

# Am10480

16,384 x 1 IMOX™ ECL Bipolar RAM

PRELIMINARY

Am10480

## DISTINCTIVE CHARACTERISTICS

- Fast access time (15 ns) — improves system cycle speeds.
- Fully compatible with standard voltage compensated 10K series ECL — no board changes required.
- Internally voltage compensated providing flat AC performance.
- Enhanced output voltage level compensation providing 6X improvement in  $V_{OL}$  and  $V_{OH}$  stability over supply and temperature ranges.
- Emitter follower outputs — easy wire-ORing
- Power dissipation decreases with increasing temperature.

## GENERAL DESCRIPTION

The Am10480-15 and Am10480-25 are fully decoded 16,384-bit ECL RAMs organized 16,384 words by one bit. Bit selection is achieved by means of a 14-bit address,  $A_0$  through  $A_{13}$ . Easy memory expansion is provided by an active LOW chip select ( $\overline{CS}$ ) input and an unterminated OR tieable emitter follower output.

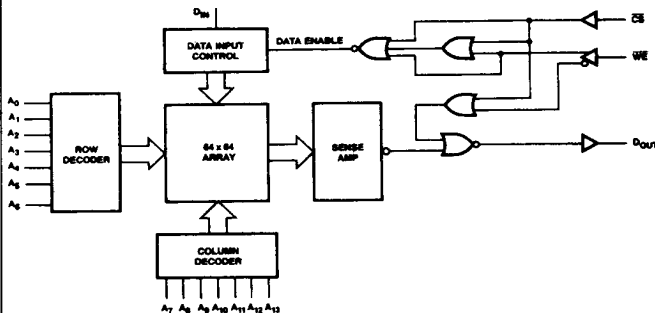
An active LOW write enable ( $\overline{WE}$ ) controls the write/read operation of the memory. When the chip select and write

enable lines are LOW, the data input ( $D_{IN}$ ) is written into the addressed memory word.

Reading is performed with the chip select line LOW and the write enable line HIGH. The information stored in the addressed bit is read out on the noninverting output ( $D_{OUT}$ ).

During the writing operation, or when the chip select line is HIGH, the output of the memory goes to a LOW state.

## BLOCK DIAGRAM



## MODE SELECT TABLE

| Input           |                 | Output   |           | Mode         |
|-----------------|-----------------|----------|-----------|--------------|
| $\overline{CS}$ | $\overline{WE}$ | $D_{IN}$ | $D_{OUT}$ |              |
| H               | X               | X        | L         | Not Selected |
| L               | L               | L        | L         | Write "0"    |
| L               | L               | H        | L         | Write "1"    |
| L               | H               | X        | $D_{OUT}$ | Read         |

H = HIGH  
L = LOW  
X = Don't Care

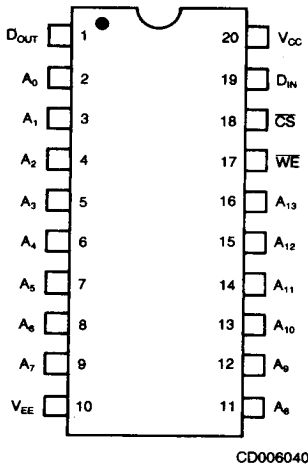
BD000661

## PRODUCT SELECTOR GUIDE

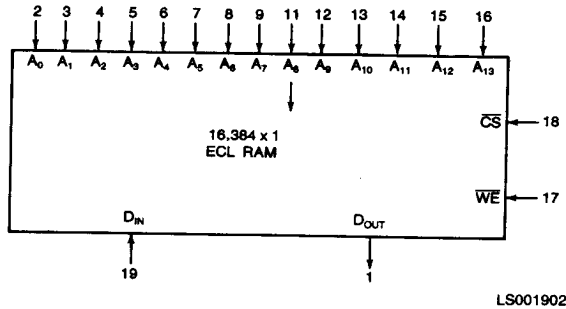
### Highlights of Key Performance Parameters (Commercial)

| Part Number  | Am10480-15 | Am10480-25 |
|--|------------|------------|
| Address Access Time ( $t_{AA}$ )   | 15 ns      | 25 ns      |
| Write Pulse Width ( $t_W$ )  | 15 ns      | 25 ns      |
| Write Recovery ( $t_{WR}$ )  | 18 ns      | 20 ns      |
| Chip Select Access/Recovery and Write Disable Times ( $t_{ACS}$ , $t_{RCS}$ , $t_{WS}$ ) | 8 ns       | 10 ns      |
| Power Supply ( $I_{EE}$ )  | 220 mA     | 200 mA     |

