



Welcome to [E-XFL.COM](https://www.e-xfl.com)

### Understanding [Embedded - FPGAs \(Field Programmable Gate Array\)](#)

Embedded - FPGAs, or Field Programmable Gate Arrays, are advanced integrated circuits that offer unparalleled flexibility and performance for digital systems. Unlike traditional fixed-function logic devices, FPGAs can be programmed and reprogrammed to execute a wide array of logical operations, enabling customized functionality tailored to specific applications. This reprogrammability allows developers to iterate designs quickly and implement complex functions without the need for custom hardware.

### Applications of Embedded - FPGAs

The versatility of Embedded - FPGAs makes them indispensable in numerous fields. In telecommunications.

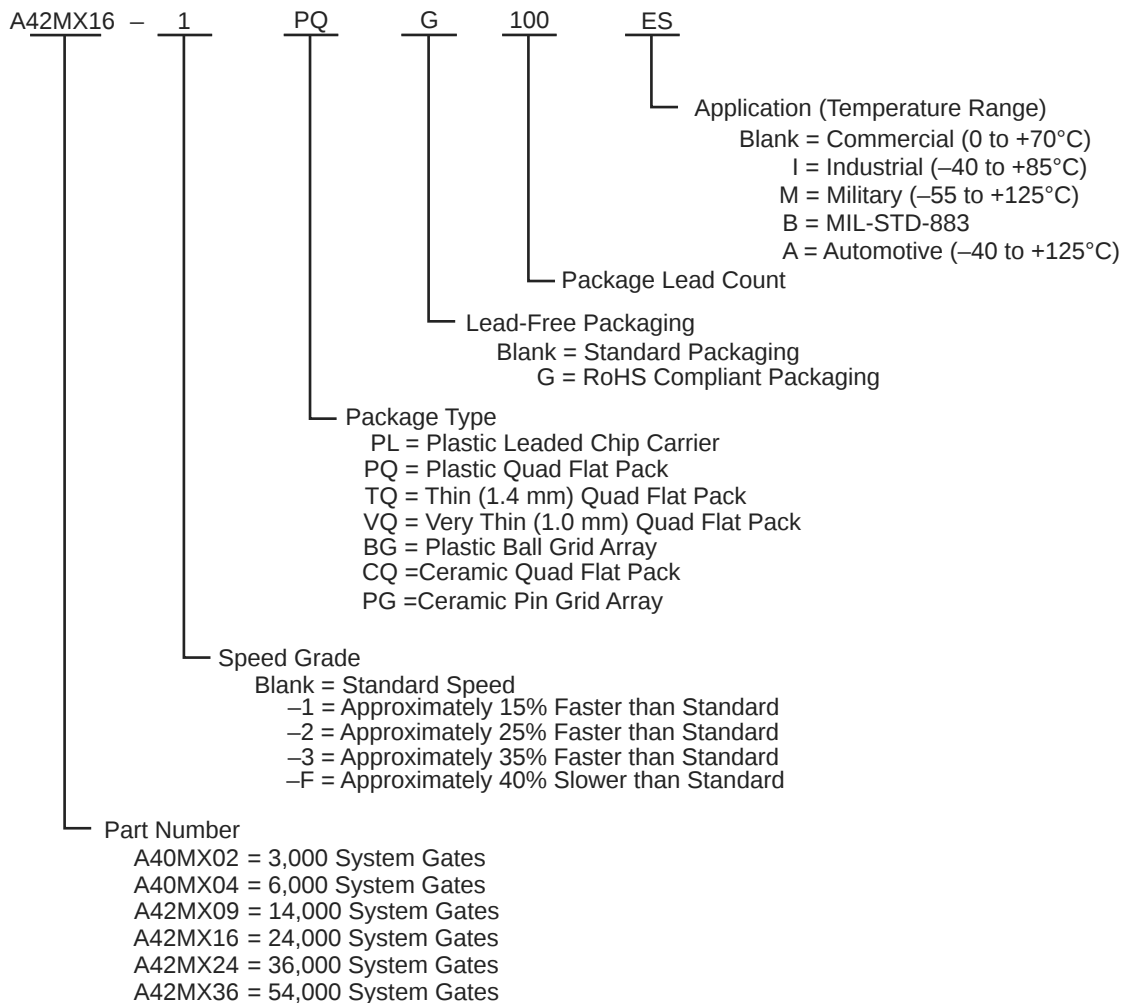
#### Details

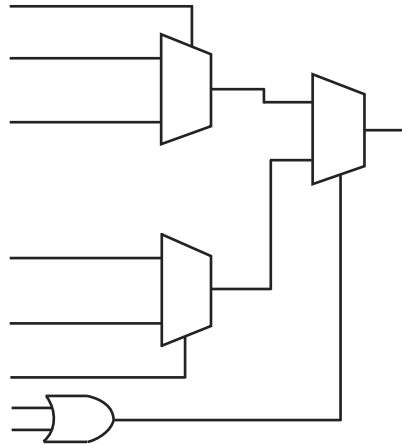
|                                |                                                                                                                                                                 |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Status                 | Active                                                                                                                                                          |
| Number of LABs/CLBs            | -                                                                                                                                                               |
| Number of Logic Elements/Cells | -                                                                                                                                                               |
| Total RAM Bits                 | -                                                                                                                                                               |
| Number of I/O                  | 72                                                                                                                                                              |
| Number of Gates                | 36000                                                                                                                                                           |
| Voltage - Supply               | 3V ~ 3.6V, 4.75V ~ 5.25V                                                                                                                                        |
| Mounting Type                  | Surface Mount                                                                                                                                                   |
| Operating Temperature          | 0°C ~ 70°C (TA)                                                                                                                                                 |
| Package / Case                 | 84-LCC (J-Lead)                                                                                                                                                 |
| Supplier Device Package        | 84-PLCC (29.31x29.31)                                                                                                                                           |
| Purchase URL                   | <a href="https://www.e-xfl.com/product-detail/microchip-technology/a42mx24-3plg84">https://www.e-xfl.com/product-detail/microchip-technology/a42mx24-3plg84</a> |

## 2.3 Ordering Information

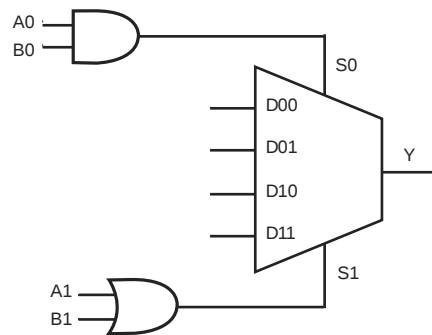
The following figure shows ordering information. All the following tables show plastic and ceramic device resources, temperature and speed grade offerings.

