

- ③ check
PSD of polar scheme is

$$S_x(f) = a^2 T_b \text{sinc}^2(f T_b)$$

PSD of Bipolar NRZ Format

① $V(f) = T_b \text{sinc}(f T_b)$

② $R_A(n)$

$$A_k = \begin{cases} a, -a & : \text{alternating 1's} \\ 0 & : \text{symbol 0} \end{cases}$$

$$\begin{array}{ccc} 1 & 1 & 1 \\ +a & -a & +a \end{array}$$

③ cal for $n=0$

Assume that 1's & 0's in i/p binary data occur with equal probs

- ④ \therefore respective probabilities of occurrence of these 3 levels are as

$$P(A_k = a) = \frac{1}{4}$$

$$P(A_k = -a) = \frac{1}{4}$$

$$P(A_k = 0) = \frac{1}{2}$$

$\left. \begin{array}{l} \text{for symbol 1} \\ \text{for symbol 0} \end{array} \right\}$

⑤ for $n=1$ (i.e. $n \neq 0$)

⑥ for $n > 1$

$$\therefore R_A(n) = \begin{cases} \frac{a^2}{2} & , n=0 \\ -\frac{a^2}{4} & , n=\pm 1 \\ 0 & , \text{otherwise} \end{cases}$$

⑤ we are calculating for $R_A(1)$ i.e. $n=1$.
from properties of autocorrelation we know that:

$$R_A(-n) = R_A(n)$$

$$\therefore \boxed{R_A(-1) = R_A(1)}$$

⑥

$$S_x(f) = a^2 T_b \operatorname{sinc}^2(f T_b) \sin^2(\pi f T_b)$$