**CONNECTION DIAGRAM**  
Top View



**LOGIC SYMBOL**



VCC = Pin 20  
VEE = Pin 10

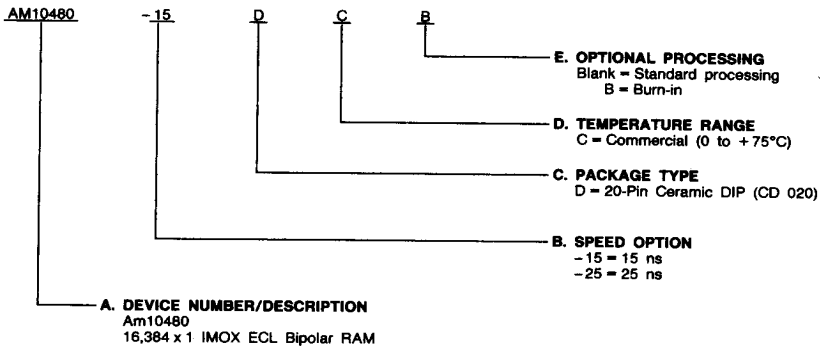
Note: Pin 1 is marked for orientation.

**ORDERING INFORMATION**

**Standard Products**

AMD standard products are available in several packages and operating ranges. The order number (Valid Combination) is formed by a combination of:

- A. Device Number**
- B. Speed Option** (if applicable)
- C. Package Type**
- D. Temperature Range**
- E. Optional Processing**



| Valid Combinations |         |
|--------------------|---------|
| AM10480-15         | DC, DCB |
| AM10480-25         |         |

**Valid Combinations**

Valid Combinations list configurations planned to be supported in volume for this device. Consult the local AMD sales office to confirm availability of specific valid combinations, to check on newly released combinations, and to obtain additional data on AMD's standard military grade products.

## ABSOLUTE MAXIMUM RATINGS

Storage Temperature ..... -65 to +150°C  
 Case Temperature with  
 Power Applied ..... -55 to +125°C  
 VEE Pin Potential to GND Pin ..... -7.0 V to +0.5 V  
 Input Voltage (DC) ..... VEE to +0.5 V  
 Output Current (DC Output HIGH) ..... -30 mA to +0.1 mA

Stresses above those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent device failure. Functionality at or above these limits is not implied. Exposure to absolute maximum ratings for extended periods may affect device reliability.

## OPERATING RANGES

Commercial (C) Devices (Note 2)  
 Temperature ..... 0 to +75°C  
 Supply Voltage ..... -5.46 V to -4.94 V

Operating ranges define those limits between which the functionality of the device is guaranteed.

## DC CHARACTERISTICS (Commercial) VEE = -5.2 V, VCC = GND (Note 2)

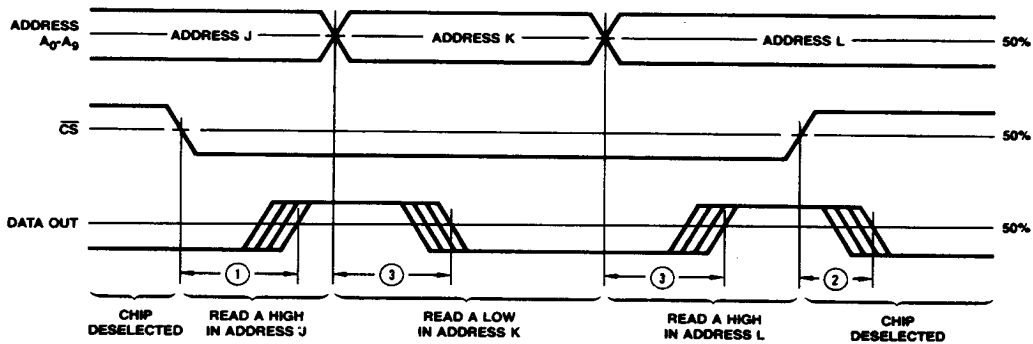
| Parameter Symbol | Parameter Description              | Test Conditions (Note 2)                               |                           | B (Note 3)     | Typ. (Note 1) | A (Note 3) | Units |
|------------------|------------------------------------|--|---------------------------|----------------|---------------|------------|-------|
| VOH              | Output Voltage HIGH                | VIN = VIH or VILB                                      | Loading is 50 Ω to -2.0 V | T = 0°C        | -1000         | -840       | mV    |
|                  |                                    |  |                           | T = +25°C      | -960          | -810       |       |
|                  |                                    |  |                           | T = +75°C      | -900          | -720       |       |
| VOL              | Output Voltage LOW                 |  |                           | T = 0°C        | -1870         | -1665      | mV    |
|                  |                                    |  |                           | T = +25°C      | -1850         | -1650      |       |
|                  |                                    |  |                           | T = +75°C      | -1830         | -1625      |       |
| VOHC             | Output Voltage HIGH                | VIN = VIH or VILA                                      | Loading is 50 Ω to -2.0 V | T = 0°C        | -1020         |            | mV    |
|                  |                                    |  |                           | T = +25°C      | -980          |            |       |
|                  |                                    |  |                           | T = +75°C      | -920          |            |       |
| VOLC             | Output Voltage LOW                 |  |                           | T = 0°C        |               | -1645      | mV    |
|                  |                                    |  |                           | T = +25°C      |               | -1630      |       |
|                  |                                    |  |                           | T = +75°C      |               | -1605      |       |
| VIH              | Input Voltage HIGH                 | Guaranteed Inputs Voltage HIGH for All Inputs (Note 4) |                           | T = 0°C        | -1145         | -840       | mV    |
|                  |                                    | T = +25°C  | -1105                     | -810           |               |            |       |
|                  |                                    | T = +75°C  | -1045                     | -720           |               |            |       |
| VIL              | Input Voltage LOW                  | Guaranteed Input Voltage LOW for All Inputs (Note 4)   |                           | T = 0°C        | -1870         | -1490      | mV    |
|                  |                                    | T = +25°C  | -1850                     | -1475          |               |            |       |
|                  |                                    | T = +75°C  | -1830                     | -1450          |               |            |       |
| IiH              | Input Current HIGH                 | VIN = VIH  |                           | T = 0 to +75°C |               | 220        | μA    |
| IiL              | Input Current LOW Chip Select (CS) | VIN = VILB   |                           | T = 0 to +75°C |               | 0.5        | μA    |
|                  | All Other Inputs                   |  |                           |                |               | -50        |       |
| IEE              | Power Supply Current (Pin 10)      | All Inputs and Outputs Open                            | Am10480-15                | T = 0 to +75°C |               | -220       | mA    |
|                  |                                    |  | Am10480-25                |                |               | -200       |       |

