



# Product Selector Guide

## Static RAMs

### Organization/Density Overview

| Density          | X1                        | X4                      | X8  | X9    | X16   | X18   | X32                                     | X36   |
|------------------|---------------------------|-------------------------|---|-------|---|---|---|---|
| 4 Kb             |                           | 7C148<br>7C149<br>7C150 |   |       |   |   |   |   |
| 16 Kb            | 7C167A                    | 7C168A                  | 7C128A<br>6116  |       |   |   |   |   |
| 64 Kb to 72 Kb   | 7C187                     | 7C164<br>7C166          | 7C185A<br>7C186A<br>6264  | 7C182 |   |   |   |   |
| 256 Kb to 288 Kb | 7C197                     | 7C192<br>7C194<br>7C195 | 7C198<br>7C199<br>7C1399/V<br>62256/V<br>62256V25<br>62256V18       | 7C188 |   |   |   |   |
| 512 Kb           |                           |                         |   |       | 7C1020<br>7C1020V                                     |   |   |   |
| 1 Mb             | 7C1007<br>7C107           | 7C106B<br>7C1006B       | 7C109B/V33<br>7C1009B/V33<br>7C1019B/V33<br>62128<br>62128V/V25/V18 |       | 7C1021<br>7C1021BV33<br>62126BV<br>62127BV            | 7C1031<br>7C1032<br>7C1313A<br>7C1314A<br>7C1315A<br>7C1358A  | 7C1316A<br>7C1335A                      |   |
| 2 Mb             |                           |                         | 62138V**  |       | 62136V/V18**<br>62137V/V18**                          | 7C1324<br>7C1317A<br>7C1326A  | 7C1329<br>7C1346A<br>7C1333*<br>7C1334* | 7C1344A   |
| 4 Mb             | 7C1046B<br>7C1046B<br>V33 |                         | 7C1049B<br>7C1049BV33<br>62148<br>62148V**                          |       | 7C1041B<br>7C1041BV33<br>62146V/V18**<br>62147V/V18** | 7C1325B<br>7C1327B/C<br>7C1328A<br>7C1352B*<br>7C1353B*   | 7C1338B<br>7C1339B<br>7C1340A           | 7C1345B<br>7C1347B/C<br>7C1348A<br>7C1350B*<br>7C1351B*   |
| 8 Mb             |                           |                         |   |       |   | 7C1362A/A1<br>7C1363A<br>7C1367A<br>7C1362V25<br>7C1363V25<br>7C1356A*<br>7C1357A*<br>7C1302V25<br>7C1304V25                  | 7C1364V25<br>7C1365V25                  | 7C1354A*<br>7C1355A*<br>7C1360A/A1<br>7C1361A<br>7C1366A<br>7V1360V25<br>7V1360V25  |
| 16 Mb            |                           |                         |   |       |   | 7C1383A<br>7C1387A<br>7C1382A<br>7C1383V25A<br>7C1387V25A<br>7C1382V25A<br>7C1372A*<br>7C1373A*<br>7C1372V25A*<br>7C1373V25A* |   | 7C1381A<br>7C1386A<br>7V1380A<br>7C1381V25A<br>7C1386V25A<br>7V1380V25A<br>7C1370A*<br>7C1371A*<br>7C1370V25A<br>7C1371V25A |

\*NoBL™ (No Bus Latency™) Synchronous Architecture

\*\* MoBL™ (More Battery Life™) Asynchronous SRAMs

Note: Please contact a Cypress Representative for product availability.

## Fast Asynchronous SRAMs

Cypress is a world leader in the design and production of high-performance CMOS SRAMs. Cypress has one of the broadest offerings of fast asynchronous SRAM devices in the industry, including more than 10 device families with densities ranging from 16 Kbits to 4 Mbits, and speeds from 45 ns to less than 10 ns. Packages include PDIP, SOJ, TSOP I & II, LCC, and BGA. Cypress's full selection of devices makes it a one-stop shop for fast asynchronous memory requirements.

Fast asynchronous SRAMs are used in a wide range of systems, including data communications and telecommunications, PC peripherals, cellular phone systems, industrial equipment, instrumentation devices, game machines, and military systems. Cypress is a leader in the fast asynchronous memory market with its six-transistor (6T) memory cell technology. The 6T cell is rapidly displacing the four-transistor (4T), two-resistor cell as an industry standard. Cypress 6T cells eliminate power dissipation in resistors, and they are not susceptible to data-corrupting alpha radiation. As a result, they are known for low power consumption and high reliability.

Cypress is currently manufacturing 0.25-micron SRAMs in volume and will continue to introduce newer, faster processing technologies for cost and performance advantages. Its SRAM technology helps to support the success of other Cypress products, including specialty memories and complex programmable logic devices (CPLDs). New 3.3-V designs have a 5-V regulator option, ensuring compatibility with legacy applications and reinforcing Cypress's commitment to 5-V product support.

| Density | Organization | V <sub>CC</sub> | Part #       | PKG       | Temp  | Speed | Attributes   |
|---------|--------------|-----------------|--------------|-----------|-------|-------|--------------|
| 16 Kb   | 2K x 8       | 5V              | CY6116A      | D,L       | M     | 35    |              |
|         |              |                 | CY7C128A     | P,S,V,D,L | C,M   | 15    |              |
|         | 4K x 4       | 5V              | CY7C168A     | P,V,D     | C,M   | 15    | Power Down   |
|         | 16K x 1      | 5V              | CY7C167A     | P,V       | C     | 15    |              |
| 64 Kb   | 8K x 9       | 5V              | CY7C182      | P,V       | C     | 25    |              |
|         |              |                 | CY7C185      | P,V,S     | C,I   | 15    | 300-mil DIP  |
|         |              |                 | CY7C185A     | D         | M     | 20    | 300-mil DIP  |
|         |              |                 | CY7C186A     | D         | M     | 20    | 600-mil DIP  |
|         | 16K x 4      | 5V              | CY7C164      | P,V       | C     | 15    | 2 CE / no OE |
|         |              |                 | CY7C166      | P,V       | C     | 15    | 2 CE / 1 OE  |
|         | 64K x 1      | 5V              | CY7C187      | P,V       | C     | 15    |              |
| 256 Kb  | 32K x 9      | 5V              | CY7C188      | V         | C     | 15    |              |
|         |              | 5V              | CY7C198      | D,L,Z     | C,M   | 20    | 600-mil DIP  |
|         |              |                 | CY7C199      | P,V,Z,D,L | C,I,M | 10    | 300-mil DIP  |
|         | 64K x 4      | 3.3V            | CY7C1399     | V,Z       | C,I   | 12    |              |
|         |              | 5V              | CY7C192      | V         | C     | 12    | Separate I/O |
|         |              |                 | CY7C194      | P,V       | C     | 12    | 1 CE         |
|         |              |                 | CY7C195      | P,V       | C     | 12    | 1 CE / 1 OE  |
|         |              |                 | CY7C197      | P,V       | C     | 12    |              |
| 512 Kb  | 32K x 16     | 5V              | CY7C1020     | V,Z       | C     | 10    |              |
|         |              |                 | CY7C1020L    | V,Z       | C     | 10    | Low Power    |
|         |              |                 | CY7C1022     | V,Z       | C     | 12    | CE High      |
|         |              | 3.3V            | CY7C1020V33  | V,Z       | C,I   | 10    |              |
|         |              |                 | CY7C1020V33L | V,Z       | C,I   | 10    | Low Power    |
|         |              |                 |              |           |       |       |              |

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| Density | Organization | V <sub>CC</sub> | Part #        | PKG    | Temp  | Speed | Attributes                       |
|---------|--------------|-----------------|---------------|--------|-------|-------|----------------------------------|
| 1 Mb    | 64K x 16     | 5V              | CY7C1021      | V,Z    | C,I   | 12    |                                  |
|         |              | 3.3V            | CY7C1021BV33  | V,Z,BA | C,I   | 10    |                                  |
|         |              |                 | CY7C1021BV33L | V,Z,BA | C,I   | 10    | Low Power                        |
|         | 128K x 8     | 5V              | CY7C109B      | V,Z    | C,I   | 12    | 400-mil SOJ                      |
|         |              |                 | CY7C1009B     | V      | C,I   | 12    | 300-mil SOJ                      |
|         |              |                 | CY7C1019B     | V      | C     | 12    | Center-Power/Ground, 400-mil SOJ |
|         |              | 3.3V            | CY7C109BV33   | V      | C     | 15    | 400-mil SOJ                      |
|         |              |                 | CY7C1009BV33  | V      | C     | 12    | 300-mil SOJ                      |
|         |              |                 | CY7C1019BV33  | V      | C     | 12    | Center-Power/Ground, 400-mil SOJ |
|         |              |                 | CY7C1018V33   | V      | C     | 12    | Center-Power/Ground, 300-mil SOJ |
|         |              |                 |               |        |       |       |                                  |
|         | 256K x 4     | 5V              | CY7C106B      | V      | C     | 12    | 400-mil SOJ                      |
|         |              |                 | CY7C1006B     | V      | C     | 12    | 300-mil SOJ                      |
|         | 1M x 1       | 5V              | CY7C107       | V      | C     | 12    | 400-mil SOJ                      |
|         |              |                 | CY7C1007      | V      | C     | 12    | 300-mil SOJ                      |
| 4 Mb    | 256K x 16    | 5V              | CY7C1041B     | V,Z    | C     | 15    |                                  |
|         |              |                 | CY7C1041BL    | V      | C     | 17    | Low Power                        |
|         |              | 3.3V            | CY7C1041BV33  | V,Z    | C     | 15    |                                  |
|         | 512K x 8     | 5V              | CY7C1049B     | V      | C,I,M | 15    |                                  |
|         |              |                 | CY7C1049BL    | V      | C,I   | 17    | Low Power                        |
|         |              |                 | 5962-95600    | FJ     | M     | 20    |                                  |
|         |              | 3.3V            | CY7C1049BV33  | V      | C,I   | 15    |                                  |
|         |              |                 | CY7C1049BV33L | V      | C     | 15    | Low Power                        |

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## Standard Pipelined/Flow-Through Synchronous SRAMs

Synchronous SRAMs were originally developed for Level 2 cache applications in computers. By adding a clock input, the SRAM becomes synchronized with the rest of the system, and the addition of pipeline stages enables a higher level of system performance than asynchronous devices. In addition, the system interface to the SRAM is simplified by only sampling the inputs and driving the outputs on the edge of a clock. Other applications have adopted these devices in order to take advantage of the cost-effective, increased performance. Synchronous SRAMs are now found in high-speed systems such as switches, routers, test and measurement equipment, and line cards. Cypress has a broad line of standard synchronous SRAMs that provide the speed and flexibility required for these applications. They offer several features that enhance overall system performance. These include the choice of two different write sequences (initiated by ADSP# or ADSC#), a "byte write" capability that allows data to be changed in one operation versus the three operations consumed by the current "read/modify/write" method, ZZ or "snooze" mode, 2.5V I/O, and a burst option that allows four words of data to be transferred with a single address.

Cypress's synchronous SRAM family includes flow-through and pipelined versions in both 2- and 4-Mbit densities. They are available in x18, x32, and x36 word widths. The pipelined versions offer bus speeds up to 166 MHz and the flow-through options run up to 117 MHz. The devices are offered in industry-standard 100-pin TQFP packages and pinouts, giving customers multiple sourcing options. Cypress will soon introduce an 8-Mbit device with a 2.5V core voltage to expand the line. The 4-Mb and 8-Mb parts will also be available in BGA packaging. All of the standard synchronous SRAMs are manufactured with Cypress's patented six transistor (6T) memory cell. This memory cell utilizes active transistors as pull-ups (instead of the passive resistors used in 4T-2R memory cells). It reduces standby power consumption while making the memory insensitive to alpha radiation. Typical standard synchronous SRAM applications include computation (L2 cache), embedded control, switches, routers, test/measurement, DSP-based systems, base stations, and RAID controllers.

| Density | Org.    | Architecture    | Speed (MHz)        | Supply Voltage | I/O Voltage | Part Number | Pins Packages      | Burst Sequence     |
|---------|---------|-----------------|--------------------|----------------|-------------|-------------|--------------------|--------------------|
| 1 Mb    | 64Kx18  | Flow-Through    | 8-12 ns            | 5.0            | 3.3/5.0     | CY7C1031    | 52 PQFP, PLCC      | Interleaved Burst  |
|         |         | Flow-Through    | 8-12 ns            | 5.0            | 3.3/5.0     | CY7C1032    | 52 PQFP, PLCC      | Linear Burst       |
|         |         | TAG RAM         | 75, 83, 100, 133   | 3.3            | 3.3         | CY7C1358A   | 100 TQFP           |                    |
| 2 Mb    | 64Kx32  | Pipelined       | 100, 133           | 3.3            | 3.3         | CY7C1329    | 100 TQFP           | Linear/Interleaved |
|         | 128Kx18 | Flow-Through    | 100, 117           | 3.3            | 3.3         | CY7C1324    | 100 TQFP           | Linear/Interleaved |
| 4 Mb    | 256Kx18 | Pipelined       | 100, 133, 166      | 3.3            | 2.5/3.3     | CY7C1327B   | 100 TQFP / 119 BGA | Linear/Interleaved |
|         |         | Pipelined       | 166, 200, 225, 250 | 3.3            | 3.3         | CY7C1327C   | 100 TQFP / 119 BGA | Linear/Interleaved |
|         |         | Pipelined - 2CD | 117, 133, 150, 166 | 3.3            | 2.5/3.3     | CY7C1328A   | 100 TQFP / 119 BGA | Linear/Interleaved |
|         |         | Flow-Through    | 100, 117           | 3.3            | 2.5/3.3     | CY7C1325B   | 100 TQFP / 119 BGA | Linear/Interleaved |
|         | 128Kx32 | Pipelined       | 100, 133, 166      | 3.3            | 2.5/3.3     | CY7C1339B   | 100 TQFP / 119 BGA | Linear/Interleaved |
|         |         | Pipelined - 2CD | 66, 83, 100        | 3.3            | 3.3         | CY7C1340A   | 100 TQFP / 119 BGA | Linear/Interleaved |
|         |         | Flow-Through    | 100, 117           | 3.3            | 2.5/3.3     | CY7C1338B   | 100 TQFP / 119 BGA | Linear/Interleaved |
|         | 128Kx36 | Pipelined       | 100, 133, 166      | 3.3            | 2.5/3.3     | CY7C1347B   | 100 TQFP / 119 BGA | Linear/Interleaved |
|         |         | Pipelined       | 200, 225, 250      | 3.3            | 2.5/3.3     | CY7C1347C   | 100 TQFP / 119 BGA | Linear/Interleaved |
|         |         | Pipelined - 2CD | 117, 133, 150, 166 | 3.3            | 2.5         | CY7C1348A   | 100 TQFP / 119 BGA | Linear/Interleaved |
|         |         | Flow-Through    | 100, 117           | 3.3            | 2.5/3.3     | CY7C1345B   | 100 TQFP / 119 BGA | Linear/Interleaved |

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| Density | Org.    | Architecture                    | Speed (MHz)                       | Supply Voltage | I/O Voltage | Part Number                | Pins Packages      | Burst Sequence     |
|---------|---------|---------------------------------|-----------------------------------|----------------|-------------|----------------------------|--------------------|--------------------|
| 9 Mb    | 256Kx36 | Pipelined                       | 100, 133, 166, 200 <sup>[1]</sup> | 2.5            | 2.5         | CY7C1360V25 <sup>[1]</sup> | 100 TQFP / 119 BGA | Linear/Interleaved |
|         |         | Pipelined - 3CE / 2CE JTAG      | 150, 166, 200 <sup>[1]</sup>      | 3.3            | 2.5/3.3     | CY7C1360A                  | 100 TQFP           | Linear/Interleaved |
|         |         | Pipelined - 2CE JTAG            |                                   |                |             |                            | 119 BGA            |                    |
|         |         | Pipelined - 3CE / 2CE JTAG      | 150, 166, 200 <sup>[1]</sup>      | 3.3            | 2.5/3.3     | CY7C1360A1                 | 100 TQFP           | Linear/Interleaved |
|         |         | Pipelined - 2CE JTAG            |                                   |                |             |                            | 119 BGA            |                    |
|         |         | Pipelined - 2 CD 3CE / 2CE JTAG | 150, 166, 200 <sup>[1]</sup>      | 3.3            | 2.5/3.3     | CY7C1366A                  | 100 TQFP           | Linear/Interleaved |
|         |         | Pipelined - 2 CD 2 CE JTAG      |                                   |                |             |                            | 119 BGA            |                    |
|         |         | Flow-Through                    | 83, 100, 117 <sup>[1]</sup>       | 2.5            | 2.5         | CY7C1361V25 <sup>[1]</sup> | 100 TQFP / 119 BGA | Linear/Interleaved |
|         |         | Flow-Through - 3CE / 2CE JTAG   | 100, 117, 133, 150 <sup>[1]</sup> | 3.3            | 2.5/3.3     | CY7C1361A                  | 100 TQFP           | Linear/Interleaved |
|         |         | Flow-Through - 2CE JTAG         |                                   |                |             |                            | 119 BGA            |                    |
|         | 512Kx18 | Pipelined                       | 100, 133, 166, 200 <sup>[1]</sup> | 2.5            | 2.5         | CY7C1362V25 <sup>[1]</sup> | 100 TQFP / 119 BGA | Linear/Interleaved |
|         |         | Pipelined - 3CE / 2CE JTAG      | 150, 166, 200 <sup>[1]</sup>      | 3.3            | 2.5/3.3     | CY7C1362A                  | 100 TQFP           | Linear/Interleaved |
|         |         | Pipelined - 2CE JTAG            |                                   |                |             |                            | 119 BGA            |                    |
|         |         | Pipelined - 3CE / 2CE JTAG      | 150, 166, 200 <sup>[1]</sup>      | 3.3            | 2.5/3.3     | CY7C1362A1                 | 100 TQFP           | Linear/Interleaved |
|         |         | Pipelined - 2CE JTAG            |                                   |                |             |                            | 119 BGA            |                    |
|         |         | Pipelined - 2 CD 3CE / 2CE JTAG | 150, 166, 200 <sup>[1]</sup>      | 3.3            | 2.5/3.3     | CY7C1367A                  | 100 TQFP           | Linear/Interleaved |
|         |         | Pipelined - 2 CD 2CE JTAG       |                                   |                |             |                            | 119 BGA            |                    |
|         |         | Flow-Through                    | 83, 100, 117 <sup>[1]</sup>       | 2.5            | 2.5         | CY7C1363V25 <sup>[1]</sup> | 100 TQFP / 119 BGA | Linear/Interleaved |
|         |         | Flow-Through - 3CE / 2CE JTAG   | 100, 117, 133, 150 <sup>[1]</sup> | 3.3            | 2.5/3.3     | CY7C1363A                  | 100 TQFP           | Linear/Interleaved |
|         |         | Flow-Through - 2CE JTAG         |                                   |                |             |                            | 119 BGA            |                    |
|         | 256Kx32 | Pipelined                       | 100, 133, 166, 200 <sup>[1]</sup> | 2.5            | 2.5         | CY7C1364V25 <sup>[1]</sup> | 100 TQFP / 119 BGA | Linear/Interleaved |
|         |         | Flow-Through                    | 83, 100, 117 <sup>[1]</sup>       | 2.5            | 2.5         | CY7C1365V25 <sup>[1]</sup> | 100 TQFP / 119 BGA | Linear/Interleaved |

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| Density | Org.    | Architecture               | Speed (MHz)                       | Supply Voltage | I/O Voltage | Part Number                 | Pins Packages | Burst Sequence     |
|---------|---------|----------------------------|-----------------------------------|----------------|-------------|-----------------------------|---------------|--------------------|
| 18 Mb   | 512Kx36 | Flow-Through - 3CE         | 100, 117, 133 <sup>[1]</sup>      | 3.3            | 2.5/3.3     | CY7C1381B <sup>[1]</sup>    | 100 TQFP      | Linear/Interleaved |
|         |         | Flow-Through - 1CE JTAG    |                                   |                |             |                             | 119 BGA       |                    |
|         |         | Pipelined - 2 CD 3CE       | 133, 150, 167, 200 <sup>[1]</sup> | 3.3            | 2.5/3.3     | CY7C1386B <sup>[1]</sup>    | 100 TQFP      | Linear/Interleaved |
|         |         | Pipelined - 2 CD 1 CE JTAG |                                   |                |             |                             | 119 BGA       |                    |
|         |         | Pipelined - 1 CD 3 CE      | 133, 150, 167, 200 <sup>[1]</sup> | 3.3            | 2.5/3.3     | CY7C1380B <sup>[1]</sup>    | 100 TQFP      | Linear/Interleaved |
|         |         | Pipelined - 1 CD 1 CE JTAG |                                   |                |             |                             | 119 BGA       |                    |
|         |         | Flow-Through - 3CE         | 100, 117, 133 <sup>[1]</sup>      | 2.5            | 2.5         | CY7C1381BV25 <sup>[1]</sup> | 119 BGA       | Linear/Interleaved |
|         |         | Flow-Through - 1CE JTAG    |                                   |                |             |                             | 119 BGA       |                    |
|         |         | Pipelined - 2 CD 3CE       | 133, 150, 167, 200 <sup>[1]</sup> | 2.5            | 2.5         | CY7C1386BV25 <sup>[1]</sup> | 100 TQFP      | Linear/Interleaved |
|         |         | Pipelined - 2 CD 1 CE JTAG |                                   |                |             |                             | 119 BGA       |                    |
|         |         | Pipelined - 1 CD 3 CE      | 133, 150, 167, 200 <sup>[1]</sup> | 2.5            | 2.5         | CY7C1380BV25 <sup>[1]</sup> | 100 TQFP      | Linear/Interleaved |
|         |         | Pipelined - 1 CD 1 CE JTAG |                                   |                |             |                             | 119 BGA       |                    |
|         | 1Mx18   | Flow-Through - 3CE         | 100, 117, 133 <sup>[1]</sup>      | 3.3            | 2.5/3.3     | CY7C1383B <sup>[1]</sup>    | 100 TQFP      | Linear/Interleaved |
|         |         | Flow-Through - 1CE JTAG    |                                   |                |             |                             | 119 BGA       |                    |
|         |         | Pipelined - 2 CD 3CE       | 133, 150, 167, 200 <sup>[1]</sup> | 3.3            | 2.5/3.3     | CY7C1387B <sup>[1]</sup>    | 100 TQFP      | Linear/Interleaved |
|         |         | Pipelined - 2 CD 1 CE JTAG |                                   |                |             |                             | 119 BGA       |                    |
|         |         | Pipelined - 1 CD 3 CE      | 133, 150, 167, 200 <sup>[1]</sup> | 3.3            | 2.5/3.3     | CY7C1382B <sup>[1]</sup>    | 100 TQFP      | Linear/Interleaved |
|         |         | Pipelined - 1 CD 1 CE JTAG |                                   |                |             |                             | 119 BGA       |                    |
|         |         | Flow-Through - 3CE         | 100, 117, 133 <sup>[1]</sup>      | 2.5            | 2.5         | CY7C1383BV25 <sup>[1]</sup> | 100 TQFP      | Linear/Interleaved |
|         |         | Flow-Through - 1CE JTAG    |                                   |                |             |                             | 119 BGA       |                    |
|         |         | Pipelined - 2 CD 3CE       | 133, 150, 167, 200 <sup>[1]</sup> | 2.5            | 2.5         | CY7C1387BV25 <sup>[1]</sup> | 100 TQFP      | Linear/Interleaved |
|         |         | Pipelined - 2 CD 1 CE JTAG |                                   |                |             |                             | 119 BGA       |                    |
|         |         | Pipelined - 1 CD 3 CE      | 133, 150, 167, 200 <sup>[1]</sup> | 2.5            | 2.5         | CY7C1382BV25 <sup>[1]</sup> | 100 TQFP      | Linear/Interleaved |
|         |         | Pipelined - 1 CD 1 CE JTAG |                                   |                |             |                             | 119 BGA       |                    |

**Note:**

1. Check availability with PME.

## NoBL™ (No Bus Latency™) Synchronous SRAMs

NoBL™ SRAMs are architected for use in demanding high-speed applications, e.g., networking, video, instrumentation, basestations. In these and other high-performance systems, the NoBL family of synchronous SRAMs provides significant performance improvement over non-NoBL SRAM architectures. NoBL stands for No Bus Latency™, which means that NoBL SRAMs complete write and read operations with zero wait states, delivering as much as 50% better performance than non-NoBL synchronous pipelined burst SRAMs. In addition, NoBL SRAMs support bus speeds up to 133 MHz and provide an effective bus bandwidth of 100%, even in applications with frequent write/read/write/read operations, as in networking. In fact, the more R/W transitions in a design, the more performance benefit NoBL devices deliver.

