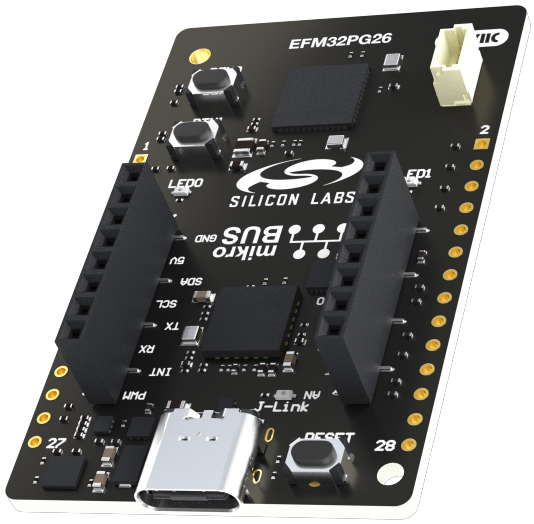
UG608: EFM32PG26 Explorer Kit User's Guide

The EFM32PG26 Explorer Kit is an ultra-low-cost, small form factor development and evaluation platform for the EFM32PG26 Pearl Gecko MCU.

The EFM32PG26 Explorer Kit is focused on rapid prototyping and concept creation of multi-purpose applications. It is designed around the EFM32PG26 MCU, which is an ideal device family for developing energy-friendly embedded applications.

The kit features a USB interface, an on-board SEGGER J-Link debugger, 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

- EFM32PG26 Pearl Gecko MCU (EFM32PG26B500F3200IM68-B)
- 32-bit ARM® Cortex®-M33 with 80 MHz maximum operating frequency
- 3200 kB flash and 512 kB RAM

KIT FEATURES

- 2x User LEDs and push buttons
- 28-pin 2.54 mm breakout pads
- mikroBUS™ socket
- Qwiic® connector
- SEGGER J-Link on-board debugger
- Virtual COM port
- USB-powered

SOFTWARE SUPPORT

- Simplicity Studio™

ORDERING INFORMATION

- PG26-EK2711A

Table of Contents

1. Introduction

The EFM32PG26 Explorer Kit has been designed to inspire customers to explore the Silicon Labs EFM32PG26 Pearl Gecko MCU. 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 EFM32PG26 Explorer Kit is easy using a USB Type-C cable and the on-board J-Link debugger. A USB virtual COM port provides a serial connection to the target application. The EFM32PG26 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 EFM32PG26 Explorer Kit by using the 28 breakout pads which present peripherals from the EFM32PG26 Pearl Gecko MCU such as I^2C, SPI, UART, and GPIOs. The mikroBUS socket allows inserting mikroBUS add-on boards which interface with the EFM32PG26 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 item is included in the box:

- 1x EFM32PG26 MCU Explorer Kit Board (BRD2711A)

1.2 Getting Started

Detailed instructions for how to get started with your new EFM32PG26 Explorer Kit can be found on the Silicon Labs web page: https://www.silabs.com/dev-tools

1.3 Hardware Content

The following key hardware elements are included on the EFM32PG26 Explorer Kit:

- EFM32PG26 Pearl Gecko MCU with 80 MHz operating frequency, 3200 kB flash, and 512 kB RAM
- Two LEDs and two push buttons
- On-board SEGGER J-Link debugger for easy programming and debugging, which includes a USB virtual COM port
- 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

EFM32PG26 Explorer Kit layout is shown below.

