

D TSA5.01 SGW2828 LoRa Module Datasheet

October 2022 V1.2

Introduction

Supporting LoRaWAN®, the global de-facto standard for the Internet of Things, the SGW2828 LoRa Module integrates the Semtech SX1276 long-range low-power transceiver and RF power amplifier with STMicroelectronics' MCU. The SGW2828 LoRa Module is proven to enable connectivity at over 6km in dense urban areas and through at least 10 concrete walls (on-site testing conducted in Hong Kong) at a maximum of 30dBm Tx power, with fast frequency hopping and high sensitivity.

Order Part Number	Description
SGW2828-01A	SGW2828 LoRa +30dBm Module - NA version (915 MHz)
SGW2828-EVK	SGW2828 LoRa +30dBm Module Evaluation Kit

Features

- Complete LoRa solution supporting LoRa Proprietary Network up to 30dBm Tx power
- Semtech SX1276 RF-front-end transceiver*
- STMicroelectronics MCU STM32L072KBU6†
- Operating frequency range: 902 – 928MHz (US)
- Fast frequency hopping for coverage improvement
- Ultra-long RF range (>22 km line-of-sight) and superb wall penetration
- Standard UART/USB interface (easy to use AT-command interface over UART)
- Operating temperature: -40°C to +85°C
- Size: 24.8 x 10.8 x 2.6mm

Block Diagram

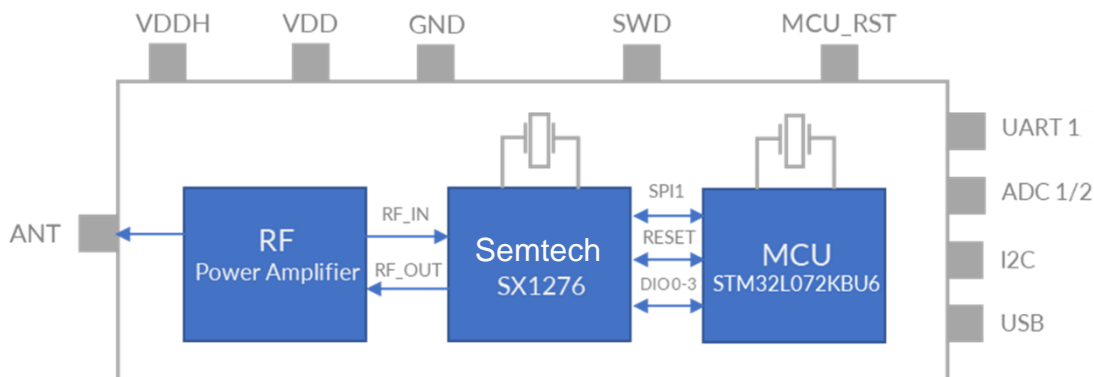


Figure 1: SGW2828 LoRa Module Block Diagram

* Official webpage: <https://www.semtech.com/products/wireless-rf/lora-transceivers/sx1276>

† Official webpage: <https://www.st.com/en/microcontrollers-microprocessors/stm32l072kb.html>

Electrical Specifications

Symbol	Parameter	Min	Max	Unit
Absolute Maximum Rating				
VDD _{max}	Voltage on VDD supply pin	-0.3	3.9	V
VDDH _{max}	Voltage on VDDH supply pin	-0.3	5.8	V
VIO _{max}	Voltage on GPIO pin (VCC ≤ 3.6 V)	-0.3	VCC+0.3 V	V
T _{storage}	Storage temperature range	-40	125	°C

Symbol	Parameter	Min	Typ	Max	Unit
Operating Conditions					
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 _{IH}	Input high voltage	0.7 x V _{CC}		V _{CC}	V
V _{IL}	Input low voltage	V _{SS}		0.3 x V _{CC}	V
V _{OH}	Output high voltage	V _{CC} - 0.4		V _{CC}	V
V _{OL}	Output low voltage	V _{SS}		V _{SS} + 0.4	V
T _{Ambient}	Operating temperature range	-40		85	°C

General	
Module	SGW2828 LoRa Module
Host Operation	AT command
Protocol	LoRa Proprietary Network
Certification	FCC and IC certified
Dimension	24.8 x 10.8 x 2.6mm

LoRa Performance	
Radio Operating Frequencies	902MHz - 928MHz
Radio On-air Data Rate	0.7kbps - 21.8kbps
Transmit Power	Max +30dBm
Antenna	External 2dBi
Range	>22km

Pin Layout

Figure 2 depicts the PCB land pattern, with pad locations and pin layout. Table 1 details pin description.

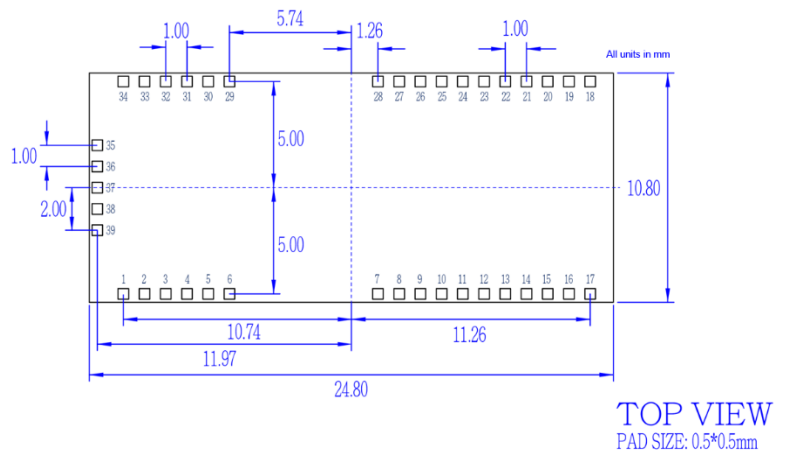


Figure 2: Landing Pattern (Top View)

