



# Wireless Gecko *Bluetooth*<sup>®</sup> Low Energy SoC EFR32BG21 Errata



---

This document contains information on the EFR32BG21 errata. The latest available revision of this device is revision B. Errata that have been resolved remain documented and can be referenced for previous revisions of this device. The device data sheet explains how to identify the chip revision, either from the package marking or electronically. Errata effective date: November, 2022.

## 1. Errata Summary

The table below lists all known errata for the EFR32BG21 and all unresolved errata of the EFR32BG21.

**Table 1.1. Errata Overview**

Designator	Title/Problem	Workaround Exists	Exists on Revision:	
			A	B
CUR_E301	<a href="#">AVDD/IOVDD to DVDD Leakage Current</a>	Yes	X	—
GPIO_E301	<a href="#">GPIO_PORTA_MODEL_MODE2 Write Affects SWDIO Pin During Active Debug</a>	Yes	X	—
GPIO_E302	<a href="#">Increased Leakage Current When EM4WU Pins Are Enabled and the Pin State Is High</a>	Yes	X	X
HFXO_E301	<a href="#">HFXO DISONDEMAND and FORCEEN Can Cause Device to Hang</a>	Yes	X	X
I2C_E301	<a href="#">New Transfer Ignored if Bus Idle Timeout Occurs Between Start Detection and the Falling Edge of SCL</a>	Yes	X	—
I2C_E302	<a href="#">Follower Holds SCL Low After Losing Arbitration</a>	Yes	X	—
I2C_E303	<a href="#">I2C Fails to Indicate New Incoming Data</a>	Yes	X	X
IADC_E301	<a href="#">Delta Sigma Modulator is Disabled in KEEPWARM Mode</a>	Yes	X	—
IADC_E302	<a href="#">EM23ABORTERROR Interrupt Does Not Work</a>	No	X	—
IADC_E303	<a href="#">Input Change Missed After Adjacent GND Conversions</a>	No	X	—
IADC_E304	<a href="#">Possible Data Loss in EM2/EM3</a>	Yes	X	X
IADC_E306	<a href="#">Changing Gain During a Scan Sequence Causes an Erroneous IADC Result</a>	Yes	X	X
RADIO_E301	<a href="#">Improper TX and RX Operation at High Temperature</a>	Yes	X	X
TIMER_E301	<a href="#">Continuous Overflow and Underflow Interrupts in Quadrature Counting Mode</a>	Yes	X	X
USART_E301	<a href="#">Possible Data Transmission on Wrong Edge in Synchronous Mode</a>	Yes	X	X
USART_E302	<a href="#">Additional SCLK Pulses Can Be Generated in USART Synchronous Mode</a>	Yes	X	X
USART_E303	<a href="#">USART DMA Transactions Fail with Slow Peripheral Clocks</a>	Yes	X	—
USART_E304	<a href="#">PRS Transmit Unavailable in Synchronous Secondary Mode</a>	No	X	X
WDOG_E301	<a href="#">Clear Command is Lost Upon EM2 Entry</a>	Yes	X	X

## 2. Current Errata Descriptions

### 2.1 GPIO\_E302 – Increased Leakage Current When EM4WU Pins Are Enabled and the Pin State Is High

<b>Description of Errata</b>
When any of the EM4WU pins are used with the input path enabled and the pin state is high, an extra leakage current of approximately 15 $\mu$ A per pin will be observed in EM0, EM1, EM2, and EM3.
<b>Affected Conditions / Impacts</b>
EM0, EM1, EM2, and EM3 current will be higher by approximately 15 $\mu$ A per pin when any of the EM4WU pins are used with the input path enabled and the pin state is high.
<b>Workaround</b>
There are two workarounds for this issue: <ol style="list-style-type: none"> <li>1. If the input path on the pad is not required, disable the input path on that pad by setting the DINDIS or DINDISALT bits in the GPIO_PORTx_CTRL register. Thus, an EM4WU pin can still be used to drive an output without incurring the extra current leakage when the pin is configured as an output and DINDIS or DINDISALT is set.</li> <li>2. If an input path is required (i.e., MODEn is any value other than DISABLED and DINDIS = 0 or DINDISALT = 0), assign it to a pin which does not have EM4 wakeup capability.</li> </ol> <p>Refer to the device data sheet to determine which pins have or do not have EM4 wake-up functionality.</p>
<b>Resolution</b>
There is currently no resolution for this issue.

