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AS3932

Application Note AS3932

Migration from ATA5282 (3-channel) to AS3932

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1 Introduction

This document describes how to easily migrate from ATA5282 to AS3932.

2 Comparison of the Hardware

2.1 Application diagrams

The figures 2-1 and 2-2 show the application diagram of ATA5282 and AS3932, respectively.

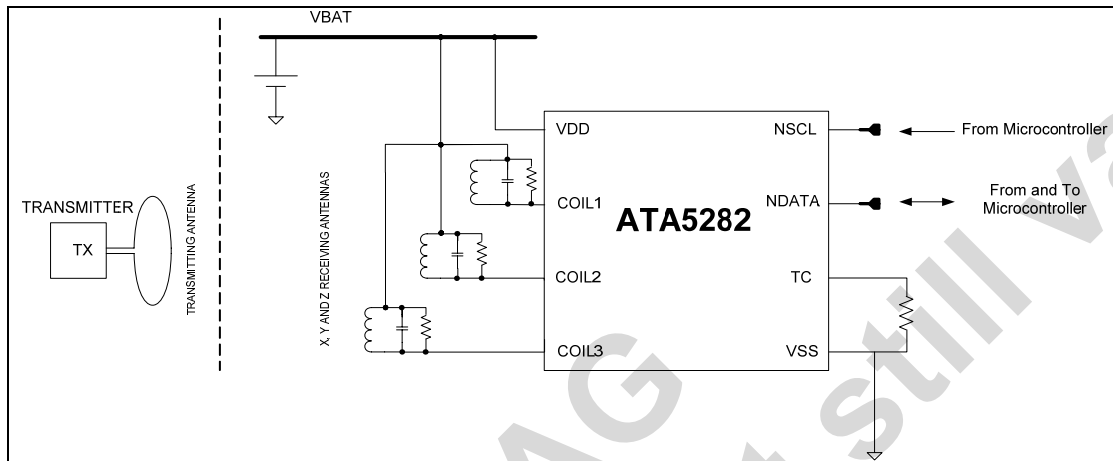


Figure 2-1: Application diagram of ATA5282

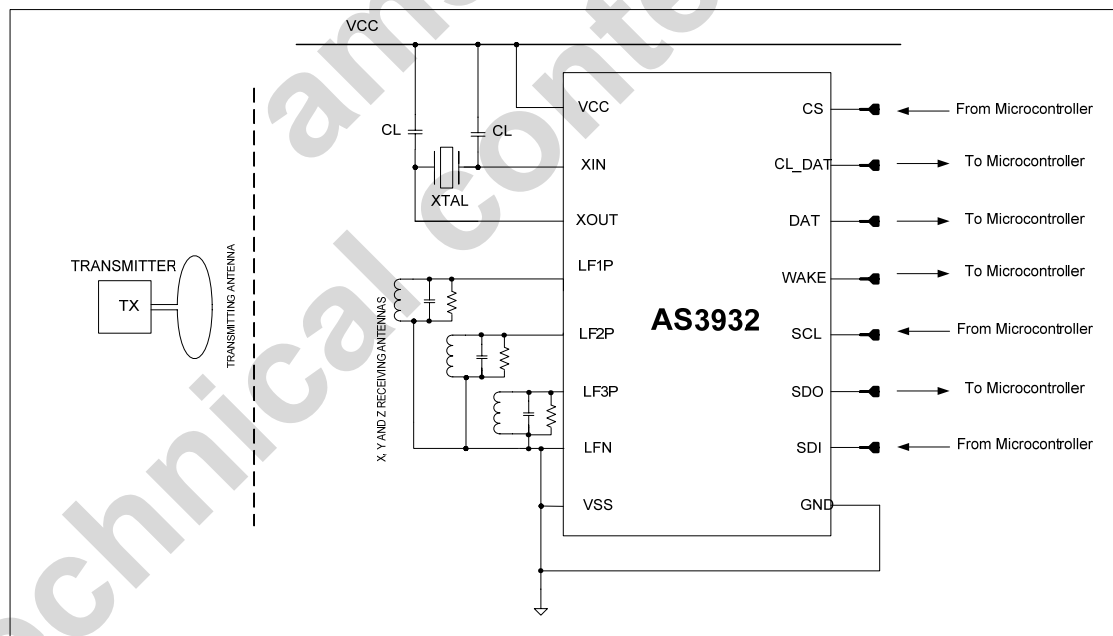


Figure 2-2: Application diagram of AS3932

ATA5282 application block diagram shows that the three antennas have to be referenced to the positive supply, while the AS3932 block diagram shows that they are referenced to ground. In addition AS3932 offers the possibility to reference all three antennas to the positive potential, as shown in the next figure 2-3. This modification will not influence the performance of AS3932.

