

# HM10422

## 256-word × 4-bit Fully Decoded Random Access Memory

The HM10422 is ECL 10K compatible, 256-word × 4-bit, read write, random access memory developed for high speed systems such as scratch pads and control buffer storages.

Four active Low Block Select lines are provided to select each block independently.

The fabrication process is the Hitachi's low capacitance, oxide isolation method with double metalization.

The HM10422 is encapsulated in cerdip-24 pin package, compatible with Fairchild's F10422.

### ■ FEATURES

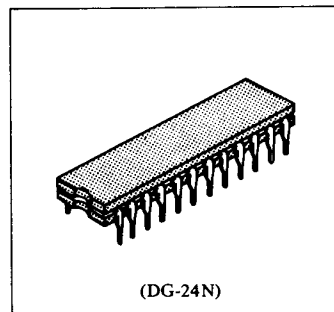
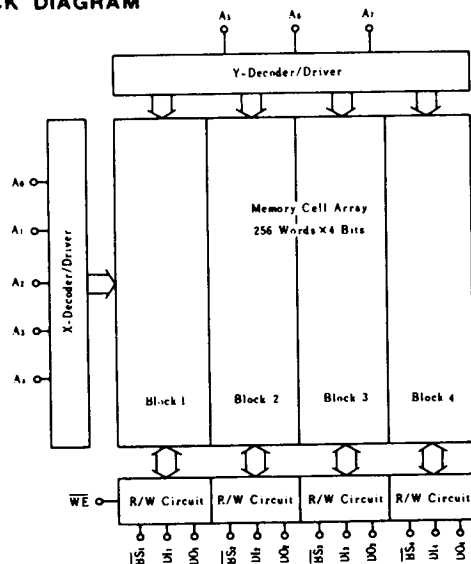
- 256-word × 4 bit organization.
- Fully compatible with 10K ECL level
- Address access time: 10ns (max)
- Write pulse width: 6ns (min)
- Power dissipation: 0.8mW/bit
- Output obtainable by wired-OR (open emitter)

### ■ TRUTH TABLE

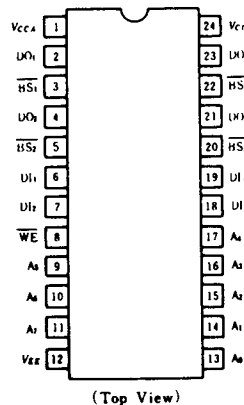
| Input |    |     | Output | Mode         |
|-------|----|-----|--------|--------------|
| BS    | WE | Din |        |              |
| H     | X  | X   | L      | Not Selected |
| L     | L  | L   | L      | Write "0"    |
| L     | L  | H   | L      | Write "1"    |
| L     | H  | X   | Dout*  | Read         |

Notes) X : Irrelevant  
\* : Read out noninvert

### ■ BLOCK DIAGRAM



### ■ PIN ARRANGEMENT



# **■ ABSOLUTE MAXIMUM RATINGS**

| Item                | Symbol                   | Rating           | Unit |
|---------------------|--------------------------|------------------|------|
| Supply Voltage      | $V_{EE}$ to $V_{CC}$     | +0.5 to -7.0     | V    |
| Input Voltage       | $V_{IL}$                 | +0.5 to $V_{EE}$ | V    |
| Output Current      | $I_{OH}$                 | -30              | mA   |
| Storage Temperature | $T_{stg}$                | -65 to +150      | °C   |
| Storage Temperature | $T_{stg}(\text{Bias})^*$ | -55 to +125      | °C   |

\* Under Bias

# **■ ELECTRICAL CHARACTERISTICS**

( $V_{EE} = -5.2\text{V}$ ,  $R_L = 50\Omega$  to  $-2.0\text{V}$ ,  $T_a = 0$  to  $+75^\circ\text{C}$ , air flow exceeding 2m/sec)