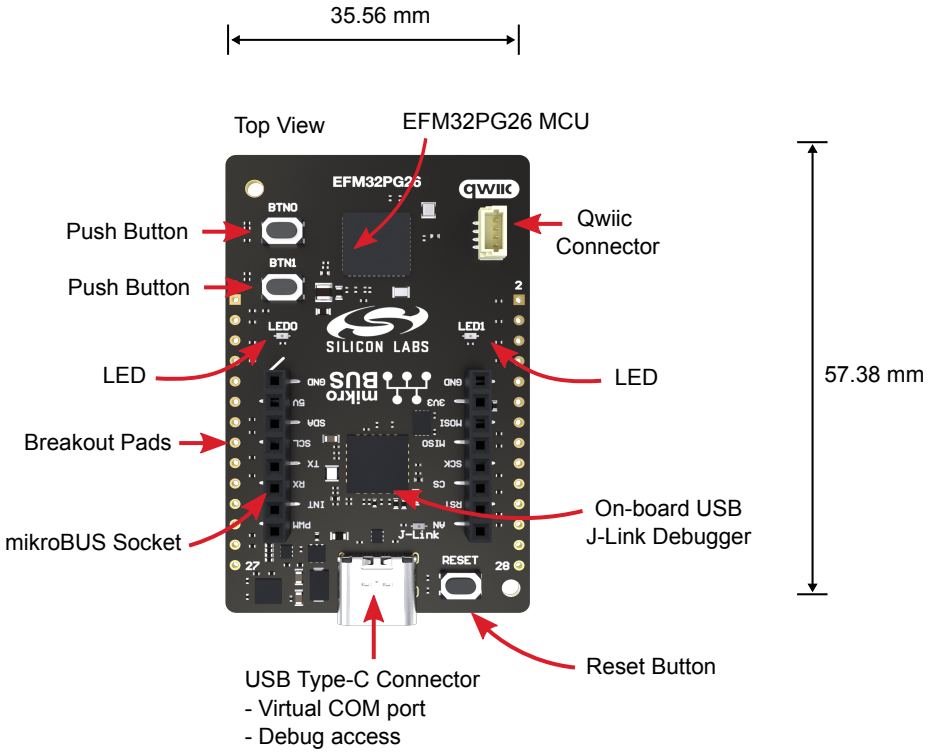


Figure 1.1. EFM32PG26 Explorer Kit Hardware Layout

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

2.2 Current Consumption

The operating current of the board greatly depends on the application and the amount of external hardware connected. The table below attempts to give some indication of typical current consumptions for the EFM32PG26 and the on-board debugger. Note that the numbers are taken from the datasheets for the devices. For a full overview of the conditions that apply for a specific number from a datasheet, the reader is encouraged to read the specific datasheet.

Table 2.2. Current Consumption

Parameter	Symbol	Condition	Typ	Unit
EFM32PG26 Current Consumption[1]	I_{EM4}	No BURTC, no LF oscillator	0.23	µA
	I_{EM2}	EM2 mode with 512 kB RAM, RTC running from LFXO (VREGVDD = 3.0 V. AVDD = DVDD = IOVDD = 1.8 V from DCDC)	5.0	µA
	I_{EM0}	EM0 mode with all peripherals disabled (VREGVDD = 3.0 V. AVDD = DVDD = IOVDD = 1.8 V from DCDC, VSCALE2, 80 MHz HFRCO, CPU running Prime from flash)	41.8	µA/MHz
On-board Debugger Sleep Current Consumption [2]	I_{DBG}	On-board debugger current consumption when USB cable is not inserted (EFM32GG12 EM4S mode current consumption)	80	nA

1 From EFM32PG26 data sheet
2 From EFM32GG12 data sheet

3. Hardware

The core of the EFM32PG26 Explorer Kit is the EFM32PG26 Pearl Gecko MCU. Refer to section 1.4 Kit Hardware Layout for placement and layout of the hardware components.

3.1 Block Diagram

An overview of the EFM32PG26 Explorer Kit is illustrated in the figure below.