### 2.2 HFXO\_E301 — HFXO DISONDEMAND and FORCEEN Can Cause Device to Hang

<b>Description of Errata</b>
With HFXO enabled, when DISONDEMAND is toggled from 0 to 1 followed by a system reset request, a handshake between the EMU and CMU hangs, preventing the system reset from being asserted.
<b>Affected Conditions / Impacts</b>
The device will hang waiting for the EMU/CMU handshake to complete, requiring a pin reset to recover.
<b>Workaround</b>
When the HFXO is enabled, do not toggle DISONDEMAND from 0 to 1.
<b>Resolution</b>
There is currently no resolution for this issue.

### 2.3 I2C\_E303 – I<sup>2</sup>C Fails to Indicate New Incoming Data

<b>Description of Errata</b>
A race condition exists in which the I <sup>2</sup> C fails to indicate reception of new data when both user software attempts to read data from and the I <sup>2</sup> C hardware attempts to write data to the I2C_RXFIFO in the same cycle.
<b>Affected Conditions / Impacts</b>
When this race condition occurs, the RXFIFO enters an invalid state in which both I2C_STATUS_RXDATAV = 0 and I2C_STATUS_RXFULL = 1. This causes the I <sup>2</sup> C to discard new incoming data bytes because RXFULL = 1 and would otherwise prevent user software from reading last byte written by the I <sup>2</sup> C hardware to RXFIFO because RXDATAV = 0.
<b>Workaround</b>
User software can recognize and clear this invalid RXDATAV = 0 and RXFULL = 1 condition by performing a dummy read of the RXFIFO (I2C_RXDATA). This restores the expected RXDATAV = 1 and RXFULL = 0 condition. The dummy read also sets the RXUFIF flag bit, which should be ignored and cleared. The data from this read can be discarded, and user software can now read the last byte written by the I <sup>2</sup> C hardware to the RXFIFO (the byte which caused the invalid RXDATAV = 0 and RXFULL = 1 condition).  No data will be lost as long as user software completes this recovery procedure (performing the dummy read and then reading the remaining valid byte in the RXFIFO) before the I <sup>2</sup> C hardware receives the next incoming data byte.
<b>Resolution</b>
There is currently no resolution for this issue.

### 2.4 IADC\_E304 – Possible Data Loss in EM2/EM3

<b>Description of Errata</b>
When the IADC wakes from EM2 or EM3 and generates conversion results that the LDMA transfers to RAM, it is possible under very rare circumstances to lose data when the ratio of the bus clock (HCLK) is slow compared to the prescaled IADC clock (ADC_CLK).
<b>Affected Conditions / Impacts</b>
Data from IADC conversions in these cases can potentially be lost due to FIFO overflow.
<b>Workaround</b>
To prevent data loss when the IADC awakens from EM2 or EM3 and performs conversions that are serviced by the LDMA before re-entering the low-energy state, make sure that: <ul style="list-style-type: none"> <li>the rate at which the IADC takes samples in EM2 or EM3 is less than or equal to 125 kHz (samples are taken no faster than every 8 μs), and</li> <li>the frequency of the HCLK (bus clock) is at least four times the frequency of the IADCCLK.</li> </ul>
<b>Resolution</b>
There is currently no resolution for this issue.