NoBL SRAMs provide other features that optimize performance, including a byte-write feature that allows data to change in just one operation (instead of the usual three, read/ modify/write); a clock-enable feature allows the insertion of wait states during system inactivity; and drive-strength control. NoBL SRAMs are built around Cypress's patented, six-transistor (6T) memory cell that eliminates resistors, thereby reducing power demand while making the memory insensitive to data-corrupting alpha radiation.

| Density | Org.    | Architecture | Speed (MHz)                       | Supply Voltage | I/O Voltage | Part Number                 | Pins Packages      |
|---------|---------|--------------|-----------------------------------|----------------|-------------|-----------------------------|--------------------|
| 2 Mb    | 64Kx32  | Pipelined    | 50, 80, 100                       | 3.3            | 3.3         | CY7C1334                    | 100 TQFP           |
|         |         | Flow-Through | 50, 66                            | 3.3            | 3.3         | CY7C1333                    | 100 TQFP           |
| 4 Mb    | 128Kx36 | Pipelined    | 100, 133, 143                     | 3.3            | 3.3         | CY7C1350B                   | 100 TQFP / 119 BGA |
|         |         | Flow-Through | 50, 66, 100, 117                  | 3.3            | 3.3         | CY7C1351B                   | 100 TQFP / 119 BGA |
|         | 256Kx18 | Pipelined    | 100, 133, 143                     | 3.3            | 3.3         | CY7C1352B                   | 100 TQFP / 119 BGA |
|         |         | Flow-Through | 50, 66, 100, 117                  | 3.3            | 3.3         | CY7C1353B                   | 100 TQFP / 119 BGA |
| 9 Mb    | 256Kx36 | Pipelined    | 100, 133, 166, 200 <sup>[1]</sup> | 2.5            | 2.5         | CY7C1354V25                 | 100 TQFP / 119 BGA |
|         |         | Pipelined    | 100, 133, 166, 200 <sup>[1]</sup> | 3.3            | 2.5/3.3     | CY7C1354A                   | 100 TQFP / 119 BGA |
|         |         | Flow-Through | 83, 100, 117 <sup>[1]</sup>       | 2.5            | 2.5         | CY7C1355V25                 | 100 TQFP / 119 BGA |
|         |         | Flow-Through | 100, 117, 133 <sup>[1]</sup>      | 3.3            | 2.5/3.3     | CY7C1355A                   | 100 TQFP / 119 BGA |
|         | 512Kx18 | Pipelined    | 100, 133, 166, 200 <sup>[1]</sup> | 2.5            | 2.5         | CY7C1356V25                 | 100 TQFP / 119 BGA |
|         |         | Pipelined    | 100, 133, 166, 200 <sup>[1]</sup> | 3.3            | 2.5/3.3     | CY7C1356A                   | 100 TQFP / 119 BGA |
|         |         | Flow-Through | 83, 100, 117 <sup>[1]</sup>       | 2.5            | 2.5         | CY7C1357V25                 | 100 TQFP / 119 BGA |
|         |         | Flow-Through | 100, 117, 133 <sup>[1]</sup>      | 3.3            | 2.5/3.3     | CY7C1357A                   | 100 TQFP / 119 BGA |
| 18 Mb   | 512Kx36 | Flow-Through | 100, 117, 133 <sup>[1]</sup>      | 3.3            | 2.5/3.3     | CY7C1371B <sup>[1]</sup>    | 100 TQFP / 119 BGA |
|         |         | Pipelined    | 133, 150, 167, 200 <sup>[1]</sup> | 3.3            | 2.5/3.3     | CY7C1370B <sup>[1]</sup>    | 100 TQFP / 119 BGA |
|         |         | Flow-Through | 100, 117, 133 <sup>[1]</sup>      | 2.5            | 2.5         | CY7C1371BV25 <sup>[1]</sup> | 100 TQFP / 119 BGA |
|         |         | Pipelined    | 133, 150, 167, 200 <sup>[1]</sup> | 2.5            | 2.5         | CY7C1370BV25 <sup>[1]</sup> | 100 TQFP / 119 BGA |
|         | 1Mx18   | Flow-Through | 100, 117, 133 <sup>[1]</sup>      | 3.3            | 2.5/3.3     | CY7C1373B <sup>[1]</sup>    | 100 TQFP / 119 BGA |
|         |         | Pipelined    | 133, 150, 167, 200 <sup>[1]</sup> | 3.3            | 2.5/3.3     | CY7C1372B <sup>[1]</sup>    | 100 TQFP / 119 BGA |
|         |         | Flow-Through | 100, 117, 133 <sup>[1]</sup>      | 2.5            | 2.5         | CY7C1373BV25 <sup>[1]</sup> | 100 TQFP / 119 BGA |
|         |         | Pipelined    | 133, 150, 167, 200 <sup>[1]</sup> | 2.5            | 2.5         | CY7C1372BV25 <sup>[1]</sup> | 100 TQFP / 119 BGA |

Note: Please contact a Cypress Representative for product availability.

## QDR™ (Quad Data Rate™) Synchronous SRAMs

Cypress's family of QDR SRAMs has become the standard for high-performance networking SRAM solutions. QDR SRAMs provide a level of bandwidth for networking applications that is unmatched by any other SRAM architecture. Each device in the QDR family is equipped with separate Input and Output ports. In addition, the QDR family is able to conduct concurrent, independent Read and write transactions to the memory array using a Double Data Rate (DDR) interface on each port. The result is four data words being transferred (2 into and 2 out of the device) during each clock cycle. Hence, the Quad Data Rate (QDR) name clearly supports the function of the family. At 167 MHz, each 9-Mb, 512Kx18 QDR device is able to support over 12 Gb/s bandwidth.

In addition to enabling higher bandwidth, the separate Input and Output port architecture also eases system design concerns. With separate ports, the data contention issue is eliminated since the controller and SRAM do not have the same data bus. In order to support the DDR interfaces, all QDR devices are equipped with variable impedance HSTL output drivers. The device monitors the ZQ input signal and adjusts the output drive strength to the specified level. The output impedance is determined by the user through a strap resistor. All input and output levels are referenced to a reference voltage supplied by the user to the device. Both the CY7C1302V25 and the CY7C1304V25 support two-stage pipelined read operations. The two-stage pipeline allows for low initial latency accesses, required in most networking applications.

The CY7C1302V25 and CY7C1304V25 are both equipped with a set of input clocks (K/K#) and output clocks (C/C#). The output clocks allow the user to eliminate the flight time back to the controller during a read operation. All QDR devices are packaged in a space saving 165-pin, 13-mm x 15-mm, 1.0-mm pitch fBGA and contain a JTAG interface. The JTAG interface allows for boundary scan testing to confirm board level connectivity.

| Density | Org.    | Architecture | Speed (MHz)   | Supply Voltage | I/O Voltage | Part Number                | Pins Packages |
|---------|---------|--------------|---------------|----------------|-------------|----------------------------|---------------|
| 9 Mb    | 512Kx18 | 2-word Burst | 100, 133, 167 | 2.5            | 1.8         | CY7C1302V25 <sup>[1]</sup> | 165 fBGA      |
|         |         | 4-word Burst | 100, 133, 167 | 2.5            | 1.8         | CY7C1304V25 <sup>[1]</sup> | 165 fBGA      |

**Note:**

1. Check availability with PME.



## Standard Micro Power SRAMs

| Density | Org.     | Supply Voltage | Part #     | Speed  | Temp. | Package                                  |
|---------|----------|----------------|------------|--------|-------|--|
| 64 Kb   | 8K x 8   | 5V             | CY6264     | 55, 70 | C,I   | 28p-SOIC                                 |
| 256 Kb  | 32K x 8  | 5V             | CY62256    | 70     | C, I  | 28p-SOIC, 28p-RTSOP, 28p-TSOP, 28p-PDIP  |
|         |          | 2.7–3.6V       | CY62256V   |        |       | 28p-SOIC, 28p-RTSOP, 28p-TSOP            |
| 1 Mb    | 64K x 16 | 2.7–3.6V       | CY62126BV  | 70     | I     | 44p-TSOP2, 48b-fBGA                      |
|         |          |                | CY62127BV* |        |       | 44p-TSOP2, 48b-fBGA                      |
|         | 128K x 8 | 4.5–5.5V       | CY62128B   | 55,70  | C, I  | 32p-SOIC, 32p-TSOP, 32p-STSOP            |
|         |          | 2.7–3.6V       | CY62128V   | 55,70  |       | 32p-SOIC, 32p-TSOP, 32p-STSOP, 32p-RTSOP |
| 4Mb     | 512K x 8 | 4.5–5.5V       | CY62148B   | 55,70  | C,I   | 32p-SOIC, 32p-TSOP2, 32p-RTSOP2          |

\* Byte Enable Power Down

## MoBL™ SRAMs

The explosion in the use of wireless communication devices has given users the freedom to communicate and exchange ideas without being tied to one location. Battery-powered portable and wireless products such as cell phones, pagers, and PDAs require components that draw as little power as possible to conserve battery life. These components also need to be as small as possible to help reduce the size of portable systems. Cypress's MoBL™ (More Battery Life™) Asynchronous SRAMs are designed to address those requirements. They provide the needed performance at an extraordinary low active current and are housed in the smallest available packages. MoBL SRAMs have the industry's lowest power consumption: they draw up to 90% less power than standard low-power SRAMs, increasing operating time in new-generation battery-powered products. These devices operate at 3V or 1.8V(MoBL2), drawing a typical active-mode Icc as low as 7 mA at 2.7V and a miniscule 1 µA standby current (Isb2). Another power-saving feature is the automatic power-down capability, where the SRAM monitors the system's request for data and powers itself down to standby when activity is low. In addition, the entire family retains data integrity down to a battery trickle level of just 1V.

Despite their low power demand, MoBL SRAMs offer superior, zero-wait-state performance with access times of 55,70 ns, over the industrial temperature range. The MoBL parts are available in standard fBGA and selected TSOP II and SOIC packages. The fBGA package provides the smallest available footprint—over 75% smaller than standard packages—thereby helping reduce the size and weight of small-form-factor designs dramatically. Organized in x8- or x16-bit and pin-compatible with standard SRAMs, MoBL SRAMs offer a simple upgrade path from 2-Mb, 4-Mb, and 8-Mb versions. To shrink form factors even further, many mobile products utilize advanced packaging options such as combination-stacked memory (Flash/SRAM combo chips) and Chip On Board (COB). Cypress has developed an optimized Flash Compatible Pinout (FCP) version of the MoBL SRAM family to minimize assembly complexity of these package options. These FCP parts are sold to Flash vendors for production of the Flash/SRAM Combo Chip. The MoBL FCP parts are exclusively sold in die format, meeting the Known Good Die (KGD) requirements.

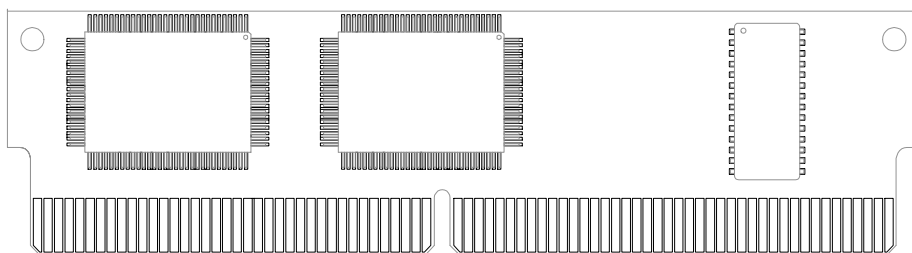
| Density | Org.      | Supply Voltage | Part #        | Speed | Temp. | Packages                      |
|---------|-----------|----------------|---------------|-------|-------|-------------------------------|
| 2MB     | 128K x 16 | 2.7–3.6V       | CY62136V      | 55,70 | I     | 48b-fBGA, 44p-TSOP2           |
|         |           |                | CY62137V*     |       |       | 48b-fBGA                      |
|         |           | 1.75–1.95V     | CY62136BV18   | 70    | I     | 48b-fBGA, 44p-TSOP2           |
|         |           |                | CY62137BV18*  |       |       | 48b-fBGA                      |
|         |           | 1.65V–1.95V    | CY62136CV18   | 55,70 | I     | 36b-fBGA                      |
|         |           |                | CY62137CV18** |       |       | 36b-fBGA                      |
|         | 256K x 8  | 2.7–3.6V       | CY62138V      | 70    | I     | 48b-fBGA                      |
| 4MB     | 256K x 16 | 2.7–3.6V       | CY62146V      | 70    | I     | 48b-fBGA, 44p-TSOP2           |
|         |           |                | CY62147V*     |       |       | 48b-fBGA                      |
|         |           | 1.65–1.95V     | CY62146BV18   | 55,70 | I     | 48b-fBGA, 44p-TSOP2           |
|         |           |                | CY62147BV18*  |       |       | 48b-fBGA                      |
|         |           |                | CY62146CV18   |       |       | 36b-fBGA, 32p-TSOP2, 32p-SOIC |
|         |           |                | CY62147CV18*  |       |       | 48b-fBGA                      |
|         | 512K x 8  | 2.7–3.6V       | CY62148V      | 70    | I     | 36b-fBGA, 32p-SOIC, 32p-TSOP2 |
| 8MB     | 512K x 16 | 1.65–1.95V     | CY62157CV18** | 55,70 | I     | 48b-fBGA                      |

\* Byte Enable Power Down

\*\* 1.8V MoBL2

Note: Please contact a Cypress Representative for product availability.

## SRAM Modules



- PC Cache
- x32-Bit Standard SRAM
- x8-, x16-, and x24-Bit Standard SRAM

### x8-, x16-, and x24-Bit SRAM Modules

| Size | Organization           | Pins | Part Number | Speed (ns)                             | $I_{CC}/I_{SB}/I_{CCDR}$<br>(mA @ ns) | Packages* |
|------|------------------------|------|-------------|--|---------------------------------------|-----------|
| 2M   | 256K x 8—JEDEC Sep I/O | 60   | CYM1441     | $t_{AA} = 20, 25, 35, 45$              | 960 @ 25                              | PZ        |
| 4M   | 512K x 8—JEDEC         | 32   | CYM1464     | $t_{AA} = 20, 22, 25, 30, 35, 45, 55,$ | 350 @ 20                              | PD        |
| 4M   | 512K x 8—JEDEC         | 32   | CYM1465     | $t_{AA} = 70, 85, 100, 120, 150$       | 110 @ 70                              | PD        |
| 16M  | 2M x 8                 | 36   | CYM1481     | $t_{AA} = 70, 85, 100, 120$            | 110 @ 85                              | PS        |

### x32-Bit Standard SRAM Module Family

| Size | Organization                | Pins | Part Number | Speed (ns)  | $I_{CC}/I_{SB}/I_{CCDR}$<br>(mA @ ns) | Packages*             |
|------|-----------------------------|------|-------------|---|---------------------------------------|-----------------------|
| 512K | 16K x 32                    | 64   | CYM1821     | $t_{AA} = 20, 25, 35, 45$                                   | 720 @ 20                              | PM, PZ                |
| 2M   | 64K x 32                    | 64   | CYM1831     | $t_{AA} = 15, 20, 25, 35, 45$                               | 720 @ 25                              | PM, PN, PZ            |
| 2M   | 64Kx32                      | 64   | CYM1831V33  | $t_{AA} = 20, 25, 35$                                       | 380 @ 20                              | PZ                    |
| 4M   | 128K x 32                   | 64   | CYM1836     | $t_{AA} = 20, 25, 35, 45$<br>$t_{AA} = 15$                  | 480 @ 20<br>760 @ 15                  | PM, PZ                |
| 4M   | 128Kx32                     | 64   | CYM1836V33  | $t_{AA} = 15, 20, 25, 30, 35$                               | 520 @ 15<br>480 @ 20+                 | PM, PZ                |
| 4M   | 128K x 32                   | 66   | CYM1838     | $t_{AA} = 25, 30, 35$                                       | 720 @ 25+                             | HG                    |
| 8M   | 256K x 32                   | 64   | CYM1841B    | $t_{AA} = 25, 35, 45$<br>$t_{AA} = 20$<br>$t_{AA} = 12, 15$ | 960 @ 25<br>1120 @ 20<br>1600 @ 12    | PM, PN, PR,<br>PT, PY |
| 8M   | 256Kx32                     | 64   | CYM1841V33  | $t_{AA} = 20, 25, 35$                                       | 270 @ 35<br>300 @ 25<br>340 @ 20      | PZ                    |
| 8M   | 256K x 32 (72-pin Superset) | 72   | CYM1841B    | $t_{AA} = 12, 15, 20, 25, 35, 45$                           | 960 @ 25<br>1120 @ 20<br>1600 @ 15    | PM, P5, P6,<br>P7, P8 |
| 16M  | 512K x 32 (72-pin Superset) | 72   | CYM1846     | $t_{AA} = 15, 20, 25, 30, 35$                               | 800 @ 20                              | PM, PZ                |
| 16M  | 512K x 32 (72-pin Superset) | 72   | CYM1846V33  | $t_{AA} = 15, 20, 25, 30$                                   | 360 @ 20                              | PM, P8, PZ            |
| 32M  | 1M x 32 (72-pin Superset)   | 72   | CYM1851     | $t_{AA} = 15, 20, 25, 30, 35$                               | 1200 @ 20                             | PM, PN, PZ            |
| 32M  | 1M x 32 (72-pin Superset)   | 72   | CYM1851V33  | $t_{AA} = 15, 20, 25, 35$                                   | 1100 @ 20<br>1250 @ 15                | P6, P8, PM,<br>PN, PZ |
| 64M  | 2Mx32                       | 72   | CYM1861     | $t_{AA} = 20, 25, 35$                                       | 2582 @ 35                             | PM                    |
| 64M  | 2Mx32                       | 72   | CYM1861V33  | $t_{AA} = 20, 25, 35$                                       | 2400 @ 25                             | PM                    |

\*See package codes on page 49.

Note: Please contact a Cypress Representative for product availability.

## Secondary Cache Subsystems SRAM Modules (continued)

| Size | Organization                      | Pins | Part Number | Speed (MHz)    | I <sub>CC</sub> /I <sub>SB</sub> /I <sub>CCDR</sub><br>(mA @ ns) | Packages* |
|------|-----------------------------------|------|-------------|----------------|--|-----------|
| 256K | P54C Cache (Intel Triton II)      | 160  | CYM74P430B  | 50, 60, 66 MHz | 750  | PM        |
| 512K | P54C Cache (Intel Triton II ETag) | 160  | CYM74P435C  | 50, 60, 66 MHz | 1550   | PM        |

## 36/72-Bit-Wide Standard Synchronous SRAM Module Family

| Size | Organization          | Pins | Part Number | Speed (ns)      | I <sub>CC</sub> | Packages* |
|------|-----------------------|------|-------------|-----------------|-----------------|-----------|
| 4M   | 64K x 72 (Flow Thru)  | 168  | CYM9260     | F= 50, 66 MHz   | 800 mA          | PM        |
| 8M   | 128K x 72 (Flow Thru) | 168  | CYM9261A    | F= 50, 66 MHz   | 1200 mA         | PM        |
| 16M  | 256K x 72 (Flow Thru) | 168  | CYM9262A    | F= 50, 66 MHz   | 1300 mA         | PM        |
| 32M  | 512K x 72 (Flow Thru) | 168  | CYM9263     | F= 50, 66 MHz   | 1400 mA         | PM        |
| 64M  | 1Mx72 (Flow Thru)     | 168  | CYM9264     | F= 50, 66 MHz   | 1400 mA         | PM        |
| 4M   | 64K x 72 (Pipe Line)  | 168  | CYM9265     | F= 100, 133 MHz | 800 mA          | PM        |
| 8M   | 128K x 72 (Pipe Line) | 168  | CYM9266A    | F= 100, 133 MHz | 1200 mA         | PM        |
| 16M  | 256K x 72 (Pipe Line) | 168  | CYM9267A    | F= 100, 133 MHz | 1300 mA         | PM        |
| 32M  | 512K x 72 (Pipe Line) | 168  | CYM9268     | F= 100, 133 MHz | 1400 mA         | PM        |
| 64M  | 1Mx72 (Pipe Line)     | 168  | CYM9269     | F= 100, 133 MHz | 1400 mA         | PM        |
| 2M   | 64K x 36 (Flow Thru)  | 144  | CYM9270     | F= 50, 66 MHz   | 400 mA          | PM        |
| 4M   | 128K x 36 (Flow Thru) | 144  | CYM9271A    | F= 50, 66 MHz   | 600 mA          | PM        |
| 8M   | 256K x 36 (Flow Thru) | 144  | CYM9272B    | F= 50, 66 MHz   | 600 mA          | PM        |
| 16M  | 512Kx36 (Flow Thru)   | 144  | CYM9273     | F= 50, 66 MHz   | 800 mA          | PM        |
| 32M  | 1Mx36 (Flow Thru)     | 144  | CYM9274     | F= 50, 66 MHz   | 800 mA          | PM        |
| 2M   | 64K x 36 (Pipe Line)  | 144  | CYM9275     | F= 100, 133 MHz | 350 mA          | PM        |
| 4M   | 128K x 36 (Pipe Line) | 144  | CYM9276A    | F= 100, 133 MHz | 500 mA          | PM        |
| 8M   | 256K x 36 (Pipe Line) | 144  | CYM9277B    | F= 100, 133 MHz | 1000 mA         | PM        |
| 16M  | 512Kx36 (Pipe Line)   | 144  | CYM9278     | F= 100, 133 MHz | 1200 mA         | PM        |
| 32M  | 1Mx36 (Pipe Line)     | 144  | CYM9279     | F= 100, 133 MHz | 1200 mA         | PM        |

## 36/72-Bit-Wide NoBL SRAM Module Family

| Size | Organization          | Pins | Part Number | Speed (ns)      | I <sub>CC</sub> | Packages* |
|------|-----------------------|------|-------------|-----------------|-----------------|-----------|
| 4M   | 512K x 72 (Pipe Line) | 186  | CYM9286A    | F= 117, 133 MHz | 2400 mA         | PM        |
| 8M   | 1M x 72 (Pipe Line)   | 186  | CYM9287A    | F= 117, 133 MHz |                 | PM        |
| 4M   | 512K x 72 (Flow Thru) | 186  | CYM9288A    | F= 60, 66 MHz   |                 | PM        |
| 8M   | 1M x 72 (Flow Thru)   | 186  | CYM9289A    | F= 60, 66 MHz   |                 | PM        |
| 16M  | 512Kx36 (Pipe Line)   | 120  | CYM9290     | F= 133 MHz      | 1400 mA         | PM        |
| 32M  | 1Mx36 (Pipe Line)     | 120  | CYM9291     | F= 133 MHz      |                 | PM        |
| 16M  | 512Kx36 (Flow Thru)   | 120  | CYM9292     | F= 66 MHz       |                 | PM        |
| 32M  | 1Mx36 (Flow Thru)     | 120  | CYM9293     | F= 66 MHz       |                 | PM        |

## Specialty Modules

| Size | Organization | Pins | Part Number | Speed (ns)    | I <sub>CC</sub> | Packages* |
|------|--------------|------|-------------|---------------|-----------------|-----------|
| 32M  | 2M x 16      | 80   | CYM8210     | F= 70 MHz     | 158 mA          | PM        |
| 12M  | 512K x 24    | 119  | CYM8301     | F= 12, 15 MHz | 700 mA          | BGA       |
| 9M   | 128K x 72    | 160  | CYM9295     | F= 66 MHz     | 700 mA          | PM        |

## DRAM Controller Modules

| Organization     | Bus Width | Part Number | Speed (MHz) | Package* |
|------------------|-----------|-------------|-------------|----------|
| DRAM Accelerator | 32-Bit    | CYM7232     | 25/33/40    | PGC      |
| DRAM Accelerator | 64-Bit    | CYM7264     | 25/33/40    | PGC      |

\*See package codes on page 49.

Note: Please contact a Cypress Representative for product availability.

## Multi-Port RAMs

### QuadPort™ Synchronous (3.3V):

- True four-ported memory cells which allow simultaneous reads of the same memory location
- High bandwidth up to 10Gbps/133-MHz operation
- High speed clock to data access (4.7ns max.)
- 1-Megabit density (64K x 18)
- IEEE 1149.1 JTAG boundary scan
- 272 BGA (27mm x 27mm, 1.27-mm pitch)

### PCI-DP™ (3.3V):

- 128K dual-ported shared memory (4K x 32)
- Master and Target PCI Specification 2.2 compliant interface
- Embedded host bridge capability
- Direct interface to many microprocessors
- I<sup>2</sup>O message transport unit; includes four 32-bit, 32-entry FIFO
- Local bus clock rates up to 50-MHz
- 160 Plastic Thin Quad Flat Pack (TQFP)

### FLEEx36™ Dual-Port (2.5V and 3.3V):

- True dual-ported memory cells which allow simultaneous reads of the same memory
- Up to 150-MHz operation
- High speed clock to data access (3.8ns max.)
- Up to 4.5-Megabit density (128K x 36)
- Bus Matching and Byte Select capability available
- 144 TQFP / 172 BGA available

### Low-Voltage Synchronous (3.3V):

- True dual-ported memory cells which allow simultaneous reads of the same memory
- Up to 150-MHz operation
- High speed clock to data access (3.8ns max.)
- Up to 4.5-Megabit density (256K x 18)
- TQFP available

### Synchronous (5V):

- True dual-ported memory cells which allow simultaneous reads of the same memory
- Up to 100-MHz operation
- High speed clock to data access (6.5ns max.)
- Up to 1-Megabit density (128K x 8/9, 64K x 16/18)
- TQFP available

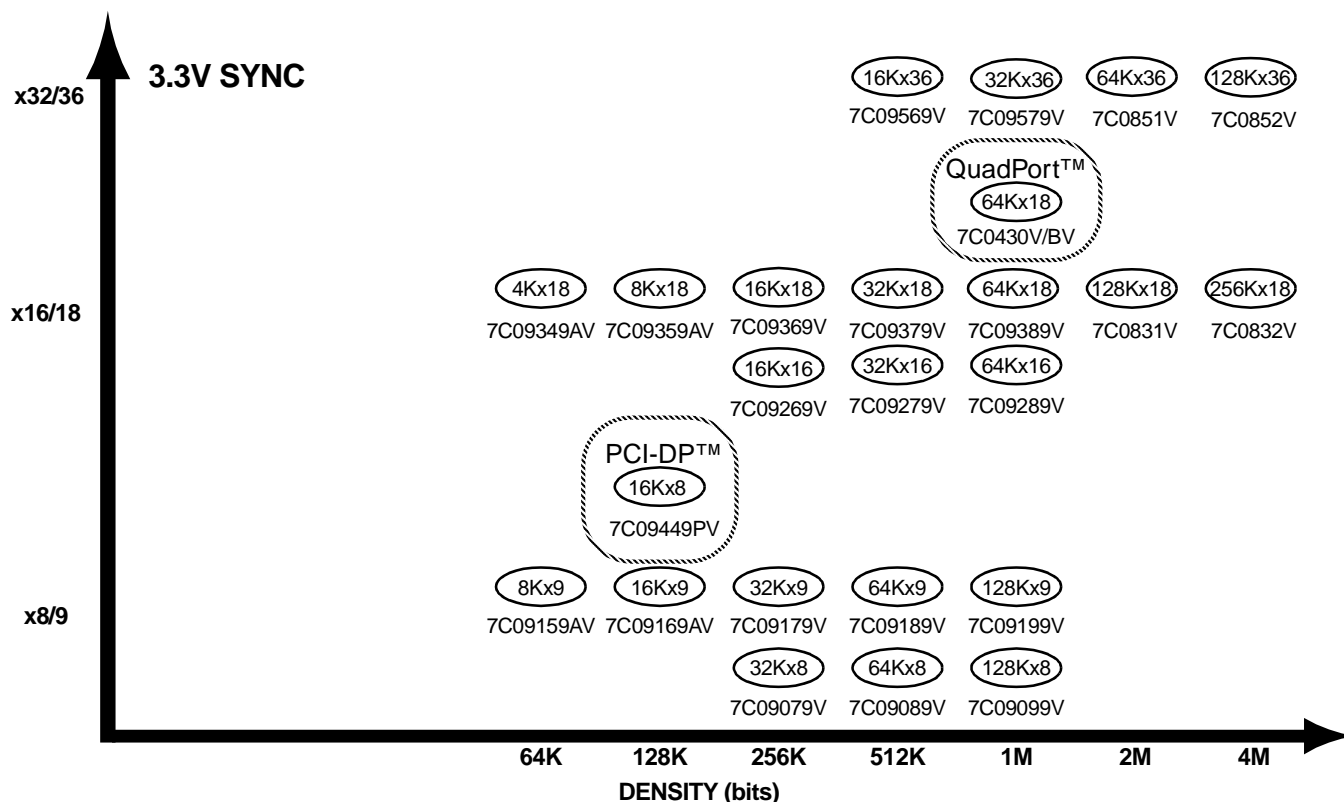
### Low-Voltage Asynchronous (3.3V):

- True dual-ported memory cells which allow simultaneous reads of the same memory
- High speed access (15ns max.)
- Up to 1-Megabit density (128K x 8/9, 64K x 16/18)
- PLCC / TQFP available