## **● DC CHARACTERISTICS**

| Item                     | Symbol           | Test Condition                                            |                                    | min(B)                | typ   | max(A) | Unit  |    |
|--------------------------|------------------|-----------------------------------------------------------|------------------------------------|-----------------------|-------|--------|-------|----|
| Output Voltage           | V <sub>OH</sub>  | V <sub>IN</sub> = V <sub>IHA</sub><br>or V <sub>ILB</sub> |                                    | 0°C                   | −1000 | —      | −840  | mV |
|                          |                  |                                                           |                                    | +25°C                 | −960  | —      | −810  |    |
|                          |                  |                                                           |                                    | +75°C                 | −900  | —      | −720  |    |
|                          | V <sub>OL</sub>  |                                                           |                                    | 0°C                   | −1870 | —      | −1665 |    |
|                          |                  |                                                           |                                    | +25°C                 | −1850 | —      | −1650 |    |
|                          |                  |                                                           |                                    | +75°C                 | −1830 | —      | −1625 |    |
| Output Threshold Voltage | V <sub>OHc</sub> | V <sub>IN</sub> = V <sub>INB</sub> or V <sub>ILA</sub>    |                                    | 0°C                   | −1020 | —      | —     | mV |
|                          |                  |                                                           |                                    | +25°C                 | −980  | —      | —     |    |
|                          |                  |                                                           |                                    | +75°C                 | −920  | —      | —     |    |
|                          | V <sub>OLc</sub> |                                                           |                                    | 0°C                   | —     | —      | −1645 |    |
|                          |                  |                                                           |                                    | +25°C                 | —     | —      | −1630 |    |
|                          |                  |                                                           |                                    | +75°C                 | —     | —      | −1605 |    |
| Input Voltage            | V <sub>IH</sub>  | Guaranteed Input Voltage<br>High for All Inputs           |                                    | 0°C                   | −1145 | —      | −840  | mV |
|                          |                  |                                                           |                                    | +25°C                 | −1105 | —      | −810  |    |
|                          |                  |                                                           |                                    | +75°C                 | −1045 | —      | −720  |    |
|                          | V <sub>IL</sub>  | Guaranteed Input Voltage<br>Low for All Inputs            |                                    | 0°C                   | −1870 | —      | −1490 |    |
|                          |                  |                                                           |                                    | +25°C                 | −1850 | —      | −1475 |    |
|                          |                  |                                                           |                                    | +75°C                 | −1830 | —      | −1450 |    |
| Input Current            | I <sub>IH</sub>  | V <sub>IN</sub> = V <sub>IHA</sub>                        |                                    | 0 to +75°C            | —     | —      | 220   | μA |
|                          | I <sub>IL</sub>  | BS                                                        | V <sub>IN</sub> = V <sub>ILB</sub> |                       | 0.5   | —      | 170   |    |
|                          |                  | Other                                                     |                                    |                       | —50   | —      | —     |    |
| Supply Current           | I <sub>EE</sub>  | All Input and Output Open,<br>Test Pin 12                 |                                    | T <sub>a</sub> = 0°C  | −200  | −160   | —     | mA |
|                          |                  |                                                           |                                    | T <sub>a</sub> = 75°C | —     | −145   | —     |    |

## **● AC CHARACTERISTICS**

### **1. READ MODE**

| Item                       | Symbol    | Test Condition | min | typ | max | Unit |
|----------------------------|-----------|----------------|-----|-----|-----|------|
| Block Select Access Time   | $t_{ABS}$ |                | -   | -   | 5   | ns   |
| Block Select Recovery Time | $t_{ABS}$ |                | -   | -   | 5   | ns   |
| Address Access Time        | $t_{AA}$  |                | -   | 7   | 10  | ns   |

### **2. WRITE MODE**

| Item                    | Symbol     | Test Condition         | min | typ | max | Unit |
|-------------------------|------------|------------------------|-----|-----|-----|------|
| Write Pulse Width       | $t_W$      | $t_{WSA} = 2\text{ns}$ | 6   | 4.5 | -   | ns   |
| Data Setup Time         | $t_{WSD}$  | $t_W = 6\text{ns}$     | 2   | 0   | -   | ns   |
| Data Hold Time          | $t_{WHD}$  |                        | 2   | 0   | -   | ns   |
| Address Setup Time      | $t_{WSA}$  |                        | 2   | 0   | -   | ns   |
| Address Hold Time       | $t_{WHA}$  |                        | 2   | 0   | -   | ns   |
| Block Select Setup Time | $t_{WSBS}$ |                        | 2   | 0   | -   | ns   |
| Block Select Hold Time  | $t_{WHS}$  |                        | 2   | 0   | -   | ns   |
| Write Disable Time      | $t_{WSD}$  |                        | -   | 4   | 5   | ns   |
| Write Recovery Time     | $t_{WR}$   |                        | -   | 4.5 | 12  | ns   |



