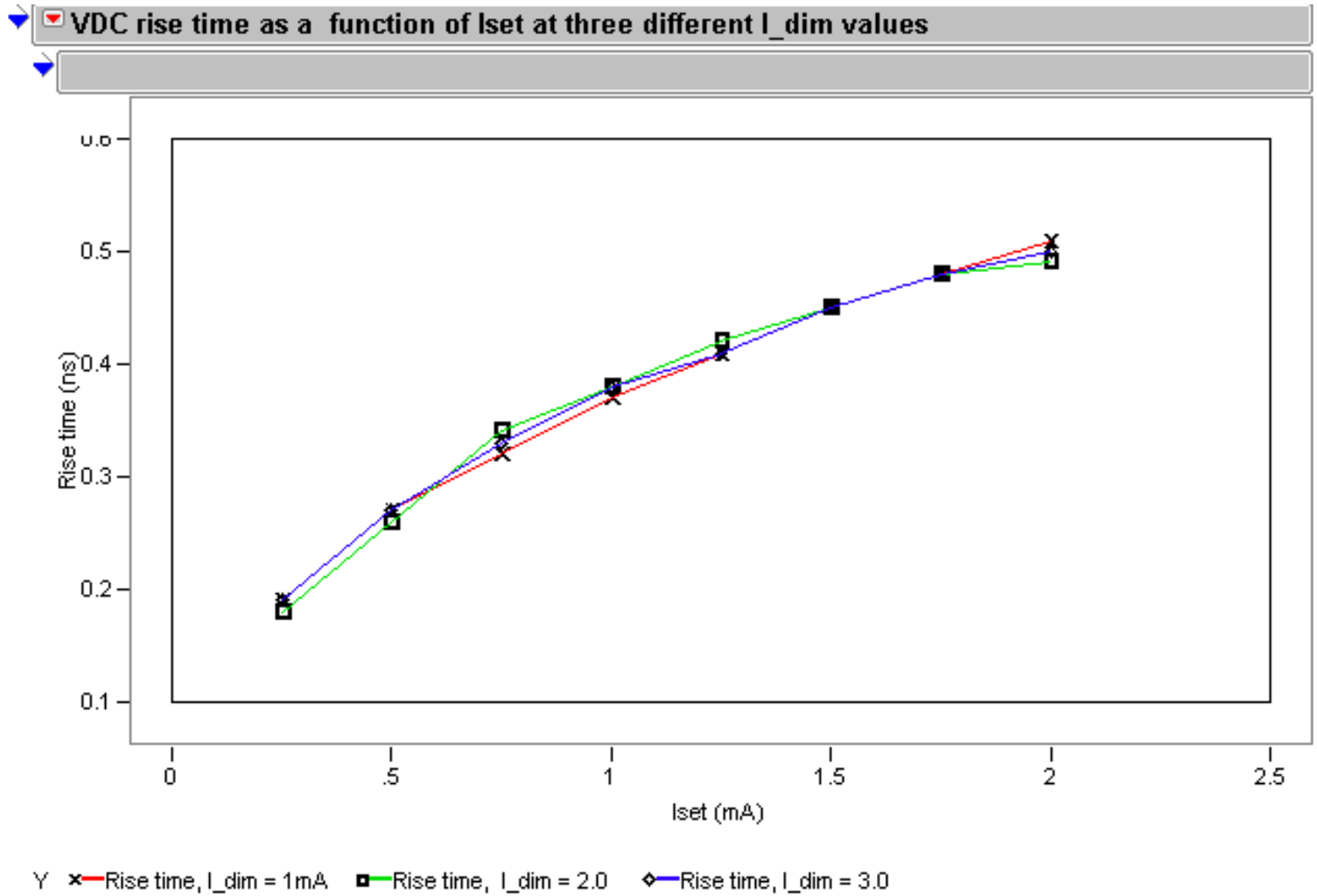