## 2.5 IADC\_E306 – Changing Gain During a Scan Sequence Causes an Erroneous IADC Result

<b>Description of Errata</b>
Differences in the ANALOGGAIN setting within multiple IADC_CFGx groups during a scan sequence introduces a transient condition that may result in an inaccurate IADC conversion.
<b>Affected Conditions / Impacts</b>
The result of the IADC scan measurement may not match the expected result for the voltage present on the pin during the conversion.
<b>Workaround</b>
Both 1 and 2 shown below must be implemented. <ol style="list-style-type: none"><li>1. If there is a difference in the ANALOGGAIN setting between IADC_CFGx groups during a scan sequence, the IADC_SCHEx clock prescaler must also change to an appropriate setting. This forces a warmup state (5 <math>\mu</math>s delay) in between ANALOGGAIN changes. Note that the same IADC_SCHEx clock prescaler value may be an appropriate setting for both ANALOGGAIN settings, but to force the warmup delay, the IADC_SCHEx must have different values.</li><li>2. The first and last entry of a scan group should use IADC_CFG0, which is the default configuration of the IADC at the start and end of a scan conversion sequence. If CONFIG1 is used at the start and end of the scan group, erroneous IADC results may occur.</li></ol>
<b>Resolution</b>
There is currently no resolution for this issue.

## 2.6 RADIO\_E301 – Improper TX and RX Operation at High Temperature

<b>Description of Errata</b>
Some radio transceivers may fail to lock to the correct RF frequency at high operating temperatures when using Gecko SDK prior to Gecko SDK v2.5.4.
<b>Affected Conditions / Impacts</b>
Devices using Gecko SDK prior to v2.5.4 at high operating temperatures may be unable to lock to the desired RF frequency. This may cause errors in the TX/RX frequency or an inability to transmit or receive data.
<b>Workaround</b>
Customers should use firmware provided in Gecko SDK v2.5.4 or later for proper TX/RX operation.
<b>Resolution</b>
There is currently no resolution for this issue.

## 2.7 TIMER\_E301 — Continuous Overflow and Underflow Interrupts in Quadrature Counting Mode

<b>Description of Errata</b>
<p>When the TIMER is configured to operate in quadrature decoder mode with the overflow interrupt enabled and the counter value (TIMER_CNT) reaches the top value (TIMER_TOP), the overflow interrupt is requested continuously even if the interrupt flag (TIMER_IF_OF) is cleared. Similarly, if the underflow interrupt is enabled and the counter value reaches zero, the underflow interrupt is requested continuously even if the interrupt flag (TIMER_IF_UF) is cleared. Only after the counter value has incremented or decremented so that the overflow or underflow condition no longer applies can the interrupt be cleared.</p>
<b>Affected Conditions / Impacts</b>
<p>Because the counter is clocked by its CC0 and CC1 inputs in quadrature decoder mode and not the prescaled HPERCLK, overflow and underflow events remain latched as long TIMER_CNT remains at the value that triggered the overflow or underflow condition. Until the counter is no longer in the overflow or underflow condition, it is not possible to clear the associated interrupt flag.</p>
<b>Workaround</b>
<p>Short of disabling the relevant interrupts, the simplest workaround is to manually increment or decrement TIMER_CNT so that the overflow or underflow condition no longer exists. Insert the following or similar code in the interrupt handler for the timer in question (TIMER0 in this case) to do this:</p>
<pre>uint32 intFlags = TIMER_IntGet(TIMER0);  if (intFlags &amp; TIMER_IEN_OF)     TIMER0-&gt;CNT += 1;  if (intFlags &amp; TIMER_IEN_UF)     TIMER0-&gt;CNT -= 1;</pre>
<p>It may be necessary for firmware to account for this adjustment in calculations that include the counter value.</p>
<b>Resolution</b>
<p>There is currently no resolution for this issue.</p>

