

SGW2828-EVK Evaluation Kit

User Manual

May 2023 V1.1

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1. Introduction

Supporting USB2.0, UART, I2C and J-Link SWD debug interfaces, the SGW2828 is controlled via AT commands and plugs directly to Arduino, making it easy to enable LoRa or LoRaWAN® connectivity on both Windows and Android operating systems.

The SGW2828-EVK is able to support proprietary networks at 30dBm transmission power without the need for an external power amplifier, enabling long-range and wall penetration abilities. Tailored for the US market at an operating frequency of 915MHz, with both FCC and IC certification, the EVK can support various IoT applications:

- Smart agriculture
- Smart cities
- Smart healthcare
- Smart industrial control
- Smart supply chain and logistics



Figure 1: SGW2828-EVK Evaluation Kit

2. SGW2828-EVK Evaluation Kit

Hardware Specifications	
LoRa Module	SGW2828-01A with 30dBm Tx power for 915MHz band
LoRa Antenna	External SMA antenna
I2C, UART, GPIO, USB Interface	On board interface
J-link SWD Debug Interface	Firmware download
Arduino UNO connection	Standard header for connection
Power Supply	5V/micro-USB
Dimension	58.6mm x 53.3mm
Accessories	
Antenna	+2dBm SMA antenna
USB Cable	Yes

