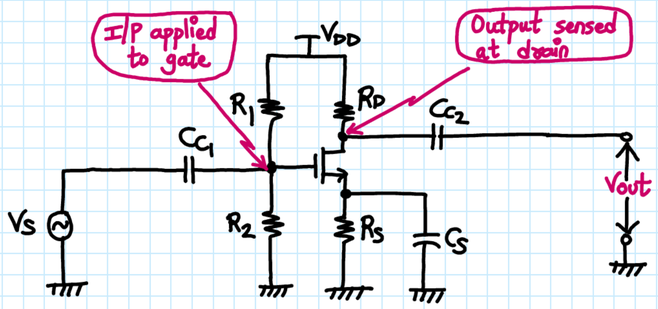
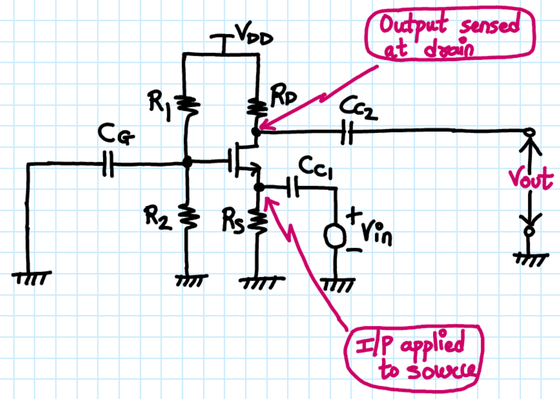
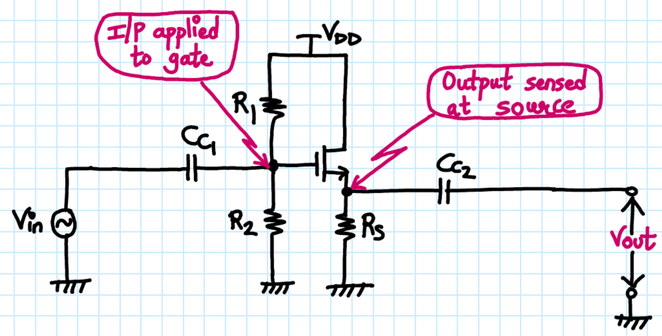
CS vs CG vs CD amplifier

08 July 2021 00:01

Todays topic:
Comparison of CS, CG and CD amplifier

	Common source amplifier	Common gate amplifier	Common drain amplifier
① Circuit diagram			
② Input signal applied to which terminal	Gate terminal	Source terminal	Gate terminal
③ Output signal is measured at	Drain terminal	Drain terminal	Source terminal
④ Voltage gain	$A_V = -g_m R_D$ Moderately high	$A_V = g_m R_D$ Moderately high	$A_V = \frac{R_S}{\frac{1}{g_m} + R_S}$ Low value ($A_V \leq 1$)
⑤ Input – Output phase relation	Output 180° out of phase with input signal	Output and input signal are in phase	Output and input signal are in phase
⑥ Input impedance Z_{in}	$Z_{in} = R_1 \parallel R_2$ High value	$Z_{in} = R_S \parallel \frac{1}{g_m}$ Low value	$Z_{in} = R_1 \parallel R_2$ High value
⑦ Output impedance Z_{out}	$Z_{out} = R_D$ Moderate value	$Z_{out} \simeq R_D$ Moderate value	$Z_{out} \simeq R_S \parallel \frac{1}{g_m}$ Low value
⑧ Applications	a) Can be used as inverting amplifier	a) Can be used as an non-inverting amplifier b) It can be driven by low impedance source (like antenna)	a) Can be used as a voltage buffer b) It can be used to drive a low impedance load (like antenna, speaker)