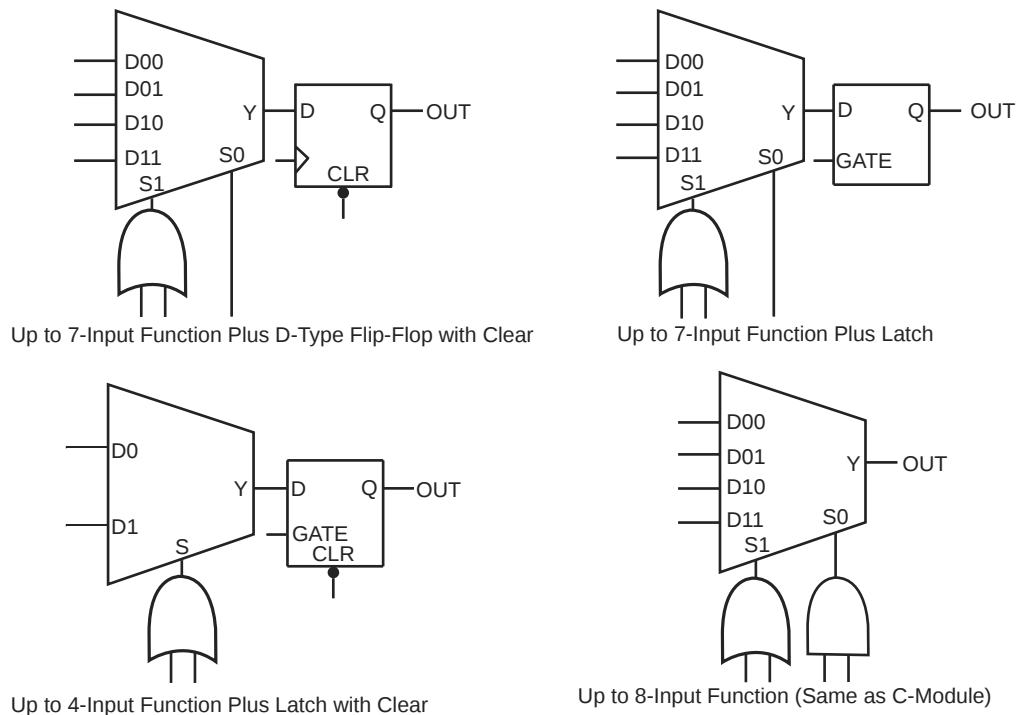
**Figure 1 • Ordering Information**



**Figure 2 • 42MX C-Module Implementation**

The 42MX devices contain three types of logic modules: combinatorial (C-modules), sequential (S-modules) and decode (D-modules). The following figure illustrates the combinatorial logic module. The S-module, shown in Figure 4, page 8, implements the same combinatorial logic function as the C-module while adding a sequential element. The sequential element can be configured as either a D-flip-flop or a transparent latch. The S-module register can be bypassed so that it implements purely combinatorial logic.

**Figure 3 • 42MX C-Module Implementation**

**Figure 4 • 42MX S-Module Implementation**

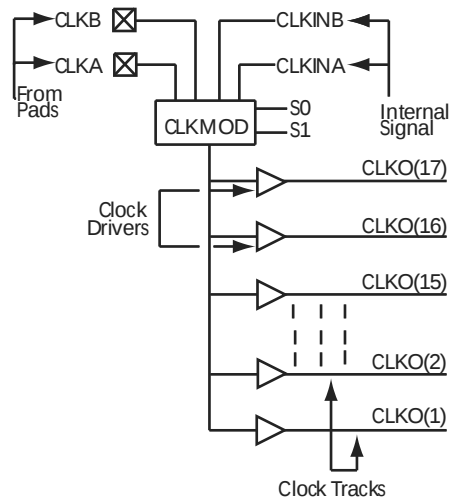
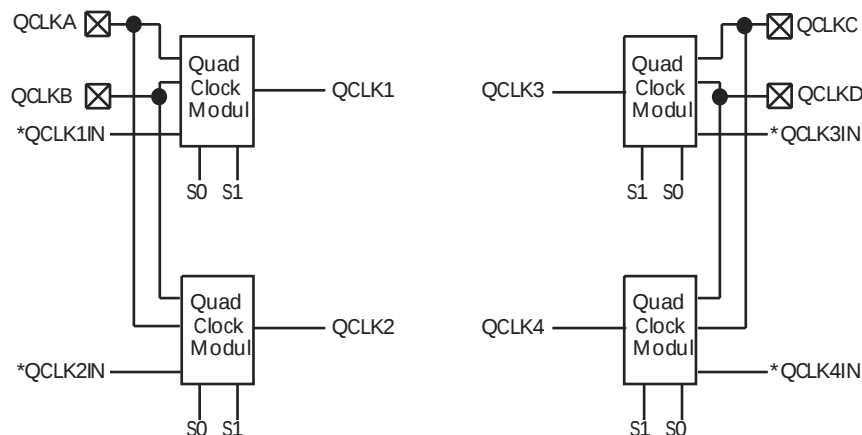
A42MX24 and A42MX36 devices contain D-modules, which are arranged around the periphery of the device. D-modules contain wide-decode circuitry, providing a fast, wide-input AND function similar to that found in CPLD architectures (Figure 5, page 9). The D-module allows A42MX24 and A42MX36 devices to perform wide-decode functions at speeds comparable to CPLDs and PALs. The output of the D-module has a programmable inverter for active HIGH or LOW assertion. The D-module output is hardwired to an output pin, and can also be fed back into the array to be incorporated into other logic.

### 3.2.2 Dual-Port SRAM Modules

The A42MX36 device contains dual-port SRAM modules that have been optimized for synchronous or asynchronous applications. The SRAM modules are arranged in 256-bit blocks that can be configured as 32x8 or 64x4. SRAM modules can be cascaded together to form memory spaces of user-definable width and depth. A block diagram of the A42MX36 dual-port SRAM block is shown in Figure 6, page 9.