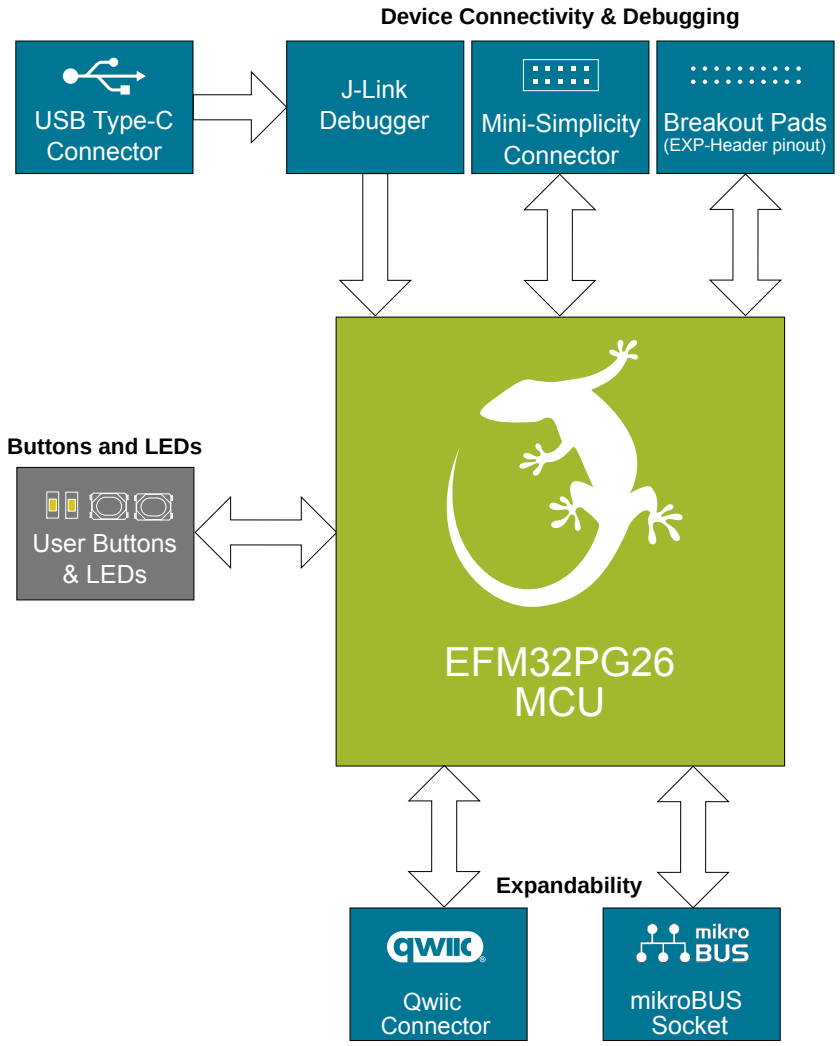


Figure 3.1. Kit Block Diagram

3.2 Power Supply

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

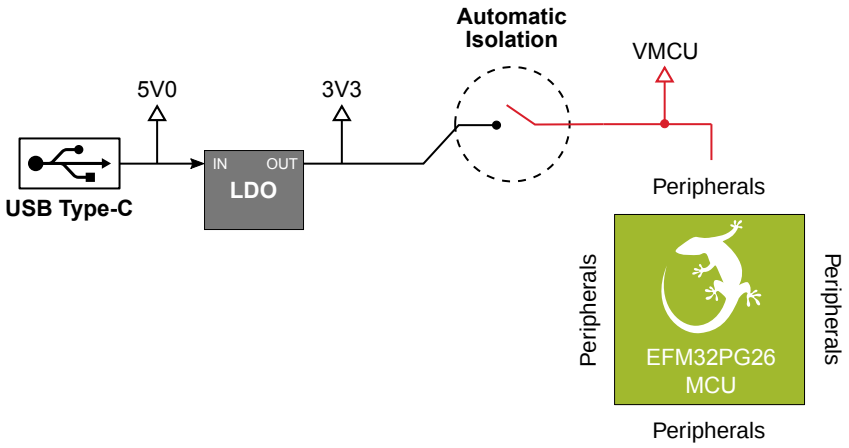


Figure 3.2. EFM32PG26 Explorer Kit Power Topology

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 EFM32PG26 Reset

The EFM32PG26 can be reset by a few different sources:

- A user pressing the RESET button.
- The on-board debugger pulling the #RESET pin low.

3.4 Push Button and LED

The kit has two user push buttons, marked BTN0 and BTN1, that are connected to GPIOs on the EFM32PG26. The buttons are connected to pin PB00 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 EFM32PG26. The LEDs are connected to pin PC08 and PC09, respectively, in an active-high configuration.

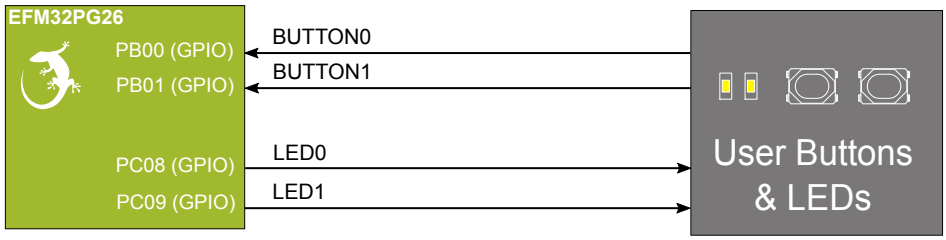


Figure 3.3. Buttons and LEDs

3.5 On-board Debugger

The EFM32PG26 Explorer Kit contains a microcontroller separate from the EFM32PG26 Pearl Gecko MCU that provides the user with an on-board J-Link debugger through the USB Type-C port. This microcontroller is referred to as the "on-board debugger", 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 (EFM32GG12 data sheet number).

