UG620: xGM270S Module Explorer Kit User's Guide

The xGM270S Module Explorer Kit is an ultra-low cost, small form factor development and evaluation platform for the MGM270S Wireless Gecko Module.

The xGM270S Module Explorer Kit is focused on rapid prototyping and concept creation of IoT applications. It is designed around the MGM270S Module, which is an ideal device family for developing energy-friendly connected IoT applications.

The kit features a USB interface, an on-board Simplicity Link Adapter for debugging, two user-LEDs and two buttons, and support for hardware add-on boards via a mikroBus socket and a Qwiic connector. The hardware add-on support allows developers to create and prototype applications using a virtually endless combination of off-the-shelf boards from MIKROE, SparkFun, Adafruit, and Seeed Studio.

TARGET DEVICE

- MGM270S Wireless Gecko Module (MGM270SC22SNA4)
- PCB Slot Antenna (2.4 GHz band)
- 32-bit ARM® Cortex®-M33 with 76.8 MHz maximum operating frequency
- 768 KB flash and 64 KB RAM

KIT FEATURES

- 2x User LEDs and 2x push buttons
- 20-pin 2.54 mm breakout pads
- mikroBUS™ socket
- Qwiic® connector
- Simplicity Link Adapter
  - SEGGER J-Link debugger
  - Virtual COM (VCOM) port
  - Packet Trace Interface (PTI)
- USB-powered

SOFTWARE SUPPORT

- Simplicity Studio®

ORDERING INFORMATION

- xGM270S-EK2715A

Table of Contents

1. Introduction

The xGM270S Module Explorer Kit has been designed to inspire customers to make IoT devices with the Silicon Labs® MGM270S Wireless Gecko Module. The kit includes a mikroBUS socket and Qwiic connector, allowing users to add features to the kit with a large selection of off-the-shelf boards.

Programming the xGM270S Module Explorer Kit is easily done using a USB Type-C cable and the on-board J-Link debugger. A USB VCOM port provides a serial connection to the target application, and the PTI offers invaluable debug information about transmitted and received packets in wireless links. The xGM270S Module Explorer Kit is supported in Simplicity Studio™ and a Board Support Package (BSP) is provided to give application developers a flying start.

External hardware is connected to the xGM270S Module Explorer Kit by using the 20 breakout pads which present peripherals from the MGM270S Wireless Gecko Module such as I^2C, SPI, UART, and GPIOs. The mikroBUS socket allows inserting mikroBUS add-on boards which interface with the MGM270S through SPI, UART, or I^2C. The Qwiic connector can be used to connect hardware from the Qwiic Connect System through I^2C.

1.1 Kit Contents

The following items are included in the box:

- 1x xGM270S Module Explorer Kit board (BRD2715A)

1.2 Getting Started

Refer to the Silicon Labs webpage, https://www.silabs.com/dev-tools, for detailed instructions on how to get started with your new xGM270S Module Explorer Kit.

1.3 Hardware Content

The following key hardware elements are included on the xGM270S Module Explorer Kit:

- MGM270S Wireless Gecko Module with 76.8 MHz operating frequency, 768 KB flash, and 64 KB RAM
- 2.4 GHz high-performance radio
- Two LEDs and two push buttons
- On-board Simplicity Link Adapter with SEGGER J-Link debugger for easy programming and debugging, USB VCOM port and PTI
- mikroBUS socket for connecting click boards and other mikroBUS add-on boards
- Qwiic connector for connecting Qwiic Connect System hardware
- Breakout pads for GPIO access and connection to external hardware
- Reset button

1.4 Kit Hardware Layout

xGM270S Module Explorer Kit layout is shown below.

