MICREL

The Infinite Bandwidth Company™

QUAD DIFFERENTIAL AND/NAND

SY10E404
SY100E404

FEATURES

- **Differential D and Q**
- **Extended 100E V_{EE} 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
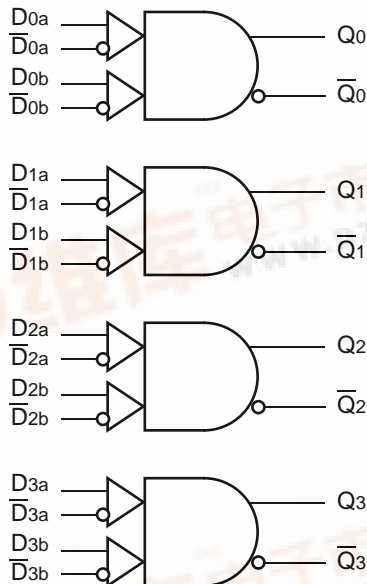
PIN CONFIGURATION
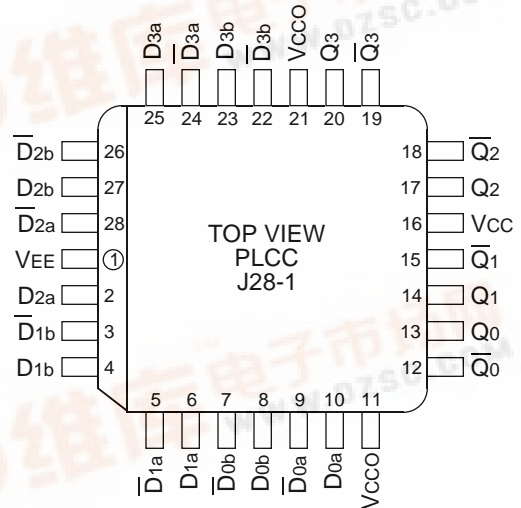
PIN NAMES

Pin	Function
D[0:4], $\overline{D}$[0:4]	Differential Data Inputs
Q[0:4], $\overline{Q}$[0:4]	Differential Data Outputs
V_{CCO}	V_{CC} to Output

TRUTH TABLE

Da	Db	Q	$\overline{D}a$	$\overline{D}b$	$\overline{Q}$
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

$V_{EE} = V_{EE}$ (Min.) to V_{EE} (Max.); $V_{CC} = V_{CCO} = GND$

Symbol	Parameter	$T_A = 0°C$			$T_A = +25°C$			$T_A = +85°C$			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

NOTES:

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 <1V.

