



# Sigfox Module WSG303S

Compact-sized
With Ultra-low Power
Consumption

### RF on pad







Sigfox Support



Zone: RC 1/3/5/6



AT Commands



Extended Temperature Range: -40°C to +85°C



Ultra-Low Power Consumption (2.2uA @ sleep mode)

WSG303S(RC1/3/5/6) is a Sigfox modem module for the low power wide area network (LPWAN) market. It is designed with STM's system S2-LP+STM32 MCU for the European, Japan, South Korea and India market.

The module was designed for high performance, high quality, low cost, small form factor and most importantly, high RF power of up to 14dBm. The design is fully compliant to ETSI regulations. The Sigfox application is running on SMT32 MCU at high efficiency executed at high efficiency using its internal 32bit core Cortex-M0 processor.

Every module is preloaded with Sigfox application software, module specific ID/KEY/PAC as referring to Sigfox network system. The preloaded software also includes a bootloader which allows software update or future user application development.





# Sigfox Verified™ Certificate M\_004E\_728B\_01

Congratulations LiteOn, the following product is now Sigfox Verified™ certified:



MODULAR: LITEON RC1/3/5/6 SINGLE MODULE: WSG303S

TYPE: RC1 RC3 RC5 RC6 UPLINK AND DOWNLINK

LAYOUT: WSG303S\_V03

SCHEMATIC VERSION: WSG303S\_V03

BOM: WSG303S\_V03 FIRMWARE: V2.0.1.4

SIGFOX LIB: LIB V2.6.0, ADDON V0.5.0

TEST REPORT: CORP-13438 CORP-13438 CORP-13438 CORP-13438

**CERTIFICATION DATE**: JULY 24, 2019

This certificate is valid for this product only. Any change to the certified product has to be reported to Sigfox as it may lead to a renewal of the Sigfox RF & Protocol Tests.

The Sigfox Verified™ logo must be used in respect of Sigfox branding guidelines.





#### General Feature

 General Sigfox module for Smart City, Smart Agriculture , Smart Industry, IOT Application

Compact Form Factor: 22.5 x 16.5 x 3.0 mm51 Pin LGA Pad for PCB SMT mounting

Interface: I2C\*1/UART\*1/GPIO\*3/ADC\*2/SWD\*1

■ Temperature range: -40°C to +85°C

■ Supply voltage: 2.0 ~ 3.6V

Frequency range: ISM RC1(868MHz), RC3/RC5(923MHz), RC6(865MHz)

Preloaded Sigfox application with ID/KEY/PAC and bootloader for firmware update

## Product Specifications

RF Function

Standard Sigfox Network System

Interface I2C/UART/GPIO/ADC/SWD

Transmit Output Power 14dBm

Data Rate Uplink: 100bps

Downlink: 600bps

Modulation Techniques

Uplink DBPSK Modulation

Downlink GFSK Modulation

Sigfox Frequency bands RC 1/3/5/6

Operating Voltage 2.0 ~ 3.6V

Operating Temperature -40 ~ 85 degree C

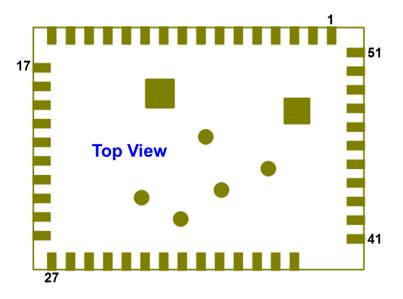
Tx mode(TX period): 21mA Uplink(TX 1 frame): 24mA