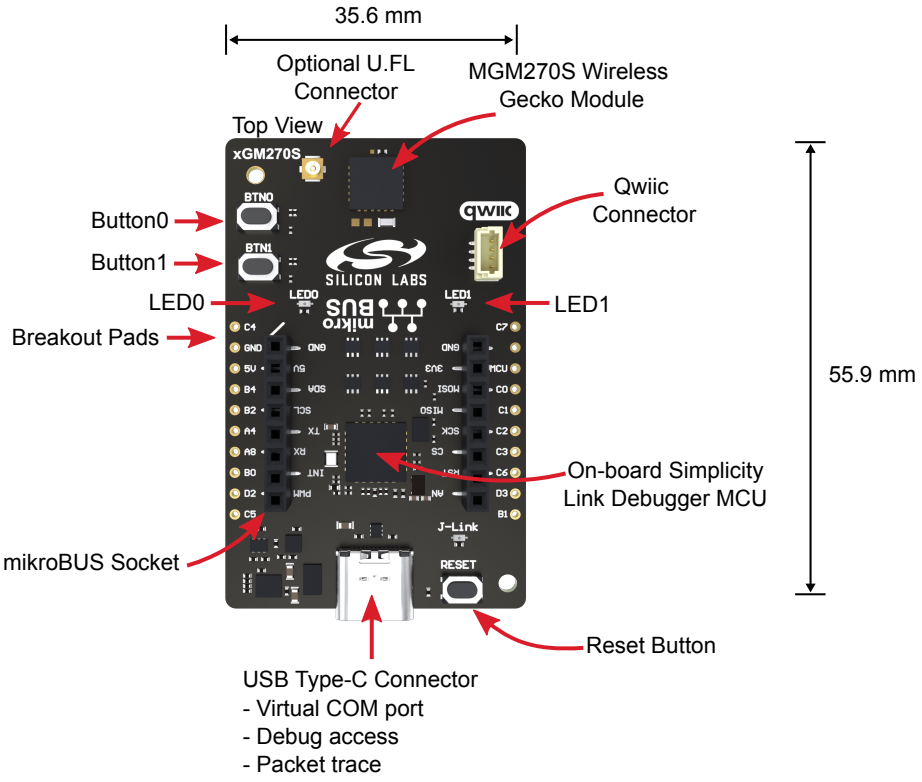

Figure 1.1. xGM270S Module Explorer Kit Hardware Layout

2. Specifications

2.1 Recommended Operating Conditions

Table 2.1. Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
USB Supply Input Voltage	V_{USB}	—	+5.0	—	V
Supply Input Voltage (VMCU supplied externally)	V_{VMCU}	—	+3.3	—	V

3. Hardware

The core of the xGM270S Module Explorer Kit is the MGM270S Wireless Gecko Module. Refer to section 1.4 Kit Hardware Layout for placement and layout of the hardware components.

3.1 Block Diagram

An overview of the xGM270S Module Explorer Kit is illustrated in the figure below.

