

1. Introduction

This document is mainly for illustrating RF carrier testing methods. 2.4GHz RF wireless demo board hardware platform is consist of ATmega324pv chip, RF-2400 (BK2421 core Chip) module and some peripherals produced by ATMEL Company. It describes how to process RF data communication and carrier testing. **Attention: This document is only adding carrier testing functions compare with the original file “RF-2400 Reference code - AVR”. So this document is only for illustrating carrier test module. If you want to know how to build RF communication mode, please visit www.inhaos.com for "RF-2400 Reference code - AVR" file.**

2. Carrier testing purposes

The purposes of carrier testing is detecting whether channel is on communication busy mode or communication idle mode to automatically adjust the channel when RF communicates.

3. Carrier testing methods

- 1、 Set RF as carrier mode. Write 0X02 for BANK1_REG5 [8:15] to open carrier mode. Write 0x06 to close carrier mode.
- 2、 Set its interference threshold range by BANK1_REG5[29:26], the range is 0: -97dBm to 15:-67dBm, step length is 2dB. When set 0: detect the signal is greater than-97dBm, consider the channel is in busy mode. When detect interference signal continuous 128us is greater that the threshold value, Bank0_REG9[0] will set 1, and will always remain 1 until read CD value. Then automatically clear. If you don't use CD, please turn off CD to save power (about 1mA, default initial value means close).
- 3、 Then read via BK2421 chip's BANK0 CD register. If the value is 0, means the channel is in idle mode and flash green LED, or in the busy mode, flash yellow LED.

4、 This sample testing process

- 1、 Use two pieces of AVR target user board (Target board A and B), and then target board B burn process with carrier testing, target board A burn process without carrier testing.

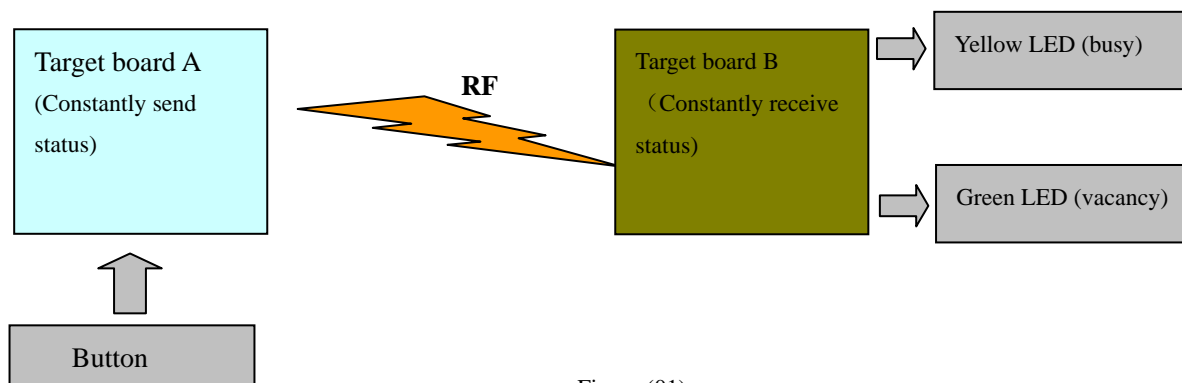


Figure (01)

2、Set target board A and B as the same communication channel but different communication address; (This sample communication channel is 0x20, target board A address is 0x3a, 0x3b, 0x3c, 0x3d, 0x01, target board B address is 0x3a, 0x3b, 0x3c, 0x3d, 0x02).

3、Target board A trigger RF sending process by button and send out button value. Target board B is in receiving state and constantly detecting whether the channel is on idle or busy mode. If in busy mode, flash yellow LED, or flash green LED.

4、Sample codes are as follows:

```

/*****
Function:          void SetRSSI( UINT8 en, UINT8 level )
Parameter:
                  en    [IN]  0, Closed RSSI,  1,  Open RSSI
                  level [IN]  0: -97 dBm,2 dB/step; 15: -67 dBm

Return:
                  None

Description:
                  Set carrier mode
*****/
void SetRSSI(UINT8 en, UINT8 level)
{
    UINT8 WriteArr[4];
    WriteArr[0] = (level << 2);
    if( en )
    {
        WriteArr[1] = 0x02;           //Open RSSI
    }
    else
    {
        WriteArr[1] = 0x06;           //Closed RSSI
    }
    WriteArr[2] = 0x7f;
    WriteArr[3] = 0xa6;

    SwitchCFG(1);                    //Switch to Bank1
    SPI_Write_Buf((WRITE_REG|0x05), &(WriteArr[0]), 4);
    SwitchCFG(0);                    //Switch to Bank0
}

/*****
Function:          UINT8 RF_CheckChnFree( UINT8 chn )
Parameter:
                  chn  -- Freq channel for check

Return:
                  TRUE  channel is busy
                  FALSE channel is free

Describe:
                  Check channel: chn is busy or free
*****/
unsigned int RF_CheckChnFree( UINT8 chn )
{
    UINT8 IsBusy;
    SetRSSI(TRUE, 8);                //Enable carrier detect
    RF_SET_CHN(chn);                 //Set the detect channel
    RF_GET_CD();                     //Clear CD flag
    IsBusy = FALSE;
    DelayMs( 200 );                  //Delay 200ms
    IsBusy = RF_GET_CD();            //Read the CD flag
    SetRSSI(FALSE, 8);              //Diable the carrier detect
    return IsBusy;
}

