

**HD75232/GD75323**

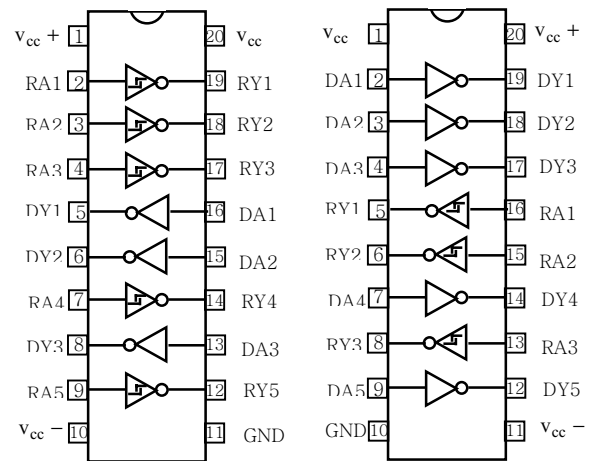
EIA RS-232-D INTERFACE 1 CHIP IC

**Description**

The HD75232 is a monolithic device containing 3 independent drivers and 5 receivers, and the GD75323 is a monolithic device containing 5 independent drivers and 3 receivers. These are designed to interface between data terminal equipment and data communication equipment as designed by EIA-232-D.

**Features**

- Meets standard EIA-232-D (Revision of RS-232-C)
- Drivers
  - Current Limited Output ... 10 mA Typical
  - Power-off Output Impedance ... 300  $\Omega$  Min
  - Slew Rate Control by Load Capacitor
  - Flexible Supply Voltage Range
  - Input Compatible with Most TTL and DTL Circuits
- Receivers
  - Input Resistance ..... 3 K $\Omega$  to 7 K $\Omega$
  - Input Signal Range .....  $\pm 30$ V
  - Built-in Input Hysteresis (Double Threshold)
- 20 DIP/SOP/SSOP/TSSOP

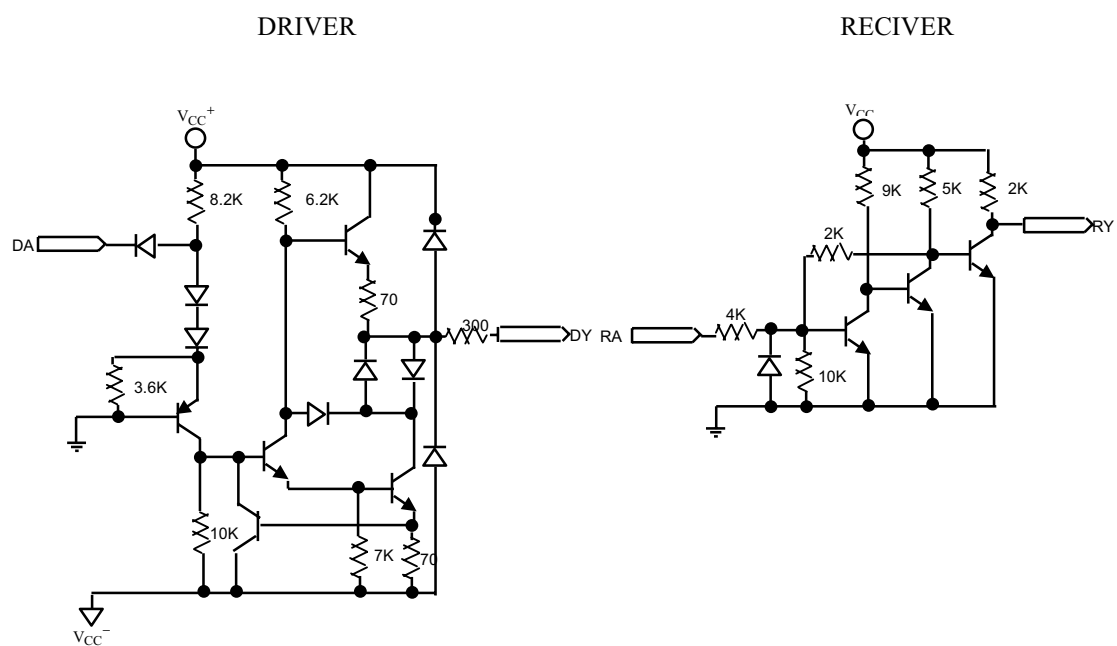
**Block Diagram****HD75232****GD75323****Pin Description**

