

Noise Margin



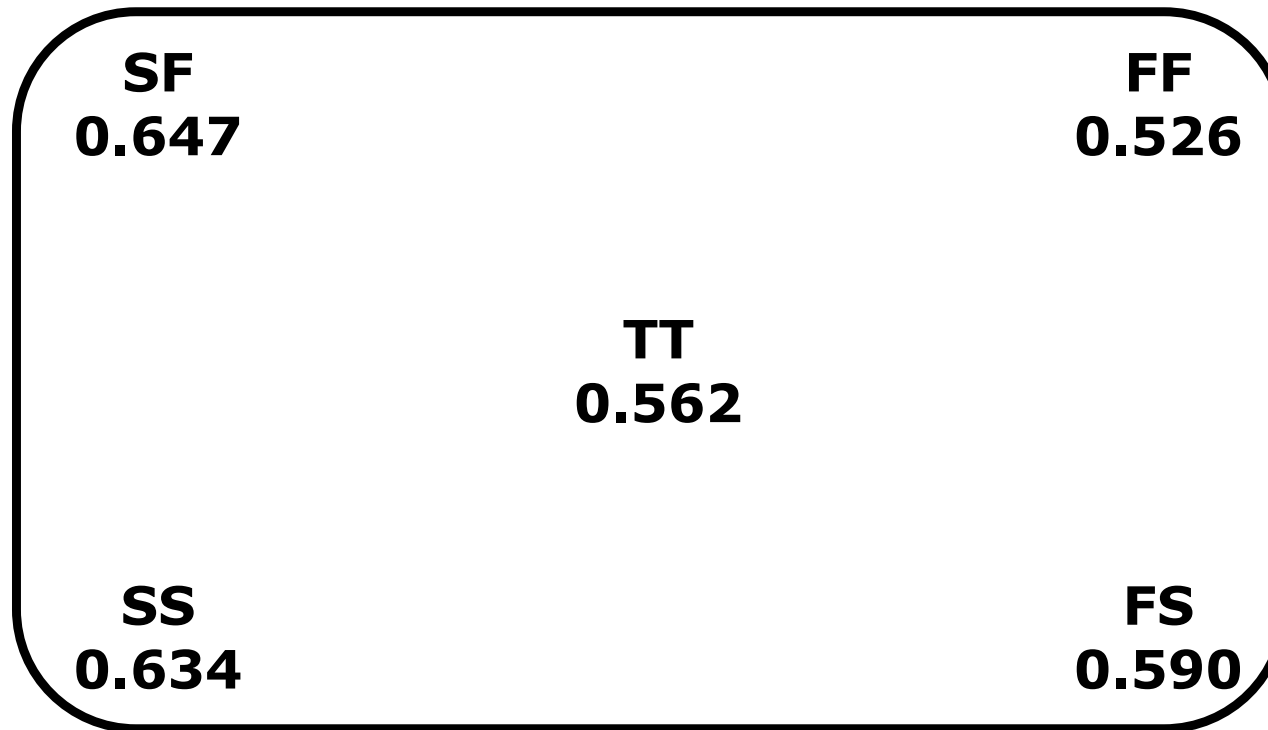
B11901027 王仁軒

Procedure

- Hspice simulation
- Download data
- Post-processing done by python
 - Rotate the curves ccw by 45 degree
 - Subtract two curves
 - Find min(local maximum, -local minimum) for SNM, RNM
 - Find local maximum (or global maximum) for WNM

SNM (corners)