- Notes: 1. Typical values are:  
 VEE = -5.2 V, VCC = GND, TA = 25°C
2. Output Load = 50 Ω and 30 pF to -2.0 V, T = TA = 0 to +75°C for DIPs. Guaranteed with transverse air flow exceeding 400 linear F.P.M. and 2-minute warm-up period. Approximate thermal resistance values of the package are:  
 θJA (Junction-to-Ambient) = 90°C/Watt (still air)  
 θJA (Junction-to-Ambient) = 50°C/Watt (at 400 F.P.M. air flow)  
 T = TC = 0 to +75°C for Flatpak and LCC packages θJC (Junction-to-Case) = 25°C/Watt
3. Definition of symbols and terms used in this product specification: The relative values of the specified conditions and limits will be referenced to an algebraic scale. The extremities of the scale are: "A" the value closest to positive infinity, "B" the value closest to negative infinity.
4. These are absolute voltages with respect to device ground pin and include all overshoots due to system and/or tester noise. Do not attempt to test these values without suitable equipment.

**SWITCHING CHARACTERISTICS (Commercial)  $V_{EE} = -5.46$  to  $-4.94$  V,  $V_{CC} = \text{GND}$  (Note 2)**

| No.                            | Parameter Symbol | Parameter Description                    | Test Conditions                                | Am10480-15 |               |      | Am10480-25 |               |      | Units |
|--------------------------------|------------------|--|--|------------|---------------|------|------------|---------------|------|-------|
|                                |                  |  |  | Min.       | Typ. (Note 1) | Max. | Min.       | Typ. (Note 1) | Max. |       |
| <b>READ MODE</b>               |                  |  |  |            |               |      |            |               |      |       |
| 1                              | tACS             | Chip Select Access Time                  | Measured at 50% of input to 50% of output      |            |               | 8    |            |               | 10   | ns    |
| 2                              | tRCS             | Chip Select Recovery Time                |  |            |               | 8    |            |               | 10   |       |
| 3                              | tAA              | Address Access Time                      |  |            |               | 15   |            |               | 25   |       |
| <b>WRITE MODE</b>              |                  |  |  |            |               |      |            |               |      |       |
| 4                              | tW               | Write Pulse Width (to Guarantee Writing) | tWSA = tWSA (Min.)                             | 15         |               |      | 25         |               |      | ns    |
| 5                              | tWSD             | Data Setup Time Prior to Write           |  | 2          |               |      | 5          |               |      | ns    |
| 6                              | tWHD             | Data Hold Time After Write               |  | 3          |               |      | 5          |               |      | ns    |
| 7                              | tWSA             | Address Setup Time Prior to Write        | tW = tW (Min.)                                 | 2          |               |      | 5          |               |      | ns    |
| 8                              | tWHA             | Address Hold Time After Write            |  | 3          |               |      | 5          |               |      | ns    |
| 9                              | tWSCS            | Chip Select Setup Time Prior to Write    |  | 2          |               |      | 5          |               |      | ns    |
| 10                             | tWHCS            | Chip Select Hold Time After Write        | Measured at 50% of input to 50% of output      | 3          |               |      | 5          |               |      | ns    |
| 11                             | tWS              | Write Disable Time                       |  |            |               | 8    |            |               | 10   | ns    |
| 12                             | tWR              | Write Recovery Time                      |  |            |               | 18   |            |               | 20   | ns    |
| <b>RISE TIME AND FALL TIME</b> |                  |  |  |            |               |      |            |               |      |       |
| 13                             | t <sub>r</sub>   | Output Rise Time                         | Measured between 20% and 80% points            |            | 2.5           |      |            | 2.5           |      | ns    |
| 14                             | t <sub>f</sub>   | Output Fall Time                         |  |            | 2.5           |      |            | 2.5           |      |       |
| <b>CAPACITANCE</b>             |                  |  |  |            |               |      |            |               |      |       |
| 15                             | C <sub>IN</sub>  | Input Pin Capacitance                    | Measure with a pulse technique on sample basis |            | 4             |      |            | 4             |      | pF    |
| 16                             | C <sub>OUT</sub> | Output Pin Capacitance                   |  |            | 7             |      |            | 7             |      |       |

