Block Name: FastoutII

Adds fast trigger capability to the Ternary Receiver

Constituent blocks
Custom Analog: Ternary Receiver
Enclosed Gate Standard Cell: E_Mux2 E_Inv1 E_Nand3 E_Nor2

Size: Area = 324X120μm

Power Requirement: 2.5mW (Ternary Receiver power only)
Inputs:
Digital –

- High_low_sel select High or Low outputs for fastout
- enable_fastout enable fastout chain
- mask_ch mask this channel (Hi -> MASK)

Low Level Digital –

- Tinn ternary input negative (voltage) going
- Tinp ternary input postive (voltage) going

Outputs:

- High (TR photon detect = 2.5V)
- Low (Track detect = 2.5V)
- TernStretch_b (Fastout output 2.5V 10ns min) Normally HIGH

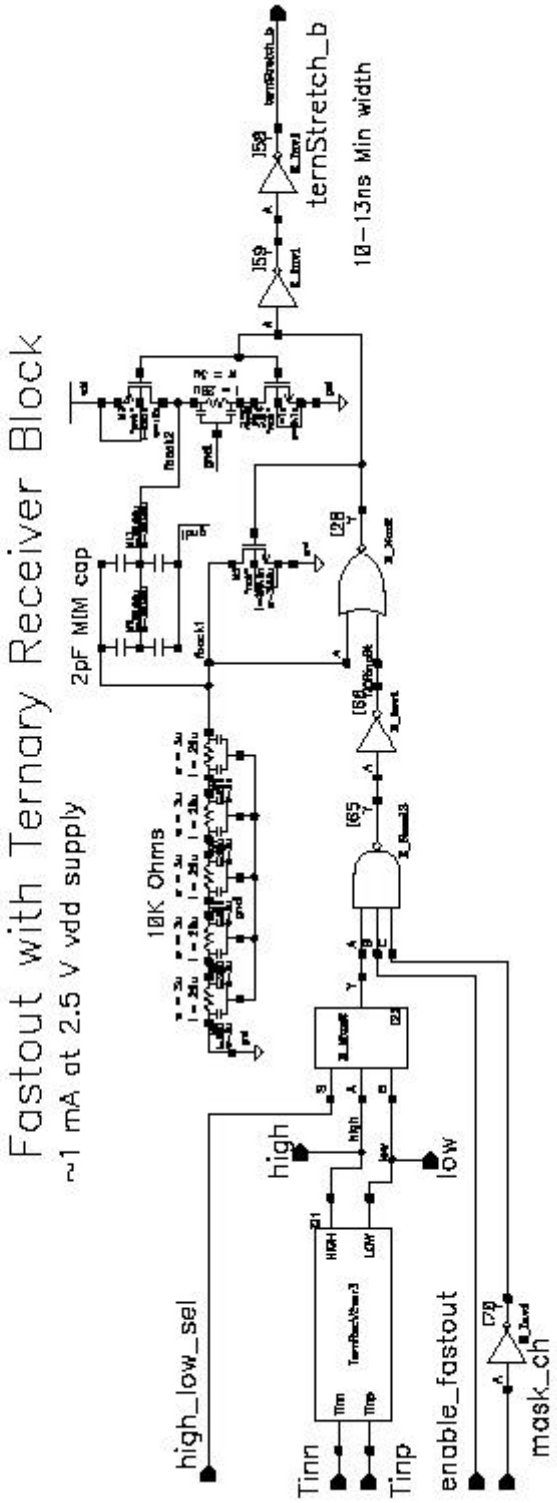
Functionality: Ternary outputs, **LOW** and **HIGH** are routed to the pipeline latch as usual. Selected ternary input channeled to **tern_stretch_b** stretched to a minimum output width of 10ns by single pole R-C . No power is consumed in quiescent mode. Several provisions for blocking the stretched output are provided:

Conditions for providing Stretched Outputs

High_Low_sel	Enable_fastout	Mask_ch	tern_stretch_b
Hi	hi	lo	Trig if Tern LOW
Lo	Hi	lo	Trig if Tern HIGH
Don't care	Lo	Don't care	HIGH
Don't care	Don't care	Hi	HIGH