| NAME              | Pin No. |         | Function                | NAME              | Pin No. |         | Function                |
|-------------------|---------|---------|-------------------------|-------------------|---------|---------|-------------------------|
|                   | HD75232 | GD75323 |                         |                   | HD75232 | GD75323 |                         |
| V <sub>CC</sub> + | 1       | 20      | Driver Section Supply + | V <sub>CC</sub> - | 10      | 11      | Driver Section Supply - |
| DA1               | 16      | 2       | Driver Input            | DY1               | 5       | 19      | Driver Output           |
| DA2               | 15      | 3       |                         | DY2               | 6       | 18      |                         |
| DA3               | 13      | 4       |                         | DY3               | 8       | 17      |                         |
| DA4               | -       | 7       |                         | DY4               | -       | 14      |                         |
| DA5               | -       | 9       |                         | DY5               | -       | 12      |                         |
| V <sub>CC</sub>   | 20      | 1       | Receiver Section Supply | GND               | 11      | 10      | Ground                  |
| RA1               | 2       | 16      | Receiver Input          | RY1               | 19      | 5       | Receiver Output         |
| RA2               | 3       | 15      |                         | RY2               | 18      | 6       |                         |
| RA3               | 4       | 13      |                         | RY3               | 17      | 8       |                         |
| RA4               | 7       | -       |                         | RY4               | 14      | -       |                         |
| RA5               | 9       | -       |                         | RY5               | 12      | -       |                         |

### Absolute Maximum Ratings

| Symbol                 | Parameter                                    | Rating    | Unit |
|------------------------|----------------------------------------------|-----------|------|
| $V_{CC+}$              | Supply Voltage                               | 15        | V    |
| $V_{CC-}$              | Supply Voltage                               | -15       | V    |
| $V_{CC}$               | Supply Voltage                               | 10        | V    |
| $V_I(\text{Driver})$   | Input Voltage                                | -15 ~ +7  | V    |
| $V_I(\text{Receiver})$ | Input Voltage                                | $\pm 30$  | V    |
| $V_O(\text{Driver})$   | Output Voltage                               | -15 ~ +15 | V    |
| PT                     | Continuous Power Dissipation<br>(Below 25°C) | 1.0       | W    |
| $T_{STG}$              | Storage Temperature                          | -65 ~ +75 | °C   |
| $T_{OP}$               | Operating Temperature                        | 0 ~ +75   | °C   |