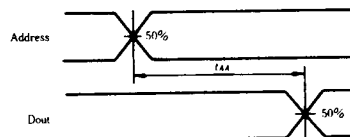
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#### 4. CAPACITANCE

## ■ TEST CIRCUIT AND WAVEFORMS

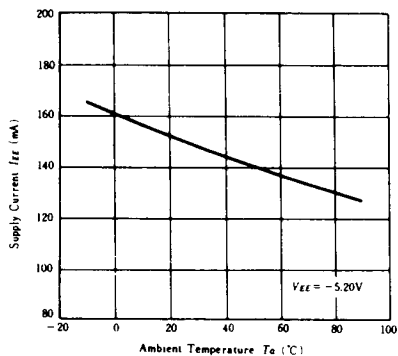
## 1. LOADING CONDITION



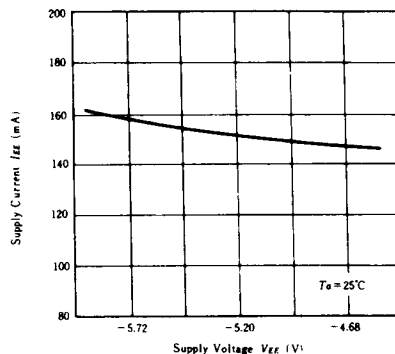
#### 4. WRITE MODE



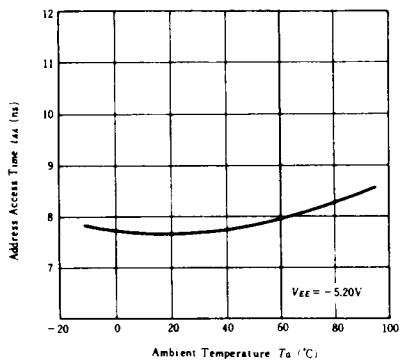
**SUPPLY CURRENT vs.  
AMBIENT TEMPERATURE**



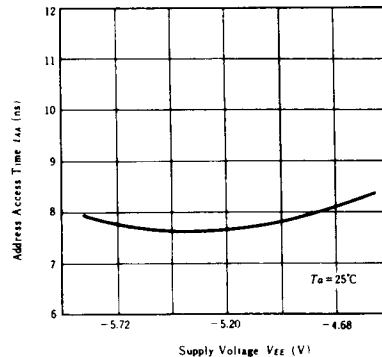
**SUPPLY CURRENT vs.  
SUPPLY VOLTAGE**



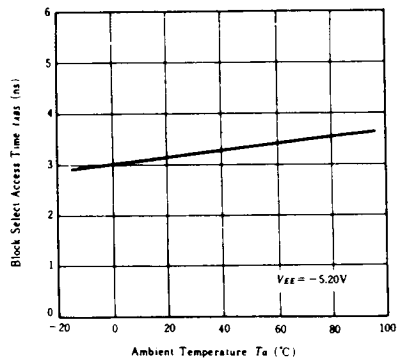
**ADDRESS ACCESS TIME vs.  
AMBIENT TEMPERATURE**



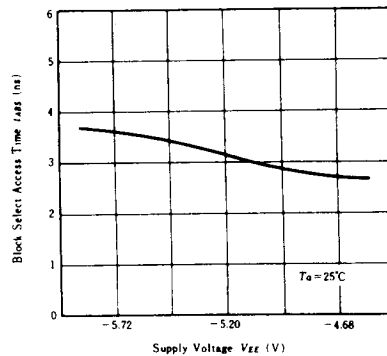
**ADDRESS ACCESS TIME vs.  
SUPPLY VOLTAGE**



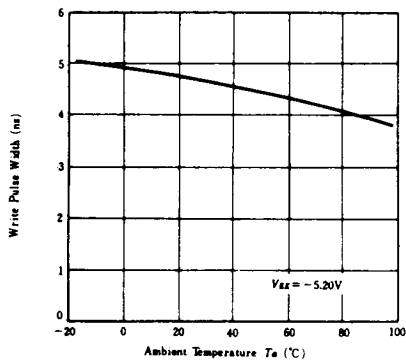
**BLOCK SELECT ACCESS TIME  
vs. AMBIENT TEMPERATURE**



**BLOCK SELECT ACCESS TIME  
vs. SUPPLY VOLTAGE**



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**WRITE PULSE WIDTH vs.  
AMBIENT TEMPERATURE****WRITE PULSE WIDTH vs.  
SUPPLY VOLTAGE**