

(1) The subject device is a part 74 transmitter with pilot tone function and a intermodulation device (Please refer to the block diagram and circuit diagram). The frequency of the pilot tone (as shown in the circuit diagram) is 32.768KHz.

(2) There are steps when do the occupied bandwidth measurement with 13KHz modulating frequency:

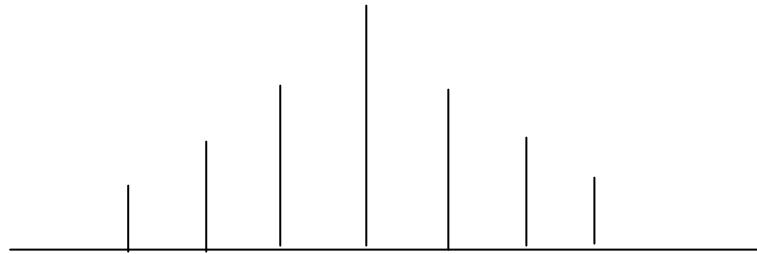
(I) 132KHz intermodulation with pilot tone:

Because the subject device is a “ narrow band modulation ” device, then according to the formula, we can get:

(a) two fundamental frequencies:  $F1=32.768\text{KHz}$ ,  $F2=13\text{KHz}$

(b) harmonics:  $F1-F2$ ,  $F1+F2$ ,  $F1-2F2$ ,  $F1+2F2$ ,  $2F1-F2$ ,  $2F1+F2$ , .....

(19.768KHz, 45.7689KHz, 6.768KHz, 58.768KHz, .....



(II) Transmitted:

The formula of the Narrowband FM Modulation:

$$E(t) = A \cdot \cos\omega_c t + (M A)/2 \cos(\omega_c + \omega_m)t + (M-A)/2 \cos(\omega_c - \omega_m)t$$

$\omega_c = 192.231\text{MHz}$  = Carrier Frequency

$\omega_m = 32.768\text{KHz}$ , 13 KHz, 19.768 KHz, 45.768 KHz, 6.768 KHz, 58.768 KHz, .....

= two fundamental frequencies + harmonic frequencies

= modulating frequencies

