

# HB56C19 Series

1,048,576-Word x 9-Bit High Density Dynamic RAM Module

## DESCRIPTION

The HB56C19 is a 1M x 9 static column mode dynamic RAM module, mounted nine 1-Mbit DRAM (HM511002JP) sealed in SOJ package. An outline of the HB56C19 is 30-pin single in-line package having Lead types (HB56C19A, HB56C19AT), socket type (HB56C19B). Therefore, the HB56C19 makes high density mounting possible without surface mount technology. The HB56C19 provides common data inputs and outputs and also provides separate I/O on parity bit for parity check. Its module board has decoupling capacitors beneath each SOJ.

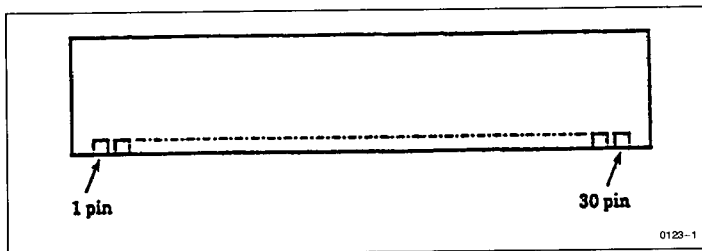
## FEATURES

- 30-pin Single In-line Package  
Lead Pitch .....2.54mm
- Single 5V ( $\pm 10\%$ ) Supply
- High Speed  
Access Time .....80 ns/100 ns/120 ns (max)
- Low Power Dissipation  
Active Mode .....3465 mW/2970 mW/2475 mW (max)  
Standby Mode .....99 mW (max)
- Static Column Mode Capability
- 512 Refresh Cycle .....(8 ms)
- 2 Variations of Refresh  
RAS Only Refresh  
CAS Before RAS Refresh
- TTL Compatible

## ORDERING INFORMATION

| Access Time | Package              |                                  |                         |
|-------------|----------------------|----------------------------------|-------------------------|
|             | 30-pin SIP Lead Type | 30-pin SIP Low Profile Lead Type | 30-pin SIMM Socket Type |
| 80 ns       | HB56C19A-8A          | HB56C19AT-8A                     | HB56C19B-8A             |
| 100 ns      | HB56C19A-10A         | HB56C19AT-10A                    | HB56C19B-10A            |
| 120 ns      | HB56C19A-12A         | HB56C19AT-12A                    | HB56C19B-12A            |

## PIN OUT



## PIN DESCRIPTION

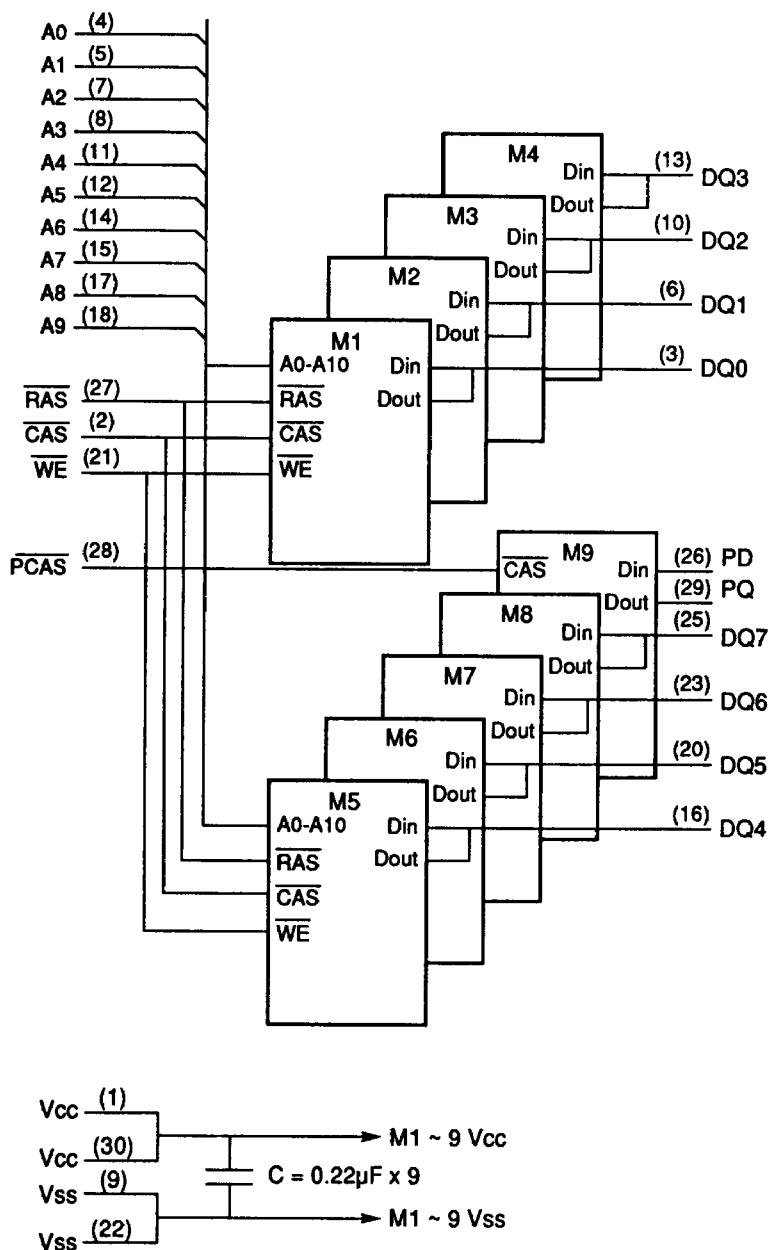
| Pin No. | Pin Name        | Pin No. | Pin Name         |
|---------|-----------------|---------|------------------|
| 1       | V <sub>CC</sub> | 16      | DQ <sub>4</sub>  |
| 2       | $\overline{CS}$ | 17      | A <sub>8</sub>   |
| 3       | DQ <sub>0</sub> | 18      | A <sub>9</sub>   |
| 4       | A <sub>0</sub>  | 19      | NC               |
| 5       | A <sub>1</sub>  | 20      | DQ <sub>5</sub>  |
| 6       | DQ <sub>1</sub> | 21      | $\overline{WE}$  |
| 7       | A <sub>2</sub>  | 22      | V <sub>SS</sub>  |
| 8       | A <sub>3</sub>  | 23      | DQ <sub>6</sub>  |
| 9       | V <sub>SS</sub> | 24      | NC               |
| 10      | DQ <sub>2</sub> | 25      | DQ <sub>7</sub>  |
| 11      | A <sub>4</sub>  | 26      | PQ               |
| 12      | A <sub>5</sub>  | 27      | RAS              |
| 13      | DQ <sub>3</sub> | 28      | $\overline{PCS}$ |
| 14      | A <sub>6</sub>  | 29      | PD               |
| 15      | A <sub>7</sub>  | 30      | V <sub>CC</sub>  |

