

# ACT-F4M32A High Speed 128 Megabit Sector Erase FLASH Multichip Module

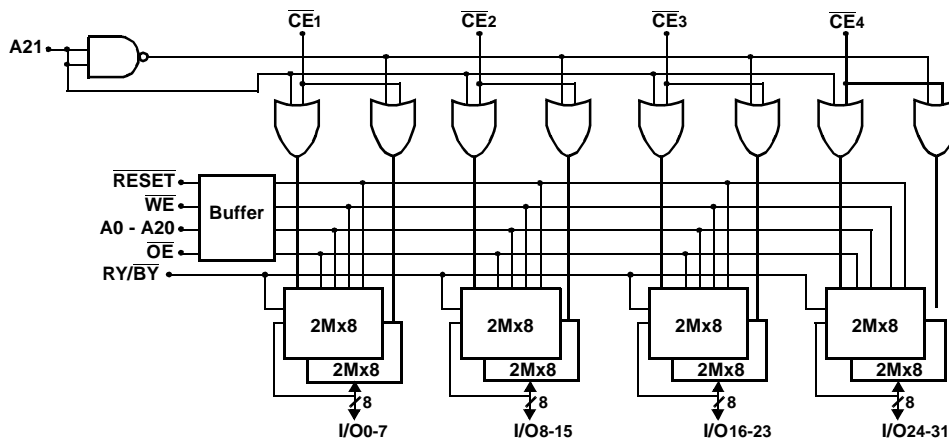
Advanced



## Features

- 8 Low Voltage/Power AMD 2M x 8 FLASH Die in One MCM Package
- Overall Configuration is 4M x 32
- +5V Power Supply / +5V Programming Operation
- Access Times of 100, 120 and 150 ns
- Erase/Program Cycles – 100,000 Minimum (+25°C)
- Sector erase architecture (Each Die)
  - 32 uniform sectors of 64 Kbytes each
  - Any combination of sectors can be erased. Also supports full chip erase
  - Sector group protection is user definable
- Embedded Erase Algorithms – Automatically pre-programs and erases the die or any sector
- Embedded Program Algorithms – Automatically programs and verifies data at specified address
- Ready/Busy output (RY/BY) – Hardware method for detection of program or erase cycle completion
- Hardware RESET pin – Resets internal state machine to the read mode
- Erase Suspend/Resume – Supports reading or programming data to a sector not being erased
- Packaging – Hermetic Ceramic
  - 68-Lead, Low Profile CQFP(F1), 1.56"SQ x .140"max
  - 68-Lead, Dual-Cavity CQFP(F2), 0.88"SQ x .20"max (.18 max thickness available, contact factory for details) (Drops into the 68 Lead JEDEC .99"SQ CQFJ footprint)
- Internal Decoupling Capacitors for Low Noise Operation
- Commercial, Industrial and Military Temperature Ranges
- MIL-PRF-38534 Compliant MCMs Available

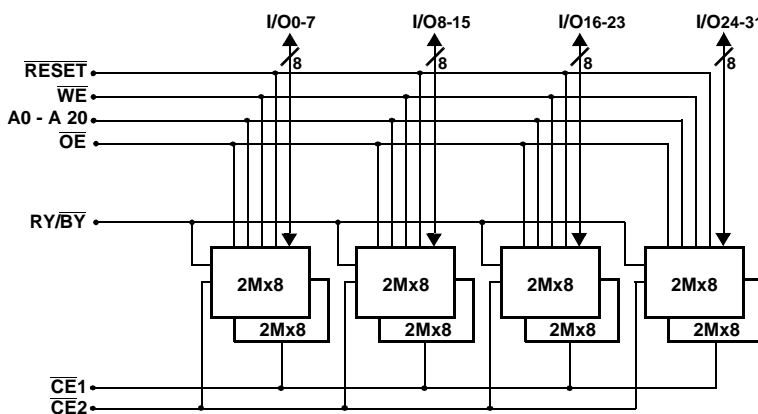
### Block Diagram – CQFP(F1)



#### Pin Description

|         |                |
|---------|----------------|
| I/O0-31 | Data I/O       |
| A0-21   | Address Inputs |
| WE      | Write Enables  |
| CE1-4   | Chip Enables   |
| OE      | Output Enable  |
| RESET   | Reset          |
| RY/BY   | Ready/Busy     |
| VCC     | Power Supply   |
| GND     | Ground         |
| NC      | Not Connected  |

### Block Diagram – CQFP(F2)



#### Pin Description

|         |                |
|---------|----------------|
| I/O0-31 | Data I/O       |
| A0-20   | Address Inputs |
| WE      | Write Enable   |
| CE1,2   | Chip Enables   |
| OE      | Output Enable  |
| RESET   | Reset          |
| RY/BY   | Ready/Busy     |
| VCC     | Power Supply   |
| GND     | Ground         |
| NC      | Not Connected  |

## General Description

Utilizing AMD's Sector Erase Flash Memory Die, the ACT-F4M32A is a high speed, 128 megabit CMOS flash multichip module (MCM) designed for full temperature range, military, space, or high reliability applications.

