EZRadioPRO® Family
Rev B1B/B1C Device Errata

This document describes the errata for the following EZRadioPRO® devices:

- Si4060-B1B
- Si4460-B1B
- Si4461-B1B
- Si4063-B1B
- Si4463-B1B
- Si4362-B1B
- Si4438-B1C
- Si4464-B1B

To verify the revision of a chip, the ROMID replay field of the PART_INFO API command can be used. All the revisions above correspond to ROMID = 3.

For a detailed description of the APIs referenced in this document, see the EZRadioPRO API Documentation available on the Silicon Labs website.

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1. Errata Summary

Table 1.1. Errata Status Summary

Errata Number	Title/Problem	Workaround Available	Si4x60-B1B Si4461-B1B Si4x63-B1B Si4362-B1B Si4438-B1C	Si4464-B1B
1.	If configured to skip sync and preamble on transmit, the TX data from the FIFO is corrupted.	Yes	+	+
2.	When the CAL timer and Wakeup timer fire at the same time, the Wakeup timer function is skipped.	Yes	+	+
3.	CHANGE_STATE to TX from TX is an invalid state transition.	Yes	+	+
4.	TX packet abort does not reset the packet handler.	Yes	+	+
5.	Packet re-transmit does not function as expected.	Yes	+	+
6.	SPI active to Ready state without any SPI activity is not supported.	Yes	+	+
7.	Non-zero BER in Low-Power mode at strong signal levels.	FW patch	+	+
8.	RSSI jump interrupt API not supported	No	+	+
9.	RSSI status is not reset upon START_RX.	Yes	+	+
10.	Variable packet length cannot be zero.	Yes	+	+
11.	Ramp waveform of external PA ramp signal on TXRAMP pin is not correct.	Yes	+	+
12.	Preamble detect signal for nonstandard preambles is incorrect on the GPIO.	No	+	+
13.	For non-standard preambles, the modem can get stuck in Low-Gear mode if gear switch is set to preamble detection and sync word detection fails.	Yes	+	+
14.	If a received packet has a CRC error, subsequent packets will report a spurious command error.	Yes	+	+
15.	Use of TCXO with low VDD supply may cause a CTS failure.	FW patch	+	+
16.	FIFO_INFO command does not update TX_FIFO_ALMOST_EMPTY status properly.	Yes	+	+
17.	FIFO threshold setting limitations	Yes	+	+
18.	479-639 MHz center frequency band is not supported.	No	-	+
19.	Transmission gets stuck in CW if it is started after IRCAL and RX state.	Yes	+	+

Note: - means not affected, + means affected

2. Detailed Errata Descriptions

2.1 If Configured to Skip Sync and Preamble on Transmit, the TX Data from the FIFO is Corrupted

Description of Errata
If preamble and sync word are excluded from the transmitted data (PREMABLE_TX_LENGTH = 0 and SYNC_CONFIG: SKIP_TX = 1), data from the FIFO is not transmitted correctly.
Affected Conditions / Impacts
Some number of missed bytes will occur at the beginning of the packet and some number of repeated bytes at the end of the packet.
Workaround
Set PKT_FIELD_1_CRC_CONFIG: CRC_START to 1. This will trigger the packet handler and result in transmitting the correct data, while still not sending a CRC unless enabled in a FIELD configuration. A fix has been identified and will be included in a future release.

2.2 When the CAL Timer and Wakeup Timer Fire at the Same Time, the Wakeup Timer Function is Skipped

Description of Errata
If the Wakeup timer and calibration timer intervals are chosen such that they will occur at the same time, the Wakeup timer function will not occur.
Affected Conditions / Impacts
When the Wakeup timer and calibration timer intervals exactly coincide, the Wakeup timer function will not occur. This will impact functionality that relies on the Wakeup timer under these specific conditions.
Workaround
Configure the Wakeup timer and CAL timer to separate intervals. The CAL timer will first expire at half its programmed interval and at every programmed interval afterwards. The Wakeup timer always expires on its programmed interval after it is enabled. These intervals should be configured such that they never align. Alternatively, the RC calibration can be performed on Wakeup timer intervals as configured using GLOBAL_WUT_CAL API. A fix has been identified and will be included in a future release.

2.3 CHANGE_STATE to TX from TX is an Invalid State Transition

Description of Errata
This is an invalid state change for the device. However, if the chip is currently in TX state and a CHANGE_STATE to TX or START_TX command is issued, the chip will stop responding. (CTS will remain low until the chip is reset).
Affected Conditions / Impacts
If attempting the invalid state transition, the host will not be able to issue subsequent commands to the device without resetting the device first. The device can be reset via the shutdown pin or by power cycling the VDD supply to the device.
Workaround
Avoid going from TX state to TX state directly. If the chip is in TX state, exit to some other state before starting TX again.

