Software implementation of the wake up behavior for the TLE9221SX

About this document

Scope and purpose

This document provides additional information for the TLE9221SX.
This document relates to the following datasheets:

- TLE9221SX datasheet Rev. 1.31

The latest datasheets can be found here:

https://www.infineon.com/cms/de/product/transceivers/automotive-transceiver/automotive-flexray-transceivers/tle9221sx/

Intended audience

Hardware – and Software developer

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1 Introduction

If an ECU is connected to the battery and permanent supplied then a power save must be implemented in the ECU. This power save mode is used to prevent a discharge of the battery if the car is parked. The following figure illustrates an example application.

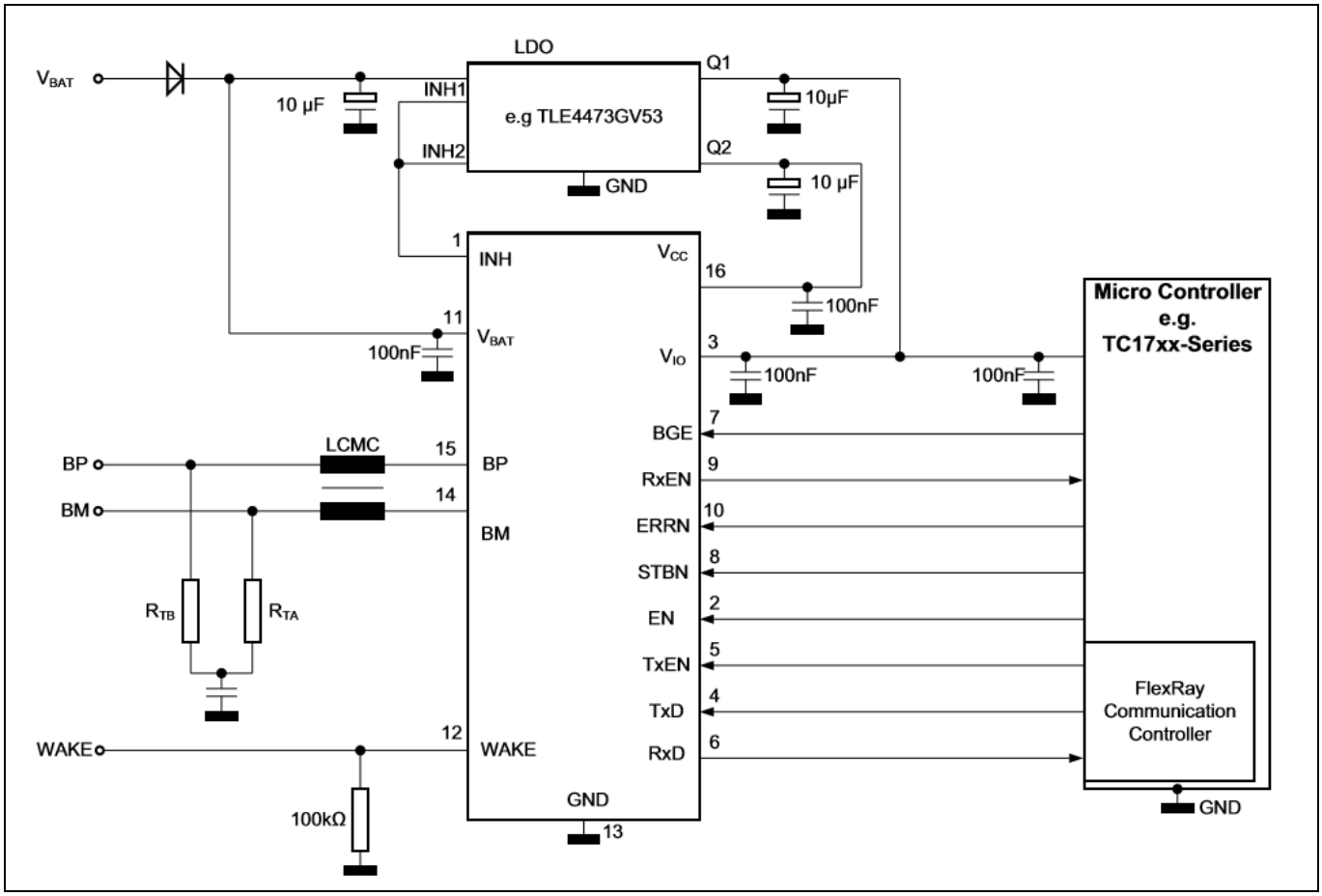

Figure 1 Application example

If the car is parked a network command “Go into low power mode” will be sent to the ECU from the network manager. The microcontroller will set the transceiver into the BD_Sleep mode. In the BD_Sleep mode the INH PIN, which controls the power supply of the microcontroller, is low. Therefore the power supply is disabled and the microcontroller is not supplied anymore. The transceiver is still supplied over the V_{Bat} pin and monitors the FlexRay bus for communication (wake up pattern). If a passenger wants to start the engine of a parked car, then the communication on the FlexRay bus will be established. The transceiver detects the wake up pattern and goes into the BD_Standby mode. In the BD_Standby mode the IHN PIN is high and activates the power supply. The microcontroller is powered and can boot its software and set the transceiver into the BD_Normal mode. Afterwards the ECU is fully functional.