### Asynchronous (5V):

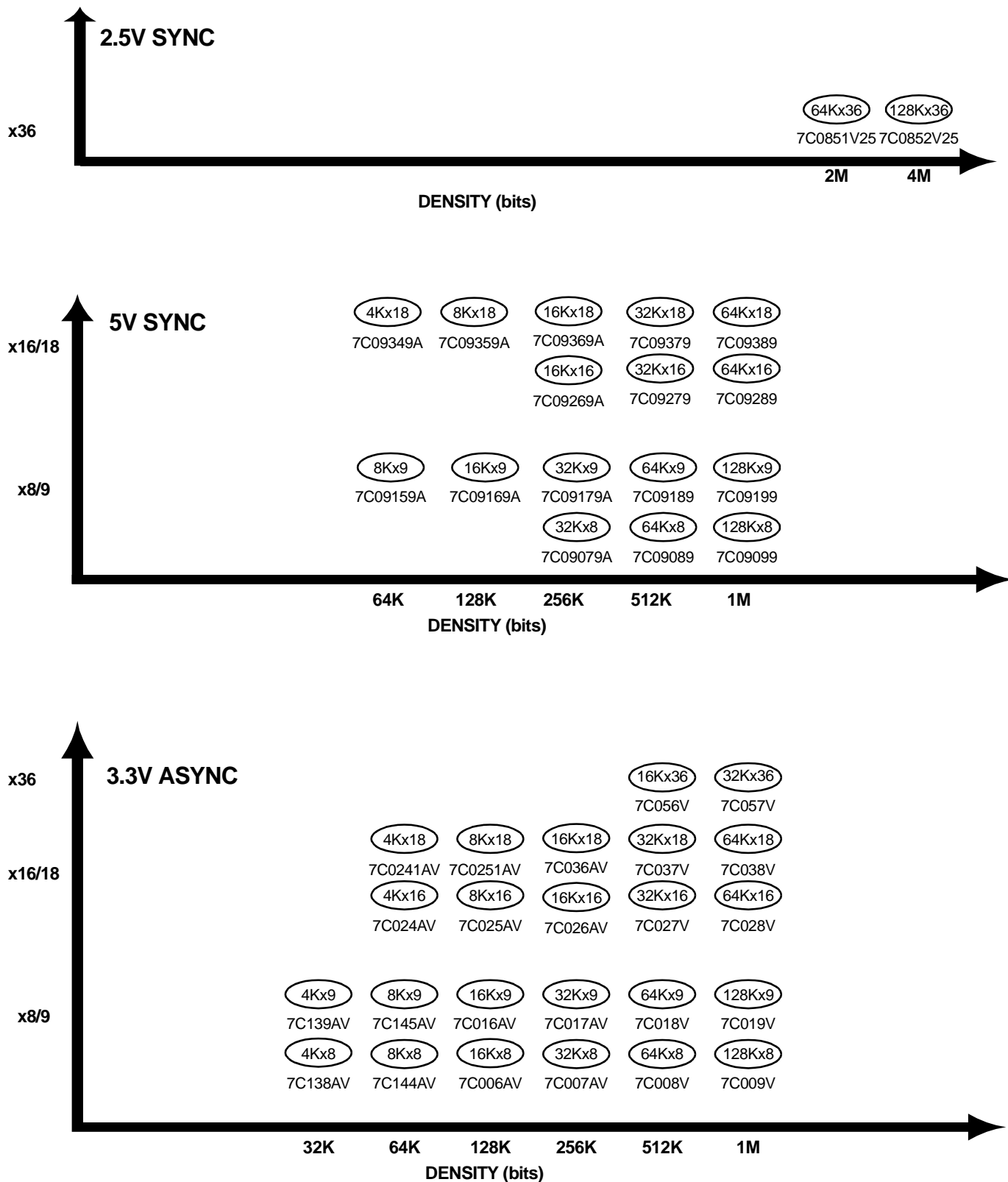
- True dual-ported memory cells which allow simultaneous reads of the same memory
- High speed access (12ns max.)
- Up to 1-Megabit density (128K x 8/9, 64K x 16/18)
- PLCC / TQFP available

## Multi-Port RAM Product Portfolio

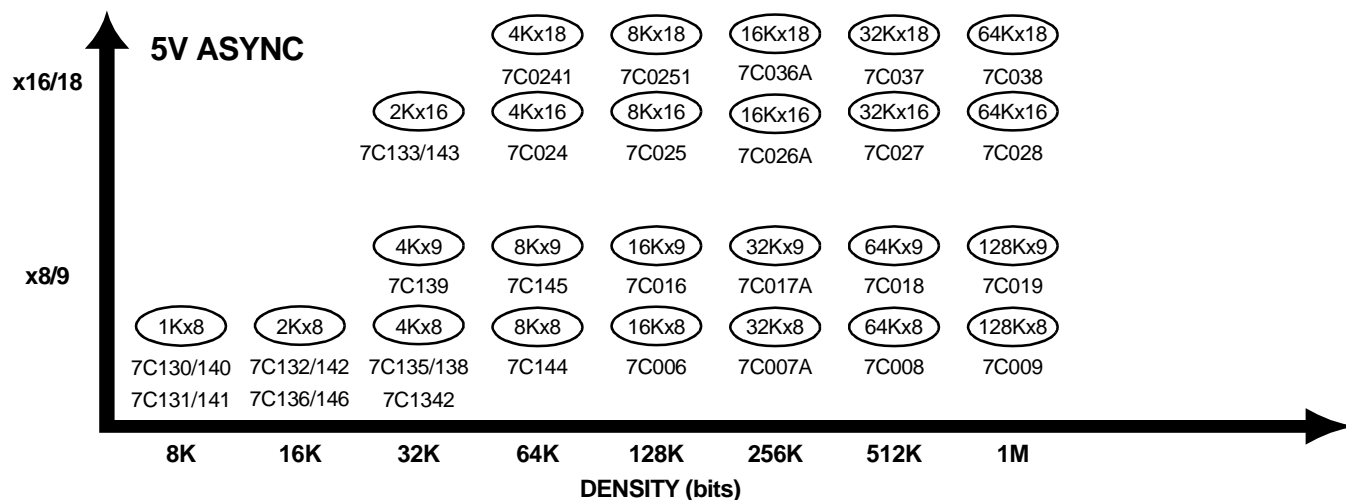


Note: Please contact a Cypress Representative for product availability.

## Multi-Port RAM Product Portfolio (continued)



Note: Please contact a Cypress Representative for product availability.



## Multi-Port RAMs

| Org.                  | 5V Part # | 3.3V Part # | 2.5V Part # | Speed (MHz/ns)<br>(Availability Guide: 5 = 5V only;<br>3 = 3.3V only; 2 = 2.5V only;<br>H = 5V and 3.3V;<br>L = 3.3V and 2.5V) |     |     |     |   |    |    |    |    |   | Package* |     |     |    |   |   | Features |
|-----------------------|-----------|-------------|-------------|--|-----|-----|-----|---|----|----|----|----|---|----------|-----|-----|----|---|---|----------|
|                       |           |             |             | 150  | 133 | 100 |     |   |    |    |    |    |   |          |     |     |    |   |   |          |
|                       |           |             |             |  |     | 6.5 | 7.5 | 9 | 12 | 15 | 20 | 25 | P | J        | A   | BB  | BG | N   |   |          |
| QuadPort™ Synchronous |           |             |             |  |     |     |     |   |    |    |    |    |   |          |     |     |    |   |   |          |
| 64K x 18              | -         | CY7C0430V   | -           | -  | 3   | 3   | -   | - | -  | -  | -  | -  | - | -        | -   | 272 | -  | Four Independent Ports/Sync Pipe-lined/Burst Counter/Mask Register/Counter Readback/JTAG IEEE1149 |   |          |
| 64K x 18              | -         | CY7C0430BV  | -           | -  | 3   | 3   | -   | - | -  | -  | -  | -  | - | -        | -   | 272 | -  | CY7C0430V + BIST  |   |          |
| PCI-DP™ Synchronous   |           |             |             |  |     |     |     |   |    |    |    |    |   |          |     |     |    |   |   |          |
| 4K x 32               | -         | CY7C09449PV | -           | -  | -   | -   | -   | - | 3  | -  | -  | -  | - | -        | 160 | -   | -  | -   | Master and Target PCI Specification 2.2 Compliant |          |
| Async                 |           |             |             |  |     |     |     |   |    |    |    |    |   |          |     |     |    |   |   |          |
| 32K x 36              | -         | CY7C057V    | -           | -  | -   | -   | -   | - | 3  | 3  | 3  | -  | - | -        | 144 | 172 | -  | -   | Bus Matching/Byte Select                          |          |
| 64K x 18              | CY7C038   | CY7C038V    | -           | -  | -   | -   | -   | - | 5  | H  | H  | 3  | - | -        | 100 | -   | -  | -   | Sem, Busy, Int, Master/Slave Pin                  |          |
| 64K x 16              | CY7C028   | CY7C028V    | -           | -  | -   | -   | -   | - | 5  | H  | H  | 3  | - | -        | 100 | -   | -  | -   | Sem, Busy, Int, Master/Slave Pin                  |          |
| 128K x 9              | CY7C019   | CY7C019V    | -           | -  | -   | -   | -   | - | 5  | H  | H  | 3  | - | -        | 100 | -   | -  | -   | Sem, Busy, Int, Master/Slave Pin                  |          |
| 128K x 8              | CY7C009   | CY7C009V    | -           | -  | -   | -   | -   | - | 5  | H  | H  | 3  | - | -        | 100 | -   | -  | -   | Sem, Busy, Int, Master/Slave Pin                  |          |
| 16K x 36              | -         | CY7C056V    | -           | -  | -   | -   | -   | - | 3  | 3  | 3  | -  | - | -        | 144 | 172 | -  | -   | Bus Matching/Byte Select                          |          |
| 32K x 18              | CY7C037   | CY7C037V    | -           | -  | -   | -   | -   | - | 5  | H  | H  | 3  | - | -        | 100 | -   | -  | -   | Sem, Busy, Int, Master/Slave Pin                  |          |
| 32K x 16              | CY7C027   | CY7C027V    | -           | -  | -   | -   | -   | - | 5  | H  | H  | 3  | - | -        | 100 | -   | -  | -   | Sem, Busy, Int, Master/Slave Pin                  |          |

\*See package codes on page 49.

Note: Please contact a Cypress Representative for product availability.

## Multi-Port RAMs(continued)

| Org.     | 5V Part # | 3.3V Part # | 2.5V Part # | Speed (MHz/ns)<br>(Availability Guide: 5 = 5V only;<br>3 = 3.3V only; 2 = 2.5V only;<br>H = 5V and 3.3V;<br>L = 3.3V and 2.5V) |     |     |     |   |    |    |    |    |    | Package* |     |    |    |    |                                  | Features |
|----------|-----------|-------------|-------------|--|-----|-----|-----|---|----|----|----|----|----|----------|-----|----|----|----|----------------------------------|----------|
|          |           |             |             | 150  | 133 | 100 |     |   |    |    |    |    |    |          |     |    |    |    |                                  |          |
|          |           |             |             |  |     | 6.5 | 7.5 | 9 | 12 | 15 | 20 | 25 | P  | J        | A   | BB | BG | N  |                                  |          |
| 64K x 9  | CY7C018   | CY7C018V    | -           | -  | -   | -   | -   | - | 5  | H  | H  | 3  | -  | -        | 100 | -  | -  | -  | Sem, Busy, Int, Master/Slave Pin |          |
| 64K x 8  | CY7C008   | CY7C008V    | -           | -  | -   | -   | -   | - | 5  | H  | H  | 3  | -  | -        | 100 | -  |    | -  | Sem, Busy, Int, Master/Slave Pin |          |
| 16K x 18 | CY7C036A  | CY7C036AV   | -           | -  | -   | -   | -   | - | -  | 5  | H  | 3  | -  | -        | 100 | -  | -  | -  | Sem, Busy, Int, Master/Slave Pin |          |
| 16K x 16 | CY7C026A  | CY7C026AV   | -           | -  | -   | -   | -   | - | -  | 5  | H  | 3  | -  | -        | 100 | -  | -  | -  | Sem, Busy, Int, Master/Slave Pin |          |
| 32K x 9  | CY7C017A  | CY7C017AV   | -           | -  | -   | -   | -   | - | -  | 5  | H  | 3  | -  | -        | 100 | -  | -  | -  | Sem, Busy, Int, Master/Slave Pin |          |
| 32K x 8  | CY7C007A  | CY7C007AV   | -           | -  | -   | -   | -   | - | -  | 5  | H  | 3  | -  | -        | 100 | -  | -  | -  | Sem, Busy, Int, Master/Slave Pin |          |
| 8K x 18  | CY7C0251  | CY7C0251AV  | -           | -  | -   | -   | -   | - | -  | 5  | 3  | H  | -  |          | 100 | -  | -  | -  | Sem, Busy, Int, Master/Slave Pin |          |
| 8K x 16  | CY7C025   | CY7C025AV   | -           | -  | -   | -   | -   | - | -  | 5  | 3  | H  | -  | 84       | 100 | -  | -  | -  | Sem, Busy, Int, Master/Slave Pin |          |
| 16K x 9  | CY7C016A  | CY7C016AV   | -           | -  | -   | -   | -   | - | -  | 5  | 3  | 3  | -  | 68       | 80  | -  | -  | -  | Sem, Busy, Int, Master/Slave Pin |          |
| 16K x 8  | CY7C006A  | CY7C006AV   | -           | -  | -   | -   | -   | - | -  | 5  | -  | H  | -  | 68       | 64  | -  | -  | -  | Sem, Busy, Int, Master/Slave Pin |          |
| 4K x 18  | CY7C0241  | CY7C0241AV  | -           | -  | -   | -   | -   | - | -  | 5  | 3  | H  | -  |          | 100 | -  | -  | -  | Sem, Busy, Int, Master/Slave Pin |          |
| 4K x 16  | CY7C024   | CY7C024AV   | -           | -  | -   | -   | -   | - | -  | 5  | 3  | H  | -  | 84       | 100 | -  | -  | -  | Sem, Busy, Int, Master/Slave Pin |          |
| 8K x 9   | CY7C145   | CY7C145AV   | -           | -  | -   | -   | -   | - | -  | 5  | -  | H  | -  | 68       | 80  | -  | -  | -  | Sem, Busy, Int, Master/Slave Pin |          |
| 8K x 8   | CY7C144   | CY7C144AV   | -           | -  | -   | -   | -   | - | -  | 5  | -  | H  | -  | 68       | 64  | -  | -  | -  | Sem, Busy, Int, Master/Slave Pin |          |
| 2K x 16  | CY7C133   | -           | -           | -  | -   | -   | -   | - | -  | -  | 5  | 5  | -  | 68       | -   | -  | -  | -  | Master, Busy, Int                |          |
| 2K x 16  | CY7C143   | -           | -           | -  | -   | -   | -   | - | -  | -  | 5  | 5  | -  | 68       | -   | -  | -  | -  | Slave, Busy, Int                 |          |
| 4K x 9   | CY7C139   | CY7C139AV   | -           | -  | -   | -   | -   | - | -  | 5  | -  | H  | -  | 68       | -   | -  | -  | -  | Sem, Busy, Int, Master/Slave Pin |          |
| 4K x 8   | CY7C135   | -           | -           | -  | -   | -   | -   | - | -  | 5  | 5  | 5  | -  | 52       | -   | -  | -  | -  | No Arbitration                   |          |
| 4K x 8   | CY7C1342  | -           | -           | -  | -   | -   | -   | - | -  | 5  | 5  | 5  | -  | 52       | -   | -  | -  | -  | Sem                              |          |
| 4K x 8   | CY7C138   | CY7C138AV   | -           | -  | -   | -   | -   | - | -  | 5  | -  | H  | -  | 68       | -   | -  | -  | -  | Sem, Busy, Int, Master/Slave Pin |          |
| 2K x 8   | CY7C132   | -           | -           | -  | -   | -   | -   | - | -  | -  | -  | -  | 48 | -        | -   | -  | -  | -  | Master, Busy, Int                |          |
| 2K x 8   | CY7C136   | -           | -           | -  | -   | -   | -   | - | -  | 5  | -  | 5  | -  | 52       | -   | -  | -  | 52 | Master, Busy, Int                |          |
| 2K x 8   | CY7C142   | -           | -           | -  | -   | -   | -   | - | -  | -  | -  | -  | 48 | -        | -   | -  | -  | -  | Slave, Busy, Int                 |          |
| 2K x 8   | CY7C146   | -           | -           | -  | -   | -   | -   | - | -  | 5  | -  | 5  | -  | 52       | -   | -  | -  | 52 | Slave, Busy, Int                 |          |
| 1K x 8   | CY7C130   | -           | -           | -  | -   | -   | -   | - | -  | -  | -  | -  | 48 | -        | -   | -  | -  | -  | Master, Busy, Int                |          |
| 1K x 8   | CY7C131   | -           | -           | -  | -   | -   | -   | - | -  | 5  | -  | 5  | -  | 52       | -   | -  | -  | 52 | Master, Busy, Int                |          |
| 1K x 8   | CY7C140   | -           | -           | -  | -   | -   | -   | - | -  | -  | -  | -  | 48 | -        | -   | -  | -  | -  | Slave, Busy, Int                 |          |
| 1K x 8   | CY7C141   | -           | -           | -  | -   | -   | -   | - | -  | 5  | -  | 5  | -  | 52       | -   | -  | -  | 52 | Slave, Busy, Int                 |          |

\*See package codes on page 49.

Note: Please contact a Cypress Representative for product availability.

## Multi-Port RAMs(continued)

| Org.                   | 5V Part #  | 3.3V Part # | 2.5V Part # | Speed (MHz/ns)<br>(Availability Guide: 5 = 5V only;<br>3 = 3.3V only; 2 = 2.5V only;<br>H = 5V and 3.3V;<br>L = 3.3V and 2.5V) |     |     |     |   |    |    |    |    |   |   |   |     |     |   |   | Package*                 |  |  |  |  |  | Features |
|------------------------|------------|-------------|-------------|--|-----|-----|-----|---|----|----|----|----|---|---|---|-----|-----|---|---|--------------------------|--|--|--|--|--|----------|
|                        |            |             |             | 150  | 133 | 100 |     |   |    |    |    |    |   |   |   |     |     |   |   |                          |  |  |  |  |  |          |
|                        |            |             |             |  |     | 6.5 | 7.5 | 9 | 12 | 15 | 20 | 25 | P | J | A | BB  | BG  | N |   |                          |  |  |  |  |  |          |
| Synchronous Dual Ports |            |             |             |  |     |     |     |   |    |    |    |    |   |   |   |     |     |   |   |                          |  |  |  |  |  |          |
| 128K x 36              | -          | CY7C0852V   | CY7C0852V25 | 3  | 3   | L   | -   | - | -  | -  | -  | -  | - | - | - | 172 | -   | - | - | Pipelined Byte Select    |  |  |  |  |  |          |
| 256K x 18              | -          | CY7C0832V   | -           | 3  | 3   | 3   | -   | - | -  | -  | -  | -  | - | - | - | 120 | -   | - | - | Pipelined Byte Select    |  |  |  |  |  |          |
| 64K x 36               | -          | CY7C0851V   | CY7C0851V25 | 3  | 3   | L   | -   | - | -  | -  | -  | -  | - | - | - | 172 | -   | - | - | Pipelined Byte Select    |  |  |  |  |  |          |
| 128K x 18              | -          | CY7C0831V   | -           | 3  | 3   | 3   | -   | - | -  | -  | -  | -  | - | - | - | 120 | -   | - | - | Pipelined Byte Select    |  |  |  |  |  |          |
| 32K x 36               | -          | CY7C09579V  | -           | -  | -   | 3   | -   | 3 | -  | -  | -  | -  | - | - | - | 144 | 172 | - | - | Bus Matching/Byte Select |  |  |  |  |  |          |
| 64K x 18               | CY7C09389  | CY7C09389V  | -           | -  | -   | H   | H   | H | H  | -  | -  | -  | - | - | - | 100 | -   | - | - | Pipelined/Flow-thru Pin  |  |  |  |  |  |          |
| 64K x 16               | CY7C09289  | CY7C09289V  | -           | -  | -   | H   | H   | H | H  | -  | -  | -  | - | - | - | 100 | -   | - | - | Pipelined/Flow-thru Pin  |  |  |  |  |  |          |
| 128K x 9               | CY7C09199  | CY7C09199V  | -           | -  | -   | H   | H   | H | H  | -  | -  | -  | - | - | - | 100 | -   | - | - | Pipelined/Flow-thru Pin  |  |  |  |  |  |          |
| 128K x 8               | CY7C09099  | CY7C09099V  | -           | -  | -   | H   | H   | H | H  | -  | -  | -  | - | - | - | 100 | -   | - | - | Pipelined/Flow-thru Pin  |  |  |  |  |  |          |
| 16K x 36               | -          | CY7C09569V  | -           | -  | -   | 3   | -   | 3 | -  | -  | -  | -  | - | - | - | 144 | 172 | - | - | Bus Matching/Byte Select |  |  |  |  |  |          |
| 32K x 18               | CY7C09379  | CY7C09379V  | -           | -  | -   | H   | H   | H | H  | -  | -  | -  | - | - | - | 100 | -   | - | - | Pipelined/Flow-thru Pin  |  |  |  |  |  |          |
| 32K x 16               | CY7C09279  | CY7C09279V  | -           | -  | -   | H   | H   | H | H  | -  | -  | -  | - | - | - | 100 | -   | - | - | Pipelined/Flow-thru Pin  |  |  |  |  |  |          |
| 64K x 9                | CY7C09189  | CY7C09189V  | -           | -  | -   | H   | H   | H | H  | -  | -  | -  | - | - | - | 100 | -   | - | - | Pipelined/Flow-thru Pin  |  |  |  |  |  |          |
| 64K x 8                | CY7C09089  | CY7C09089V  | -           | -  | -   | H   | H   | H | H  | -  | -  | -  | - | - | - | 100 | -   | - | - | Pipelined/Flow-thru Pin  |  |  |  |  |  |          |
| 16K x 18               | CY7C09369A | CY7C09369V  | -           | -  | -   | H   | H   | H | H  | -  | -  | -  | - | - | - | 100 | -   | - | - | Pipelined/Flow-thru Pin  |  |  |  |  |  |          |
| 16K x 16               | CY7C09269A | CY7C09269V  | -           | -  | -   | H   | H   | H | H  | -  | -  | -  | - | - | - | 100 | -   | - | - | Pipelined/Flow-thru Pin  |  |  |  |  |  |          |
| 32K x 9                | CY7C09179A | CY7C09179V  | -           | -  | -   | H   | H   | H | H  | -  | -  | -  | - | - | - | 100 | -   | - | - | Pipelined/Flow-thru Pin  |  |  |  |  |  |          |
| 32K x 8                | CY7C09079A | CY7C09079V  | -           | -  | -   | H   | H   | H | H  | -  | -  | -  | - | - | - | 100 | -   | - | - | Pipelined/Flow-thru Pin  |  |  |  |  |  |          |
| 8K x 18                | CY7C09359A | CY7C09359AV | -           | -  | -   | 5   | H   | H | H  | -  | -  | -  | - | - | - | 100 | -   | - | - | Pipelined/Flow-thru Pin  |  |  |  |  |  |          |
| 16K x 9                | CY7C09169A | CY7C09169AV | -           | -  | -   | 5   | H   | H | H  | -  | -  | -  | - | - | - | 100 | -   | - | - | Pipelined/Flow-thru Pin  |  |  |  |  |  |          |
| 4K x 18                | CY7C09349A | CY7C09349AV | -           | -  | -   | 5   | H   | H | H  | -  | -  | -  | - | - | - | 100 | -   | - | - | Pipelined/Flow-thru Pin  |  |  |  |  |  |          |
| 8K x 9                 | CY7C09159A | CY7C09159AV | -           | -  | -   | 5   | H   | H | H  | -  | -  | -  | - | - | - | 100 | -   | - | - | Pipelined/Flow-thru Pin  |  |  |  |  |  |          |

\*See package codes on page 49.



## FIFOs

### X80 Synchronous (2.5V):

- Unidirectional
- 30+ Gbps bandwidth/200-MHz operation
- 2.5V
- Up to 5-Megabit density (64K x 80)
- Bus Matching on both ports to x80/40/20/10
- 288 BGA (19 mm x 19 mm, 1.0-mm pitch)

### Low-Voltage Synchronous (3.3V):

- Up to 1-Megabit Deep Sync™ density
- 100-MHz operation (Deep Sync™)
- Programmable flags

### Synchronous (5V):

- Up to 1-Megabit Deep Sync™ density
- 100-MHz operation
- Programmable flags

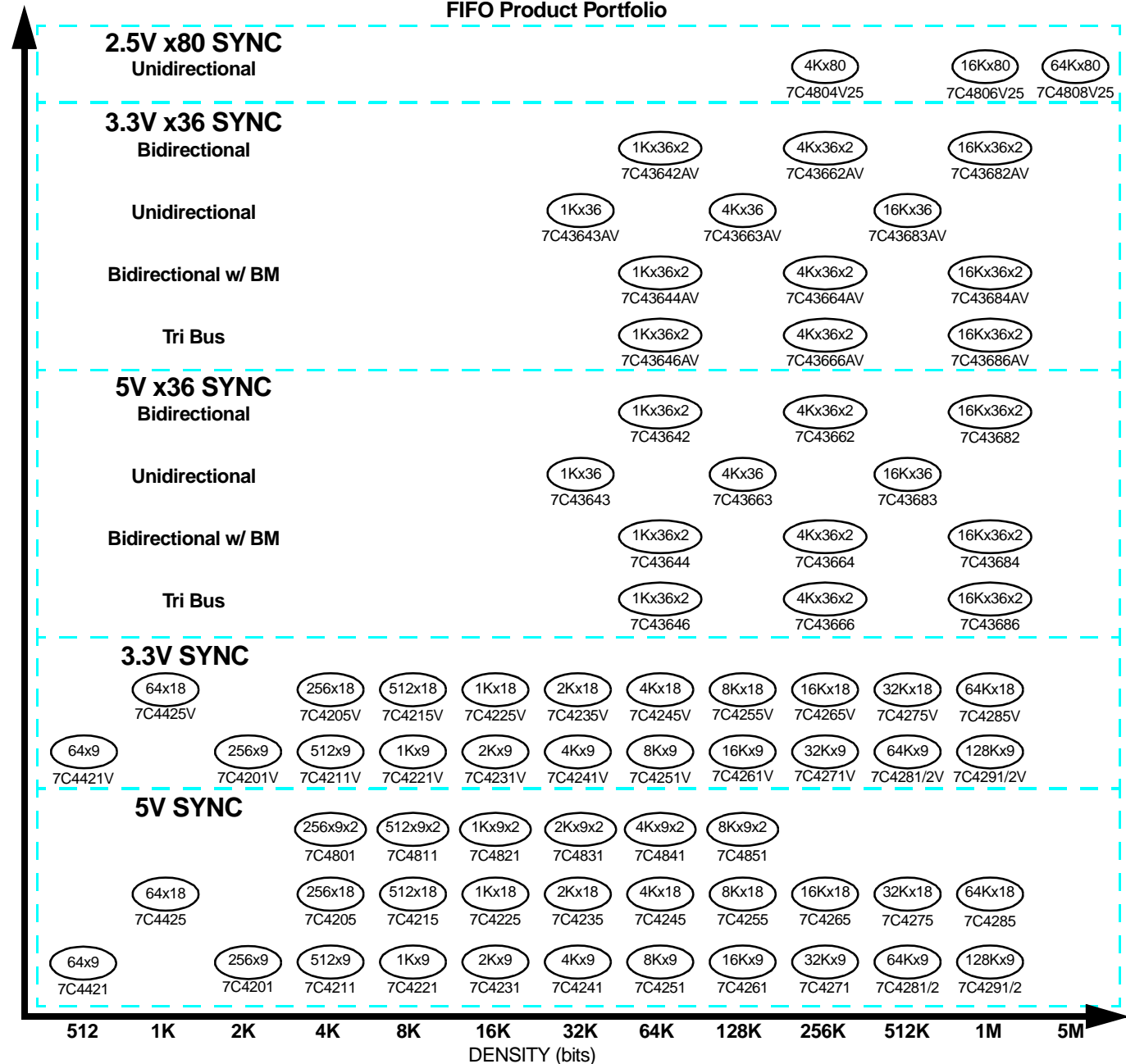
### Asynchronous (5V):

- 10-ns access time
- Industry-standard operation and pinout
- Densities up to 64K x 9—all densities pin compatible

### X36 Synchronous (3.3V and 5V):

- Unidirectional, Bidirectional, and Tri Bus
- Up to 1-Megabit density (16K x 36 x 2)
- Up to 10-Gbps bandwidth/133-MHz operation
- Bus Matching capability, retransmit
- 128 TQFP / 120 TQFP available

### FIFO Product Portfolio



Note: Please contact a Cypress Representative for product availability.