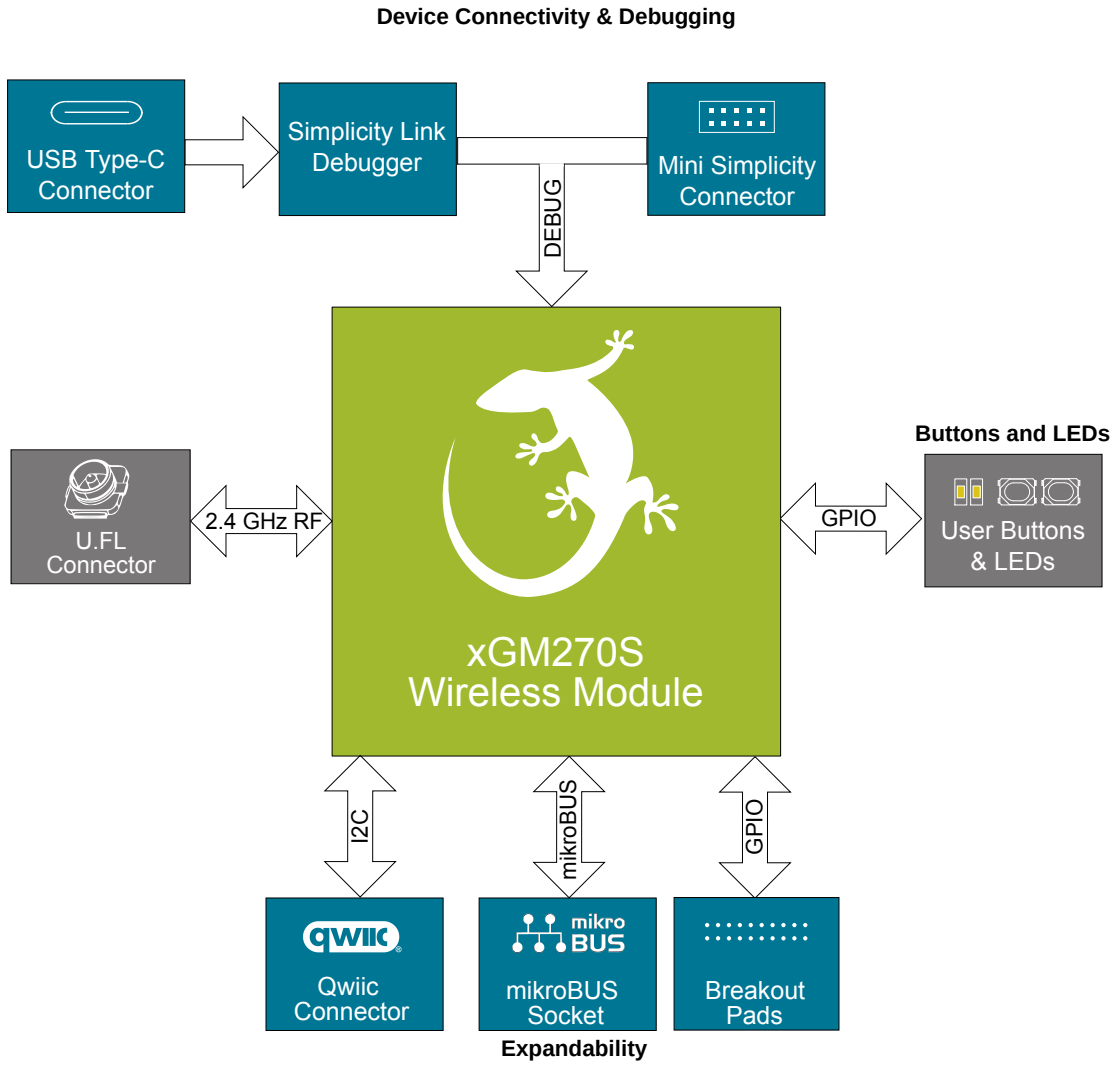

Figure 3.1. Kit Block Diagram

3.2 Power Supply

The kit is powered by the debug USB cable as illustrated in the figure below.

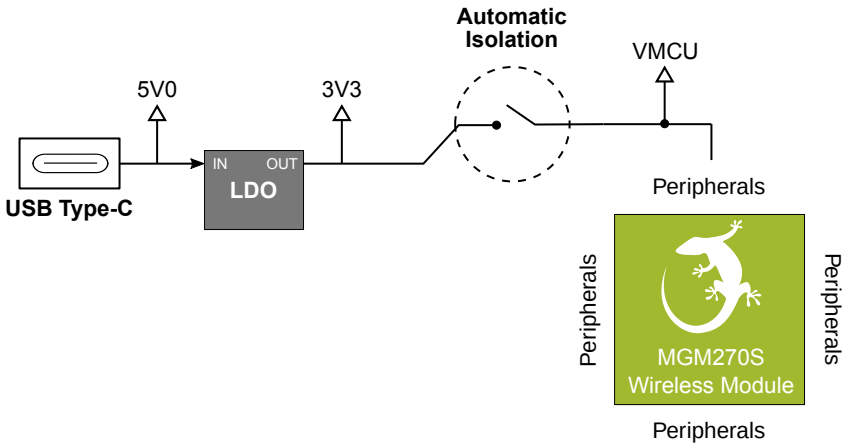

Figure 3.2. xGM270S Module Explorer Kit Power Topology

The 5 V power net on the USB bus is regulated down to 3.3 V using a Low-Dropout Regulator (LDO). An automatic isolation circuit isolates the LDO when the USB cable is not plugged in.

Power can be injected externally on the VMCU net if the USB cable is removed and no other power sources are present on the kit. Failure to follow this guideline can cause power conflicts and damage the LDO.

3.3 MGM270S Reset

The MGM270S can be reset by a few different sources:

- A user pressing the RESET button.
- The on-board debugger pulling the #RESET pin low.
- The Mini Simplicity connector (not mounted), which allows an external debugger to reset the target.

3.4 Push Buttons and LEDs

The kit has two user push buttons, marked BTN0 and BTN1, that are connected to GPIOs on the MGM270S. The buttons are connected to pin PB03 and PB01, respectively, and they are debounced by an RC filter with a time constant of 1 ms. The logic state of a button is high while that button is not being pressed, and low when it is pressed.

The kit also features two yellow LEDs, marked LED0 and LED1, that are controlled by GPIO pins on the MGM270S. The LEDs are connected to pin PD02 and PC07, respectively, in an active-high configuration.