## 2.8 USART\_E301 — Possible Data Transmission on Wrong Edge in Synchronous Mode

<b>Description of Errata</b>
<p>The first bit of the new data word is incorrectly transmitted on the leading clock edge of the subsequent data bit and not the trailing clock edge of the current data bit if the USART is configured to operate in synchronous mode with</p> <ol style="list-style-type: none"> <li>1. USART_CLKDIV_DIV = 0 (clock = <math>f_{\text{HPPERCLK}} \div 2</math>),</li> <li>2. USART_CTRL_CLKPHA = 0,</li> <li>3. USART_TIMING_CSHOLD = 1 and</li> <li>4. Data is loaded into the transmit FIFO (say, by the LDMA) at the exact same time as the USART state machine begins to insert the requested one bit time extension of the chip select hold time (USART_TIMING_CSHOLD = 1).</li> </ol>
<b>Affected Conditions / Impacts</b>
<p>Reception of each data bit by the secondary is tied to a specific clock edge. Therefore, the late transmission by the main of the first bit of a word may cause the secondary to receive the incorrect data, especially if the data setup time for the secondary approaches or exceeds one half the shift clock period.</p>
<b>Workaround</b>
<p>Because there is no way to specifically time a write to the transmit FIFO such that it does not occur when the USART state machine changes state, use one of the following workarounds to avoid the risk for data corruption described above:</p> <ul style="list-style-type: none"> <li>• Set USART_CLK_DIV &gt; 0.</li> <li>• Use USART_TIMING_CSHOLD = 0 or USART_TIMING_CSHOLD &gt; 1.</li> <li>• Use USART_CTRL_CLKPHA = 1. This option is particularly useful with SPI flash memories as many support operation in both the CLKPOL = CLKPHA = 0 and CLKPOL = CLKPHA = 1 modes.</li> </ul>
<b>Resolution</b>
<p>There is currently no resolution for this issue.</p>

## 2.9 USART\_E302 — Additional SCLK Pulses Can Be Generated in USART Synchronous Mode

<b>Description of Errata</b>
<p>When inter-character spacing is enabled (USART_TIMING_ICS &gt; 0) and USART_CTRL_CLKPHA = 1 in synchronous main mode, an extra clock pulse is generated after each frame transmitted except the last (that frame which when sent results in both the transmit FIFO and transmit shift register being empty).</p>
<b>Affected Conditions / Impacts</b>
<p>The extra clock pulse generated at the end of the first frame would cause a secondary device to clock in the first bit of the next frame it expects to receive even though the USART is not yet driving that data. The secondary would lose synchronization with the main and erroneously receive all frames after the first.</p>
<b>Workaround</b>
<p>Do not enable inter-character spacing when CLKPHA = 1. If a delay between frames is necessary, insert one manually with a software delay loop. Data cannot be transmitted using DMA in this case.</p>
<b>Resolution</b>
<p>There is currently no resolution for this issue.</p>

## 2.10 USART\_E304 — PRS Transmit Unavailable in Synchronous Secondary Mode

<b>Description of Errata</b>
When the USART is configured for synchronous secondary operation, the transmit output (MISO) is not driven if the signal is routed to a pin using the PRS producer (e.g., SOURCESEL = 0x20 and SIGSEL = 0x4 for USART0).
<b>Affected Conditions / Impacts</b>
Systems cannot operate the USART in synchronous secondary mode if the PRS is used to route the transmit output to the RX (MISO) pin. Operation is not affected in main mode when the transmit output is routed to the TX (MOSI) pin using the PRS producer nor is operation affected in any mode when the GPIO_USARTn_RXROUTE and GPIO_USARTn_TXROUTE registers are used.
<b>Workaround</b>
There is currently no workaround for this issue.
<b>Resolution</b>
There is currently no resolution for this issue.

## 2.11 WDOG\_E301 – Clear Command is Lost Upon EM2 Entry

<b>Description of Errata</b>
If the device enters EM2, while the clear command is still being synchronized, the watchdog counter may not be cleared as expected.
<b>Affected Conditions / Impacts</b>
If the watchdog counter is not cleared as expected, the device can encounter a watchdog reset.
<b>Workaround</b>
Wait for WDOG_SYNCBUSY_CMD to clear before entering EM2. Note that WDOG can be clocked from one of the low-frequency clock sources and will require additional time to enter EM2 when implementing this workaround.
<b>Resolution</b>
There is currently no resolution for this issue.



### 3. Resolved Errata Descriptions

This section contains previous errata for EFR32BG21 devices.

For errata on the latest revision, refer to the beginning of this document. The device data sheet explains how to identify chip revision, either from package marking or electronically.