The ACT-F4M32A consists of eight high-performance AMD Am29F016 16Mbit (16,777,216 bit) memory die. Each die contains 8 separately write or erase sector groups of 256Kbytes (A sector group consists of 4 adjacent sectors of 64Kbytes each).

The command register is written by bringing  $\overline{WE}$  to a logic low level ( $V_{IL}$ ), while  $\overline{CE}$  is low and  $\overline{OE}$  is high ( $V_{IH}$ ). Reading is accomplished by chip Enable ( $\overline{CE}$ ) and Output Enable ( $\overline{OE}$ ) being logically active. Access time grades of 100ns, 120ns and 150ns maximum are standard.

The ACT-F4M32A is offered in two different hermetically sealed co-fired 68 lead ceramic packages. This allows operation in a military environment temperature range of  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ .

The ACT-F4M32A can be programmed (both read and write functions) in-system using the +5.0V VCC power supply. A 12.0V VPP is not required for programming or erase operations. The end of program or erase is detected by the RY/ $\overline{BY}$  pin, Data Polling of DQ7, or by the Toggle bit (DQ6).

The ACT-F4M32A also has a hardware  $\overline{RESET}$  pin. When this pin is driven low, execution of any Embedded Program Algorithm or Embedded Erase Algorithm will be terminated.

Each block can be independently erased and programmed 100,000 times at  $+25^{\circ}\text{C}$ .

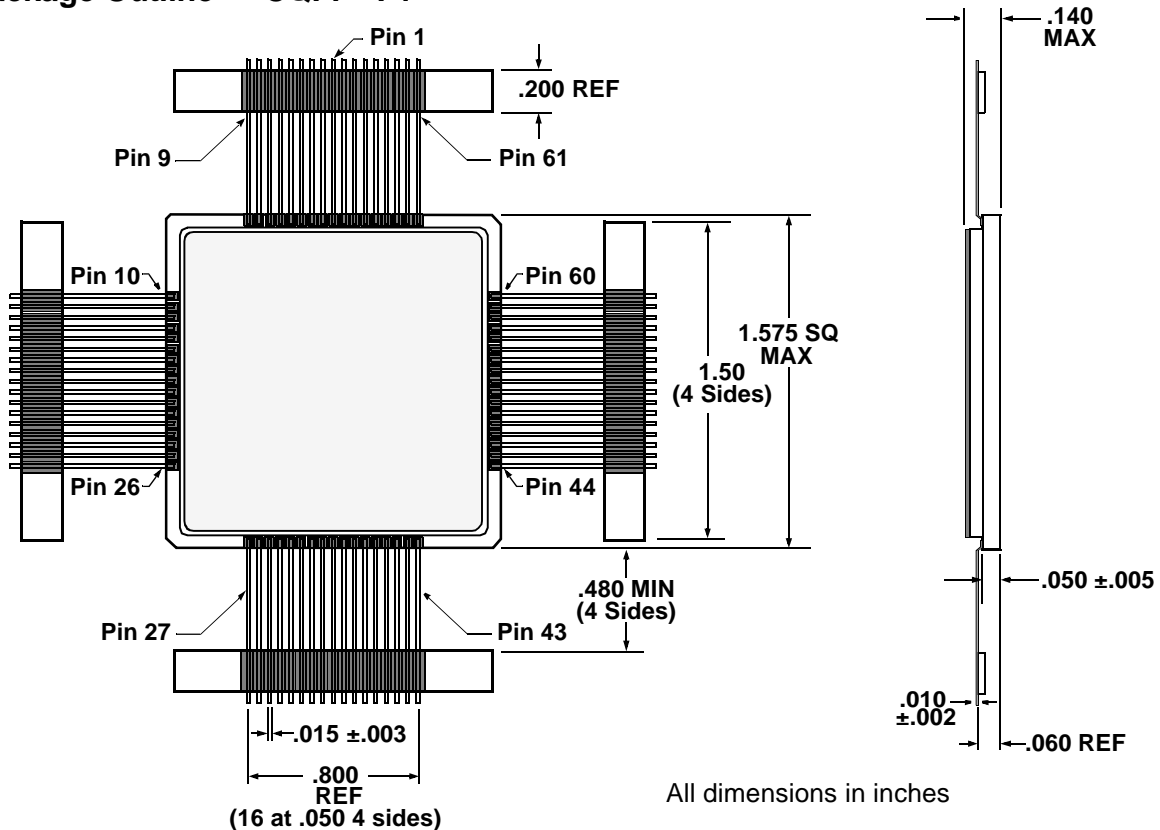
For Detail Information regarding the operation of the Am29F016 Sector Erase Flash Memory, see the AMD datasheet (Publication 18805).