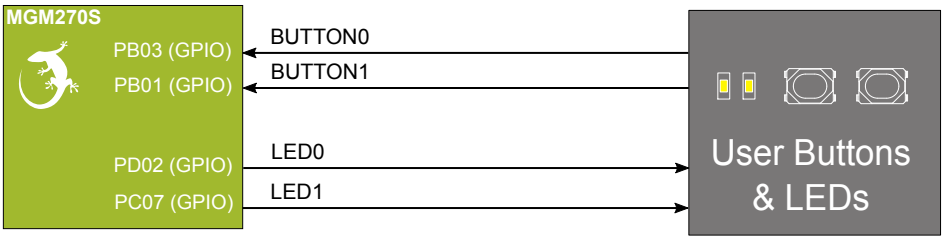

Figure 3.3. Buttons and LEDs

3.5 On-board Debugger

The xGM270S Module Explorer Kit contains a microcontroller separate from the MGM270S Wireless Gecko Module that provides the user with an on-board Simplicity Link featuring a SEGGER J-Link debugger, through the USB Type-C port. This microcontroller is referred to as the "Simplicity Link", and is not programmable by the user. When the USB cable is removed, the on-board debugger goes into a very low power shutoff mode (EM4S), consuming around 80 nA typically (from https://www.silabs.com/efm32gg12-datasheet).

In addition to providing code download and debug features, the on-board debugger also presents a VCOM port for general purpose application serial data transfer. The PTI is also supported which offers invaluable debug information about transmitted and received packets in wireless links. Additionally, the kit includes a Simplicity Link Isolation feature that disconnects the debugger circuit via isolation MOSFETs when the USB cable is unplugged.

The figure below shows the connections between the target MGM270S device and the on-board debugger.

Refer to section 4. Debugging for more details on debugging.

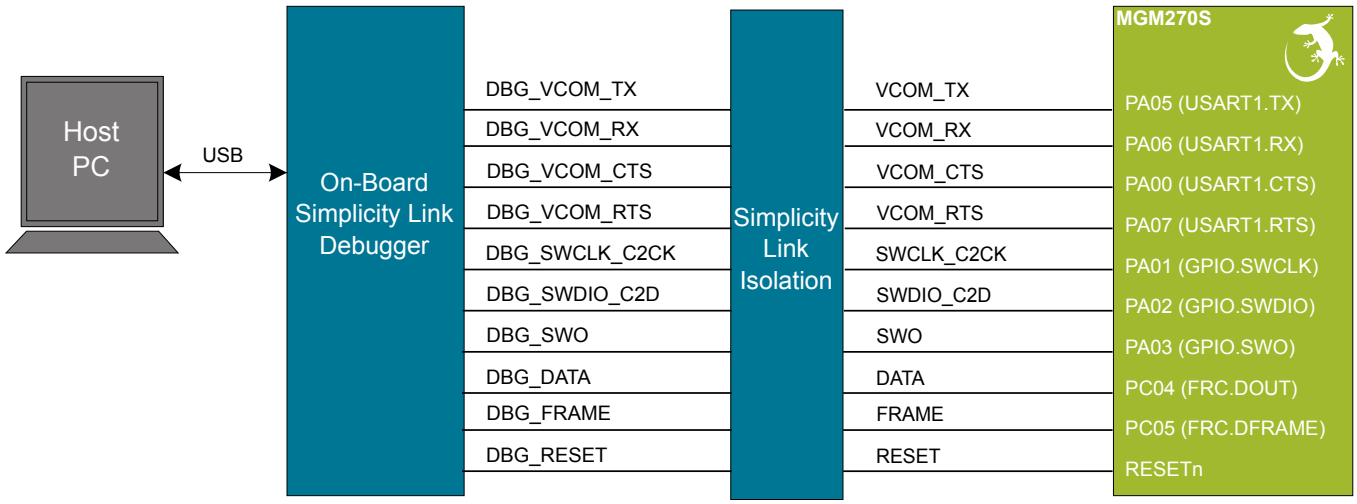

Figure 3.4. On-Board Debugger Connections

3.6 Connectors

The xGM270S Module Explorer Kit features a USB Type-C connector, 20 breakout pads, a Mini Simplicity connector (not mounted), a mikroBUS socket for connecting mikroBUS add-on boards, and a Qwiic connector for connecting Qwiic Connect System hardware. The Qwiic connector, mikroBUS socket, and USB Type-C connector are located on the top side of the board. The breakout header can be placed on either side of the board based on user preference. The Mini Simplicity connector can be placed on the bottom side of the board. Their placement and pinout are shown in the figure below. For additional information on the connectors, see the following sub-sections.

