXC |             |       |       |      |                 |
|  |     |                           |               |                       | 40   | 8051       | 0°C - 70°C              | 3.3        | 128-TQFP          | 428-1668-ND       | 20.95      | 12.91      | 10.47            | CY7C68013A-128AXC |             |       |       |      |                 |
|  |     |                           |               |                       | 40   | 8051       | -40°C - 85°C            | 3.3        | 128-TQFP          | 428-1943-ND       | 25.13      | 23.46      | 21.78            | CY7C68013A-128AXI |             |       |       |      |                 |
|  |     |                           |               |                       | 24   | 8051       | 0°C - 70°C              | 3.3        | 56-QFN            | 428-1669-ND       | 18.71      | 11.54      | 9.36             | CY7C68013A-56LFXC |             |       |       |      |                 |
|  |     |                           |               |                       | 24   | 8051       | 0°C - 70°C              | 3.3        | 56-SSOP           | 428-1627-ND       | 17.87      | 11.11      | 9.68             | CY7C68013A-56PVXC |             |       |       |      |                 |
|  |     |                           |               |                       | 24   | 8051       | -40°C - 85°C            | 3.3        | 56-SSOP           | 428-1944-5-ND     | 21.44      | 20.02      | 18.59            | CY7C68013A-56PVXI |             |       |       |      |                 |
|  |     |                           |               |                       | 40   | 8051       | 0°C - 70°C              | 3.3        | 100-TQFP          | 428-1670-ND       | 22.74      | 14.03      | 11.37            | CY7C68014A-100AXC |             |       |       |      |                 |
|  |     |                           |               |                       | 40   | 8051       | 0°C - 70°C              | 3.3        | 128-TQFP          | 428-1671-ND       | 24.11      | 14.90      | 12.06            | CY7C68014A-128AXC |             |       |       |      |                 |
|  |     |                           |               |                       | 24   | 8051       | 0°C - 70°C              | 3.3        | 56-QFN            | 428-1672-ND       | 21.53      | 13.28      | 10.77            | CY7C68014A-56LFXC |             |       |       |      |                 |
|  |     |                           |               |                       | 24   | 8051       | 0°C - 70°C              | 3.3        | 56-SSOP           | 428-1673-ND       | 20.57      | 12.72      | 10.29            | CY7C68014A-56PVXC |             |       |       |      |                 |
|  |     |                           |               |                       | 26   | 8051       | 0°C - 70°C              | 3.3        | 56-QFN            | 428-1674-ND       | 19.61      | 12.17      | 9.81             | CY7C68015A-56LFXC |             |       |       |      |                 |
|  |     |                           |               |                       | 26   | 8051       | 0°C - 70°C              | 3.3        | 56-QFN            | 428-1676-ND       | 22.56      | 13.96      | 11.28            | CY7C68016A-56LFXC |             |       |       |      |                 |
|  |     |                           |               |                       | <b>USB HUB and Integrated HUB Solutions — RoHS Compliant</b> |            |                         |            |                   |                   |            |            |                  |                   |             |       |       |      |                 |
|  |     |                           |               |                       | 8K   | 256        | 24MHz Xtal<br>6MHz Xtal | OTP        | 12Mbps Hub        | 4-port            | M-8        | 0°C - 70°C | 3.3              | 56-QFN            | 428-1805-ND | 13.29 | 10.64 | 8.27 | CY7C65640A-LFXC |
|  |     |                           |               |                       |  |            |                         |            |                   | 39 (4-port)       | M-8        | 0°C - 70°C | 4.5-5            | 56-TSSOP          | 428-1808-ND | 5.50  | 5.13  | 4.76 | CY7C66113C-PVXC |
| <b>EZ-USB SX2™ High Speed USB Interface — RoHS Compliant</b>           |     |                           |               |                       |  |            |                         |            |                   |                   |            |            |                  |                   |             |       |       |      |                 |
| —  | —   | 24MHz                     | N/A           | 12/480Mbps            | —  | None       | 0°C - 70°C              | 3.3        | 56-SSOP           | 428-1864-ND       | 13.85      | 8.96       | 8.40             | CY7C68001-56PVXC  |             |       |       |      |                 |
|  |     |                           |               |                       | —  | None       | 0°C - 70°C              | 3.3        | 56-QFN            | 428-1942-ND       | 11.64      | 9.32       | 7.86             | CY7C68001-56LFXC  |             |       |       |      |                 |
| <b>USB Host/Slave Controller — RoHS Compliant</b>                      |     |                           |               |                       |  |            |                         |            |                   |                   |            |            |                  |                   |             |       |       |      |                 |
| —  | 256 | 12-48MHz Xtal             | RAM           | 1.5-12Mbps            | 8  | No CPU     | 0°C - 65°C              | 3.3        | 48-TQFP           | 428-1721-ND       | 12.56      | 10.05      | 8.48             | SL811HST-AXC      |             |       |       |      |                 |
| <b>EZ-Host™ USB Host/Peripheral Controller — RoHS Compliant</b>        |     |                           |               |                       |  |            |                         |            |                   |                   |            |            |                  |                   |             |       |       |      |                 |
| 8K   | 16K | 12MHz                     | ROM/RAM       | —                     | 32   | CY16       | -40°C - 85°C            | 3.3        | 100-TQFP          | 428-1865-ND       | 13.34      | 12.01      | 10.65            | CY7C67300-100AXI  |             |       |       |      |                 |
| <b>Wireless enCoRe™ II Microcontroller — RoHS Compliant</b>            |     |                           |               |                       |  |            |                         |            |                   |                   |            |            |                  |                   |             |       |       |      |                 |
| 8K   | 256 | 12MHz                     | —             | —                     | 36   | M8C        | 0°C - 70°C              | 2.7 - 3.6  | 48-SSOP           | 428-1795-ND       | 3.21       | 2.57       | 2.00             | CY7C60123-PVXC    |             |       |       |      |                 |
|  |     |                           |               |                       | 20   | M8C        | 0°C - 70°C              | 2.7 - 3.6  | 24-QSOP           | 428-1798-ND       | 3.64       | 2.91       | 2.26             | CY7C60223-QXC     |             |       |       |      |                 |
|  |     |                           |               |                       | 20   | M8C        | 0°C - 70°C              | 2.7 - 3.6  | 24-SOIC           | 428-1799-ND       | 3.82       | 3.06       | 2.38             | CY7C60223-SXC     |             |       |       |      |                 |

