



SGW2828 LoRa Module

Manual

Version 1.0

## 1. Introduction

The SGW2828 is a pre-certified SoM enables LoRa connectivity for portable and extremely low power embedded systems. SGW2828 integrates Semtech SX1276 long range, low power transceiver, RF power amplifier and high performance MCU from STMicroelectronics. With a maximum of +30dBm Tx power and high sensitivity, the SGW2828 supports a wide range of sensors and ultra-long range spread spectrum communication between devices. This can be easily applicable to popular development platforms to facilitate the building of smart devices fast at optimized cost.

## 2. Features

- Complete LoRa solution
- Semtech SX1276 RF-front-end transceiver
- STMicroelectronics MCU STM32L072KBU6
- Frequency range: 902-928MHz (US)
- High sensitivity and Ultra long range: >10 km
- Programmable bit rate: up to 300kbps
- Standard UART/I2C/USB interface for external connectivity
- Easy to use AT-command interface over UART
- Operating temperature: -40°C to +85°C
- Mechanical Dimension: 24.8mm x 10.8mm x 2.6mm (without antenna and connector)

### 2.1. Applications

- Smart Agriculture
- Smart Buildings & Smart Cities
- Smart Healthcare
- Smart Industrial Control
- Smart Logistics & Supply Chain Management

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### 3. Ordering Information

Part No	Description
SGW2828-01A	SGW2828 LoRa +30dBm Module – NA version (915 MHz)
SGW2828–EVK	SGW2828 LoRa +30dBm Module Evaluation Kit

Table 1. *Ordering Part Number*

## 4. Pin Description

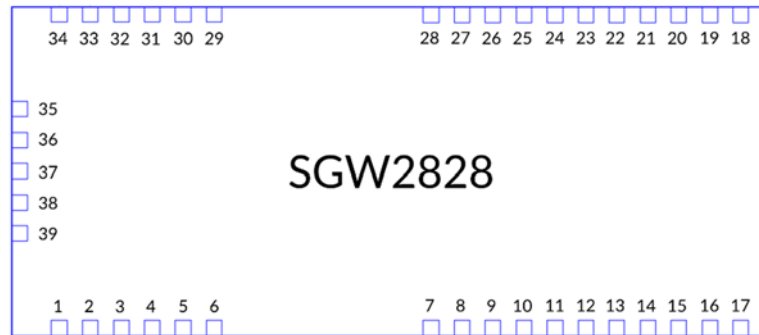


Figure 2. SGW2828 Pin Out (Top View)

Pin Number	Pin Name	Type	Description
8	PB0	Digital I/O, Analog Input	General purpose I/O, ADC_IN
12	USB-D-	Digital I/O	General purpose I/O, USB-Data-
13	USB-D+	Digital I/O	General purpose I/O, USB-Data+
14	SWDIO	Digital I/O	Serial wire debug data
15	SWDCLK	In	Serial wire debug clock input
16	I2C_SDA	Digital I/O	General purpose I/O
17	I2C_SCL	Digital I/O	General purpose I/O
19	OSC_IN	Analog Input	
20	OSC_OUT	Analog Output	
22	RESET	In	
23	PA0	Digital I/O, Analog Input	General purpose I/O, ADC_IN0
24	UART_TX	Digital Output	UART output TX signal
25	UART_RX	Digital Input	UART input RX signal
37	RF_OUT	RF connection	
3,4	VDDH	Power	RF PA Power Supply, 5V
29,30	VDD	Power	+3.3V Power supply
1, 2, 5-7, 9-11, 18, 21, 26-28, 31-36, 38-39	GND	Power	Ground signal

Table 1. SGW2828 Pin Description

## 5. Electrical Specifications

### 5.1. Absolute Maximum Ratings

Symbol	Parameter	Min.	Max.	Unit
VDD <sub>max</sub>	Voltage on VDD supply pin	-0.3	3.9	V
VDDH <sub>max</sub>	Voltage on VDDH supply pin	-0.3	5.8	V
VIO <sub>max</sub>	Voltage on GPIO pin (VCC ≤ 3.6 V)	-0.3	VCC+0.3 V	V
T <sub>storage</sub>	Storage Temperature Range	-40	125	°C