In addition to providing code download and debug features, the on-board debugger also presents a virtual COM port for general purpose application serial data transfer.

The figure below shows the connections between the target EFM32PG26 device and the on-board debugger.

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

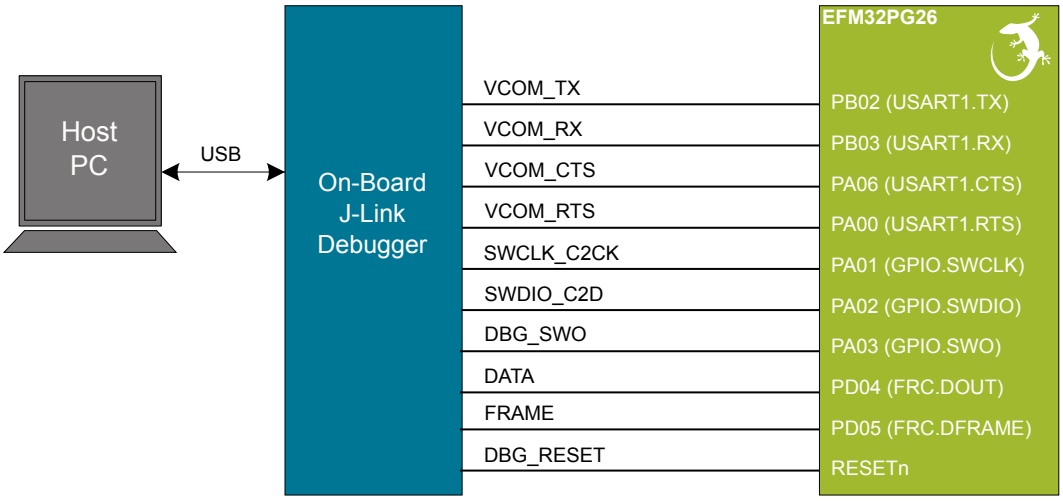


Figure 3.4. On-Board Debugger Connections

Note: PTI pins are not supported. Refer to section 7.2 Errata for more details.

3.6 Connectors

The EFM32PG26 Explorer Kit features a USB Type-C connector, 28 breakout pads, a mikroBUS connector for connecting mikroBUS add-on boards, and a Qwiic connector for connecting Qwiic Connect System hardware. The connectors are placed on the top side of the board, and their placement and pinout are shown in the figure below. For additional information on the connectors, see the following sub chapters.

