

Problema 3: En la hoja de datos adjunta se muestran las características de la célula NAND de tres entradas. Calcular:

4.1 La potencia que disipa la célula **nd03d0** a 150 MHz. (0,5 puntos).

4.2 El retardo entrada/salida de la célula **nd03d0** cuando $a1=1$, $a3=1$ y $a2$ pasa de 0 a 1. Considere una carga a la salida de 0,05 pF (2 puntos).

Specification

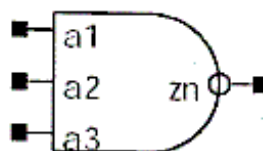
Datasheet Version: 1.1.1, Jun 2000

Symbol

ND03D0, ND03D1, ND03D2 and ND03D4 are 3-Input NAND Gates with 0.5x, 1x, 2x and 4x drive capabilities.

Function Table

Input			Output
A1	A2	A3	ZN
X	X	L	H
X	L	X	H
L	X	X	H
H	H	H	L



Cell Parameters

Code	Parameter	nd03d0	nd03d1	nd03d2	nd03d4	Unit
X	Length	4.0	4.0	6.4	8.8	um
nTran	Transistor Count	6	6	12	14	trans
Power	AC Power Dissipation	0.059	0.129	0.265	0.334	uW/MHz

Input Specifications (Fanin)

Name	Pin Description	nd03d0	nd03d1	nd03d2	nd03d4	Unit
a1	Data In	0.003	0.006	0.014	0.003	pF
a2	Data In	0.003	0.006	0.013	0.003	pF
a3	Data In	0.003	0.006	0.013	0.003	pF

Output Specifications (Fanout)

Name	Pin Description	nd03d0	nd03d1	nd03d2	nd03d4	Unit
zn	Data Out	0.140	0.288	0.608	2.81	pF

Typical Propagation Delays (VDD=2.5V, Temp.=25°C, Input Slope=1ns)

Code	From	To	nd03d0	nd03d1	nd03d2	nd03d4	Unit
tpdhl	a1	zn	0.071	0.114	0.073	0.281	ns
tpdlh	a1	zn	0.192	0.153	0.161	0.382	ns
tpdhl	a2	zn	0.096	0.098	0.093	0.299	ns
tpdlh	a2	zn	0.186	0.161	0.155	0.368	ns
tpdhl	a3	zn	0.110	0.079	0.112	0.314	ns
tpdlh	a3	zn	0.175	0.171	0.146	0.360	ns
dtpdhl	any	zn	6.088	2.978	1.417	0.296	ns/pF
dtpdlh	any	zn	7.212	2.682	1.191	0.590	ns/pF