## FIFOs (continued)

### 2.5V X80 Sync FIFOs

| Organization          | Pins | Part Number | Speed (ns)       | Packages*                 |
|-----------------------|------|-------------|------------------|---------------------------|
| 64Kx80 Unidirectional | 288  | CY7C4808V25 | 200 MHz, 167 MHz | BB (19x19mm, 1.0mm Pitch) |
| 16Kx80 Unidirectional | 288  | CY7C4806V25 | 200 MHz, 167 MHz | BB (19x19mm, 1.0mm Pitch) |
| 4Kx80 Unidirectional  | 288  | CY7C4804V25 | 200 MHz, 167 MHz | BB (19x19mm, 1.0mm Pitch) |

### 3.3V X36 Sync FIFOs

| Organization                           | Pins | Part Number | Speed (ns) | Packages*   |
|--|------|-------------|------------|-------------|
| 1Kx36x2 Bidirectional                  | 120  | CY7C43642AV | 7, 10, 15  | A (14x14mm) |
| 1Kx36 Unidirectional w/ Bus Matching   | 128  | CY7C43643AV | 7, 10, 15  | A (14x20mm) |
| 1Kx36x2 Bidirectional w/ Bus Matching  | 128  | CY7C43644AV | 7, 10, 15  | A (14x20mm) |
| 1Kx36/18x2 Tri Bus                     | 128  | CY7C43646AV | 7, 10, 15  | A (14x20mm) |
| 4Kx36x2 Bidirectional                  | 120  | CY7C43662AV | 7, 10, 15  | A (14x14mm) |
| 4Kx36 Unidirectional w/ Bus Matching   | 128  | CY7C43663AV | 7, 10, 15  | A (14x20mm) |
| 4Kx36x2 Bidirectional w/ Bus Matching  | 128  | CY7C43664AV | 7, 10, 15  | A (14x20mm) |
| 4Kx36/18x2 Tri Bus                     | 128  | CY7C43666AV | 7, 10, 15  | A (14x20mm) |
| 16Kx36x2 Bidirectional                 | 120  | CY7C43682AV | 7, 10, 15  | A (14x14mm) |
| 16Kx36 Unidirectional w/ Bus Matching  | 128  | CY7C43683AV | 7, 10, 15  | A (14x20mm) |
| 16Kx36x2 Bidirectional w/ Bus Matching | 128  | CY7C43684AV | 7, 10, 15  | A (14x20mm) |
| 16Kx36/18x2 Tri Bus                    | 128  | CY7C43686AV | 7, 10, 15  | A (14x20mm) |

### 5V X36 Sync FIFOs

| Organization                           | Pins | Part Number | Speed (ns) | Packages*   |
|--|------|-------------|------------|-------------|
| 1Kx36x2 Bidirectional                  | 120  | CY7C43642   | 7, 10, 15  | A (14x14mm) |
| 1Kx36 Unidirectional w/ Bus Matching   | 128  | CY7C43643   | 7, 10, 15  | A (14x20mm) |
| 1Kx36x2 Bidirectional w/ Bus Matching  | 128  | CY7C43644   | 7, 10, 15  | A (14x20mm) |
| 1Kx36/18x2 Tri Bus                     | 128  | CY7C43646   | 7, 10, 15  | A (14x20mm) |
| 4Kx36x2 Bidirectional                  | 120  | CY7C43662   | 7, 10, 15  | A (14x14mm) |
| 4Kx36 Unidirectional w/ Bus Matching   | 128  | CY7C43663   | 7, 10, 15  | A (14x20mm) |
| 4Kx36x2 Bidirectional w/ Bus Matching  | 128  | CY7C43664   | 7, 10, 15  | A (14x20mm) |
| 4Kx36/18x2 Tri Bus                     | 128  | CY7C43666   | 7, 10, 15  | A (14x20mm) |
| 16Kx36x2 Bidirectional                 | 120  | CY7C43682   | 7, 10, 15  | A (14x14mm) |
| 16Kx36 Unidirectional w/ Bus Matching  | 128  | CY7C43683   | 7, 10, 15  | A (14x20mm) |
| 16Kx36x2 Bidirectional w/ Bus Matching | 128  | CY7C43684   | 7, 10, 15  | A (14x20mm) |
| 16Kx36/18x2 Tri Bus                    | 128  | CY7C43686   | 7, 10, 15  | A (14x20mm) |

\*See package codes on page 49.

## 3.3V Low-Voltage Synchronous FIFOs

| Organization                     | Pins | Part Number | Speed(ns) | Packages*              |
|----------------------------------|------|-------------|-----------|------------------------|
| 64 x 9—Low-Voltage Synchronous   | 32   | CY7C4421V   | 15, 25    | A (7x7mm), J (14x11mm) |
| 256 x 9—Low-Voltage Synchronous  | 32   | CY7C4201V   | 15, 25    | A (7x7mm), J (14x11mm) |
| 512 x 9—Low-Voltage Synchronous  | 32   | CY7C4211V   | 15, 25    | A (7x7mm), J (14x11mm) |
| 1K x 9—Low-Voltage Synchronous   | 32   | CY7C4221V   | 15, 25    | A (7x7mm), J (14x11mm) |
| 2K x 9—Low-Voltage Synchronous   | 32   | CY7C4231V   | 15, 25    | A (7x7mm), J (14x11mm) |
| 4K x 9—Low-Voltage Synchronous   | 32   | CY7C4241V   | 15, 25    | A (7x7mm), J (14x11mm) |
| 8K x 9—Low-Voltage Synchronous   | 32   | CY7C4251V   | 15, 25    | A (7x7mm), J (14x11mm) |
| 16K x 9—Low-Voltage Deep Sync    | 32   | CY7C4261V   | 10,15, 25 | J (14x11mm)            |
| 32K x 9—Low-Voltage Deep Sync    | 32   | CY7C4271V   | 10,15, 25 | J (14x11mm)            |
| 64K x 9—Low-Voltage Deep Sync    | 32   | CY7C4281V   | 10,15, 25 | J (14x11mm)            |
| 64K x 9—Low-Voltage Deep Sync    | 64   | CY7C4282V   | 10,15, 25 | AS (10x10mm)           |
| 128K x 9—Low-Voltage Deep Sync   | 32   | CY7C4291V   | 10,15, 25 | J (14x11mm)            |
| 128K x 9—Low-Voltage Deep Sync   | 64   | CY7C4292V   | 10,15, 25 | AS (10x10mm)           |
| 64 x 18—Low-Voltage Synchronous  | 64   | CY7C4425V   | 15, 25    | AS (10x10mm)           |
| 256 x 18—Low-Voltage Synchronous | 64   | CY7C4205V   | 15, 25    | AS (10x10mm)           |
| 512 x 18—Low-Voltage Synchronous | 64   | CY7C4215V   | 15, 25    | AS (10x10mm)           |
| 1K x 18—Low-Voltage Synchronous  | 64   | CY7C4225V   | 15, 25    | AS (10x10mm)           |
| 2K x 18—Low-Voltage Synchronous  | 64   | CY7C4235V   | 15, 25    | AS (10x10mm)           |
| 4K x 18—Low-Voltage Synchronous  | 64   | CY7C4245V   | 15, 25    | AS (10x10mm)           |
| 8K x 18—Low-Voltage Deep Sync    | 64   | CY7C4255V   | 10,15, 25 | AS (10x10mm)           |
| 16K x 18—Low-Voltage Deep Sync   | 64   | CY7C4265V   | 10,15, 25 | AS (10x10mm)           |
| 32K x 18—Low-Voltage Deep Sync   | 64   | CY7C4275V   | 10,15, 25 | AS (10x10mm)           |
| 64K x 18—Low-Voltage Deep Sync   | 64   | CY7C4285V   | 10,15, 25 | AS (10x10mm)           |

\*See package codes on page 49.

## 5V Synchronous FIFOs

| Organization         | Pins | Part Number | Speed (ns) | Packages*                 |
|----------------------|------|-------------|------------|---------------------------|
| 64 x 9—Synchronous   | 32   | CY7C4421    | 10, 15, 25 | A (7x7mm), J (14x11mm)    |
| 256 x 9—Synchronous  | 32   | CY7C4201    | 10, 15, 25 | A (7x7mm), J (14x11mm)    |
| 512 x 9—Synchronous  | 32   | CY7C4211    | 10, 15, 25 | A (7x7mm), J (14x11mm)    |
| 1K x 9—Synchronous   | 32   | CY7C4221    | 10, 15, 25 | A (7x7mm), J (14x11mm)    |
| 2K x 9—Synchronous   | 32   | CY7C4231    | 10, 15, 25 | A (7x7mm), J (14x11mm)    |
| 4K x 9—Synchronous   | 32   | CY7C4241    | 10, 15, 25 | A (7x7mm), J (14x11mm)    |
| 8K x 9—Synchronous   | 32   | CY7C4251    | 10, 15, 25 | A (7x7mm), J (14x11mm)    |
| 16K x 9—Deep Sync    | 32   | CY7C4261    | 10, 15, 25 | A (7x7mm), J (14x11mm)    |
| 32K x 9—Deep Sync    | 32   | CY7C4271    | 10, 15, 25 | A (7x7mm), J (14x11mm)    |
| 64K x 9—Deep Sync    | 32   | CY7C4281    | 10, 15, 25 | J (14x11mm)               |
| 64K x 9—Deep Sync    | 64   | CY7C4282    | 10, 15, 25 | AS (10x10mm)              |
| 128K x 9—Deep Sync   | 32   | CY7C4291    | 10, 15, 25 | J (14x11mm)               |
| 128K x 9—Deep Sync   | 64   | CY7C4292    | 10, 15, 25 | AS (10x10mm)              |
| 64 x 18—Synchronous  | 64   | CY7C4425    | 10, 15, 25 | A (14x14mm), AS (10x10mm) |
| 256 x 18—Synchronous | 64   | CY7C4205    | 10, 15, 25 | A (14x14mm), AS (10x10mm) |
| 512 x 18—Synchronous | 64   | CY7C4215    | 10, 15, 25 | A (14x14mm), AS (10x10mm) |
| 1K x 18—Synchronous  | 64   | CY7C4225    | 10, 15, 25 | A (14x14mm), AS (10x10mm) |
| 2K x 18—Synchronous  | 64   | CY7C4235    | 10, 15, 25 | A (14x14mm), AS (10x10mm) |
| 4K x 18—Synchronous  | 64   | CY7C4245    | 10, 15, 25 | A (14x14mm), AS (10x10mm) |
| 8K x 18—Deep Sync    | 64   | CY7C4255    | 10, 15, 25 | A (14x14mm), AS (10x10mm) |
| 16K x 18—Deep Sync   | 64   | CY7C4265    | 10, 15, 25 | A (14x14mm), AS (10x10mm) |
| 32K x 18—Deep Sync   | 64   | CY7C4275    | 10, 15, 25 | AS (10x10mm)              |
| 64K x 18—Deep Sync   | 64   | CY7C4285    | 10, 15, 25 | AS (10x10mm)              |
| 256 x 9—Double Sync  | 64   | CY7C4801    | 10, 15, 25 | A (14x14mm)               |
| 512 x 9—Double Sync  | 64   | CY7C4811    | 10, 15, 25 | A (14x14mm)               |
| 1K x 9—Double Sync   | 64   | CY7C4821    | 10, 15, 25 | A (14x14mm)               |
| 2K x 9—Double Sync   | 64   | CY7C4831    | 10, 15, 25 | A (14x14mm)               |
| 4K x 9—Double Sync   | 64   | CY7C4841    | 10, 15, 25 | A (14x14mm)               |
| 8K x 9—Double Sync   | 64   | CY7C4851    | 10, 15, 25 | A (14x14mm)               |

## Asynchronous FIFOs

| Organization              | Pins    | Part Number | Speed (ns)                 | Packages*     |
|---------------------------|---------|-------------|----------------------------|---------------|
| 256 x 9—w/ Half Full Flag | 28S, 32 | CY7C419     | 10, 15, 40                 | A, J, V       |
| 512 x 9—w/ Half Full Flag | 28S, 32 | CY7C421     | 10, 15, 20, 25, 30, 40, 65 | A, J, P, V    |
| 1K x 9—w/ Half Full Flag  | 28S, 32 | CY7C425     | 10, 15, 20, 25, 30, 40, 65 | A, J, L, P, V |
| 2K x 9—w/ Half Full Flag  | 28S, 32 | CY7C429     | 10, 15, 20, 25, 30, 40, 65 | A, J, L, P, V |
| 4K x 9—w/ Half Full Flag  | 28S, 32 | CY7C433     | 10, 15, 20, 25, 30, 40, 65 | A, J, L, P, V |
| 8K x 9—w/ Half Full Flag  | 28, 32  | CY7C460A    | 10, 15, 25                 | P, PT, J      |
| 16K x 9—w/ Half Full Flag | 28, 32  | CY7C462A    | 10, 15, 25                 | P, PT, J      |
| 32K x 9—w/ Half Full Flag | 28, 32  | CY7C464A    | 10, 15, 25                 | P, PT, J, L   |
| 64K x 9—w/ Half Full Flag | 28, 32  | CY7C466A    | 10, 15, 25                 | P, PT, J, L   |

\*See package codes on page 49.

## Communications Products

| Description                                  | Pins   | Part Number       | Speed (MHz) | I <sub>CC</sub> (mA) | Packages*    |
|--|--------|-------------------|-------------|----------------------|--------------|
| 3.3V SONET/SDH PMD Transceiver               | 120    | CYS25G0101DX      | 2488        | —N/A                 | A            |
| OC-48 Packet Over SONET (POS) Framer         | 504    | CY7C9536          | 2488        | TBD                  | BGA          |
| SONET/SDH LAN PHY Transceiver                | 128    | CY7C955           | 51 & 155    | TBD                  | N            |
| BellCore SONET/SDH WAN PMD Transceiver       | 24     | CY7B952           | 51 & 155    | 50                   | S            |
| SONET/SDH PMD Transceiver                    | 24     | CY7B951           | 51 & 155    | 50                   | S            |
| 10BASE 2/5 Ethernet Coax Transceiver         | 16, 28 | CY7B8392          | 10          | 25                   | J, P         |
| Quad HOTLink III™ Transceiver                | 256    | CYP32G0401DX      | 2500–3200   | 1000                 | BGA          |
| Quad HOTLink II™ Transceiver                 | 256    | CYP15G0401DX      | 200–1500    | 1200                 | BGA          |
| Quad HOTLink II™ Transceiver Evaluation Kit  | N/A    | CYP15G0401DX-EVAL | 200–1500    | N/A                  | N/A          |
| Quad HOTLink II SERDES                       | 256    | CYP15G0402DX      | 200–1500    | 1000                 | BGA          |
| HOTLink® Transmitter                         | 28     | CY7B923           | 150–400     | 65                   | J, L, S      |
| HOTLink Receiver                             | 28     | CY7B933           | 150–400     | 120                  | J, L, S      |
| HOTLink Evaluation Card                      | N/A    | CY9266            | 150–360     | —N/A                 | C, F, T, P** |
| HOTLink Transceiver                          | 100    | CY7C924DX         | 50–200      | 250                  | A            |
| HOTLink Transceiver Evaluation Board         | N/A    | CY7C924-EVALC/F/T | 50–200      | N/A                  | C, F, T**    |
| TAXI Compatible HOTLink Transceiver          | 100    | CY7C9689          | 50–200      | 250                  | A            |
| TAXI Compatible Transceiver Evaluation Board | N/A    | CY7C9689-EVALC/T  | 50–200      | N/A                  | C, T**       |
| Utopia Compliant HOTLink Transceiver         | 100    | CY7C954DX         | 50–200      | 250                  | A            |
| SMPTE Encoder                                | 44     | CY7C9235          | 270, 400    | 250                  | J            |
| SMPTE Decoder                                | 100    | CY7C9335          | 270, 400    | 300                  | A            |
| SMPTE HOTLink Transmitter                    | 28     | CY7B9234          | 270, 400    | 65                   | J            |
| SMPTE HOTLink Receiver                       | 28     | CY7B9334          | 270, 400    | 120                  | J            |
| SMPTE Evaluation Card                        | N/A    | CY9267            | 160–400     | —N/A                 | F            |

\*See package codes on page 49.

\*\* Interface: C-Coax; T-Twisted Pair; F-Fiber, P-POF

### CYS25G0101DX: SONET/SDH Transceiver

- Performs Clock & Data Recovery and SERDES of SONET/SDH frames - single PMD
- OC-48 (2.488 MHz)
- 3.3V
- Meets LAN Bellcore specifications
- Supports Loop-back testing
- Connects to SONET processors, ATM framers, Mux/De-Mux, & ASICs

### CY7C9536: OC-48 Packet Over SONET (POS) Framer

- SONET / SDH STM-16 / OC48 Concatenated or channelized
- Up to 16 channels of Virtual Concatenation
- ATM / HDLC (PPP/FR) / GFP framing
- Clear Channel Transport
- Ingress Packet Pre-classification
- Utopia / POS-PHY L3 compliant system interface

### CY7C955: SONET/SDH PHY Transceiver

- Framer + PMD in one chip = integrated solution
- Pin compatible to PMC Sierra 5346 (S/UNI-Lite)
- SONET/SDH and ATM compatible
- OC-1 (51.8 MHz) & OC-3 (155.5 MHz)
- Available in Industrial Temperature

### CY7B952: Bellcore WAN SONET/SDH Transceiver

- Performs Clock & Data Recovery of SONET frames - single PMD
- OC-1 (51.8 MHz) & OC-3 (155.5 MHz) clock & data recovery
- Meets **all** WAN Bellcore specifications
- Loop-back testing
- Connects to SONET processors, ATM framers, Mux/De-Mux, & ASICs

### CY7B951: SONET/SDH Transceiver

- Performs Clock & Data Recovery of SONET/SDH frames - single PMD
- OC-1 (51.8 MHz) & OC-3 (155.5 MHz)
- Meets LAN Bellcore specifications
- Loop-back testing
- Connects to SONET processors, ATM framers, Mux/De-Mux, & ASICs

### CY7B8392: Low-power Coax Transceiver for 10 Mbps Ethernet applications

- Pin compatible to industry standard 8392
- 10BASE5 and 10BASE2 applications
- Auto Attachment Unit Interface (AUI)
- Hybrid collision detection

Note: Please contact a Cypress Representative for product availability.

## Communications Products (continued)

### CYP32G0401DX: HOTLink III™ transceiver

- 4 channels of 2.5–3.2Gb/s operation
- Programmable 8-bit or 10-bit SERDES
- Integrated Tx, Rx, and FIFO
- 10G Ethernet/InfiniBand compliant
- On-chip 8B/10B encoding/decoding
- Built-In Self-Test (BIST)/Loopback Mode
- Evaluation Boards Available

### CYP15G0401DX: Quad HOTLink II™ transceiver

- 4-channel integrated Tx, Rx and FIFO
- 0.2–1.5 Gbps/channel
- 8B/10B coding
- Dual PECL serial I/O per channel
- Channel bonding
- BIST

### CYP15G0402DX: Quad HOTLink II SERDES

- 4-channel integrated Tx, Rx
- Gigabit Ethernet and Fibre Channel compliant
- 0.2–1.5 Gbps/channel
- Dual PECL serial I/O per channel

### CY7B923/933: HOTLink®

- Transmitter/receiver chipset
- 150–400 Mb/s operation
- Fibre Channel/ESCON® compliant
- On-chip 8B/10B encoding/decoding
- Built-In Self-Test (BIST)
- Evaluation boards available (CY9266)
- User's Guide available

### CY7C924DX: HOTLink Transceiver

- Integrated Tx, Rx, and FIFO
- 50–200 Mb/s operation
- Fibre Channel/ESCON compliant
- On-chip 8B/10B encoding/decoding
- Built-In Self-Test (BIST)
- Evaluation boards available (CY7C924-EVALC/F/T)

### CY7C9689: TAXI Compatible HOTLink

- Integrated Tx, Rx, and FIFO
- 50–200 Mb/s operation
- TAXIchip™ and FDDI Compliant
- On chip 4B/5B and 5B/6B encoding/decoding
- Built-In Self-Test (BIST)
- Evaluation boards available (CY7C9689-EVALC/T)

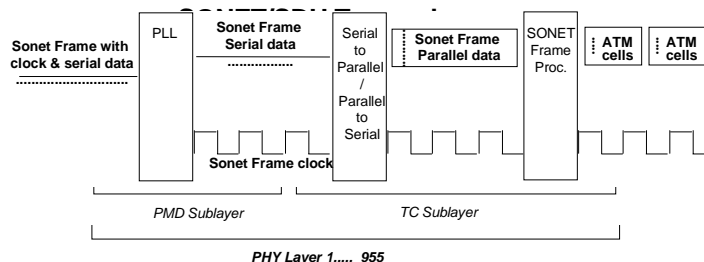
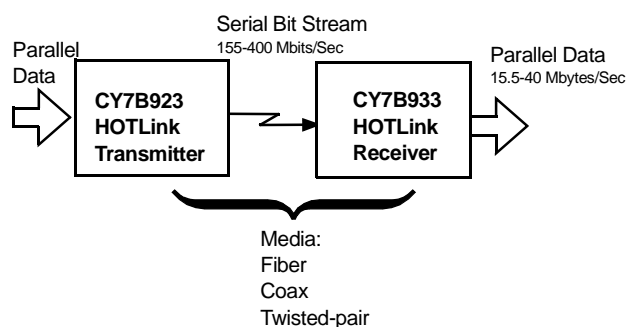
### CY7C954DX: Utopia Compliant HOTLink

- Integrated Tx, Rx, and FIFO
- 50–200 Mb/s operation
- UTOPIA Level 1 and 2 compliant
- On-chip 8B/10B encoding/decoding
- Built-In Self-Test (BIST)

### CY7C9235/9335: SMPTE Encoder/Decoder

- For High-end Video applications
- Compliant to **both** SMPTE-259M and DVB-ASI standards
- Works with SMPTE HOTLink Receiver/Transmitter (CY7B9234/9334)
- Evaluation boards available (CY9267)

### Point-to-Point HOTLink



## VMEbus Interface Products

Cypress offers a broad range of VME interface products ranging from low-cost slave I/O controllers to high-end 32/64-bit master controllers. All products are listed in detail in the VME Interface Handbook.

### VIC068A and VAC068A

- 32-bit VMEbus operation
- Complete VMEbus interface controller/arbitrator
- Complete master/slave capability
- Commercial / Industrial / Military

### CY7C964

- Companion to VIC64 and VIC068A
- 100-pin TQFP
- Commercial / Military

### VIC64

- 64-bit MBLT operation
- Software and pin compatible to VIC068A
- Complete master/slave capability
- Commercial / Industrial / Military

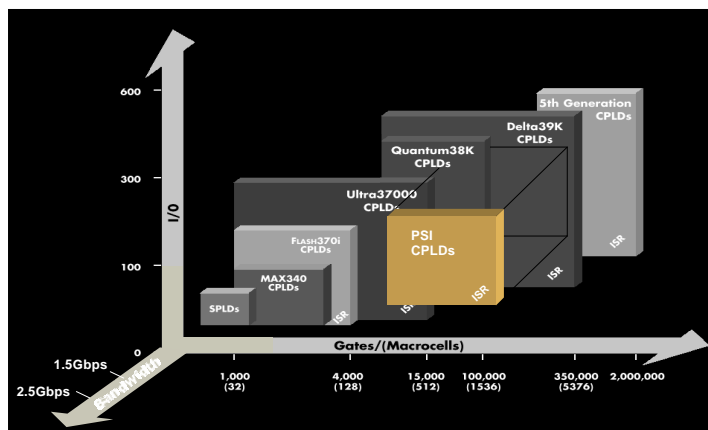
| Description                 | Pins    | Part Number | Transfer Rate (MB/s) | I <sub>CC</sub> (mA) | Packages*     |
|-----------------------------|---------|-------------|----------------------|----------------------|---------------|
| VME Interface Controller    | 144/160 | VIC068A     | 40                   | 150                  | A, B, G, N, U |
| VME Address Controller      | 144/160 | VAC068A     | —                    | 150                  | B, G, N, U    |
| 64-Bit VIC                  | 144/160 | VIC64       | 80                   | 150                  | A, B, G, N, U |
| Bus Interface Logic Circuit | 64/68   | CY7C964     | —                    | 120                  | A, G, N, U    |

\*See package codes on page 49.



## Programmable Logic Devices (PLDs)

Cypress's Programmable Logic offering ranges from the industry-standard Simple Programmable Logic Devices (SPLDs), to high-density Complex Programmable Logic Devices (CPLDs). The entire family is supported by the Cypress *Warp®* development tools for complete device independence during the design cycle.