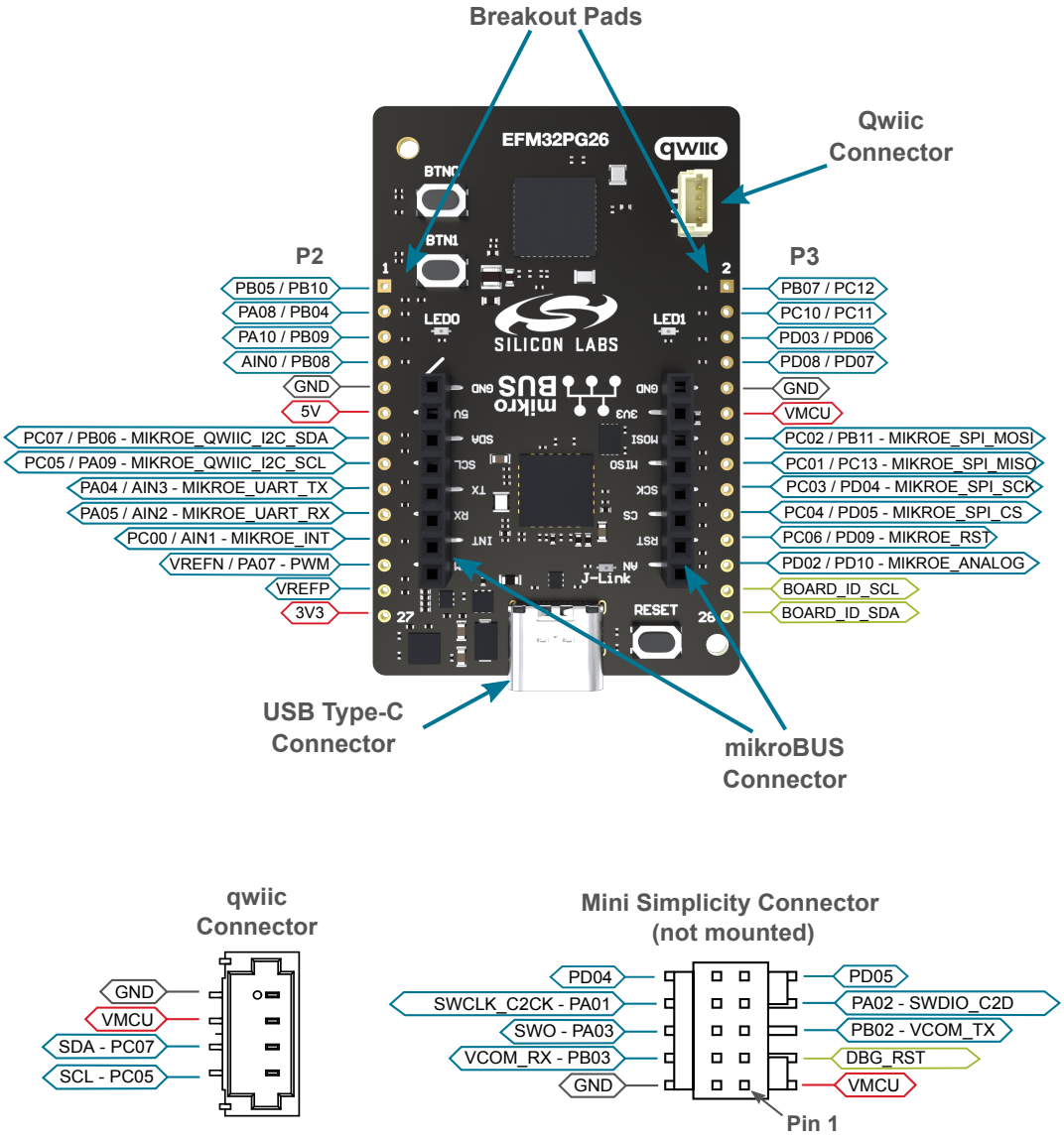


Figure 3.5. EFM32PG26 Explorer Kit Connectors

3.6.1 Breakout Pads

Twenty-eight breakout pads are provided and allow connection of external peripherals. There are 14 pads on the left side of the board, and 14 pads on the right. The breakout pads contain a number of I/O pins that can be used with most of the EFM32PG26 Pearl Gecko MCU's features. Additionally, the VMCU (main board power rail), 3V3 (LDO regulator output), and 5V power rails are also exposed on the pads.

The pin-routing on the Pearl Gecko MCU 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 EFM32PG26 Explorer Kit. The table below includes an overview of the breakout pads and functionality that is shared with the kit.

Note: To use the alternate connection mentioned, the corresponding resistor needs to be mounted, and the existing resistor for the same breakout must be unmounted.

Table 3.1. Breakout Pads Pinout

Pin	Connection	Shared Feature	Peripheral Mapping	Alternate Connection
Left-side Breakout Pins				
1	PB05	—	GPIO	PB10
3	PA08	—	GPIO	PB04
5	PA10	—	GPIO	PB09
7	AIN0	—	AIN / GPIO	PB08
9	GND	Ground		
11	5V	Board USB voltage		
13	PC07	QWIIC_I2C_SDA, MIKROE_I2C_SDA	I2C_SDA / GPIO	PB06
15	PC05	QWIIC_I2C_SCL, MIKROE_I2C_SCL	I2C_SCL / GPIO	PA09
17	PA04	MIKROE_TX	UART_TX / GPIO	AIN3
19	PA05	MIKROE_RX	UART_RX / GPIO	AIN2
21	PC00	MIKROE_INT	EXT_INT / GPIO	AIN1
23	VREFN	MIKROE_PWM	ADC VREF Negative Input / PWM	PA07
25	VREFP	—	ADC VREF Positive Input	—
27	3V3	Board controller supply		
Right-side Breakout Pins				
2	PB07	—	GPIO	PC12
4	PC10	—	GPIO	PC11
6	PD03	—	GPIO	PD06
8	PD08	—	GPIO	PD07
10	GND	Ground		
12	VMCU	EFM32PG26 voltage domain		
14	PC02	MIKROE_MOSI	SPI_MOSI / AIN	PB11
16	PC01	MIKROE_MISO	SPI_MISO / AIN	PC13
18	PC03	MIKROE_SCK	SPI_SCLK	PD04
20	PC04	MIKROE_CS	SPI_CS	PD05

