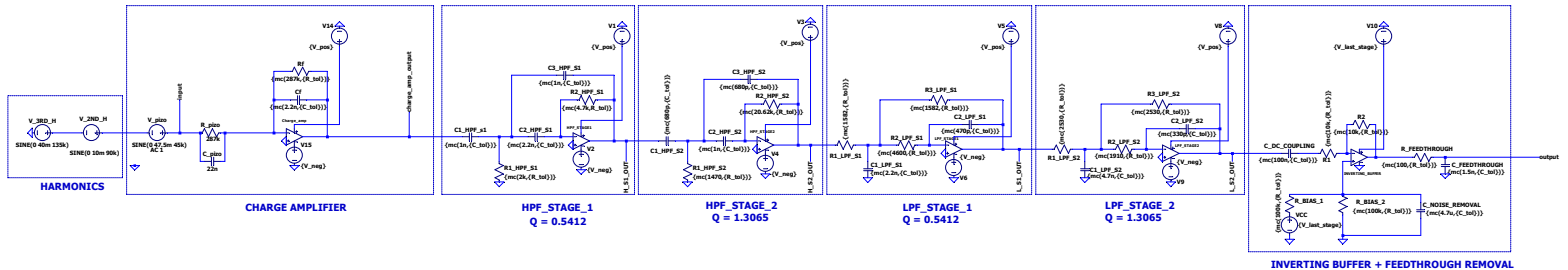
V_3RD_H
V_2ND_H
SINE(0 40m 135k)
SINE(0 10m 90k)
HARMONICS
V_piezo
SINE(0 27.5m 45k)
R2 1
input
R_piezo
20.5k
C_piezo
22n
V14
{V_pos}
R1
{mc(287k,{R_tol})}
C1
{mc(2.2n,{C_tol})}
Charge_amp
V15
{V_neg}
charge_amp_output
CHARGE AMPLIFIER
C1_HPF_s1
{mc(1n,{C_tol})}
C2_HPF_S1
{mc(2.2n,{C_tol})}
R1_HPF_S1
{mc(2k,{R_tol})}
V1
{V_pos}
C3_HPF_S1
{mc(1n,{C_tol})}
R2_HPF_S1
{mc(4.7k,R_tol)}
opa_2stage1
V2
{V_neg}
H_S1_OUT
HPF_STAGE_1
Q = 0.5412
C1_HPF_S2
{mc(680p,{C_tol})}
C2_HPF_S2
{mc(1n,{C_tol})}
R1_HPF_S2
{mc(1470,{R_tol})}
V3
{V_pos}
C3_HPF_S2
{mc(680p,{C_tol})}
R2_HPF_S2
{mc(20.62k,{R_tol})}
opa_2stage2
V4
{V_neg}
H_S2_OUT
HPF_STAGE_2
Q = 1.3065
R1_LPF_S1
{mc(158k,{R_tol})}
R2_LPF_S1
{mc(460k,{R_tol})}
C1_LPF_S1
{mc(2.2n,{C_tol})}
R3_LPF_S1
{mc(158k,{R_tol})}
C2_LPF_S1
{mc(470p,{C_tol})}
opa_1stage1
V5
{V_pos}
V6
{V_neg}
L_S1_OUT
LPF_STAGE_1
Q = 0.5412
R1_LPF_S2
{mc(283k,{R_tol})}
R2_LPF_S2
{mc(191k,{R_tol})}
C1_LPF_S2
{mc(4.7n,{C_tol})}
R3_LPF_S2
{mc(253k,{R_tol})}
C2_LPF_S2
{mc(330p,{C_tol})}
opa_2stage2
V8
{V_pos}
V9
{V_neg}
L_S2_OUT
LPF_STAGE_2
Q = 1.3065
C_DC_COUPLING
{mc(100n,{C_tol})}
R1
{mc(49.9k,{R_tol})}
R2
{mc(10k,{R_tol})}
V10
{V_last_stage}
R_FEEDTHROUGH
{mc(100,{R_tol})}
C_FEEDTHROUGH
{mc(1.5n,{C_tol})}
output
inverter1
R_BIAS_1
{mc(500k,{R_tol})}
R_BIAS_2
{mc(100k,{R_tol})}
C_NOISE_REMOVAL
{mc(4.7u,{C_tol})}
VCC
{V_last_stage}
INVERTING BUFFER + FEEDTHROUGH REMOVAL
.param R_tol=0.01
.param C_tol=0.05
.param V_pos=5V
.param V_neg=-5V
.param V_last_stage=3.3V
Simulation Parameters
.ac dec 100 1 1meg
.tran 0 1.1m 1m
.meas AC PeakVal_charge MAX mag(V(charge_amp_output))
.meas AC Target_charge PARAM PeakVal_charge/sqrt(2)
.meas AC f_low_charge WHEN mag(V(charge_amp_output))=Target RISE=1
.meas AC f_high_charge WHEN mag(V(charge_amp_output))=Target FALL=1
.meas AC BW_Res_charge PARAM f_high-f_low
.meas AC PeakVal MAX mag(V(output))
.meas AC f_center WHEN mag(V(output))=PeakVal
.meas AC Target PARAM PeakVal/sqrt(2)
.meas AC f_low WHEN mag(V(output))=Target RISE=1
.meas AC f_high WHEN mag(V(output))=Target FALL=1
.meas AC Bandwidth PARAM f_high - f_low
.meas AC Phase_Deg FIND ph(V(output)) AT 45k
.step param run 1 100000 1
SIMULATION DIRECTIVES