## Programmable Serial Interface (PSI)

The Programmable Serial Interface (PSI) family is a convergence of Cypress's serial communications and programmable logic technologies. It consolidates serializing /deserializing (SERDES) capability with the speed, predictable timing, high-density, and ease of use of programmable logic. PSI is a point-to-point or point-to-multipoint programmable communications solution which allows the manipulation and transfer of data over high-speed serial links at signaling speeds ranging from 200 Mbps to 1.5 Gbps or 2.5 Gbps per serial link. The family features up to 200K gates of programmable logic and provides a maximum duplex serial bandwidth of 12Gbps. The device includes high-performance PLLs on the transmit and receive channels and FIFO, Dual-Port, synchronous and asynchronous RAM laced throughout the logic of the device. Supported standards are PCI, SONET, Gigabit-ENET, Fibre Channel and InfiniBand™. The applications include backplanes, linecards, switches, routers, 3G basestations, VoIP gateways, servers, mass storage equipment, interconnecting workstations and video-transmission equipment.

| Device               | Channel and link speed | Total Bandwidth | f <sub>max</sub> (Mhz) | Logic Speed<br>t <sub>pd</sub> (ns) pin-to-pin | Standby I <sub>cc</sub> |
|----------------------|------------------------|-----------------|------------------------|--|-------------------------|
| CYPSI2G100P456-1MGC  | 1 x 2.5Gbps            | 2.5 Gbps        | 200                    | 7.5 ns   | 11 mA                   |
| CYPSI2G100SP456-1MGC | 1 x 2.5Gbps            | 2.5 Gbps        | 200                    | 7.5 ns   | 11 mA                   |
| CYPSI5G100P456-1MGC  | 2 x 2.5Gbps            | 5 Gbps          | 200                    | 7.5 ns   | 11 mA                   |
| CYPSI5G100SP456-1MGC | 2 x 2.5Gbps            | 5 Gbps          | 200                    | 7.5 ns   | 11 mA                   |
| CYPSI6G100P456-1MGC  | 4 x 1.5Gbps            | 6 Gbps          | 200                    | 7.5 ns   | 11 mA                   |

## Complex PLDs (CPLDs)

### Delta39K™ CPLDs

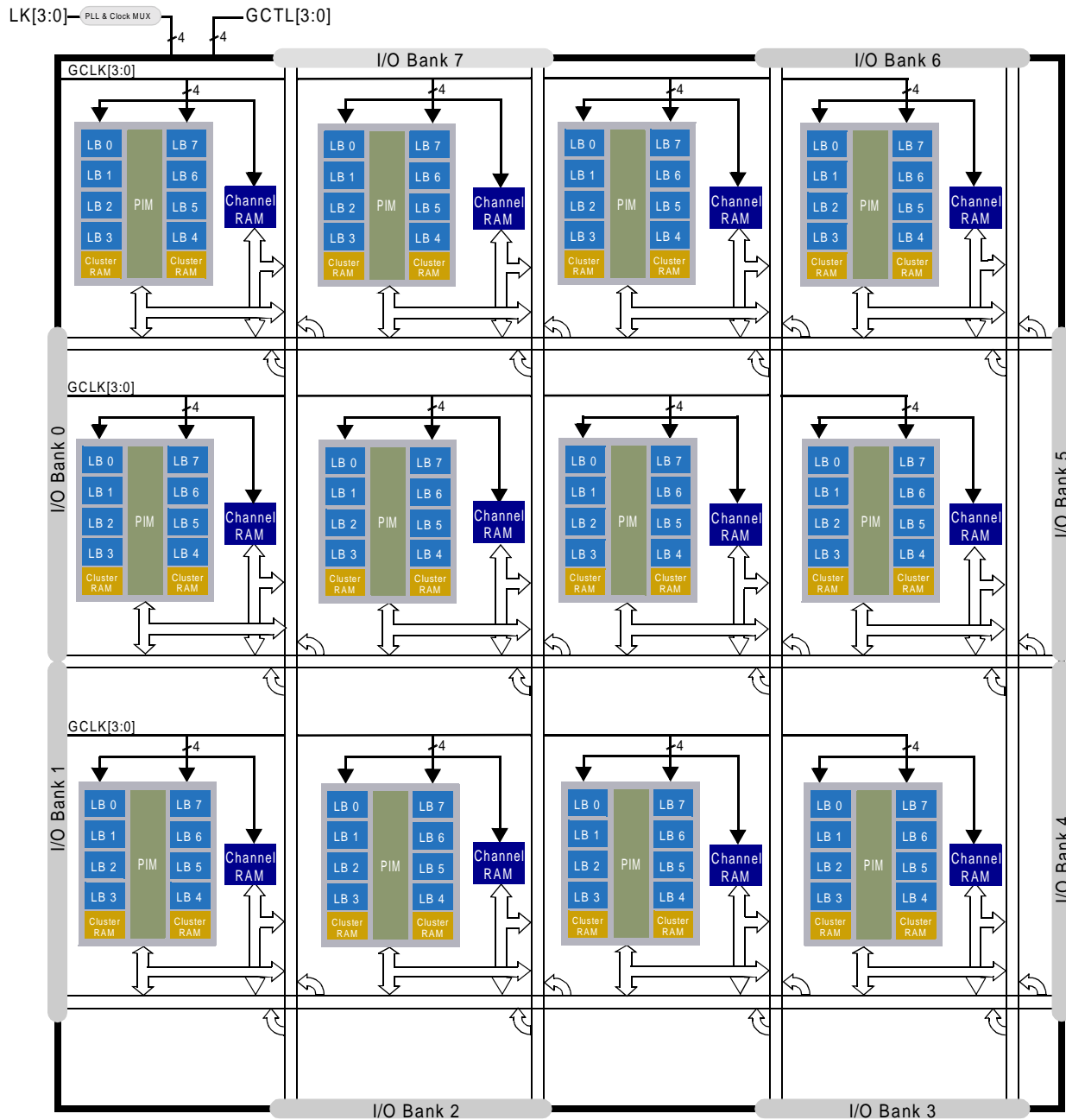
- CPLDs at FPGA Densities™
- More RAM than any other programmable logic device
- Integrated FIFO control and Dual-Port arbitration logic
- Advanced PLL, I/O, and packaging technology

### Delta39K

| Device | Typical Gates | Macrocells | RAM Bits | t <sub>PD</sub> (ns) | f <sub>MAX</sub> (MHz) | I/O Pins | Packages        |
|--------|---------------|------------|----------|----------------------|------------------------|----------|-----------------|
| 39K15  | 8K–24K        | 256        | 40K      | 6.5                  | 250                    | 126      | PQFP, BGA, FBGA |
| 39K30  | 15K–47K       | 512        | 80K      | 6.5                  | 250                    | 168      | PQFP, BGA, FBGA |
| 39K50  | 22K–71K       | 768        | 120K     | 7.0                  | 222                    | 210      | PQFP, BGA, FBGA |
| 39K100 | 45K–140K      | 1536       | 240K     | 7.5                  | 200                    | 294      | PQFP, BGA, FBGA |
| 39K165 | 74K–238K      | 2560       | 400K     | 8.0                  | 181                    | 378      | PQFP, BGA, FBGA |
| 39K200 | 92K–289K      | 3072       | 480K     | 8.0                  | 181                    | 420      | PQFP, BGA, FBGA |
| 39K250 | 110K–337K     | 3840       | 600K     | 8.5                  | 167                    | 462      | PQFP, BGA, FBGA |
| 39K350 | 154K–473K     | 5376       | 840K     | 9.0                  | 154                    | 546      | PQFP, BGA, FBGA |



## Delta39K Architecture



Note: Please contact a Cypress Representative for product availability.

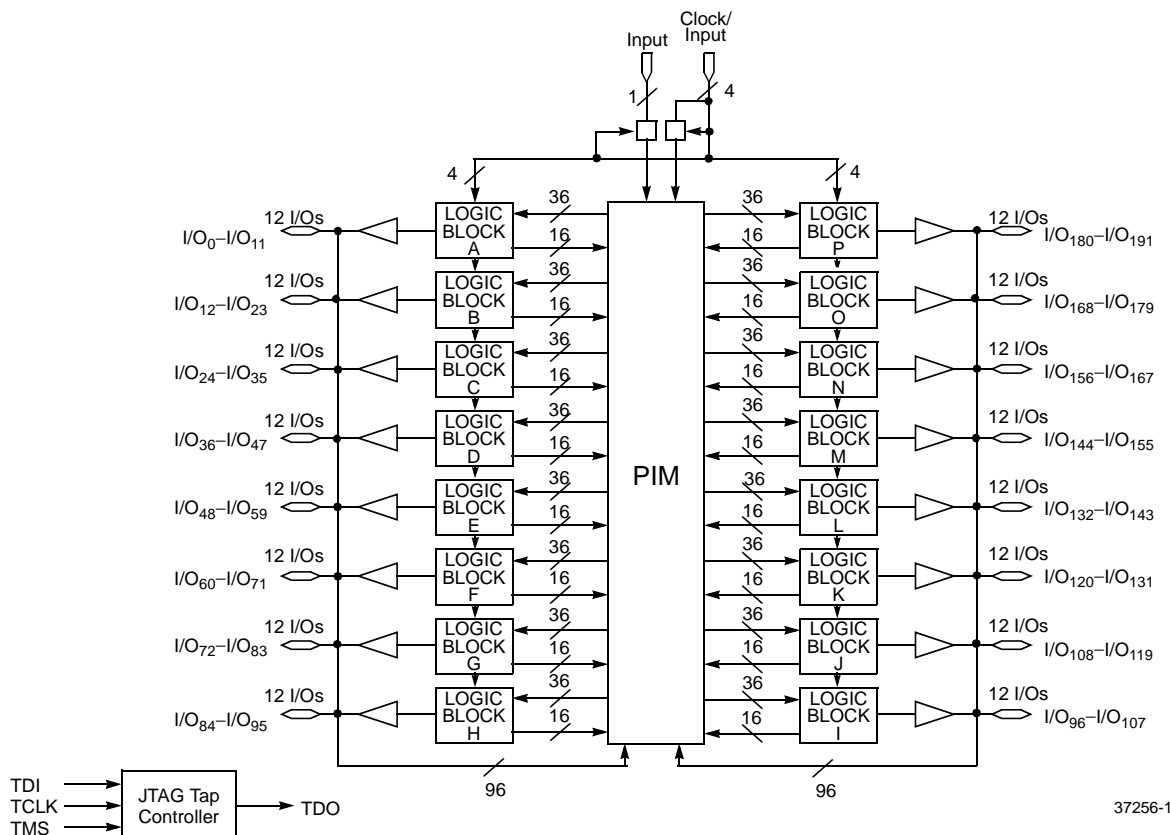
## Ultra37000™ CPLDs

- In-System Reprogrammable™ (ISR™) CPLDs offering high density and high performance
- From 32 to 512 macrocells
- True 3.3V and 5V versions
- Simple timing model for easy design and system simulation
- Supports fixed pin assignments
- Full JTAG (IEEE 1149.1) compatibility
- PCI compliant

## Ultra37000

| Description                 | Packages   | Part Number | f <sub>MAX</sub> (MHz) | t <sub>pd</sub> (ns) | t <sub>s</sub> (ns) | t <sub>co</sub> (ns) | Typical I <sub>CC</sub> (mA) |
|-----------------------------|--|-------------|------------------------|----------------------|---------------------|----------------------|------------------------------|
| <b>5V CPLDs</b>             |  |             |                        |                      |                     |                      |                              |
| 32-Macrocell ISR CPLD       | 44PLCC, 44TQFP                                   | CY37032     | 200                    | 6                    | 4                   | 4                    | 15                           |
| 64-Macrocell ISR CPLD       | 44PLCC, 44TQFP, 84PLCC, 100TQFP                  | CY37064     | 200                    | 6                    | 4                   | 4                    | 30                           |
| 128-Macrocell ISR CPLD      | 84PLCC, 100TQFP, 160TQFP                         | CY37128     | 167                    | 6.5                  | 4                   | 4                    | 30                           |
| 192-Macrocell ISR CPLD      | 160TQFP  | CY37192     | 154                    | 7.5                  | 5                   | 4.5                  | 90                           |
| 256-Macrocell ISR CPLD      | 160TQFP, 208PQFP, 256BGA                         | CY37256     | 154                    | 7.5                  | 5                   | 4.5                  | 120                          |
| 384-Macrocell ISR CPLD      | 208PQFP, 256BGA                                  | CY37384     | 125                    | 10                   | 5.5                 | 6.5                  | 180                          |
| 512-Macrocell ISR CPLD      | 208PQFP, 256BGA, 352BGA                          | CY37512     | 118                    | 10                   | 6.5                 | 5                    | 240                          |
| <b>3.3V CPLDs</b>           |  |             |                        |                      |                     |                      |                              |
| 32-Macrocell ISR CPLD 3.3V  | 44PLCC, 44TQFP, 48FBGA                           | CY37032V    | 143                    | 8.5                  | 5                   | 4                    | 15                           |
| 64-Macrocell ISR CPLD 3.3V  | 44PLCC, 44TQFP, 48FBGA, 84PLCC, 100TQFP, 100FBGA | CY37064V    | 143                    | 8.5                  | 5                   | 4                    | 30                           |
| 128-Macrocell ISR CPLD 3.3V | 84PLCC, 100TQFP, 100FBGA, 160TQFP                | CY37128V    | 125                    | 10                   | 5.5                 | 4                    | 30                           |
| 192-Macrocell ISR CPLD 3.3V | 160TQFP  | CY37192V    | 100                    | 12                   | 7                   | 6                    | 90                           |
| 256-Macrocell ISR CPLD 3.3V | 160TQFP, 208PQFP, 256BGA, 256FBGA                | CY37256V    | 100                    | 12                   | 7                   | 6                    | 120                          |
| 384-Macrocell ISR CPLD 3.3V | 208PQFP, 256BGA                                  | CY37384V    | 83                     | 15                   | 8                   | 8                    | 180                          |
| 512-Macrocell ISR CPLD 3.3V | 208PQFP, 256BGA, 352BGA, 400FBGA                 | CY37512V    | 83                     | 15                   | 9.5                 | 6.5                  | 240                          |

## Ultra37000 Architecture



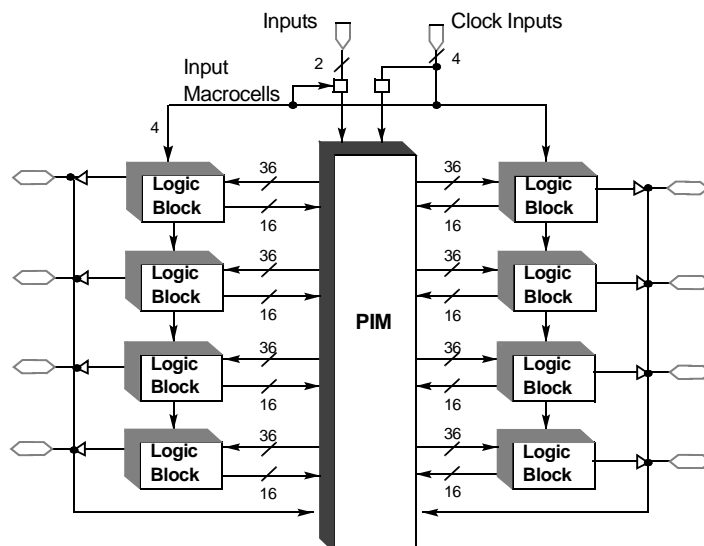
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Note: Please contact a Cypress Representative for product availability.

## FLASH370i™ CPLDs

- In-System Reprogrammable (ISR)
- State-of-the-art Flash technology for electrical erasability
- Unique single-product-term sharing and steering
- Architecture provides complete design flexibility for user-assigned pinouts. Even when you make changes to your logic, you will be able to maintain the same pin configuration
- Significant capacity advantages over all other CPLD architectures
- Simple timing model for easy design and system simulation
- Everything you liked about the 22V10 now available in high-performance, high-density logic
- ISR versions are upward compatible from earlier devices using existing software tools

## FLASH370i Family Architecture



## FLASH370i

| Organization                 | Packages                 | Part Number | Speed (ns)  | $I_{CC}/I_{SB}$ (mA) |
|------------------------------|--------------------------|-------------|---|----------------------|
| 32-Macrocell ISR Flash CPLD  | 44PLCC, 44TQFP           | CY7C371i    | $f_{MAX}/t_{PD}/t_S/t_{CO}=143\text{ MHz}/8.5\text{ ns}/5\text{ ns}/6\text{ ns}$    | 75                   |
| 64-Macrocell ISR Flash CPLD  | 44PLCC, 84PLCC, 100TQFP  | CY7C372i/3i | $f_{MAX}/t_{PD}/t_S/t_{CO}=125\text{ MHz}/10\text{ ns}/5.5\text{ ns}/6.5\text{ ns}$ | 75                   |
| 128-Macrocell ISR Flash CPLD | 84PLCC, 100TQFP, 160TQFP | CY7C374i/5i | $f_{MAX}/t_{PD}/t_S/t_{CO}=125\text{ MHz}/10\text{ ns}/5.5\text{ ns}/6.5\text{ ns}$ | 125                  |

## MAX340™/340B

- Second-sourced family of CPLDs
- High-volume 0.8μ UV-erasable CMOS process
- CY7C340B devices are 0.65μ shrinks of the original versions offering even faster speed options
- All Cypress MAX340B products are identical to Altera Max5000 products

## MAX340/340B

| Organization       | Pins    | Part Number  | Speed (ns)                        | $I_{CC}/I_{SB}$ (mA) | Packages*  |
|--------------------|---------|--------------|-----------------------------------|----------------------|------------|
| 32 Macrocell CPLD  | 28      | CY7C344/344B | $t_{PD}/s/CO = 15/10/10, 10/6/5$  | 200/150              | H, J, P, W |
| 64 Macrocell CPLD  | 44      | CY7C343/343B | $t_{PD}/s/CO = 20/12/12, 12/8/6$  | 135/125              | H, J, R    |
| 128 Macrocell CPLD | 68      | CY7C342B     | $t_{PD}/s/CO = 25/15/14, 12/8/6$  | 250/225              | H, J, R    |
| 128 Macrocell CPLD | 84, 100 | CY7C346/346B | $t_{PD}/s/CO = 25/15/14, 15/10/7$ | 250/225              | H, J, N, R |
| 192 Macrocell CPLD | 84      | CY7C341/341B | $t_{PD}/s/CO = 25/15/14, 15/10/7$ | 380/360              | H, J, R    |

\*See package codes on page 49.

## Industry-Standard PLDs

- CMOS Flash and UV erasable technology expertise
- Complete line of SPLDs—GAL® architectures: 16V8, 20V8, and 22V10
- Packaging options include PDIP, PLCC, and LCC packages

## PLDs

| Part Number  | $t_{PD}$ (ns) | f (MHz)  | $I_{CC}$ (mA) | Pins  | Packages*  |
|--------------|---------------|----------|---------------|-------|------------|
| PALCE16V8    | 7.5           | 100      | 115           | 20    | J, P       |
| PALCE16V8    | 10/15/25      | 69/45/37 | 90            | 20    | D, J, L, P |
| PLDC20G10**  | 25            | 33       | 55            | 24/28 | J, P       |
| PLDC20G10B** | 15            | 45       | 70            | 24/28 | P          |
| PLDC20RA10** | 20            | 33       | 75            | 24/28 | D, J, P, W |
| PALCE20V8    | 7.5/10        | 83/58    | 115           | 24/28 | J, L, P    |
| PALCE20V8    | 15/25         | 45/37    | 90            | 24/28 | D, J, L, P |
| PALC22V10*   | 25            | 42       | 90            | 24/28 | J, P, W    |
| PALC22V10B*  | 15            | 50       | 90            | 24/28 | J, P       |
| PALC22V10D*  | 7.5           | 100      | 130           | 24/28 | J, P       |
| PALC22V10D*  | 10/15/25      | 77/55/33 | 90            | 24/28 | D, J, L, P |
| PALCE22V10   | 5/7.5         | 143/100  | 130           | 24/28 | J, P       |
| PALCE22V10   | 10/15/25      | 77/55/33 | 90            | 24/28 | D, J, L, P |
| CY7C331**    | 20/25         | 27/24    | 130           | 28    | J, P       |
| CY7C335**    | 15/20/25      | 50/45/35 | 140           | 28    | J, P, W    |

\*See package codes on page 49.

\*\* Not recommended for new designs. For new designs please refer to the Ultra37000 family of CPLDs.

## Design and Programming Tools

The capabilities of *Warp*™ CPLD development software and Cypress's programming tools greatly simplify your design effort and let you reach the optimal solution to your design problems in the shortest possible time. *Warp* software features include:

- Support for Cypress's entire Programmable Logic product offering
- Open language support—IEEE-STD-1076/1164 **VHDL** (Very-high-speed integrated-circuit Hardware Description Language) and IEEE-STD-1364 **Verilog** for programmable logic design
- Design entry with VHDL/Verilog text editor, graphical Finite State Machine editor, or in any combination of these entry modes
- Optimized synthesis and fitting by replacing basic circuits with ones handcrafted for the target device, by implementing logic in unused memory and by perfect communication between synthesis and fitting.
- Architecture Explorer graphical debugging and analysis tool integrated with the Static Timing Analyzer
- Dynamic Timing Simulation with Waveform Viewer
- Although *Warp* is a complete CPLD development tool on its own, it also integrates seamlessly with third party EDA tools.

*Warp Professional*™ software adds extra features:

- Graphical waveform comparison before and after design changes
- HDL graphical block diagram text entry
- Maximum length for timing simulation extended from 2 ms to 5 ms

*Warp Enterprise*™ software adds even more features:

- Unlimited timing simulation
- Graphical waveform editing
- Source-level behavioral simulation and debugging
- Testbench generation
- Code2Graphics automatic conversion of HDL text to HDL graphical blocks

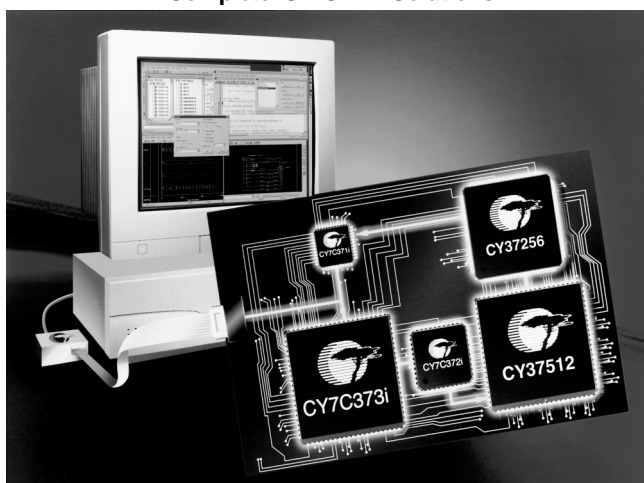
Cypress also provides powerful programming tools:

- The Cypress ISR kit is a low-cost kit for programming Cypress's advanced CPLD and Programmable Serial Interface (PSI) families and comes complete with a prototype board containing both a CY37256 160-pin device and a CY39100 208-pin device for easy design testing
- The *WarpISR*™ kit combines *Warp* software with a Cypress ISR kit for a complete low-cost ISR design and programming solution
- All VHDL software development kits include the popular textbook "VHDL for Programmable Logic" by Kevin Skahill, an engineer at Cypress

## Design and Programming Tools

| Description                          | Type   | Part Number   |
|--------------------------------------|--|---|
| <i>Warp</i> software for PC and UNIX | <i>Warp</i> VHDL and Verilog for PC<br><i>Warp</i> VHDL and Verilog for PC (Japanese)<br><i>Warp</i> VHDL and Verilog for UNIX*<br><i>Warp</i> Professional VHDL and Verilog for PC<br><i>Warp</i> Enterprise VHDL for PC<br><i>Warp</i> Enterprise Verilog for PC | CY3120R60<br>CY3120JR60<br>CY3125R60<br>CY3128R60<br>CY3130R60<br>CY3138R60 |
| Cypress ISR Kit                      | ISR Programming Kit for Ultra37000 and Delta39K on PC  | CY3900i   |
| <i>WarpISR</i> for PC                | <i>Warp</i> Design Software plus ISR Programmer  | CY3620R60<br>CY3620JR60 (Japanese)  |

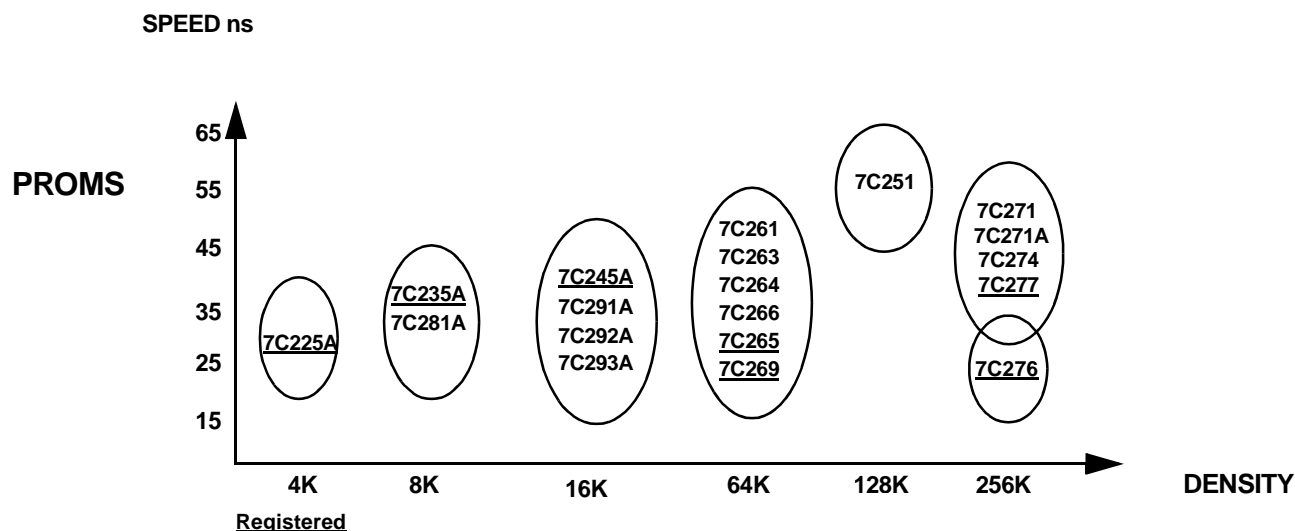
## Complete ISR CPLD Solutions



Note: Please contact a Cypress Representative for product availability.

