



LVDS (Tx/Rx) Design With 5V Devices in Sky130nm Process

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Revision 0.0

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Transceiver Overall Netlist

```
** sch_path:  
/home/saumeek/xschem_test/Reciever_pvt_test_allNetlist.sch  
  
**.subckt Reciever_pvt_test_allNetlist Vinp Vinn Vout VCC INN INP  
*.ipin Vinp  
*.ipin Vinn  
*.opin Vout  
*.iopin VCC  
*.opin INN  
*.opin INP  
  
x5 Vinn Vinp INP INN OutputDriverOffice_5v_sym  
  
XM1 OP B Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=30 nf=2  
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'  
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +  
0.29)' nrd='0.29 / W' nrs='0.29 / W'  
+ sa=0 sb=0 sd=0 mult=1 m=1  
  
XM2 B B Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=30 nf=2  
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'  
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +  
0.29)' nrd='0.29 / W' nrs='0.29 / W'  
+ sa=0 sb=0 sd=0 mult=1 m=1  
  
XM3 ON B Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=30 nf=2  
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'  
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +  
0.29)' nrd='0.29 / W' nrs='0.29 / W'  
+ sa=0 sb=0 sd=0 mult=1 m=1  
  
XM9 OP A VCC VCC sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=10 nf=1  
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'  
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +  
0.29)' nrd='0.29 / W' nrs='0.29 / W'  
+ sa=0 sb=0 sd=0 mult=1 m=1  
  
XM10 A A VCC VCC sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=10 nf=1  
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
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+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'

+ sa=0 sb=0 sd=0 mult=1 m=1

XM11 ON A VCC VCC sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=10 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'

+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'

+ sa=0 sb=0 sd=0 mult=1 m=1

x1 Vss newVss

I0_ref net4 net1 500u

I1_ref net5 net2 500u

R3 C B 0.5k m=1

R4 A C 0.5k m=1

R5 OP INP 0.5k m=1

R6 ON INN 0.5k m=1

XM7 C C Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=2.5 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'

+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'

+ sa=0 sb=0 sd=0 mult=1 m=1

XM4 Vss OP net1 VCC sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=40 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'

+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'

+ sa=0 sb=0 sd=0 mult=1 m=1

XM5 C net3 net1 VCC sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=40 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'

+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'

+ sa=0 sb=0 sd=0 mult=1 m=1

XM6 C net3 net2 VCC sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=40 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'

+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'

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+ sa=0 sb=0 sd=0 mult=1 m=1

XM8 Vss ON net2 VCC sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=40 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'

+ sa=0 sb=0 sd=0 mult=1 m=1

V1 net3 Vss 2.5

.save i(v1)

R1 net4 VCC 10 m=1

R2 net5 VCC 10 m=1

XM12 BGR BGR Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=5 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'

+ sa=0 sb=0 sd=0 mult=1 m=1

XM13 net6 BGR Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=10 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'

+ sa=0 sb=0 sd=0 mult=1 m=1

XM14 F F Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=67 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'

+ sa=0 sb=0 sd=0 mult=1 m=1

XM15 net9 F Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=67 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'

+ sa=0 sb=0 sd=0 mult=1 m=1

XM16 N1 net10 Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=67 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'

+ sa=0 sb=0 sd=0 mult=1 m=1

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XM17 net10 net10 Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=67 nf=1
ad='int((nf+1)/2) * W/nf * 0.29'
+ as='int((nf+2)/2) * W/nf * 0.29' pd='2*int((nf+1)/2) * (W/nf +
0.29)' ps='2*int((nf+2)/2) * (W/nf + 0.29)'
+ nrd='0.29 / W' nrs='0.29 / W' sa=0 sb=0 sd=0 mult=1 m=1

XM18 net6 net6 VCC VCC sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=40 nf=1
ad='int((nf+1)/2) * W/nf * 0.29'
+ as='int((nf+2)/2) * W/nf * 0.29' pd='2*int((nf+1)/2) * (W/nf +
0.29)' ps='2*int((nf+2)/2) * (W/nf + 0.29)'
+ nrd='0.29 / W' nrs='0.29 / W' sa=0 sb=0 sd=0 mult=1 m=1

XM19 net8 net6 VCC VCC sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=50 nf=2
ad='int((nf+1)/2) * W/nf * 0.29'
+ as='int((nf+2)/2) * W/nf * 0.29' pd='2*int((nf+1)/2) * (W/nf +
0.29)' ps='2*int((nf+2)/2) * (W/nf + 0.29)'
+ nrd='0.29 / W' nrs='0.29 / W' sa=0 sb=0 sd=0 mult=1 m=1

XM20 net9 net9 VCC VCC sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=67 nf=1
ad='int((nf+1)/2) * W/nf * 0.29'
+ as='int((nf+2)/2) * W/nf * 0.29' pd='2*int((nf+1)/2) * (W/nf +
0.29)' ps='2*int((nf+2)/2) * (W/nf + 0.29)'
+ nrd='0.29 / W' nrs='0.29 / W' sa=0 sb=0 sd=0 mult=1 m=1

XM21 N1 net9 VCC VCC sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=67 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM22 H net7 VCC VCC sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=67 nf=2