The A42MX36 SRAM modules are true dual-port structures containing independent read and write ports. Each SRAM module contains six bits of read and write addressing (RDAD[5:0] and WRAD[5:0], respectively) for 64x4-bit blocks. When configured in byte mode, the highest order address bits (RDAD5 and WRAD5) are not used. The read and write ports of the SRAM block contain independent clocks (RCLK and WCLK) with programmable polarities offering active HIGH or LOW implementation. The SRAM block contains eight data inputs (WD[7:0]), and eight outputs (RD[7:0]), which are connected to segmented vertical routing tracks.

The A42MX36 dual-port SRAM blocks provide an optimal solution for high-speed buffered applications requiring FIFO and LIFO queues. The ACTgen Macro Builder within Microsemi's designer software provides capability to quickly design memory functions with the SRAM blocks. Unused SRAM blocks can be used to implement registers for other user logic within the design.

**Figure 8 • Clock Networks of 42MX Devices****Figure 9 • Quadrant Clock Network of A42MX36 Devices**

**Note:** \*QCLK1IN, QCLK2IN, QCLK3IN, and QCLK4IN are internally-generated signals.

### 3.2.5 MultiPlex I/O Modules

42MX devices feature Multiplex I/Os and support 5.0 V, 3.3 V, and mixed 3.3 V/5.0 V operations.

The MultiPlex I/O modules provide the interface between the device pins and the logic array. Figure 10, page 12 is a block diagram of the 42MX I/O module. A variety of user functions, determined by a library macro selection, can be implemented in the module. (See the *Antifuse Macro Library Guide* for more information.) All 42MX I/O modules contain tristate buffers, with input and output latches that can be configured for input, output, or bidirectional operation.

All 42MX devices contain flexible I/O structures, where each output pin has a dedicated output-enable control (Figure 10, page 12). The I/O module can be used to latch input or output data, or both, providing fast set-up time. In addition, the Designer software tools can build a D-type flip-flop using a C-module combined with an I/O module to register input and output signals. See the *Antifuse Macro Library Guide* for more details.

A42MX24 and A42MX36 devices also offer selectable PCI output drives, enabling 100% compliance with version 2.1 of the PCI specification. For low-power systems, all inputs and outputs are turned off to reduce current consumption to below 500  $\mu$ A.

To achieve 5.0 V or 3.3 V PCI-compliant output drives on A42MX24 and A42MX36 devices, a chip-wide PCI fuse is programmed via the Device Selection Wizard in the Designer software (Figure 11, page 12). When the PCI fuse is not programmed, the output drive is standard.

Additionally, the back-annotation flow is compatible with all the major simulators and the simulation results can be cross-probed with Silicon Explorer II, Microsemi's integrated verification and logic analysis tool. Another tool included in the Libero software is the SmartGen macro builder, which easily creates popular and commonly used logic functions for implementation into your schematic or HDL design.

Microsemi's Libero software is compatible with the most popular FPGA design entry and verification tools from companies such as Mentor Graphics, Synopsys, and Cadence design systems.

See the Libero IDE web content at [www.microsemi.com/soc/products/software/libero/default.aspx](http://www.microsemi.com/soc/products/software/libero/default.aspx) for further information on licensing and current operating system support.

## 3.6 Related Documents

The following sections give the list of related documents which can be referred for this datasheet.

### 3.6.1 Application Notes

- *AC278: BSDL Files Format Description*
- *AC225: Programming Antifuse Devices*
- *AC168: Implementation of Security in Microsemi Antifuse FPGAs*

### 3.6.2 User Guides and Manuals

- *Antifuse Macro Library Guide*
- *Silicon Sculptor Programmers User Guide*

### 3.6.3 Miscellaneous

*Libero IDE Flow Diagram*

## 3.7 5.0 V Operating Conditions

The following tables show 5.0 V operating conditions.

**Table 12 • Absolute Maximum Ratings for 40MX Devices\***

| Symbol           | Parameter           | Limits          | Units |
|------------------|---------------------|-----------------|-------|
| VCC              | DC Supply Voltage   | −0.5 to +7.0    | V     |
| VI               | Input Voltage       | −0.5 to VCC+0.5 | V     |
| VO               | Output Voltage      | −0.5 to VCC+0.5 | V     |
| t <sub>STG</sub> | Storage Temperature | −65 to +150     | °C    |

**Note:** \*Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. Exposure to absolute maximum rated conditions for extended periods may affect device reliability. Devices should not be operated outside the recommended operating conditions.

**Table 13 • Absolute Maximum Ratings for 42MX Devices\***

| Symbol           | Parameter                   | Limits           | Units |
|------------------|-----------------------------|------------------|-------|
| VCCI             | DC Supply Voltage for I/Os  | −0.5 to +7.0     | V     |
| VCCA             | DC Supply Voltage for Array | −0.5 to +7.0     | V     |
| VI               | Input Voltage               | −0.5 to VCCI+0.5 | V     |
| VO               | Output Voltage              | −0.5 to VCCI+0.5 | V     |
| t <sub>STG</sub> | Storage Temperature         | −65 to +150      | °C    |

**Table 23 • DC Specification (5.0 V PCI Signaling)<sup>1</sup>**

| Symbol           | Parameter             | Condition | PCI  |      | MX   |                     | Units |
|------------------|-----------------------|-----------|------|------|------|---------------------|-------|
|                  |                       |           | Min. | Max. | Min. | Max.                |       |
| C <sub>IN</sub>  | Input Pin Capacitance |           |      | 10   | —    | 10                  | pF    |
| C <sub>CLK</sub> | CLK Pin Capacitance   |           | 5    | 12   | —    | 10                  | pF    |
| L <sub>PIN</sub> | Pin Inductance        |           |      | 20   | —    | < 8 nH <sup>4</sup> | nH    |