opinik(17 1 frame). 2-

Current consumption Downlink:14mA

Normal mode: 5mA Sleep mode: 2.2 uA

## ◆ MODULE PINOUT

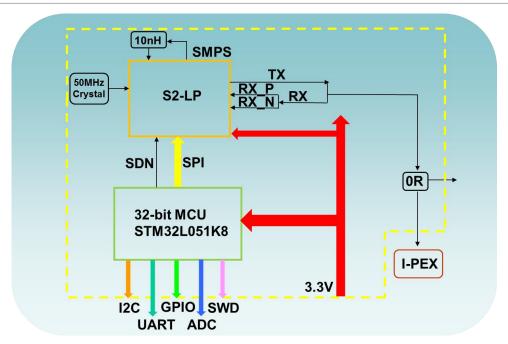


## PIN DEFINITION

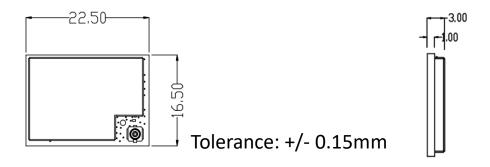
Pin.	Description	Function	Pin.	Description	Function
1,2,3,4,5,15, 16,39,40,41, 42,43,44,45, 47,48,49,50, 51		GND	24	PA11	PA11
6	SDO	PA6	25	PA12	PA12
7	SDI	PA7	26	SWDIO	PA13 (MCU debugging and programming)
8	SCLK	PB3	27	SWCLK	PA14 (MCU debugging and programming)
9	CSN	PA1	28	NC	NC
10	GPIO0	PAO	29	PB4	PB4
11	GPIO1	PA4	30	PB5	PB5
12	GPIO2	PB1	31	I2C1_SCL	PB6
13	GPIO3	PA15	32	I2C1_SDA	PB7
14	SDN	SDN=0, Shutdown mode	33	NRST	NRST (MCU Reset)
17	USART2_TX	PA2 (115200bps)	34	воото	BOOTO (Floating or Low)
18	USART2_RX	PA3 (115200bps)	35	PB8	PB8
19	PA5	PA5	36	XI	PC14-OSC_IN (Ready for External Crystal)
20	PB0	PB0	37	XO	PC15-OSC32_OUT (Ready for External Crystal)
21	PB2	PB2	38	VDD	VDD_3V3
22	UART1_TX	PA9 (115200bps)	46	ANT1	SigFox Antenna
23	UART1_RX	PA10 (115200bps)			



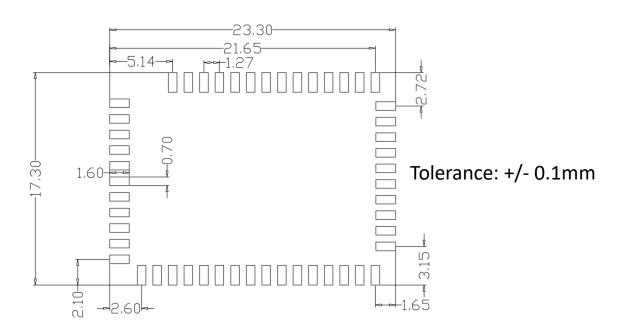
#### BLOCK DIAGRAM



## ◆ Module Dimension



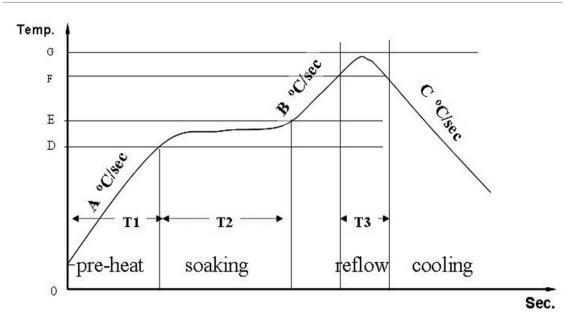
## RECOMMENDED FOOTPRINT







## RECOMMENDED REFLOW PROFILE



Standard conditions for reflow soldering:

- a. Pre-heating Ramp (A) (Initial temperature: 150°C): 1~2.5°C/sec;
- b. Soaking Time (T2) (150°C~180°C): 60sec~100sec;
- c. Peak Temperature (G): 230~250°C;
- d. Reflow Time (T3) (>220°C): 30~60 sec;
- e. Ramp-up Rate (B): 0~2.5°C/ sec;
- f. Ramp-down Rate (C): 1~3°C/ sec.