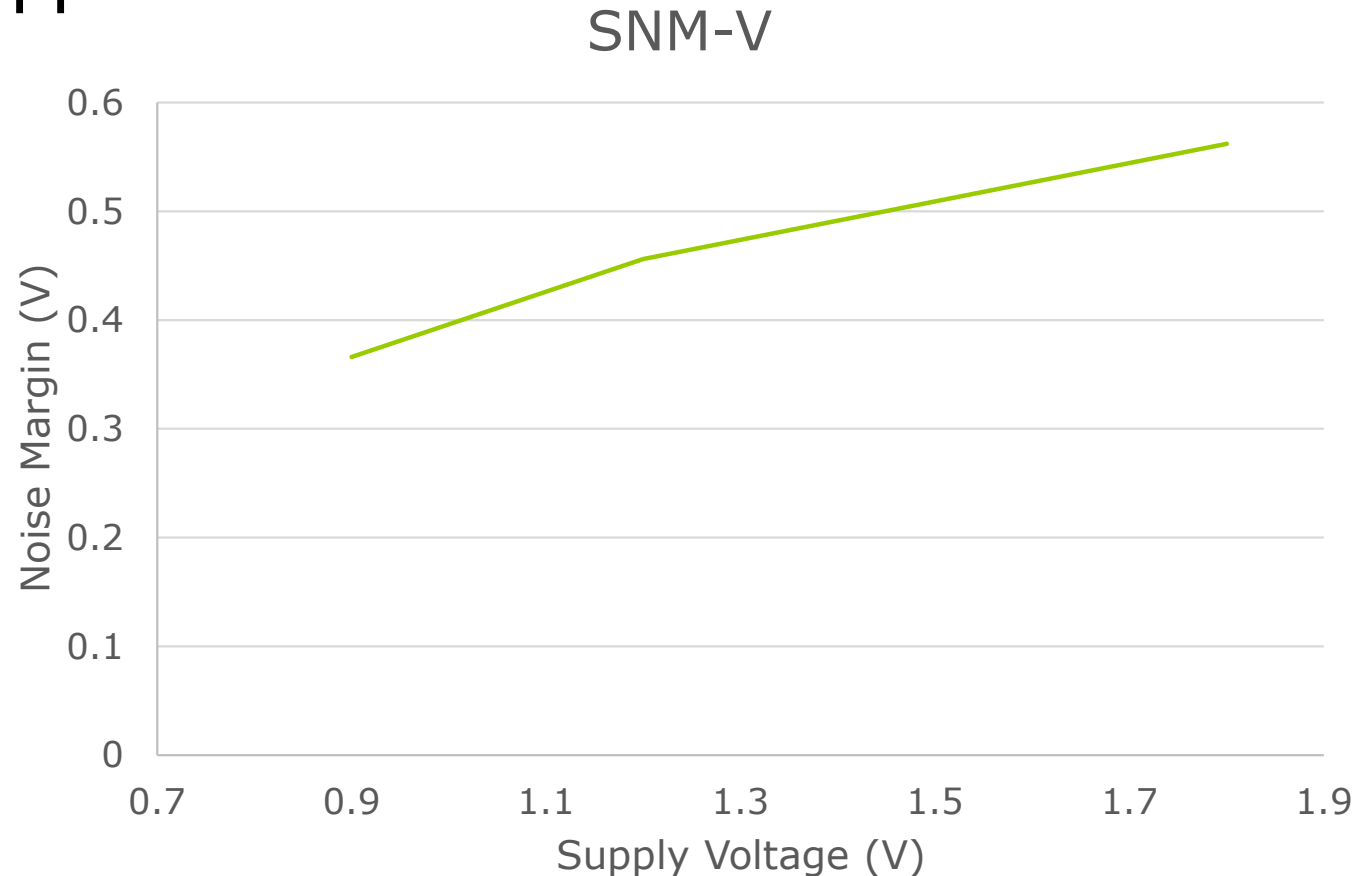
□ Best at SF, worst at FF



SNM (supply voltage)

□ Roughly linear to VDD

■ At TT



SNM (width)