Pin	Connection	Shared Feature	Peripheral Mapping	Alternate Connection
22	PC06	MIKROE_RST	RST / GPIO	PD09
24	PD02	MIKROE_AN	AIN / GPIO	PD10
26	BOARD_ID_SCL	Connected to Board Controller for identification of add-on boards.		
28	BOARD_ID_SDA	Connected to Board Controller for identification of add-on boards.		

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 EFM32PG26.

Table 3.2. Mini Simplicity Connector Pin Descriptions

Pin number	Function	Connection	Description
1	AEM	VMCU	Target voltage on the debugged application. May be supplied and monitored by the AEM on an external debugger.
2	GND	GND	Ground
3	RST	RESET	EFM32PG26 reset
4	VCOM_RX	PB03	Virtual COM Rx
5	VCOM_TX	PB02	Virtual COM Tx
6	SWO	PA03	Serial Wire Output
7	SWDIO	PA02	Serial Wire Data
8	SWCLK	PA01	Serial Wire Clock
9	PTI_FRAME	PD05	Packet Trace Frame
10	PTI_DATA	PD04	Packet Trace Data

Note: Since the EFM32PG26 Pearl Gecko MCU is designed primarily for low-power applications without integrated wireless capabilities, it does not support PTI functionality.

3.6.3 MikroBUS Socket

The EFM32PG26 Explorer Kit features a mikroBUS socket compatible with mikroBUS add-on boards. 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 EFM32PG26 through UART, SPI, or I^2C. Several GPIOs are exposed on the mikroBUS socket. 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 EFM32PG26 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.

When inserting a mikroBUS add-on board, refer to the orientation notch on the EFM32PG26 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.

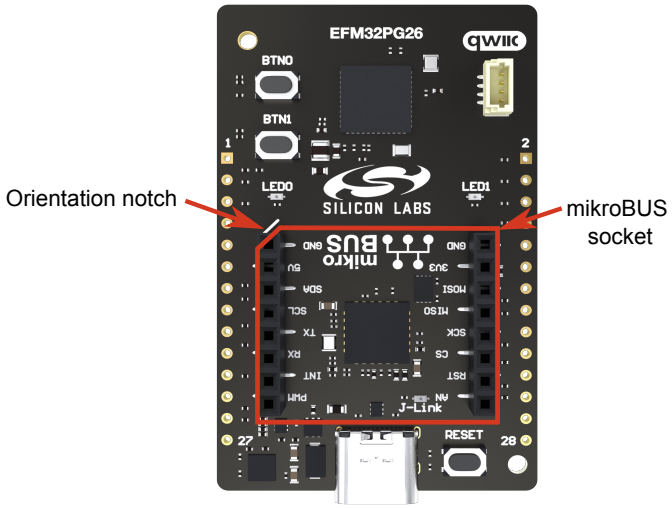


Figure 3.6. mikroBUS Add-on Board Orientation

The table below gives an overview of the mikroBUS socket pin connections to the EFM32PG26.