2 Wake up behavior of the TLE9221SX

The following figure 1 shows the bus wake up behavior of the TLE9221SX:

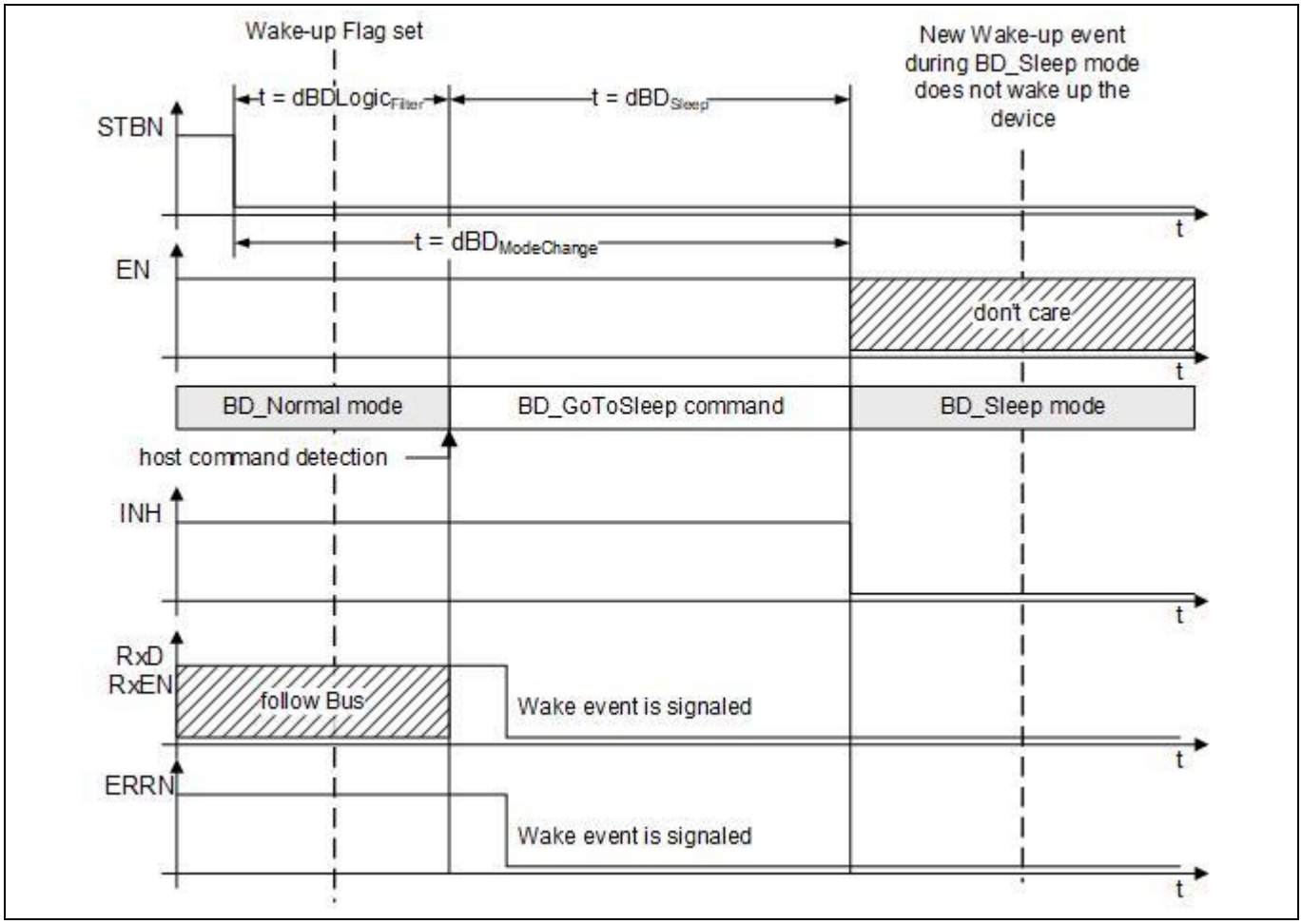

Figure 2 Bus wake up behavior of the TLT9221SX

If the TLE9221SX is set by the microcontroller to the BD_GotoSleep status (EN = 1, STBN = 0) and a bus wake up occurs during the $dBDLogic_{Filter}$ time then the TLE9221SX will remain in the DB_Sleep Mode when a second Bus wake up occurs. However the Bus Wake up will be indicated by the RxD pin and ERRN pin (RxD = 0, ERRN = 0). This can lead to the situation that the ECU will always stay in the power save mode if the software implementation is not correct.

