

## FEATURES

- Differential D and Q
- Extended 100E VEE range of -4.2V to -5.5V
- 700ps max. propagation delay
- High frequency outputs
- Internal 75KΩ input pull-down resistors
- Fully compatible with Motorola 10E/100E404
- Available in 28-pin PLCC package

## DESCRIPTION

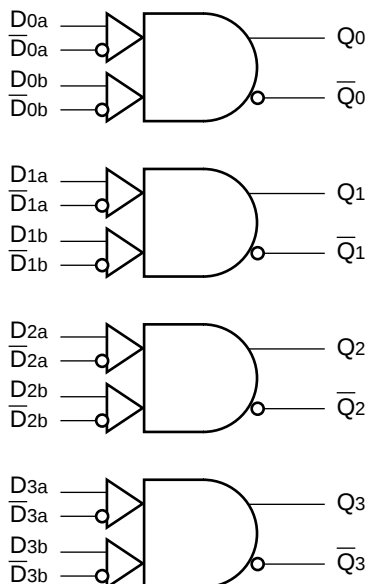
The SY10/100E404 are 4-bit differential AND/NAND devices. The differential operation of these devices make them ideal for pulse shaping applications where duty cycle skew is critical. Special design techniques were incorporated to minimize the skew between the upper and lower level gate inputs.

Because a negative 2-input NAND function is equivalent to a 2-input OR function, the differential inputs and outputs of the devices also allow for their use as fully differential 2-input OR/NOR functions.

The output RISE/FALL times of these devices are significantly faster than most other standard ECLinPS devices, resulting in an increased bandwidth.

The differential inputs have clamp structures which will force the Q output of a gate in an open input condition to go to a LOW state. Thus, inputs of unused gates can be left open and will not affect the operation of the rest of the device.

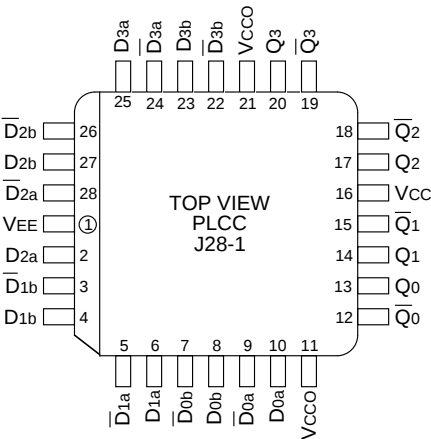
## BLOCK DIAGRAM



## PIN NAMES

| Pin                          | Function                  |
|------------------------------|---------------------------|
| D[0:4], $\overline{D}$ [0:4] | Differential Data Inputs  |
| Q[0:4], $\overline{Q}$ [0:4] | Differential Data Outputs |
| Vcco                         | Vcc to Output             |

PACKAGE/ORDERING INFORMATION



28-Pin PLCC (J28-1)

Ordering Information<sup>(1)</sup>

| Part Number                     | Package Type | Operating Range | Package Marking                             | Lead Finish |
|---------------------------------|--------------|-----------------|---------------------------------------------|-------------|
| SY10E404JC                      | J28-1        | Commercial      | SY10E404JC                                  | Sn-Pb       |
| SY10E404JCTR <sup>(2)</sup>     | J28-1        | Commercial      | SY10E404JC                                  | Sn-Pb       |
| SY100E404JC                     | J28-1        | Commercial      | SY100E404JC                                 | Sn-Pb       |
| SY100E404JCTR <sup>(2)</sup>    | J28-1        | Commercial      | SY100E404JC                                 | Sn-Pb       |
| SY10E404JZ <sup>(3)</sup>       | J28-1        | Commercial      | SY10E404JZ with Pb-Free bar-line indicator  | Matte-Sn    |
| SY10E404JZTR <sup>(2, 3)</sup>  | J28-1        | Commercial      | SY10E404JZ with Pb-Free bar-line indicator  | Matte-Sn    |
| SY100E404JZ <sup>(3)</sup>      | J28-1        | Commercial      | SY100E404JZ with Pb-Free bar-line indicator | Matte-Sn    |
| SY100E404JZTR <sup>(2, 3)</sup> | J28-1        | Commercial      | SY100E404JZ with Pb-Free bar-line indicator | Matte-Sn    |

Notes:

1. Contact factory for die availability. Dice are guaranteed at T<sub>A</sub> = 25°C, DC Electricals only.
2. Tape and Reel.
3. Pb-Free package is recommended for new designs.