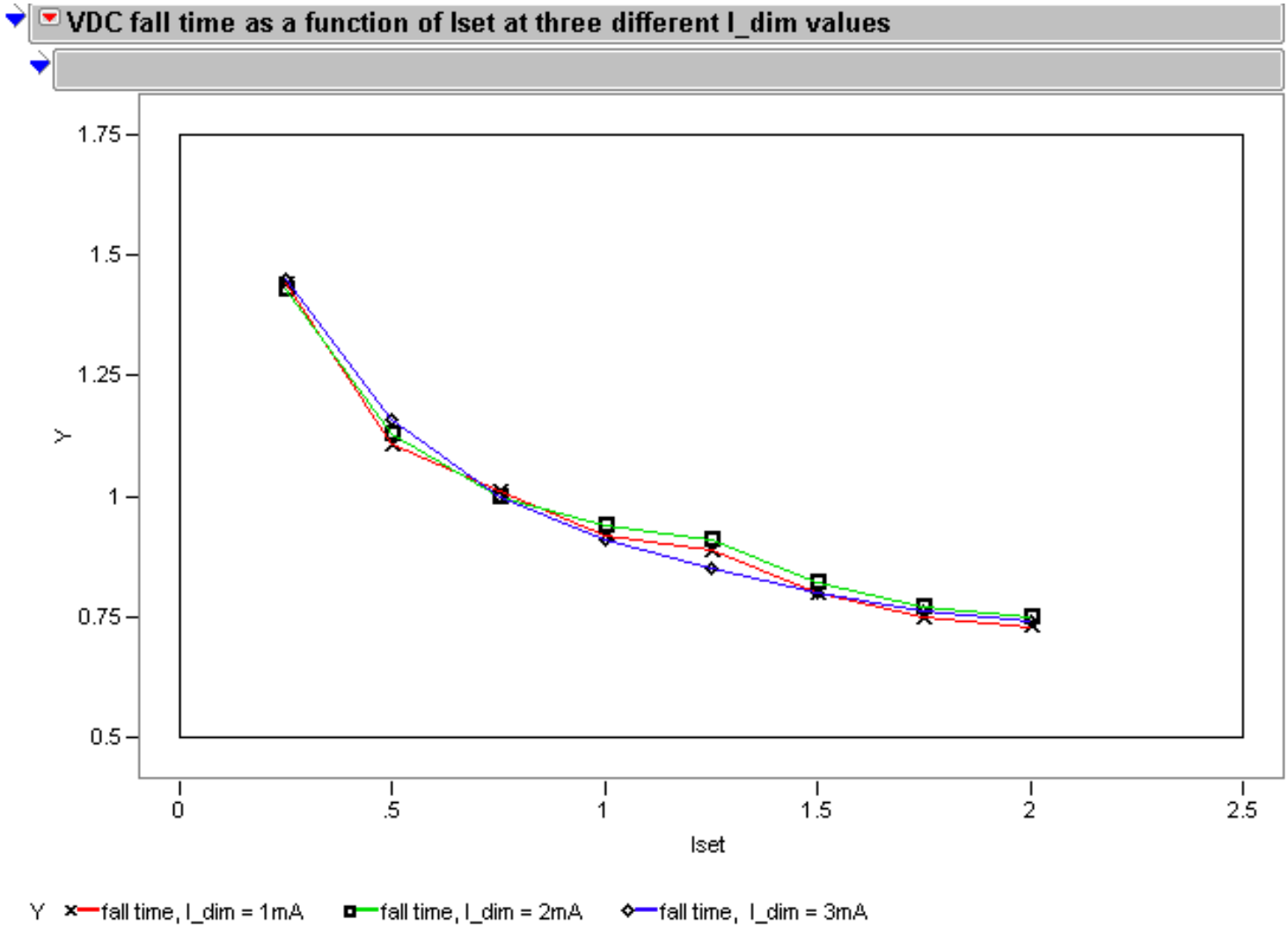
VDC rise time



