PROBLEM:

- Conduct SRRC pulse shaping for a given sequence (S7HW.mat).
- Use the practical DAC (the up-sampling factor is 64) to do the job.
- Let the symbol rate be 1MHz, the carrier frequency be 8MHz. Conduct the up-conversion operation in the equivalent digital domain.
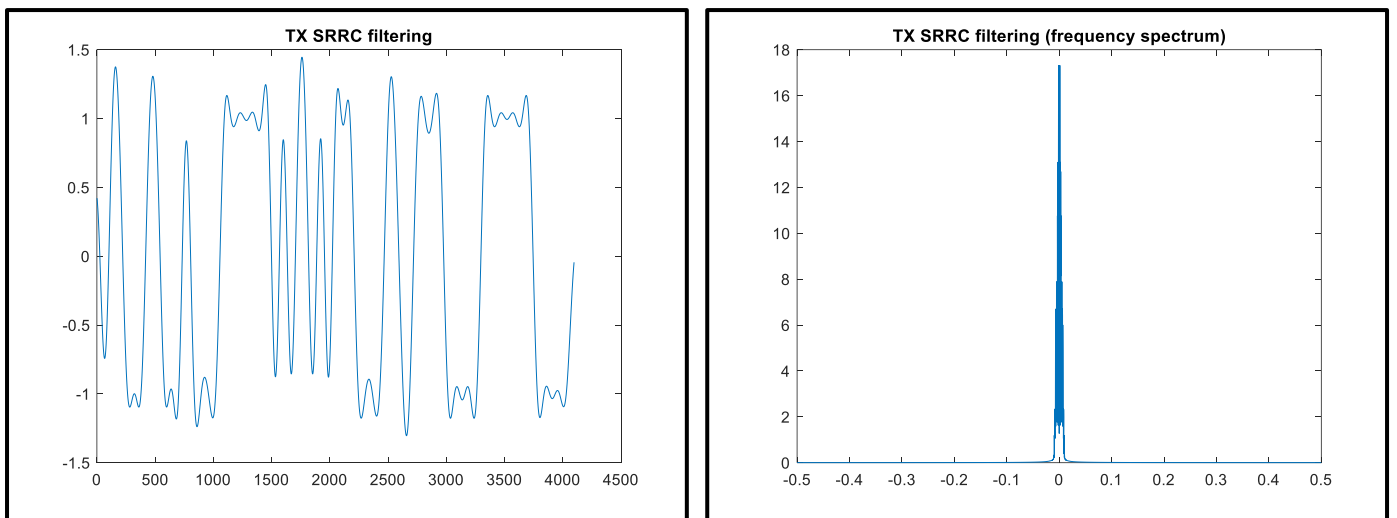- Observe the up-converted spectrum to see if your design is correct.

