

# Quad Differential AND/NAND

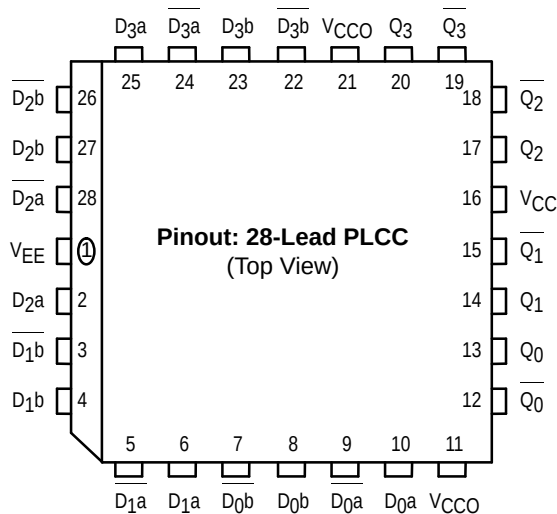
The MC10E404/100E404 is a 4-bit differential AND/NAND device. The differential operation of the device makes it ideal for pulse shaping applications where duty cycle skew is critical. Special design techniques were incorporated to minimize the skew between the upper and lower level gate inputs.

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

The output RISE/FALL times of this device 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. Note that the input clamp will take affect only if both inputs fall 2.5V below VCC.

- Differential D and Q
- 700ps Max. Propagation Delay
- High Frequency Outputs
- Extended 100E VEE Range of – 4.2V to – 5.46V
- Internal 75kΩ Input Pulldown Resistors



\* All VCC and VCCO pins are tied together on the die.

## PIN NAMES

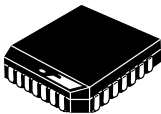
| Pin            | Function                  |
|----------------|---------------------------|
| D[0:4], D[0:4] | Differential Data Inputs  |
| Q[0:4], Q[0:4] | Differential Data Outputs |

## FUNCTION TABLE

| Da | Db | Q | Da | Db | 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 |

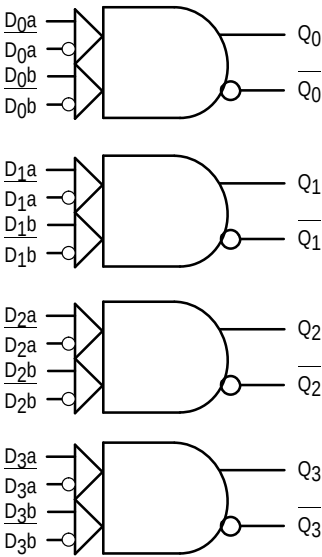
MC10E404  
MC100E404

QUAD DIFFERENTIAL  
AND/NAND



FN SUFFIX  
PLASTIC PACKAGE  
CASE 776-02

## LOGIC DIAGRAM



# MC10E404 MC100E404

## DC CHARACTERISTICS ( $V_{EE} = V_{EE}(\min)$ to $V_{EE}(\max)$ ; $V_{CC} = V_{CCO} = \text{GND}$ )

| Symbol              | Characteristic       | 0°C  |     |     | 25°C |     |     | 85°C |     |     | Unit          | Condition |
|---------------------|----------------------|------|-----|-----|------|-----|-----|------|-----|-----|---------------|-----------|
|                     |                      | min  | typ | max | min  | typ | max | min  | typ | max |               |           |
| $I_{IH}$            | Input HIGH Current   |      |     | 150 |      |     | 150 |      |     | 150 | $\mu\text{A}$ |           |
| $I_{EE}$            | Power Supply Current |      |     |     |      |     |     |      |     |     | $\text{mA}$   |           |
|                     | 10E                  |      | 106 | 127 |      | 106 | 127 |      | 106 | 127 |               |           |
|                     | 100E                 |      | 106 | 127 |      | 106 | 127 |      | 122 | 146 |               |           |
| $V_{PP}(\text{DC})$ | Input Sensitivity    | 50   |     |     | 50   |     |     | 50   |     |     | $\text{mV}$   | 1         |
| $V_{CMR}$           | Common Mode Range    | -1.5 |     | 0   | -1.5 |     | 0   | -1.5 |     | 0   | $\text{V}$    | 2         |

1. Differential input voltage required to obtain a full ECL swing on the outputs.
2.  $V_{CMR}$  is referenced to the most positive side of the differential input signal. Normal operation is obtained when the input signals are within the  $V_{CMR}$  range and the input swing is greater than  $V_{PP \text{ MIN}}$  and  $< 1.0\text{V}$ .