1. PCI Local Bus Specification, Version 2.1, Section 4.2.1.1.

2. Maximum rating for VCCI –0.5 V to 7.0 V

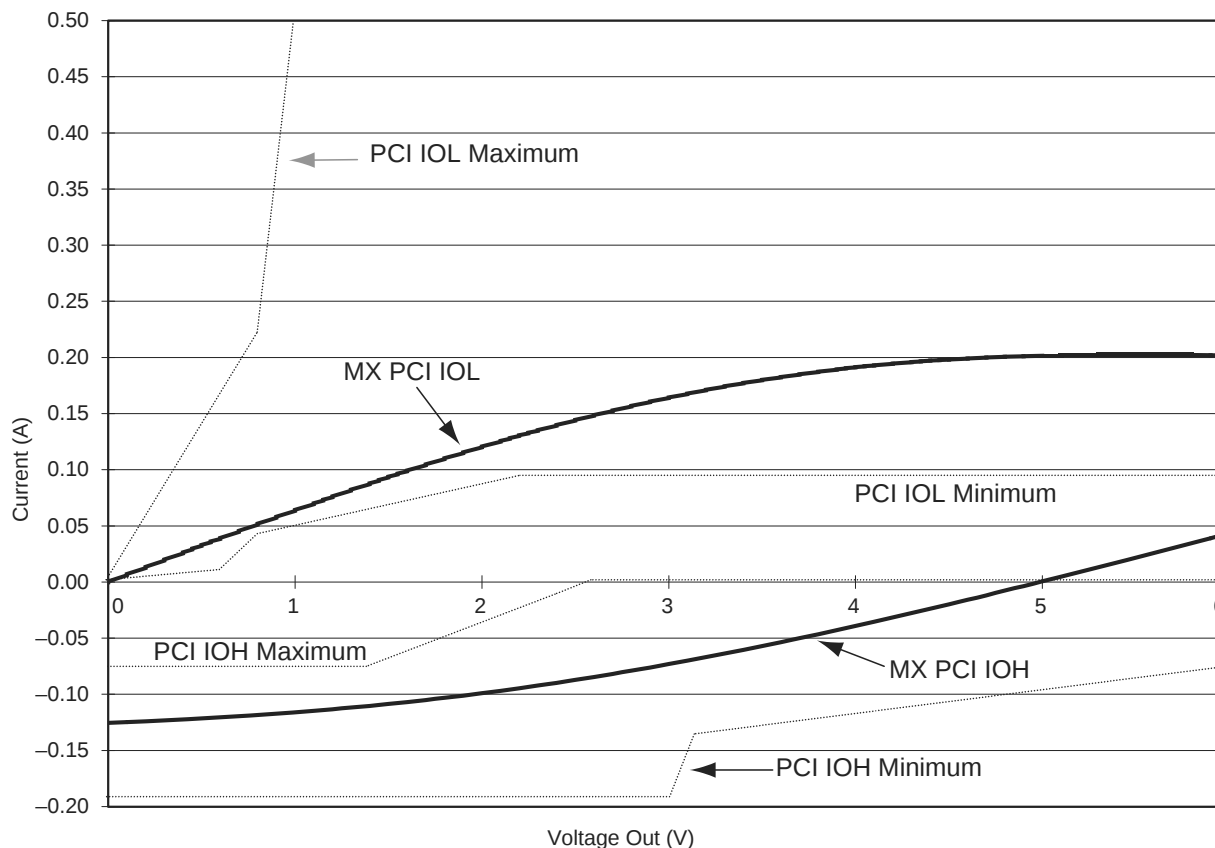
3. VIH(Min) is 2.4V for A42MX36 family. This applies only to VCCI of 5V and is not applicable to VCCI of 3.3V.

4. Dependent upon the chosen package. PCI recommends QFP and BGA packaging to reduce pin inductance and capacitance.

**Table 24 • AC Specifications (5.0V PCI Signaling)\***

| Symbol   | Parameter             | Condition             | PCI                          |      | MX   |      | Units |
|----------|-----------------------|-----------------------|------------------------------|------|------|------|-------|
|          |                       |                       | Min.                         | Max. | Min. | Max. |       |
| ICL      | Low Clamp Current     | $-5 < V_{IN} \leq -1$ | $-25 + (V_{IN} + 1) / 0.015$ |      | –60  | –10  | mA    |
| Slew (r) | Output Rise Slew Rate | 0.4 V to 2.4 V load   | 1                            | 5    | 1.8  | 2.8  | V/ns  |
| Slew (f) | Output Fall Slew Rate | 2.4 V to 0.4 V load   | 1                            | 5    | 2.8  | 4.3  | V/ns  |

**Note:** \*PCI Local Bus Specification, Version 2.1, Section 4.2.1.2.

**Figure 16 • Typical Output Drive Characteristics (Based Upon Measured Data)**

### 3.9.4 Junction Temperature ( $T_J$ )

The temperature variable in the Designer software refers to the junction temperature, not the ambient temperature. This is an important distinction because the heat generated from dynamic power consumption is usually hotter than the ambient temperature. The following equation can be used to calculate junction temperature.

$$\text{Junction Temperature} = \Delta T + T_a(1)$$

EQ 4

where:

- $T_a$  = Ambient Temperature
- $\Delta T$  = Temperature gradient between junction (silicon) and ambient
- $\Delta T = \theta_{ja} * P$  (2)
- $P$  = Power
- $\theta_{ja}$  = Junction to ambient of package.  $\theta_{ja}$  numbers are located in Table 27, page 29.

### 3.9.5 Package Thermal Characteristics

The device junction-to-case thermal characteristic is  $\theta_{jc}$ , and the junction-to-ambient air characteristic is  $\theta_{ja}$ . The thermal characteristics for  $\theta_{ja}$  are shown with two different air flow rates.

The maximum junction temperature is 150°C.

Maximum power dissipation for commercial- and industrial-grade devices is a function of  $\theta_{ja}$ .

A sample calculation of the absolute maximum power dissipation allowed for a TQ176 package at commercial temperature and still air is given in the following equation

$$\text{MaximumPowerAllowed} = \frac{\text{Max} \cdot \text{junction temp} \cdot (^\circ\text{C}) - \text{Max} \cdot \text{ambient temp} \cdot (^\circ\text{C})}{\theta_{ja} (^\circ\text{C/W})} = \frac{150^\circ\text{C} - 70^\circ\text{C}}{(28^\circ\text{C})/\text{W}} = 2.86\text{W}$$