#### 3.1 CUR\_E301 – AVDD/IOVDD to DVDD Leakage Current

<b>Description of Errata</b>
Leakage from AVDD or IOVDD to DVDD is present when either supply voltage is higher than DVDD.
<b>Affected Conditions / Impacts</b>
When the AVDD or IOVDD supply voltage is higher than DVDD, a leakage current from AVDD or IOVDD to DVDD is present. This current has a diode-like property, such that when the voltage difference is less than 700 mV, the leakage is less than 1 $\mu$ A. If the difference is near the maximum (e.g. AVDD = 3.8 V and DVDD = 1.8 V), the leakage can be as high as 100 $\mu$ A on a typical device at room temperature. In this case, there is also as much as 50 $\mu$ A of added current from AVDD or IOVDD directly to ground.
<b>Workaround</b>
Enable the AVDD and/or IOVDD brownout detector via the EMU_BOD3SENSE register for the supply voltage(s) that is/are higher than DVDD. <ul style="list-style-type: none"> <li>• Enable the AVDD monitor by performing a read-modify-write operation on the EMU_BOD3SENSE with 0x1 as the bit mask.</li> <li>• Enable the IOVDD monitor by performing a read-modify-write operation on the EMU_BOD3SENSE with 0x6 as the bit mask.</li> </ul> Note that enabling the relevant brownout detector minimizes this leakage current, but it does not eliminate it completely.
<b>Resolution</b>
This issue is resolved in revision B devices.

#### 3.2 GPIO\_E301 – GPIO\_PORTA\_MODEL\_MODE2 Write Affects SWDIO Pin During Active Debug

<b>Description of Errata</b>
When a debugger is connected to the device, software cannot clear GPIO_DBGROUTE PEN in order to prevent loss of communication with the host.  However, changing the GPIO_PORTA_MODEL_MODE2 field, which corresponds to the SWDIO pin, to any of the wired-AND/wired-OR modes effectively disables the debugger connection.
<b>Affected Conditions / Impacts</b>
Reconfiguring the SWDIO pin to a wired-AND/wired-OR output mode causes loss of debugger contact upon writing to the GPIO_PORTA_MODEL_MODE2 field.
<b>Workaround</b>
To prevent the debugger from losing its connection to the target device, do not change the state of the GPIO_PORTA_MODEL_MODE2 field.
<b>Resolution</b>
This issue is resolved in revision B devices.

**3.3 I2C\_E301 – New Transfer Ignored if Bus Idle Timeout Occurs Between Start Detection and the Falling Edge of SCL**

<b>Description of Errata</b>
If a bus idle timeout occurs between detection of a start condition and the falling edge of SCL, the start condition detection logic is defeated, causing the I <sup>2</sup> C state machine to indicate that bus is not busy (I2C_STATE_BUSY = 0).
<b>Affected Conditions / Impacts</b>
A transfer that meets the timing conditions cited above will be missed, causing the device not to respond to the leader if it is the follower being addressed. Furthermore, because I2C_STATE_BUSY no longer reflects the actual state of the bus, the device can, if configured as a leader, mistakenly attempt to use the bus, thus corrupting a transfer already in progress.
<b>Workaround</b>
To avoid corrupting bus activity, application software should implement the following before starting a transaction in systems where the bus timeout is used: <ul style="list-style-type: none"> <li>• Wait for the I2C_IF_SSTOP flag, either by polling or by using the associated interrupt (I2C_IEN_SSTOP).</li> <li>• Impose a system-defined delay after all transfers that are independent of the bus timeout monitor to ensure that the bus is in idle state.</li> </ul> When one of the above workarounds is met, the bus can be considered inactive and available for use.
<b>Resolution</b>
This issue is resolved in revision B devices.

**3.4 I2C\_E302 – Follower Holds SCL Low After Losing Arbitration**

<b>Description of Errata</b>
If, while transmitting data as a follower, arbitration is lost, SCL is unintentionally held low for an indefinite period of time.
<b>Affected Conditions / Impacts</b>
The winner of arbitration cannot use the bus because SCL is never released.
<b>Workaround</b>
If the I <sup>2</sup> C arbitration lost flag is asserted (I2C_IF_ARBLOST = 1) in follower mode (I2C_STATE_MASTER = 0), application software needs to wait for at least one SCL high time and then issue the transmission abort command (set I2C_CMD_ABORT = 1), thus releasing SCL.
<b>Resolution</b>
This issue is resolved in revision B devices.