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM23 net7 net7 VCC VCC sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=67 nf=2
ad='int((nf+1)/2) * W/nf * 0.29'
+ as='int((nf+2)/2) * W/nf * 0.29' pd='2*int((nf+1)/2) * (W/nf +
0.29)' ps='2*int((nf+2)/2) * (W/nf + 0.29)'
+ nrd='0.29 / W' nrs='0.29 / W' sa=0 sb=0 sd=0 mult=1 m=1

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XM24 E E VCC VCC sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=67 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM25 N1 E VCC VCC sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=67 nf=2
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM26 net10 OP net8 VCC sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=50 nf=4
ad='int((nf+1)/2) * W/nf * 0.29'
+ as='int((nf+2)/2) * W/nf * 0.29' pd='2*int((nf+1)/2) * (W/nf +
0.29)' ps='2*int((nf+2)/2) * (W/nf + 0.29)'
+ nrd='0.29 / W' nrs='0.29 / W' sa=0 sb=0 sd=0 mult=1 m=1

XM27 F ON net8 VCC sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=50 nf=4
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM28 net7 ON D Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=67 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM29 E OP D Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=67 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM30 Vinv N1 VCC VCC sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=30 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

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XM31 Vinv N1 Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=35 nf=2
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM32 Vout Vinv VCC VCC sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=50 nf=2
ad='int((nf+1)/2) * W/nf * 0.29'
+ as='int((nf+2)/2) * W/nf * 0.29' pd='2*int((nf+1)/2) * (W/nf +
0.29)' ps='2*int((nf+2)/2) * (W/nf + 0.29)'
+ nrd='0.29 / W' nrs='0.29 / W' sa=0 sb=0 sd=0 mult=1 m=1

XM33 Vout Vinv Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=67 nf=1
ad='int((nf+1)/2) * W/nf * 0.29'
+ as='int((nf+2)/2) * W/nf * 0.29' pd='2*int((nf+1)/2) * (W/nf +
0.29)' ps='2*int((nf+2)/2) * (W/nf + 0.29)'
+ nrd='0.29 / W' nrs='0.29 / W' sa=0 sb=0 sd=0 mult=1 m=1

XM34 D BGR Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=83 nf=2
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM35 H H Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=83 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM36 N1 H Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=83 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

x3 net14 newVcc_5

x4 Vss newVss

I2_ref net11 net12 500u

R9 BGR net12 1k m=1

Vref net11 Vss 3.3

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.save i(vref)
x9 net13 net15 VCC Vss inv_0_5_3v3
R8 net13 Vout 10 m=1
Vmeas net14 VCC 0
.save i(vmeas)
**.ends

* expanding symbol: OutputDriverOffice_5v_sym.sym # of pins=4
** sym_path: /home/saumeeek/xschem_test/OutputDriverOffice_5v_sym.sym
** sch_path: /home/saumeeek/xschem_test/OutputDriverOffice_5v_sym.sch
.subckt OutputDriverOffice_5v_sym Vinn Vinp Vop Von
*.ipin Vinp
*.ipin Vinn
*.opin Vop
*.opin Von
x2 Vss newVss
R1 Vcm Voutp 1.5k m=1
R2 Voutn Vcm 1.5k m=1
V3 Vref Vss 3
.save i(v3)
I0_bgr_ref net9 net10 500u
R4 net7 Voutp 10 m=1
R5 net5 Voutn 10 m=1
C1 net6 Vss 3p m=1
R6 Von net6 10 m=1
C2 Von Vss 3p m=1
C3 net8 Vcc 3p m=1
R7 Vop net8 10 m=1
C4 Vop Vss 3p m=1
R9 BGR net10 1k m=1

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V4_bgr_ref net9 Vss 3.3
.save i(v4_bgr_ref)
R8 Von Vop 100 m=1
C5 C Vss 1p m=1
C6 net11 Vss 1p m=1
L1 net6 net5 4n m=1
L2 net8 net7 4n m=1
R11 Vcm net11 100 m=1
C7 Vcc Vss 500p m=1
V1 Vinpl Vss pulse(0 1.8 0ns 0.1ns 0.1ns 0.4ns 1ns)
.save i(v1)
V2 Vinnl Vss pulse(1.8 0 0ns 0.1ns 0.1ns 0.4ns 1ns)
.save i(v2)
XM27 net12 H Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=25 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1
XM8 net1 H Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=25 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1
XM25 Voutp pu net12 Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=10 nf=1
ad='int((nf+1)/2) * W/nf * 0.29'
+ as='int((nf+2)/2) * W/nf * 0.29' pd='2*int((nf+1)/2) * (W/nf +
0.29)' ps='2*int((nf+2)/2) * (W/nf + 0.29)'
+ nrd='0.29 / W' nrs='0.29 / W' sa=0 sb=0 sd=0 mult=1 m=1
XM7 Voutn pd net1 Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=15 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

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XM6 B C Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=80 nf=6
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM11 H H Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=88 nf=2
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM13 C C Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=68 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM15 K Vcm F Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=50 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM19 F BGR Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=55 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM16 E Vref F Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=50 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM23 net3 BGR Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=10 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