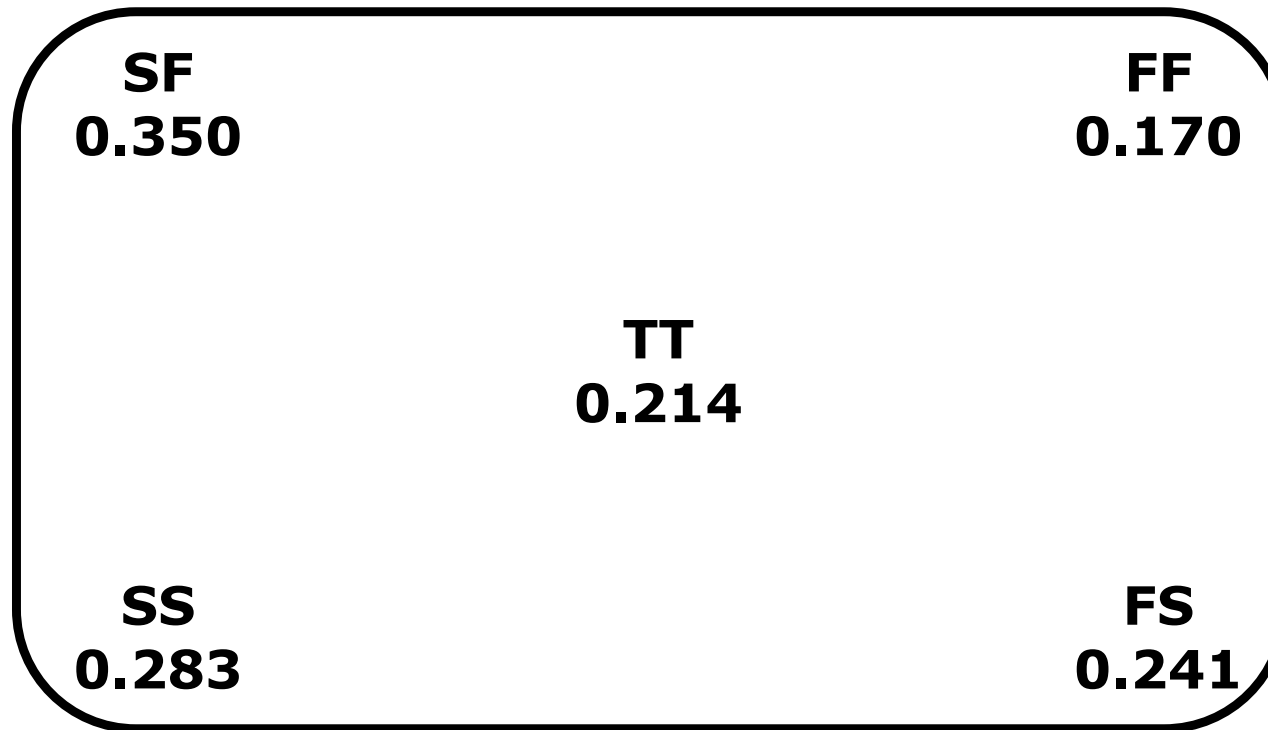
□ Noise margin ↑ with W_n ↓ or W_p ↑

■ $V_{DD} = 1.8 \text{ V}$

$W_p = 0.25 \text{ um}$		
0.533		
$W_n = 0.62 \text{ um}$	$W_n = 0.72 \text{ um}$	$W_n = 0.82 \text{ um}$
0.564	$W_p = 0.30 \text{ um}$	0.560
	0.562	
$W_p = 0.35 \text{ um}$		
0.569		

RNM (corners)

