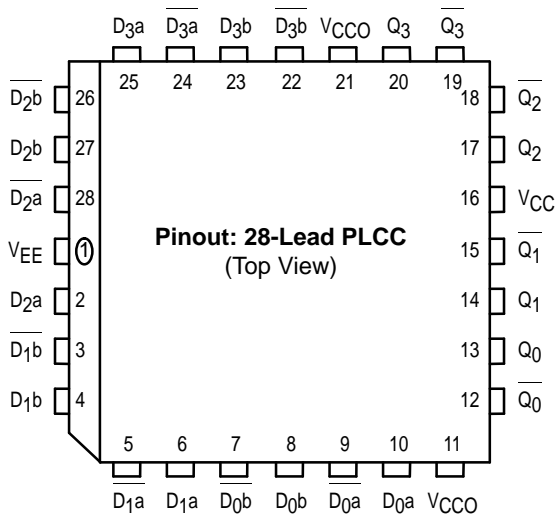# Quad Differential AND/NAND

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 V_{CC}.

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

MC10E404
MC100E404

QUAD DIFFERENTIAL AND/NAND
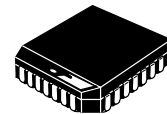
FN SUFFIX
PLASTIC PACKAGE
CASE 776-02

Pinout: 28-Lead PLCC (Top View)

* All V_{CC} and V_{CCO} pins are tied together on the die.

PIN NAMES

Pin	Function
D[0:4], $\overline{D}$[0:4]	Differential Data Inputs
Q[0:4], $\overline{Q}$[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

LOGIC DIAGRAM

(M) MOTOROLA

REV 2
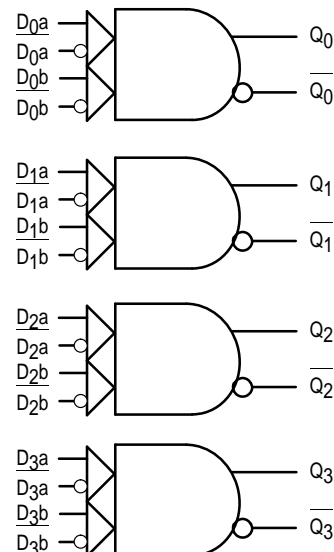
MC10E404 MC100E404

DC CHARACTERISTICS (V_{EE} = V_{EE}(min) to V_{EE}(max); V_{CC} = V_{CCO} = 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	µA	
I_{EE}	Power Supply Current										mA	
	10E		106	127		106	127		106	127		
	100E		106	127		106	127		122	146		
V_{PP}(DC)	Input Sensitivity	50			50			50			mV	1
V_{CMR}	Common Mode Range	−1.5		0	−1.5		0	−1.5		0	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 $V_{PP\ MIN}$ and < 1.0V.

**AC CHARACTERISTICS** (V_{EE}= V_{EE}(min) to V_{EE}(max); V_{CC} = V_{CCO} = GND)

Symbol	Characteristic	0°C			25°C			85°C			Unit	Condition
		min	typ	max	min	typ	max	min	typ	max		
t_{PLH} t_{PHL}	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		
	Db (SE)	325	500	725	325	500	725	325	500	725		
t_{SKEW}	Within-Device Skew		50			50			50		ps	1
V_{PP}(AC)	Minimum Input Swing	150			150			150			mV	2
t_r t_f	Rise/Fall Time 20 - 80%	150		400	150		400	150		400	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

VIEW D-D

VIEW S
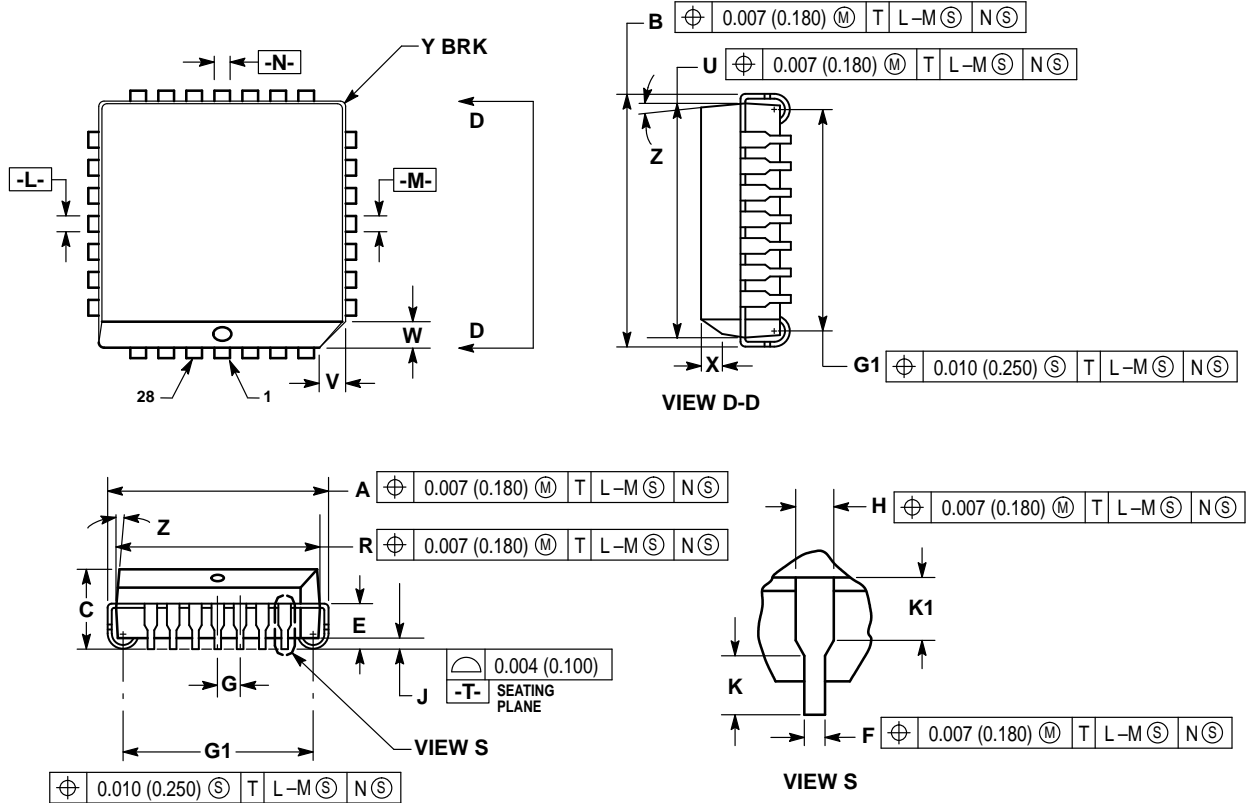
NOTES:
1. DATUMS -L-, -M-, AND -N- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
2. DIM G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
3. DIM R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE.
4. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
5. CONTROLLING DIMENSION: INCH.
6. 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.
7. 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 MIN	MAX	MILLIMETERS 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

MC10E404 MC100E404

MOTOROLA

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MC10E404/D