```

```

XM24 D BGR Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=20 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM26 BGR BGR Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=5.88 nf=1
ad='int((nf+1)/2) * W/nf * 0.29'
+ as='int((nf+2)/2) * W/nf * 0.29' pd='2*int((nf+1)/2) * (W/nf +
0.29)' ps='2*int((nf+2)/2) * (W/nf + 0.29)'
+ nrd='0.29 / W' nrs='0.29 / W' sa=0 sb=0 sd=0 mult=1 m=1

XM21 D net3 net4 Vcc Vcc sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=60 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM20 net4 D Vcc Vcc sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=30 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM22 net3 net3 Vcc Vcc sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=5 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM17 E E Vcc Vcc sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=50 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM18 K K Vcc Vcc sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=50 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

```

```

XM14 C K Vcc Vcc sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=68 nf=3
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM12 H D Vcc Vcc sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=85 nf=4
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM1 Voutp Vinn A Vcc sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=50 nf=4
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM4 Voutn Vinp A Vcc sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=50 nf=4
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM3 B Vinn Voutn Vcc sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=40 nf=2
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM2 B Vinp Voutp Vcc sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=40 nf=2
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM5 A E Vcc Vcc sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=80 nf=6
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

```

```

XM10 net2 D Vcc Vcc sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=60 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM9 Voutp pu net2 Vcc sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=30 nf=4
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM28 Voutn pd net13 Vcc sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=30 nf=4
ad='int((nf+1)/2) * W/nf * 0.29'
+ as='int((nf+2)/2) * W/nf * 0.29' pd='2*int((nf+1)/2) * (W/nf +
0.29)' ps='2*int((nf+2)/2) * (W/nf + 0.29)'
+ nrd='0.29 / W' nrs='0.29 / W' sa=0 sb=0 sd=0 mult=1 m=1

XM29 net13 D Vcc Vcc sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=60 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

x5 pd pu Vinp1 Vinn1 dnl dpl LevelShifter_5v
x3 Vcc newVcc_5
x1 Vinn Vinp_5
x4 Vinp Vinn1_5
.ends

* expanding symbol: /home/saumeeek/simulation_library/newVss.sym #
of pins=1
** sym_path: /home/saumeeek/simulation_library/newVss.sym
** sch_path: /home/saumeeek/simulation_library/newVss.sch
.subckt newVss VSS
*.iopin VSS