Table 1: Pin Description

Pin Number	Pin Name	MCU Pin	Type	Description
8	PB0	PB0	Digital I/O, Analog Input	General purpose I/O, ADC_IN
12	USB-D-	PA11	Digital I/O	General purpose I/O, USB-Data-
13	USB-D+	PA11	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	PB7	Digital I/O	General purpose I/O
17	I2C_SCL	PB6	Digital I/O	General purpose I/O
19	OSC_IN	OSC_IN	Analog Input	32.768kHz clock
20	OSC_OUT	OSC_OUT	Analog Output	32.768kHz clock
22	RESET		In	Hardware reset
23	PA0	PA0	Digital I/O, Analog Input	General purpose I/O, ADC_IN0
24	UART_TX	PA2	Digital Output	UART output TX signal
25	UART_RX	PA3	Digital Input	UART input RX signal
37	RF_OUT		RF Connection	RF output pin out
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

Mechanical Data

The SGW2828 Module is marked with its BLE address and certifications. It has a mechanical dimension of 24.8 x 10.8 x 2.6mm, allowing small form factor design. (Figure 3)

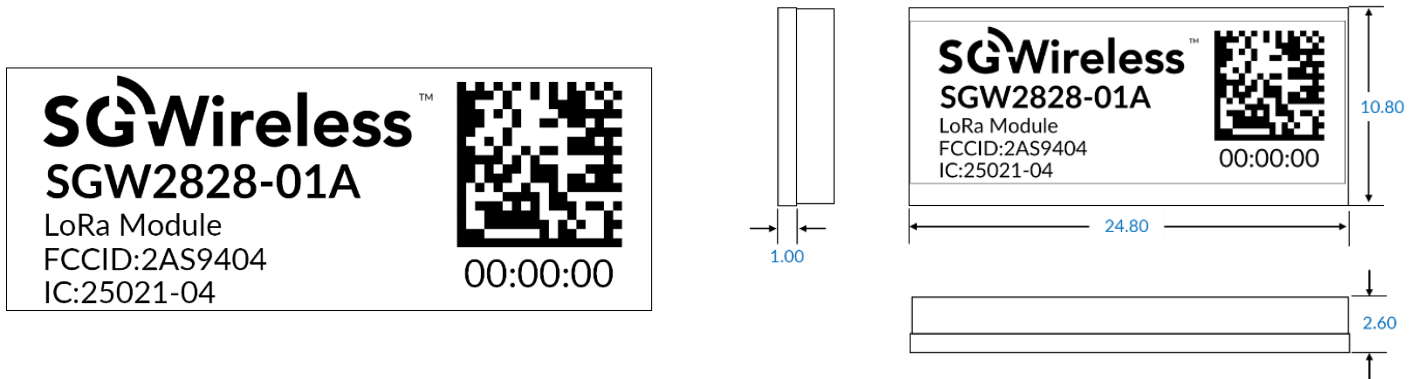


Figure 3: Marking and Dimensions

For re-flow soldering, the recommended temperature-time profile is depicted in Figure 4. The SGW2828 Module is rated MSL 3 (168-hour floor life after opening).

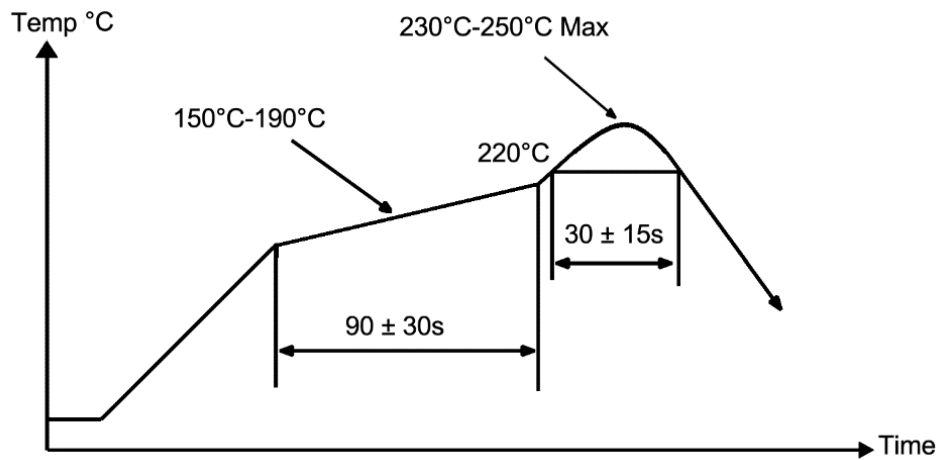


Figure 4: Temperature-time Soldering Profile

Certification

a. 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

i. *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.

ii. *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.

FCC Statement

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.

iii. 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.

iv. End Product Labelling

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.

b. 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.

i. 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.).

ii. Important Note

In the event that these conditions cannot be met (for certain configurations or co-location with another transmitter), then the ISED 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 ISED authorization.

iii. 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.

Revision History

Revised	Version	Description
21-Mar-2020	1.0	Initial document release
3-Jun-2020	1.1	Formatting update
25-Oct-2022	1.2	Formatting and PCB land pattern update

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