**TRUTH TABLE**

| Da | Db | Q | $\overline{Da}$ | $\overline{Db}$ | $\overline{Q}$ |
|----|----|---|-----------------|-----------------|----------------|
| L  | L  | L | L               | L               | L              |
| L  | H  | L | L               | H               | H              |
| H  | L  | L | H               | L               | H              |
| H  | H  | H | H               | H               | H              |

**DC ELECTRICAL CHARACTERISTICS**V<sub>EE</sub> = V<sub>EE</sub> (Min.) to V<sub>EE</sub> (Max.); V<sub>CC</sub> = V<sub>CCO</sub> = GND

| Symbol               | Parameter            | T <sub>A</sub> = 0°C |      |      | T <sub>A</sub> = +25°C |      |      | T <sub>A</sub> = +85°C |      |      | Unit | Condition |
|----------------------|----------------------|----------------------|------|------|------------------------|------|------|------------------------|------|------|------|-----------|
|                      |                      | Min.                 | Typ. | Max. | Min.                   | Typ. | Max. | Min.                   | Typ. | Max. |      |           |
| I <sub>IH</sub>      | Input HIGH Current   | —                    | —    | 150  | —                      | —    | 150  | —                      | —    | 150  | μA   | —         |
| I <sub>EE</sub>      | Power Supply Current | —                    | —    | —    | —                      | —    | —    | —                      | —    | —    | mA   | —         |
|                      | 10E                  | —                    | 106  | 127  | —                      | 106  | 127  | —                      | 106  | 127  |      |           |
|                      | 100E                 | —                    | 106  | 127  | —                      | 106  | 127  | —                      | 106  | 127  |      |           |
| V <sub>PP</sub> (DC) | Input Sensitivity    | 50                   | —    | —    | 50                     | —    | —    | 50                     | —    | —    | mV   | 1         |
| V <sub>CMR</sub>     | Common Mode Range    | –1.5                 | —    | 0    | –1.5                   | —    | 0    | –1.5                   | —    | 0    | V    | 2         |