3. SGW2828-EVK Hardware

a. Block Diagram

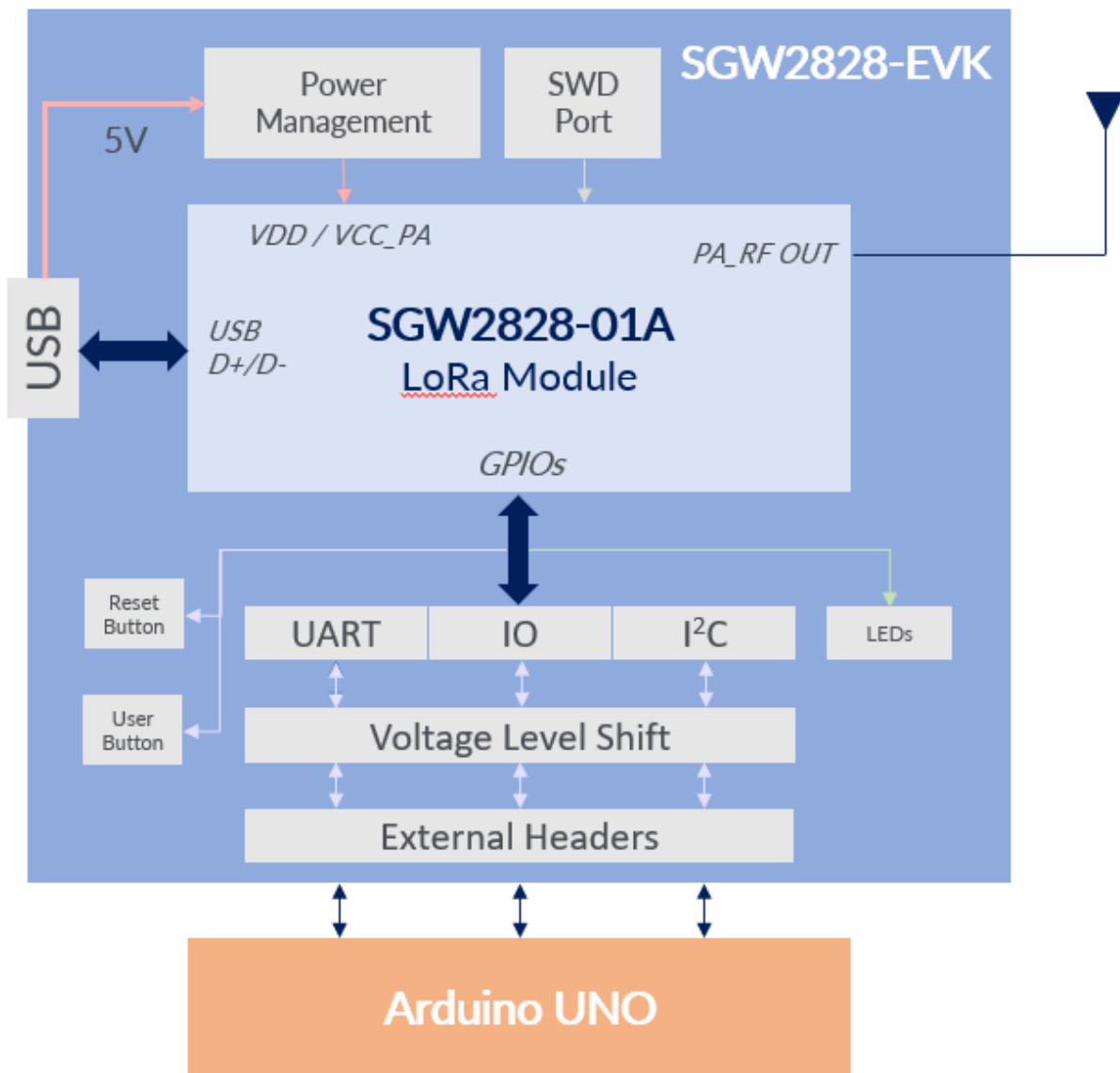


Figure 2: SGW2828-EVK Block Diagram

b. SGW2828-EVK Interface

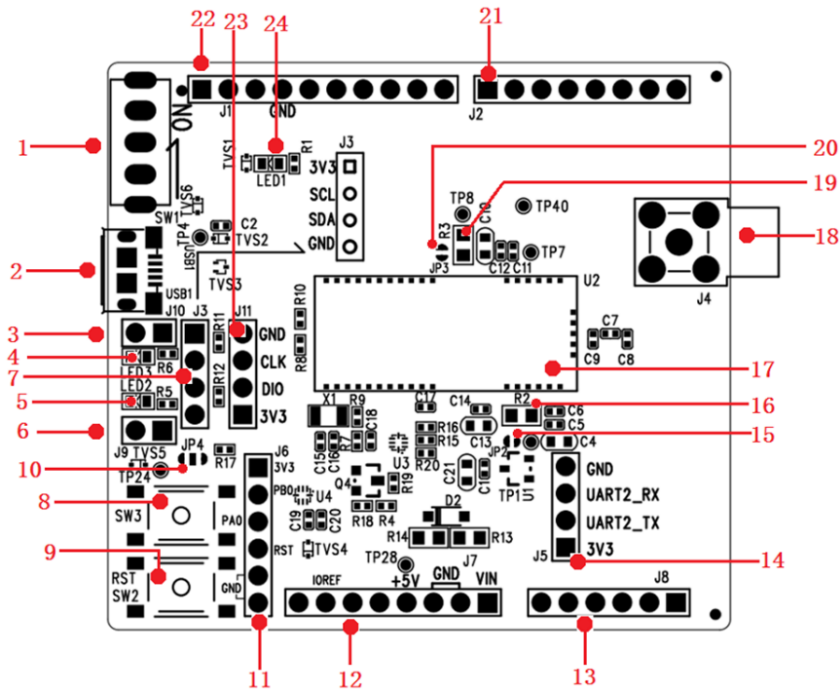








Figure 3: SGW2828-EVK Interface

Pin	Location	Description
1	SGW1	Power ON/OFF
2	USB1	Power supply, USB communication port
3	J10	Option jumper. If LED3 is used, J10 need to be shorted. At the same time, there should be no external equipment on the J3; If I ² C_SDA is used J10 need to be opened.
4	LED3	User LED
5	LED2	User LED
6	J9	Option jumper. LED2 is available if it's short. At the same time, there should be no external connection on the J6.2pin; IO PBO/ADC8 is available if it's open.
7	J3	I ² C interface. When I ² C is used, J10 needs to be opened.
8	SW3	User key
9	SW2	Reset key
10	JP4	 SW3 is available (default)  IO PA0/ADC0 is available (J6.3 pin)
11	J6	Extended IO port
12	J7	Connect with Arduino UNO
13	J8	Connect with Arduino UNO
14	J5	UART interface
15	JP2	 The current consumption on LORA_3V3 is measurable by R2 (Default)  Disable R2
16	R2	Use to measure the current consumption on LORA_3V3
17	U2	LoRa module SW2828-01A
18	J4	SMA RF connector
19	R3	Use to measure the current consumption on LORA_5V
20	JP3	 The current consumption on LORA_5V is measurable by R3 (Default)  Disable R3
21	J2	Connect with Arduino UNO
22	J1	Connect with Arduino UNO
23	J11	J-Link SWD debug interface
24	LED1	Power indicator