**SWITCHING WAVEFORMS (Cont'd.)**

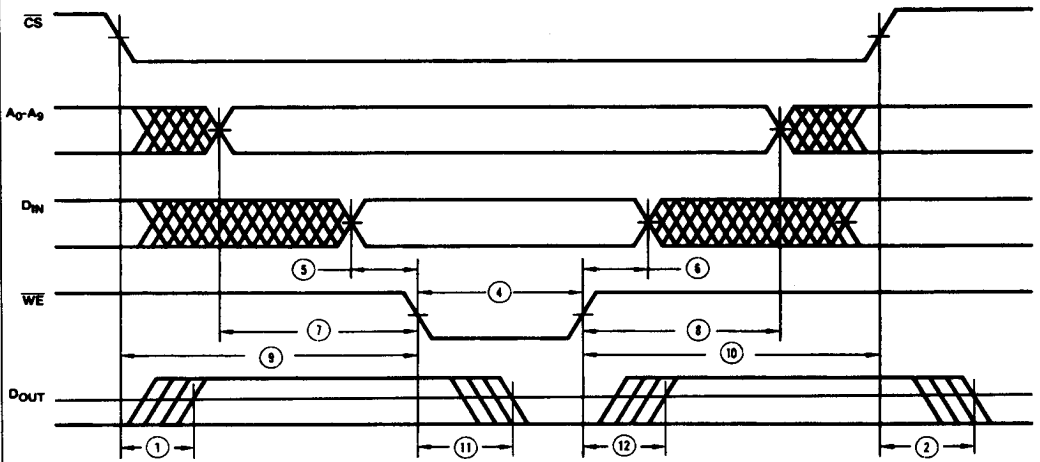


**Read Mode**

WF001173

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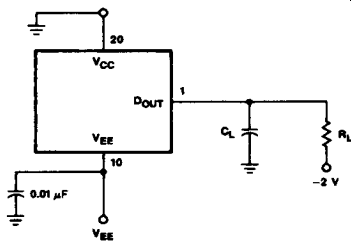
## SWITCHING WAVEFORMS



WF001163

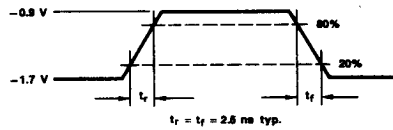
Write Mode

### SWITCHING TEST CIRCUIT



TC000223

### SWITCHING TEST WAVEFORM



TW000310

### KEY TO SWITCHING WAVEFORMS

| WAVEFORM | INPUTS                           | OUTPUTS                                   |
|----------|----------------------------------|---|
|          | MUST BE STEADY                   | WILL BE STEADY                            |
|          | MAY CHANGE FROM H TO L           | WILL BE CHANGING FROM H TO L              |
|          | MAY CHANGE FROM L TO H           | WILL BE CHANGING FROM L TO H              |
|          | DON'T CARE; ANY CHANGE PERMITTED | CHANGING; STATE UNKNOWN                   |
|          | DOES NOT APPLY                   | CENTER LINE IS HIGH IMPEDANCE "OFF" STATE |

KS000010

$R_L = 50 \Omega$  termination of measurement system  
 $C_L = 30 \text{ pF}$  (including stray jig capacitance)