**Notes:**

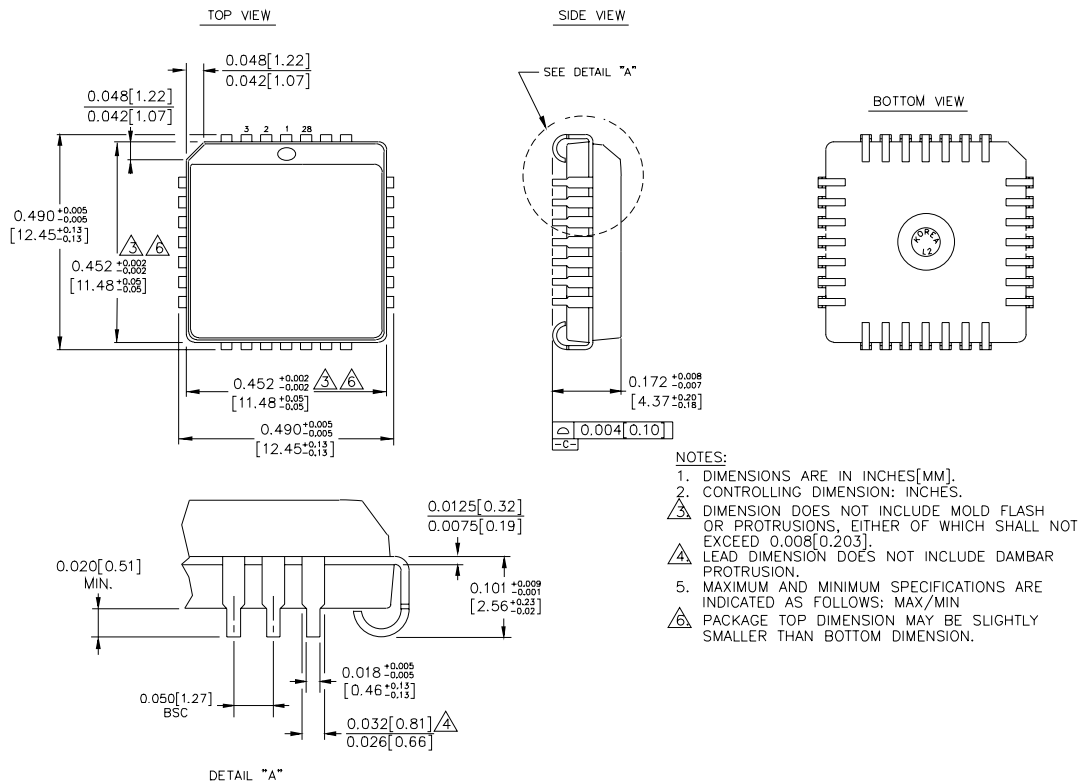
1. Differential input voltage required to obtain a full ECL swing on the outputs.
2. V<sub>CMR</sub> is referenced to the most positive side of the differential input signal. Normal operation is obtained when the input signals are within the V<sub>CMR</sub> range and the input swing is greater than V<sub>PP</sub> (min.) and <1V.

**AC ELECTRICAL CHARACTERISTICS**V<sub>EE</sub> = V<sub>EE</sub> (Min.) to V<sub>EE</sub> (Max.); V<sub>CC</sub> = V<sub>CCO</sub> = GND

| Symbol                           | Parameter                   | T <sub>A</sub> = 0°C |      |      | T <sub>A</sub> = +25°C |      |      | T <sub>A</sub> = +85°C |      |      | Unit | Condition |
|----------------------------------|-----------------------------|----------------------|------|------|------------------------|------|------|------------------------|------|------|------|-----------|
|                                  |                             | Min.                 | Typ. | Max. | Min.                   | Typ. | Max. | Min.                   | Typ. | Max. |      |           |
| t <sub>PD</sub>                  | Propagation Delay to Output | —                    | —    | —    | —                      | —    | —    | —                      | —    | —    | ps   | —         |
|                                  | Da (Diff)                   | 350                  | 475  | 650  | 350                    | 475  | 650  | 350                    | 475  | 650  |      |           |
|                                  | Da (SE)                     | 300                  | 475  | 700  | 300                    | 475  | 700  | 300                    | 475  | 700  |      |           |
|                                  | Db (Diff)                   | 375                  | 500  | 675  | 375                    | 500  | 675  | 375                    | 500  | 675  |      |           |
| t <sub>skew</sub>                | Db (SE)                     | 325                  | 500  | 725  | 325                    | 500  | 725  | 325                    | 500  | 725  | ps   | 1         |
|                                  | Within-Device Skew          | —                    | 50   | —    | —                      | 50   | —    | —                      | 50   | —    |      |           |
| V <sub>PP</sub> (AC)             | Minimum Input Swing         | 150                  | —    | —    | 150                    | —    | —    | 150                    | —    | —    | mV   | 2         |
| t <sub>r</sub><br>t <sub>f</sub> | Rise/Fall Time<br>20–80%    | 150                  | —    | 400  | 150                    | —    | 400  | 150                    | —    | 400  | ps   | —         |

**Notes:**

1. Within-device skew is defined as identical transitions on similar paths through a device.
2. Minimum input swing for which AC parameters are guaranteed.

**28-PIN PLCC (J28-1)**

Rev. 03

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