```

```

R2 net1 GND 5 m=1
L1 VSS net1 2n m=1
C1 VSS GND 20p m=1
.ends

* expanding symbol: /home/saumeeek/simulation_library/newVcc_5.sym # of pins=1
** sym_path: /home/saumeeek/simulation_library/newVcc_5.sym
** sch_path: /home/saumeeek/simulation_library/newVcc_5.sch
.subckt newVcc_5 Vcc
*.iopin Vcc
V1 net1 GND 4.5
.save i(v1)
R1 net2 net1 0.1 m=1
L1 Vcc net2 2n m=1
C1 Vcc GND 20p m=1
.ends

* expanding symbol:
/home/saumeeek/simulation_library/inv_0_5_3v3.sym # of pins=4
** sym_path: /home/saumeeek/simulation_library/inv_0_5_3v3.sym
** sch_path: /home/saumeeek/simulation_library/inv_0_5_3v3.sch
.subckt inv_0_5_3v3 Vin Vout Vcc Vss
*.ipin Vin
*.opin Vout
*.iopin Vcc
*.iopin Vss
XM3 Vout Vin Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=10 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'

```

```

+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'

+ sa=0 sb=0 sd=0 mult=1 m=1

XM1 Vout Vin Vcc Vcc sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=20 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'

+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'

+ sa=0 sb=0 sd=0 mult=1 m=1

.ends

* expanding symbol: LevelShifter_5v.sym # of pins=6
** sym_path: /home/saumeeek/xschem_test/LevelShifter_5v.sym
** sch_path: /home/saumeeek/xschem_test/LevelShifter_5v.sch
.subckt LevelShifter_5v Dn_H Dp_H vinp vinn Dn_L Dp_L
*.opin Dp_H
*.opin Dn_H
*.ipin vinp
*.ipin vinn
*.opin Dp_L
*.opin Dn_L
x1 VSS newVss

XM1 Dn_H Dp_H VCC5 VCC5 sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=15 nf=1
ad='int((nf+1)/2) * W/nf * 0.29'

+ as='int((nf+2)/2) * W/nf * 0.29' pd='2*int((nf+1)/2) * (W/nf +
0.29)' ps='2*int((nf+2)/2) * (W/nf + 0.29)'

+ nrd='0.29 / W' nrs='0.29 / W' sa=0 sb=0 sd=0 mult=1 m=1

XM2 Dp_H Dn_H VCC5 VCC5 sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=15 nf=1
ad='int((nf+1)/2) * W/nf * 0.29'

+ as='int((nf+2)/2) * W/nf * 0.29' pd='2*int((nf+1)/2) * (W/nf +
0.29)' ps='2*int((nf+2)/2) * (W/nf + 0.29)'

+ nrd='0.29 / W' nrs='0.29 / W' sa=0 sb=0 sd=0 mult=1 m=1

```

```

XM5 Dn_H Dp_L VSS VSS sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=50 nf=10
ad='int((nf+1)/2) * W/nf * 0.29'
+ as='int((nf+2)/2) * W/nf * 0.29' pd='2*int((nf+1)/2) * (W/nf +
0.29)' ps='2*int((nf+2)/2) * (W/nf + 0.29)'
+ nrd='0.29 / W' nrs='0.29 / W' sa=0 sb=0 sd=0 mult=1 m=1
XM3 Dp_H Dn_L VSS VSS sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=50 nf=10
ad='int((nf+1)/2) * W/nf * 0.29'
+ as='int((nf+2)/2) * W/nf * 0.29' pd='2*int((nf+1)/2) * (W/nf +
0.29)' ps='2*int((nf+2)/2) * (W/nf + 0.29)'
+ nrd='0.29 / W' nrs='0.29 / W' sa=0 sb=0 sd=0 mult=1 m=1
x2 Dp_L vinp PreEmphasisDriver_1v8_3v3
x3 Dn_L vinn PreEmphasisDriver_1v8_3v3
x4 VCC5 newVcc_5
.ends

```

```

* expanding symbol: Vinp_5.sym # of pins=1
** sym_path: /home/saumeeek/xschem_test/Vinp_5.sym
** sch_path: /home/saumeeek/xschem_test/Vinp_5.sch
.subckt Vinp_5 Vinp
*.opin Vinp
x4 VSS newVss
V1 net2 VSS pulse(0 5.5 0ns 0.1ns 0.1ns 0.4ns 1ns)
.save i(v1)
x9 net2 net1 Vcc VSS inv_0_5_3v3
x1 net5 net3 Vcc VSS inv_0_5_3v3
x5 net6 net4 Vcc VSS inv_0_5_3v3
x7 net1 net5 Vcc VSS inv_1_5_3v3
x2 net3 net6 Vcc VSS inv_1_5_3v3
x6 net4 Vinp Vcc VSS inv_0_5_3v3
x3 Vcc newVcc_5
.ends