**3.5 IADC\_E301 – Delta Sigma Modulator is Disabled in KEEPWARM Mode**

<b>Description of Errata</b>
When IADC_CTRL_WARMUPMODE = KEEPWARM, the IADC delta sigma modulator is disabled between conversions.
<b>Affected Conditions / Impacts</b>
Because the delta sigma modulator is disabled before conversions restart, the results will be erroneous until the usual 1 μs required for warm-up has elapsed.
<b>Workaround</b>
Do not use IADC_CTRL_WARMUPMODE = KEEPWARM or discard the results received during the first 1 μs of operation after re-starting the converter.
<b>Resolution</b>
This issue is resolved in revision B devices.

### 3.6 IADC\_E302 – EM23ABORTERROR Interrupt Does Not Work

<b>Description of Errata</b>
When IADC_IEN_EM23ABORTERROR = 1, the IADC does not request an interrupt upon EM2 or EM3 entry when running from a clock that is not active in these energy modes.
<b>Affected Conditions / Impacts</b>
There is no way for the IADC to let application software know that the system has (erroneously) entered EM2 or EM3 with a converter clock source that is now disabled.
<b>Workaround</b>
There is currently no workaround for this issue.
<b>Resolution</b>
This issue is resolved in revision B devices.

### 3.7 IADC\_E303 – Input Change Missed After Adjacent GND Conversions

<b>Description of Errata</b>
If the IADC is performing a scan that includes two adjacent GND conversions (IADC_SCAN[n]_PORTPOS = IADC_SCAN[n]_PORTNEG = GND and IADC_SCAN[n + 1]_PORTPOS = IADC_SCAN[n + 1]_PORTNEG = GND) such that the configuration for one GND conversion differs from the other (e.g. IADC_SCAN[n]_CFG = 0 and IADC_SCAN[n + 1]_CFG = 1 or vice versa), the inputs for conversion [n + 2] in the sequence after the two GND conversions will not be selected.
<b>Affected Conditions / Impacts</b>
Results for the first conversion after two adjacent GND conversions in a scan will be erroneous.
<b>Workaround</b>
Do not perform scans that include two adjacent GND conversions.
<b>Resolution</b>
This issue is resolved in revision B devices.

### 3.8 USART\_E303 — USART DMA Transactions Fail with Slow Peripheral Clocks

<b>Description of Errata</b>
USART DMA transactions will fail when the USART peripheral clock is slower than the DMA clock and IGNORESREQ is cleared to 0.
<b>Affected Conditions / Impacts</b>
Systems will not be able to use the DMA with a USART running from a slow clock when IGNORESREQ is cleared to 0.
<b>Workaround</b>
Use one of the following options to avoid USART DMA transaction failures: <ul style="list-style-type: none"> <li>• Set IGNORESREQ to 1 in LDMA.</li> <li>• Do not prescale USART clock.</li> </ul>
<b>Resolution</b>
This issue is resolved in revision B devices.

## 4. Revision History

### Revision 0.7

November, 2022

- Updated errata description and workaround for [HFXO\\_E301](#).
- Updated workaround for [IADC\\_E306](#).

### Revision 0.6

March, 2022

- Updated the workaround in [I2C\\_E303](#).
- Added [USART\\_E304](#).
- Added [IADC\\_E306](#).
- Replaced select terms with inclusive lexicon.

### Revision 0.5

August, 2020

- Added [I2C\\_E303](#).
- Clarified the affected conditions and impacts in [WDOG\\_E301](#).

### Revision 0.4

June, 2020

- Added [TIMER\\_E301](#), [USART\\_E301](#), [USART\\_E302](#), [USART\\_E303](#) and [WDOG\\_E301](#).
- Migrated to new errata document format.

### Revision 0.3

May, 2019

- Added [RADIO\\_E301](#).