EQ 5

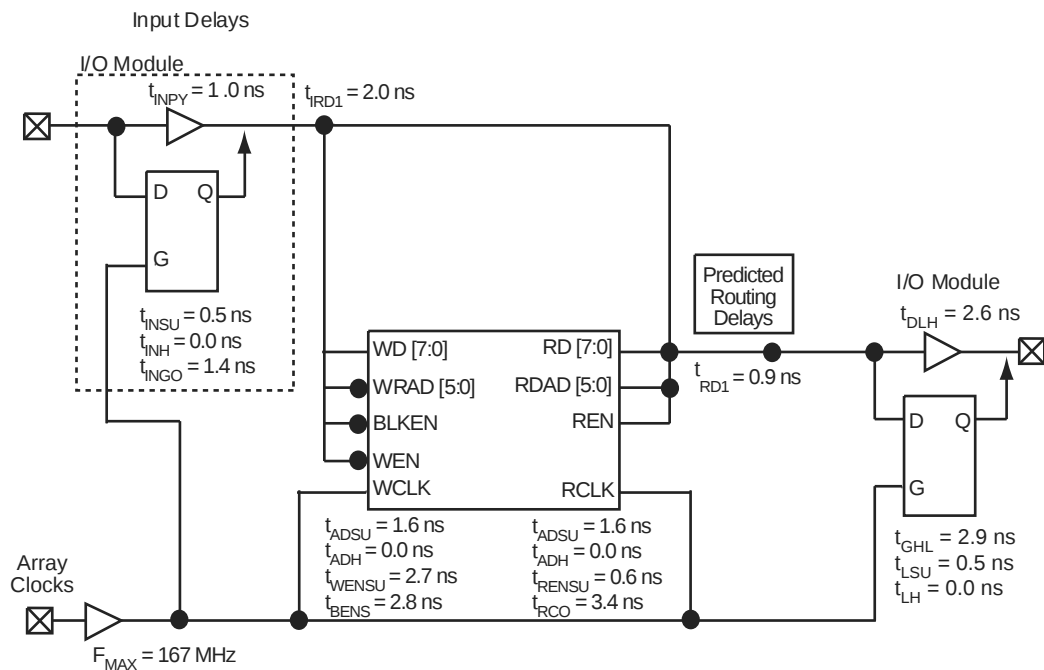
The maximum power dissipation for military-grade devices is a function of  $\theta_{jc}$ . A sample calculation of the absolute maximum power dissipation allowed for CQFP 208-pin package at military temperature and still air is given in the following equation

$$\text{MaximumPowerAllowed} = \frac{\text{Max} \cdot \text{junction temp} \cdot (^\circ\text{C}) - \text{Max} \cdot \text{ambient temp} \cdot (^\circ\text{C})}{\theta_{jc} (^\circ\text{C/W})} = \frac{150^\circ\text{C} - 125^\circ\text{C}}{(6.3^\circ\text{C})/\text{W}} = 3.97\text{W}$$

EQ 6

**Table 27 • Package Thermal Characteristics**

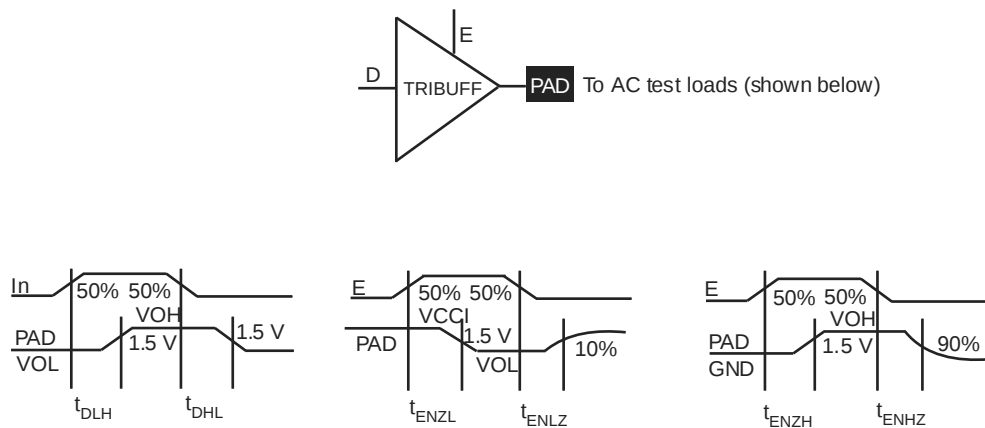
| Plastic Packages                 | Pin Count | $\theta_{jc}$ | $\theta_{ja}$ |                        |                        | Units              |
|----------------------------------|-----------|---------------|---------------|------------------------|------------------------|--------------------|
|                                  |           |               | Still Air     | 1.0 m/s<br>200 ft/min. | 2.5 m/s<br>500 ft/min. |                    |
| Plastic Quad Flat Pack           | 100       | 12.0          | 27.8          | 23.4                   | 21.2                   | $^\circ\text{C/W}$ |
| Plastic Quad Flat Pack           | 144       | 10.0          | 26.2          | 22.8                   | 21.1                   | $^\circ\text{C/W}$ |
| Plastic Quad Flat Pack           | 160       | 10.0          | 26.2          | 22.8                   | 21.1                   | $^\circ\text{C/W}$ |
| Plastic Quad Flat Pack           | 208       | 8.0           | 26.1          | 22.5                   | 20.8                   | $^\circ\text{C/W}$ |
| Plastic Quad Flat Pack           | 240       | 8.5           | 25.6          | 22.3                   | 20.8                   | $^\circ\text{C/W}$ |
| Plastic Leaded Chip Carrier      | 44        | 16.0          | 20.0          | 24.5                   | 22.0                   | $^\circ\text{C/W}$ |
| Plastic Leaded Chip Carrier      | 68        | 13.0          | 25.0          | 21.0                   | 19.4                   | $^\circ\text{C/W}$ |
| Plastic Leaded Chip Carrier      | 84        | 12.0          | 22.5          | 18.9                   | 17.6                   | $^\circ\text{C/W}$ |
| Thin Plastic Quad Flat Pack      | 176       | 11.0          | 24.7          | 19.9                   | 18.0                   | $^\circ\text{C/W}$ |
| Very Thin Plastic Quad Flat Pack | 80        | 12.0          | 38.2          | 31.9                   | 29.4                   | $^\circ\text{C/W}$ |
| Very Thin Plastic Quad Flat Pack | 100       | 10.0          | 35.3          | 29.4                   | 27.1                   | $^\circ\text{C/W}$ |
| Plastic Ball Grid Array          | 272       | 3.0           | 18.3          | 14.9                   | 13.9                   | $^\circ\text{C/W}$ |
| <b>Ceramic Packages</b>          |           |               |               |                        |                        |                    |
| Ceramic Pin Grid Array           | 132       | 4.8           | 25.0          | 20.6                   | 18.7                   | $^\circ\text{C/W}$ |
| Ceramic Quad Flat Pack           | 208       | 2.0           | 22.0          | 19.8                   | 18.0                   | $^\circ\text{C/W}$ |
| Ceramic Quad Flat Pack           | 256       | 2.0           | 20.0          | 16.5                   | 15.0                   | $^\circ\text{C/W}$ |