```

```
}  
  
/*****  
Function:          void CarrierDetect( UINT8 CH )  
Parameter:        CH [IN]   measure frequency channel  
  
Return:           None  
  
Description:      Setting specified channel, the carrier detection  
*****/  
void CarrierDetect( UINT8 CH )  
{  
    UINT8 temp = 0;  
    temp = RF_CheckChnFree( CH );  
    if( temp )  
    {  
        GLED_OFF();           //Light yellow LED,express busy status;  
        YLED_ON();  
    }  
    else  
    {  
        YLED_OFF();          //Light green LED,express free status;  
        GLED_ON();  
    }  
}
```

5. Carrier testing demo chart

1、 Figure (02) shows carrier testing detects 0X6E channel is in communication idle mode (green LED):

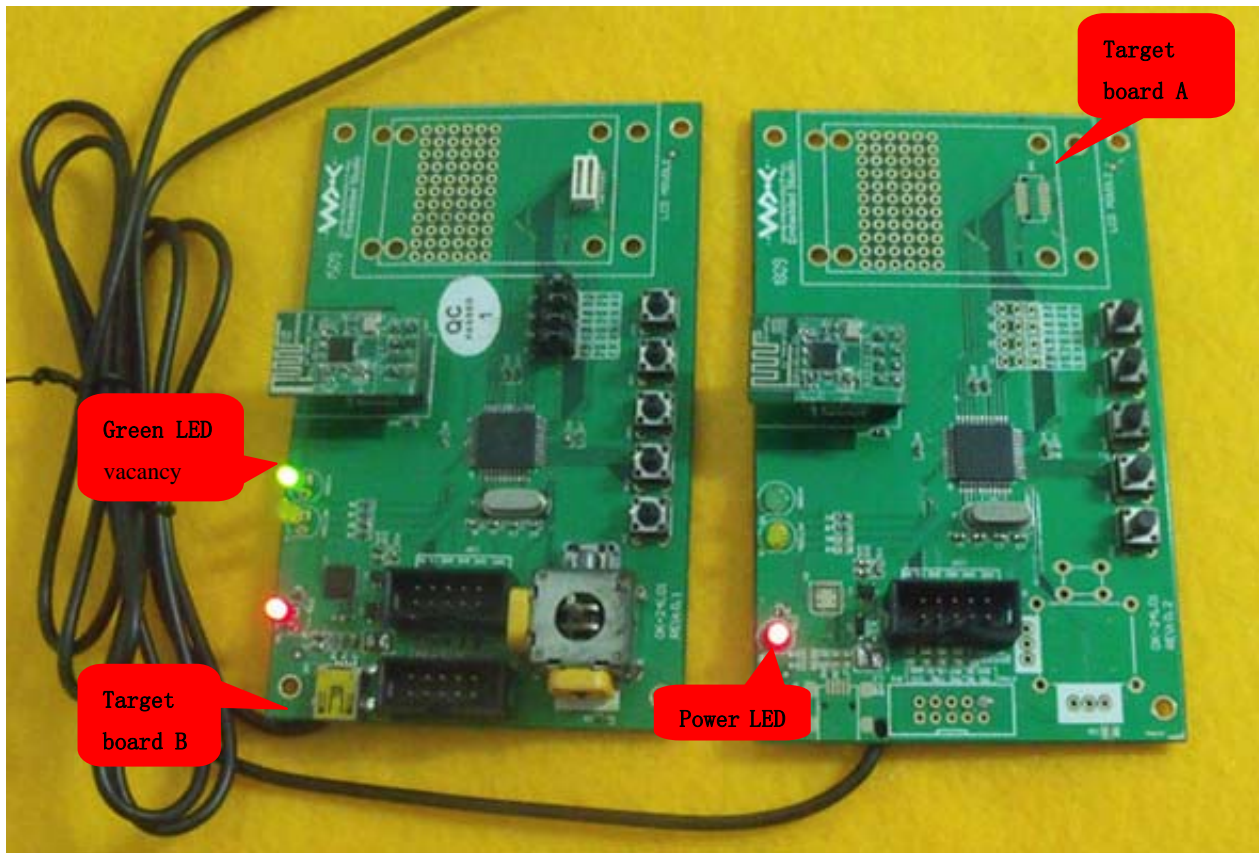


Figure (02)