### Revision 0.2

April, 2019

- Added [GPIO\\_E302](#) and [HFXO\\_E301](#).

### Revision 0.1

January, 2019

- Initial release.

# Simplicity Studio

One-click access to MCU and wireless tools, documentation, software, source code libraries & more. Available for Windows, Mac and Linux!



**IoT Portfolio**  
[www.silabs.com/IoT](http://www.silabs.com/IoT)



**SW/HW**  
[www.silabs.com/simplicity](http://www.silabs.com/simplicity)



**Quality**  
[www.silabs.com/quality](http://www.silabs.com/quality)



**Support & Community**  
[www.silabs.com/community](http://www.silabs.com/community)

## Disclaimer

Silicon Labs intends to provide customers with the latest, accurate, and in-depth documentation of all peripherals and modules available for system and software implementers using or intending to use the Silicon Labs products. Characterization data, available modules and peripherals, memory sizes and memory addresses refer to each specific device, and "Typical" parameters provided can and do vary in different applications. Application examples described herein are for illustrative purposes only. Silicon Labs reserves the right to make changes without further notice to the product information, specifications, and descriptions herein, and does not give warranties as to the accuracy or completeness of the included information. Without prior notification, Silicon Labs may update product firmware during the manufacturing process for security or reliability reasons. Such changes will not alter the specifications or the performance of the product. Silicon Labs shall have no liability for the consequences of use of the information supplied in this document. This document does not imply or expressly grant any license to design or fabricate any integrated circuits. The products are not designed or authorized to be used within any FDA Class III devices, applications for which FDA premarket approval is required or Life Support Systems without the specific written consent of Silicon Labs. A "Life Support System" is any product or system intended to support or sustain life and/or health, which, if it fails, can be reasonably expected to result in significant personal injury or death. Silicon Labs products are not designed or authorized for military applications. Silicon Labs products shall under no circumstances be used in weapons of mass destruction including (but not limited to) nuclear, biological or chemical weapons, or missiles capable of delivering such weapons. Silicon Labs disclaims all express and implied warranties and shall not be responsible or liable for any injuries or damages related to use of a Silicon Labs product in such unauthorized applications.

**Note: This content may contain offensive terminology that is now obsolete. Silicon Labs is replacing these terms with inclusive language wherever possible. For more information, visit [www.silabs.com/about-us/inclusive-lexicon-project](http://www.silabs.com/about-us/inclusive-lexicon-project)**

## Trademark Information

Silicon Laboratories Inc.<sup>®</sup>, Silicon Laboratories<sup>®</sup>, Silicon Labs<sup>®</sup>, SiLabs<sup>®</sup> and the Silicon Labs logo<sup>®</sup>, Bluegiga<sup>®</sup>, Bluegiga Logo<sup>®</sup>, EFM<sup>®</sup>, EFM32<sup>®</sup>, EFR, Ember<sup>®</sup>, Energy Micro, Energy Micro logo and combinations thereof, "the world's most energy friendly microcontrollers", Redpine Signals<sup>®</sup>, WiSeConnect, n-Link, ThreadArch<sup>®</sup>, EZLink<sup>®</sup>, EZRadio<sup>®</sup>, EZRadioPRO<sup>®</sup>, Gecko<sup>®</sup>, Gecko OS, Gecko OS Studio, Precision32<sup>®</sup>, Simplicity Studio<sup>®</sup>, Telegesis, the Telegesis Logo<sup>®</sup>, USBXpress<sup>®</sup>, Zentri, the Zentri logo and Zentri DMS, Z-Wave<sup>®</sup>, and others are trademarks or registered trademarks of Silicon Labs. ARM, CORTEX, Cortex-M3 and THUMB are trademarks or registered trademarks of ARM Holdings. Keil is a registered trademark of ARM Limited. Wi-Fi is a registered trademark of the Wi-Fi Alliance. All other products or brand names mentioned herein are trademarks of their respective holders.



Silicon Laboratories Inc.  
400 West Cesar Chavez  
Austin, TX 78701  
USA

[www.silabs.com](http://www.silabs.com)