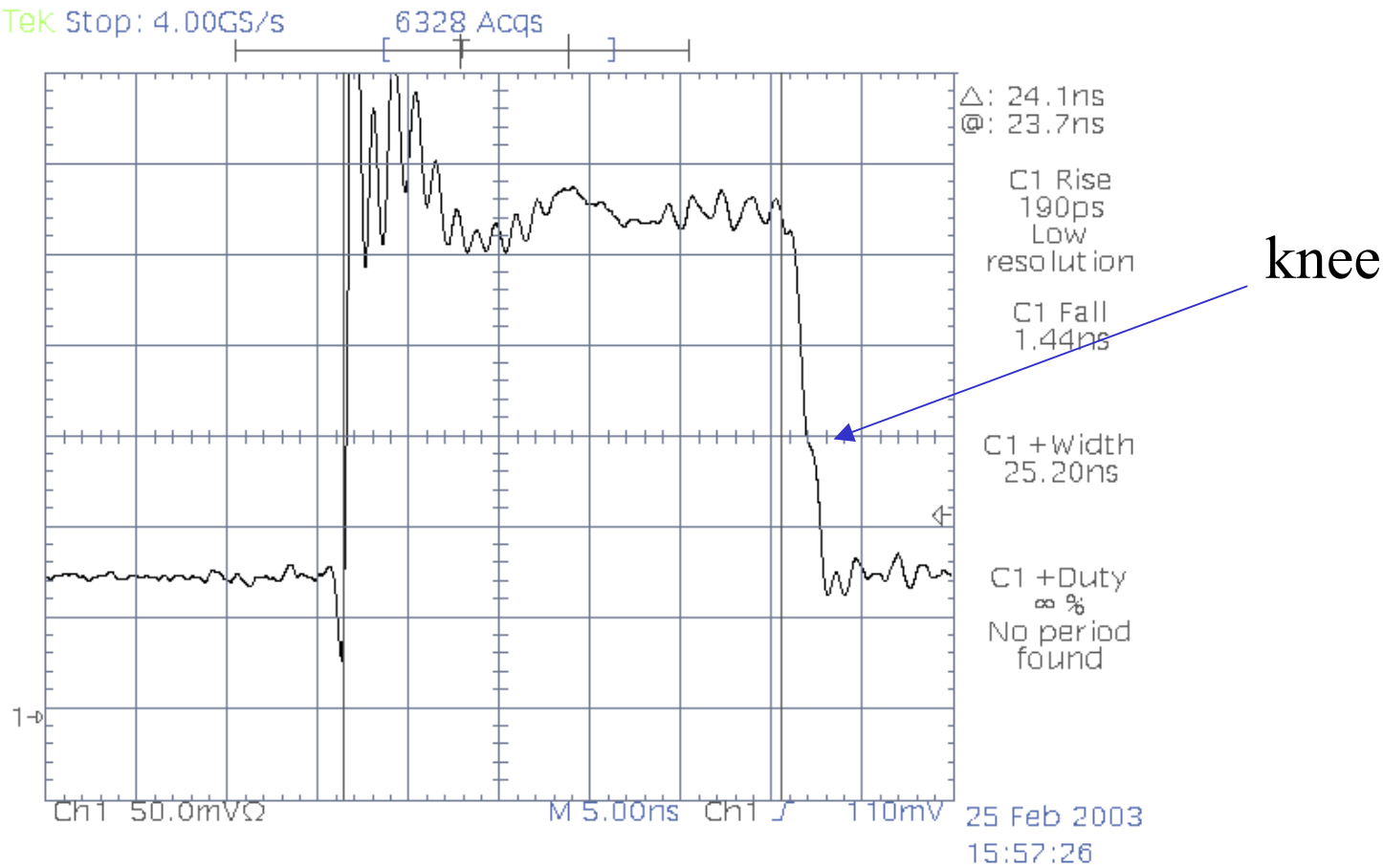
- Rise time increases as a function of I_set
- I_dim does not change the rise time