Table 2. Absolute Maximum Ratings

### 5.2. Operating Conditions

Symbol	Parameter	Min.	Typ.	Max.	Unit
VDD	VCC Operating supply voltage	2.5	3.0	3.6	V
VDDH	VCCH Operating supply voltage	2.5	3.7	5.5	V
V <sub>IH</sub>	Input High Voltage	0.7 x V <sub>CC</sub>		V <sub>CC</sub>	V
V <sub>IL</sub>	Input Low Voltage	V <sub>SS</sub>		0.3 x V <sub>CC</sub>	V
V <sub>OH</sub>	Output High Voltage	V <sub>CC</sub> - 0.4		V <sub>CC</sub>	V
V <sub>OL</sub>	Output High Voltage	V <sub>SS</sub>		V <sub>SS</sub> + 0.4	V
T <sub>Ambient</sub>	Operating Temperature Range	-40		85	°C

Table 3. Operating Conditions

## 6. Mechanical Dimension



Figure 3. SGW2828 Mechanical Information

### 7. Recommended PCB Landing Pattern & Pad Locations

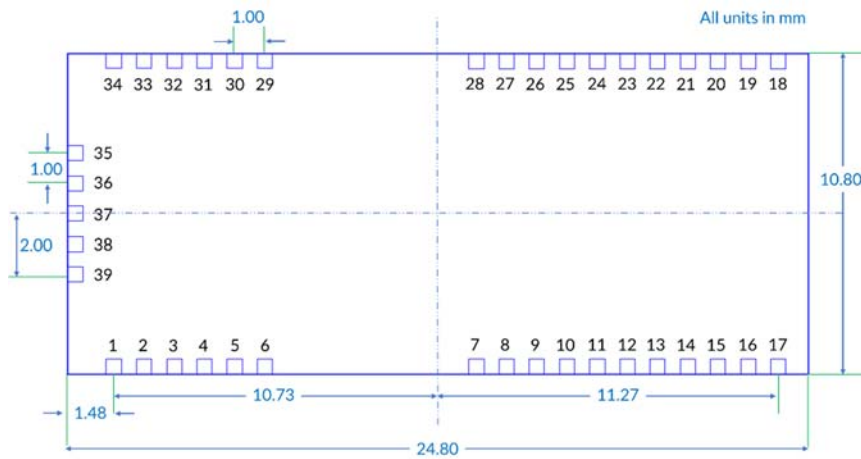


Figure 4. SGW2828 Dimension (Top View)

### 8. Module Marking



Figure 5. SGW2828 Module Label

## 9. Soldering Temperature-Time Profile for Re-Flow Soldering

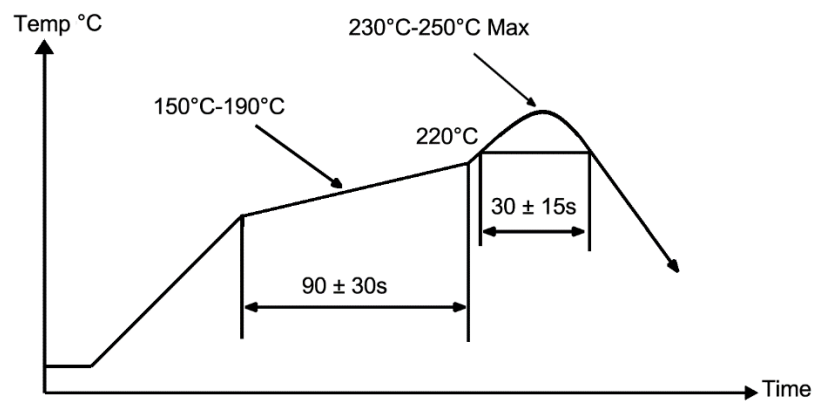


Figure 6. Soldering Temperature-Time Profile for Re-Flow Soldering

**Remark:**

SGW2828 is rated as MSL 3, 168-hour floor life after opening.