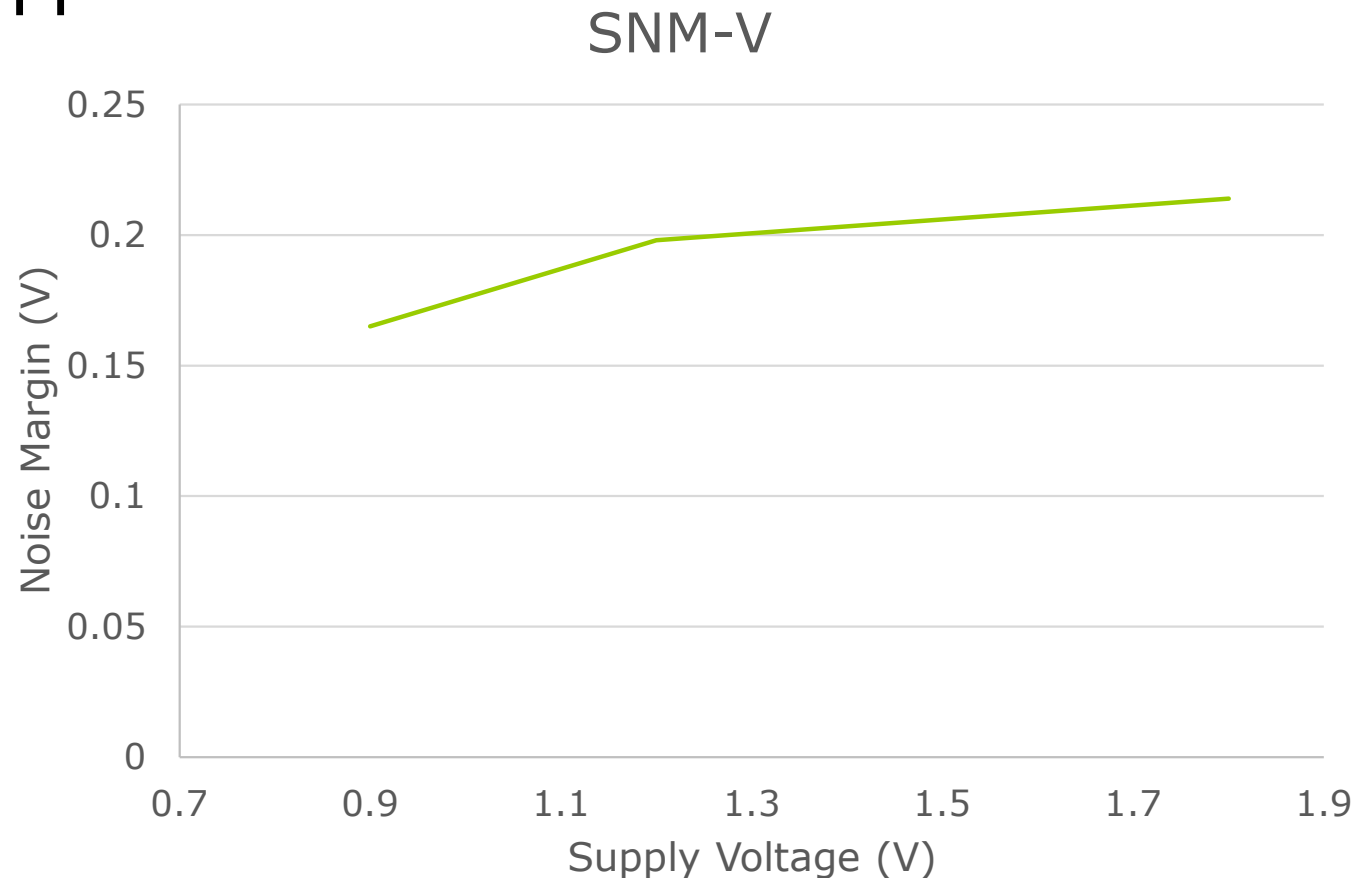
□ Best at SF, worst at FF



RNM (supply voltage)

□ NM ↓ with VDD ↓

■ At TT



RNM (width)

