APPENDIX B: Equation List

B.1 I-V Model

B.1.1 Threshold Voltage

$$
\begin{aligned}
V_{th} &= V_{th0ox} + K_{1ox}\cdot\sqrt{\Phi_s - V_{bseff}} - K_{2ox}V_{bseff} \\
&+ K_{1ox}\left(\sqrt{1+\frac{Nlx}{L_{eff}}}-1\right)\sqrt{\Phi_s} + \left(K_3 + K_{3b}V_{bseff}\right)\frac{T_{ox}}{W_{eff}'+W_0}\Phi_s \\
&- D_{VT0w}\left(\exp\left(-D_{VT1w}\frac{W_{eff}'L_{eff}}{2l_{tw}}\right)+2\exp\left(-D_{VT1w}\frac{W_{eff}'L_{eff}}{l_{tw}}\right)\right)\left(V_{bi}-\Phi_s\right) \\
&- D_{VT0}\left(\exp\left(-D_{VT1}\frac{L_{eff}}{2l_t}\right)+2\exp\left(-D_{VT1}\frac{L_{eff}}{l_t}\right)\right)\left(V_{bi}-\Phi_s\right) \\
&- \left(\exp\left(-D_{sub}\frac{L_{eff}}{2l_{to}}\right)+2\exp\left(-D_{sub}\frac{L_{eff}}{l_{to}}\right)\right)\left(E_{tao}+E_{tab}V_{bseff}\right)V_{ds}
\end{aligned}
$$

$$
V_{th0ox} = V_{th0} - K_1\cdot\sqrt{\Phi_s}
$$

$$
K_{1ox} = K_1\cdot\frac{T_{ox}}{T_{oxm}}
$$

$$
K_{2ox} = K_2\cdot\frac{T_{ox}}{T_{oxm}}
$$