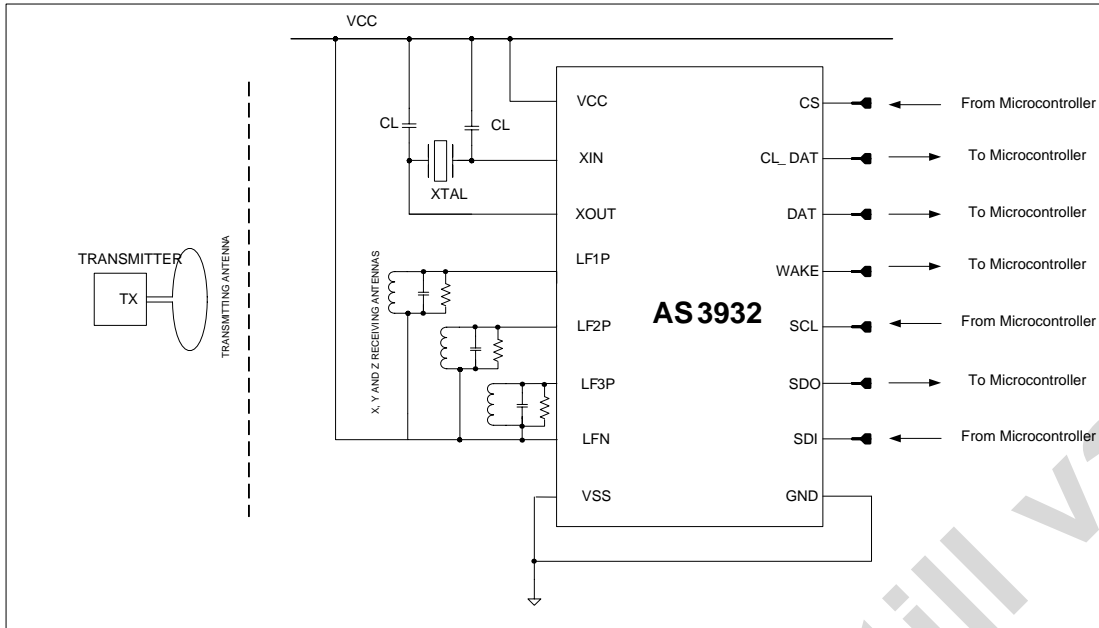


Figure 2-3: Alternative application diagram of AS3932.

2.2 Oscillator frequency

The ATA5282 uses a resistor to define the oscillator frequency, while the AS3932 offers the possibility either to use a crystal oscillator or the fully integrated RC oscillator. In case a crystal is used to define the operating frequency, a 32768 Hz quartz (for 125 kHz) and two capacitors (specified by the crystal manufacturer) are needed for AS3932.

AS3932 also offers the possibility to define the oscillator frequency using the internal RC-oscillator. This oscillator can be calibrated with the microcontroller (see p. 27 of AS3932 data sheet) in order to increase its precision. In this case the XIN and XOUT have to be connected to the positive supply voltage, as shown in figure 2-4.