c. SGW2828-EVK Circuit

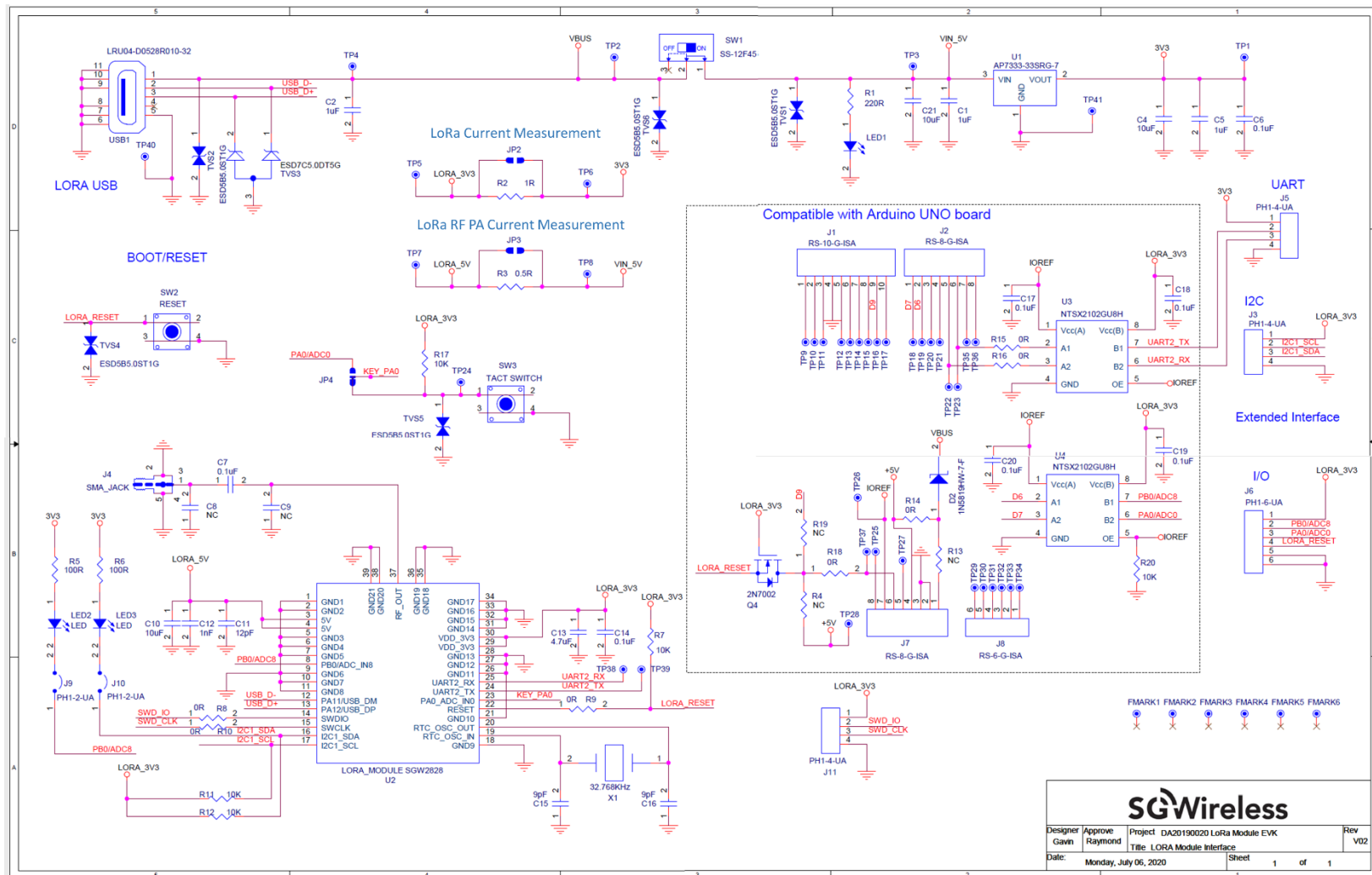


Figure 4: SGW2828-EVK Circuit

d. Power

The SGW2828-EVK can be powered through two sources:

