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CC1101 GDO0 is not rising sometimes   Resolved

Bruno Andrade

Hi,

I am using a CC1101 with this configuration:

0x0C, // FSCTRL1 Frequency synthesizer control.
0x00, // FSCTRL0 Frequency synthesizer control.
0x23, // FREQ2 Frequency control word, high byte.
0x31, // FREQ1 Frequency control word, middle byte.
0x3B, // FREQ0 Frequency control word, low byte.
0x2D, // MDMCFG4 Modem configuration.
0x3B, // MDMCFG3 Modem configuration.
0x13, // MDMCFG2 Modem configuration.
0x22, // MDMCFG1 Modem configuration.
0xF8, // MDMCFG0 Modem configuration.
0x00, // CHANNR Channel number.
0x62, // DEVIATN Modem deviation setting (when FSK modulation is enabled).
0xB6, // FREND1 Front end RX configuration.
0x10, // FREND0 Front end TX configuration.
0x18, // MCSM0 Main Radio Control State Machine configuration.
0x1D, // FOCCFG Frequency Offset Compensation Configuration.
0x1C, // BSCFG Bit synchronization Configuration.
0xC7, // AGCCTRL2 AGC control.
0x00, // AGCCTRL1 AGC control.
0xB0, // AGCCTRL0 AGC control.
0xEA, // FSCAL3 Frequency synthesizer calibration.
0x2A, // FSCAL2 Frequency synthesizer calibration.
0x00, // FSCAL1 Frequency synthesizer calibration.
0x1F, // FSCAL0 Frequency synthesizer calibration.
0x59, // FSTEST Frequency synthesizer calibration.
0x88, // TEST2 Various test settings.
0x31, // TEST1 Various test settings.
0x09, // TEST0 Various test settings.
0x0F, // FIFOTHR RXFIFO and TXFIFO thresholds.
0x29, // IOCFG2 GDO2 output pin configuration.
0x06, // IOCFG0D GDO0 output pin configuration. Refer to SmartRF® Studio User Manual for detailed pseudo register explanation.
0x04, // PKTCTRL1 Packet automation control.
0x45, // PKTCTRL0 Packet automation control.
0x00, // ADDR Device address.
0x3D // PKTLEN Packet length.

I configured my mcu to interrupt on a rising edge of GDO0, and inside the interrupt handler I wait for the GDO0 falling edge or a timeout. The interrupt has the highest priority.

Every time that this timeout occours or a packet has been received, I strobe IDLE and SFRX in order to prevent the radio to get stuck in RX as related in errata notes.

But the radio seems to be stuck in RX mode rarely, the current consumption is high as in RX state and the radio is not able to receive packets anymore, the strange is that GDO0 is not asserted when it get stucked.

What am I doing wrong?

Thanks in advance.

Bruno Andrade

Martin B

Hi

The GDO0 will only assert when a sync word is found which implies that you are not able to detect any sync word on the air. When you say that the radio is still in RX do you know this based on the current consumption or have you read out the status byte or MARCSTATE? Could it be that the radio has gone in to a error state?

Have you verified that it is the receiver that has the issue and not the transmitter? You can check this by resetting one node at the time and see which node that had to be reset to start receiving again.

Best regards
Martin
--
PS. Thank you for clicking   Verify Answer   below if this answered your question!

Bruno Andrade

In reply to Martin B:

Hi Martin,

The problem is in fact in RX. I have another module sniffing all the packets in the air. And the sender still sending.

The current consumption is high as in RX state, and reading MARCSTATE it gives 0x0D (RX)

Martin B

In reply to Bruno Andrade:

I understand.

Just to clarify your issue. How does this issue occur;

1. You set the radio in RX for the first time you do not receive any packets at all, or
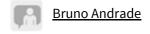2. You are receiving packets, returning to RX and than suddenly stops receiving.

A code snippet of your RX code may also be helpful in investigating this issue

Best regards
Martin
--
PS. Thank you for clicking   Verify Answer   below if this answered your question!