### Schematic



**Electrical Characteristics****Supply Current** $V_{CC} = 5V$   $T_a = 25^\circ C$ 

| Symbol    | Parameter                        | Test Conditions                         |                                    | HD75232 |             |             | GD75323 |               |             | Unit |
|-----------|----------------------------------|-----------------------------------------|------------------------------------|---------|-------------|-------------|---------|---------------|-------------|------|
|           |                                  |                                         |                                    | Min     | Typ         | Max         | Min     | Typ           | Max         |      |
| $I_{CC+}$ | Supply Current<br>From $V_{CC+}$ | $V_{CC+} = 9V$<br>No Load               | $V_{IN} = 1.9V$<br>$V_{IN} = 0.8V$ |         | 11.3<br>3.4 | 15<br>4.5   |         | 18.8<br>5.6   | 25<br>7.5   | mA   |
|           |                                  | $V_{CC+} = 12V$<br>No Load              | $V_{IN} = 1.9V$<br>$V_{IN} = 0.8V$ |         | 14.3<br>4.1 | 19<br>5.5   |         | 23.8<br>6.9   | 31.3<br>8.8 |      |
|           |                                  | $V_{CC+} = 15V$<br>No Load              | $V_{IN} = 1.9V$<br>$V_{IN} = 0.8V$ |         |             | 25<br>9     |         |               | 42<br>15    |      |
|           |                                  |                                         |                                    |         |             |             |         |               |             |      |
| $I_{CC-}$ | Supply Current<br>From $V_{CC-}$ | $V_{CC-} = -9V$<br>No Load              | $V_{IN} = 1.9V$<br>$V_{IN} = 0.8V$ |         | -12<br>-3.2 | -15<br>-3.2 |         | -20<br>-26.7  | -24<br>-32  | mA   |
|           |                                  | $V_{CC-} = -12V$<br>No Load             | $V_{IN} = 1.9V$<br>$V_{IN} = 0.8V$ |         | -16<br>-3.2 | -19<br>-3.2 |         | -26.7<br>-2.5 | -32<br>-2.5 |      |
|           |                                  | $V_{CC-} = -15V$<br>No Load             | $V_{IN} = 1.9V$<br>$V_{IN} = 0.8V$ |         |             | -25<br>-3.2 |         |               | -40<br>-4.0 |      |
|           |                                  |                                         |                                    |         |             |             |         |               |             |      |
| $I_{CC}$  | Supply Current<br>From $V_{CC}$  | $V_{CC} = 5V$<br>$V_{CC} = 5V$ O/P Open | $V_{IN} = 5.0V$                    |         | 20          | 30          |         | 15            | 19.5        | mA   |

**Driver Section**

| Symbol      | Parameter                                        | Test Conditions                                   |                                          | Min | Typ   | Max  | Unit     |
|-------------|--------------------------------------------------|---------------------------------------------------|------------------------------------------|-----|-------|------|----------|
| $V_{IH}$    | High Level<br>Input Voltage                      | $V_{CC+} = +9V$<br>$V_{CC-} = -9V$                |                                          | 1.9 |       |      | V        |
| $V_{IL}$    | Low Level<br>Input Voltage                       |                                                   |                                          |     |       | 0.8  | V        |
| $V_{OH}$    | High Level<br>Output Voltage                     | $V_{IL} = 0.8V$<br>$R_L = 3K\Omega$               | $V_{CC+} = +9V$<br>$V_{CC-} = -9V$       | 6   | 7     |      | V        |
|             |                                                  |                                                   | $V_{CC+} = +13.2V$<br>$V_{CC-} = -13.2V$ | 9   | 10.5  |      |          |
|             |                                                  |                                                   |                                          |     |       |      |          |
| $V_{OL}$    | Low Level<br>Output Voltage                      | $V_{IH} = 1.9V$<br>$R_L = 3K\Omega$               | $V_{CC+} = +9V$<br>$V_{CC-} = -9V$       |     | -7    | -6   | V        |
|             |                                                  |                                                   | $V_{CC+} = +13.2V$<br>$V_{CC-} = -13.2V$ |     | -10.5 | -9   |          |
|             |                                                  |                                                   |                                          |     |       |      |          |
| $I_{IH}$    | High Level<br>Input Current                      | $V_I = 5V$                                        |                                          |     |       | 10   | $\mu A$  |
| $I_{IL}$    | Low Level<br>Input Current                       | $V_I = 0$                                         |                                          |     | -1    | -1.6 | MA       |
| $I_{OS(H)}$ | Short Circuit<br>Output Current<br>at High Level | $V_I = 0.8V$<br>$V_O = 0$                         |                                          | -6  | -10   | -12  | MA       |
| $I_{OS(L)}$ | Short Circuit<br>Output Current<br>at Low Level  | $V_I = 1.9V$<br>$V_O = 0$                         |                                          | 6   | 10    | 12   | mA       |
| $R_O$       | Output Resistance,<br>Power Off                  | $V_{CC+} = 0, V_{CC-} = 0$<br>$V_O = -2V$ to $2V$ |                                          | 300 |       |      | $\Omega$ |