1. SGW2828-EVK USB connector (**USB1**)
2. External power supply from header **J7.4** (for target application with Arduino UNO system)

With the power key (**Switch 1**) ON, the red LED (**LED1**) will turn on. The voltage will be regulated from 5V DC to 3.3V through LDO (**U1**) and supplied to the digital circuitry of the EVK.

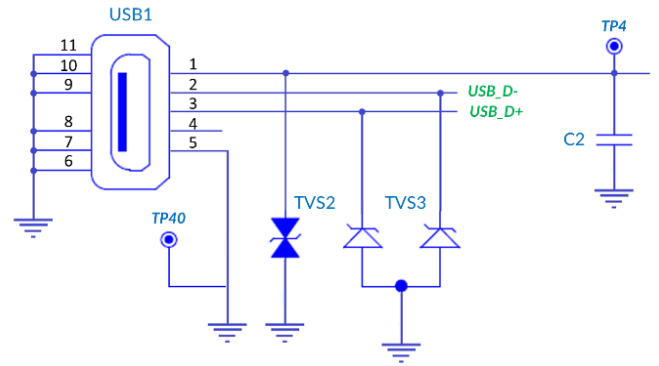


Figure 5: SGW2828-EVK Power Supply

e. Reset and User-defined Buttons

The SGW2828-EVK has two on-board buttons – the reset button (**SW2**) and user-defined button (**SW3**).

1. The reset button (**SW2**) is connected to the RESET pin of the SGW2828 LoRa Module.
2. The user-defined button (**SW3**) is connected to the PA0/ADC0 of the SGW2828 LoRa Module.

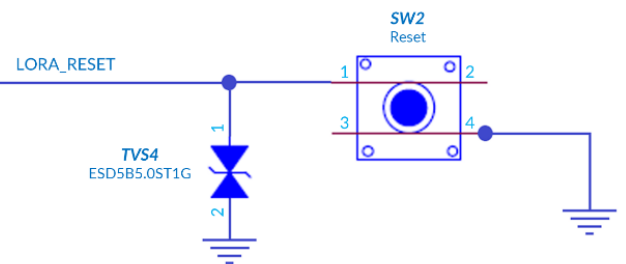


Figure 6: SGW2828-EVK Reset Button

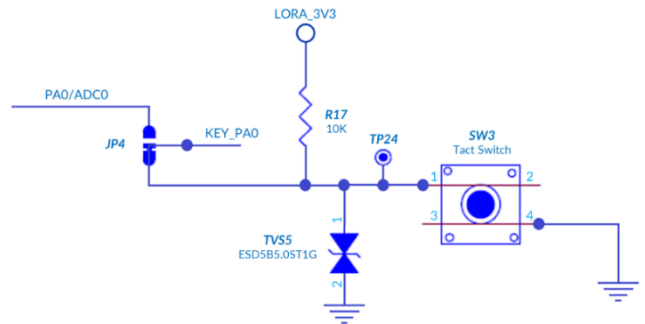


Figure 7: SGW2828-EVK User-defined Button

f. Configurable LEDs

There are two green LEDs on the SGW2828-EVK. The user inputs AT commands to control LED2/LED3. It is necessary to short **J9** and **J10** during LED operations.