2、 Figure (03) shows starting target board A's RF sending process via button. Carrier testing detects 0X6E channel is in communication busy mode that means the channel is occupied (Yellow LED):

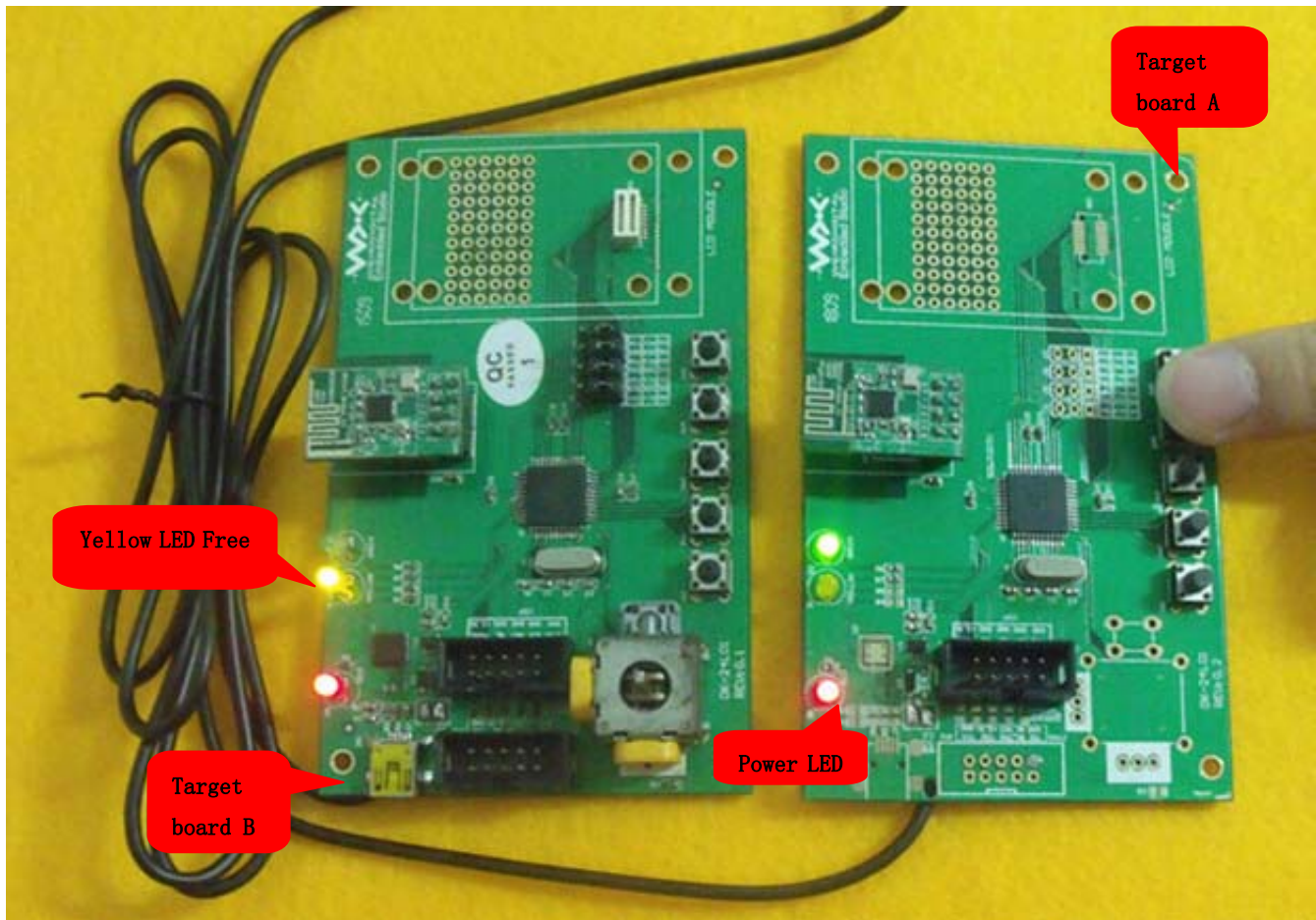


Figure (03)