**CSIE DIC Lab 2015**

**Lab01c APR Data Preparation**

**Reading Cell Library Datasheet**

**5.**

CLKBUFXL 上升下降的K load 較接近，所以 Delay 上會比 BUFXL 來的平穩，不會上升Delay很少，下降Delay 時很多，CLKBUFXL 消耗功率較大，相較於 BUFXL，CLKBUFXL 消耗更大的功率來換取更短的Delay time。

**6**

CLKBKUFXL T PHL = 0.064 +4.661 \* 0.1 = 0.5301 (ns)

T PLH= 0.058 + 5.274 \* 0. 1 = 0.5854 (ns)

BKUFXL T PHL = 0.084+3.418 \* 0.1 = 0.4258 (ns)

T PLH= 0.059 + 5.775\* 0. 1 = 0.6365 (ns)

**7.**

100MHz 週期為 10ns

T\_PLH : 0.058+5.274\*0.0026 = 0.0717124(ns)

T\_PHL : 0.064+4.661\*0.0026 = 0.0761186(ns)

T\_PHL – T\_PLH =  0.0044062 (ns) (1 顆 Delay的時間)

9 \* 0.0044062 = 0.0396558(ns) (前9顆 Delay 的時間)

0.0396558 + (0.064 – 0.058) =  0.0456558(ns)

(加上最後一顆只有instrinsic delay)

原本時間為 5ns

5 + 0.0456558 = 5.0456558(ns) (Delay 後時間)

Duty cycle = [5.0456558/10](tel:5.0456558%2F10) = 0.50456558 = 50.456558%

**8.**

100MHz 週期為 10ns

T\_PLH : 0.059+5.775\*0.0023 = 0.0722825(ns)

T\_PHL : 0.084+3.418\*0.0023 = 0.0918614(ns)

T\_PHL – T\_PLH =  0.0195789 (ns) (1 顆 Delay的時間)

9 \* 0. 0195789 = 0.1762101(ns) (前9顆 Delay 的時間)

0. 1762101+ (0. 084– 0. 059) =  0.2012101(ns)

(加上最後一顆只有instrinsic delay)

原本時間為 5ns

5 + 0. 2012101= 5. 2012101 (ns) (Delay 後時間)

Duty cycle = [5. 2012101/10](tel:5.0456558%2F10) = 0.52012101 = 52. 012101%

**10.**

A : T\_ PHL = 1.115 + 20 \*0.024 = 1.595 (ns)

T\_ PLH = 1.150 + 20 \* 0.026 = 1.67 (ns)

OE : T\_ PHL = 1.172 + 20 \* 0.024 = 1.652 (ns)

T\_ PLH =1.151 + 20 \* 0.025 = 1.651 (ns)

POC16C : T\_ PHL = 1.652 (ns)

T\_ PLH = 1.67 (ns)

**Reading Timing and Power Model (.lib)**

**13.**

取A(0.042 , 0.0015 , 0.051832)、 B(3 , 0.0015 , 0.445351)、

C(0.042 , 0.015 , 1.403541)、D(3 , 0.015 , 2.282641)、

T PLH (ns)= 0.0327 + 0.1314X + 9.0560Y + 1.1054XY

取A(0.042 , 0.0015 , 0.61729)、 B(3 , 0.0015 , 0.379207)、

C(0.042 , 0.015 , 2.551200)、D(3 , 0.015 , 2.571336)、

T R (ns) = 0.032 + 0.1083X + 16.7925Y – 0.6770 XY

取A(0.042 , 0.0015 , 0.0360009)、 B(3 , 0.0015 , -0.077346)、

C(0.042 , 0.015 , 0.864017)、D(3 , 0.015 , 1.515747)、

T PHL (ns) = 0.0294 – 0.0410X + 5.5027Y + 1.7417XY

取A(0.042 , 0.0015 , 0.036599)、 B(3 , 0.0015 , 0.407869)、

C(0.042 , 0.015 , 1.506609)、D(3 , 0.015 ,1.835034)、

T F (ns) = 0.0165 + 0.1257X + 9.1032Y – 0.0975XY

Max Capactiance = 15.0000 (pF)

Leakage Power = 247.448682= (μW / MHz)

**15**

取A(0.02 , 0.0015 , 0.023179)、 B(1.6 , 0.0015 , 0.244763)、

C(0.02 , 0.015 , 0.660703)、D(1.6 , 0.015 , 1.074144)、

T PLH (ns) = 0.0165 + 0.1374X + 4.26Y +0.8282XY

取A(0.02 , 0.0015 , 0.029181)、 B(1.6 , 0.0015 , 0.203643)、

C(0.02 , 0.015 , 1.212351)、D(1.6 , 0.015 , 1.251270)、

T R (ns) = 0.017 + 0.11X + 7.966Y – 0.5692 XY

取A(0.02 , 0.0015 , 0.015961)、 B(1.6 , 0.0015 ,- 0.102738)、

C(0.02 , 0.015 , 0.407783)、D(1.6 , 0.015 , 0.642872)、

T PHL (ns) = 0.0121 – 0.0765X + 2.6178Y + 1.502XY

取A(0.02 , 0.0015 , 0.016565)、 B(1.6 , 0.0015 , 0.221310)、

C(0.02 , 0.015 , 0.681741)、D(1.6 , 0.015 , 0.910467)、

T F (ns)= 0.01 + 0.128X + 4.4615Y + 0.1120XY

Max Capactiance = 15.0000 (pF)

Leakage Power = 5.896340 (μW / MHz)

**Reading Cel Library Information for APR (.lef)**

**20.**

Met 1

Max Width = 9

Pitch Setup = 0.56

Met 2

Max Width = 9

Pitch Setup = 0.66

Met 3

Max Width = 9

Pitch Setup = 0.56

Met 4

Max Width = 9

Pitch Setup = 0.66

Met 5

Max Width = 9

Pitch Setup = 0.56

Met 6

Max Width = 9

Pitch Setup = 1.32

21

Obstruction information

Met 1

RECT[(5.530 , 2.160) , (9.610 , 2.560)]

RECT[(4.140, 2.210) , (5.530 , 2.510)]

RECT[4.050 , 1.490) , (4.140 , 3.290)]

RECT[(3.840 , 1.390) , (4.050 , 3.290)]

RECT[(2.370 , 1.390) , (3.840 , 1.790)]

RECT[(3.740 , 2.840) , (3.840 ,3.290)]

RECT[(2.670 , 2.840) , (3.740 ,3.140)]

RECT[(1.500, 2.070) , (3.600 , 2.470)]

RECT[(2.270, 2.840) , (2.670 , 3.820)]

RECT[(1.260 , 1.390) , (1.500 , 2.990)]

RECT[(0.970 ,1.390) , (1.260 , 1.790)]

RECT[(1.220, 2.750) , (1.260 , 2.990)]

RECT[(0.820 , 2.750) , (1.220 , 3.150)]