## Non-Volatile Memories

- World's fastest PROMs
- 4K to 256K density
- Industry-standard pinouts
- Low-power CMOS technology
- PDIP, PLCC, TSOP, CDIP, LCC packages
- Registered and x16 versions
- Direct replacement for Bipolar PROMs



## CMOS PROMs

| Density | Organization | Pins Count | Package*      | Part Number | Access Time $t_{AA}$ (ns) | Feature                   |
|---------|--------------|------------|---------------|-------------|---------------------------|---------------------------|
| 8K      | 1K x 8       | 24/28      | J,P,D         | CY7C281A    | 25/30/45                  | 300-mil DIP               |
| 16K     | 2K x 8       | 24/28      | P,J,S,W,D,Q,L | CY7C291A/AL | 20/25/35/50               | 300-mil DIP               |
| 16K     | 2K x 8       | 24         | P,W           | CY7C292A/AL | 20/25/35/50               | 600-mil DIP               |
| 16K     | 2K x 8       | 24/28      | P,W,J         | CY7C293A/AL | 20/25/35/50               | Power-Down, 300-mil DIP   |
| 64K     | 8K x 8       | 24/28      | P,J,W,D,L,Q   | CY7C261     | 20/25/35/45/55            | Power-Down, 300-mil DIP   |
| 64K     | 8K x 8       | 24/28      | J,P,W,D,L,Q   | CY7C263     | 20/25/35/45/55            | 300-mil DIP               |
| 64K     | 8K x 8       | 24         | P,W           | CY7C264     | 20/25/35/45/55            | 600-mil DIP               |
| 64K     | 8K x 8       | 28/32      | P,J,W         | CY7C266     | 20/25/35/45               | Power-Down                |
| 128K    | 16K x 8      | 28/32      | P,W           | CY7C251     | 45/55/65                  | Power-Down, 300-mil DIP   |
| 256K    | 32K x 8      | 28/32      | D,W,Q,L       | CY7C271     | 35/45/55                  | Power-Down, Military only |
| 256K    | 32K x 8      | 28/32      | PC,WC,JC      | CY7C271A    | 25/35/45/55               | Power-Down, Com'l only    |
| 256K    | 16K x 16     | 44         | JC            | CY7C276     | 25/30/35                  | 16 Bit Word Wide          |

## CMOS Registered PROMs

| Density | Organization | Pins Count | Package*      | Part Number | Set-Up $t_{SA}$ (ns) | Clock-to-Out $t_{CO}$ (ns) |
|---------|--------------|------------|---------------|-------------|----------------------|----------------------------|
| 4K      | 512 x 8      | 24/28      | J,P,D,L       | CY7C225A    | 18/25/30/35/40       | 12/12/15/20/25             |
| 8K      | 1K x 8       | 24/28      | J,P,D,L       | CY7C235A    | 18/25/30/40          | 12/12/15/20                |
| 16K     | 2K x 8       | 24/28      | P,J,W,S,D,Q,L | CY7C245A/AL | 15/25/35/45          | 10/12/12/15/25             |
| 64K     | 8K x 8       | 28         | J,P,W,Q       | CY7C265     | 15/25/40/50          | 12/15/20/25                |
| 64K     | 8K x 8       | 28         | J,P,W,Q       | CY7C269     | 15/25/40/50          | 12/15/20/25                |
| 256K    | 32K x 8      | 28/32      | J,P,W         | CY7C277     | 30/40/50             | 15/20/25                   |

\*See package codes on page 49.

Note: Please contact a Cypress Representative for product availability.

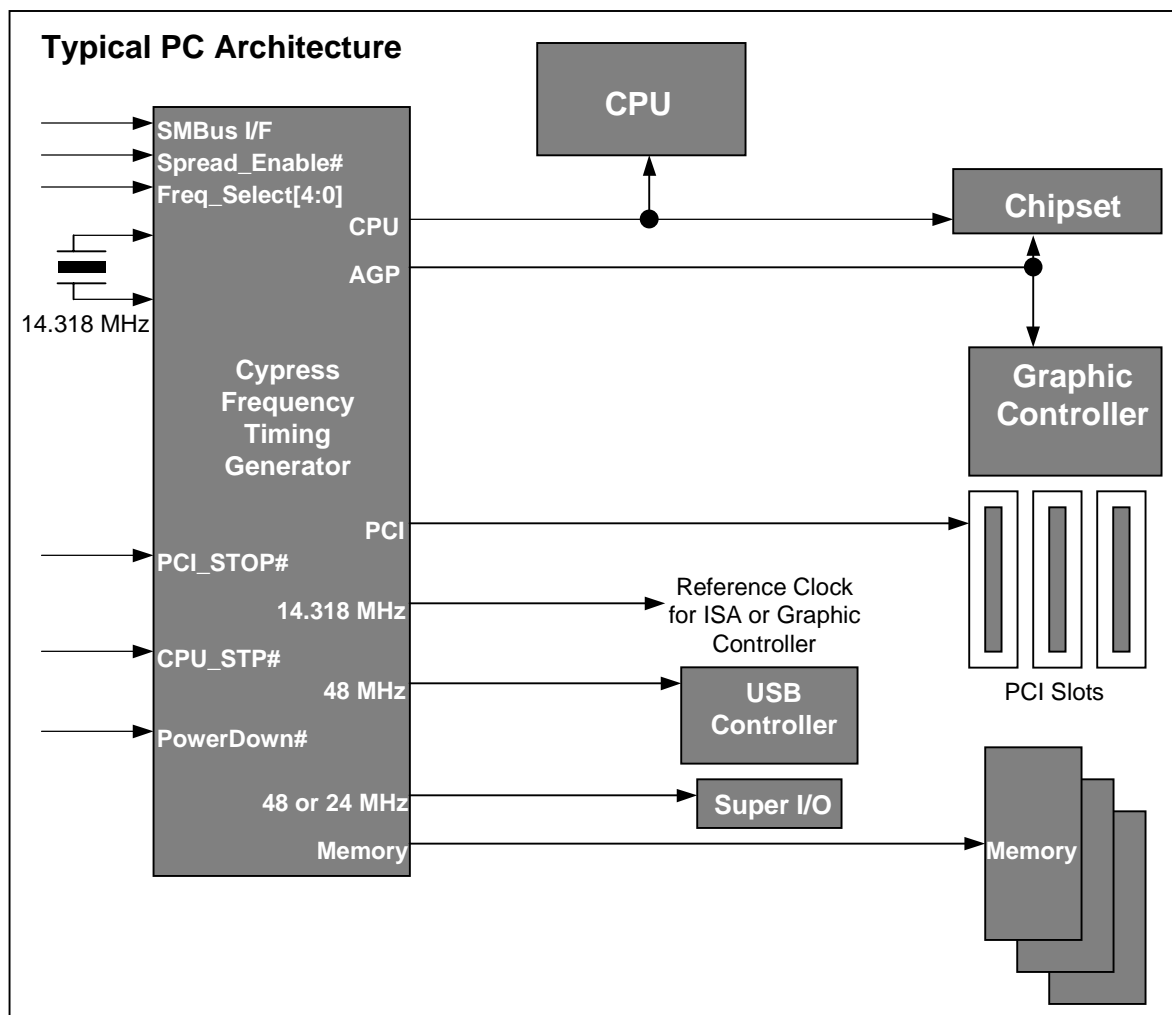
## Timing Technology Products

Today's high-performance digital designs often require multiple timing signals in order to control all the functions on the board. In the past, this required the designer to use multiple metal-can oscillators which increased the size and cost of the design. Cypress solves this problem by providing single-chip solutions that can synthesize multiple frequencies. The Cypress product line contains over 50 Frequency Timing Generator options and consists of five main device families:

1. **Motherboard FTGs**
2. **EPROM Programmable FTGs**
3. **Spread Spectrum FTGs**
4. **Zero Delay Buffers**
5. **Programmable Skew Buffers (RoboClock®)**

### 1. Motherboard FTGs

Cypress offers an extensive family of motherboard frequency timing generators for PC designs. The Cypress offering includes products with 1–3 integrated PLLs and up to 32 output signals to support system, bus, and peripheral frequencies on the motherboard. Desktop and mobile applications are supported, as well as various processor/chipset platforms. The Cypress motherboard FTGs are designed for high accuracy, low EMI, and maximum output flexibility.



Note: Please contact a Cypress Representative for product availability.

## Memory Buffers for SDRAM, DDR and Rambus

| Part Number                                     | Description   | CK Designator         | # of outputs 3.3V       | Other  | Package   |
|---|---|-----------------------|-------------------------|--|---|
| W255<br>B9847<br>B9848                          | DDR and SDRAM clock buffer for 4 DDR DIMM or (2 DDR & 3 SDRAM DIMM)<br>Note: B9847 supports only (2 DDR & 2 SDRAM DIMM) | --                    | 25<br>25<br>25          | SMBus I/F<br>SMBus I/F<br>SMBus I/F          | 48 SSOP<br>48 SSOP<br>48 SSOP                       |
| W256<br>B9846                                   | DDR and SDRAM buffer for 2 DDR or 3 SDRAM DIMM  | --                    | 13<br>13                | SMBus I/F<br>SMBus I/F                       | 28 SSOP<br>28 SSOP                                  |
| W134M<br>W134S                                  | Direct Rambus Clock Generator (DRCG)  | DRCG Plus<br>DRCG III | 1 pair of diff. output  | up to 400MHz                                 | 24 SSOP   |
| W234  | Dual Direct Rambus Clock Generator (DRCG)   | Dual DRCG             | 2 pairs of diff. output | up to 400MHz                                 | 28 TSSOP  |
| SC660<br>CY2309NZ<br>CY2310ANZ-1<br>CY2310BNZ-1 | 2 DIMM or 4 SO-DIMM Buffer  | CKBF-M                | 10<br>12<br>10          | SMBus I/F<br>SMBus I/F<br>--<br>SMBus        | 28 SSOP<br>28 SSOP & 28 TSSOP<br>16 SOIC<br>28 SSOP |
| SC680<br>B9680<br>CY2318ANZ-11<br>CY2318BNZ-11  | 4 DIMM Buffer   | CKBF                  | 18<br>18<br>18<br>18    | SMBus I/F<br>SMBus I/F<br>SMBus I/F<br>SMBus | 48 SSOP<br>48 SSOP<br>48 SSOP<br>48 SSOP            |
| W40S11-23<br>CY2313ANZ<br>CY2313BNZ             | 3 DIMM Buffer   | CKBF / -M             | 13<br>13                | SMBus I/F<br>SMBus I/F                       | 28 SOIC<br>28 SOIC                                  |
| W191  | PCI or memory clock buffer  |                       | 6                       | SMBus I/F                                    | 16 SSOP   |

## Motherboard FTG for Intel Chipsets

| Part Number   | Processor/ Platform            | Chipset                                | Intel CLK Spec.     | #CPU 2.5V                              | #3V66 3.3V                | #PCI 3.3V                     | #Ref 3.3V                 | #SDRAM or #MREF 3.3V      | #USB 3.3V                 | #APIC 2.5V                     | Other  | Package   |
|---|--------------------------------|--|---------------------|--|---------------------------|-------------------------------|---------------------------|---------------------------|---------------------------|--------------------------------|--|---|
| W320-03<br>C9827<br><br>CY28326<br>CY28324<br>C9832 | P4 Desktop/ Mobile             | Almador (mobile)<br>Brookdale (DT)     | CK-408<br>CK-Titan  | 3<br>3<br><br>3<br>2<br>3 (diff. pair) | 5<br>5<br><br>4<br>4<br>5 | 10<br>10<br><br>8<br>10<br>10 | 1<br>1<br><br>1<br>2<br>1 | 1<br>1<br><br>1<br>2<br>1 | 2<br>2<br><br>2<br>2<br>2 | --<br>--<br><br>--<br>--<br>-- | W320-03-Intel spec.,<br>CY28324 w/ over-clocking<br>C9832 w/ E-PCI clock | 56 SSOP & TSSOP<br>48 SSOP<br>48 SSOP<br>48 SSOP    |
| CY2220<br>C9850<br>C9853                            | P4 Server/WS                   | 850 (Tehama)                           | CK-00               | 4 diff.<br>4 diff.<br>2 diff.          | 4<br>4<br>3               | 10<br>10<br>10                | 2<br>2<br>2               | 2<br>2<br>2               | 2<br>2<br>2               | --<br>--<br>--                 | Requires two W134 or one W234  | 56 SSOP<br>56 SSOP<br>48 SSOP                       |
| W218<br>C9815<br>C9915<br>W219B<br>C9926            | Celeron/ PIII/Tualatin Desktop | 815, 815E, 815EP, 815B (Solano) 2-DIMM | CK-Solano<br>2-DIMM | 3<br>3<br>3<br>2<br>2                  | 3<br>3<br>3<br>3<br>3     | 7<br>7<br>7<br>8<br>6         | 1<br>1<br>1<br>1<br>1     | 9<br>9<br>9<br>9<br>9     | 2<br>2<br>2<br>3<br>2     | 2<br>2<br>2<br>1<br>1          | C9815, C9915 & W218 -Intel Spec.<br>W219 & C9926-w/ over-clocking        | 56 SSOP<br>56 SSOP<br>56 SSOP<br>48 SSOP<br>48 SSOP |

Note: Please contact a Cypress Representative for product availability.





Note: Please contact a Cypress Representative for product availability.

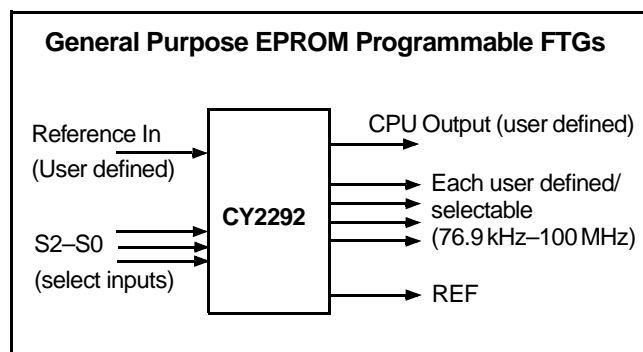
| Part Number  | Processor/<br>Platform               | Chipset   | #CPU<br>2.5/3.3V                               | #AGP<br>3.3V   | #PCI<br>3.3V                                   | #Ref<br>3.3V                                   | #SDRAM<br>or #MREF<br>3.3V                               | #USB<br>3.3V                                   | #APIC<br>2.5V                                  | Other  | Package   |
|--|--------------------------------------|---|--|--|--|--|--|--|--|--|---|
| W250-03<br>W311<br>CY28313<br>C9846  | PIII/Celeron/<br>Tualatin<br>Desktop | VIA Pro266<br>VIA Pro266T                             | 3<br>3<br>2<br>4                               | 3<br>3<br>3<br>3   | 9<br>9<br>7<br>9                               | 2<br>2<br>1<br>2                               | --<br>--<br>6 pair DDR<br>--                             | 2<br>2<br>2<br>2                               | 3<br>3<br>1<br>2                               | W311 has RST# output and programmable output freq.<br>CY28313 - single chip for 2 DDR                                | 48 SSOP<br>48 SSOP<br>56 SSOP<br>48 SSOP  |
| W312-02<br>C9854<br>CY28333  | AMD K7<br>Desktop                    | VIA KT266   | 2 diff.<br>2 diff.<br>2 diff. pair             | 3<br>3<br>3  | 11<br>11<br>7                                  | 3<br>3<br>1                                    | --<br>--<br>6 pair DDR                                   | 2<br>2<br>2                                    | --<br>--<br>--                                 | w/ RST# output and programmable output frequency<br>CY28333 - single chip for 2 DDR                                  | 48 SSOP<br>48 SSOP<br>48 SSOP   |
| CY28316  | PIII/Celeron/<br>Tualatin<br>Desktop | VIA SDRAM<br>chipsets with<br>Tualatin sup-<br>port   | 2  | --   | 7  | 2  | 13   | 2  | --   | w/ RST# output and programmable output frequency   | 48 SSOP   |
| CY28317  | PIII/Celeron/<br>Tualatin<br>Mobile  | VIA SDRAM<br>chipsets with<br>Tualatin sup-<br>port   | 2 + 1<br>(single-<br>ended +<br>diff. pair)    | --   | 7  | 2  | 6  | 2  | --   | w/ RST# output and programmable output frequency   | 48 SSOP   |
| W210<br>W230<br>W230-03<br>W310<br>C9726/27  | AMD K7<br>Desktop                    | VIA KT133,<br>KT133A,<br>KL133                        | 3<br>3<br>3<br>3<br>3                          | --<br>--<br>--<br>--<br>--                               | 6<br>6<br>6<br>6<br>6                          | 2<br>2<br>2<br>2<br>2                          | 13<br>13<br>13<br>13<br>out                              | 2<br>2<br>2<br>2<br>2                          | --<br>--<br>--<br>--<br>--                     | first revision<br>w/ enhanced freq. table<br>w/ push-pull CPU output<br>w/ RST# output and prog.<br>output frequency | 48 SSOP<br>48 SSOP<br>48 SSOP<br>48 SSOP<br>48 SSOP   |
| W233   | AMD K7<br>Mobile                     | VIA KN133   | 3  | --   | 8  | 3  | 7  | 2  | --   | w/ power management support  | 48 SSOP   |
| W164<br>W196<br>W214<br>W144<br>W149<br>W150<br>W211B<br>CY28318<br>C9713<br>C9723 | Celeron/PIII/<br>Tualatin<br>Desktop | VIA Pro133,<br>Pro133A,<br>PM133,<br>PL133,<br>PLE133 | 2<br>2<br>2<br>2<br>2<br>3<br>2<br>2<br>2<br>2 | --<br>--<br>--<br>--<br>--<br>--<br>--<br>--<br>--<br>-- | 7<br>7<br>7<br>6<br>6<br>7<br>6<br>6<br>6<br>6 | 1<br>1<br>1<br>2<br>2<br>2<br>2<br>2<br>2<br>2 | --<br>--<br>--<br>13<br>13<br>17<br>13<br>13<br>13<br>13 | 2<br>2<br>2<br>2<br>2<br>2<br>2<br>2<br>2<br>2 | 1<br>1<br>1<br>1<br>1<br>2<br>1<br>1<br>1<br>1 | --   | 28 SOIC<br>28 SOIC<br>28 SOIC<br>48 SSOP<br>48 SSOP<br>56 SSOP<br>48 SSOP<br>48 SSOP<br>48 SSOP<br>48 SSOP<br>48 SSOP |
| W48C111-16<br>W48C111-17<br>CY2285-1<br>CY2285-3<br>W137<br>C9806j                 | Celeron/PIII<br>Mobile               | VIA PM133,<br>PL133,<br>PLE133                        | 2<br>2<br>2<br>2<br>2<br>2                     | --<br>--<br>--<br>--<br>--<br>--                         | 6<br>6<br>6<br>6<br>6<br>7                     | 1<br>1<br>2<br>1<br>2<br>4                     | --<br>--<br>--<br>--<br>--<br>7                          | 1<br>1<br>1<br>1<br>1<br>2                     | --<br>--<br>--<br>--<br>--<br>--               | --   | 28 SOIC<br>28 SOIC<br>28 SSOP<br>28 SSOP<br>28 SSOP<br>48 SSOP &<br>TSSOP   |
| XG571<br>C9716l  | Transmeta<br>Crusoe                  | Transmeta<br>Crusoe                                   | 2<br>2   | --<br>--   | 7<br>6   | 3<br>2   | 8<br>--  | 2<br>2   | 1<br>--  |  | 48 SSOP &<br>TSSOP<br>28 SSOP &<br>TSSOP  |
| CY22K7-1<br>W174B  | AMD K7/<br>Desktop                   | AMD 750,<br>760                                       | 3<br>3   | 2<br>2   | 8<br>8   | 2<br>2   | --<br>--   | 1<br>1   | --<br>--                                       | W174B has more freq. options   | 48 SSOP<br>48 SSOP  |
| CY28158  | Tualatin<br>Server/WS                | ServerWorks<br>HE-SL, LE-T                            | 6  | 2  | 6  | 2  | --   | 1  | 3  | 150ps CPU jitter   | 56 SSOP   |
| CY2210-2<br>W158   | PIII/Xeon<br>Server/WS               | ServerWorks<br>2.0LE, 3.0LE,<br>HE                    | 4<br>4   | 4<br>4   | 8<br>8   | 2<br>2   | 2<br>2   | 1<br>1   | 3<br>3   | 150ps CPU jitter   | 56 SSOP<br>56 SSOP  |
| W159   | PIII/Xeon<br>Server/WS               | ServerWork<br>HE                                      | CK133-<br>WS                                   | 7  | 4  | 2  | 2  | 2  | 1  | 7  | Support up<br>to 6 CPU  |
| CY28159  | PIII/Xeon<br>servers                 | ServerWorks<br>grand cham-<br>pion                    | 8 diff   | --   | 1  | 1  | --   | 2  | 1  |  | 48 SSOP   |
| W207B<br>C9630   | Celeron/<br>Desktop                  | SiS630/540  | 3<br>3   | --<br>--   | 7<br>7   | 2<br>2   | 14<br>14   | 2<br>2   | --<br>--                                       | --   | 48 SSOP<br>48 SSOP  |
| W212   | Katmai/Desk-<br>top                  | ALI 1641  | 2  | 2  | 6  | 2  | 13   | 1  | 1  | --   | 48 SSOP<br>48 SSOP  |
| W247<br>C9730  | K7                                   | SiS730S   | 3 (1 diff)<br>3 (1 diff)                       | 2<br>2   | 6<br>7   | 2<br>2   | 14<br>14   | 2<br>2   | --<br>--                                       | --   | 48 SSOP<br>48 SSOP  |

Note: Please contact a Cypress Representative for product availability.

| Part Number   | Processor/ Platform   | Chipset                   | #CPU 2.5/3.3V | #AGP 3.3V | #PCI 3.3V | #Ref 3.3V | #SDRAM or #MREF 3.3V | #USB 3.3V | #APIC 2.5V | Other                       | Package |
|---------------|-----------------------|---------------------------|---------------|-----------|-----------|-----------|----------------------|-----------|------------|-----------------------------|---------|
| W127<br>W156C | PII, 6x86, K6 Desktop | ALI V,<br>VIA MVP3 & MVP4 | 4<br>4        | --        | 6<br>6    | 1<br>2    | 12<br>13             | 2<br>2    | --<br>--   | 2 AGP<br>(97 MHz for K6-2+) | 48 SSOP |
| C9725         | VIA Mathew            | VIA Mathew                | 1             | --        | 2         | 1         | 1 in 5 out           | 1         | --         |                             | 28 SSOP |

## 2. General-Purpose EPROM Programmable FTGs

Cypress offers a selection of EPROM programmable (OTP) Frequency Timing Generators for general-purpose applications such as modems, datacom, networking products, CD-ROMs, DVD, hard disk drives, and more. Cypress EPROM-programmable timing products are "customized" for each application and the output frequencies can be programmed in the field or at the factory using EPROM technology. Cypress is the only manufacturer offering EPROM-programmability, allowing sample delivery of custom frequency products within days rather than the weeks or months required by older technologies. The Cypress product mix includes both single- and three-PLL designs with one to eight outputs and signal frequencies up to 130 MHz. The number of unique frequencies possible depends on the number of PLLs in the FTG. The following table summarizes our offerings. Please note that field-programmable FTGs are identified with the suffix F.



| Part Number                         | # PLLs | # Outputs | Description of Outputs                       | Input frequency Range                     | Output frequency Range                           | VDD     | Package           | Temp                                   |
|-------------------------------------|--------|-----------|--|---|--|---------|-------------------|--|
| CY2907SC<br>CY2907SL<br>CY2907SI    | 1      | 2         | Interdependent                               | 10–25 MHz (Crystal)<br>1–30 MHz (TTL/Osc) | 500 kHz–130 MHz (5V)<br>500 kHz–100 MHz (3.3V)   | 5V/3.3V | 14 SOIC or 8 SOIC | Commercial<br>Commercial<br>Industrial |
| CY2907F8<br>CY2907F8I               | 1      | 2         | Interdependent                               | 10–25 MHz (Crystal)<br>1–30 MHz (TTL/Osc) | 500 kHz–130 MHz (5V)<br>500 kHz–100 MHz (3.3V)   | 5V/3.3V | 8 SOIC            | Commercial<br>Industrial               |
| CY2907F14<br>CY2907F14I             | 1      | 2         | Interdependent                               | 10–25 MHz (Crystal)<br>1–30 MHz (TTL/Osc) | 500 kHz–130 MHz (5V)<br>500 kHz–100 MHz (3.3V)   | 5V/3.3V | 14 SOIC           | Commercial<br>Industrial               |
| CY2071ASC<br>CY2071ASL<br>CY2071ASI | 1      | 3         | Interdependent                               | 10–25 MHz (Crystal)<br>1–30 MHz (TTL/Osc) | 500 kHz–130 MHz (5V)<br>500 kHz–100 MHz (3.3V)   | 5V/3.3V | 8 SOIC            | Commercial<br>Commercial<br>Industrial |
| CY2071AF<br>CY2071AFI               | 1      | 3         | Interdependent                               | 10–25 MHz (Crystal)<br>1–30 MHz (TTL/Osc) | 500 kHz–130 MHz (5V)<br>500 kHz–100 MHz (3.3V)   | 5V/3.3V | 8 SOIC            | Commercial<br>Industrial               |
| CY2081SC<br>CY2081SL                | 3      | 3         | Independent                                  | 10–25 MHz (Crystal)<br>1–30 MHz (TTL/Osc) | 500 kHz–100 MHz (5V)<br>500 kHz–80 MHz (3.3V)    | 5V/3.3V | 8 SOIC            | Commercial<br>Commercial               |
| CY2291SC<br>CY2291SL<br>CY2292SI    | 3      | 8         | 1 Ref, 32 kHz,<br>1 CPU,<br>5 Interdependent | 10–25 MHz (Crystal)<br>1–30 MHz (TTL/Osc) | 76.9 kHz–100 MHz (5V)<br>76.9 kHz–80 MHz (3.3V)  | 5V/3.3V | 20 SOIC           | Commercial<br>Commercial<br>Industrial |
| CY2291F<br>CY2291FI                 | 3      | 8         | 1 Ref, 32 kHz,<br>1 CPU,<br>5 Interdependent | 10–25 MHz (Crystal)<br>1–30 MHz (TTL/Osc) | 76.9 kHz–80 MHz (5V)<br>76.9 kHz–66.6 MHz (3.3V) | 5V/3.3V | 20 SOIC           | Commercial<br>Industrial               |
| CY2292SC<br>CY2292SL<br>CY2292SI    | 3      | 6         | 1 Ref, 1 CPU,<br>4 Interdependent            | 10–25 MHz (Crystal)<br>1–30 MHz (TTL/Osc) | 76.9 kHz–100 MHz (5V)<br>76.9 kHz–80 MHz (3.3V)  | 5V/3.3V | 16 SOIC           | Commercial<br>Commercial<br>Industrial |
| CY2292F<br>CY2292FI                 | 3      | 6         | 1 Ref, 1 CPU,<br>4 Interdependent            | 10–25 MHz (Crystal)<br>1–30 MHz (TTL/Osc) | 76.9 kHz–80 MHz (5V)<br>76.9 kHz–66.6 MHz (3.3V) | 5V/3.3V | 16 SOIC           | Commercial<br>Industrial               |

## Field Programmable FTG Development Kits

Note: Please contact a Cypress Representative for product availability.

| Part Number | Description         | Parts Supported   |
|-------------|---------------------|-------------------|
| CY3670      | FTG Development Kit | CY2071AF, CY2292F |
| CY3093      | Socket Adapter      | CY2291F           |
| CY3095      | Socket Adapter      | CY2292F           |
| CY3096      | Socket Adapter      | CY2071AF          |
| CY3097      | Socket Adapter      | CY2907F8          |
| CY3098      | Socket Adapter      | CY2907F14         |

## Field Programming Using Value Added Distribution and 3rd Party Programming (CY2071AF, CY2291F, CY2292F, CY2907F8, CY2907F14)

Due to limited factory resources, and with the availability of field programming, Cypress Semiconductor is unable to entertain every factory programming opportunity. In order for Cypress to accept a factory programmed opportunity, it must meet the following minimum requirements 1) For all **factory-programmed** EPROM clocks, programmed at the package level, a single configuration must have a forecasted usage of 100K units per year, or 10K units per month. 2) If the design win opportunity falls below these minimum requirements, you must qualify the design and opportunity using field programmable devices. There are no usage minimums for field programmable design wins. 3) For the CY2081 (factory programmed at the wafer/die level), a single configuration must have a forecasted usage of 50K units per year. The CY2081 is not field programmable.