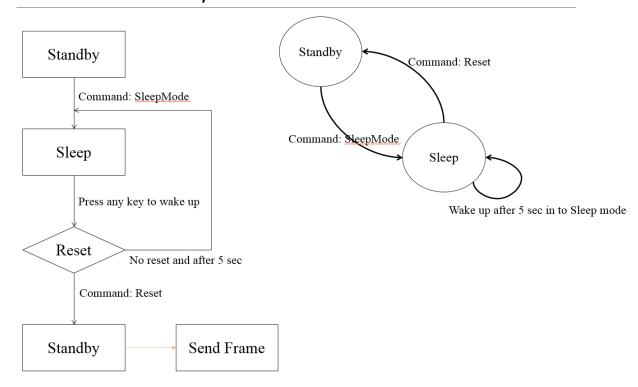


Baud Rate: 115200,N,8,1

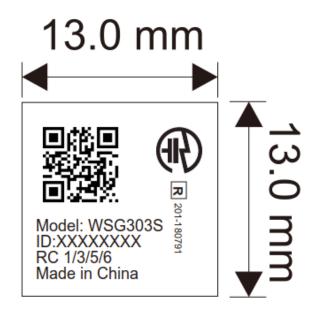
	Bada Nate: 119200,11,6	<u> </u>
Command	Description	Value
Get_FWVer	Get fw version	return firmware version
Get_Sigfox_Ver	Get version of Sigfox library	return Sigfox library version
Get_API_Ver u	Get version of specified module	u= 1 is MCU_API, 2 is RF_API and 3 is Addon API sersion
Get_ID	ID of the current device	return ID
Get_PAC	PAC of the current device	return PAC
Switch_Public_Key b	Switch public/private key	u= 0: private , 1: public
Open_RCZ u	Open the Sigfox RCZ	u= [1, 3, 5, 6] is RC1/ RC3C/ RC5/ RC6
Get_RCZ	RCZ of the current device	return regional
Set_std_config w w w b	Configure specific variables for standard only for RC3C and RC5	w=:number of attempts to send the first frame [ has to be greater or equal to 1] w= maximum carrier sense sliding window (in ms) [ has to be greater than 6 ms ] w= bit 8 : set the value to 1 to indicate that the device will use the full operationnal radio band.( 192kHz ) bit 7-3: number of Carrier Sense attempts bit 2-0: number of frames sent b= timer_enable, unused always to be set 0 default value is 0x000000001 0x000002EE0 0x00000000000000
Get_std_config	Get standard config of the current device	return standard config value
		Frame: data is boolen byte to send
		b= data to transmit, e.g. u= 1 or 0
Send_bit b u b	Send a bit	u= Number of repetition[0 to 2], e.g. u= 2
		b= Flag to initiate a downlink response, 1= downlink 0= non downlink
		Frame: data bytes (0,1,2,3C,D,E,F) to be sent, 12 byte
		maximum
		w= data to transmit, e.g. u= 1234
Send_frame w u b	Send a frame	u= Number of repetition[0 to 2], e.g. u= 2
		b= Flag to initiate a downlink response, 1= downlink 0= non
		downlink
		if data not 1 byte, fill up with 0 e.g. w= ABC -> ABOC
Send_out_of_band	Send a oob frame	Send out of band frame
	Send a only Unlink frame	Frame: data bytes (0,1,2,3C,D,E,F) to be sent, 12 byte
Send_MSG w		maximum
	, com a com, cp	w= data to transmit, e.g. u= 1234
		if data not 1 byte must be discarded e.g. w= 012 -> 01
Uplink u	Send the number of Uplink frames	u= how many frames to send. The transmitted data is 0x11,
	'	0x22, 0x33, 0x44
		e.g. u = 5000, u is waiting the number of console line to be
Set_CWTx u	Start continuous wave transmission	sent
		the transmission frequency based on opened regional
Cat Charact	Charles and in the control of the co	e.g. u = 5000, u is waiting the number of console line to be
Set_CMTx u	Start continuous modulated transmission	sent
		the transmission frequency based on opened regional
Set_payload_encryption b	Toggles the payload encryption option	b= 1 or 0, enabled/ disable payload encryption, the default value is 0
Enable test made b	Change ID/KEY/PAC for specific credentials	
Enable_test_mode b		
Test_mode u u	Enter a specified test mode	1st u is test regional, 2nd is test item
	Set RX listening Freq, only for Get_Rssi	e.g. u= 869525000 (RC1) u= 922200000 (RC3)
Set_FreqBase u	command	u= 922300000 (RC5)
	Communic	u= 866300000 (RC5)
	Get RX listening Freq, only for Get_Rssi	u= 800300000 (NCO)
Get_FreqBase	command	Return frequency in Hz
		u= how many RSSI value to get. Please set the frequency first
Get_Rssi u	Direct to measure RSSI level	by Set FreqBase command
		In Sleep Mode, press any key to exit and enable auto in
SleepMode	Device enter sleep mode	sleep mode after 5s
UART echo u	Toggles UART echo option	b= 1 or 0, enabled/ disable UART echo, the default value is 0
Reset	Reset device	System soft reset and disable auto in sleep mode
help	Show command list	Display the all AT command
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## ◆ FLOW OF STANDBY/SLEEP MODE