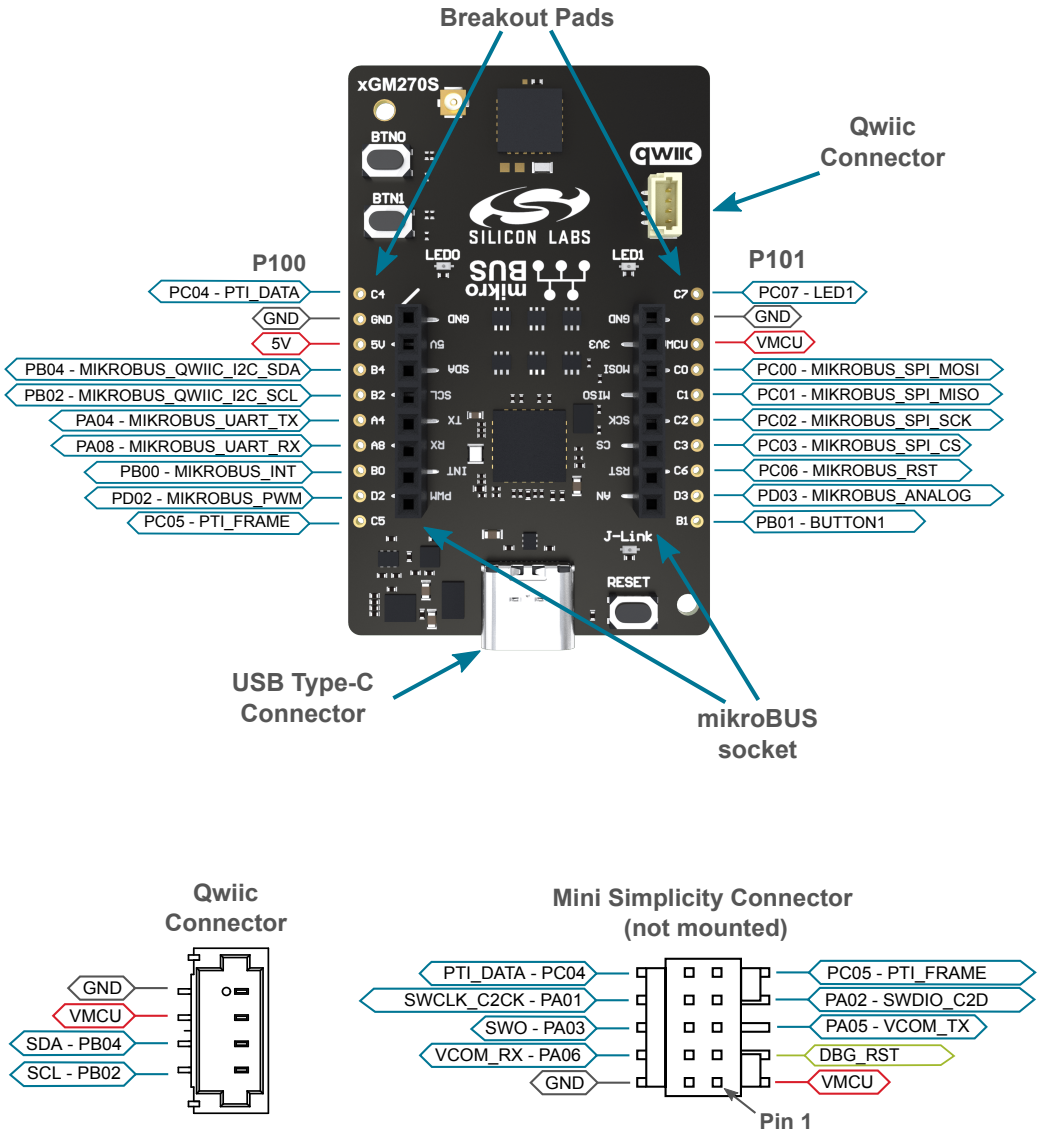

Figure 3.5. xGM270S Module Explorer Kit Connectors

3.6.1 Breakout Pads

Twenty breakout pads are provided and allow connection of external peripherals. There are 10 pads on the left side of the board, and 10 pads on the right. The breakout pads contain a number of I/O pins that can be used with most of the MGM270S Wireless Gecko Module's features. Additionally, the VMCU (main board power rail) and 5V power rails are also exposed on the pads.

The pin-routing on the Wireless Gecko Module is very flexible, so most peripherals can be routed to any pin. However, pins may be shared between the breakout pads and other functions on the xGM270S Module Explorer Kit. The table below includes an overview of the breakout pads and functionality that is shared with the kit.