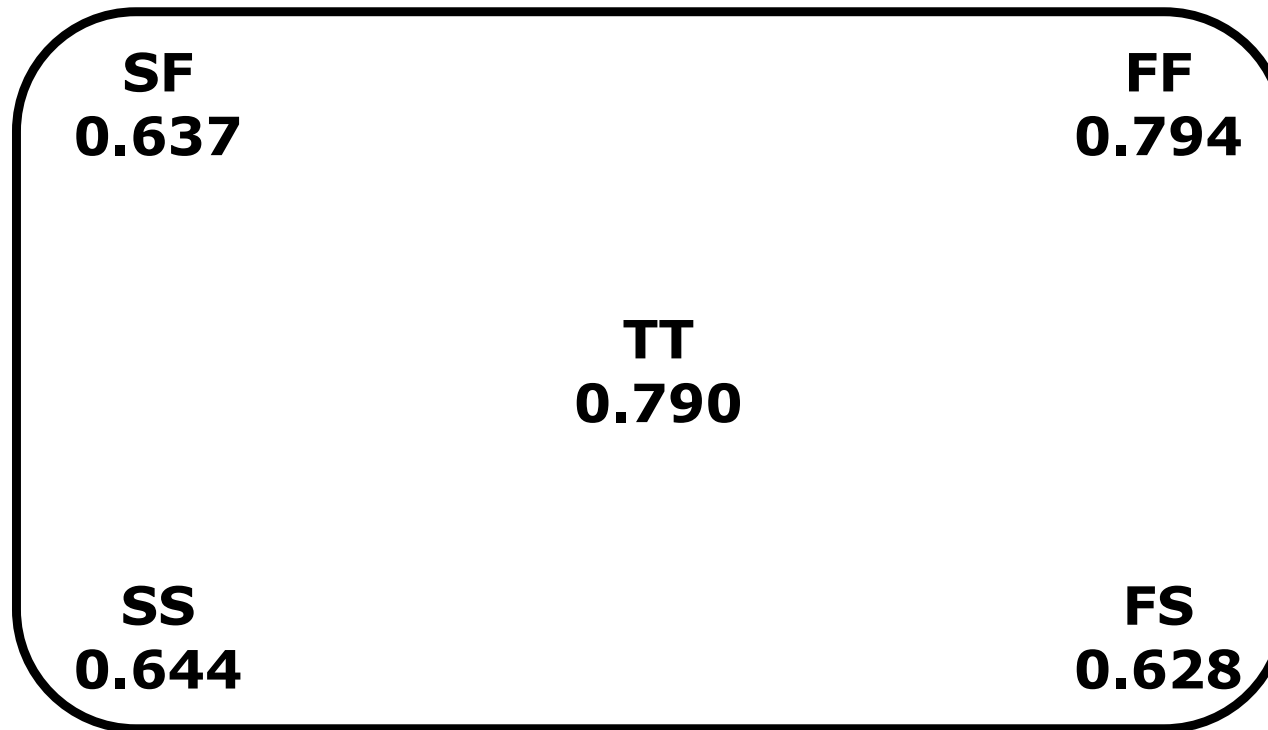
□ Noise margin ↑ with W_n ↓ or W_p ↑

■ $V_{DD} = 1.8 \text{ V}$

$W_p = 0.24 \text{ um}$		
0.196		
$W_n = 0.60 \text{ um}$	$W_n = 0.72 \text{ um}$	$W_n = 0.84 \text{ um}$
0.167	$W_p = 0.30 \text{ um}$	0.237
	0.214	
$W_p = 0.36 \text{ um}$		
0.216		

WNM (corners)