## Pin Numbers & Functions

| 68 Pins — CQFP |                     |       |                   |       |                    |       |                   |
|----------------|---------------------|-------|-------------------|-------|--------------------|-------|-------------------|
| Pin #          | Function            | Pin # | Function          | Pin # | Function           | Pin # | Function          |
| 1              | GND                 | 18    | GND               | 35    | $\overline{OE}$    | 52    | GND               |
| 2              | $\overline{CE1}$    | 19    | I/O <sub>8</sub>  | 36    | $\overline{CE4}$   | 53    | I/O <sub>23</sub> |
| 3              | A <sub>5</sub>      | 20    | I/O <sub>9</sub>  | 37    | A <sub>17</sub>    | 54    | I/O <sub>22</sub> |
| 4              | A <sub>4</sub>      | 21    | I/O <sub>10</sub> | 38    | A <sub>18</sub>    | 55    | I/O <sub>21</sub> |
| 5              | A <sub>3</sub>      | 22    | I/O <sub>11</sub> | 39    | A <sub>19</sub>    | 56    | I/O <sub>20</sub> |
| 6              | A <sub>2</sub>      | 23    | I/O <sub>12</sub> | 40    | A <sub>20</sub>    | 57    | I/O <sub>19</sub> |
| 7              | A <sub>1</sub>      | 24    | I/O <sub>13</sub> | 41    | A <sub>21</sub>    | 58    | I/O <sub>18</sub> |
| 8              | A <sub>0</sub>      | 25    | I/O <sub>14</sub> | 42    | $\overline{RESET}$ | 59    | I/O <sub>17</sub> |
| 9              | RY/ $\overline{BY}$ | 26    | I/O <sub>15</sub> | 43    | NC                 | 60    | I/O <sub>16</sub> |
| 10             | I/O <sub>0</sub>    | 27    | V <sub>CC</sub>   | 44    | I/O <sub>31</sub>  | 61    | V <sub>CC</sub>   |
| 11             | I/O <sub>1</sub>    | 28    | A <sub>11</sub>   | 45    | I/O <sub>30</sub>  | 62    | A <sub>10</sub>   |
| 12             | I/O <sub>2</sub>    | 29    | A <sub>12</sub>   | 46    | I/O <sub>29</sub>  | 63    | A <sub>9</sub>    |
| 13             | I/O <sub>3</sub>    | 30    | A <sub>13</sub>   | 47    | I/O <sub>28</sub>  | 64    | A <sub>8</sub>    |
| 14             | I/O <sub>4</sub>    | 31    | A <sub>14</sub>   | 48    | I/O <sub>27</sub>  | 65    | A <sub>7</sub>    |
| 15             | I/O <sub>5</sub>    | 32    | A <sub>15</sub>   | 49    | I/O <sub>26</sub>  | 66    | A <sub>6</sub>    |
| 16             | I/O <sub>6</sub>    | 33    | A <sub>16</sub>   | 50    | I/O <sub>25</sub>  | 67    | $\overline{WE}$   |
| 17             | I/O <sub>7</sub>    | 34    | $\overline{CE2}$  | 51    | I/O <sub>24</sub>  | 68    | $\overline{CE3}$  |