I. **Practical DAC:** bit stream → up-sampling → rectangular filtering

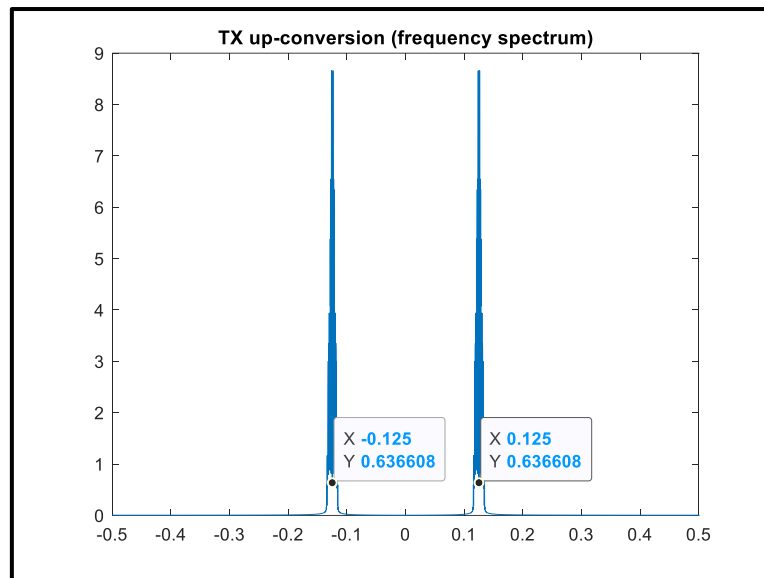DAC 實際上不能製造出理想的瞬時脈衝，而是只能以方波形式維持電壓，所以在取樣間會產生額外的脈衝，造成失真或誤差。
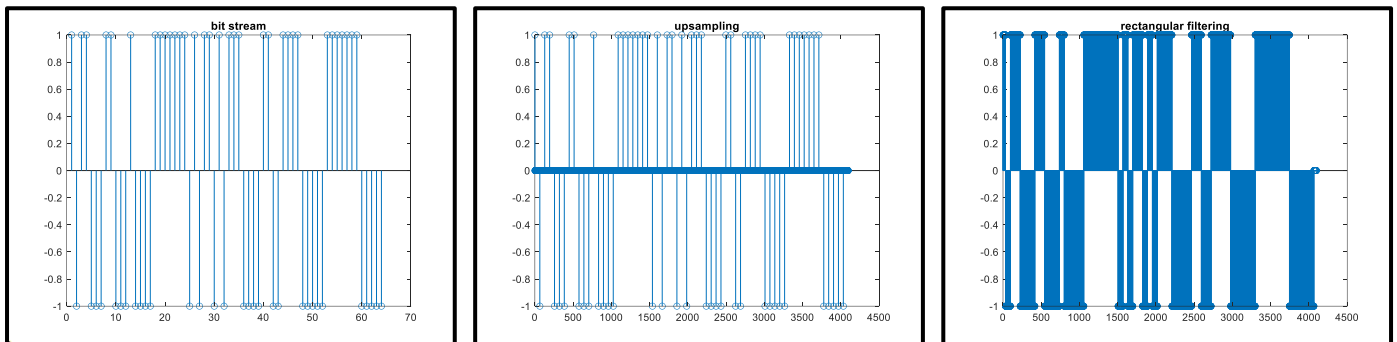
II. Pulse Shaping

SRRC 的參數為 $\alpha = 0.3, M = 64, S = 5$。

III. Up-conversion

$R = 1\text{MHz}, f_c = 8\text{MHz}, M = 64 \Rightarrow f_s = \frac{f_c}{R \times M} = \frac{1}{8} = 0.125$。

可以看到頻譜中兩根的中心為 ± 0.125。

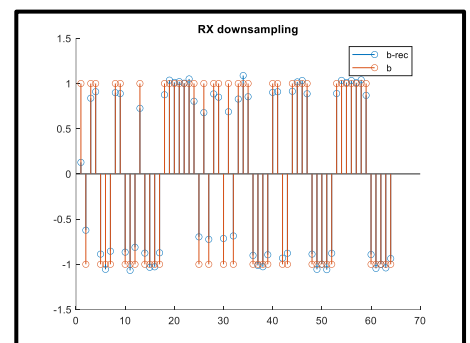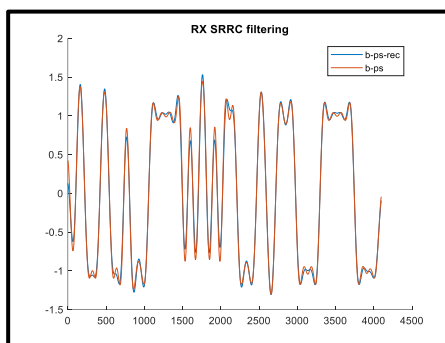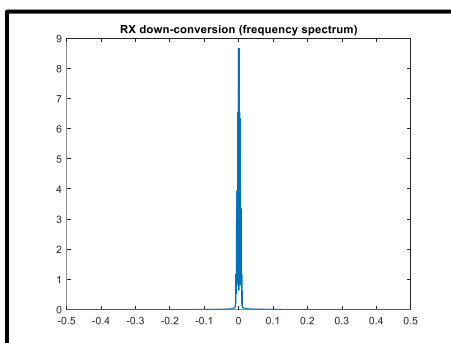IV. **RX:** down-conversion + LPF → SRRC → down-sampling

在接收端嘗試還原成原本的 bit stream。

從底下兩個比較可以看出，practical DAC 的 rectangular filtering 的確會對還原訊號造成失真。

● **Practical DAC**

● **Ideal DAC**