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# CY7B923 HOTLink



The **CY7B923 HOTLink Transmitter** and **CY7B933 HOTLink Receiver** are point-to-point communications building blocks that transfer data over high-speed serial links (fiber, coax, and twisted pair). Standard HOTLink data rates range from 160-330 Mb/second. Higher speed HOTLink is also available for high-speed applications (160-400 Mb/second), as well as for those low-cost applications HOTLink-155 (150-160 Mb/second operations).

### Features:

- Fibre-Channel compliant • IBM ESCON compliant • DVB-ASI compliant • ATM compliant • B/10B coded or 10-bit unencoded • Standard HOTLink: 160–330Mbps • High-speed HOTLink 160–400 Mbps for high-speed applications • Low-speed HOTLink: 150–160Mbps for low-cost fiber

### Applications:

- TTL synchronous I/O • No external phase-locked-loop (PLL) components • Triple PECL 100K serial outputs
- Dual PECL 100K serial inputs • Low power: 350mW (Tx), 650mW (Rx) • Compatible with fiber optic modules, coaxial cable, and twisted pair media • Built-In Self-Test • Single +5V supply • 28-pin SOIC/PLCC/LCC • 0.8 BiCMOS

| Description                 | Package | Digi-Key Part No. | Price Each |       |       | Cypress Part No. |
|-----------------------------|---------|-------------------|------------|-------|-------|------------------|
|                             |         |                   | 1          | 25    | 100   |                  |
| Transmitter, Standard Speed | 28-PLCC | 428-1706-5-ND     | 69.74      | 55.79 | 47.08 | CY7B923-JXC      |
|                             | 28-SOIC | 428-1707-5-ND     | 69.74      | 55.79 | 47.08 | CY7B923-SXC      |
| Receiver, Standard Speed    | 28-PLCC | 428-1708-5-ND     | 69.74      | 55.79 | 47.08 | CY7B933-JXC      |
|                             | 28-SOIC | 428-1709-5-ND     | 69.74      | 55.79 | 47.08 | CY7B933-SXC      |