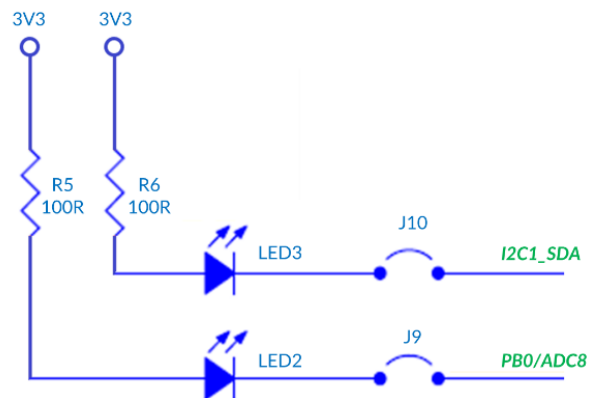


Figure 8: SGW2828-EVK LEDs

g. I2C Operation

The user can connect an I2C device at **J3** position, and operate it through AT commands. Jumper **J10** must be removed during this operation.

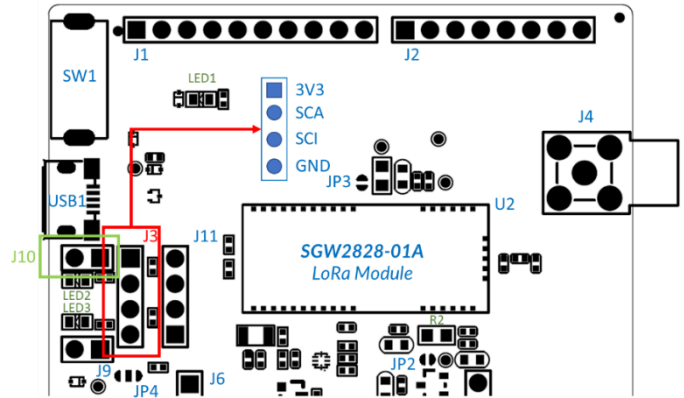


Figure 9: SGW2828-EVK I2C Operation

h. UART Serial Communication

The user can send AT commands through the UART port of the SGW2828 LoRa module (header **J5**) with the below pin assignment. The UART operating voltage is at 3.3V.

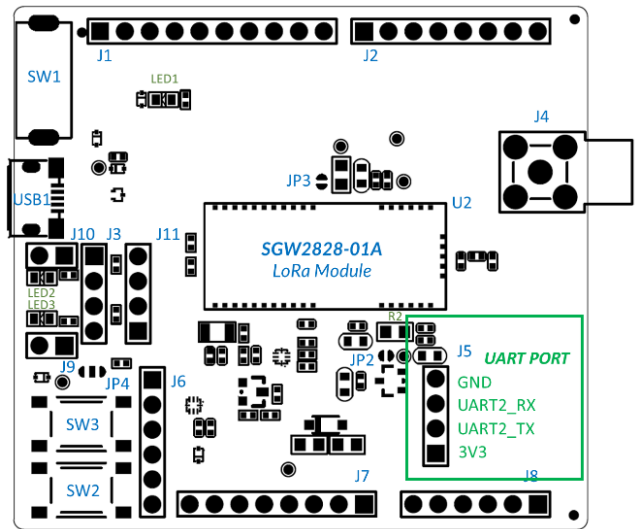
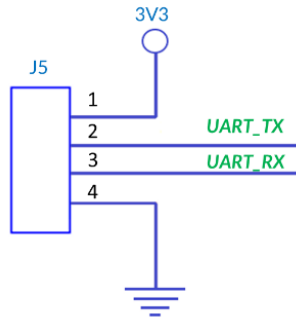


Figure 10: SGW2828-EVK UART

i. Current Measurement Headers

The SGW2828 LoRa Module is powered by LoRa_5V and LoRa_3V3. LoRa_5V from USB supplies power to the embedded RF PA, and its power consumption can be calculated by measuring the voltage at the precision resistor **R3** (Figure 11).

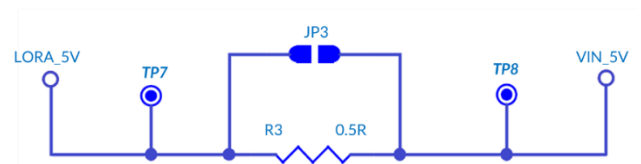


Figure 11: LoRa RF PA Current Measurement

LoRa_3V3 from LDO supplies power to the embedded MCU, and its power consumption can be calculated by measuring the voltage at the precision resistor **R2** (Figure 12).