Table 3.1. Breakout Pads Pinout

Pin	Connection	Shared Feature	Peripheral Mapping
Left-side Breakout Pins			
1	PC04	—	PTI_DATA
3	GND	Ground	
5	5V	Board USB voltage	
7	PB04	QWIIC_I2C_SDA, MIKROBUS_I2C_SDA	I2C_SDA
9	PB02	QWIIC_I2C_SCL, MIKROBUS_I2C_SCL	I2C_SCL
11	PA04	MIKROBUS_TX	UART_TX
13	PA08	MIKROBUS_RX	UART_RX
15	PB00	MIKROBUS_INT	EXT_INT
17	PD02	MIKROBUS_PWM	PWM
19	PC05	PTI_FRAME	PTI_FRAME
Right-side Breakout Pins			
2	PC07	—	LED1
4	GND	Ground	
6	VMCU	MGM270S voltage domain	
8	PC00	MIKROBUS_MOSI	SPI_MOSI
10	PC01	MIKROBUS_MISO	SPI_MISO
12	PC02	MIKROBUS_SCK	SPI_SCLK
14	PC03	MIKROBUS_CS	SPI_CS
16	PC06	MIKROBUS_RST	GPIO
18	PD03	MIKROBUS_AN	AIN
20	PB01	—	BUTTON1

3.6.2 Mini Simplicity Connector

The Mini Simplicity Connector (not mounted) is a 10-pin, 1.27 mm pitch connector that allows the use of an external debugger such as the one found on a Silicon Labs Wireless Starter Kit mainboard. The pinout of the connector on the board is described in the table below with the names being referenced from the MGM270S.

Table 3.2. Mini Simplicity Connector Pin Descriptions

Pin number	Function	Connection	Description
1	VCC	VMCU	Target voltage on the debugged application.
2	GND	GND	Ground
3	RST	RESET	MGM270S reset
4	VCOM_RX	PA06	VCOM Rx
5	VCOM_TX	PA05	VCOM Tx
6	SWO	PA03	Serial Wire Output
7	SWDIO	PA02	Serial Wire Data
8	SWCLK	PA01	Serial Wire Clock
9	PTI_FRAME	PC05	Packet Trace Frame
10	PTI_DATA	PC04	Packet Trace Data

3.6.3 mikroBUS Socket

The xGM270S Module Explorer Kit features a mikroBUS socket compatible with mikroBUS add-on boards. The mikroBUS add-on boards can expand the functionality of the kit with peripherals such as sensors and LCDs. Add-on boards follow the mikroBUS socket pin mapping and communicate with the on-kit MGM270S through UART, SPI, or I^2C. Several GPIOs are exposed on the mikroBUS socket. The mikroBUS add-on boards can be powered by the 5V or VMCU power rails, which are available on the mikroBUS socket.

The pinout of the MGM270S on the kit is made such that all required peripherals are available on the mikroBUS socket. The I^2C signals are, however, shared with the Qwiic connector, and all mikroBUS signals are also routed to adjacent breakout pads.

When inserting a mikroBUS add-on board, refer to the orientation notch on the xGM270S Module Explorer Kit, shown in the figure below, to ensure correct orientation. Add-on boards have a similar notch that needs to be lined up with the one shown below.

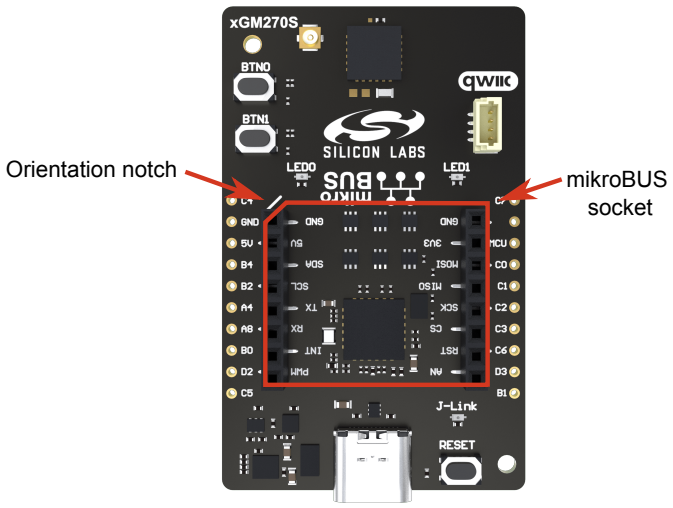

Figure 3.6. mikroBUS Add-on Board Orientation

The table below gives an overview of the mikroBUS socket pin connections to the MGM270S.