**Driver Switching Characteristics****V<sub>cc</sub>+ =9V, V<sub>cc</sub>- =-9V, T<sub>A</sub>=25°C**

| Symbol           | Parameter                                        | Test Conditions                                                             | Min | Typ | Max | Unit |
|------------------|--------------------------------------------------|-----------------------------------------------------------------------------|-----|-----|-----|------|
| t <sub>PLH</sub> | Propagation Delay Time, Low-To-High-Level Output | R <sub>L</sub> = 3kΩ<br>C <sub>L</sub> = 15pF<br><br>See Figure 1           |     | 400 | 500 | ns   |
| t <sub>PHL</sub> | Propagation Delay Time, High-To-Low-Level Output |                                                                             |     | 100 | 175 | ns   |
| t <sub>TLH</sub> | Transition Time, Low-To-High-Level Output†       |                                                                             |     | 55  | 100 | ns   |
| t <sub>THL</sub> | Transition Time, High-To-Low-Level Output†       |                                                                             |     | 45  | 75  | ns   |
| t <sub>TLH</sub> | Transition Time, Low-To-High-Level Output‡       | R <sub>L</sub> = 3kΩ to 7 kΩ<br>C <sub>L</sub> = 2500pF<br><br>See Figure 1 |     | 2.5 |     | μs   |
| t <sub>THL</sub> | Transition Time, High-To-Low-Level Output‡       |                                                                             |     | 3.0 |     | μs   |

† Measured between 10% and 70% Points of Output Waveform

‡ Measured between +3V and -3V Points on the Output Waveform (EIA-232-D Condition)

**Receiver Section**

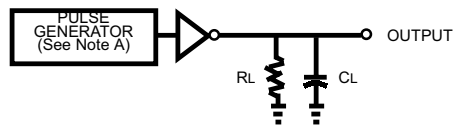
| Symbol          | Parameter                        | Test Conditions                                      | Min   | Typ  | Max  | Unit |
|-----------------|----------------------------------|------------------------------------------------------|-------|------|------|------|
| V <sub>T+</sub> | Positive-Going Threshold Voltage |                                                      | 1.75  | 1.9  | 2.25 | V    |
| V <sub>T-</sub> | Negative-Going Threshold Voltage |                                                      | 0.75  | 0.97 | 1.25 | V    |
| V <sub>OH</sub> | High Level Output Voltage        | V <sub>I</sub> = 0.75V ,<br>I <sub>OL</sub> = -0.5mA | 2.6   | 4    | 5    | V    |
|                 |                                  | Input Open ,<br>I <sub>OL</sub> = -0.5mA             | 2.6   | 4    | 5    |      |
| V <sub>OL</sub> | Low Level Output Voltage         | V <sub>I</sub> = 3V , I <sub>OL</sub> = 10mA         |       | 0.2  | 0.45 | V    |
| I <sub>IH</sub> | High-Level Input Current         | V <sub>I</sub> = 25V                                 | 3.6   |      | 8.3  | mA   |
|                 |                                  | V <sub>I</sub> = 3V                                  | 0.43  |      |      |      |
| I <sub>IL</sub> | Low-Level Input Current          | V <sub>I</sub> = -25V                                | -3.6  |      | -8.3 | mA   |
|                 |                                  | V <sub>I</sub> = -3V                                 | -0.43 |      |      |      |
| I <sub>OS</sub> | Short-Circuit Output Current     |                                                      |       | -3   |      | mA   |