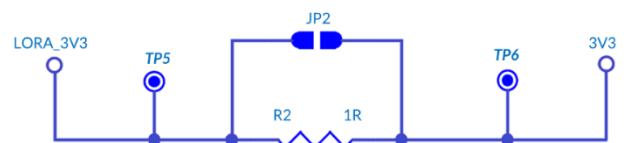


Figure 12: LoRa Current Measurement

The user can use AT commands to control the LoRa Module and evaluate its power consumption with the above methods.

j. External J-Link Programming and Debug Interface

For the embedded MCU in the SGW2828 LoRa Module, firmware programming and debugging is done via the external J-Link interface at header **J11**. The interface is implemented by using 1 x 4 2.54mm pitch 4-pin header.

To ensure the proper use of external J-Link connection, the external device must be connected to the following pins:

- SWD_IO, SWD_CLK
- Connect power pin from SWG2828 LoRa Module

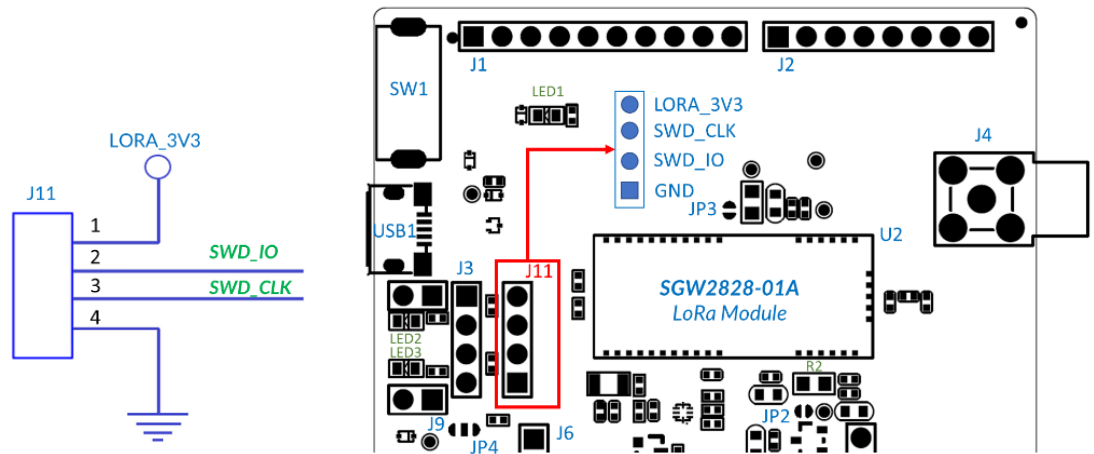


Figure 13: SGW2828-EVK J-Link Programming and Debug Interface

4. Operation Guide

a. MCU Program Download with J-Link Program Download

1. Connect the J11 on SGW2828-EVK to your PC using a J-Link kit (Figure 14).



Figure 14: SGW2828-EVK to PC Connection via J-Link Kit

2. Open the SEGGER J-Flash software. Create a new project with settings (Figure 15).
3. Connect target board: Target=>Connect.
4. Open a data file (*.hex): File=>Open data file.....
5. Download to SGW2828-EVK: Target=>Production Programming.

