1) gain <
2) linearity
3) \( \eta \)
4) noise (008)
5) Post

- Device \( W \)s are in several mm
- \( L > L_{\text{min}} \) may give better linearity but larger \( C_g \) & \( C_d \)
- \( I_{\text{DC}} \) of device is low due to large \( W \) \( \Rightarrow \) Can save power

- Swing is limited
- \( C_{pv} @ (A) \)
- \( V_{A} \) swing is small \( \Rightarrow V_{D} \), small (better linearity)
- Stability
- \( R_{out} \) is larger
- Breakdown voltage stresses are low

Core device: \( 98 \text{mm}, 1.2 \text{V} \)
\( \Rightarrow I/o, -250 \text{nm}, 2.5 \text{V} \)
- \( V_{DRAIN} \) - choose equal to \( V_{SOURCE} \)
- \( L = L_{\text{min}}, V = V_{DRAIN}, I_{DC} \)
- \( V_{0} \) - choose such that
  a) \( V_{A} \) is large enough for linearity
  b) \( M_{2} \) does not go into triode
Linear

\[ x(t) \rightarrow y(t) \]

\[ x(t) = a(t) \cos(w_0 t + \phi(t)) \]

\[ y(t) = A(t) \cos(w_0 t + \phi(t) + \theta(t)) \]

If \( A(t) \gg \cos \text{ signal} \) \( \Rightarrow \):

\[ y(t) \approx A \cos \left[ w_0 t + \phi(t) + \theta(A(t)) \right] \]

\[ \Rightarrow \text{AM-AM change} \]

\[ \Rightarrow \text{AM-PM change} \]

\[ \eta_{\text{max}} = 25 \% \]

\[ \eta_{\text{max}} = 50 \% \]

\[ \eta \]

\[ P_{\text{out}} \]

\[ P_{\text{in}} \]

\[ \eta = \frac{P_{\text{out}}}{P_{\text{in}}} \]

\[ \eta_{\text{max}} = \frac{P_{\text{out}}}{P_{\text{in}} + P_{\text{out}}} \]

\[ P_{\text{in}} \text{ is small} \]

\[ P_{\text{out}} \text{ is added efficiently} \]

\[ \text{when gain is not large} \]