## PIN DESCRIPTION

| Pin Name                         | Function              |
|----------------------------------|-----------------------|
| A <sub>0</sub> -A <sub>9</sub>   | Address Input         |
| A <sub>0</sub> -A <sub>8</sub>   | Refresh Address Input |
| $\overline{RAS}$                 | Row Address Strobe    |
| $\overline{CS}$                  | Chip Select           |
| $\overline{PCS}$                 | Parity Chip Select    |
| $\overline{WE}$                  | Read/Write Enable     |
| DQ <sub>0</sub> -DQ <sub>7</sub> | Data-in/Data-out      |
| PD                               | Parity Data-in        |
| PQ                               | Parity Data-out       |
| V <sub>CC</sub>                  | Power Supply (+ 5V)   |
| V <sub>SS</sub>                  | Ground                |
| NC                               | Non-Connection        |



## ■ BLOCK DIAGRAM



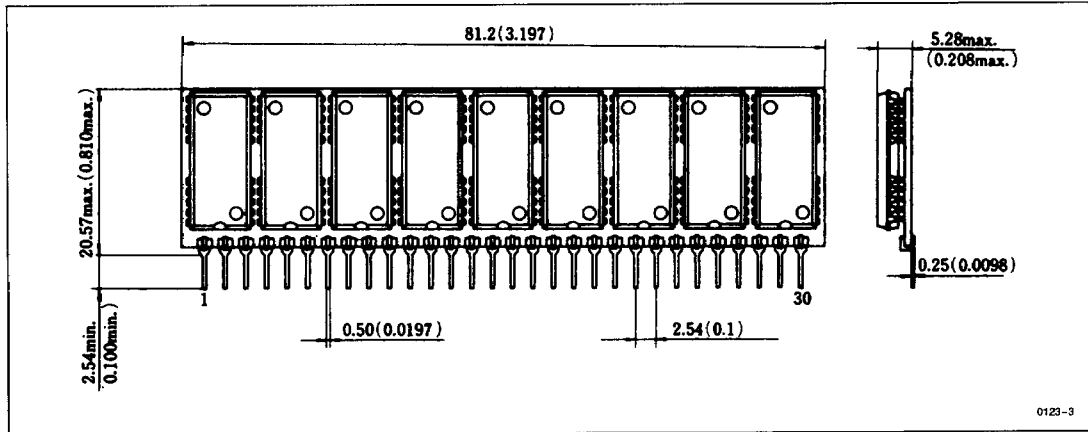
0123-2



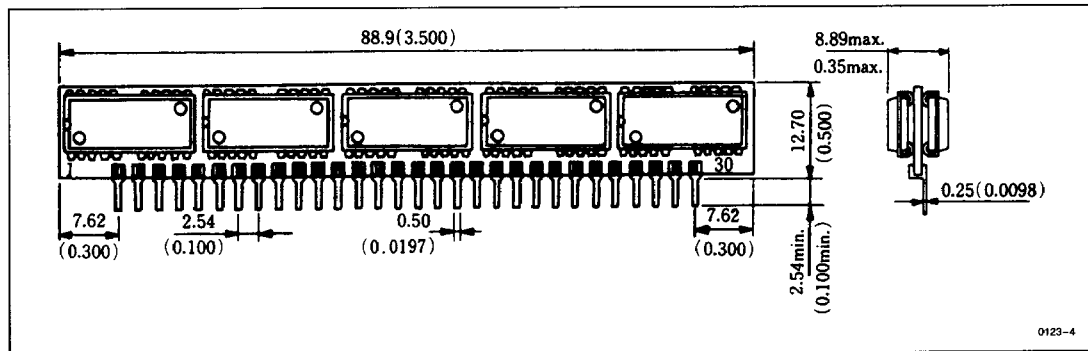
## ■ PHYSICAL OUTLINE

Unit:  $\frac{\text{mm}}{(\text{inch})}$ 

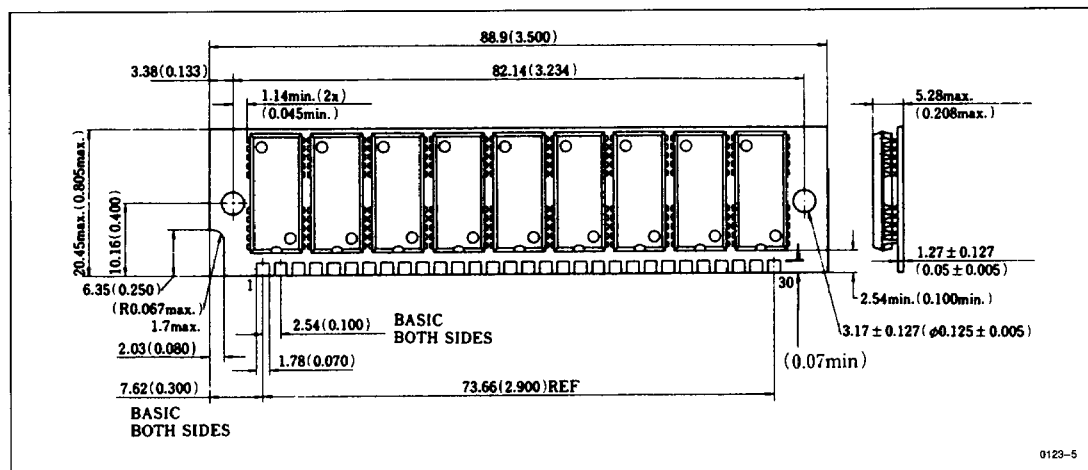
## • HB56C19A Series



## • HB56C19AT Series



## • HB56C19B Series



Note: 1. The plating of the contact finger is solder coat.