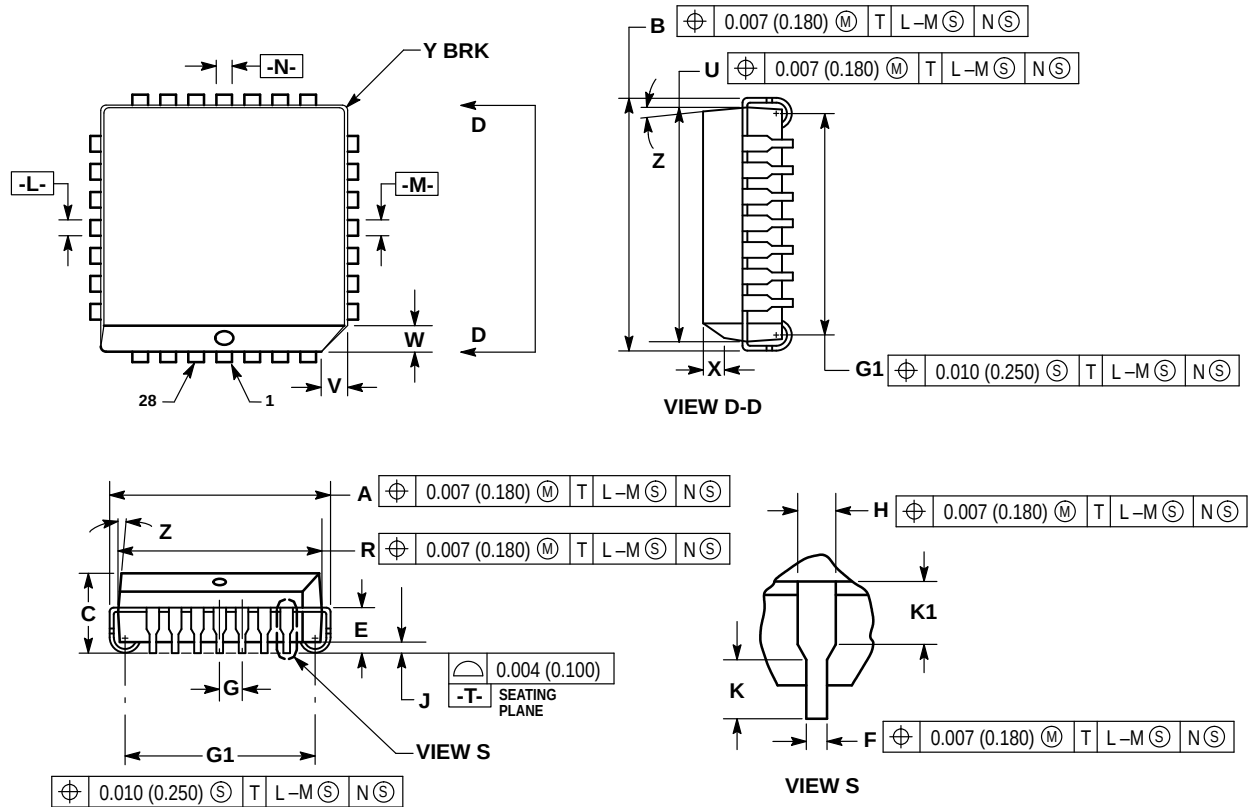
## AC CHARACTERISTICS ( $V_{EE} = V_{EE}(\min)$ to $V_{EE}(\max)$ ; $V_{CC} = V_{CCO} = \text{GND}$ )

