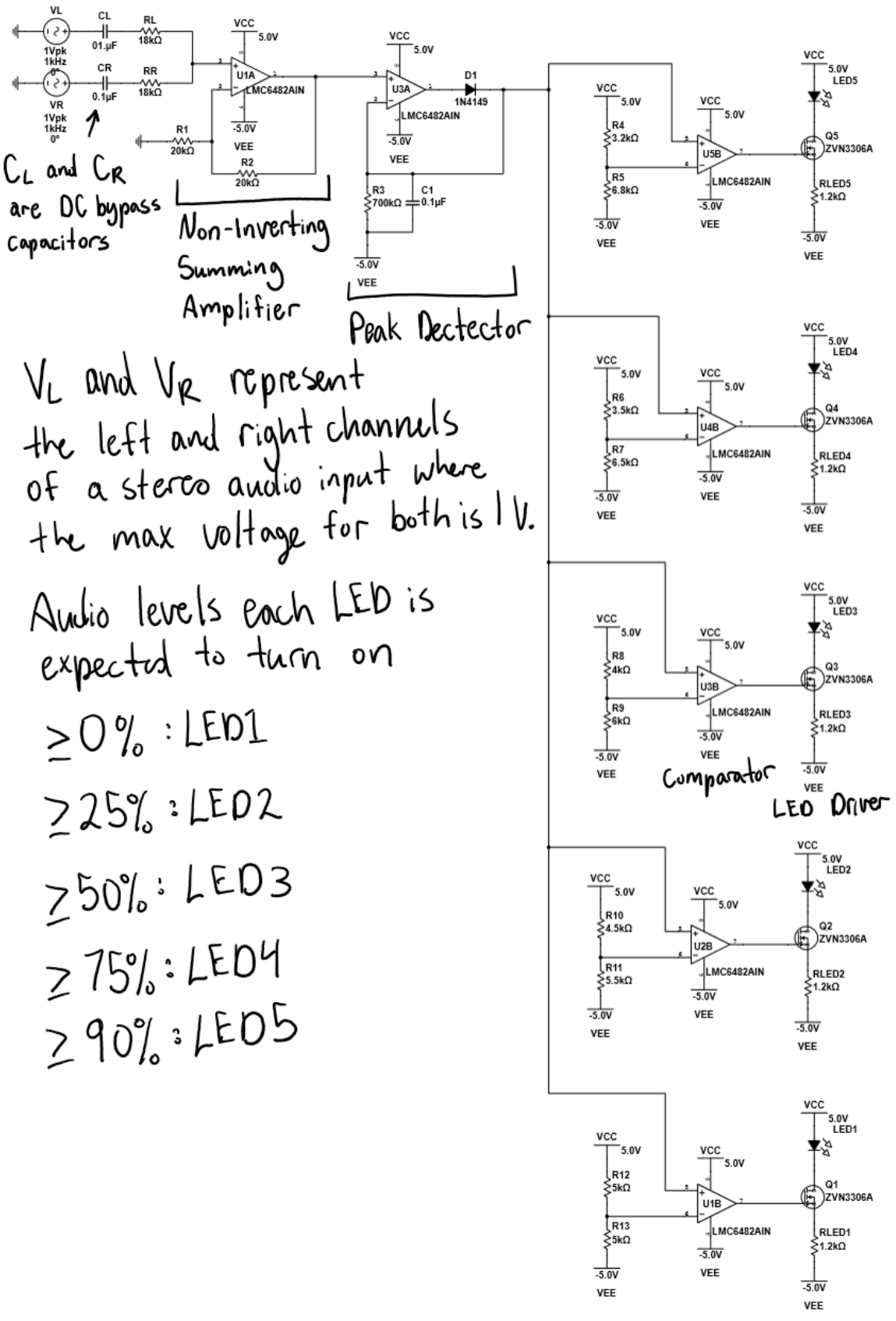


C_L and C_R are DC bypass capacitors

Non-Inverting Summing Amplifier

Peak Detector

Comparator

LED Driver

V_L and V_R represent the left and right channels of a stereo audio input where the max voltage for both is 1 V.

Audio levels each LED is expected to turn on

$\geq 0\%$: LED1

$\geq 25\%$: LED2

$\geq 50\%$: LED3

$\geq 75\%$: LED4

$\geq 90\%$: LED5

Work for Non-Inverting Summing Amplifier with Gain = 2

$$V_{sum} = V_{in}\left(1 + \frac{R_2}{R_1}\right) \quad \text{Set } V_{sum} = 2$$

Set $R_L = R_R$ so $I_L + I_R = 0$

$$I_L = \frac{\Delta V_{R_L}}{R_L} = \frac{V_L - V_{in}}{R_L} \qquad I_R = \frac{\Delta V_{R_R}}{R_R} = \frac{V_R - V_{in}}{R_R}$$

$$\frac{V_L - V_{in}}{R_L} + \frac{V_R - V_{in}}{R_R} = 0 \rightarrow V_{in} = \frac{V_L + V_R}{2}$$

$$V_{sum} = \left(\frac{V_L + V_R}{2}\right)\left(1 + \frac{R_2}{R_1}\right) = 2$$

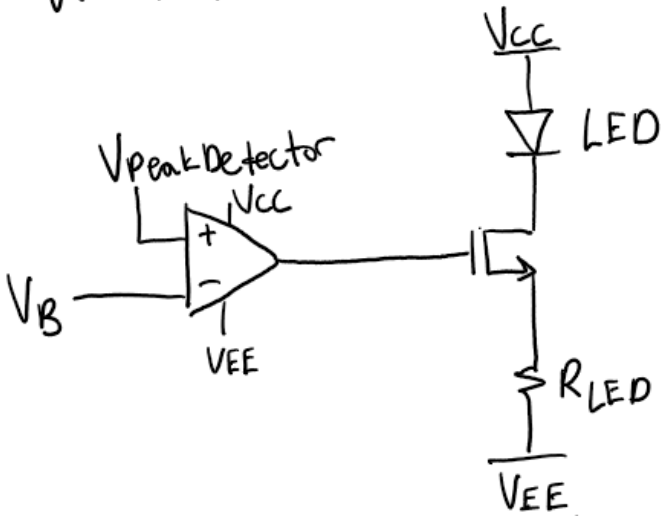
$R_1 = 18\,k\Omega \qquad R_2 = 18\,k\Omega$

Work for Peak Detector

$\tau = R_3 C_3 = 70\,ms$

$R_3 = 700\,k\Omega \qquad C_3 = 0.1\,\mu F$

Work for LED Driver

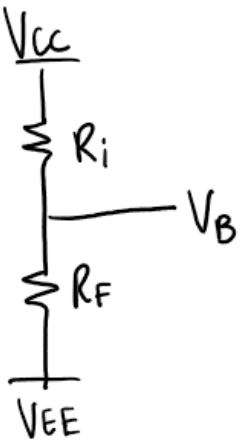


Mosfet is considered in switch mode

R_{LED}: assume $V_{DROP} = 0.9V$ $I_{max} = 7mA$

$$R_{LED} = \frac{\Delta V_{R_{LED}}}{I_{max}} = \frac{5 - 0.9 + 5}{0.007} = 1.2k\Omega$$

Setting DC offsets for the inverting terminals of the comparators



$$V_B = V_{EE} + (V_{CC} - V_{EE}) \frac{R_i}{R_i + R_F}$$

Calculated to set:

$V_{B_1} = 0.0V$

$V_{B_2} = 0.5V$

$V_{B_3} = 1.0V$

$V_{B_4} = 1.5V$

$V_{B_5} = 1.8V$