Consult Factory for Special order: Pin 9 -NC

### Package Outline — CQFP "F1"



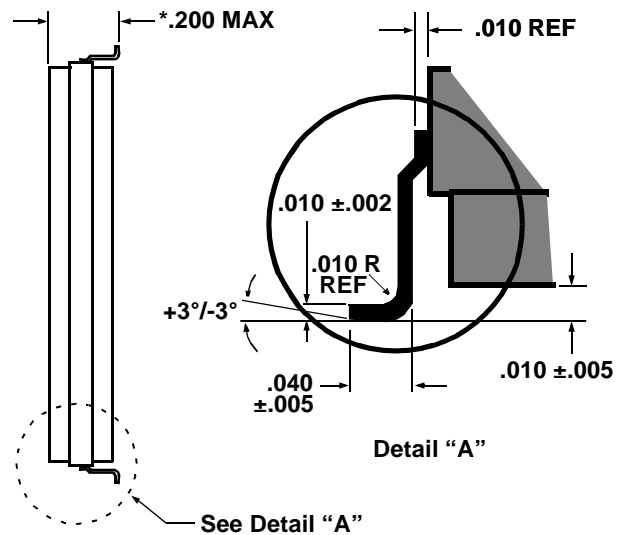
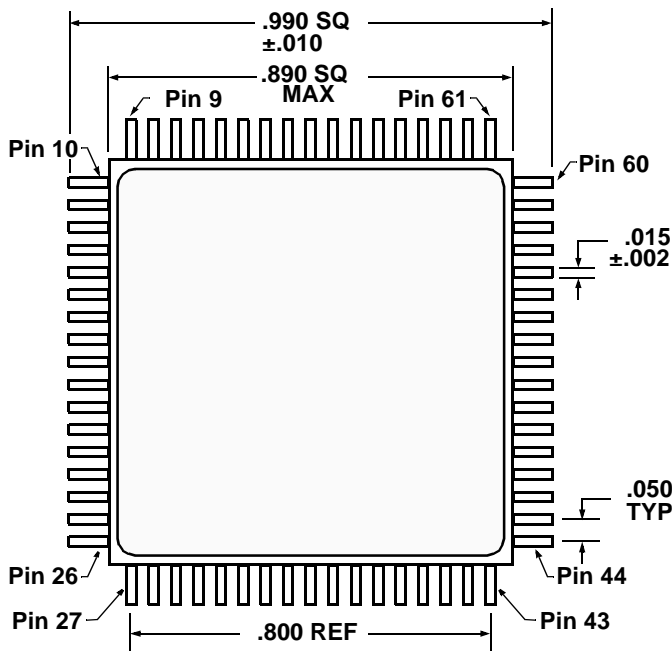
## Pin Numbers & Functions

| 68 Pins — Dual-Cavity CQFP (Standard Configuration) |                    |       |                   |       |                     |       |                   |
|---|--------------------|-------|-------------------|-------|---------------------|-------|-------------------|
| Pin #   | Function           | Pin # | Function          | Pin # | Function            | Pin # | Function          |
| 1   | GND                | 18    | GND               | 35    | $\overline{OE}$     | 52    | GND               |
| 2   | NC                 | 19    | I/O <sub>8</sub>  | 36    | $\overline{CE}_2$   | 53    | I/O <sub>23</sub> |
| 3   | A <sub>5</sub>     | 20    | I/O <sub>9</sub>  | 37    | A <sub>17</sub>     | 54    | I/O <sub>22</sub> |
| 4   | A <sub>4</sub>     | 21    | I/O <sub>10</sub> | 38    | RY/ $\overline{BY}$ | 55    | I/O <sub>21</sub> |
| 5   | A <sub>3</sub>     | 22    | I/O <sub>11</sub> | 39    | NC                  | 56    | I/O <sub>20</sub> |
| 6   | A <sub>2</sub>     | 23    | I/O <sub>12</sub> | 40    | NC                  | 57    | I/O <sub>19</sub> |
| 7   | A <sub>1</sub>     | 24    | I/O <sub>13</sub> | 41    | A <sub>18</sub>     | 58    | I/O <sub>18</sub> |
| 8   | A <sub>0</sub>     | 25    | I/O <sub>14</sub> | 42    | A <sub>19</sub>     | 59    | I/O <sub>17</sub> |
| 9   | $\overline{RESET}$ | 26    | I/O <sub>15</sub> | 43    | A <sub>20</sub>     | 60    | I/O <sub>16</sub> |
| 10  | I/O <sub>0</sub>   | 27    | V <sub>CC</sub>   | 44    | I/O <sub>31</sub>   | 61    | V <sub>CC</sub>   |
| 11  | I/O <sub>1</sub>   | 28    | A <sub>11</sub>   | 45    | I/O <sub>30</sub>   | 62    | A <sub>10</sub>   |
| 12  | I/O <sub>2</sub>   | 29    | A <sub>12</sub>   | 46    | I/O <sub>29</sub>   | 63    | A <sub>9</sub>    |
| 13  | I/O <sub>3</sub>   | 30    | A <sub>13</sub>   | 47    | I/O <sub>28</sub>   | 64    | A <sub>8</sub>    |
| 14  | I/O <sub>4</sub>   | 31    | A <sub>14</sub>   | 48    | I/O <sub>27</sub>   | 65    | A <sub>7</sub>    |
| 15  | I/O <sub>5</sub>   | 32    | A <sub>15</sub>   | 49    | I/O <sub>26</sub>   | 66    | A <sub>6</sub>    |
| 16  | I/O <sub>6</sub>   | 33    | A <sub>16</sub>   | 50    | I/O <sub>25</sub>   | 67    | $\overline{WE}$   |
| 17  | I/O <sub>7</sub>   | 34    | $\overline{CE}_1$ | 51    | I/O <sub>24</sub>   | 68    | NC                |