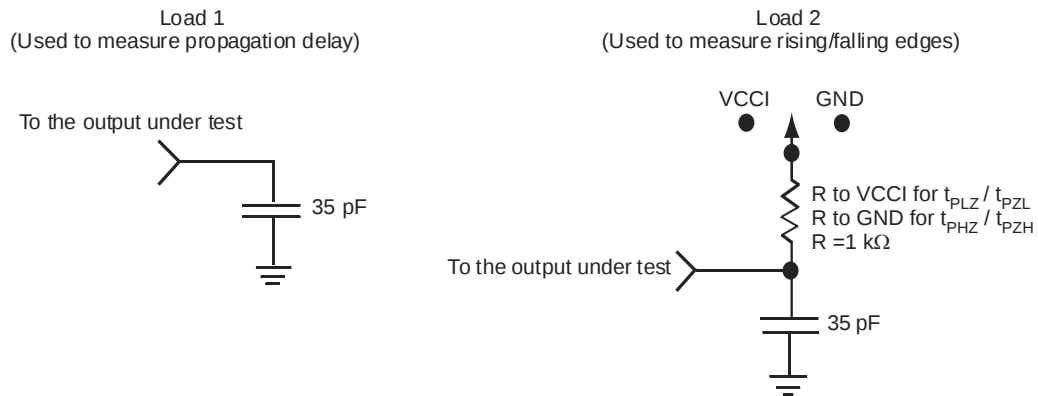
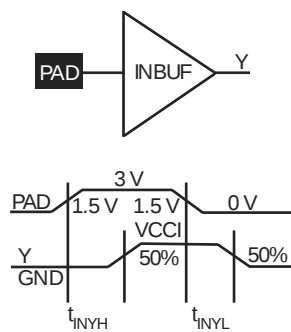
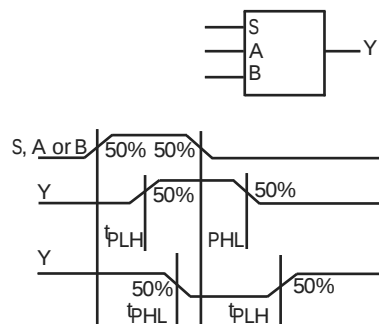
**Figure 20 • 42MX Timing Model (SRAM Functions)**

**Note:** Values are shown for A42MX36 –3 at 5.0 V worst-case commercial conditions.

### 3.10.1 Parameter Measurement

The following figures show parameter measurement details.

**Figure 21 • Output Buffer Delays**

**Figure 22 • AC Test Loads****Figure 23 • Input Buffer Delays****Figure 24 • Module Delays**

**Table 50 • PQ 100**

| <b>PQ100</b>      |                         |                         |                         |                         |
|-------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| <b>Pin Number</b> | <b>A40MX02 Function</b> | <b>A40MX04 Function</b> | <b>A42MX09 Function</b> | <b>A42MX16 Function</b> |
| 56                | VCC                     | VCC                     | I/O                     | I/O                     |
| 57                | I/O                     | I/O                     | GND                     | GND                     |
| 58                | I/O                     | I/O                     | I/O                     | I/O                     |
| 59                | I/O                     | I/O                     | I/O                     | I/O                     |
| 60                | I/O                     | I/O                     | I/O                     | I/O                     |
| 61                | I/O                     | I/O                     | I/O                     | I/O                     |
| 62                | I/O                     | I/O                     | I/O                     | I/O                     |
| 63                | GND                     | GND                     | I/O                     | I/O                     |
| 64                | I/O                     | I/O                     | LP                      | LP                      |
| 65                | I/O                     | I/O                     | VCCA                    | VCCA                    |
| 66                | I/O                     | I/O                     | VCCI                    | VCCI                    |
| 67                | I/O                     | I/O                     | VCCA                    | VCCA                    |
| 68                | I/O                     | I/O                     | I/O                     | I/O                     |
| 69                | VCC                     | VCC                     | I/O                     | I/O                     |
| 70                | I/O                     | I/O                     | I/O                     | I/O                     |
| 71                | I/O                     | I/O                     | I/O                     | I/O                     |
| 72                | I/O                     | I/O                     | GND                     | GND                     |
| 73                | I/O                     | I/O                     | I/O                     | I/O                     |
| 74                | I/O                     | I/O                     | I/O                     | I/O                     |
| 75                | I/O                     | I/O                     | I/O                     | I/O                     |
| 76                | I/O                     | I/O                     | I/O                     | I/O                     |
| 77                | NC                      | NC                      | I/O                     | I/O                     |
| 78                | NC                      | NC                      | I/O                     | I/O                     |
| 79                | NC                      | NC                      | SDI, I/O                | SDI, I/O                |
| 80                | NC                      | I/O                     | I/O                     | I/O                     |
| 81                | NC                      | I/O                     | I/O                     | I/O                     |
| 82                | NC                      | I/O                     | I/O                     | I/O                     |
| 83                | I/O                     | I/O                     | I/O                     | I/O                     |
| 84                | I/O                     | I/O                     | GND                     | GND                     |
| 85                | I/O                     | I/O                     | I/O                     | I/O                     |
| 86                | GND                     | GND                     | I/O                     | I/O                     |
| 87                | GND                     | GND                     | PRA, I/O                | PRA, I/O                |
| 88                | I/O                     | I/O                     | I/O                     | I/O                     |
| 89                | I/O                     | I/O                     | CLKA, I/O               | CLKA, I/O               |
| 90                | CLK, I/O                | CLK, I/O                | VCCA                    | VCCA                    |
| 91                | I/O                     | I/O                     | I/O                     | I/O                     |
| 92                | MODE                    | MODE                    | CLKB, I/O               | CLKB, I/O               |

**Table 50 • PQ 100**

| <b>PQ100</b>      |                         |                         |                         |                         |
|-------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| <b>Pin Number</b> | <b>A40MX02 Function</b> | <b>A40MX04 Function</b> | <b>A42MX09 Function</b> | <b>A42MX16 Function</b> |
| 93                | VCC                     | VCC                     | I/O                     | I/O                     |
| 94                | VCC                     | VCC                     | PRB, I/O                | PRB, I/O                |
| 95                | NC                      | I/O                     | I/O                     | I/O                     |
| 96                | NC                      | I/O                     | GND                     | GND                     |
| 97                | NC                      | I/O                     | I/O                     | I/O                     |
| 98                | SDI, I/O                | SDI, I/O                | I/O                     | I/O                     |
| 99                | DCLK, I/O               | DCLK, I/O               | I/O                     | I/O                     |
| 100               | PRA, I/O                | PRA, I/O                | I/O                     | I/O                     |