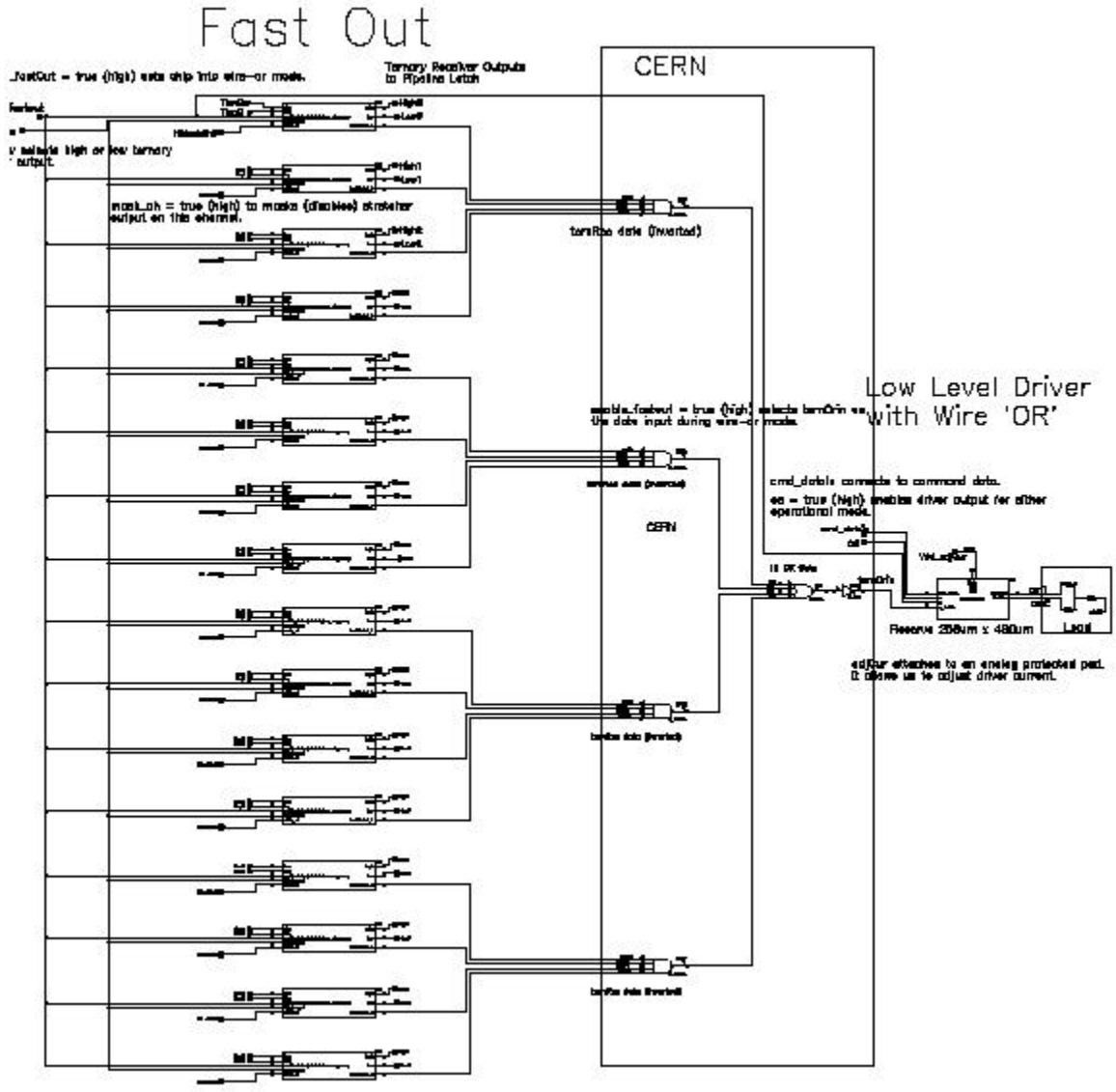
The stretched output is 'or'ed with the 16 other channels and sent directly to the Low level driver with wire or output (**LVDS3dsmNcd** block) to provide a trigger for prototyping and installation electronics. This trigger can be used to generate a Level 1 trigger.