## ■ ABSOLUTE MAXIMUM RATINGS

| Parameter                               | Symbol    | Value        | Unit |
|-----------------------------------------|-----------|--------------|------|
| Voltage on Any Pin Relative to $V_{SS}$ | $V_T$     | -1.0 to +7.0 | V    |
| Supply Voltage Relative to $V_{SS}$     | $V_{CC}$  | -1.0 to +7.0 | V    |
| Short Circuit Output Current            | $I_{out}$ | 50           | mA   |
| Power Dissipation                       | $P_T$     | 9.0          | W    |
| Operating Temperature                   | $T_{opr}$ | 0 to +70     | °C   |
| Storage Temperature                     | $T_{stg}$ | -55 to +125  | °C   |

## ■ ELECTRICAL CHARACTERISTICS

• Recommended DC Operating Conditions ( $T_A = 0$  to +70°C)

| Parameter          | Symbol   | Min  | Typ | Max | Unit | Note |
|--------------------|----------|------|-----|-----|------|------|
| Supply Voltage     | $V_{SS}$ | 0    | 0   | 0   | V    |      |
|                    | $V_{CC}$ | 4.5  | 5.0 | 5.5 | V    | 1    |
| Input High Voltage | $V_{IH}$ | 2.4  | —   | 5.5 | V    | 1    |
| Input Low Voltage  | $V_{IL}$ | -1.0 | —   | 0.8 | V    | 1    |