VDC fall time



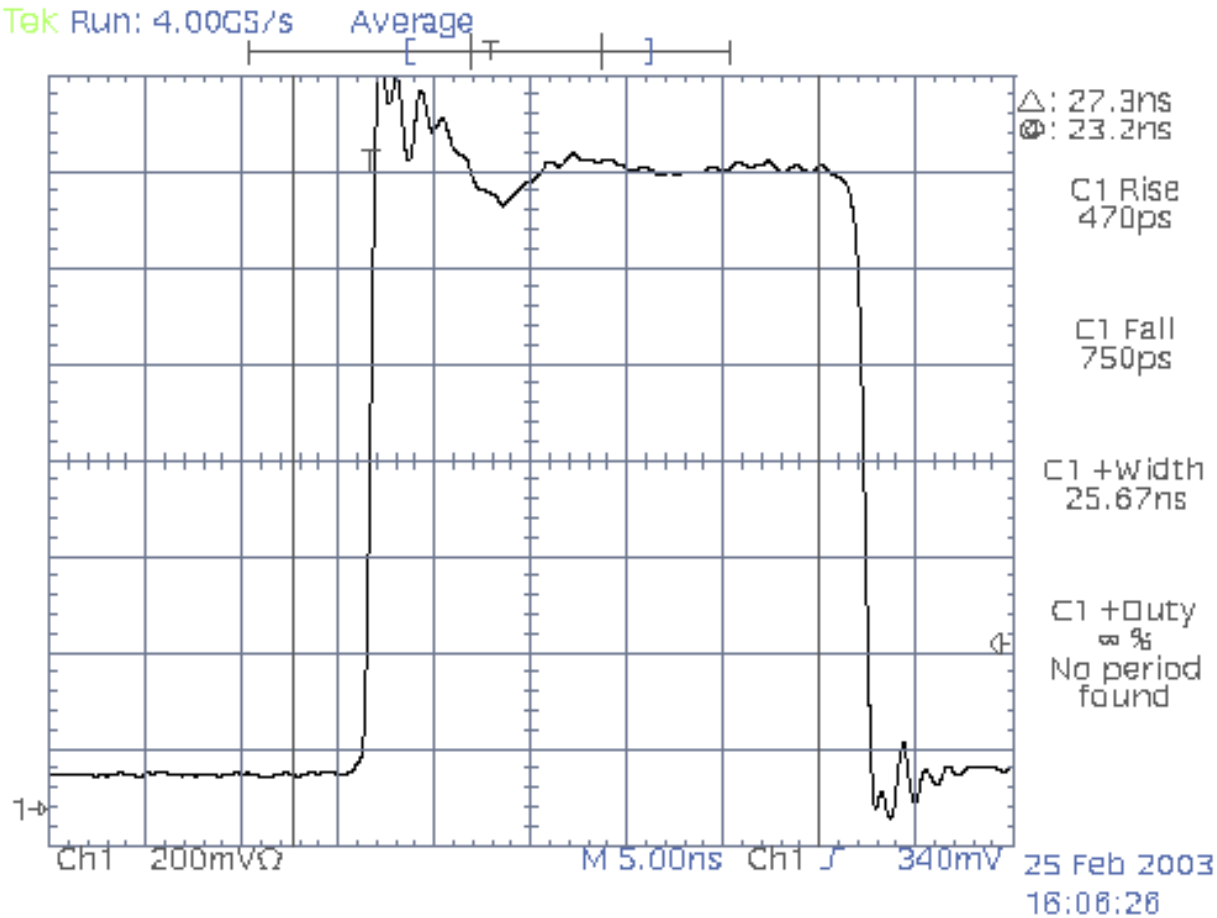
- Fall time decreases as a function of I_set
- I_dim does not change the rise time

