

$$V_{rms} = \sqrt{\frac{1}{T} \int_0^T V^2(t) dt}$$

ANALOG VOLTAGE SIGNAL FROM THE SENSING CIRCUIT YIELDS:

$$V_{sense}(t) = 0.00744675 V_{AC}(t) + 1.488$$

STEPS TO CALCULATE V_{RMS}

1) REMOVE THE 1.488 OFFSET
 $V_{sense_nooff}(t) = V_{sense}(t) - 1.488$

2) SQUARE THE VOLTAGE

$$V_{sense_sqd}(t) = V_{sense_nooff}(t) * V_{sense_nooff}(t)$$

3) INTEGRATE THE SQUARED VOLTAGE

$$V_{sense_int}(t) = \sum_{n=0}^T V_{sense_sqd}(t)$$

4) CALCULATE MEAN OF SUM OF VOLT-SQUARED

$$V_{squared_mean} = \frac{1}{t-t_0} * \sum_{n=0}^t V(t_n) * V(t_n) * t_{step}$$

5) SCALE RESULT BACK TO REAL VALUES

$$V(t)^2 = (.00744675 V(t))^2$$

$$V(t)^2 = \frac{V(t)^2}{(.00744675)^2} = 18033 V(t)^2$$

6) TAKE SQUARE ROOT OF RESULT TO FIND RMS VALUE

$$V_{rms} = \sqrt{V(t)^2}$$

STEPS FOR CODE (RMS VOLTAGE)

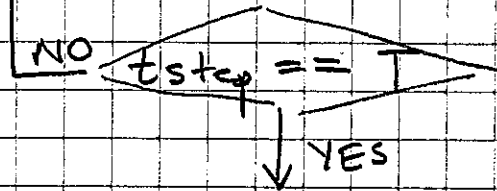
$$V_sum = 0$$

$$\rightarrow V_sample = v(t)$$

$$V_sample = V_sample - 1.488$$

$$V_sample = V_sample * V_sample$$

$$V_sum = V_sum + V_sample * t_step$$



$$V_sum = \frac{1}{T} * V_sum$$

NOTE: T SHOULD REALLY BE A MULTIPLE OF THE WAVEFORM FREQUENCY.

$$scaled_V_sum = V_sum * 18033$$

$$V_rms_value = \text{sgnt}(scaled_V_sum)$$

STEPS FOR CODE (RMS CURRENT)

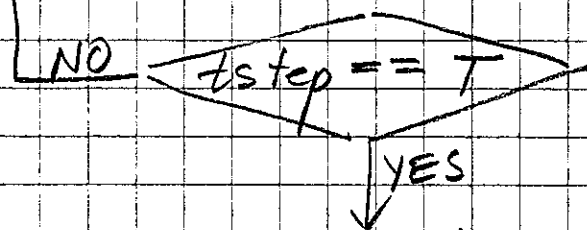
$$i_sum = 0$$

$$\rightarrow i_sample = i(t)$$

$$i_sample = i_sample - 1.68$$

$$i_sample = i_sample * i_sample$$

$$i_sum = i_sum + i_sample * tstep$$



$$i_sum = \frac{1}{T} * i_sum$$

NOTE: T SHOULD REALLY BE A MULTIPLE OF THE WAVEFORM FREQUENCY.

$$scaled_i_sum = i_sum * 223$$

$$i_rms_value = \sqrt{scaled_i_sum}$$

$$\frac{1}{(0.067)^2}$$

NOTE: AVERAGE POWER, RMS VOLTAGE, RMS CALCULATION CAN BE COMBINED IN ONE CALCULATION LOOP WHICH WOULD AVOID DUPLICATING A LOT OF CALCULATIONS