| Symbol                 | Characteristic                                                              | 0°C                      |                          |                          | 25°C                     |                          |                          | 85°C                     |                          |                          | Unit        | Condition |
|------------------------|-----------------------------------------------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------|-----------|
|                        |                                                                             | min                      | typ                      | max                      | min                      | typ                      | max                      | min                      | typ                      | max                      |             |           |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation Delay to Output<br>Da (Diff)<br>Da (SE)<br>Db (Diff)<br>Db (SE) | 350<br>300<br>375<br>325 | 475<br>475<br>500<br>500 | 650<br>700<br>675<br>725 | 350<br>300<br>375<br>325 | 475<br>475<br>500<br>500 | 650<br>700<br>675<br>725 | 350<br>300<br>375<br>325 | 475<br>475<br>500<br>500 | 650<br>700<br>675<br>725 | $\text{ps}$ |           |
| $t_{SKEW}$             | Within-Device Skew                                                          |                          | 50                       |                          |                          | 50                       |                          |                          | 50                       |                          | $\text{ps}$ | 1         |
| $V_{PP}(\text{AC})$    | Minimum Input Swing                                                         | 150                      |                          |                          | 150                      |                          |                          | 150                      |                          |                          | $\text{mV}$ | 2         |
| $t_r$<br>$t_f$         | Rise/Fall Time<br>20 - 80%                                                  | 150                      |                          | 400                      | 150                      |                          | 400                      | 150                      |                          | 400                      | $\text{ps}$ |           |

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.

## OUTLINE DIMENSIONS

FN SUFFIX  
PLASTIC PLCC PACKAGE  
CASE 776-02  
ISSUE D



## NOTES:

- DATUMS -L-, -M-, AND -N- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
- DIM G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
- DIM R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE.
- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: INCH.
- THE PACKAGE TOP MAY BE SMALLER THAN THE PACKAGE BOTTOM BY UP TO 0.012 (0.300). DIMENSIONS R AND U ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY.
- DIMENSION H DOES NOT INCLUDE DAMBAR PROTRUSION OR INTRUSION. THE DAMBAR PROTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE GREATER THAN 0.037 (0.940). THE DAMBAR INTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE SMALLER THAN 0.025 (0.635).

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 0.485     | 0.495 | 12.32       | 12.57 |
| B   | 0.485     | 0.495 | 12.32       | 12.57 |
| C   | 0.165     | 0.180 | 4.20        | 4.57  |
| E   | 0.090     | 0.110 | 2.29        | 2.79  |
| F   | 0.013     | 0.019 | 0.33        | 0.48  |
| G   | 0.050 BSC |       | 1.27 BSC    |       |
| H   | 0.026     | 0.032 | 0.66        | 0.81  |
| J   | 0.020     | —     | 0.51        | —     |
| K   | 0.025     | —     | 0.64        | —     |
| R   | 0.450     | 0.456 | 11.43       | 11.58 |
| U   | 0.450     | 0.456 | 11.43       | 11.58 |
| V   | 0.042     | 0.048 | 1.07        | 1.21  |
| W   | 0.042     | 0.048 | 1.07        | 1.21  |
| X   | 0.042     | 0.056 | 1.07        | 1.42  |
| Y   | —         | 0.020 | —           | 0.50  |
| Z   | 2°        | 10°   | 2°          | 10°   |
| G1  | 0.410     | 0.430 | 10.42       | 10.92 |
| K1  | 0.040     | —     | 1.02        | —     |

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters which may be provided in Motorola data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and  are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

**How to reach us:**

**USA/EUROPE/Locations Not Listed:** Motorola Literature Distribution;  
P.O. Box 20912; Phoenix, Arizona 85036. 1-800-441-2447 or 602-303-5454

**MFAX:** RMFAX0@email.sps.mot.com – TOUCHTONE 602-244-6609  
**INTERNET:** <http://Design-NET.com>

**JAPAN:** Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, 6F Seibu-Butsuryu-Center,  
3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 03-81-3521-8315

**ASIA/PACIFIC:** Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,  
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298



Copyright © Each Manufacturing Company.

All Datasheets cannot be modified without permission.

This datasheet has been download from :

[www.AllDataSheet.com](http://www.AllDataSheet.com)

100% Free DataSheet Search Site.

Free Download.

No Register.

Fast Search System.

[www.AllDataSheet.com](http://www.AllDataSheet.com)