VDC out put at I_set = .25 mA



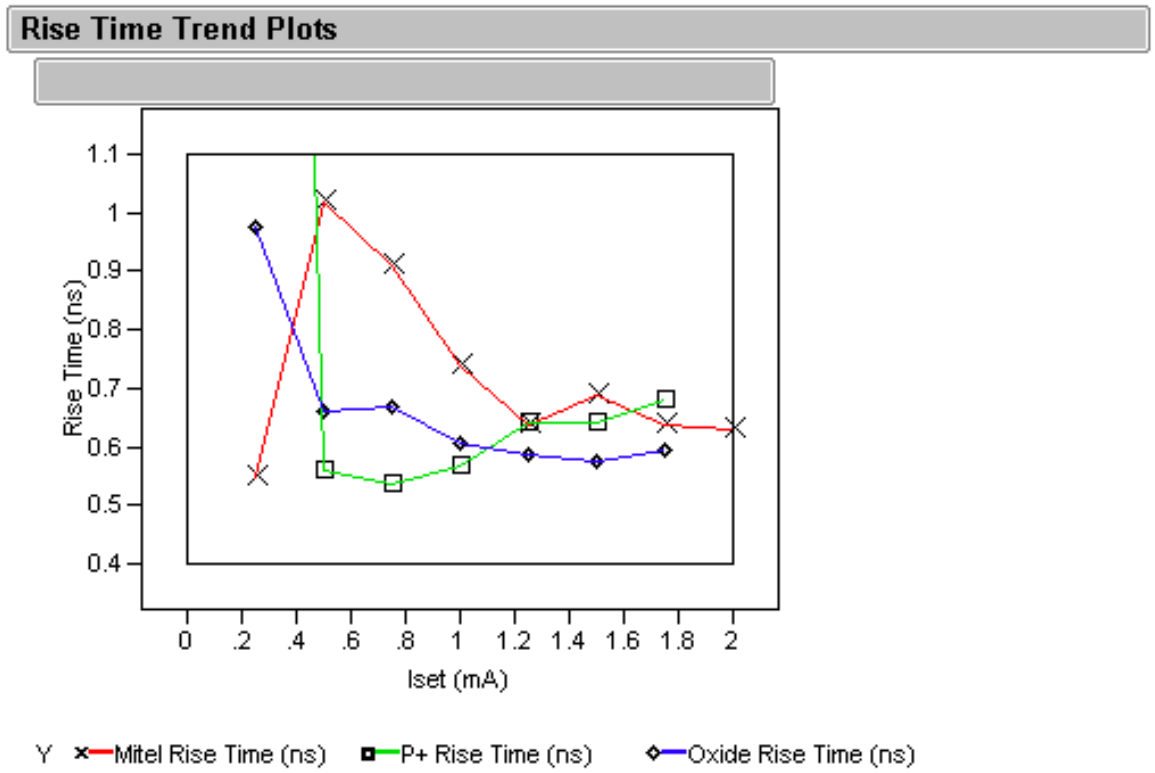
- Tail of the signal shows a knee at I_set = 0.25 mA