Consult Factory for Special order: Pin 38 -NC

### Package Outline — Dual-Cavity CQFP "F2"

#### Top View



\*.180 MAX available, call factory for details

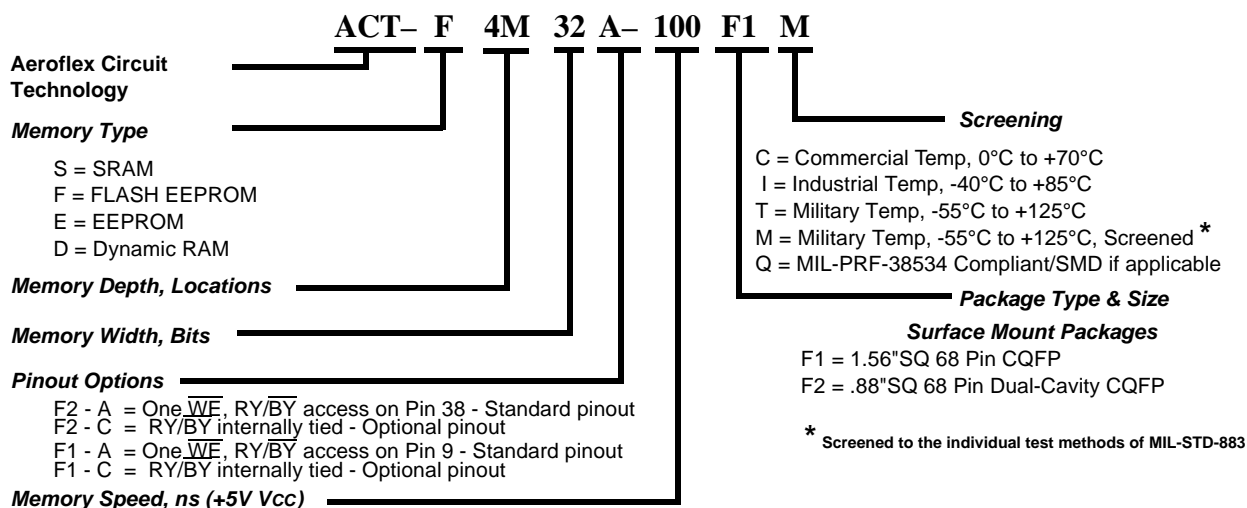
All dimensions in inches



## Ordering Information

| Model Number      | Screening                   | Speed  | Package      |
|-------------------|-----------------------------|--------|--------------|
| ACT-F4M32C-100F1C | Commercial (0°C to +70°C)   | 100 ns | 1.56"sq CQFP |
| ACT-F4M32A-100F2C | Commercial (0°C to +70°C)   | 100 ns | .88"sq CQFP  |
| ACT-F4M32C-100F2C | Commercial (0°C to +70°C)   | 100 ns | .88"sq CQFP  |
| ACT-F4M32A-100F1C | Commercial (0°C to +70°C)   | 100 ns | 1.56"sq CQFP |
| ACT-F4M32C-100F1I | Industrial (-40°C to +85°C) | 100 ns | 1.56"sq CQFP |
| ACT-F4M32A-100F2I | Industrial (-40°C to +85°C) | 100 ns | .88"sq CQFP  |
| ACT-F4M32C-100F2I | Industrial (-40°C to +85°C) | 100 ns | .88"sq CQFP  |
| ACT-F4M32A-100F1I | Industrial (-40°C to +85°C) | 100 ns | 1.56"sq CQFP |
| ACT-F4M32C-100F1M | Military (-55°C to +125°C)  | 100 ns | 1.56"sq CQFP |
| ACT-F4M32A-100F2M | Military (-55°C to +125°C)  | 100 ns | .88"sq CQFP  |
| ACT-F4M32C-100F2M | Military (-55°C to +125°C)  | 100 ns | .88"sq CQFP  |
| ACT-F4M32A-100F1M | Military (-55°C to +125°C)  | 100 ns | 1.56"sq CQFP |

## Part Number Breakdown



Specifications subject to change without notice

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