```

```

* expanding symbol: Vinnl_5.sym # of pins=1
** sym_path: /home/saumeeek/xschem_test/Vinnl_5.sym
** sch_path: /home/saumeeek/xschem_test/Vinnl_5.sch
.subckt Vinnl_5 Vinn
*.opin Vinn
x4 VSS newVss
V1 net3 VSS pulse(5.5 0 0ns 0.1ns 0.1ns 0.4ns 1ns)
.save i(v1)
x3 net2 net4 Vcc VSS inv_0_5_3v3
x1 net3 net1 Vcc VSS inv_0_5_3v3
x5 net6 net5 Vcc VSS inv_0_5_3v3
x8 net1 net2 Vcc VSS inv_1_5_3v3
x2 net4 net6 Vcc VSS inv_1_5_3v3
x6 Vcc newVcc_5
x7 net5 Vinn Vcc VSS inv_0_5_3v3
.ends

```

```

* expanding symbol: PreEmphasisDriver_1v8_3v3.sym # of pins=2
** sym_path: /home/saumeeek/xschem_test/PreEmphasisDriver_1v8_3v3.sym
** sch_path: /home/saumeeek/xschem_test/PreEmphasisDriver_1v8_3v3.sch
.subckt PreEmphasisDriver_1v8_3v3 dn DpH
*.ipin DpH
*.opin dn
x1 VSS DpH xor_out Buf_out Vcc xor
x5 VSS newVss
x4 Vcc newVcc
x10 Vcc DpH xor_out net2 VSS and

```

```

x2 VSS net1 Buf_out Vcc buf2
x3 VSS DpH net1 Vcc buf1
x6 net3 net2 dn VCC5 buf2_3v3
x8 net3 newVss
x7 VCC5 newVcc_5
.ends

```

```

* expanding symbol:
/home/saumeeek/simulation_library/inv_1_5_3v3.sym # of pins=4
** sym_path: /home/saumeeek/simulation_library/inv_1_5_3v3.sym
** sch_path: /home/saumeeek/simulation_library/inv_1_5_3v3.sch
.subckt inv_1_5_3v3 Vin Vout Vcc Vss
*.ipin Vin
*.opin Vout
*.iopin Vcc
*.iopin Vss
XM3 Vout Vin Vcc Vcc sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=80 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1
XM4 Vout Vin Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=40 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1
.ends

* expanding symbol: /home/saumeeek/simulation_library/xor.sym # of
pins=5

```

```

** sym_path: /home/saumeeek/simulation_library/xor.sym
** sch_path: /home/saumeeek/simulation_library/xor.sch
.subckt xor Vss A Vo B Vcc
*.iopin Vcc
*.iopin Vss
*.ipin A
*.opin Vo
*.ipin B

XM1 net3 Ab Vcc Vcc sky130_fd_pr_pfet_01v8 L=0.15 W=35 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM2 net4 A Vcc Vcc sky130_fd_pr_pfet_01v8 L=0.15 W=35 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM3 Vo Ab net1 Vss Vss sky130_fd_pr_nfet_01v8 L=0.15 W=17 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM4 net1 Bb Vss Vss sky130_fd_pr_nfet_01v8 L=0.15 W=17 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM5 Vo A net2 Vss Vss sky130_fd_pr_nfet_01v8 L=0.15 W=17 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

```

```

XM6 net2 B Vss Vss sky130_fd_pr_nfet_01v8 L=0.15 W=17 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1
x1 A Ab Vcc Vss inv111
x2 B Bb Vcc Vss inv111
XM7 Vo B net3 Vcc sky130_fd_pr_pfet_01v8 L=0.15 W=35 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1
XM8 Vo Bb net4 Vcc sky130_fd_pr_pfet_01v8 L=0.15 W=35 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1
.ends

