Aayush Arya

(Submitted: November 8, 2021)

PHY366 Lab Report
Practical: 8 Registration No.: 11912610 Section: G2903

Aim

To construct a modulator circuit using a transistor

Methods

An amplitude modulation circuit was constructed using a transistor element. The circuit is available at https://www.multisim.com/content/KEnsCE4LaBc7W8WNh3ZaY2/modulator-circuit/open/ and is shown in Figure 1.

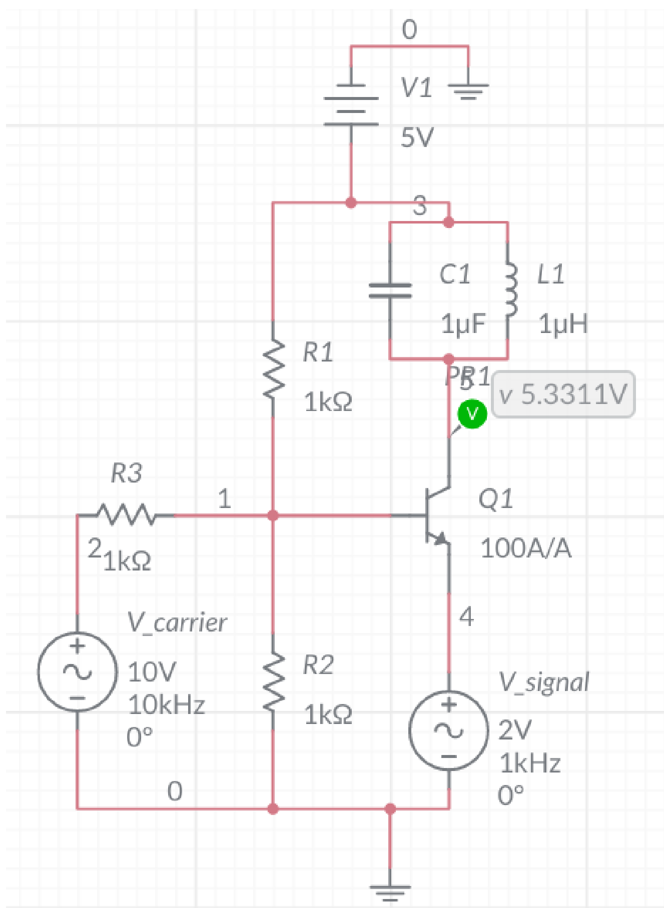

Figure 1: Circuit diagram of the modulator

The signal A_{signal} and f_{signal} were kept fixed at 2V and 1 kHz respectively.

Results & Conclusions

We calculated the modulation index

$$m = \frac{V_{max} - V_{min}}{V_{max} + V_{min}}$$

for each configuration studied.

In Figure 2, we show what the modulated signal output looks like, for an input carrier $A_c = 10V$ of frequency $f_c = 10$ kHz.

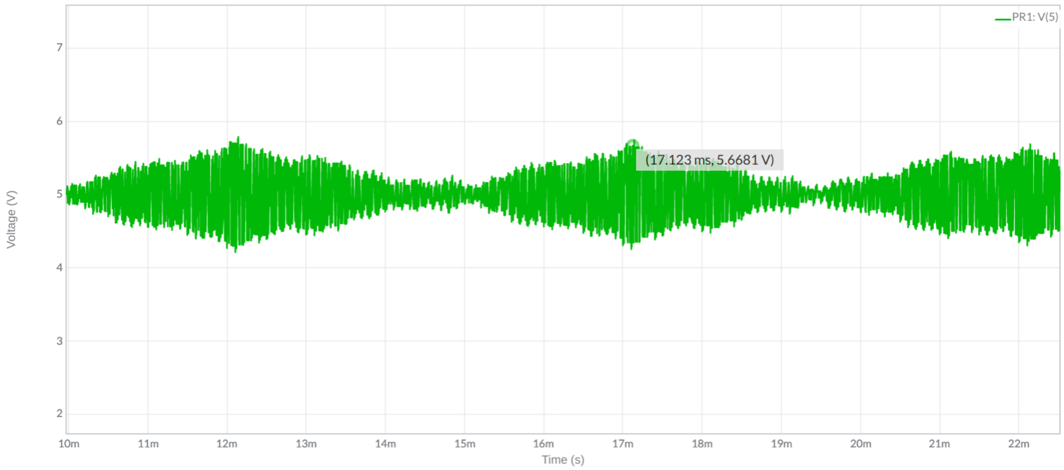

Figure 2: Modulated output signal for carrier $f_c = 10$ kHz and $A_c = 10$V.

By varying f_c and A_c, we obtain the following V_{max} and V_{min} values.

V_{max}	V_{min}	f_c (kHz)	A_c (V)	m
0.6681	0.0744	10	10	0.7994
0.6821	0.1152	10	15	0.7110
1.7676	0.9980	100	10	0.2783
2.6944	1.7005	100	15	0.2261

Table 1: Summary of the measurements

Note that since the V_{CC} was kept at $5V$ DC, we subtracted this continuum value to obtain the correct V_{max} and V_{min}

Clearly, from Table 1, it's evident that the modulation index is larger for lower frequency and carrier amplitude.