Table 3.3. mikroBUS Socket Pinout

mikro-BUS Pin Name	mikroBUS Pin Function	Connection	Shared Feature	Suggested Peripheral Mapping
AN	Analog	PD03	—	IADC0
RST	Reset	PC06	—	—
CS	SPI Chip Select	PC03	—	USARTx.CS
SCK	SPI Clock	PC02	—	USARTx.CLK
MISO	SPI Main Input Secondary Output	PC01	—	USARTx.RX
MOSI	SPI Main Output Secondary Input	PC00	—	USARTx.TX
PWM	PWM Output	PD02	—	TIMER0.CCx
INT	Hardware Interrupt	PB00	—	—
RX	UART Receive	PA08	—	USARTx.RX
TX	UART Transmit	PA04	—	USARTx.TX
SCL	I2C Clock	PB02	QWIIC_I2C_SCL	I2Cx.SCL
SDA	I2C Data	PB04	QWIIC_I2C_SDA	I2Cx.SDA

mikro-BUS Pin Name	mikroBUS Pin Function	Connection	Shared Feature	Suggested Peripheral Mapping
3V3	VCC 3.3V power	VMCU	MGM270S voltage domain	
5V	VCC 5V power	5V	Board USB voltage	
GND	Reference Ground	GND	Ground	

3.6.4 Qwiic Connector

The xGM270S Module Explorer Kit features a Qwiic connector compatible with Qwiic Connect System hardware. The Qwiic connector provides an easy way to expand the functionality of the xGM270S Module Explorer Kit with sensors, LCDs, and other peripherals over the I2C interface. The Qwiic connector is a 4-pin polarized JST connector, which ensures the cable is inserted the right way.

Qwiic Connect System hardware is daisy chain-able as long as each I2C device in the chain has a unique I2C address.

Note: The Qwiic I2C lines are shared with the on-board I2C sensors.

The Qwiic connector and its connections to Qwiic cables and the MGM270S are illustrated in the figure below.

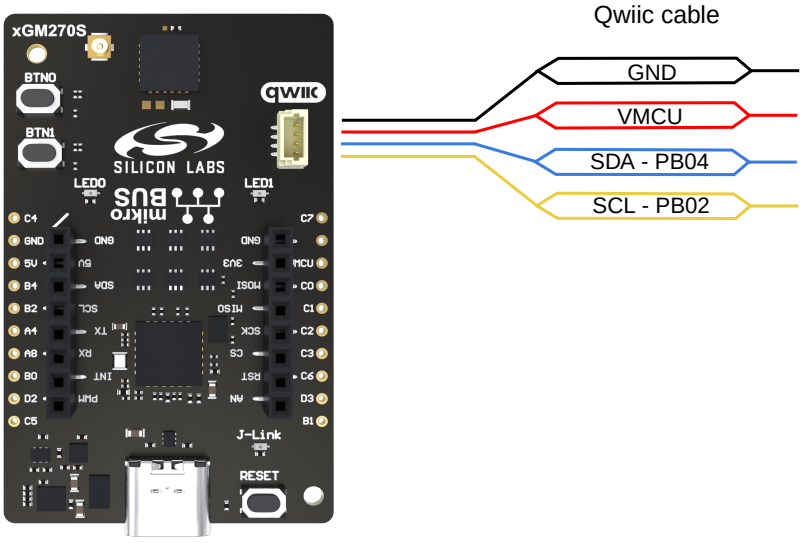

Figure 3.7. Qwiic Connector

The table below gives an overview of the Qwiic connections to the MGM270S.

Table 3.4. Qwiic Connector Pinout

Qwiic Pin	Connection	Shared Feature	Suggested Peripherial Mapping
Ground	GND	Ground	
3.3V	VMCU	MGM270S voltage domain	
SDA	PB04	MIKRO-BUS_I2C_SDA	I2Cx.SDA
SCL	PB02	MIKRO-BUS_I2C_SCL	I2Cx.SCL

3.6.5 Debug USB Type-C Connector

The debug USB port can be used for uploading code, debugging, and as a VCOM port. More information is available in section 4. Debugging.