FastoutII block

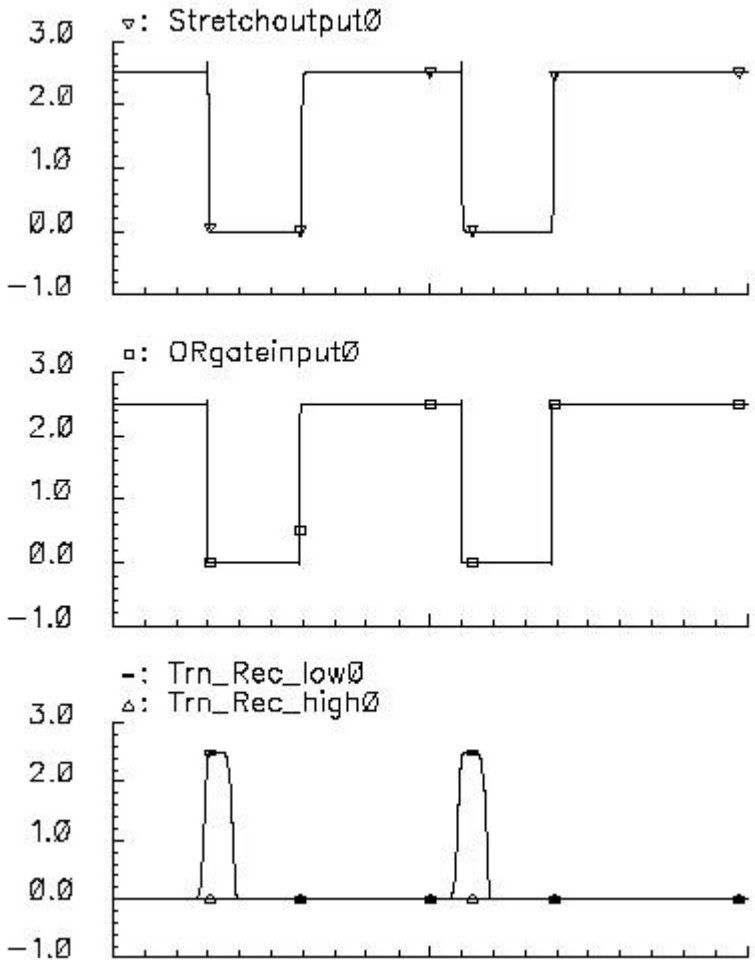