AC ELECTRICAL CHARACTERISTICS

$V_{EE} = V_{EE}$ (Min.) to V_{EE} (Max.); $V_{CC} = V_{CCO} = GND$

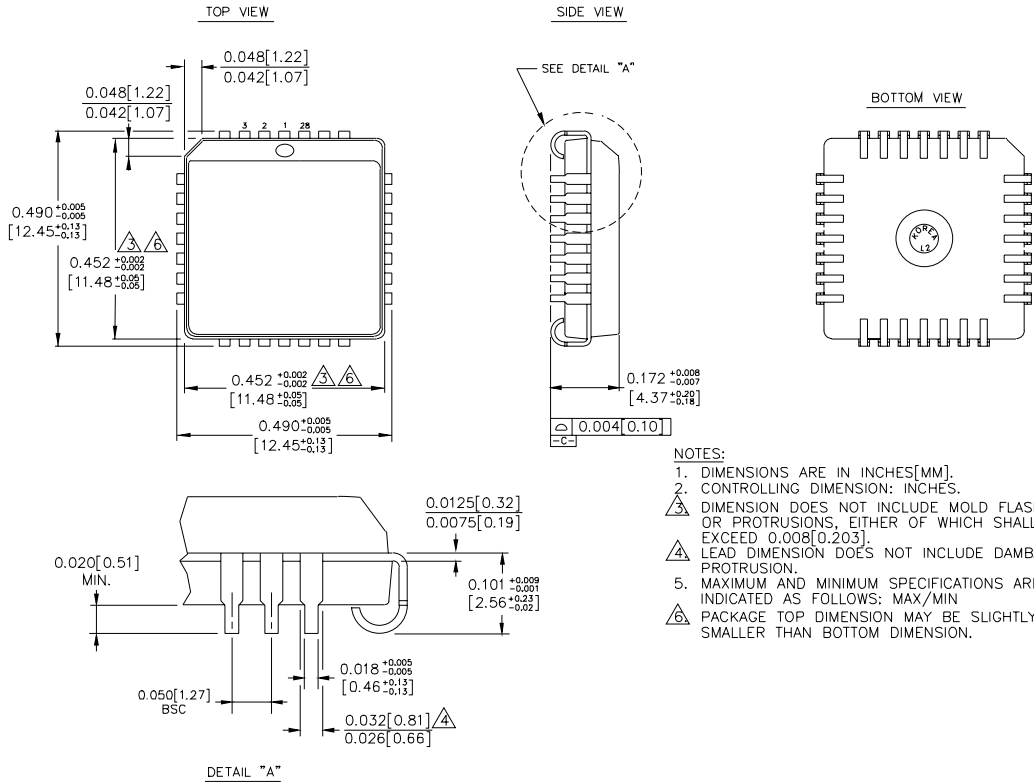| Symbol	Parameter	$T_A = 0°C$			$T_A = +25°C$			$T_A = +85°C$			Unit	Condition
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.		
t_{PLH} t_{PHL}	Propagation Delay to Output										ps	—
	D_a (Diff)	350	475	650	350	475	650	350	475	650		
	D_a (SE)	300	475	700	300	475	700	300	475	700		
	D_b (Diff)	375	500	675	375	500	675	375	500	675		
	D_b (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	—

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.

PRODUCT ORDERING CODE

Ordering Code	Package Type	Operating Range
SY10E404JC	J28-1	Commercial
SY10E404JCTR	J28-1	Commercial
SY100E404JC	J28-1	Commercial
SY100E404JCTR	J28-1	Commercial

28 LEAD PLCC (J28-1)

TOP VIEW

0.048[1.22]
‾‾‾‾‾‾‾‾‾‾
0.042[1.07]

0.048[1.22]
‾‾‾‾‾‾‾‾‾‾
0.042[1.07]

3 2 1 28

0.490 +0.005 −0.005
[12.45 +0.13 −0.13]

△3 △6

0.452 +0.002 −0.002
[11.48 +0.05 −0.05]

0.452 +0.002 −0.002
[11.48 +0.05 −0.05]   △3 △6

0.490 +0.005 −0.005
[12.45 +0.13 −0.13]

SIDE VIEW

SEE DETAIL "A"

0.172 +0.008 −0.007
[4.37 +0.20 −0.18]

⌷ 0.004[0.10]
−C−

BOTTOM VIEW

KOREA
12

0.0125[0.32]
‾‾‾‾‾‾‾‾‾‾
0.0075[0.19]

0.020[0.51]
MIN.

0.101 +0.009 −0.001
[2.56 +0.23 −0.02]

0.050[1.27]
BSC

0.018 +0.005 −0.005
[0.46 +0.13 −0.13]

0.032[0.81] △4
‾‾‾‾‾‾‾‾‾‾
0.026[0.66]

DETAIL "A"

NOTES:
1. DIMENSIONS ARE IN INCHES[MM].
2. CONTROLLING DIMENSION: INCHES.
△3 DIMENSION DOES NOT INCLUDE MOLD FLASH
   OR PROTRUSIONS, EITHER OF WHICH SHALL NOT
   EXCEED 0.008[0.203].
△4 LEAD DIMENSION DOES NOT INCLUDE DAMBAR
   PROTRUSION.
5. MAXIMUM AND MINIMUM SPECIFICATIONS ARE
   INDICATED AS FOLLOWS: MAX/MIN
△6 PACKAGE TOP DIMENSION MAY BE SLIGHTLY
   SMALLER THAN BOTTOM DIMENSION.

Rev. 03