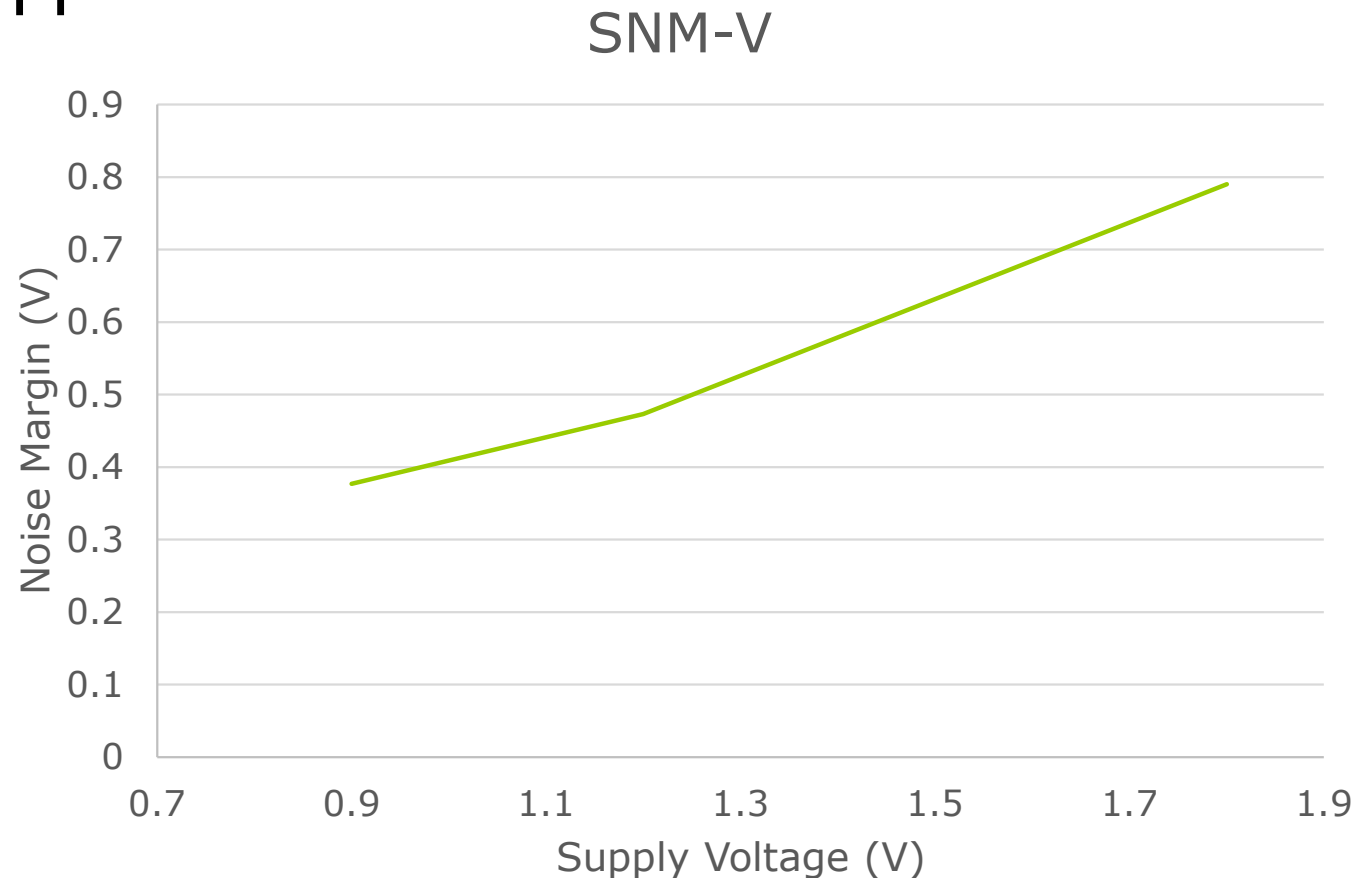
□ Best at FF, worst at FS



WNM (supply voltage)

□ Roughly linear to VDD

■ At TT



WNM (width)

□ Noise margin ↑ with W_n ↓ or W_p ↑

■ $V_{DD} = 1.2$ V

	$W_p = 0.25$ μm 0.472	
$W_n = 0.60$ μm 0.475	$W_n = 0.72$ μm $W_p = 0.30$ μm 0.473	$W_n = 0.84$ μm 0.471
	$W_p = 0.36$ μm 0.473	

□ Some special cases