## Value Added Distribution

With the release of all our field programmable EPROM clocks, our Value Added Distribution channel is now set up for prototype and production programming of all parts. Distribution offers design service, kitting, quick turn-arounds on prototype order, custom marking and labeling, and more. For more information, contact your local distributor listed below.

|                     |                |
|---------------------|----------------|
| Arrow Electronics   | (888) 263-7720 |
| Avnet               | (480) 643-2000 |
| Future Electronics  | (514) 694-7710 |
| Unique Technologies | (800) 556-0225 |

## 3rd Party Programming

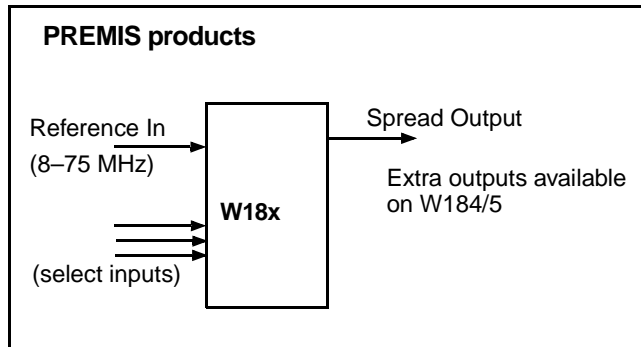
In addition to the distribution channels listed above, Cypress Semiconductor has engaged with a number of 3rd party programming companies to provide support on industry standard programmers for all our field programmable clocks. For more detailed information, contact the programmer companies listed below.

|   | CY2071AF | CY2291F | CY2292F | CY2907F8/F14 |
|---|----------|---------|---------|--------------|
| BP Microsystems<br>800-225-2102<br>www.bpmicro.com                | Yes      | Yes     | Yes     | Yes          |
| Data I/O<br>800-332-8246<br>www.data-io.com                       | No       | Yes     | Yes     | No           |
| Tribal Microsystems / HiLo<br>510-623-8859<br>www.tribalmicro.com | Yes      | Yes     | Yes     | Yes          |
| Stag Programmers<br>888-700-7824                                  | No       | No      | Yes     | No           |

## 3. Spread Spectrum FTGs (PREMIS™)

Cypress offers a selection of Spread Spectrum Frequency Timing Generators for general-purpose applications such as printers, fax machines, LCD displays, set-top boxes, games, copiers, and more. Cypress W18x products are standard devices that, in concept, inject the Spread Spectrum feature into a clocking signal. The resulting time-variable frequency output is nominally equal in frequency to the reference signal. Additional devices available provide some frequency multiplication capability in addition to providing the benefits of Spread Spectrum Timing.

Cypress Spread Spectrum Timing solutions provide the maximum EMI reduction on the market; two Cypress trademark terms (PREMIS™ and Spread Aware™) are broadly recognized devices in the industry; further evidence of Cypress's leadership in this market.

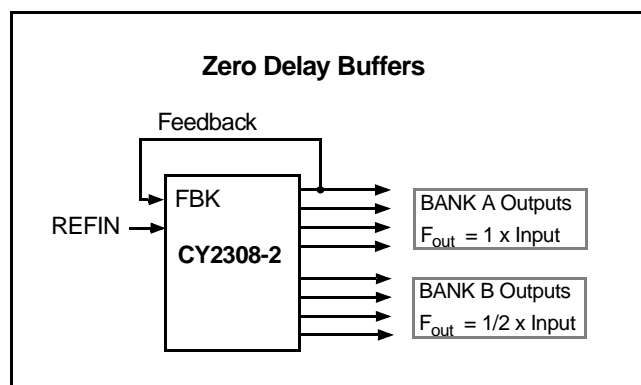


| Part Number    | Input Frequency | Output Frequency              | Modulation Width | # of outputs Spread/<br>Nonspread | Vdd     | Package           |
|----------------|-----------------|-------------------------------|------------------|-----------------------------------|---------|-------------------|
| FS781          | 6-82 MHz        | Input x1                      | 1-4%             | 1/0                               | 3.3/5.0 | 8 SOIC<br>8 TSSOP |
| FS782          | 6-82 MHz        | Input x2<br>(max 82)          | 1-4%             | 1/0                               | 3.3/5.0 | 8 SOIC<br>8 TSSOP |
| FS784          | 6-82 MHz        | Input x4<br>(max 82)          | 1-4%             | 1/0                               | 3.3/5.0 | 8 SOIC<br>8 TSSOP |
| FS786<br>FS787 | 6-82 MHz        | Input x1                      | 1-4%             | 1/1 (REF)                         | 3.3/5.0 | 8 SOIC            |
| FS791          | 80-140 MHz      | Input x1                      | 1-4%             | 1/0                               | 3.3/5.0 | 8 SOIC            |
| FS792          | 40-70 MHz       | Input x2                      | 1-4%             | 1/0                               | 3.3/5.0 | 8 SOIC            |
| FS794          | 20-35 MHz       | Input x4                      | 1-4%             | 1/0                               | 3.3/5.0 | 8 SOIC            |
| W530-02        | 14-166 MHz      | Input x0.25,<br>0.5, 1, 2, 4  | 1.25/2.5/5/10%   | 1/1 (REF)                         | 3.3/5.0 | 20 SSOP           |
| CY25245        | 14-166 MHz      | Input x0.25,<br>0.5, 1, 2, 4  | 1.25/2.5/5/10%   | 1/1 (REF)                         | 3.3/5.0 | 20 SSOP           |
| W532           | 15-120 MHz      | Input x0.25,<br>0.5, 1, 2, 4  | 1.25/2.5/5/10%   | 1/0                               | 3.3/5.0 | 16 SOIC           |
| SM560          | 25-112 MHz      | Input x1                      | 0.6 to 3.5%      | 1/0                               | 3.3     | 8 SOIC            |
| SM561          | 56-166 MHz      | Input x1                      | 0.6 to 3.5%      | 1/0                               | 3.3     | 8 SOIC            |
| SM562          | 56-200 MHz      | Input x1                      | 0.6 to 3.5%      | 1/0                               | 3.3     | 8 SOIC            |
| SM566          | 27-200 MHz      | Input x0.5, 1, 2<br>(max 200) | 0.5 to 3.5%      | 1/0                               | 3.3     | 16 SOIC           |
| W155           | 14.31818 MHz    | Selectable                    | -1.25/-3.75%     | 1/1 (USB)                         | 3.3/5.0 | 16 SOIC           |
| CY25568        | 4-32 MHz        | Input x1, 2, 4                | 0.5 to 3.0%      | 1/0                               | 3.3     | 8 SOIC            |
| CY25811        | 4-32 MHz        | Input x1                      | 0.5 to 3.0%      | 1/0                               | 3.3     | 8 SOIC            |
| CY25812        | 4-32 MHz        | Input x2                      | 0.5 to 3.0%      | 1/0                               | 3.3     | 8 SOIC            |
| CY25814        | 4-32 MHz        | Input x4                      | 0.5 to 3.0%      | 1/0                               | 3.3     | 8 SOIC            |

Note: Please contact a Cypress Representative for product availability.

## 4. Buffers: Zero Delay

Cypress Zero Delay Buffers accept a 5V or 3.3V timing signal input and provide multiple 3.3V outputs with low skew and zero delay between input and outputs. These FTGs are ideal for applications such as PCI buffering and SDRAM buffering, as well as high-end datacom and network clocking (Gigabit Ethernet, ATM, etc.). The standard family consists of four base devices: W194-70, CY2304, CY2305, CY2308, and CY2309, which provide 2, 4, 5, 8, and 9 outputs, respectively, and support up to 133-MHz frequencies. Within each CY base device there are several options or “dash-numbers” providing a total of nine separate devices. Outputs are split into two banks (Bank A and B) with individual power-down options. A feedback loop (external or internal) provides the additional option of frequency multiplication or division of the input signal on each bank.



| Part #        | # of Outputs | Feedback Type | Supply Voltage | Package  | Multiplication Ability | Output Enable | Spread Aware |
|---------------|--------------|---------------|----------------|----------|------------------------|---------------|--------------|
| CY2304-1, -2  | 4            | ext.          | 3.3V           | 8 SOIC   | x1, 2, 4               | No            | No           |
| CY2305, -1H   | 5            | int.          | 3.3V           | 8 SOIC   | No                     | Yes (2)       | No           |
| CY23S05, -1H  | 5            | int.          | 3.3V           | 8 SOIC   | No                     | Yes (2)       | Yes          |
| CY2308-1, 1H  | 8            | ext.          | 3.3V           | 16 SOIC  | No                     | Yes (2)       | No           |
| CY23S08-1, 1H | 8            | ext.          | 3.3V           | 16 SOIC  | No                     | Yes (2)       | Yes          |
| CY2308-2, 2H  | 8            | ext.          | 3.3V           | 16 SOIC  | /2, x1, 2              | Yes (2)       | No           |
| CY23S08-2, 2H | 8            | ext.          | 3.3V           | 16 SOIC  | /2, x1, 2              | Yes (2)       | Yes          |
| CY2308-3      | 8            | ext.          | 3.3V           | 16 SOIC  | x1, 2, 4               | Yes (2)       | No           |
| CY23S08-3     | 8            | ext.          | 3.3V           | 16 SOIC  | x1, 2, 4               | Yes (2)       | Yes          |
| CY2308-4      | 8            | ext.          | 3.3V           | 16 SOIC  | x2                     | Yes (2)       | No           |
| CY23S08-4     | 8            | ext.          | 3.3V           | 16 SOIC  | x2                     | Yes (2)       | Yes          |
| CY2308-5H     | 8            | ext.          | 3.3V           | 16 SOIC  | /2                     | Yes (2)       | No           |
| CY2309, -1H   | 9            | int.          | 3.3V           | 16 SOIC  | No                     | No            | No           |
| CY23S09, -1H  | 9            | int.          | 3.3V           | 16 SOIC  | No                     | No            | Yes          |
| CY23S02       | 2            | ext.          | 3.3 or 5.5V    | 8 SOIC   | /2, x1, 2, 4, 8, 16    | No            | Yes          |
| CY2302        | 2            | ext.          | 3.3 or 5.5V    | 8 SOIC   | /2, x1, 2, 4, 8, 16    | No            | No           |
| CY2509        | 10           | ext.          | 3.3V           | 24 TSSOP | No                     | Yes (2)       | Yes          |
| CY2510        | 11           | ext.          | 3.3V           | 24 TSSOP | No                     | Yes (1)       | Yes          |

A new and important consideration for zero delay buffers arises from the introduction and growing pervasiveness of an EMC technique called Spread Spectrum Timing. In designs where the main timing signal is coming from off the board, it is vital to design the board so that it is Spread Aware. If the board is not designed to be Spread Aware, then it may not work properly with companion products that use Spread Spectrum Timing for EMI reduction. Designers who use systems that generate their own main system signal are also well served by using Spread Aware Zero Delay Buffers. By doing so, they leave open the option of moving to Spread Spectrum timing to help solve EMI issues at some point in the future perhaps without relaying out the board. Designers that are already using Spread Spectrum Timing will find Spread Aware Zero Delay Buffers not only allow the system to maintain synchronization, but they also spread the peak EMI reduction benefit of the main signal to the entire system.

## 5. Programmable Skew/Zero Delay RoboClock® Family

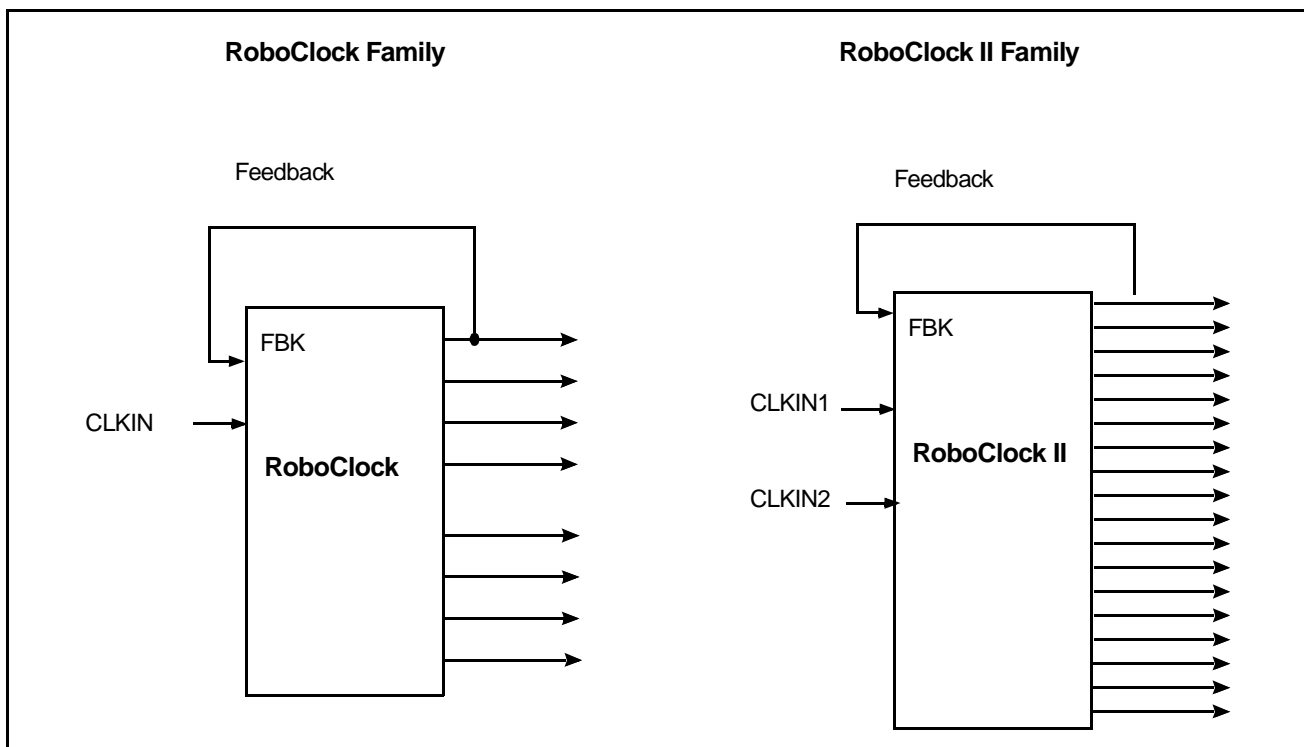
Cypress Programmable Skew Clock Buffers offer user-selectable skew control over clock functions. These multiple-output clock drivers provide the system integrator with functions necessary to optimize the timing of high-performance computer and network systems. The RoboClock® family offers:

### RoboClock I

- 5 & 3.3 Volts
- 8 outputs
- 3.75–110 MHz
- All output pair skew <100 ps typical
- Zero input to output delay
- 50% duty cycle
- Low operating current
- Selectable skew up to 18 ns
- Inverter and non-inverted outputs
- Operation at 1/2 and 1/4 the input frequency
- Operations at 2x and 4x the input frequency

### RoboClock II

- Dual Reference Clocks
- Dual-Differential (or single-ended) inputs
- Hot Insertion Capable
- Spread Aware
- 3.3 Volts
- 18 Three-Statable Outputs
- 12–185 MHz
- Zero input to output delay
- 50% duty cycle
- Low operating current
- Selectable skew up to 10 ns
- Inverter and non-inverted outputs
- Operation at 1/1–6, 1/8, 1/10, and 1/12 the input frequency
- Operations at 1–6x, 8x, 10x, and 12x the input frequency





## RoboClock Family

| Device                          | V   | #<br>Outputs | Output<br>Operation | Multiplication     | Division           | Programmable<br>Skew | Package  | t <sub>PD</sub><br>(ps) | t <sub>SKEW</sub><br>(ps) |
|---------------------------------|-----|--------------|---------------------|--------------------|--------------------|----------------------|----------|-------------------------|---------------------------|
| CY7B991V-2JC<br>(TTL)           | 3.3 | 8            | 3.75–80 MHz         | 1x, 2x, 4x         | /2, /4             | YES                  | 32 PLCC  | 250                     | 750                       |
| CY7B991V-5JC<br>(TTL)           | 3.3 | 8            | 3.75–80 MHz         | 1x, 2x, 4x         | /2, /4             | YES                  | 32 PLCC  | 500                     | 750                       |
| CY7B991V-5JI<br>(TTL)           | 3.3 | 8            | 3.75–80 MHz         | 1x, 2x, 4x         | /2, /4             | YES                  | 32 PLCC  | 500                     | 750                       |
| CY7B991V-7JC<br>(TTL)           | 3.3 | 8            | 3.75–80 MHz         | 1x, 2x, 4x         | /2, /4             | YES                  | 32 PLCC  | 700                     | 750                       |
| CY7B991-2JC<br>(TTL)            | 5   | 8            | 3.75–80 MHz         | 1x, 2x, 4x         | /2, /4             | YES                  | 32 PLCC  | 250                     | 750                       |
| CY7B991-5JC<br>(TTL)            | 5   | 8            | 3.75–80 MHz         | 1x, 2x, 4x         | /2, /4             | YES                  | 32 PLCC  | 500                     | 750                       |
| CY7B991-5JI (TTL)               | 5   | 8            | 3.75–80 MHz         | 1x, 2x, 4x         | /2, /4             | YES                  | 32 PLCC  | 500                     | 750                       |
| CY7B991-7JC<br>(TTL)            | 5   | 8            | 3.75–80 MHz         | 1x, 2x, 4x         | /2, /4             | YES                  | 32 PLCC  | 700                     | 750                       |
| CY7B992-2JC<br>(CMOS)           | 5   | 8            | 3.75–80 MHz         | 1x, 2x, 4x         | /2, /4             | YES                  | 32 PLCC  | 250                     | 750                       |
| CY7B992-5JC<br>(CMOS)           | 5   | 8            | 3.75–80 MHz         | 1x, 2x, 4x         | /2, /4             | YES                  | 32 PLCC  | 500                     | 750                       |
| CY7B992-5JI<br>(CMOS)           | 5   | 8            | 3.75–80 MHz         | 1x, 2x, 4x         | /2, /4             | YES                  | 32 PLCC  | 500                     | 750                       |
| CY7B992-7JC<br>(CMOS)           | 5   | 8            | 3.75–80 MHz         | 1x, 2x, 4x         | /2, /4             | YES                  | 32 PLCC  | 700                     | 750                       |
| CY7B9911-5JC<br>(TTL)           | 5   | 8            | 3.75–100 MHz        | 1x, 2x, 4x         | /2, /4             | YES                  | 32 PLCC  | 500                     | 750                       |
| CY7B9911-7JC<br>(TTL)           | 5   | 8            | 3.75–100 MHz        | 1x, 2x, 4x         | /2, /4             | YES                  | 32 PLCC  | 700                     | 750                       |
| CY7B9911V-5JC<br>(LVTTTL/TTL)   | 3.3 | 8            | 3.75–110 MHz        | 1x, 2x, 4x         | /2, /4             | YES                  | 32 PLCC  | 500                     | 750                       |
| CY7B9911V-7JC<br>(LVTTTL/TTL)   | 3.3 | 8            | 3.75–110 MHz        | 1x, 2x, 4x         | /2, /4             | YES                  | 32 PLCC  | 700                     | 750                       |
| CY7B9910/20-2SC<br>(TTL/CMOS)   | 5   | 8            | 3.75–80 MHz         | N/A                | N/A                | NO                   | 24 SOIC  | 250                     | 750                       |
| CY7B9910/20-5SC<br>(TTL/CMOS)   | 5   | 8            | 3.75–80 MHz         | N/A                | N/A                | NO                   | 24 SOIC  | 500                     | 750                       |
| CY7B9910/20-7SC<br>(TTL/CMOS)   | 5   | 8            | 3.75–80 MHz         | N/A                | N/A                | NO                   | 24 SOIC  | 700                     | 750                       |
| CY7B993V-5AC<br>(LVTTTL/LVPECL) | 3.3 | 18           | 12–100 MHz          | 1–6x, 8x, 10x, 12x | /1–6, /8, /10, /12 | YES                  | 100 TQFP | 500                     | 625                       |
| CY7B993V-5AI<br>(LVTTTL/LVPECL) | 3.3 | 18           | 12–100 MHz          | 1–6x, 8x, 10x, 12x | /1–6, /8, /10, /12 | YES                  | 100 TQFP | 500                     | 625                       |
| CY7B994V-5AC<br>(LVTTTL/LVPECL) | 3.3 | 18           | 24–185 MHz          | 1–6x, 8x, 10x, 12x | /1–6, /8, /10, /12 | YES                  | 100 TQFP | 500                     | 625                       |
| CY7B994V-5AI<br>(LVTTTL/LVPECL) | 3.3 | 18           | 24–185 MHz          | 1–6x, 8x, 10x, 12x | /1–6, /8, /10, /12 | YES                  | 100 TQFP | 500                     | 625                       |

Note: Please contact a Cypress Representative for product availability.



## 6. ComL™ Backplane Interface and Clock Management

The ComL™ series includes multiplexed-differential line drivers that provide redundant links for serial backplanes, three-state buffers and clock distribution buffers. The devices offer configurable inputs that match industry standard interfaces including LVCMOS, LVDS and complementary I/O signal pair. The LVDS output drivers are configurable to support standard drive (1.2 ns rise and fall times), and high drive (less than 500 ps rise and fall times).

Operating at data transfer rates up to 1.6 Gbps, and will boost the performance of a wide variety of systems including Internet routers, optical switches, workstations, servers, enterprise networks, central office equipment, and cellular base stations.

| Top Marking                              | Description                                  | Voltage (V <sub>DD</sub> ) | Input(s)     | Output(s) | Package      |
|--|--|----------------------------|--------------|-----------|--------------|
| <b>Clock Fanout and Distribution</b>     |  |                            |              |           |              |
| CY2CC810AZ                               | 1:10 Clock Fanout Buffer                     | 2.3 - 3.6V                 | LVCMOS       | LVCMOS    | 20 pin TSSOP |
| CY 2CC 810AO                             | 1:10 Clock Fanout Buffer                     | 2.3 - 3.6V                 | LVCMOS       | LVCMOS    | 20 pin SSOP  |
| CY2CC1810AZ                              | 1:10 Signal Fanout Buffer with Output Enable | 2.3 - 3.6V                 | LVCMOS       | LVCMOS    | 24 pin TSSOP |
| CY2CC1810AO                              | 1:10 Signal Fanout Buffer with Output Enable | 2.3 - 3.6V                 | LVCMOS       | LVCMOS    | 24 pin SSOP  |
| CY2DL814AZ                               | 1:4 Clock Fanout Buffer                      | 3.0 - 3.6V                 | Differential | LVDS      | 20 pin TSSOP |
| CY2DL814AO                               | 1:4 Clock Fanout Buffer                      | 3.0 - 3.6V                 | Differential | LVDS      | 20 pin SSOP  |
| CY2DP818AZ                               | 1:8 Clock Fanout Buffer                      | 3.0 - 3.6V                 | Differential | LVPECL    | 38 pin TSSOP |
| CY2DL818AZ                               | 1:8 Clock Fanout Buffer                      | 3.0 - 3.6V                 | Differential | LVDS      | 38 pinTSSOP  |
| <b>Source Synchronous Clock Buffers</b>  |  |                            |              |           |              |
| CY2DL8520AA                              | 20 Bit Buffer - Differential to LVDS         | 3.0 - 3.6V                 | Differential | LVDS      | BGA          |
| CY2LDT8520AA                             | 20 Bit Buffer - Differential to LVCMOS       | 3.0 - 3.6V                 | Differential | LVCMOS    | BGA          |
| <b>LVDS Cross Point Switch/Repeaters</b> |  |                            |              |           |              |
| CY2LL842AZ                               | 2x2 Switch/Mux LVDS Repeater                 | 3.0 - 3.6V                 | LVDS         | LVDS      | 16 pin TSSOP |
| CY2LL842AS                               | 2x2 Switch/Mux LVDS Repeater                 | 3.0 - 3.6V                 | LVDS         | LVDS      | 16 pin SOIC  |
| CY2LL842BAZ                              | LL842 High Drive Version                     | 3.0 - 3.6V                 | LVDS         | LVDS      | 16 pin TSSOP |
| CY2LL842BAS                              | LL842 High Drive Version                     | 3.0 - 3.6V                 | LVDS         | LVDS      | 16 pin SOIC  |
| CY2LL8422AZ                              | Dual 2x2 Switch/Mux LVDS Repeater            | 3.0 - 3.6V                 | LVDS         | LVDS      | 28 pin TSSOP |
| CY2LL8422AS                              | Dual 2x2 Switch/Mux LVDS Repeater            | 3.0 - 3.6V                 | LVDS         | LVDS      | 28 pin SOIC  |
| CY2LL8422ABA                             | Dual 2x2 Switch/Mux LVDS Repeater            | 3.0 - 3.6V                 | LVDS         | LVDS      | uBGA         |
| CY2LL8422BABZ                            | LL8422 High Drive Version                    | 3.0 - 3.6V                 | LVDS         | LVDS      | 28 pin TSSOP |
| CY2LL8422BAS                             | LL8422 High Drive Version                    | 3.0 - 3.6V                 | LVDS         | LVDS      | 28 pin SOIC  |
| CY2LL8422BABA                            | LL8422 High Drive Version                    | 3.0 - 3.6V                 | LVDS         | LVDS      | LFBGA        |

## Wireless RF Products

### Dual-PLL Frequency Synthesizers

| Part Number | Cross Ref.* | PLL1 Frequency (GHz) | Prescaler Divide Ratio | PLL2 Frequency (GHz) | Prescaler Divide Ratio | I <sub>CP</sub> (mA) | I <sub>CC</sub> (mA) | V <sub>CC</sub> (V) | Package                            |
|-------------|-------------|----------------------|------------------------|----------------------|------------------------|----------------------|----------------------|---------------------|------------------------------------|
| CYW3335     | Sole Source | 2.5 GHz              | 32/33<br>64/65         | 2.5 GHz              | 32/33<br>64/65         | 1/3.8                | 14                   | 2.7<br>5.5          | TSSOP – 20<br>MLF – 20             |
| CYW2338     | LMX2336     | 2.5 GHz              | 64/65<br>128/129       | 1.1 GHz              | 64/65<br>128/129       | 1/3.8                | 11                   | 2.7<br>5.5          | TSSOP – 20<br>MLF – 20<br>CSP – 24 |
| CYW2330     | LMX2330     | 2.5 GHz              | 32/33<br>64/65         | 600 MHz              | 8/9<br>16/17           | 1/3.8                | 9                    | 2.7<br>5.5          | TSSOP – 20<br>MLF – 20<br>CSP – 24 |
| CYW2331     | LMX2331     | 2.0 GHz              | 64/65<br>128/129       | 600 MHz              | 8/9<br>16/17           | 1/3.8                | 8                    | 2.7<br>5.5          | TSSOP – 20<br>MLF – 20<br>CSP – 24 |
| CYW2332     | LMX2332     | 1.2 GHz              | 64/65<br>128/129       | 600 MHz              | 8/9<br>16/17           | 1/3.8                | 6                    | 2.7<br>5.5          | TSSOP – 20<br>MLF – 20<br>CSP – 24 |

\* 2<sup>nd</sup> source to National's PLLatinum Series Dual-PLL LMX233Xs.