**Receiver Switching Characteristics**

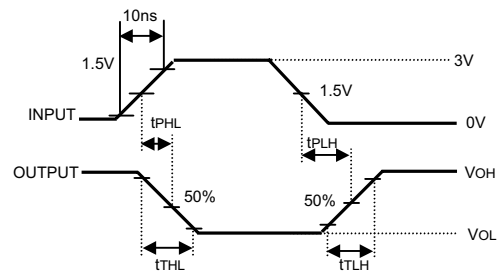
| Symbol           | Parameter                                        | Test Conditions                                 | Min | Typ | Max | Unit |
|------------------|--------------------------------------------------|-------------------------------------------------|-----|-----|-----|------|
| t <sub>PLH</sub> | Propagation Delay Time, Low-To-High Level Output | C <sub>L</sub> = 15pF<br>R <sub>L</sub> = 3.9kΩ |     | 100 | 150 | ns   |
| t <sub>PHL</sub> | Propagation Delay Time, High-To-Low Level Output | C <sub>L</sub> = 15pF<br>R <sub>L</sub> = 390kΩ |     | 25  | 50  | ns   |
| t <sub>TLH</sub> | Transition Time, Low-To-High Level Output        | C <sub>L</sub> = 15pF<br>R <sub>L</sub> = 3.9kΩ |     | 120 | 175 | ns   |
| t <sub>THL</sub> | Transition Time, High-To-Low Level Output        | C <sub>L</sub> = 15pF<br>R <sub>L</sub> = 390kΩ |     | 10  | 20  | ns   |

## Parameter Measurement Information

### • DRIVER

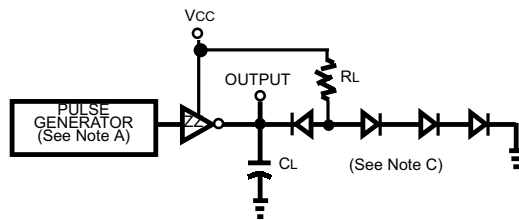


Test Circuit

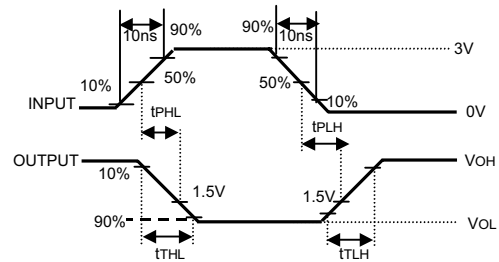


Voltage Wave form

### • RECEIVER



Test Circuit



Voltage Waveform

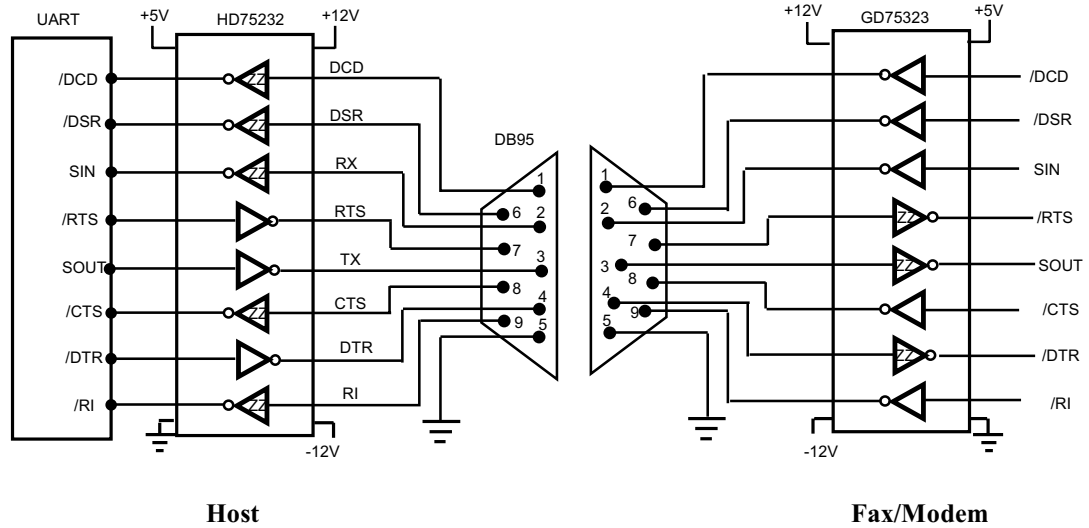
NOTE A. The pulse generator has the following characteristics.  $t_W = 25\mu s$ ,  $f = 200KHz$ ,  $Z_O = 50\Omega$