VDC signal at I_set = 1.5mA



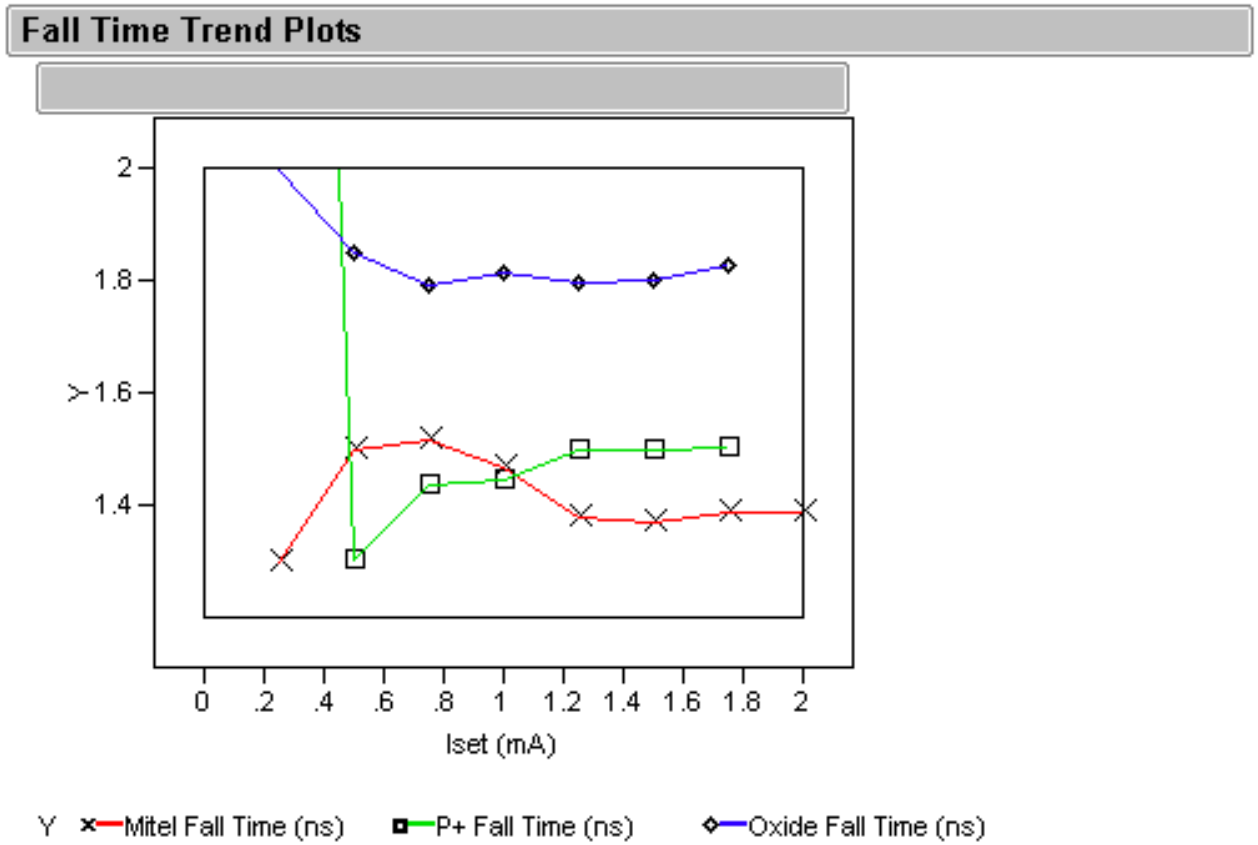
- There is no sign of the knee at I_set = 1.5 mA

Rise Time Trend Plot



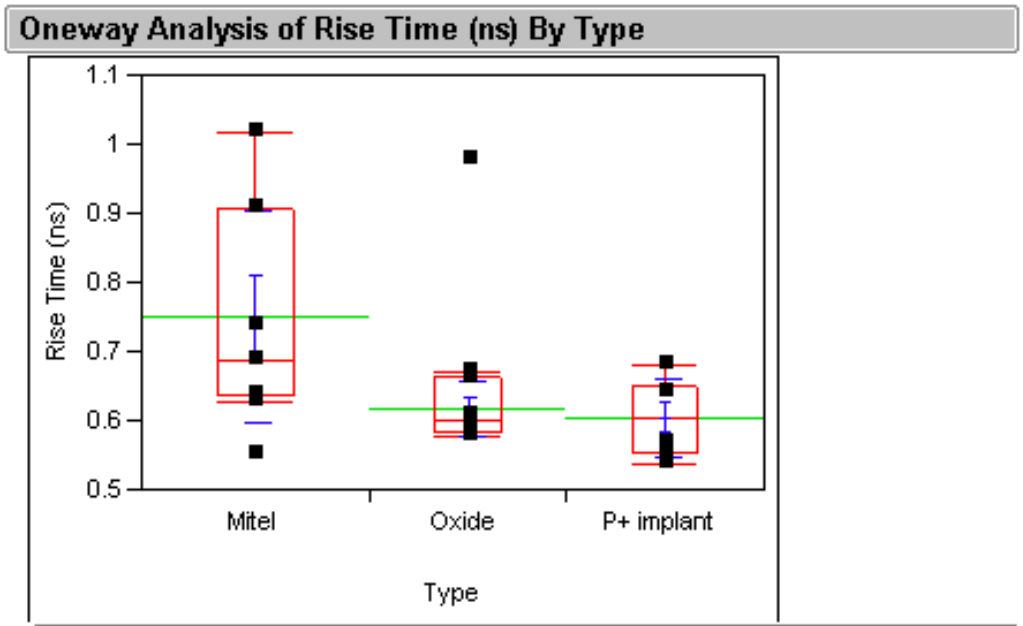
- P+ data is from the average of 7 links
- Oxide data is from the average of 6 links
- Mitel data is from one link only (larger sigma)