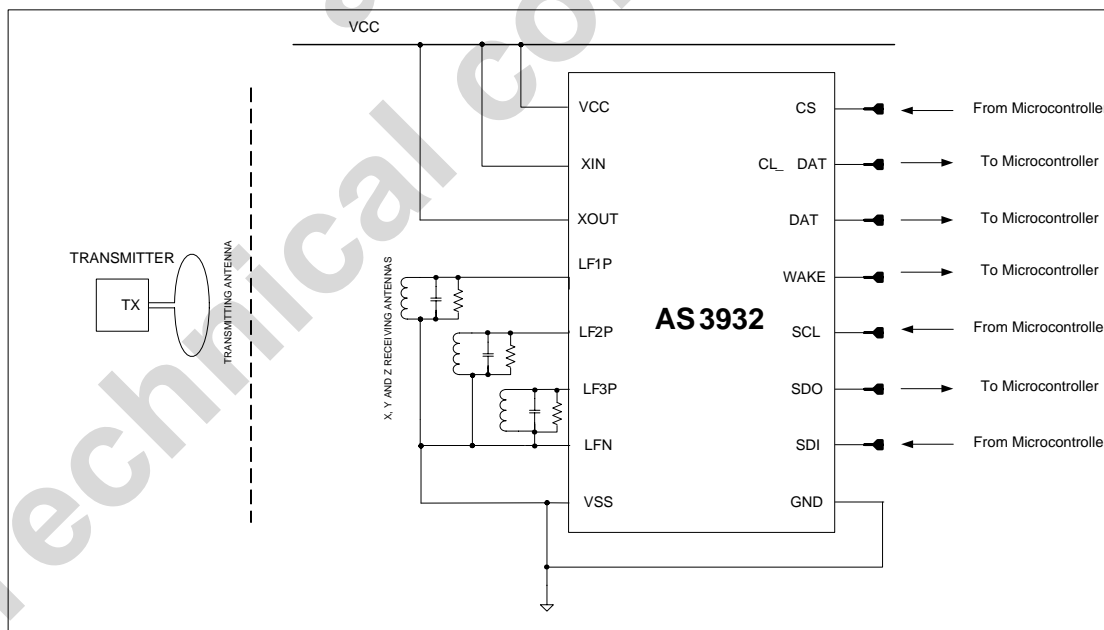


Figure 2-4: Application diagram of AS3932 in case the RC-oscillator is used.

2.3 Serial Digital Interface

The AS3932 has a 4-wire serial digital interface (CS, SDI, SDO, SCL) while the ATA5282 has a 2-wire interface. The Serial Digital Interface of AS3932 needs to be programmed accordingly (see p. 16 to p. 18 of AS3932 data sheet).

2.4 Wakeup and data pin

In addition AS3932 has two dedicated pins for the wakeup (pin WAKE) and data (pin DAT), while they are merged in one pin (NDATA) in the ATA5282. The pin NDATA, of the ATA5282, delivers the inverted demodulated data (carrier NDATA= low, no-carrier NDATA=high), while the AS3932 delivers the non-inverted data on the pin DAT (carrier DAT= high, no-carrier DAT=low).

2.5 Manchester clock recovery

Furthermore the AS3932 has a fully integrated Manchester clock recovery, which provides the recovered clock on the pin CL_DAT. This pin is missing in the ATA5282, thus no clock recovery is possible. In case clock recovery is not required, the pin CL_DAT of AS3932 can remain floating.

3 Protocol compatibility

The ATA5282 wakes up if a 2ms carrier frequency burst is followed by a certain "header" made up of a gap and 8 consecutive rising and falling edges as shown in figure 3-1. There are two possibilities for AS3932 to be compatible with this protocol.