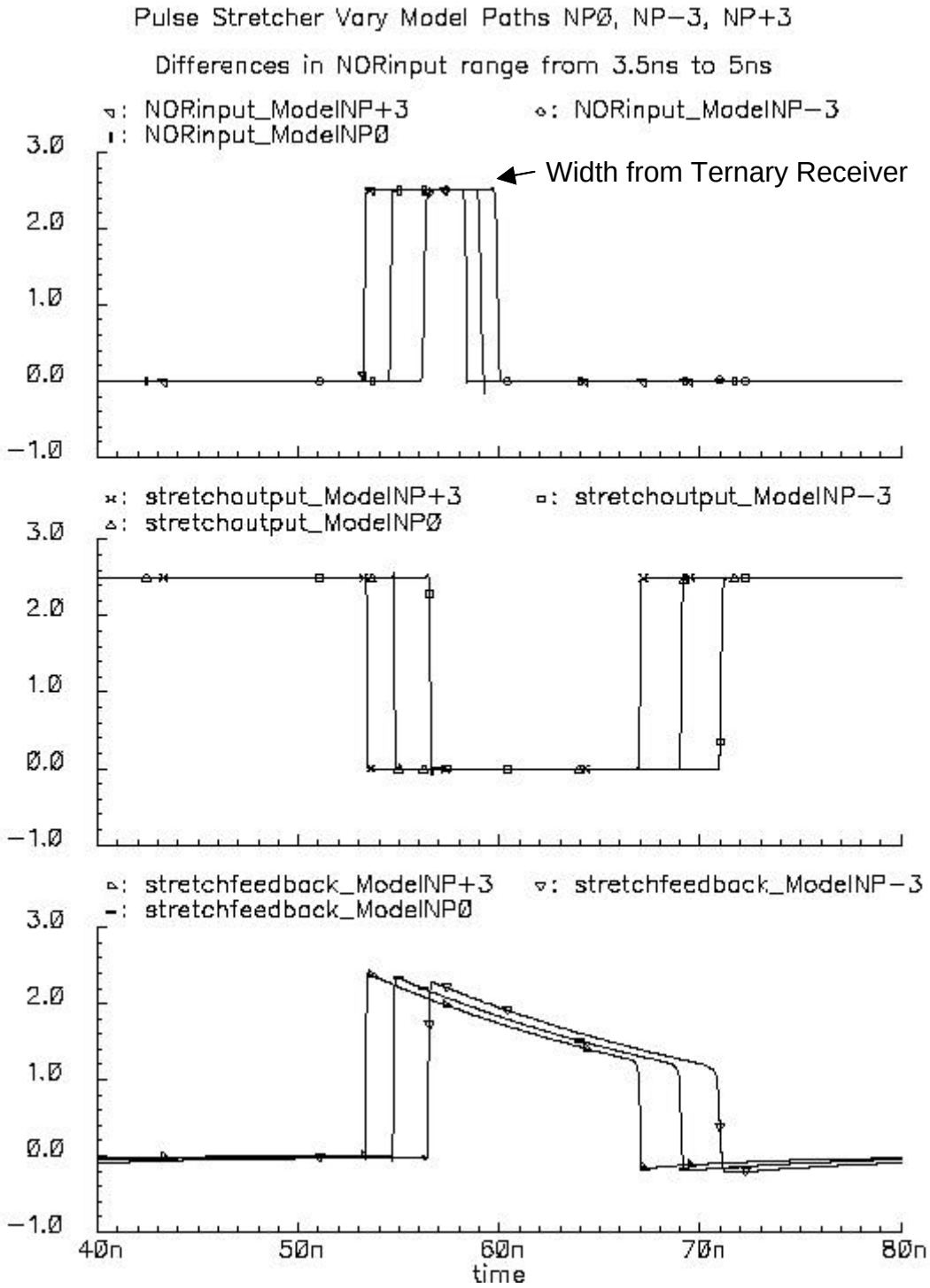
Chip Level Implementation of **FastoutII**