## Developer Kits

### CY3674

The development kits for the EZ-USB FX™ family provide complete hardware and software solutions for accelerating the firmware and device driver development for all the products in the family. The development kits use the actual silicon for the entire development. Software utilities and example of firmware allow the user to generate USB traffic in hours, not weeks! Includes an evaluation version of the 8051 Keil Software Tools in the Full Speed USB 2.0 development kit. The evaluation version of the C-Compiler lets the designer write 8051 microcontroller applications in C and still get the efficiency and speed of assembly language. Advanced features from Keil Tools include the ability to single step through code. This makes it easy to detect errors, handle source level debugging, and set breakpoints. With the ability to debug code one line at a time and to quickly compile and one-step download new code, developers have a more efficient means to complete firmware faster than using emulators. The supplied Keil Tools are fully functional, but are limited in object size to 4 kilobytes.

**Devices Supported:** CY7C64713-56LFXC, CY7C64713-100AXC, CY7C64713-128AXC

### Kit Includes:

- EZ-USB Development Board with CY7C64713-128AXC • Peripheral Board for prototyping • USB cable
- RS-232 9-pin to 9-pin cable

**428-1681-ND** EZ-USB FX1 Development Kit ..... \$608.02

### CY3684

The CY3684 development kit for the EZ-USB FX2LP™ family provides complete hardware and software solutions for accelerating the firmware and device driver development for all of the products in the family. The development kits use the actual silicon for the entire development. Software utilities and example firmware allow the user to generate USB traffic in hours, not weeks! Includes an evaluation version of the 8051 Keil Software Tools. The evaluation version of the C-Compiler lets the designer write 8051 microcontroller applications in C and still get the efficiency and speed of assembly language. The supplied Keil tools are fully functional, but are limited in object size to 4 kilobytes.

### Kit includes:

- EZ-USB development board • Peripheral board for prototyping • USB cable • RS232 9-pin to 9-pin cable

**428-1677-ND** Development Kit for EZ-USB FX2LP ..... \$651.45

### SL11R-DK

The SL11R from Cypress, is a low cost, full speed Universal Serial Bus (USB) RISC based Controller. The SL11R contains a 16-bit RISC processor with built-in BIOS ROM that greatly reduces firmware development time. This unique architecture provides the ability to upgrade products, in the field, without changing the peripheral hardware. The processor can execute code either from internal ROM/DRAM or external DRAM, SRAM and ROM. Email support.

**Kit Includes:** • HW reference design for SL11R evaluation board • Assembler/Debugger and built in emulator • Application notes • BIOS ROM information • System Software demo program source code • Generic WDM mini-port driver for WIN98/2000-object code • 2 sample chips

Devices Supported: SL11R-IDE

**428-1344-ND** SL11 Development Tools ..... \$614.22

### CY4636

WirelessUSB LP RDK (CY4636) provides an exemplary implementation of a 2:1, bidirectional Wireless desktop keyboard and mouse to single wireless receiver. The RDK will help jump-start your Keyboard and Mouse development using WirelessUSB LP (CYRF6936) Radio System on Chip. WirelessUSB LP is the next generation WirelessUSB device, with high data throughput and low power designed to operate in 2.4 GHz ISM band. WirelessUSB has many powerful features that allow users to create never before seen radio applications.