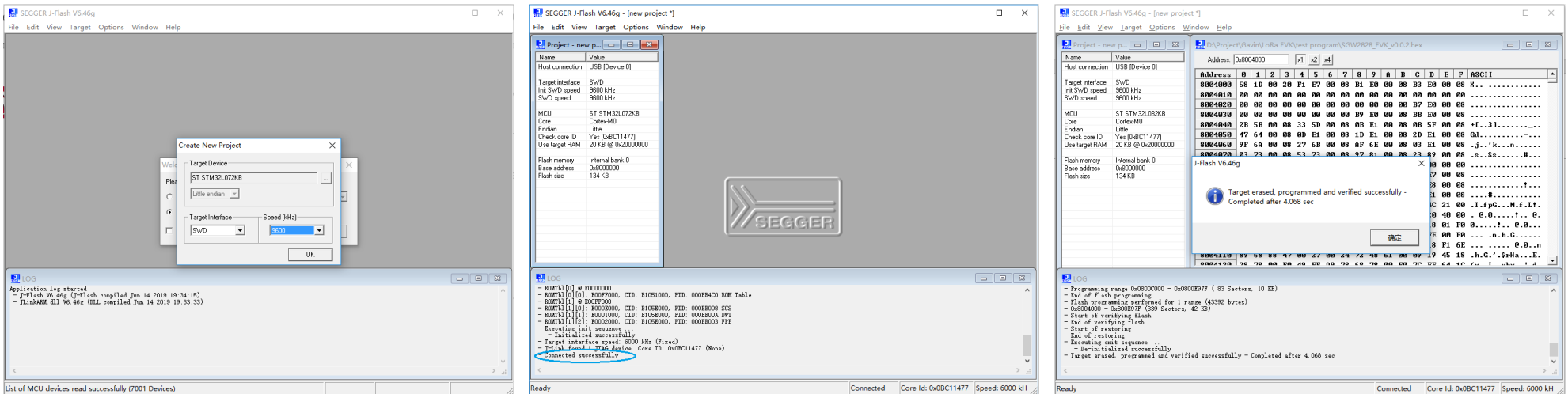


Figure 15: SGW2828-EVK MCU Program Download

b. SGW2828-EVK Control by AT Command through USB Port

1. Connect the SGW2828-EVK to the PC USB port with the USB cable. Switch SW1 on.
2. Open the serial debugging tool or any serial terminal program for AT Command operation (Baud set to 115,200bps).