```

```

* expanding symbol: /home/saumeeek/simulation_library/newVcc.sym #
of pins=1
** sym_path: /home/saumeeek/simulation_library/newVcc.sym
** sch_path: /home/saumeeek/simulation_library/newVcc.sch
.subckt newVcc Vcc
*.iopin Vcc
V1 net1 GND 1.8
.save i(v1)
R1 net2 net1 5 m=1
L1 Vcc net2 2n m=1
C1 Vcc GND 20p m=1
.ends

```

```

* expanding symbol: /home/saumeeek/simulation_library/and.sym # of
pins=5

** sym_path: /home/saumeeek/simulation_library/and.sym
** sch_path: /home/saumeeek/simulation_library/and.sch

.subckt and Vcc B A C VSS

*.opin C
*.iopin Vcc
*.iopin VSS
*.ipin A
*.ipin B

XM1 net1 A Vcc Vcc sky130_fd_pr_pfet_01v8 L=0.15 W=45 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM2 net1 B Vcc Vcc sky130_fd_pr_pfet_01v8 L=0.15 W=45 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM3 net1 A net2 VSS sky130_fd_pr_nfet_01v8 L=0.15 W=60 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM4 net2 B VSS VSS sky130_fd_pr_nfet_01v8 L=0.15 W=60 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM5 C net1 Vcc Vcc sky130_fd_pr_pfet_01v8 L=0.15 W=65 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'

```

```

+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'

+ sa=0 sb=0 sd=0 mult=1 m=1

XM6 C net1 VSS VSS sky130_fd_pr_nfet_01v8 L=0.15 W=25 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'

+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'

+ sa=0 sb=0 sd=0 mult=1 m=1

.ends

```

```

* expanding symbol: buf2.sym # of pins=4
** sym_path: /home/saumeeek/xschem_test/buf2.sym
** sch_path: /home/saumeeek/xschem_test/buf2.sch
.subckt buf2 Vss Vin Buf_out Vcc
*.iopin Vcc
*.iopin Vss
*.ipin Vin
*.opin Buf_out
x1 Vin net1 Vcc Vss inv2
x2 net1 Buf_out Vcc Vss inv22
.ends

```

```

* expanding symbol: buf1.sym # of pins=4
** sym_path: /home/saumeeek/xschem_test/buf1.sym
** sch_path: /home/saumeeek/xschem_test/buf1.sch
.subckt buf1 Vss Vin Buf_out Vcc
*.iopin Vcc
*.iopin Vss
*.ipin Vin

```

```

*.opin Buf_out
x1 Vin net1 Vcc Vss inv1
x2 net1 Buf_out Vcc Vss inv11
.ends

* expanding symbol: buf2_3v3.sym # of pins=4
** sym_path: /home/saumeeek/xschem_test/buf2_3v3.sym
** sch_path: /home/saumeeek/xschem_test/buf2_3v3.sch
.subckt buf2_3v3 Vss Vin Buf_out Vcc
*.iopin Vcc
*.iopin Vss
*.ipin Vin
*.opin Buf_out
x1 Vin net1 Vcc Vss inv2_3v3
x3 net1 Buf_out Vcc Vss inv22_3v3
.ends

* expanding symbol: /home/saumeeek/simulation_library/inv111.sym #
of pins=4
** sym_path: /home/saumeeek/simulation_library/inv111.sym
** sch_path: /home/saumeeek/simulation_library/inv111.sch
.subckt inv111 Vin Vout Vcc Vss
*.ipin Vin
*.opin Vout
*.iopin Vcc
*.iopin Vss
XM2 Vout Vin Vcc Vcc sky130_fd_pr_pfet_01v8 L=0.15 W=6 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'

```

```

+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'

+ sa=0 sb=0 sd=0 mult=1 m=1

XM1 Vout Vin Vss Vss sky130_fd_pr_nfet_01v8 L=0.15 W=3 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'

+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'

+ sa=0 sb=0 sd=0 mult=1 m=1

.ends

* expanding symbol: /home/saumeeek/simulation_library/inv2.sym # of
pins=4

** sym_path: /home/saumeeek/simulation_library/inv2.sym
** sch_path: /home/saumeeek/simulation_library/inv2.sch

.subckt inv2 Vin Vout Vcc Vss

*.ipin Vin
*.opin Vout
*.iopin Vcc
*.iopin Vss

XM1 Vout Vin Vss Vss sky130_fd_pr_nfet_01v8 L=0.17 W=2 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'

+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'

+ sa=0 sb=0 sd=0 mult=1 m=1

XM2 Vout Vin Vcc Vcc sky130_fd_pr_pfet_01v8 L=0.17 W=16 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'

+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'

+ sa=0 sb=0 sd=0 mult=1 m=1

.ends