**Table 51 • PQ144**

| <b>PQ144</b>      |                         |
|-------------------|-------------------------|
| <b>Pin Number</b> | <b>A42MX09 Function</b> |
| 43                | I/O                     |
| 44                | GNDQ                    |
| 45                | GNDI                    |
| 46                | NC                      |
| 47                | I/O                     |
| 48                | I/O                     |
| 49                | I/O                     |
| 50                | I/O                     |
| 51                | I/O                     |
| 52                | I/O                     |
| 53                | I/O                     |
| 54                | VCC                     |
| 55                | VCCI                    |
| 56                | NC                      |
| 57                | I/O                     |
| 58                | I/O                     |
| 59                | I/O                     |
| 60                | I/O                     |
| 61                | I/O                     |
| 62                | I/O                     |
| 63                | I/O                     |
| 64                | GND                     |
| 65                | GNDI                    |
| 66                | I/O                     |
| 67                | I/O                     |
| 68                | I/O                     |
| 69                | I/O                     |
| 70                | I/O                     |
| 71                | SDO                     |
| 72                | I/O                     |
| 73                | I/O                     |
| 74                | I/O                     |
| 75                | I/O                     |
| 76                | I/O                     |
| 77                | I/O                     |
| 78                | I/O                     |
| 79                | GNDQ                    |

**Table 55 • VQ80**

| <b>VQ80</b>       |                             |                             |
|-------------------|-----------------------------|-----------------------------|
| <b>Pin Number</b> | <b>A40MX02<br/>Function</b> | <b>A40MX04<br/>Function</b> |
| 49                | I/O                         | I/O                         |
| 50                | CLK, I/O                    | CLK, I/O                    |
| 51                | I/O                         | I/O                         |
| 52                | MODE                        | MODE                        |
| 53                | VCC                         | VCC                         |
| 54                | NC                          | I/O                         |
| 55                | NC                          | I/O                         |
| 56                | NC                          | I/O                         |
| 57                | SDI, I/O                    | SDI, I/O                    |
| 58                | DCLK, I/O                   | DCLK, I/O                   |
| 59                | PRA, I/O                    | PRA, I/O                    |
| 60                | NC                          | NC                          |
| 61                | PRB, I/O                    | PRB, I/O                    |
| 62                | I/O                         | I/O                         |
| 63                | I/O                         | I/O                         |
| 64                | I/O                         | I/O                         |
| 65                | I/O                         | I/O                         |
| 66                | I/O                         | I/O                         |
| 67                | I/O                         | I/O                         |
| 68                | GND                         | GND                         |
| 69                | I/O                         | I/O                         |
| 70                | I/O                         | I/O                         |
| 71                | I/O                         | I/O                         |
| 72                | I/O                         | I/O                         |
| 73                | I/O                         | I/O                         |
| 74                | VCC                         | <b>VCC</b>                  |
| 75                | I/O                         | I/O                         |
| 76                | I/O                         | I/O                         |
| 77                | I/O                         | I/O                         |
| 78                | I/O                         | I/O                         |
| 79                | I/O                         | I/O                         |
| 80                | I/O                         | I/O                         |

**Table 57 • TQ176**

| <b>TQ176</b>      |                         |                         |                         |
|-------------------|-------------------------|-------------------------|-------------------------|
| <b>Pin Number</b> | <b>A42MX09 Function</b> | <b>A42MX16 Function</b> | <b>A42MX24 Function</b> |
| 10                | NC                      | I/O                     | I/O                     |
| 11                | NC                      | I/O                     | I/O                     |
| 12                | I/O                     | I/O                     | I/O                     |
| 13                | NC                      | VCCA                    | VCCA                    |
| 14                | I/O                     | I/O                     | I/O                     |
| 15                | I/O                     | I/O                     | I/O                     |
| 16                | I/O                     | I/O                     | I/O                     |
| 17                | I/O                     | I/O                     | I/O                     |
| 18                | GND                     | GND                     | GND                     |
| 19                | NC                      | I/O                     | I/O                     |
| 20                | NC                      | I/O                     | I/O                     |
| 21                | I/O                     | I/O                     | I/O                     |
| 22                | NC                      | I/O                     | I/O                     |
| 23                | GND                     | GND                     | GND                     |
| 24                | NC                      | VCCI                    | VCCI                    |
| 25                | VCCA                    | VCCA                    | VCCA                    |
| 26                | NC                      | I/O                     | I/O                     |
| 27                | NC                      | I/O                     | I/O                     |
| 28                | VCCI                    | VCCA                    | VCCA                    |
| 29                | NC                      | I/O                     | I/O                     |
| 30                | I/O                     | I/O                     | I/O                     |
| 31                | I/O                     | I/O                     | I/O                     |
| 32                | I/O                     | I/O                     | I/O                     |
| 33                | NC                      | NC                      | I/O                     |
| 34                | I/O                     | I/O                     | I/O                     |
| 35                | I/O                     | I/O                     | I/O                     |
| 36                | I/O                     | I/O                     | I/O                     |
| 37                | NC                      | I/O                     | I/O                     |
| 38                | NC                      | NC                      | I/O                     |
| 39                | I/O                     | I/O                     | I/O                     |
| 40                | I/O                     | I/O                     | I/O                     |
| 41                | I/O                     | I/O                     | I/O                     |
| 42                | I/O                     | I/O                     | I/O                     |
| 43                | I/O                     | I/O                     | I/O                     |
| 44                | I/O                     | I/O                     | I/O                     |
| 45                | GND                     | GND                     | GND                     |
| 46                | I/O                     | I/O                     | TMS, I/O                |