Note: 1. All voltage referenced to  $V_{SS}$ .• DC Electrical Characteristics ( $T_A = 0$  to +70°C,  $V_{CC} = 5V \pm 10\%$ ,  $V_{SS} = 0V$ )

| Parameter                      | Symbol           | HB56C19A/AT/B |                 |      |                 |      |                 | Unit | Test Conditions                                                                   | Note |
|--------------------------------|------------------|---------------|-----------------|------|-----------------|------|-----------------|------|-----------------------------------------------------------------------------------|------|
|                                |                  | -8A           |                 | -10A |                 | -12A |                 |      |                                                                                   |      |
|                                |                  | Min           | Max             | Min  | Max             | Min  | Max             |      |                                                                                   |      |
| Operating Current              | I <sub>CC1</sub> | —             | 630             | —    | 540             | —    | 450             | mA   | t <sub>RC</sub> = Min                                                             | 1, 2 |
| Standby Current                | I <sub>CC2</sub> | —             | 18              | —    | 18              | —    | 18              | mA   | TTL Interface<br>RAS, CAS = V <sub>IH</sub> ,<br>D <sub>out</sub> = High-Z        |      |
|                                |                  | —             | 9               | —    | 9               | —    | 9               | mA   | CMOS Interface RAS,<br>CAS ≥ V <sub>CC</sub> - 0.2V,<br>D <sub>out</sub> = High-Z |      |
| RAS Only Refresh Current       | I <sub>CC3</sub> | —             | 540             | —    | 450             | —    | 405             | mA   | t <sub>RC</sub> = Min                                                             | 2    |
| Standby Current                | I <sub>CC5</sub> | —             | 45              | —    | 45              | —    | 45              | mA   | RAS = V <sub>IH</sub> ,<br>CS = V <sub>IL</sub> ,<br>D <sub>out</sub> = Enable    | 1    |
| CAS Before RAS Refresh Current | I <sub>CC6</sub> | —             | 540             | —    | 450             | —    | 360             | mA   | t <sub>RC</sub> = Min                                                             |      |
| Static Column Mode Current     | I <sub>CC9</sub> | —             | 540             | —    | 450             | —    | 360             | mA   | Static Column Mode<br>t <sub>PC</sub> = Min                                       | 1, 3 |
| Input Leakage Current          | I <sub>LI</sub>  | -10           | 10              | -10  | 10              | -10  | 10              | μA   | 0V ≤ V <sub>in</sub> ≤ 7V                                                         |      |
| Output Leakage Current         | I <sub>LO</sub>  | -10           | 10              | -10  | 10              | -10  | 10              | μA   | 0V ≤ V <sub>out</sub> ≤ 7V,<br>D <sub>out</sub> = Disable                         |      |
| Output High Voltage            | V <sub>OH</sub>  | 2.4           | V <sub>CC</sub> | 2.4  | V <sub>CC</sub> | 2.4  | V <sub>CC</sub> | V    | I <sub>out</sub> = -5 mA                                                          |      |
| Output Low Voltage             | V <sub>OL</sub>  | 0             | 0.4             | 0    | 0.4             | 0    | 0.4             | V    | I <sub>out</sub> = 4.2 mA                                                         |      |

Notes: 1.  $I_{CC}$  depends on output load condition when the device is selected,  $I_{CC}$  max is specified at the output open condition.2. Address can be changed less than three times while  $\overline{RAS} = V_{IL}$ .3. Address can be changed once or less while  $\overline{CS} = V_{IH}$ .

• **Capacitance** ( $T_A = 25^\circ\text{C}$ ,  $V_{CC} = 5\text{V} \pm 10\%$ )

| Parameter                                    | Symbol    | Typ | Max | Unit | Note |
|----------------------------------------------|-----------|-----|-----|------|------|
| Input Capacitance (Address)                  | $C_{I1}$  | —   | 60  | pF   | 1    |
| Input Capacitance (Clock)                    | $C_{I2}$  | —   | 75  | pF   | 1, 2 |
| Input/Output Capacitance ( $DQ_0$ – $DQ_7$ ) | $C_{I/O}$ | —   | 17  | pF   | 1, 2 |
| Input Capacitance (PD)                       | $C_{I3}$  | —   | 10  | pF   | 1    |
| Output Capacitance (PQ)                      | $C_O$     | —   | 12  | pF   | 1, 2 |

Notes: 1. Capacitance measured with Boonton Meter or effective capacitance measuring method.

2.  $\overline{CS} = V_{IH}$  to disable  $D_{out}$ .