```

```

* expanding symbol: /home/saumeeek/simulation_library/inv22.sym # of
pins=4

** sym_path: /home/saumeeek/simulation_library/inv22.sym
** sch_path: /home/saumeeek/simulation_library/inv22.sch

.subckt inv22 Vin Vout Vcc Vss

*.ipin Vin
*.opin Vout
*.iopin Vcc
*.iopin Vss

XM1 Vout Vin Vss Vss sky130_fd_pr_nfet_01v8 L=0.17 W=20 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM2 Vout Vin Vcc Vcc sky130_fd_pr_pfet_01v8 L=0.17 W=5 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

.ends

```

```

* expanding symbol: /home/saumeeek/simulation_library/inv1.sym # of
pins=4

** sym_path: /home/saumeeek/simulation_library/inv1.sym
** sch_path: /home/saumeeek/simulation_library/inv1.sch

.subckt inv1 Vin Vout Vcc Vss

*.ipin Vin
*.opin Vout
*.iopin Vcc
*.iopin Vss

XM1 Vout Vin Vss Vss sky130_fd_pr_nfet_01v8 L=0.17 W=1.7 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'

```

```

+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'

+ sa=0 sb=0 sd=0 mult=1 m=1

XM2 Vout Vin Vcc Vcc sky130_fd_pr_pfet_01v8 L=0.17 W=3 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'

+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'

+ sa=0 sb=0 sd=0 mult=1 m=1

.ends

* expanding symbol: /home/saumeeek/simulation_library/inv11.sym # of
pins=4

** sym_path: /home/saumeeek/simulation_library/inv11.sym
** sch_path: /home/saumeeek/simulation_library/inv11.sch

.subckt inv11 Vin Vout Vcc Vss

*.ipin Vin
*.opin Vout
*.iopin Vcc
*.iopin Vss

XM1 Vout Vin Vss Vss sky130_fd_pr_nfet_01v8 L=0.17 W=3 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'

+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'

+ sa=0 sb=0 sd=0 mult=1 m=1

XM2 Vout Vin Vcc Vcc sky130_fd_pr_pfet_01v8 L=0.17 W=6.5 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'

+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'

+ sa=0 sb=0 sd=0 mult=1 m=1

.ends

```

```

* expanding symbol: /home/saumeeek/simulation_library/inv2_3v3.sym #
of pins=4

** sym_path: /home/saumeeek/simulation_library/inv2_3v3.sym
** sch_path: /home/saumeeek/simulation_library/inv2_3v3.sch

.subckt inv2_3v3 Vin Vout Vcc Vss

*.ipin Vin
*.opin Vout
*.iopin Vcc
*.iopin Vss

XM3 Vout Vin Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=15 nf=4
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

XM1 Vout Vin Vcc Vcc sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=3 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'
+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'
+ sa=0 sb=0 sd=0 mult=1 m=1

.ends

```

```

* expanding symbol: /home/saumeeek/simulation_library/inv22_3v3.sym
# of pins=4

** sym_path: /home/saumeeek/simulation_library/inv22_3v3.sym
** sch_path: /home/saumeeek/simulation_library/inv22_3v3.sch

.subckt inv22_3v3 Vin Vout Vcc Vss

*.ipin Vin
*.opin Vout
*.iopin Vcc
*.iopin Vss

XM3 Vout Vin Vcc Vcc sky130_fd_pr_pfet_g5v0d10v5 L=0.5 W=20 nf=5
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'

```

```

+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'

+ sa=0 sb=0 sd=0 mult=1 m=1

XM4 Vout Vin Vss Vss sky130_fd_pr_nfet_g5v0d10v5 L=0.5 W=5 nf=1
ad='int((nf+1)/2) * W/nf * 0.29' as='int((nf+2)/2) * W/nf * 0.29'

+ pd='2*int((nf+1)/2) * (W/nf + 0.29)' ps='2*int((nf+2)/2) * (W/nf +
0.29)' nrd='0.29 / W' nrs='0.29 / W'

+ sa=0 sb=0 sd=0 mult=1 m=1

.ends

.GLOBAL GND

.end

```