B. C includes probe and zig capacitance

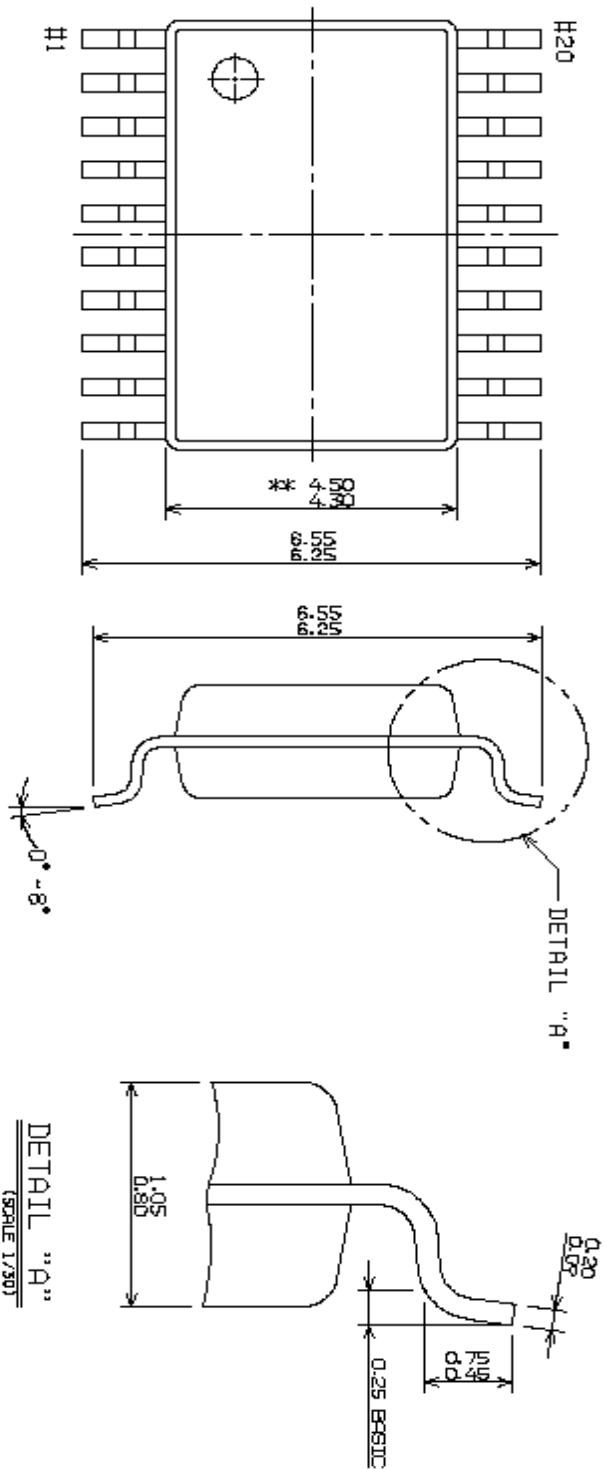
C. All diodes are 1N3064 or equivalent.