Bruno Andrade

In reply to Martin B:

Ok Martin, here is the code:

The module is constantly receiving and sending packets, retransmitting all the time. Suddenly it stops receiving.

function to put the radio in RX:

```
void RADIO_RX (void) {
    RADIO_IDLE();
    RADIO_Write_Reg(CCxxx0_MCSM2, 0x07); // Stays in RX until the end of the packet
    RADIO_Strobe(CCxxx0_SRX);
}
```

function to read the received packet, executed inside the interrupt (just for testing):

```
uint8_t RADIO_Receive_Packet (uint8_t *packet, uint8_t *size) {
    uint32_t pktTimeOut;
    uint8_t receivedPktLenght, status[2], ok;
    ok = 0;
    if ((RADIO_Read_Status(CCxxx0_RXBYTES) & 0x7F)) { // if there is bytes in fifo
        receivedPktLenght = RADIO_Read_Reg(CCxxx0_RXFIFO);
        if (receivedPktLenght <= *size) {
            RADIO_Read_Burst(CCxxx0_RXFIFO, packet, receivedPktLenght);
            *size = receivedPktLenght;
            RADIO_Read_Burst(CCxxx0_RXFIFO, status, 2);
            ok = (status[1] & 0x80); // CRC ok is the MSB of status[1]
        }
        else {
            *size = receivedPktLenght;
            RADIO_Strobe(CCxxx0_SIDLE);
            RADIO_Strobe(CCxxx0_SFRX);
            ok = 0;
        }
    }
    return ok;
}
```

Interrupt handler:

```
if (transmitting) {   // transmitting is set before writing to TX FIFO
    while(GDO0_High()); // Wait for sync to be transmitted
    transmitting = 0;
}
else {
    while(GDO0_High() && timeoutReceiving--);
    PACKET_Receive();
    RADIO_IDLE();
    RADIO_FLUSH_RX();
    pktReceived = 1;
}
```

Bruno Andrade

In reply to Bruno Andrade:

Hi Martin, you took a look in the code?

Thanks in advance.

Martin B

In reply to Bruno Andrade:

Hi Bruno

I have looked over your code and as far as I can tell it looks fine. it is still not clear to me what exactly causes you to stop receiving. does it help to exit RX and than re-enter RX when you stop getting sync or do you have to reset the whole device?

Best regards
Martin
--
PS. Thank you for clicking   Verify Answer   below if this answered your question!

Bruno Andrade

In reply to Martin B:

Hi Martin,

It seems that if i strobe IDLE and RX again it works. But I'll do more tests...

Martin B

In reply to Bruno Andrade:

Hi

When you re-enter RX the radio will do a calibration. calibration is needed if there is significant changes in temperature or voltage supply (or frequency change) since last calibration. If you try to disable the auto calibration (MCSM0.FS_AUTOCAL = 0) will it still help to re-enter RX?

Best regards
Martin
--
PS. Thank you for clicking   Verify Answer   below if this answered your question!

Bruno Andrade

In reply to Martin B:

Hi Martin,

I reorganized the firmware, PKTLEN now is 61d and I'm not worring about the rx_overflow issue anymore, is that secure alright?

The problem continued until I did what you said about auto calibration. Now it is completely manual, I strobe SCAL just after configuring the radio at startup and ~3 times in each minute, I know this is too much, I'll do it less frequently.

The boards are running for exactly 24h without a single problem, and still running. The problem was happening in a maximum of 2 hours.

But I'm not secure about it, should I? What is the problem with calibrating every time before active modes?

Thank you.

Martin B

In reply to Bruno Andrade:

Hi Bruno

That is promising news. I would say the RX_OWERFLOW issue is covered.

Regarding the calibration, I suggested to disable autocal to verify that the issue was related to calibration. It is no problem to calibrate each time you go inti active mode. This is the recommended setting for the radio, and I would continue to do this. However it seems that when you stay in RX for a long enough time the frequency shifts for some reason (e.g. temperature change, voltage change). Therefor you need to do a recalibration after a certain amount of time in RX. You probably need to do some testing to find out how often this has do be done.

Best regards
Martin
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