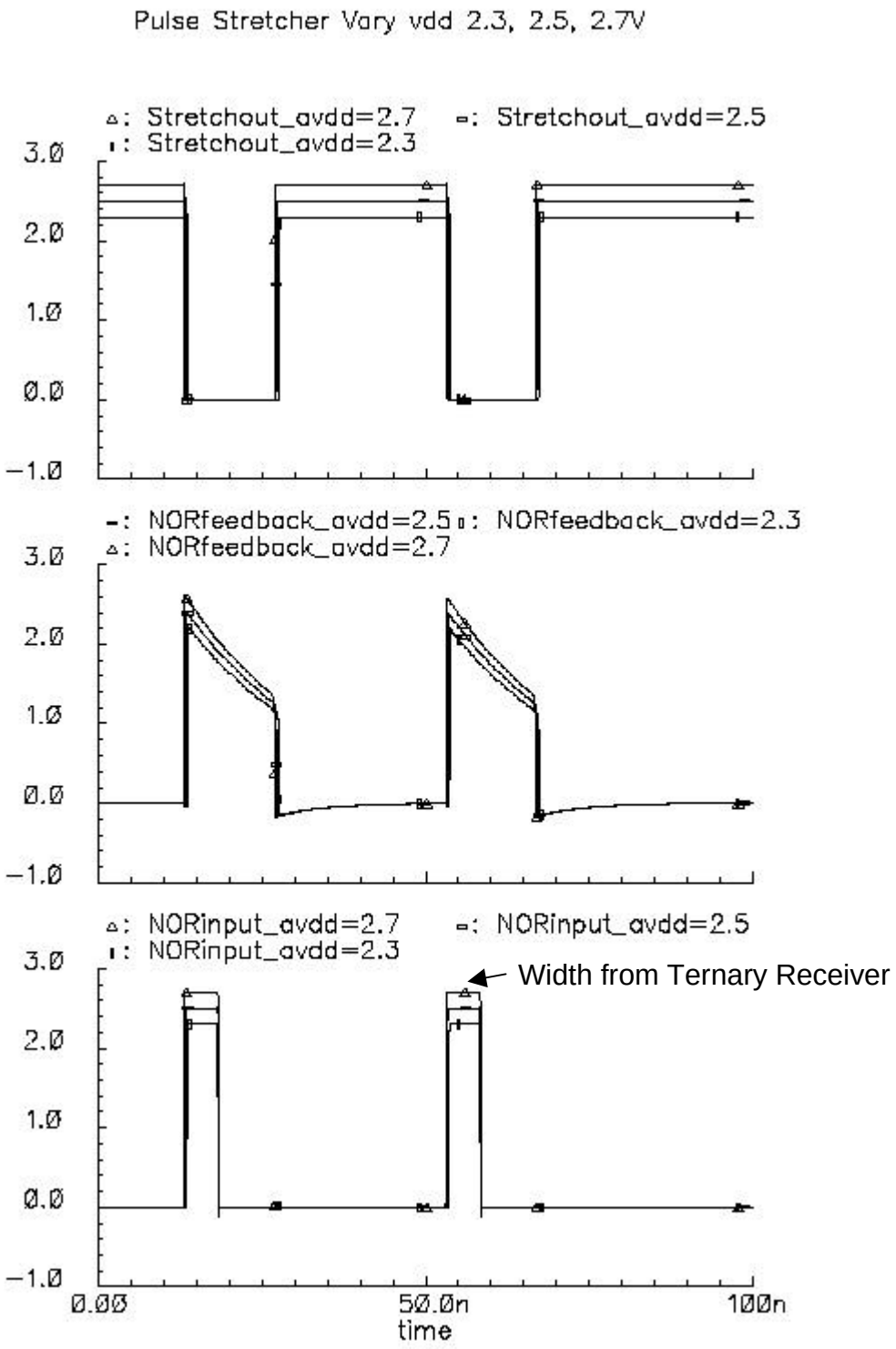
Fastout blocks (left) contribute to 16 input ‘Nand’ to create a digital ‘or’ of all 16 channel outputs on the DTMROC. The output is sent to the Low Level Driver with (analog) wire ‘or’ capability.



SPICE Calculations
Ternary Input (bot) Fastout (top)




Pulse Stretcher Vary Model Paths NPØ, NP−3, NP+3
Differences in NORinput range from 3.5ns to 5ns
NORinput_ModelNP+3
NORinput_ModelNP−3
NORinput_ModelNPØ
Width from Ternary Receiver
3.Ø
2.Ø
1.Ø
Ø.Ø
−1.Ø
stretchoutput_ModelNP+3
stretchoutput_ModelNP−3
stretchoutput_ModelNPØ
stretchfeedback_ModelNP+3
stretchfeedback_ModelNP−3
stretchfeedback_ModelNPØ
4Øn
5Øn
6Øn
7Øn
8Øn
time


Pulse Stretcher Vary vdd 2.3, 2.5, 2.7V
△: Stretchout_avdd=2.7
▫: Stretchout_avdd=2.5
▮: Stretchout_avdd=2.3
3.0
2.0
1.0
0.0
−1.0
-: NORfeedback_avdd=2.5
▮: NORfeedback_avdd=2.3
△: NORfeedback_avdd=2.7
3.0
2.0
1.0
0.0
−1.0
△: NORinput_avdd=2.7
▫: NORinput_avdd=2.5
▮: NORinput_avdd=2.3
Width from Ternary Receiver
3.0
2.0
1.0
0.0
−1.0
0.00
50.0n
100n
time

Layout