**Kit Includes:** • CYRF6936 WirelessUSB LS transceiver • Optical Sensor Mouse • WirelessUSB keyboard • Batteries • CD

**428-1858-ND** Wireless USB REF Kit ..... \$308.66

### CY3655

The enCoRe™ II development system, based on the highly refined PSoC™ (Programmable System-on-Chip™) tools, supplies the user with an in-circuit emulator (ICE) that works in conjunction with actual silicon to provide an accurate and efficient development system. The PSoC Designer™ software consists of a graphical user interface, assembler, C-Compiler, linker and debugger for a highly integrated code development environment. A compliant USB "User Module" along with PS/2 and other peripheral User Modules simplifies the learning curve and speeds development time.

**Kit Includes:** • Application Board enCoRe II Pod • Wireless enCoRe II Pod • PDIP feet • Modular Programmer Base Board • Programming Adapter Plug • USB Cable PS/2 Male to Male Cable • Software • Printed Documentation

**428-1773-ND** Development Kit for enCoRe II ..... \$1446.83

**428-1774-ND** Extension Kit for enCoRe II ..... \$763.12

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Toshiba 8-bit microcontrollers feature low-power consumption and low voltage operation. The on-chip peripherals options include LCD, VFT and LED display drivers. The 870/C series has a single register bank to increase C-Compiler efficiency.

**Features:** • Minimum Instruction cycle time: 0.25µs at 16MHz • Low-power modes including HALT, IDLE and clock gear and dual clocks • Powerful instruction set with 731 instructions including multiply, divide, 16-bit operations, bit manipulations, etc. • On-chip peripherals including A/D, PWM, UARTS and LCD • Operating Temperature: -40° ~ 85°C

**Kits Include:** Evaluation Board, C-Compiler (3000 lines per module), Assembler, Linker, RS-232 Cable, Batteries, Quick Start Guide, Datasheet, Manuals, CD with Tools