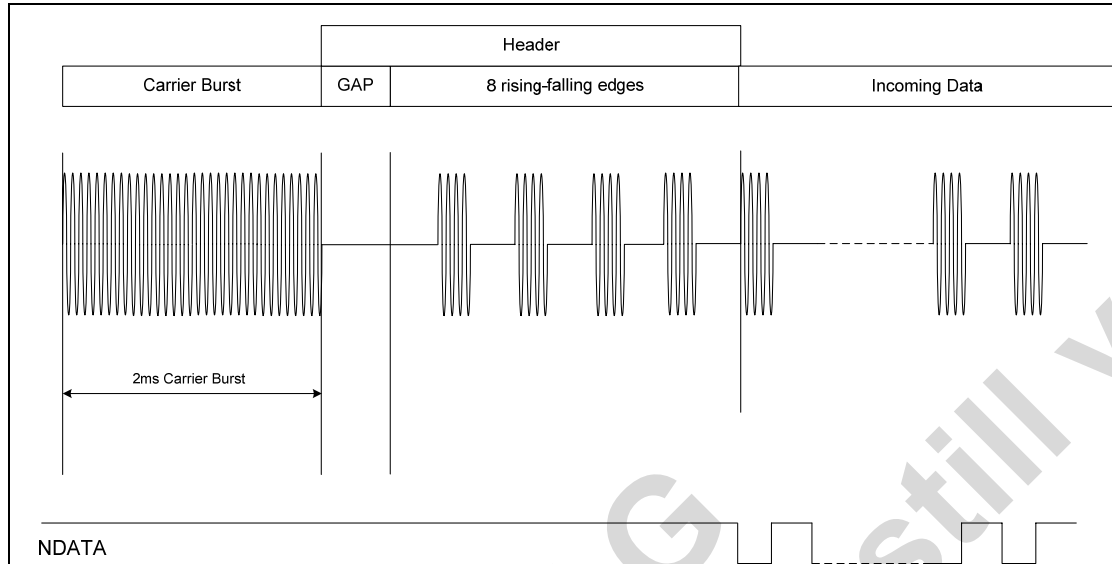


Figure 3-1: Description of ATA5282 wakeup protocol

3.1 Pattern detection disabled in AS3932

The first method is to disable the pattern detection ($R1<1>=0$). In this way the AS3932 will wakeup just after the carrier burst and the WAKE pin will go high. From this point on it is up to the microcontroller to detect the 8 rising-falling edges of the wakeup signal and thus verify that the "header" is correct. In case the "header" is wrong the microcontroller has to set the AS3932 back to listening mode by sending the clear_wake direct command through the SDI. This is shown in the figure 3-2.