Fall Time Trend Plot



- Oxide fall time is higher by roughly 20%

Rise Time Averages

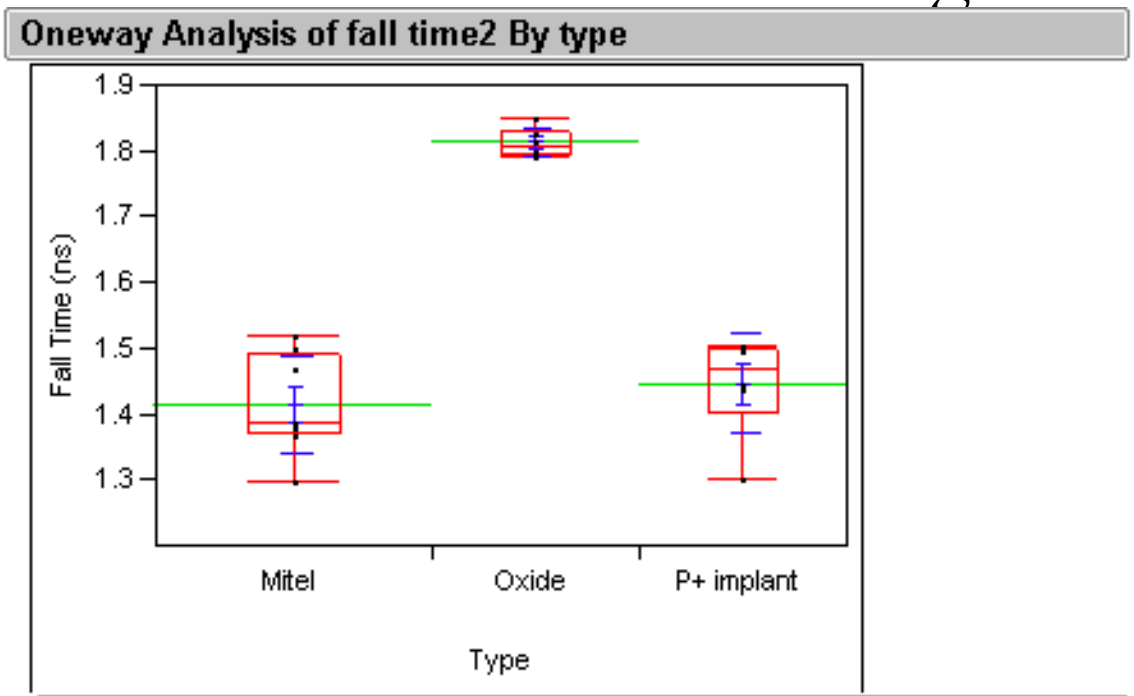


Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Mitel	7	0.752857	0.153157	0.05789	0.61121	0.89450
Oxide	6	0.617444	0.039436	0.01610	0.57606	0.65883
P+ implant	6	0.605000	0.057286	0.02339	0.54488	0.66512

- Green lines are the means
- Red boxes are the inner 50% quintile.
- Oxide shows a tighter spread, the distributions are consistent for all three types

Fall Time Averages



Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Mitel	8	1.41500	0.074642	0.02639	1.3526	1.4774
Oxide	6	1.81472	0.022445	0.00916	1.7912	1.8383
P+ implant	6	1.44833	0.076928	0.03141	1.3676	1.5291

- Oxide has the largest fall time mean, but its sigma is significantly lower
- Mitel and P+ fall times are consistent

Conclusions

- VDC Rise time increases as a function of I_set
- VDC Fall time decreases as a function of I_set
- VCSEL rise times are consistent
  - Mitel = .75 +/- .15 ns
  - Oxide = 0.62 +/- 0.039 ns
  - P+ = 0.61 +/- 0.057 ns
- VCSEL fall times are consistent for Mitel and P+, but Oxide fall time is larger by about 20% and not statistically consistent with the other two types
  - Mitel = 1.42 +/- 0.075 ns
  - Oxide = 1.81 +/- 0.022 ns
  - P+ = 1.45 +/- 0.077 ns