The following Figure illustrate how the above described behaviour can be avoided:

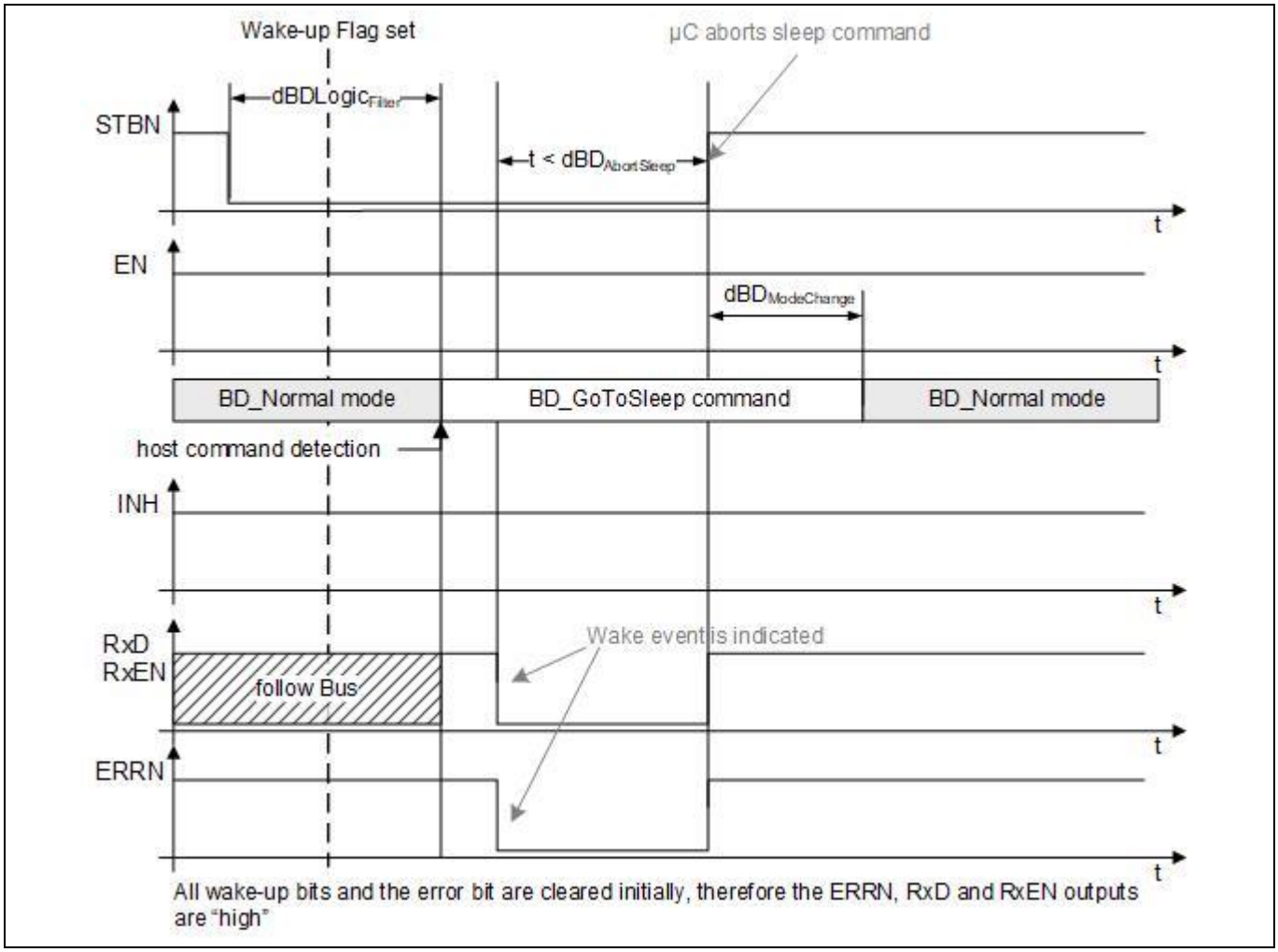

Figure 3 Recommended process if a Bus wake up occurs during the $dBDLogic_{filter}$ time

If the TLE9221SX is set by the microcontroller to the BD_GotoSleep status (EN = 1, STBN = 0) and a Bus wake up occurs during the $dBDLogic_{Filter}$ time then the microcontroller has to set the TLE9221SX into the Standby or BD_Normal mode within the time interval $dBD_{AbortSleep}$ after the Bus wake up was indicated by the RxD Pin.