• **AC Characteristics**

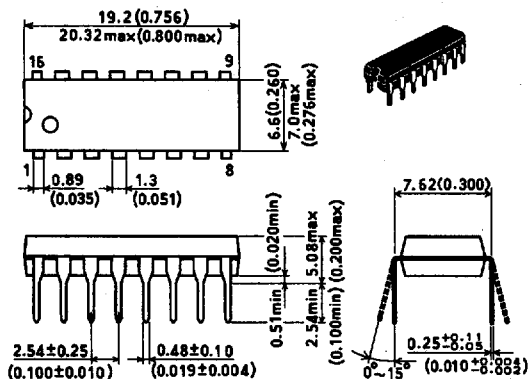
Please show at HM511002A series about AC Characteristics. But don't use by Delayed Write Cycle, because the HB56C19 provides common data inputs and outputs. Please use by Early Write Cycle. ( $t_{WCS} \geq t_{WCS}(\text{min})$ ).

T-90-20

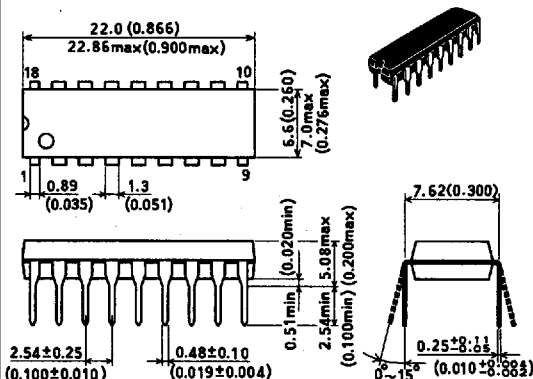
Unit: mm (inch) Scale 3/2

• Dual-in-line Plastic

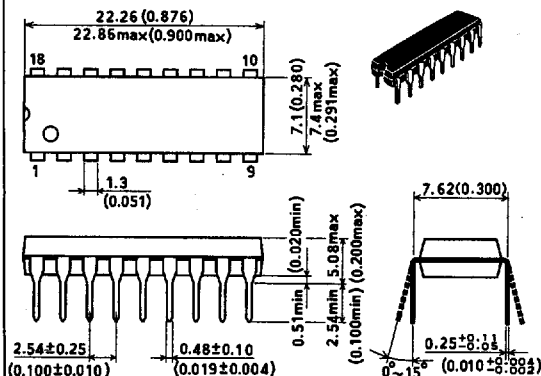
• DP-16B



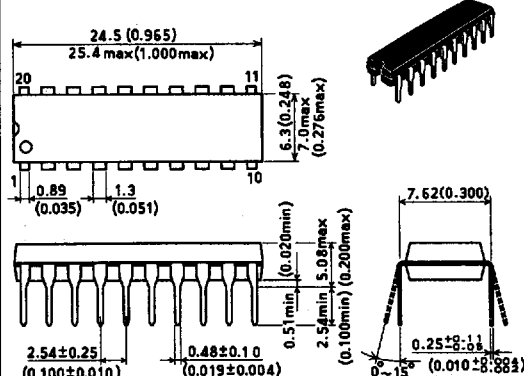
• DP-18B



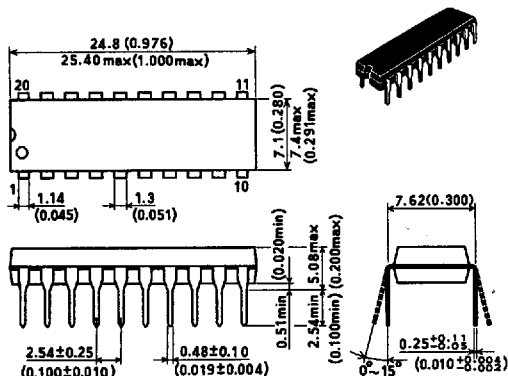
• DP-18C



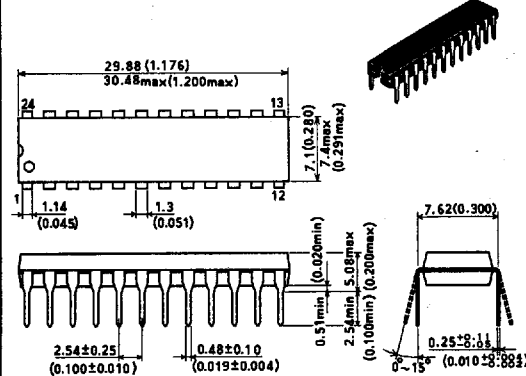
• DP-20N



• DP-20NA



• DP-20NC

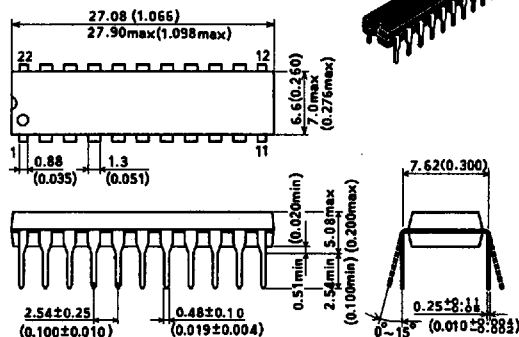


• Dual-In-line Plastic

HITACHI/ LOGIC/ARRAYS/MEM

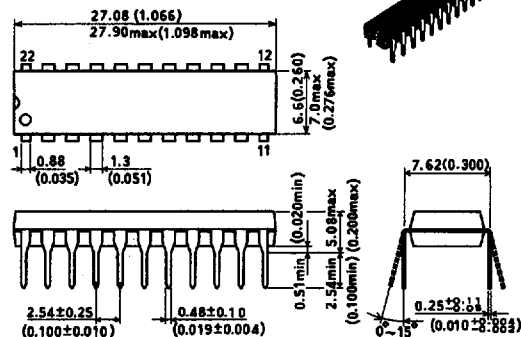
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• DP-22N

