Department of Electronics and Electrical Communication Engineering, IIT Kharagpur

Experiment 2: Switching Modulator

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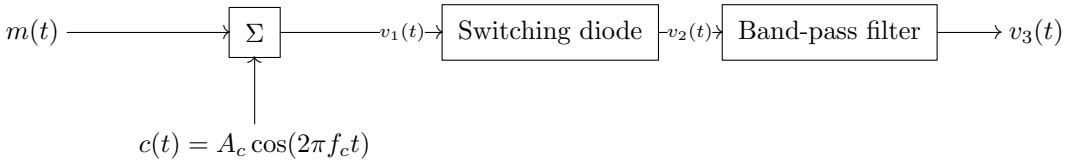
1 Introduction

We want to a transmit a message signal $m(t)$ using a carrier signal $c(t)$. We set up the following to generate the final modulated signal, and the following block diagram represents it:



Here

$$v_1(t) = m(t) + A_c \cos(2\pi f_c t)$$

where $A_c > |m(t)|$
Due to the diode:

$$v_2(t) = \begin{cases} v_1(t), & \text{if } c(t) > 0 \\ 0, & \text{if } c(t) < 0 \end{cases} \tag{1}$$

which means that the expression can be represented as:

$$v_2(t) = v_1(t)x(t) \tag{2}$$

where $x(t)$ is a square wave which follows $\cos(2\pi f_c t)$

The Fourier decomposition can be written as

$$x(t) = \frac{1}{2} + \frac{2}{\pi} \sum_{n=1}^{\infty} \left(\frac{(-1)^{n-1}}{2n-1} \cos(2\pi(2n-1) f_c t) \right) \tag{3}$$