3 Recommended Software implementation for the Wake up behavior of the TLE9221SX

The following figure shows the recommended software implementation to enter the BD_Sleep mode.

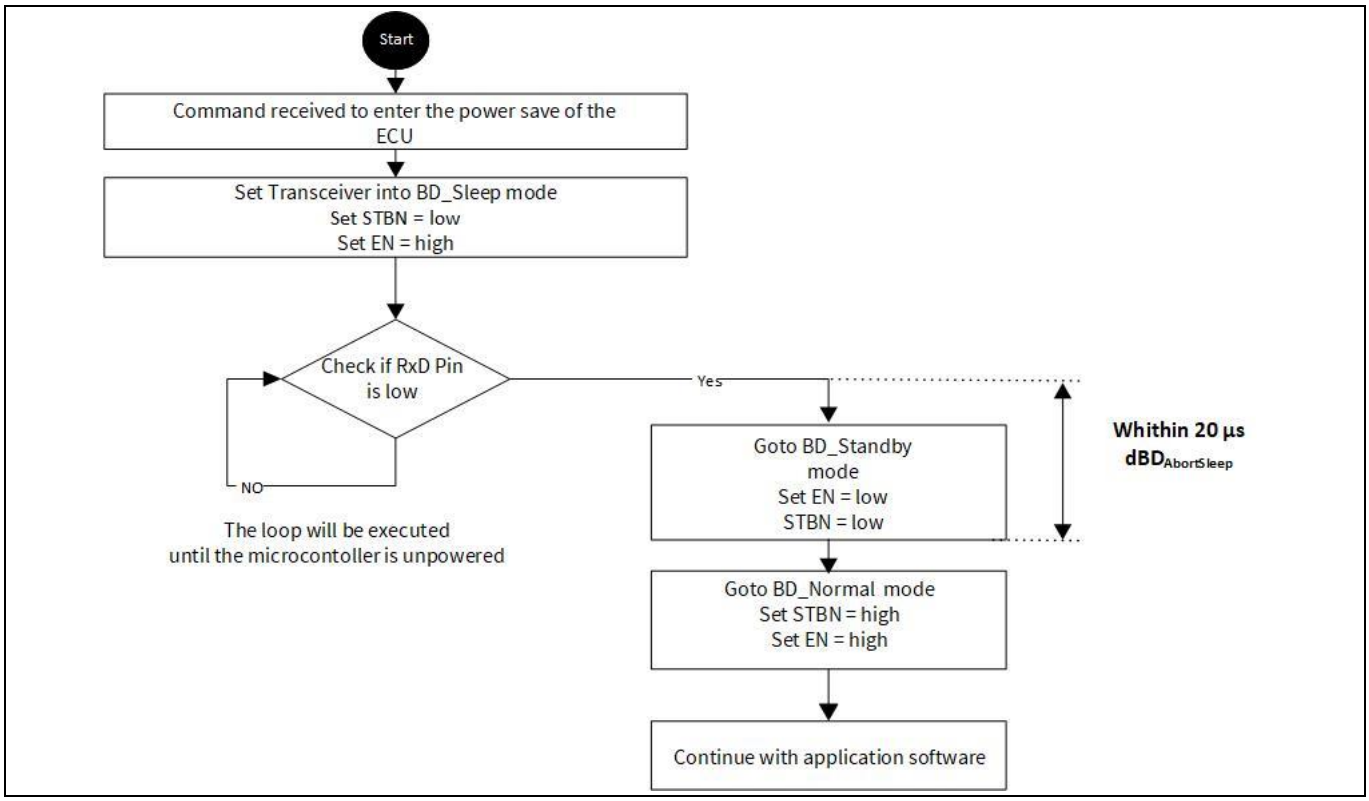

Figure 4 Software flow diagram

4 Electrical Parameter

Table 1 Electrical Parameter

Parameter	MIN	MAX	Unit
$dBD_{ModeChange}$	-	100	µs
$dBDLogic_{Filter}$	10	30	µs
$dBD_{AbortSleep}$	-	20	µs

Revision history

Document version	Date of release	Description of changes
1.0	16.07.2020	Initial Version

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Email: erratum@infineon.com

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