### Single-PLL Frequency Synthesizers

| Part Number | Cross Ref.* | PLL1 Frequency (GHz) | Prescaler Divide Ratio | I <sub>CP</sub> (mA) | I <sub>CC</sub> (mA) | V <sub>CC</sub> (V) | Package                |
|-------------|-------------|----------------------|------------------------|----------------------|----------------------|---------------------|------------------------|
| CYW2325     | LMX2325     | 2.5 GHz              | 32/33<br>64/65         | 3.7                  | 8                    | 2.7<br>5.5          | TSSOP – 20<br>MLF – 20 |
| CYW2320     | LMX2320     | 2.0 GHz              | 64/65<br>128/129       | 3.7                  | 7                    | 2.7<br>5.5          | TSSOP – 20<br>MLF – 20 |
| CYW2315     | LMX2315     | 1.2 GHz              | 64/65 128/129          | 3.7                  | 4.5                  | 2.7<br>5.5          | TSSOP – 20<br>MLF – 20 |

Note: Please contact a Cypress Representative for product availability.

## USB Microcontroller Family

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 (up to 1.5 Mb/s signaling rate), Full-Speed USB Applications (up to 12 Mb/s), and USB Hub Applications. Two unique microcontroller architectures have been developed by Cypress that will give peripheral developers the freedom and flexibility to choose the solution that best fits their needs.

Take our highly flexible family of custom 8-bit RISC microcontrollers (*M8 Series*) that have been optimized from the ground up for USB applications. Human Interface Device (HID) applications such as mice, keyboards, and joysticks can take advantage of this cost-effective, EPROM based product family. But because they are fully programmable, the *M8 Series* is also suited for special-purpose control and other low data rate applications.

Cypress's EZ-USB® family of full-speed USB microcontrollers feature an enhanced 8051 core running at 24 MHz, and a RAM-based architecture, enabling the download of firmware from the host PC. The EZ-USB family supports high-bandwidth applications by providing the maximum number of endpoints allowed by the USB specification, as well as an efficient mechanism to move data on or off chip. For data intensive applications like modems, scanners, printers, and cameras, the EZ-USB family is the premier solution.

For even higher performance full-speed USB applications, Cypress has released the EZ-USB *FX™* family. Based on the same architecture that has made the EZ-USB family so successful, the *FX* family (which stands for Faster and Xtended) implements an 8051 core that runs at 48 MHz, a 16-bit external datapath supported by on-chip FIFOs, as well as a DMA engine. The *FX* family is the highest performance full-speed USB solution available—until high-speed USB comes on line next year with USB 2.0 (with signaling rates up to 480 Mb/second)! The EZ-USB and EZ-USB *FX* families offer software compatibility, and EZ-USB *FX* provides an excellent migration path to USB 2.0 for your customers. The I/O side is already capable of the high-speed signaling rates.

Cypress also offers a full line of USB hub solutions. Based on the highly optimized *M8* architecture, Cypress's USB hub family includes 4-port and 7-port standalone hub solutions, as well as integrated 4-port hub solutions, allowing designers to implement a full-speed USB peripheral and 4-port hub using a single chip.

All Cypress USB family members are supported by one of our comprehensive Development Kits. These kits are the fast track to developing firmware and driver software for USB peripherals. Examples complete with source code are included to provide the designer with fast time to market.

### Cypress M8™ Series

- Industry's smallest 8-bit RISC microcontroller core
- Integrated 128/256 bytes SRAM
- Integrated 2/4/6/8 Kbytes EPROM
- Optimized USB instruction set (34 instructions)
- 10–40 General Purpose I/Os
- USB 1.1 Compliant

### EZ-USB® and EZ-USB FX™ Series

- High-Performance I/O port
- RAM Architecture—4/8 Kbytes
- Enhanced 8051 Core
- Pin and Software Compatible Family
- I<sup>2</sup>C Controller
- USB 1.1 Compliant

## Low-Speed USB Microcontrollers

| Part Number | Core | Endpoints | RAM(Bytes) | EPROM(KB) | #I/Os | Package                  |
|-------------|------|-----------|------------|-----------|-------|--------------------------|
| CY7C63000A  | M8   | 2         | 128        | 2         | 12    | 20-pin PDIP/SOIC         |
| CY7C63001A  | M8   | 2         | 128        | 4         | 12    | 20-pin PDIP/SOIC         |
| CY7C63100A  | M8   | 2         | 128        | 2         | 16    | 24-pin SOIC              |
| CY7C63101A  | M8   | 2         | 128        | 4         | 16    | 24-pin QSOP/SOIC         |
| CY7C63411   | M8   | 3         | 256        | 4         | 32    | 40-pin PDIP, 48-pin SSOP |
| CY7C63412   | M8   | 3         | 256        | 6         | 32    | 40-pin PDIP, 48-pin SSOP |
| CY7C63413   | M8   | 3         | 256        | 8         | 32    | 40-pin PDIP, 48-pin SSOP |
| CY7C63511   | M8   | 3         | 256        | 4         | 40    | 48-pin SSOP              |
| CY7C63512   | M8   | 3         | 256        | 6         | 40    | 48-pin SSOP              |
| CY7C63513   | M8   | 3         | 256        | 8         | 40    | 48-pin SSOP              |
| CY7C63612   | M8   | 3         | 256        | 6         | 16    | 28-pin SOIC              |
| CY7C63613   | M8   | 3         | 256        | 8         | 16    | 28-pin SOIC              |

Note: Please contact a Cypress Representative for product availability.

## EZ-USB® Full-Speed USB Microcontrollers

| Part Number | Core          | RAM Size | EPROM Size | Isochronous Support | # I/Os | Package     |
|-------------|---------------|----------|------------|---------------------|--------|-------------|
| AN2121SC    | Enhanced 8051 | 4 Kbyte  | N/A        | Yes                 | 16     | 44-pin PQFP |
| AN2122SC    | Enhanced 8051 | 4 Kbyte  | N/A        | No                  | 16     | 44-pin PQFP |
| AN2122TC    | Enhanced 8051 | 4 Kbyte  | N/A        | No                  | 19     | 48-pin TQFP |
| AN2125SC    | Enhanced 8051 | 4 Kbyte  | N/A        | Yes                 | 8      | 44-pin PQFP |
| AN2126SC    | Enhanced 8051 | 4 Kbyte  | N/A        | No                  | 8      | 44-pin PQFP |
| AN2126TC    | Enhanced 8051 | 4 Kbyte  | N/A        | No                  | 11     | 48-pin TQFP |
| AN2131SC    | Enhanced 8051 | 8 Kbyte  | N/A        | Yes                 | 16     | 44 pin PQFP |
| AN2135SC    | Enhanced 8051 | 8 Kbyte  | N/A        | Yes                 | 8      | 44 pin PQFP |
| AN2136SC    | Enhanced 8051 | 8 Kbyte  | N/A        | No                  | 8      | 44-pin PQFP |
| AN2131QC    | Enhanced 8051 | 8 Kbyte  | N/A        | Yes                 | 24     | 80-pin PQFP |

## EZ-USB FX™ Full-Speed USB Microcontrollers

| Part Number     | Core          | RAM Size | EPROM Size | Isochronous Support | # I/Os | Package      |
|-----------------|---------------|----------|------------|---------------------|--------|--------------|
| CY7C64601-52NC  | Enhanced 8051 | 4 Kbyte  | N/A        | No                  | 16     | 52-pin PQFP  |
| CY7C64603-52NC  | Enhanced 8051 | 8 Kbyte  | N/A        | No                  | 16     | 52-pin PQFP  |
| CY7C64613-52NC  | Enhanced 8051 | 8 Kbyte  | N/A        | Yes                 | 16     | 52-pin PQFP  |
| CY7C64603-80NC  | Enhanced 8051 | 8 Kbyte  | N/A        | No                  | 32     | 80-pin PQFP  |
| CY7C64613-80NC  | Enhanced 8051 | 8 Kbyte  | N/A        | Yes                 | 32     | 80-pin PQFP  |
| CY7C64603-128NC | Enhanced 8051 | 8 Kbyte  | N/A        | No                  | 40     | 128-pin PQFP |
| CY7C64613-128NC | Enhanced 8051 | 8 Kbyte  | N/A        | Yes                 | 40     | 128-pin PQFP |

## Medium Performance Full-Speed M8 USB Microcontrollers

| Part Number | Core | RAM Size  | EPROM Size | Isochronous Support | # I/Os | Package     |
|-------------|------|-----------|------------|---------------------|--------|-------------|
| CY7C64013   | M8   | 256 bytes | 8 Kbytes   | Yes                 | 19     | 28-pin SOIC |
| CY7C64113   | M8   | 256 bytes | 8 Kbytes   | Yes                 | 36     | 48-pin SSOP |

## USB Hub and Integrated Hub Solutions

| Part Number | Core | EPROM Size | # Hub Ports | Full-Speed Peripheral | Package          |
|-------------|------|------------|-------------|-----------------------|------------------|
| CY7C65013   | M8   | 8 Kbytes   | 7           | No                    | 48-pin SSOP      |
| CY7C65113   | M8   | 8 Kbytes   | 4           | No                    | 28-pin SOIC      |
| CY7C66013   | M8   | 8 Kbytes   | 4           | Yes                   | 48-pin PDIP/SSOP |
| CY7C66113   | M8   | 8 Kbytes   | 4           | Yes                   | 56-pin SSOP      |

## USB Development Tools

| Part Number   | Description   | CY Parts Supported                |
|---------------|---|-----------------------------------|
| CY3650        | Low-Speed, Low I/O Emulator Board (1.5 Mbps)          | CY7C630xxA, CY7C631xxA            |
| CY3651        | Low-Speed, High and Low I/O Emulator Board (1.5 Mbps) | CY7C634xx, CY7C635xx, CY7C636xx   |
| CY3652C       | Full-Speed Emulator Board                             | CY7C640/1xx, CY7C65xxx, CY7C66xxx |
| AN2131-DK001  | EZ-USB Development                                    | EZ-USB Series (AN21xx)            |
| CY3671        | Full-Speed Development Board                          | EZ-USB FX Series (CY7C646xx)      |
| CY3660R100-CC | C-Compiler (Windows Version)                          | Cypress M8 Series (CY7C6xxxx)     |
| CY3661R100-CC | C-Compiler (DOS Version)                              | Cypress M8 Series (CY7C6xxxx)     |

Note: Please contact a Cypress Representative for product availability.

## USB Programming Tools

| Device Part Number | Package | Needed For Programming          |             |             |
|--------------------|---------|---------------------------------|-------------|-------------|
|                    |         | Hi-Lo Programmer <sup>[2]</sup> | Adapter     | Matrix Card |
| CY7C63000A-PC      | PDIP    | CY3649-xxxV                     | Not Needed  | Not Needed  |
| CY7C63000A-SC      | SOIC    | CY3649-xxxV                     | See Note 3  | Not Needed  |
| CY7C63001A-PC      | PDIP    | CY3649-xxxV                     | Not Needed  | Not Needed  |
| CY7C63001A-SC      | SOIC    | CY3649-xxxV                     | See Note 3  | Not Needed  |
| CY7C63100A-SC      | SOIC    | CY3649-xxxV                     | See Note 3  | Not Needed  |
| CY7C63101A-SC      | SOIC    | CY3649-xxxV                     | See Note 3  | Not Needed  |
| CY7C63101A-QC      | QSOP    | CY3649-xxxV                     | See Note 4  | Not Needed  |
| CY7C63411-PC       | PDIP    | CY3649-xxxV                     | CY3083-DP48 | CY3083-01   |
| CY7C63411-PVC      | SSOP    | CY3649-xxxV                     | CY3083-SS56 | CY3083-01   |
| CY7C63412-PC       | PDIP    | CY3649-xxxV                     | CY3083-DP48 | CY3083-01   |
| CY7C63412-PVC      | SSOP    | CY3649-xxxV                     | CY3083-SS56 | CY3083-01   |
| CY7C63413-PC       | PDIP    | CY3649-xxxV                     | CY3083-DP48 | CY3083-01   |
| CY7C63413-PVC      | SSOP    | CY3649-xxxV                     | CY3083-SS56 | CY3083-01   |
| CY7C63511-PVC      | SSOP    | CY3649-xxxV                     | CY3083-SS56 | CY3083-01   |
| CY7C63512-PVC      | SSOP    | CY3649-xxxV                     | CY3083-SS56 | CY3083-01   |
| CY7C63513-PVC      | SSOP    | CY3649-xxxV                     | CY3083-SS56 | CY3083-01   |
| CY7C63612-SC       | SOIC    | CY3649-xxxV                     | CY3083-SC28 | CY3083-06   |
| CY7C63613-SC       | SOIC    | CY3649-xxxV                     | CY3083-SC28 | CY3083-06   |
| CY7C64013-PC       | PDIP    | CY3649-xxxV                     | CY3083-DP48 | CY3083-02   |
| CY7C64013-SC       | SOIC    | CY3649-xxxV                     | CY3083-SC28 | CY3083-02   |
| CY7C64113-PVC      | SSOP    | CY3649-xxxV                     | CY3083-SS56 | CY3083-03   |
| CY7C65013-PVC      | SSOP    | CY3649-xxxV                     | CY3083-SS56 | CY3083-03   |
| CY7C65113-SC       | SOIC    | CY3649-xxxV                     | CY3083-SC28 | CY3083-04   |
| CY7C66013-PC       | PDIP    | CY3649-xxxV                     | CY3083-DP48 | CY3083-04   |
| CY7C66013-PVC      | SSOP    | CY3649-xxxV                     | CY3083-SS56 | CY3083-04   |
| CY7C66113-PVC      | SSOP    | CY3649-xxxV                     | CY3083-SS56 | CY3083-05   |

### Notes:

- The Hi-Lo programmer can be ordered for 110V support (CY3649-110V) or 220V support (CY3649-220V).
- An SOIC-to-DIP flow-through adapter (p/n AS-28-28-03S-6-GANG) is available from Emulation Technologies ([www.emulation.com](http://www.emulation.com)). You can contact Emulation Technologies by calling 1-800-ADAPTER.
- A QSOP-to-DIP flow-through adapter (p/n 130-5304-06) is available from Emulation Solutions ([www.adapter.com](http://www.adapter.com)).

## Neuron® Chip Family

Neuron Chips are sophisticated VLSI devices that make it possible to implement low-cost control networking applications. They provide all the key functions necessary to intelligently process inputs from sensors, control actuator devices, and propagate control information across a variety of networking media such as twisted pair, power line, fiber optics and RF. The Neuron Chip provides support for all layers of the LonTalk® control networking protocol, which has been approved as an open industry standard by the American National Standards Institute as ANSI/EIA 709.1-A-1999.

Control networks using Neuron Chips are used in a wide variety of applications in areas such as building automation, industrial control, and transportation systems. These include HVAC, lighting control, access control, fire and security monitoring, machine control, food industry applications, electrical metering and utility automation, home automation, domestic appliances, scientific and medical instrumentation, semiconductor processing equipment, fuel monitoring and distribution, aircraft flight control, train braking, door control and signage, and entertainment applications.

The most cost-sensitive applications use the CY7C53120 family of Neuron Chips, which include all memory resources on-chip. Applications that require more memory use the CY7C53150 Neuron Chip, which includes an off-chip bus for external memory. Both models of Neuron Chip feature an 8-bit application processor with flexible I/O options. Applications that require more processing or I/O capability can use the Neuron Chip as a communications co-processor to a more powerful host, via a high-speed parallel interface.

Cypress offers a line of high performance low cost Neuron Chips that are compatible with legacy designs, with improved performance and expanded internal memory configuration options. The CY7C53150 is drop-in compatible with both the MC143150 and TMPN3150 devices, and can operate at twice the input clock rate. The CY7C53120E2 is the only Neuron Chip that is drop-in compatible with the discontinued MC143120E2, since it contains the identical firmware in the on-board ROM. Compared to the MC143120E2, the CY7C53120E4 operates at four times the input clock, with twice the EEPROM memory for user program storage.

Software for the Neuron Chip application processor is developed using the Neuron C programming language, which is based on ANSI C with extensions for embedded I/O, multi-tasking, and network communications. Development tool software and hardware, physical layer transceivers, and network infrastructure components are available from Echelon Corporation (<http://www.echelon.com>) and other vendors.

### Neuron Chip Features

- Three 8-bit pipelined processors for concurrent processing of application code and network communications
- 11-pin I/O port programmable in 34 modes for easy application program development
- Two 16-bit timer/counters for flexible input and output of time and frequency related waveforms
- 5-pin communication port supporting direct mode and special purpose PHY transceiver interfaces
- 5.0V operation over a -40 to +85°C temperature range
- 2,048 bytes of on-chip SRAM for buffering network traffic, and system and application temporary storage

- EEPROM memory with on-chip charge pump for in-circuit-programmable non-volatile storage of configuration data and application code

### CY7C53120 Features

- On-board ROM containing LonTalk network protocol and operating system firmware
- 32-pin SOIC or 44-pin TQFP package

### CY7C53150 Features

- Off-chip memory bus for up to 58KB of external flash, EPROM, or SRAM. 16KB of external memory is reserved for the LonTalk network protocol firmware
- 64-pin TQFP package

## Neuron® Chip Selector Guide

| Part Number      | ROM  | Firmware Version | SRAM | EEPROM | Max. Input Clock | Package     |
|------------------|------|------------------|------|--------|------------------|-------------|
| CY7C53150-20AI   | 0KB* | N/A*             | 2KB  | 3KB    | 20 MHz           | 64-pin TQFP |
| CY7C53120E2-10SI | 10KB | 6                | 2KB  | 2KB    | 10 MHz           | 32-pin SOIC |
| CY7C53120E2-10AI | 10KB | 6                | 2KB  | 2KB    | 10 MHz           | 44-pin TQFP |
| CY7C53120E4-40SI | 12KB | 12               | 2KB  | 4KB    | 40 MHz           | 32-pin SOIC |
| CY7C53120E4-40AI | 12KB | 12               | 2KB  | 4KB    | 40 MHz           | 44-pin TQFP |

\* Firmware for the CY7C53150 is stored in off-board flash or EPROM memory.

Neuron, Echelon, and LonTalk are registered trademarks of Echelon Corporation.



## Cypress MicroSystems: Programmable System-on-Chip™ (PSoC™) Microcontrollers

Every electronics designer is faced with multiple constraints in the systems they create. The system has targets for features, reliability and cost that must be met before the resulting product can be successful. Microcontroller based systems, particularly those based on 8-bit microcontrollers, are usually sold in very cost competitive markets, and therefore the designers of these systems are faced with strong pressure to keep costs low. One way to achieve this goal is to purchase a microcontroller that has just the right features, "the perfect fit", for the application. The designer can optimize their design because they are only paying for the features they need on the microcontroller, and not paying for features they will not need. There is also a big benefit to having a highly integrated solution, with minimal components external to the microcontroller. Microcontroller vendors have responded to this need by creating large families of devices, some of which contain hundreds of different parts. Each of the parts within a family is differentiated by the type and number of peripherals (i.e. timers, counters, ADCs, etc) that it has. The goal of each of these individual part types is to perfectly match the needs of a small segment of the market, and do this at an attractive price. The goal of the family is to have a diverse set of parts so that a designer can develop with one part in the family, and migrate to other members in the family as system requirements change. Even with hundreds of choices, designers are often faced with the problem that the perfect fit is not available.

Cypress MicroSystems is creating a new class of microcontroller to address this exact problem. These devices, known as the Programmable System-on-Chip™ (PSoC™) microcontrollers, have programmable blocks of digital logic and programmable blocks of analog logic. These blocks, known as PSoC blocks, are designed so that they can be configured into a wide range of digital and analog peripherals. The designer also has the option to dynamically reconfigure the blocks during operation to make greater use of the on-chip resources.

### PSoC Microcontroller Features

- Based on the Cypress Semiconductor M8C microcontroller core. In this implementation, the processor runs at 24 MHz for a 4 MIP instruction throughput rate.
- The memory space for user code is Flash based.
- Four individual part types
- Each part type has eight digital PSoC blocks, and twelve analog PSoC blocks.
- All devices in the family are implemented using Cypress SONOS Flash program memory.

The entire development cycle is changed when designing with the PSoC microcontroller. For traditional microcontrollers, the first step in the development process was to laboriously read specifications on all the available microcontrollers in a family, and pick the one that was the closest match to the system requirements. From that point onward, it is difficult to incorporate new features because of the fixed peripherals on that device. In the case of a design using the PSoC microcontroller, the system architecture and the peripheral set can be developed concurrently, giving much more flexibility for feature enhancement.

### PSoC Microcontroller Development Tools

The development tools are designed to assist the customer in utilizing the flexibility of the devices. The PSoC Designer Integrated Development Environment software allows the designer to browse and pick "User Modules" (pre-defined configurations of analog and digital blocks to perform peripheral functions). The designer can also select the interconnections between the user modules. The software even allows the designer to select the interconnections between internal signals and pins on the device. Cypress MicroSystems has also created a full function In-Circuit Emulator, known as the PSoC ICE™ development tool. This unit, which will have individual emulation pods for the different devices in the family, is designed to be a high functionality, low cost hardware development tool. It includes a fully featured debugger and allows the designer to step through application code, set breakpoints and define watch variables from the graphical user interface of the PSoC Designer software. The ICE development tool also has trace capability, and can do single site programming for engineering evaluation.

### Development Tools Features

- PSoC Designer Integrated Development Environment software allows the designer to browse and pick "User Modules" (pre-defined configurations of analog and digital blocks to perform peripheral functions).
- The DIDE also allows the designer to select the interconnections between the user modules as well as interconnections between internal signals and pins on the device.
- The In-Circuit Emulator, known as the PSoC ICE™ development tool, includes individual emulation pods for the different devices in the family.
- The PSoC ICE development tool has a fully featured debugger and allows the designer to step through application code, set breakpoints and define watch variables from the graphical user interface of PSoC Designer.
- The PSoC ICE development tool has trace capability and can do single site programming for engineering evaluation.

The benefits of these devices are multiple. First, and most importantly, they allow the designer to tailor the microcontroller perfectly to the application, instead of being forced to adapt the application to a microcontroller that is less than optimal. This solution will also reduce the number of components in the designer's system, leading to cost savings. The designer has the flexibility to change the user modules during the development process, to meet changing system requirements, or to modify the system implementation.

## PSoC Microcontroller Selector Guides

| Part Number    | Flash<br>(Kbytes) | RAM (Bytes) | Analog PSoC<br>Blocks | Digital PSoC<br>Blocks | I/Os |
|----------------|-------------------|-------------|-----------------------|------------------------|------|
| CY8C25122-24PI | 4                 | 128         | 12                    | 8                      | 6    |
| CY8C26233-24PI | 8                 | 256         | 12                    | 8                      | 16   |
| CY8C26233      | 8                 | 256         | 12                    | 8                      | 16   |
| CY8C26233      | 8                 | 256         | 12                    | 8                      | 16   |
| CY8C26233      | 8                 | 256         | 12                    | 8                      | 16   |
| CY8C26233      | 8                 | 256         | 12                    | 8                      | 16   |
| CY8C26443      | 16                | 256         | 12                    | 8                      | 24   |
| CY8C26443      | 16                | 256         | 12                    | 8                      | 24   |
| CY8C26443      | 16                | 256         | 12                    | 8                      | 24   |
| CY8C26443      | 16                | 256         | 12                    | 8                      | 24   |
| CY8C26443      | 16                | 256         | 12                    | 8                      | 24   |
| CY8C26443      | 16                | 256         | 12                    | 8                      | 24   |
| CY8C26643      | 16                | 256         | 12                    | 8                      | 44   |
| CY8C26643      | 16                | 256         | 12                    | 8                      | 44   |
| CY8C26643      | 16                | 256         | 12                    | 8                      | 44   |
| CY8C26643      | 16                | 256         | 12                    | 8                      | 40   |

Note: Please contact a Cypress Representative for product availability.



## Package Code:

|   |  |                          |
|---|--|--------------------------|
| A=Thin Quad Flat Pack (TQFP)                | Q=Windowed LCC                               | HD=Hermetic DIP (Module) |
| AS=Small Thin Quad Plastic Flatpack (STQFP) | Q=QSOP                                       | HG=Ceramic PGA (Module)  |
| B=Plastic Pin Grid Array                    | R=Windowed PGA                               | PA=TSSOP                 |
| BA=Fine Pitch Ball Grid Array               | S=SOIC                                       | PD=Plastic DIP (Module)  |
| BB=Thin Ball Grid Array                     | SN=Narrow SOIC                               | PM=Plastic SIMM          |
| BG=Ball Grid Array                          | T=Windowed Cerpack                           | PN=Plastic Angled SIMM   |
| D=CerDIP                                    | U=Ceramic Quad Flatpack                      | PS=Plastic SIP           |
| E=Tape Automated Bond (TAB)                 | V=SOJ  | PV=SSOP                  |
| F=Flatpack                                  | W=Windowed Cerdip                            | PZ=Plastic ZIP           |
| FJ=Ceramic SOJ                              | X=DICE                                       | SO=SOIC                  |
| G=Pin Grid Array (PGA)                      | Y=Ceramic LCC                                |                          |
| H=Windowed Hermetic LCC                     | Z=Thin Small Outline Package (TSOP)          |                          |
| J=PLCC                                      | ZA=Shrunk Thin Small Outline Package (STSOP) |                          |
| K=Cerpack                                   | ZR=Reverse TSOP                              |                          |
| L=Leadless Chip Carrier (LCC)               | ZS=TSOP, Type II                             |                          |
| N=Plastic Quad Flatpack                     |  |                          |
| P=Plastic DIP                               |  |                          |

## Notes:

Military temperature range (–55°C to +125°C) product processed to MIL-STD-883 Revision C is also available for most products. Speed and power selections may vary from those above. Contact your local sales office for more information.

Commercial grade product is available in plastic, CerDIP, or LCC. Military grade product is available in CerDIP, LCC, or PGA.

Power supplies for most product lines are  $V_{CC} = 5V \pm 10\%$ .

22S, 24S, 28S stands for 300 mil. 22-pin, 24-pin, 28-pin, respectively. 28.4 stands for 28-pin 400 mil, 24.4 stands for 24-pin 400 mil.

PLCC, SOJ, and SOIC packages are available on some products.

F, K, and T packages are special order only.

Please contact a Cypress representative for product availability.