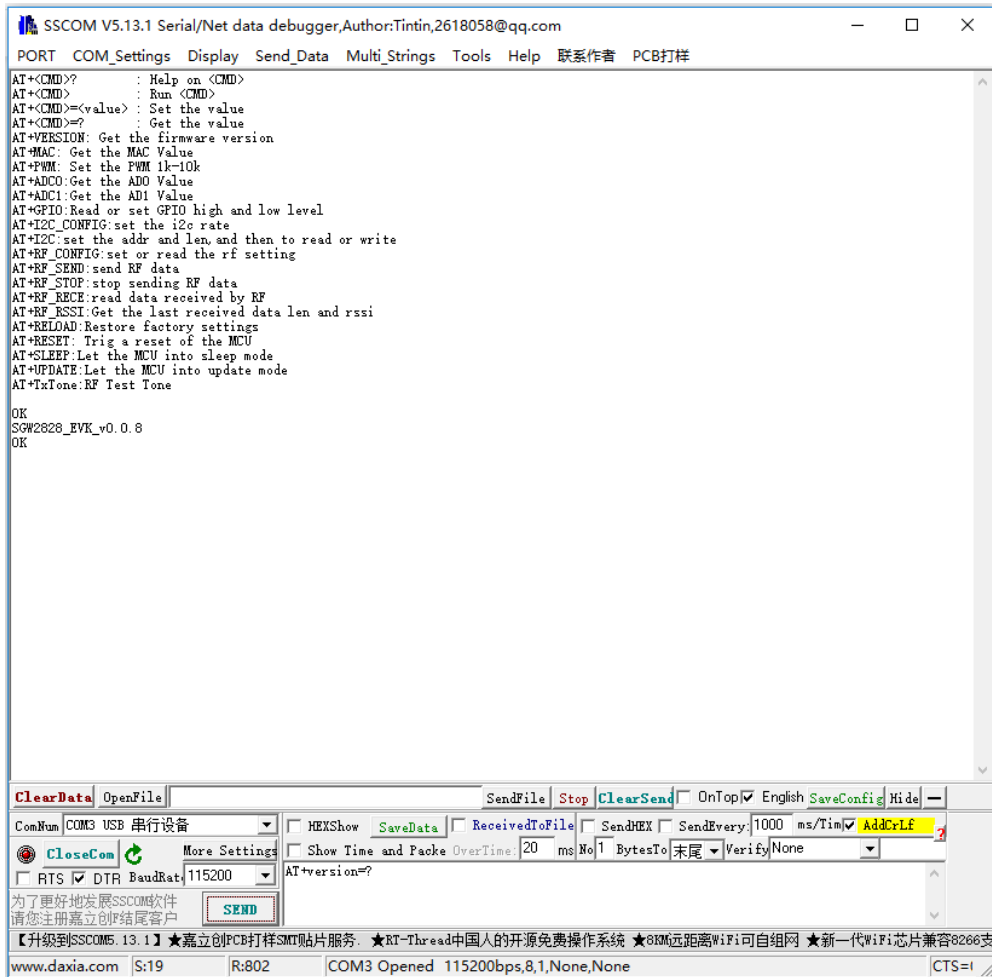


Figure 16: SGW2828-EVK Control by AT Command

c. SGW2828-EVK Control by AT Command through EVK UART

1. Connect the SGW2828-EVK to PC through the FT-232 UART/USB module (Figure 17).
2. Open the serial debugging tool for AT Command operation (Baud set to 4,800bps).



Figure 17: SGW2828-EVK to PC Connection via EVK UART

d. Development with Arduino

The SGW2828-EVK plugs directly to Arduino UNO for development of LoRa-based projects.

1. Connect the SGW2828-EVK to Arduino UNO (Figure 18).
2. Configure the Arduino UNO serial port per below table.

- | Arduino UNO | SGW2828-EVK |
|-------------|-------------|
| D2 | UART_TX |
| D3 | UART_RX |
| D6 | PB0 |
| D7 | PA0 |
| D9 | LoRa_RESET |

- Configure D2 and D3 as serial ports RX and TX respectively.
- Set the Arduino UNO baud to 4,800bps.
- The compilation reference code is provided below.

```
//uno code
#include<SoftwareSerial.h>
SoftwareSerial softSerial(2,3);//rx,tx
String device_B_String="";
Int SoftNum;
void setup() {
  // put your setup code here, to run once:
  softSerial.begin(4800);//
  softSerial.listen();
}

void loop() {
  // put your main code here, to run repeatedly:

  if(softSerial.available(>0)
  {
    device_B_String+=(char)softSerial.read();
    if(softSerial.peek()!='\n')
    {
      SoftNum++;
    }
  }
}
```



Figure 18: SGW2828-EVK and Arduino UNO Connection

5. Environment and Support

a. Life Support Applications

SG Wireless products may not be used in any life critical equipment, systems or applications where failure of such equipment, system or application would cause serious bodily injury or death. SG Wireless customers will fully indemnify SG Wireless and its representatives against any damages, costs, losses and/or liabilities arising out of customer's non-compliance.

b. RoHS and REACH Statement

The SG Wireless module and product meet the requirement of Directive 2015/863/EU of the European Parliament and the Council on the Restriction of Hazardous Substances (RoHS 2) in electrical and electronic equipment. It also meets the requirements of Regulation (EC) No 1907/2006 of Registration, Evaluation, Authorization, and Restriction of Chemicals. The SG Wireless module and product does not contain any of the candidate list of substances of very high concern for authorization.

6. Related Documents and Useful Links

1. SG Wireless SGW2828-01A LoRa Module: <https://sgwireless.com/product/SGW2828>.
2. Semtech SX1276 Documentation: <https://www.semtech.com/products/wireless-rf/lora-transceivers/sx1276>
3. SG Wireless SGW2828 LoRa Module AT Command User Manual: <https://www.sgwireless.com/uploads/product/files/USGA5.03-V2.0%20SGW2828%20LoRa%20Module%20AT%20Command%20User%20Manual.pdf>
4. SG Wireless SGW2828-EVK LoRaWAN Connection on TTN Application Note: [https://www.sgwireless.com/uploads/product/files/APPA6.05-V1.0%20SGW2828-EVK%20LoRaWAN%20Connection%20on%20The%20Things%20Network%20\(TTN\).pdf](https://www.sgwireless.com/uploads/product/files/APPA6.05-V1.0%20SGW2828-EVK%20LoRaWAN%20Connection%20on%20The%20Things%20Network%20(TTN).pdf)
5. Segger J-Link Download: <https://www.segger.com/downloads/jlink/>

Revision History

Revised	Version	Description
6-Oct-2020	1.0	Initial document release
5-May-2023	1.1	Document overview update

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