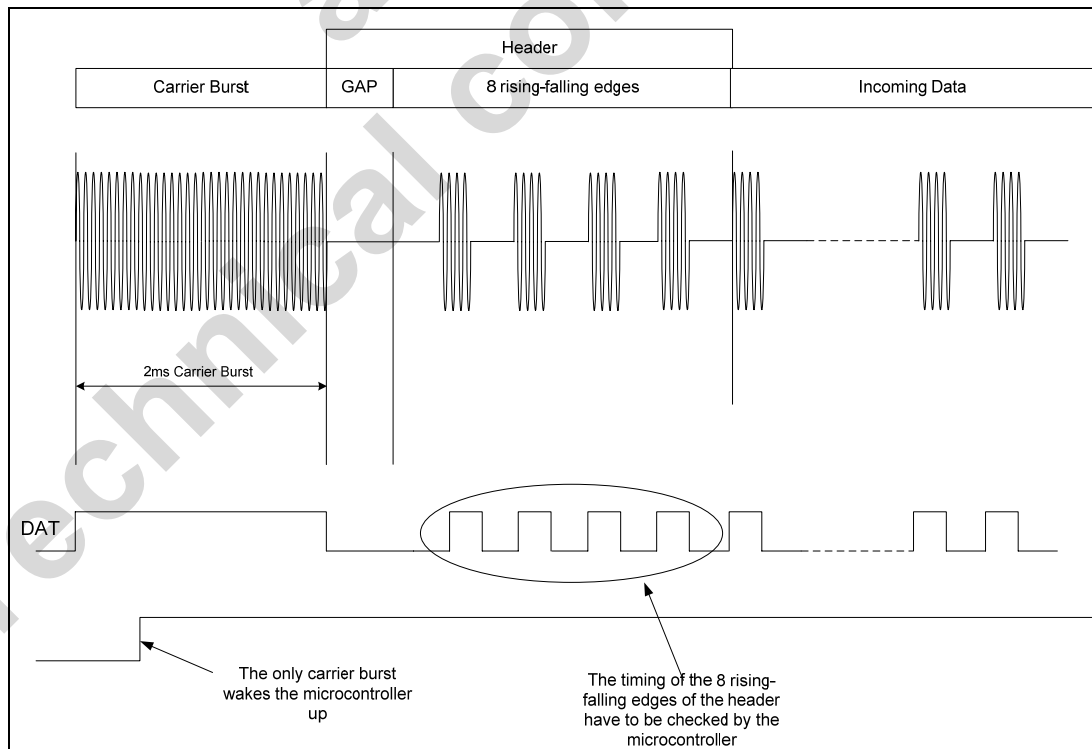


Figure 3-2: Header evaluation by external microcontroller

The procedure to set up the AS3932 working in this way is described below.

- Send the `preset_default` direct command
- Write `R1<7:0>=00100001` in case the crystal oscillator is used or write `R1<7:0>=00100000` if the RC oscillator is used. In this way the wakeup will occur only based on frequency detection.
- Set the envelop detector time constant (`R3<2:0>`) according to the used bit rate (see pag 20 of AS3932 data sheet).

3.2 Pattern detection enabled in AS3932

The second method is using the pattern detection capability of AS3932. This is more advantageous since the work load of the microcontroller is reduced without decreasing the reliability of the system. The only modification needed for this method is a simple firmware change in the transmitter which increases the number of rising and falling edges in the header of the wakeup signal from 8 to 16. The diagram in figure 3-3 shows that the WAKE pin is set to high as soon as the 16th edge is detected (and not after the 8th, any more).

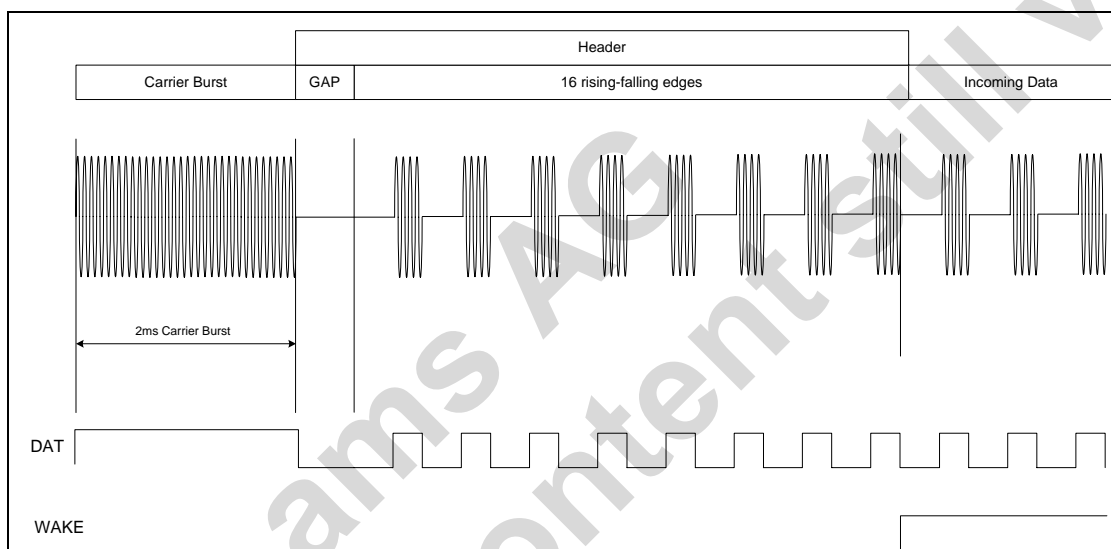


Figure 3-3: Header evaluation by AS3932

How to set up AS3932 for this is described below:

- Send the `preset_default` direct command
- Write `R1<7:0>=00100010` (only in case the internal RC oscillator is used)
- Set the envelop detector time constant (`R3<2:0>`) according to the used bit rate (see p. 20 of AS3932 data sheet).
- Write `R5<7:0>=01010101` and Write `R6<7:0>=01010101`. By this the checked (wakeup) pattern is made up of the 16 consecutive rising and falling edges.
- Write the register `R7<4:0>` in order to set the used bit rate

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