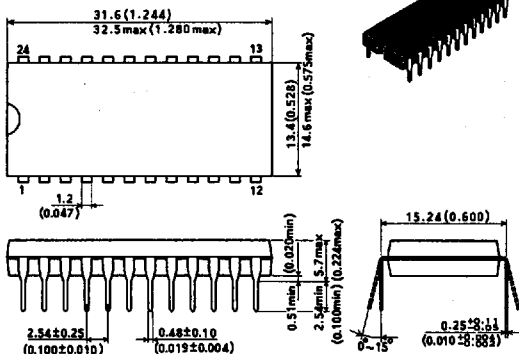


• DP-22NB

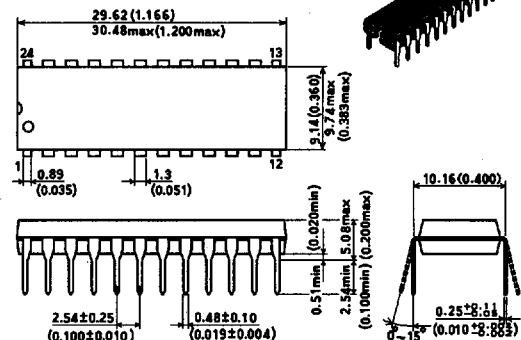
T-90-20



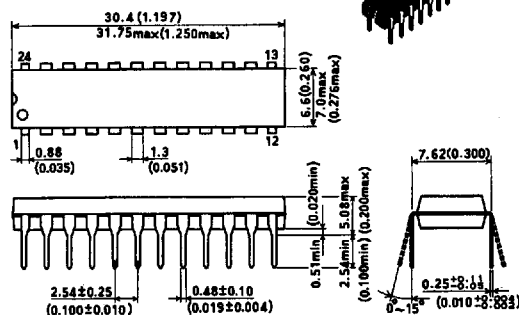
• DP-24



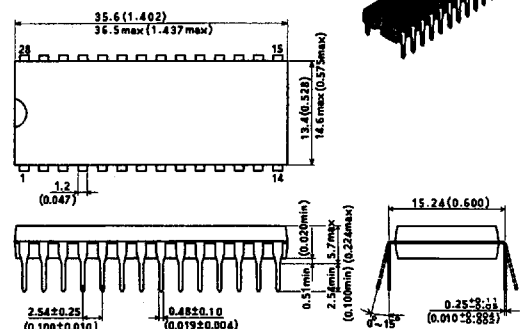
• DP-24A



• DP-24N



• DP-28

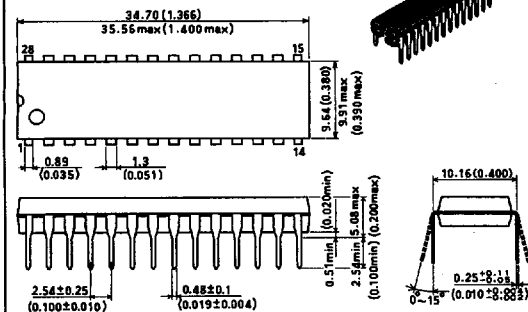


## • Dual-in-line Plastic

HITACHI/ LOGIC/ARRAYS/MEM

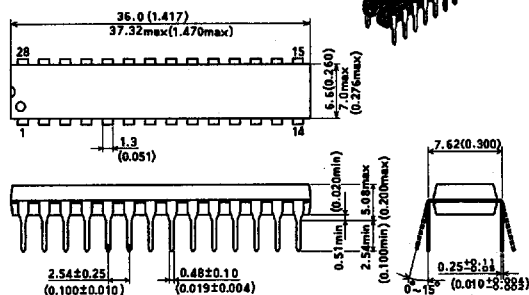