Table 3.3. mikroBUS Socket Pinout

mikro-BUS Pin Name	mikroBUS Pin Function	Connection	Shared Feature	Suggested Peripheral Mapping
AN	Analog	PD02	—	IADC0
RST	Reset	PC06	—	—
CS	SPI Chip Select	PC04	—	USARTx.CS
SCK	SPI Clock	PC03	—	USARTx.CLK
MISO	SPI Main Input Secondary Output	PC01	—	USARTx.RX
MOSI	SPI Main Output Secondary Input	PC02	—	USARTx.TX
PWM	PWM Output	PA07	—	TIMER0.CCx
INT	Hardware Interrupt	PC00	—	—
RX	UART Receive	PA05	—	USARTx.RX
TX	UART Transmit	PA04	—	USARTx.TX
SCL	I2C Clock	PC05	QWIIC_I2C_SCL	I2Cx.SCL
SDA	I2C Data	PC07	QWIIC_I2C_SDA	I2Cx.SDA

mikro-BUS Pin Name	mikroBUS Pin Function	Connection	Shared Feature	Suggested Peripheral Mapping
3V3	VCC 3.3V power	VMCU	EFM32PG26 voltage domain	
5V	VCC 5V power	5V	Board USB voltage	
GND	Reference Ground	GND	Ground	

3.6.4 Qwiic Connector

The EFM32PG26 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 EFM32PG26 Explorer Kit with sensors, LCDs, and other peripherals over the I^2C 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 I^2C device in the chain has a unique I^2C address.

Note: The Qwiic I^2C lines are shared with the on-board I^2C sensors.

The Qwiic connector and its connections to Qwiic cables and the EFM32PG26 are illustrated in the figure below.

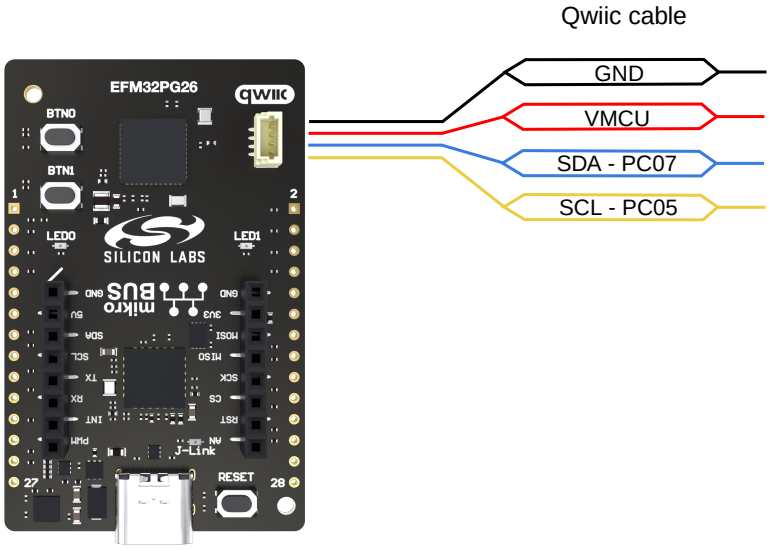


Figure 3.7. Qwiic Connector

The table below gives an overview of the Qwiic connections to the EFM32PG26.

Table 3.4. Qwiic Connector Pinout

Qwiic Pin	Connection	Shared Feature	Suggested Peripherial Mapping
Ground	GND	Ground	
3.3V	VMCU	EFM32PG26 voltage domain	
SDA	PC07	MIKROE_I2C_SDA	I2Cx.SDA
SCL	PC05	MIKROE_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 Virtual COM port. More information is available in section 4. Debugging.

4. Debugging

The EFM32PG26 Explorer Kit contains an on-board SEGGER J-Link Debugger that interfaces to the target EFM32PG26 using the Serial Wire Debug (SWD) interface. The debugger allows the user to download code and debug applications running in the target EFM32PG26. Additionally, it provides a virtual COM 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 on-board debugger is accessible through the USB Type-C connector.

4.1 On-board Debugger

The on-board debugger is a SEGGER J-Link debugger running on an EFM32 Giant Gecko. The debugger is directly connected to the debug and VCOM pins of the target SiWG917.

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 virtual COM port is a connection to a UART of the target EFM32PG26 and allows serial data to be sent and received from the device. The on-board debugger presents this as a virtual COM 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	18 November 2024	New kit introduction of PG26-EK2711A.

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
A02	13 November 2024	Initial production release.

7.2 Errata

Table 7.2. Board Errata

Board Revision	Problem	Description
A02	PTI pins are not supported	PTI pins are not supported for the 'EFM32PG26B500F3200IM68-B.' PTI connectivity will be removed from the design in future revisions.

8. Document Revision History

Revision 1.0

January 2025

- Initial document release.

Simplicity Studio

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