2.4 TX Packet Abort does not Reset the Packet Handler

Description of Errata
When a packet is aborted before it has completed transmitting, by issuing a CHANGE_STATE out of TX state, the next transmission will continue where the previous packet stopped. For example, if START_TX is issued with TX_LEN = 700, the packet is aborted after 300 bytes have been sent, the next TX will not send preamble and sync and will attempt to send 400 bytes.
Affected Conditions / Impacts
The second packet will have invalid information if the first packet is aborted during transmission with a change state out of TX state. This does not impact direct mode operation of the device.
Workaround
To abort TX, always use CHANGE_STATE to SLEEP mode. Once in sleep mode, the device can change state to any other state properly. A fix has been identified and will be included in a future release.

2.5 Packet Re-Transmit does not Function as Expected

Description of Errata
The RETRANSMIT bit affects the next transmission, not the current transmission.
Affected Conditions / Impacts
If the first transmission has the RETRANSMIT bit set to 0, re-transmission will not occur.
Workaround
For packet re-transmission, users have to set the RETRANSMIT bit of START_TX to 1 for the very first packet transmitted. In the last re-transmission, users should set the bit to 0. A fix has been identified and will be included in a future release.

2.6 SPI Active to Ready State without SPI Activity is not Supported

Description of Errata
If the chip transitions from SPI active state to ready state, there must be some SPI activity when leaving the SPI active state. This is not a common condition but can occur where the user sets the device to SPI active state and the Wakeup timer to TX or RX a packet on timer expiry. This could also occur if the user goes from SPI active to ready state and polls CTS on a GPIO instead of the SPI interface.
Affected Conditions / Impacts
The device cannot go from SPI active to ready state without SPI activity.
Workaround
Ensure there is SPI activity when going from SPI active to ready state. A fix has been identified and will be included in a future release.

2.7 Non-Zero BER in Low-Power Mode at Strong Signal Levels

Description of Errata
If the transceiver is in low-power mode (default is high-performance mode), there is a chance of non-zero BER at very strong signal levels (e.g., 1% BER at > -12 dBm).
Affected Conditions / Impacts
High-performance mode, which is the default setting is not impacted. Non-zero BER (~1%) will be seen at strong signal levels.
Workaround
None. A firmware patch is available on request and a fix has been identified and will be included in a future release.

2.8 RSSI Jump Interrupt API not Supported

Description of Errata
The RSSI jump interrupt indicates a sudden change in RSSI. This feature is not supported.
Affected Conditions / Impacts
RSSI jump interrupt functionality is not supported in this revision.
Workaround
None. A fix has been identified and will be included in a future release.

2.9 RSSI Status is not Reset upon START_RX

Description of Errata
Transitioning out of RX state and then going back to RX will not result in automatically resetting the RSSI status bit. ‘RSSI status' indicates whether the current RSSI is above the threshold, while ‘RSSI pending’ indicates whether sometime during RX the current RSSI ever went above the threshold.
Affected Conditions / Impacts
This issue occurs when there is a constant radio signal, which is above the RSSI threshold, in between START_RX calls. Because the radio does not reset the RSSI status bit, it will stay TRUE and won’t set the RSSI pending bit. As a result, the chip will not be able to generate an RSSI interrupt more than once per reset.
Workaround
Clear the RSSI pending bit manually with a GET_INT_STATUS command, strictly outside of RX state. As a side effect, it will clear the RSSI status bit also. A fix has been identified and will be included in a future release.

2.10 Variable Packet Length cannot be Zero

Description of Errata
If the variable packet length field of the received packet is zero (e.g., detected in noise), the device will never finish packet reception. Instead, it will stay in RX state and preamble and sync-detect signals will remain high.
Affected Conditions / Impacts
The variable packet length of zero will cause the device to remain in RX state.
Workaround
Error state can be detected by setting up a timeout of packet reception in the host MCU. Then, issue a CHANGE_STATE to stand by and a START_RX to re-start reception. A fix has been identified and will be included in a future release.

2.11 Ramp Waveform of External PA Ramp Signal on TXRAMP Pin is not Smooth

Description of Errata
The TXRAMP pin is intended to ramp external PAs for higher TX power. The waveform is not smooth and could cause transient spectral splatter that impacts certain regulatory requirements.
Affected Conditions / Impacts
Potentially impacts certain regulatory requirements due to transient spectral splatter.
Workaround
Add RC filtering on the board to smoothe the TXRAMP signal. A fix has been identified and will be included in a future release.