Unit: mm (inch) Scale 3/2

## • DP-28C

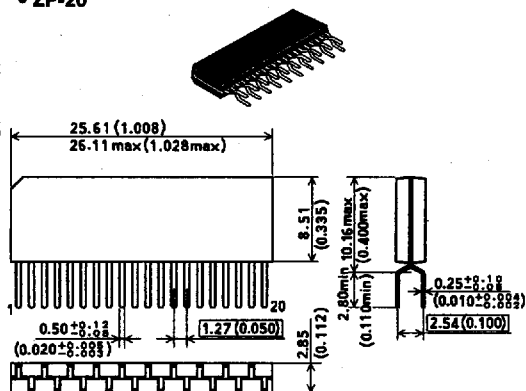


## • DP-28N

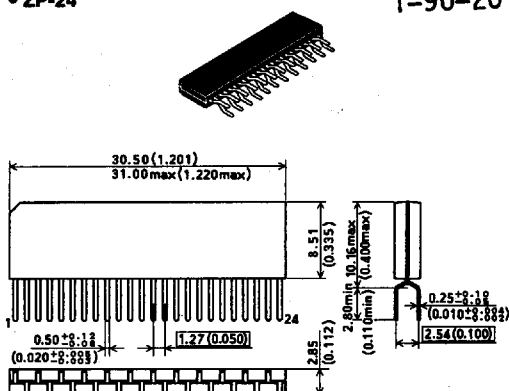
T-90-20



• ZP-20

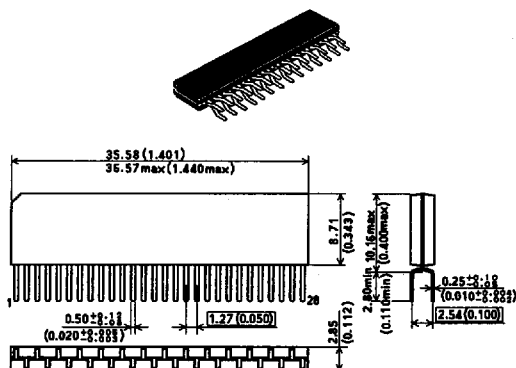


• ZP-24

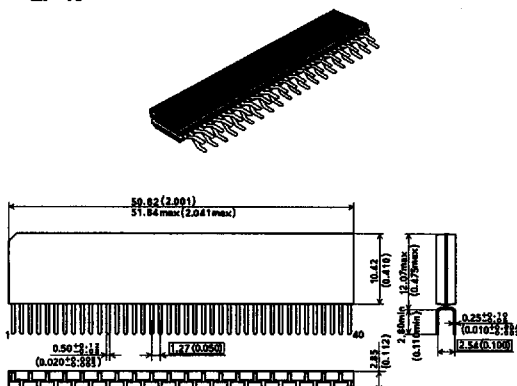


T-90-20

• ZP-28



• ZP-40



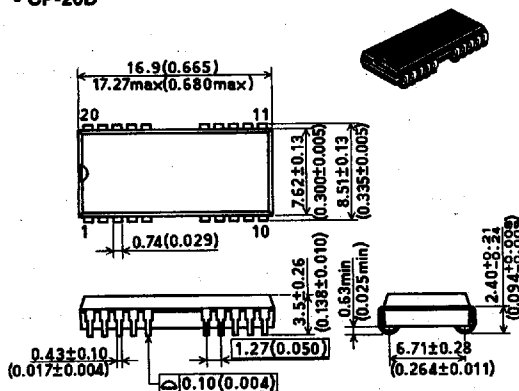
• Flat Package (J-bend Leads)