**Table 58 • CQ208**

| <b>CQ208</b>      |                         |
|-------------------|-------------------------|
| <b>Pin Number</b> | <b>A42MX36 Function</b> |
| 74                | I/O                     |
| 75                | I/O                     |
| 76                | I/O                     |
| 77                | I/O                     |
| 78                | GND                     |
| 79                | VCCA                    |
| 80                | VCCI                    |
| 81                | I/O                     |
| 82                | I/O                     |
| 83                | I/O                     |
| 84                | I/O                     |
| 85                | WD, I/O                 |
| 86                | WD, I/O                 |
| 87                | I/O                     |
| 88                | I/O                     |
| 89                | I/O                     |
| 90                | I/O                     |
| 91                | QCLKB, I/O              |
| 92                | I/O                     |
| 93                | WD, I/O                 |
| 94                | WD, I/O                 |
| 95                | I/O                     |
| 96                | I/O                     |
| 97                | I/O                     |
| 98                | VCCI                    |
| 99                | I/O                     |
| 100               | WD, I/O                 |
| 101               | WD, I/O                 |
| 102               | I/O                     |
| 103               | TDO, I/O                |
| 104               | I/O                     |
| 105               | GND                     |
| 106               | VCCA                    |
| 107               | I/O                     |
| 108               | I/O                     |
| 109               | I/O                     |
| 110               | I/O                     |

**Table 58 • CQ208**

| <b>CQ208</b>      |                         |
|-------------------|-------------------------|
| <b>Pin Number</b> | <b>A42MX36 Function</b> |
| 148               | I/O                     |
| 149               | I/O                     |
| 150               | GND                     |
| 151               | I/O                     |
| 152               | I/O                     |
| 153               | I/O                     |
| 154               | I/O                     |
| 155               | I/O                     |
| 156               | I/O                     |
| 157               | GND                     |
| 158               | I/O                     |
| 159               | SDI, I/O                |
| 160               | I/O                     |
| 161               | WD, I/O                 |
| 162               | WD, I/O                 |
| 163               | I/O                     |
| 164               | VCCI                    |
| 165               | I/O                     |
| 166               | I/O                     |
| 167               | I/O                     |
| 168               | WD, I/O                 |
| 169               | WD, I/O                 |
| 170               | I/O                     |
| 171               | QCLKD, I/O              |
| 172               | I/O                     |
| 173               | I/O                     |
| 174               | I/O                     |
| 175               | I/O                     |
| 176               | WD, I/O                 |
| 177               | WD, I/O                 |
| 178               | PRA, I/O                |
| 179               | I/O                     |
| 180               | CLKA, I/O               |
| 181               | I/O                     |
| 182               | VCCI                    |
| 183               | VCCA                    |
| 184               | GND                     |

Figure 50 • CQ256

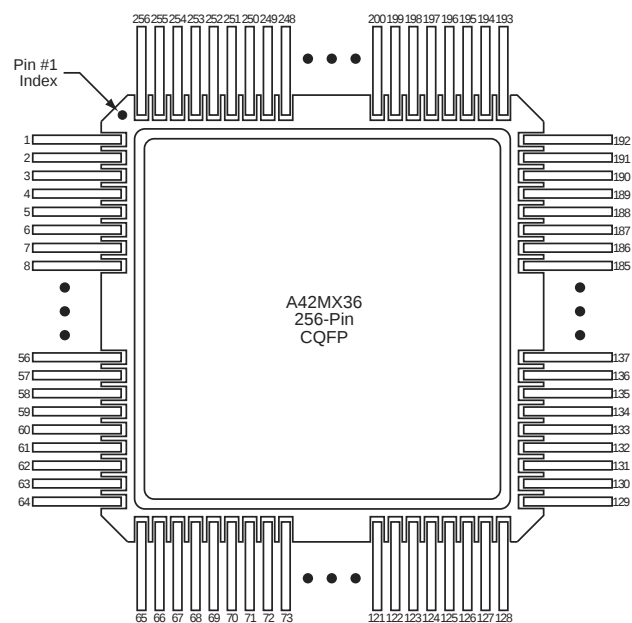


Table 59 • CQ256

| CQ256      |                  |
|------------|------------------|
| Pin Number | A42MX36 Function |
| 1          | NC               |
| 2          | GND              |
| 3          | I/O              |
| 4          | I/O              |
| 5          | I/O              |
| 6          | I/O              |
| 7          | I/O              |
| 8          | I/O              |
| 9          | I/O              |
| 10         | GND              |
| 11         | I/O              |
| 12         | I/O              |
| 13         | I/O              |
| 14         | I/O              |
| 15         | I/O              |
| 16         | I/O              |
| 17         | I/O              |
| 18         | I/O              |
| 19         | I/O              |
| 20         | I/O              |
| 21         | I/O              |

**Table 60 • BG272**

| <b>BG272</b>      |                         |
|-------------------|-------------------------|
| <b>Pin Number</b> | <b>A42MX36 Function</b> |
| V16               | I/O                     |
| V17               | I/O                     |
| V18               | SDO, TDO, I/O           |
| V19               | I/O                     |
| V20               | I/O                     |
| W1                | GND                     |
| W2                | GND                     |
| W3                | I/O                     |
| W4                | TMS, I/O                |
| W5                | I/O                     |
| W6                | I/O                     |
| W7                | I/O                     |
| W8                | WD, I/O                 |
| W9                | WD, I/O                 |
| W10               | I/O                     |
| W11               | I/O                     |
| W12               | I/O                     |
| W13               | WD, I/O                 |
| W14               | I/O                     |
| W15               | I/O                     |
| W16               | WD, I/O                 |
| W17               | I/O                     |
| W18               | WD, I/O                 |
| W19               | GND                     |
| W20               | GND                     |
| Y1                | GND                     |
| Y2                | GND                     |
| Y3                | I/O                     |
| Y4                | TDI, I/O                |
| Y5                | WD, I/O                 |
| Y6                | I/O                     |
| Y7                | QCLKA, I/O              |
| Y8                | I/O                     |
| Y9                | I/O                     |
| Y10               | I/O                     |
| Y11               | I/O                     |
| Y12               | I/O                     |

Figure 53 • CQ172

Table 62 • CQ172

| CQ172      |                     |
|------------|---------------------|
| Pin Number | A42MX16<br>Function |
| 1          | MODE                |
| 2          | I/O                 |
| 3          | I/O                 |
| 4          | I/O                 |
| 5          | I/O                 |
| 6          | I/O                 |
| 7          | GND                 |
| 8          | I/O                 |
| 9          | I/O                 |
| 10         | I/O                 |
| 11         | I/O                 |
| 12         | VCC                 |
| 13         | I/O                 |
| 14         | I/O                 |
| 15         | I/O                 |
| 16         | I/O                 |
| 17         | GND                 |
| 18         | I/O                 |
| 19         | I/O                 |
| 20         | I/O                 |