## 10. Certifications

### 10.1. FCC Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

#### 10.1.1. FCC RF Exposure Information and Statement.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesirable operation.

Any changes or modifications not expressly approved by SG Wireless could void the user's authority to operate the equipment.

#### 10.1.2. Instructions to the OEM/Integrator:

This module has been granted modular approval for mobile applications. OEM integrators for host products may use the module in their final products without additional FCC/ISED

(Innovation, Science and Economic Development Canada) certification if they meet the following conditions. Otherwise, Additional FCC/IC approvals must be obtained.

- The OEM must comply with the FCC labeling requirements. If the module's label is not visible when installed, then an additional permanent label must be applied on the outside of the finished product which states: "Contains transmitter module FCC ID: 2AS9402". Additionally, the following statement should be included on the label and in the final product's user manual:  
  
"This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interferences, and (2) this device must accept any interference received, including interference that may cause undesired operation."
- The user's manual for the host product must clearly indicate the operating requirements and conditions that must be observed to ensure compliance with current FCC / IC RF exposure guidelines.
- The final host / module combination may also need to be evaluated against the FCC Part 15B criteria for unintentional radiators in order to be properly authorized for operation as a Part 15 digital device.
- This Module is full modular approval, it is limited to OEM installation ONLY.
- The module is limited to installation in mobile application.
- A separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093 and difference antenna configurations.
- The OEM integrator is responsible for ensuring that the end-user has no manual instruction to remove or install module.
- The Grantee will provide guidance to the Host Manufacturer for compliance with the Part 15B requirements if requested. The transmitter module must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with FCC multi-transmitter product procedures.

**NOTE:** The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.

#### 10.1.3. Important Note:

In the event that the above conditions cannot be met (for certain configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

#### 10.1.4. End Product Labeling.

The SGW2828 is labeled with her own FCC ID. If the FCC ID is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. In that case, the final end product must be labeled in a visible area with the following:

"Contains FCC ID: 2AS9404"

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module or change RF related parameters in the user manual of the end product.

## 10.2. IC Statement

*EN:* This device complies with RSS-247 of Industry Canada. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

*RF exposure warning:* This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

*FR:* Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

*Avertissement d'exposition RF:* Cet équipement est conforme aux limites d'exposition aux rayonnements de la IC établies pour un environnement non contrôlé. Cet équipement doit être installé et fonctionner à au moins 20cm de distance d'un radiateur ou de votre corps.

### 10.2.1. OEM Responsibilities to comply with IC Regulations.

The SGW2828 module has been certified for integration into products only by OEM integrators under the following conditions:

- The antenna(s) must be installed such that a minimum separation distance as stated above is maintained between the radiator (antenna) and all persons at all times
- The transmitter module must not be co-located or operating in conjunction with any other antenna or transmitter

As long as the two conditions above are met, further transmitter testing will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

### 10.2.2. Important Note:

In the event that these conditions cannot be met (for certain configurations or co-location with another transmitter), then the ISEDC authorization is no longer considered valid and the IC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate ISEDC authorization.

### 10.2.3. End Product Labeling.

The SGW2828 module is labeled with its own IC ID. If the IC ID is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. In that case, the final end product must be labeled in a visible area with the following:

“Contains IC: 25021-04”

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module or change RF related parameters in the user manual of the end product.

## 11. Revision History

Revision	Date	Description
1.0	21 Mar, 2020	Official release

## 12. Useful Links

1. Official Page of Semtech SX1276: <https://www.semtech.com/products/wireless-rf/lora-transceivers/sx1276>
2. Official Page of MCU STM32L072KBU6: <https://www.st.com/en/microcontrollers-microprocessors/stm32l072kb.html>.