HITACHI/ LOGIC/ARRAYS/MEM

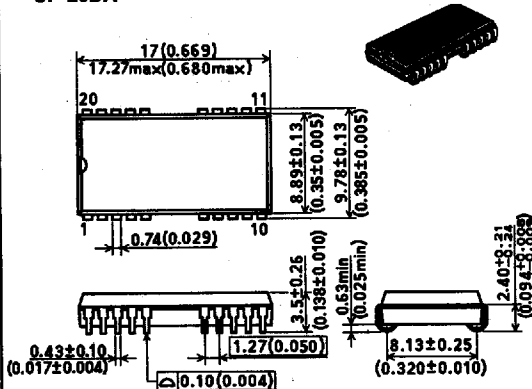
Unit: mm (inch) Scale 3/2

T-90-20

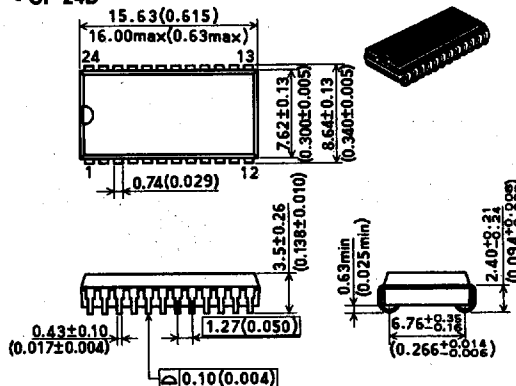
## • CP-20D



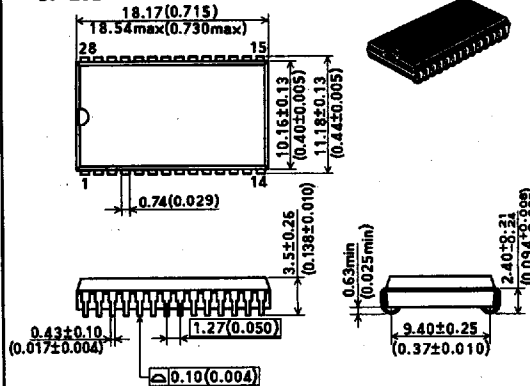
## • CP-20DA



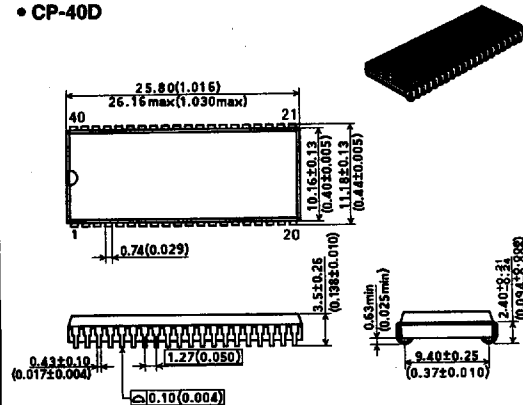
## • CP-24D



## • CP-28D



## • CP-40D

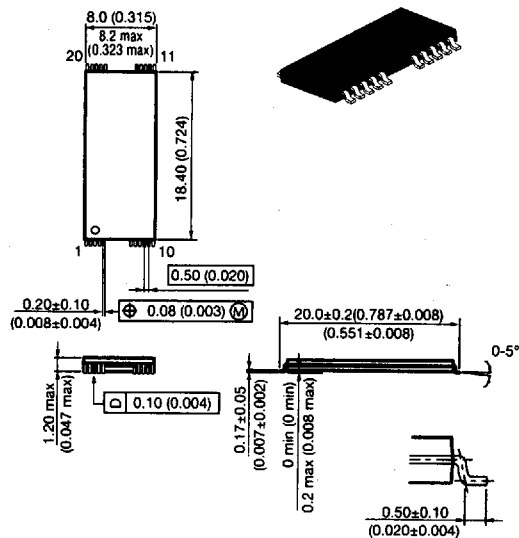


• TSOP (Thin Small Outline Package)

HITACHI/ LOGIC/ARRAYS/MEM

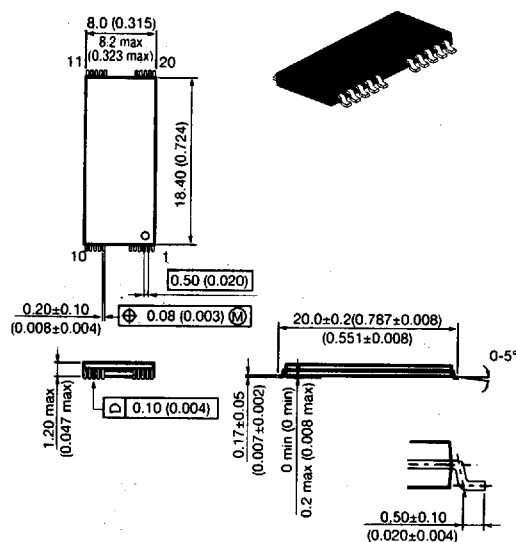
Unit: mm (inch) Scale 3/2

• TFP-20DA

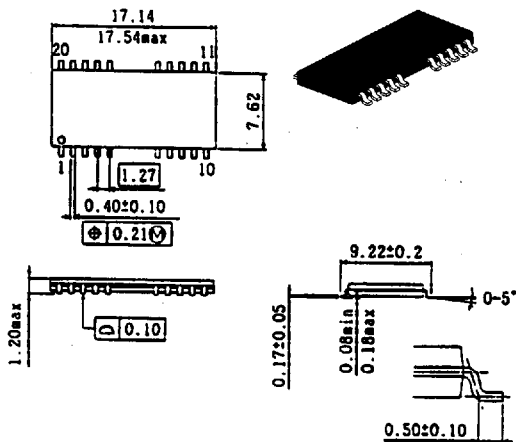


• TFP-20DAR

T-90-20



• TTP-20D



• TTP-20DR