2.12 Preamble Detect Signal for Non-Standard Preambles is Incorrect on the GPIO

Description of Errata
Preamble detection for non-standard (non 1010) patterns is not indicated correctly on GPIOs.
Affected Conditions / Impacts
The host can't use the GPIO to indicate detection of a non-standard preamble.
Workaround
None. A fix has been identified and will be included in a future release.

2.13 For Non-Standard Preambles, the Modem may Remain in Low-Gear Mode if Gear Switch is Set to Preamble Detection and Sync Word Detection Fails

Description of Errata
The modem can switch gears (signal acquisition speed) based on preamble detection. If the sync word is not detected after preamble detection, the modem will remain in Low-Gear mode. This is only observed when using non-standard preambles.
Affected Conditions / Impacts
This can have severe implications on receive performance if the modem gets stuck in Low-Gear mode where the AFC algorithm may not be running, the reception will not have any frequency error tolerance.
Workaround
Always set the gear switch condition to sync word detection instead of preamble detection, if non-standard preamble is used. For configuring the gear switching event manually, see property “MODEM_AFC_MISC” in the API documentation. A fix has been identified and will be included in a future release.

2.14 If a Received Packet has CRC Error, Subsequent Packets will Report a Command Error

Description of Errata
If a received packet has a CRC error, the next received packet may raise a CMD_ERR interrupt during the reception of the packet.
Affected Conditions / Impacts
The device is still functional but a spurious CMD_ERR interrupt will occur.
Workaround
After a packet with a CRC error is received, go to sleep state before going back to receive state. A fix has been identified and will be included in a future release.

2.15 Use of TCXO with Low VDD Supply may Cause a CTS Failure

Description of Errata
In high-performance mode, use of TCXO as clock source with a supply voltage of less than 2.3 V may cause CTS failures if there are state transitions. This occurs at specific temperatures within the operating temperature range and varies chip-to-chip.
Affected Conditions / Impacts
Without a CTS response, the host MCU will be unable to send further commands to the transceiver.
Workaround
A firmware patch is available on request and a fix has been identified, which will be included in a future release. Workarounds include increasing supply voltage above 2.3 V when using a TCXO, switching to a XTAL clock source, or using the device in low-power (LP) mode.

2.16 FIFO_INFO Command does not Update TX_FIFO_ALMOST_EMPTY Status Properly

Description of Errata
If the TX FIFO is reset by the FIFO_INFO command, the chip does not update the TX_FIFO_ALMOST_EMPTY status bit correctly. It gets updated only by the next TX FIFO fill that causes the TX_FIFO_ALMOST_EMPTY interrupt to occur later than expected.
Affected Conditions / Impacts
TX_FIFO_ALMOST_EMPTY interrupt occurs later than expected.
Workaround
Write one dummy byte into the TX_FIFO to fire the TX_FIFO_ALMOST_EMPTY interrupt and reset the TX_FIFO again. A fix has been identified and will be included in the next revision of the device.