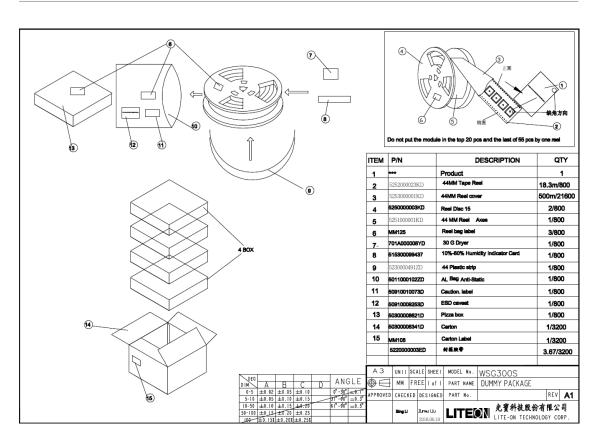


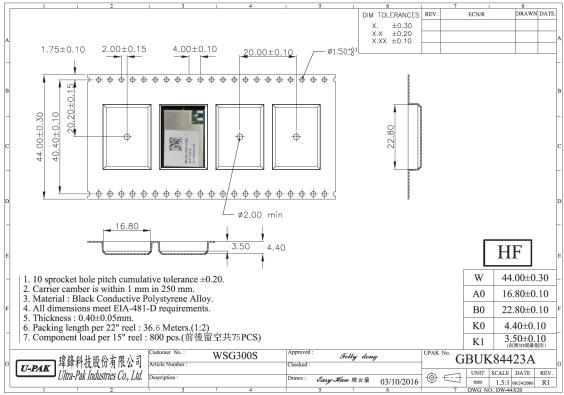
### ♦ LABEL DRAWING





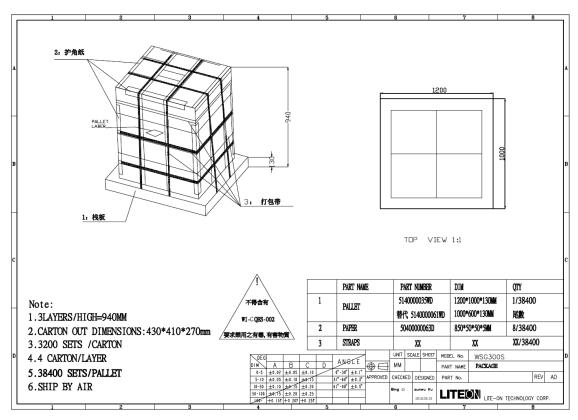
#### PACKAGING SPEC

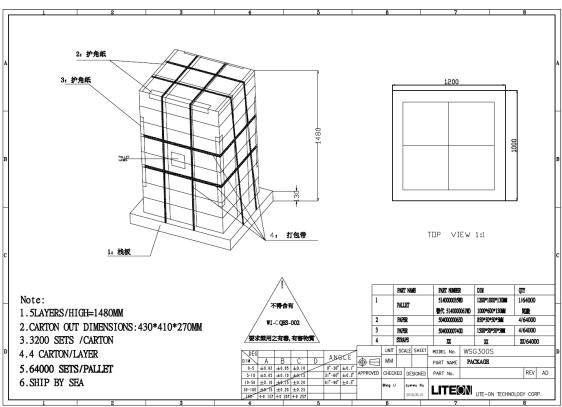






#### PACKAGING SPEC







## CHANGE LIST

Rev	Date	Author	Change List
V1.0	2018.02.12	Kaysa Lee	Preliminary
V1.1	2018.06.11	Kelly Hsu	Update Voltage supply Update Current consumption Update AT Command List
V1.2	2018.06.19	Kaysa Lee	Add Packaging spec
V1.3	2018.07.02	Kelly Hsu	Add Reflow profile Add Label Drawing
V1.4	2018.09.03	Kaysa Lee	Add sigfox P1 Cert
V1.5	2018.09.25	Kaysa Lee	Update Power consumption data
V1.6	2018.10.04	Kaysa Lee	Add Standby/Sleep Flow chart
V1.7	2018.12.04	Kelly Hsu	Update Recommended footprint
V1.8	2018.12.27	Kaysa Lee	Update sigfox P1 cert. to support RC 1/3/5 Update AT Command for RC3/5
V1.9	2019.07.25	Kelly Hsu	Update sigfox P1 cert. to support RC 1/3/5/6 Modify AT Command List and Label Drawing