| Memory Size                    |       |     | I/O       | Supply Voltage | Package             | Digi-Key Part No.    | Price Each |       |                   | Toshiba Part No.    |
|--------------------------------|-------|-----|-----------|----------------|---------------------|----------------------|------------|-------|-------------------|---------------------|
| EPROM                          | RAM   |     |           |                |                     |                      | 1          | 25    | 100               |                     |
| 512K                           | 24KB  | 143 | 2.7 - 3.6 | 193-FBGA       | TMP19A43FDXBG-ND◆   | 15.67                | 14.11      | 12.51 | TMP19A43FDXBG     |                     |
| 2MB                            | 64KB  | 209 | 2.7 - 3.6 | 281-FBGA       | TMP19A64F20AXBG-ND◆ | 51.68                | 46.54      | 41.26 | TMP19A64F20AXBG   |                     |
| 32K                            | 2K    | 39  | 1.8 - 3.6 | 64-QFP         | TMP86FM29FG-ND◆     | 6.95                 | 5.56       | 4.33  | TMP86FM29FG       |                     |
| 32K                            | 2K    | 39  | 1.8 - 3.6 | 64-LQFP        | TMP86FM29UG-ND◆     | 6.95                 | 5.56       | 4.33  | TMP86FM29UG       |                     |
| 32K                            | 2K    | 56  | 1.8 - 3.6 | 64-QFP         | TMP86FM48FG-ND◆     | 9.93                 | 7.95       | 6.71  | TMP86FM48FG       |                     |
| 32K                            | 2K    | 56  | 1.8 - 3.6 | 64-LQFP        | TMP86FM48UG-ND◆     | 9.80                 | 7.85       | 6.62  | TMP86FM48UG       |                     |
| 48K                            | 2K    | 48  | 1.8 - 3.6 | 80-LQFP        | TMP86FP24FG-ND◆     | 7.79                 | 6.23       | 5.26  | TMP86FP24FG       |                     |
| 8K                             | 256   | 22  | 2.7 - 5.5 | 30-SSOP        | TMP86F807MGJY-ND◆   | 6.70                 | 5.37       | 4.17  | TMP86F807MG(EY)   |                     |
| 8K                             | 256   | 24  | 2.7 - 5.5 | 30-SSOP        | TMP86F808DMGJY-ND◆  | 6.70                 | 5.37       | 4.17  | TMP86F808DMG(EY)  |                     |
| 16K                            | 512   | 26  | 4.5 - 5.5 | 32-SDIP        | TMP86FH09NGZM-ND◆   | 3.15                 | 2.53       | 1.97  | TMP86FH09NG(ZM)   |                     |
| 16K                            | 512   | 24  | 2.7 - 5.5 | 30-SSOP        | TMP86FH12MGZ-ND◆    | 4.47                 | 3.58       | 2.78  | TMP86FH12MG(Z)    |                     |
| 16K                            | 512   | 33  | 2.7 - 5.5 | 42-SDIP        | TMP86FH46ANGZ-ND◆   | 6.20                 | 4.97       | 4.19  | TMP86FH46ANG(Z)   |                     |
| 16K                            | 512   | 35  | 2.7 - 5.5 | 44-LQFP        | TMP86FH47UG-ND◆     | 3.57                 | 2.86       | 2.41  | TMP86FH47UG       |                     |
| 60K                            | 2K    | 48  | 2.7 - 5.5 | 64-LQFP        | TMP86FS23UGJZ-ND◆   | 5.93                 | 4.75       | 3.70  | TMP86FS23UG(JZ)   |                     |
| 60K                            | 1K    | 55  | 2.7 - 5.5 | 80-LQFP        | TMP86FS27FG-ND◆     | 11.76                | 9.41       | 7.94  | TMP86FS27FG       |                     |
| 60K                            | 2K    | 62  | 2.7 - 5.5 | 80-LQFP        | TMP86FS28DFGJZ-ND◆  | 6.28                 | 5.03       | 4.24  | TMP86FS28DFG(JZ)  |                     |
| 60K                            | 2K    | 62  | 2.7 - 5.5 | 80-QFP         | TMP86FS28FGTZ-ND◆   | 6.28                 | 5.03       | 4.24  | TMP86FS28FG(TZ)   |                     |
| 60K                            | 2KB   | 56  | 2.7 - 5.5 | 60-QFP         | TMP86FS49AFGZ-ND◆   | 6.45                 | 5.17       | 4.36  | TMP86FS49AFG(Z)   |                     |
| 60K                            | 2KB   | 56  | 2.7 - 5.5 | 60-LQFP        | TMP86FS49AUGJZ-ND◆  | 6.45                 | 5.17       | 4.36  | TMP86FS49AUG(JZ)  |                     |
| 60K                            | 2KB   | 91  | 2.7 - 5.5 | 100-QFP        | TMP86FS64FGTZ-ND◆   | 6.87                 | 5.51       | 4.28  | TMP86FS64FG(TZ)   |                     |
| 16K                            | 512   | 32  | 1.8 - 5.5 | 44-LQFP        | TMP86PH22UGJZ-ND◆   | 5.45                 | 4.36       | 3.39  | TMP86PH22UG(JZ)   |                     |
| 128K                           | 4KB   | 61  | 2.4 - 3.6 | 100-LQFP       | TMP91FW40FGJZ-ND◆   | 9.26                 | 7.41       | 6.25  | TMP91FW40FG(JZ)   |                     |
| 256K                           | 16KB  | 81  | 2.4 - 3.6 | 100-LQFP       | TMP91FY42FGJZ-ND◆   | 12.67                | 11.41      | 10.12 | TMP91FY42FG(JZ)   |                     |
| 128K                           | 8KB   | 81  | 2.4 - 3.6 | 100-QFP        | TMP91FW60DFGTZ-ND◆  | 9.26                 | 7.41       | 6.25  | TMP91FW60DFG(TZ)  |                     |
| 128K                           | 8KB   | 83  | 2.4 - 3.6 | 100-LQFP       | TMP91FW60FGBJZ-ND◆  | 9.26                 | 7.41       | 6.25  | TMP91FW60FBG(BJZ) |                     |
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