2.17 FIFO Threshold Limitations

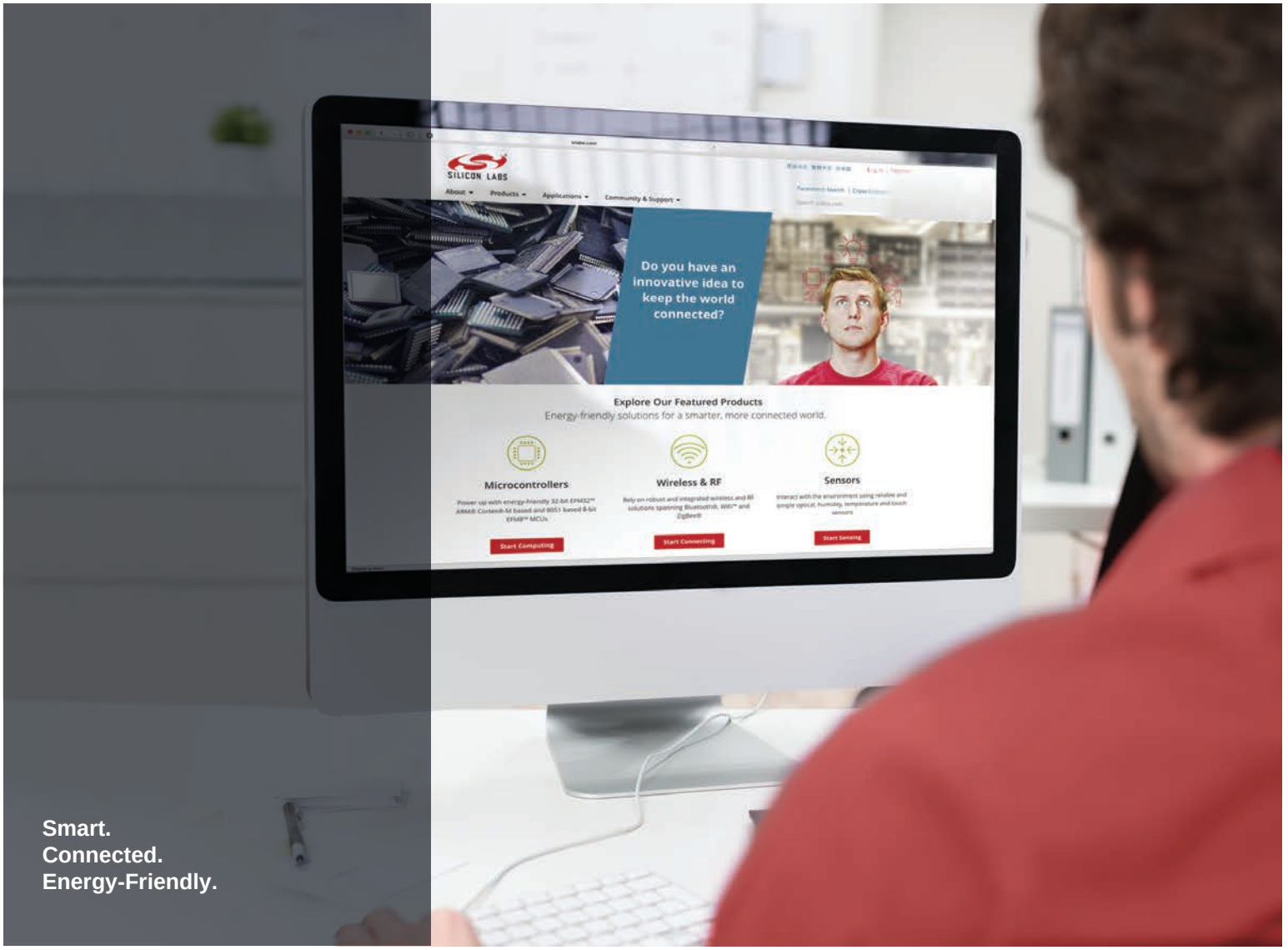
Description of Errata
Threshold of TX_FIFO_ALMOST_EMPTY interrupt can only be set as high as 58 bytes for reliable interrupt generation when the threshold is reached. If the payload length of the transmitted packet is less than 7 bytes, the user can rely on the PACKET_SENT interrupt which indicates the end of packet transmission. Threshold of RX_FIFO_ALMOST_FULL interrupt can only be set as low as 12 bytes for reliable interrupt generation when the threshold is reached. If the payload length of the received packet is less than 12 bytes, the user can rely on the PACKET_RX interrupt which indicates the end of packet.
Affected Conditions / Impacts
Users should not rely on FIFO threshold interrupts for greater than 58 bytes on the TX side and less than 12 bytes on the RX side.
Workaround
Rely on PACKET_SENT and PACKET_RX interrupts for very small payload lengths as described above. A fix has been identified and will be included in the next revision of the device.

2.18 479-639 MHz Center Frequency Band is not Supported

Description of Errata
Using the radio at a center frequency in the 470-639 MHz band requires the use of the divide by 6 output divider (DIV6) of the synthesizer. The divider is selected by setting the BAND field of the MODEM_CLKGEN_BAND property to 1. Depending on runtime conditions, such as supply voltage, DIV6 can go into a failure state and stay there until it is reset by restarting RX state.
Affected Conditions / Impacts
In the failure state the receiver can't receive. Restarting the receive state (by using START_RX API command) can recover the receiver, but it can get halted again after running for some time. As a result, the 470-639 MHz band can't be used. This affects only the Si4464-B1B.
Workaround
For the 470-479MHz band, the DIV8 divider can be used alternatively. (For details see the frequency control section in the data sheet.) No workaround exists for the 479-639 MHz band.

2.19 Transmission is Stuck in CW if Started after IRCAL and RX State

Description of Errata
If IR calibration is performed, the receiver is started and then transmission is started, transmission will get stuck in Continuous Wave transmission. If no IR calibration is performed, the issue does not occur.
Affected Conditions / Impacts
In this failure state the transmitter cannot transmit modulated signal.
Workaround
A state transition to READY state before starting transmission solves the problem.



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