Fig 1. Propagation and Transition Times

## Typical Application



•20SOP(300MIL)



-NOTE-

1. DIMENSION \* MARK DOES NOT INCLUDE MOLD PROTRUSION. MAXIMUM ALLOWABLE PROTRUSION IS 0.15 MM PER SIDE.
2. DIMENSION \*\* MARK DOES NOT INCLUDE MOLD PROTRUSION. MAXIMUM ALLOWABLE PROTRUSION IS 0.25 MM PER SIDE.
3. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M-1982.
4. UNSPECIFIED IS ACCORDING TO JEDEC MO-153, VARIATION "A".

## TOLERANCES

UNLESS OTHERWISE SPECIFIED

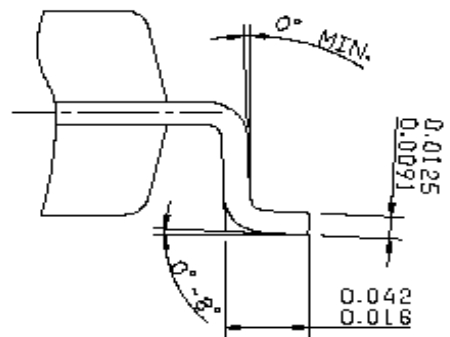
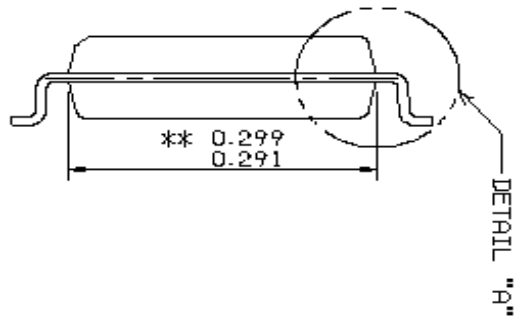
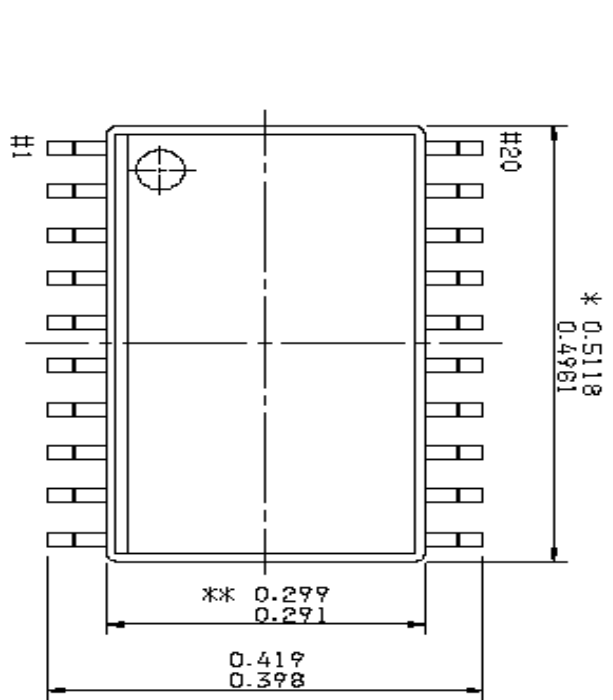
ANGULAR: 10.5°

X : ±0.25

XX : ±0.1

XXX : ±0.05

## •20TSSOP(4.4mm)



-NOTE-

1. DIMENSION \* MARK DOES NOT INCLUDE MOLD PROTRUSION. MAXIMUM ALLOWABLE PROTRUSION IS 0.006 INCH PER SIDE.
2. DIMENSION \*\* MARK DOES NOT INCLUDE MOLD PROTRUSION. MAXIMUM ALLOWABLE PROTRUSION IS 0.010 INCH PER SIDE.
3. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M-1982.
4. UNSPECIFIED IS ACCORDING TO JEDEC MS-013, VARIATION "NC".

DETAIL "A"  
(SCALE 1/20)

| TOLERANCES                 |
|----------------------------|
| UNLESS OTHERWISE SPECIFIED |
| ANGULAR: 10.5°             |
| X : ±0.25                  |
| XX : ±0.1                  |
| XXX : ±0.05                |