

8.4.4 Sleep Mode

Sleep Mode is the power saving mode for the TLIN1431x-Q1. Even with extremely low current consumption in this mode, the device can still wake up from the LIN bus through a wake up signal or local wake via WAKE pin. Upon a wake event the SWE timer, $t_{\text{INACT_FS}}$, starts and the device enters restart mode. If UV_{CC} is still present after this time, the device re-enters sleep mode. The LIN bus is filtered to prevent false wake up events. The wake-up events must be active for the respective time periods (t_{LINBUS}).

In pin control mode, sleep mode is entered by setting EN low for longer than t_{EN} and TXD pin is low when entered from normal mode.

In SPI control mode, setting register 8'h1D[7:6] = 01b transitions the device into sleep mode. If the reset counter exceeds three, the device enters sleep mode from restart mode. The reset counter increments on an UV_{CC} event, or a watchdog error event that causes the device to enter restart mode when fail-safe mode is disabled. The reset counter must be cleared through a SPI command.

While the device is in sleep mode, the following conditions exist.

- The LIN bus driver is disabled and the internal LIN bus termination is switched off (to minimize power loss if LIN is short circuited to ground). However, the weak current pull-up is active to prevent false wake up events in case an external connection to the LIN bus is lost.
- The normal receiver is disabled.
- LIN wake up receiver is active.
- WAKE pin is active.

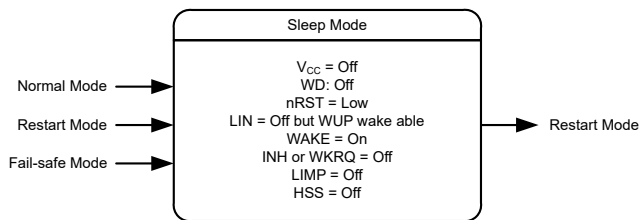


Figure 8-34. Sleep Mode Pin Control

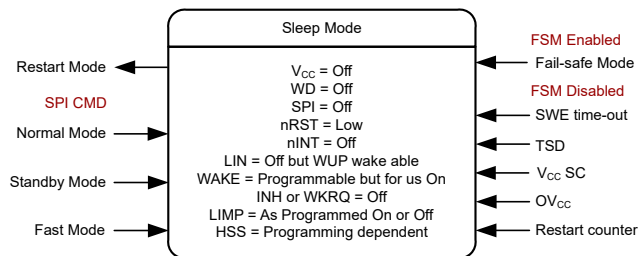


Figure 8-35. Sleep Mode SPI Control

8.4.5 Standby Mode

This mode is entered from various other modes based upon which control method is implemented, the pin control [Figure 8-24](#) or SPI control [Figure 8-25](#). The LIN bus responder node termination circuit is turned on when standby mode is entered. Standby mode is signaled through a low level on RXD. See [Standby Mode Application Note](#) for more application information.

When EN (in Pin Control Mode) is set high for longer than $t_{\text{FM_CHANGE}}$ while the device is in standby mode the device returns to normal mode and the normal transmission paths from TXD to LIN bus and LIN bus to RXD are enabled.

During power up, the device automatically enters standby mode from restart mode. EN has an internal pull-down resistor ensuring EN is pulled low if the pin is left floating in the system.

In both pin and SPI modes, the watchdog is default on in standby mode. There is a long timeout initial window that is t_{INITWD} that a WD trigger event must take place. In SPI mode, watchdog can be disabled when entering standby mode except for cases that the device has had a POR event.

The device automatically enters standby mode from restart mode when $V_{\text{CC}} \geq \text{UV}_{\text{CC}}$ and $t_{\text{RSTN_act}}$ time has expired. When in SPI communication mode, the TLIN1431x-Q1 can enter standby mode by writing a 00 to register 8'h1D[7:6] from normal or fast modes. The watchdog function is default on in standby mode. When using SPI to configure the device, the watchdog function can be configured.