

Fundamentals of Nanotransistors

L3.6 Quiz

ANSWERS

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Lecture 3.6: Revisiting the VS Model

- 1) How does the traditional expression for the linear region current, $I_{DLIN} = (W/L) m_h |Q_n(V_{GS}, V_{DS})| V_{DS}$, change for a ballistic MOSFET?
 - a) Change (W/L) to (W) .
 - b) Change (W/L) to $(W + I_0)/L$.
 - c) Change m_h to m_B .**
 - d) Change m_h to $u_T I_0 / 2$.
 - e) Change V_{DS} to $k_B T / q$.

- 2) How does the traditional expression for the saturation current, $I_{DSAT} = W |Q_n(V_{GS}, V_{DS})| u_{sat}$, change for a ballistic MOSFET?
 - a) Change (W) to (W/L) .
 - b) Change (W/L) to $(W + I_0)/L$.
 - c) Change u_{sat} to $m_B V_{DS} / L$.
 - d) Change u_{sat} to u_T .**
 - e) Change u_{sat} to $m_B (k_B T / q) / L$.

- 3) Which of the following is true?
 - a) Present day, short channel silicon N-MOSFETs operate essentially at the ballistic limit for current.
 - b) Present day, short channel silicon N-MOSFETs operate at a very small fraction of the ballistic limit for current.
 - c) Present day, short, n-channel channel III-V HEMTs operate essentially at the ballistic limit for current.**
 - d) Present day, short, n-channel channel III-V HEMTs operate at a small fraction of the ballistic limit for current.
 - e) Both present day, short channel silicon N-MOSFETs and n-channel III-V HEMTs operate essentially at the ballistic limit for current.