4. Debugging

The xGM270S Module Explorer Kit contains an on-board SEGGER J-Link Debugger that interfaces to the target MGM270S using the Serial Wire Debug (SWD) interface. The debugger allows the user to download code and debug applications running in the target MGM270S. Additionally, it provides a VCOM port (VCOM) to the host computer that is connected to the target device's serial port for general purpose communication between the running application and the host computer. The PTI is also supported by the on-board debugger, which offers invaluable debug information about transmitted and received packets in wireless links. The on-board debugger is accessible through the USB Type-C connector.

4.1 On-board Debugger

This kit features a Simplicity Link Adapter running on an EFM32GG12 MCU and offers SEGGER J-Link debugging functions as well as VCOM port and PTI. The debugger is directly connected to the debug and VCOM pins of the target MGM270S.

When the debug USB cable is inserted, the on-board debugger is automatically activated and takes control of the debug and VCOM interfaces. This means that debug and communication will **not** work with an external debugger connected at the same time. The on-board LDO is also activated, providing power to the board.

4.2 Virtual COM Port

The VCOM port is a connection to a UART of the target MGM270S and allows serial data to be sent and received from the device. The on-board debugger presents this as a VCOM port on the host computer that shows up when the USB cable is inserted.

Data is transferred between the host computer and the debugger through the USB connection, which emulates a serial port using the USB Communication Device Class (CDC). From the debugger, the data is passed on to the target device through a physical UART connection.

The serial format is 115200 bps, 8 bits, no parity, and 1 stop bit by default.

Note: Changing the baud rate for the COM port on the PC side does not influence the UART baud rate between the debugger and the target device.

5. Schematics, Assembly Drawings, and BOM

Schematics, assembly drawings, and Bill of Materials (BOM) are available through Simplicity Studio when the kit documentation package has been installed. They are also available from the kit page on the Silicon Labs website: silabs.com.

6. Kit Revision History and Errata

6.1 Revision History

The kit revision can be found printed on the box label of the kit, as outlined in the figure below. The kit revision history is summarized in the table below.

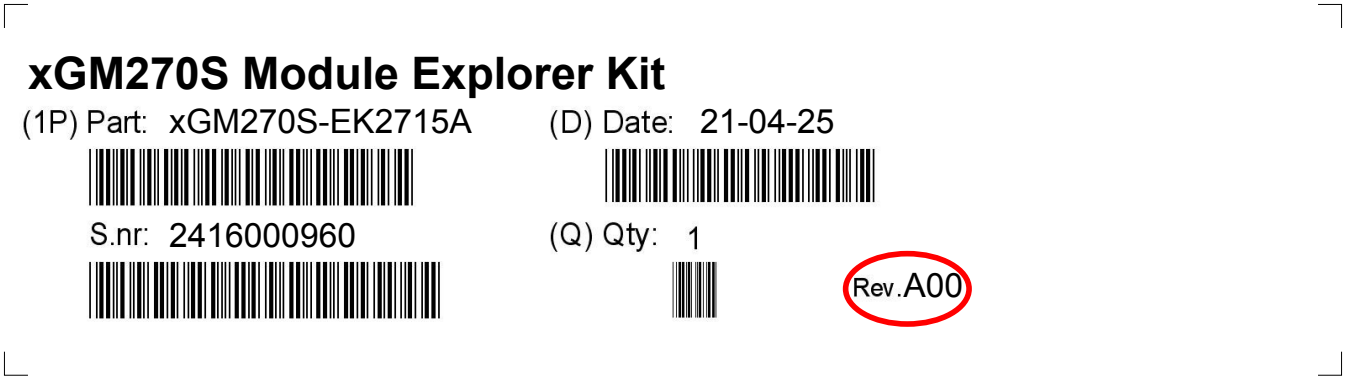

Figure 6.1. Revision Info

Table 6.1. Kit Revision History

Kit Revision	Released	Description
A00	9 September 2025	New kit introduction of xGM270S-EK2715A.

6.2 Errata

There are no known errata at present.

7. Board Revision History and Errata

7.1 Revision History

The board revision can be found laser printed on the board, and the board revision history is summarized in the following table.

Table 7.1. Board Revision History

Revision	Released	Description
A04	08 September 2025	Updated U1 OPN.
A03	05 September 2025	U1 OPN revised to "MGM270SC22SNA4".
A02	21 April 2025	U1 OPN revised to "MGM270SC22SNA3".
A01	6 February 2025	Initial release.

7.2 Errata

There are no known errata at present.

8. Document Revision History

Revision 1.1

September 2025

- Board revision updated.

Revision 1.0

July 2025

- Initial document release.

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