

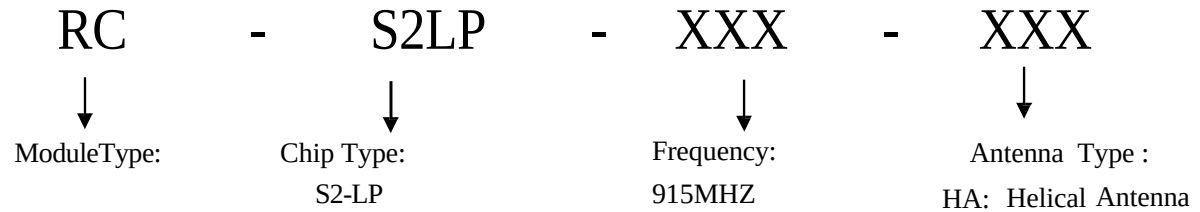
RC-S2LP Module Datasheet V1.1

Radiocontrolli SRL.

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Module Name Information



Description

RC-S2LP Module is designed based on S2-LP. S2-LP is a high performance ultra-low power RF transceiver, intended for RF wireless applications in the sub-1 GHz band. It is designed to operate in both the license-free ISM and SRD frequency bands at 915.1-915.6 MHz .

The S2-LP can be used in systems with channel bandwidth of 53 kHz enabling. The narrow band operations. The S2-LP shows an RF link budget higher than 140dB for long communication ranges and meets the regulatory requirements applicable in territories worldwide, including Europe, Japan, China and the USA.



Features

- Frequency bands:
 - 915.1-915.6 MHz
- Modulation schemes:
 - GFSK
- Air data rate 10 kbps
- Ultra-low power consumption:
 - 7 mA RX
 - 10 mA TX
- Excellent performance of receiver sensitivity: down to -130 dBm
- Excellent receiver selectivity and blocking
- Programmable RF output power up to 94dBuV/m for RC-S2LP-915
88dBuV/m for RC-S2LP-915-HA
- Bit rate from 10 kbps
- Programmable RX digital filter
- Programmable channel spacing
- Fast startup and frequency synthesizer settling time
- Automatic frequency offset compensation, AGC and symbol timing recovery
- More than 140 dB RF link budget
- Battery indicator and low battery detector
- RX and TX FIFO buffers
- 4 wires SPI interface
- Automatic packet acknowledgment and retransmission
- Embedded timeout protocol engine
- Antenna diversity algorithm
- Fully integrated ultra-low power RC oscillator
- Wake-up driven by internal timer or external event
- Digital real time RSSI
- Flexible packet length with dynamic payload length
- Programmable preamble and SYNC word quality filtering and detection
- Embedded CSMA/CA engine based on listen-before-talk systems
- Wireless M-BUS supported
- Enables operations in the SIGFOX™ networks
- Operating temperature range: -40 °C to +85 °C

Antenna Style Selection

1. RC-S2LP-915 (UFL Antenna)

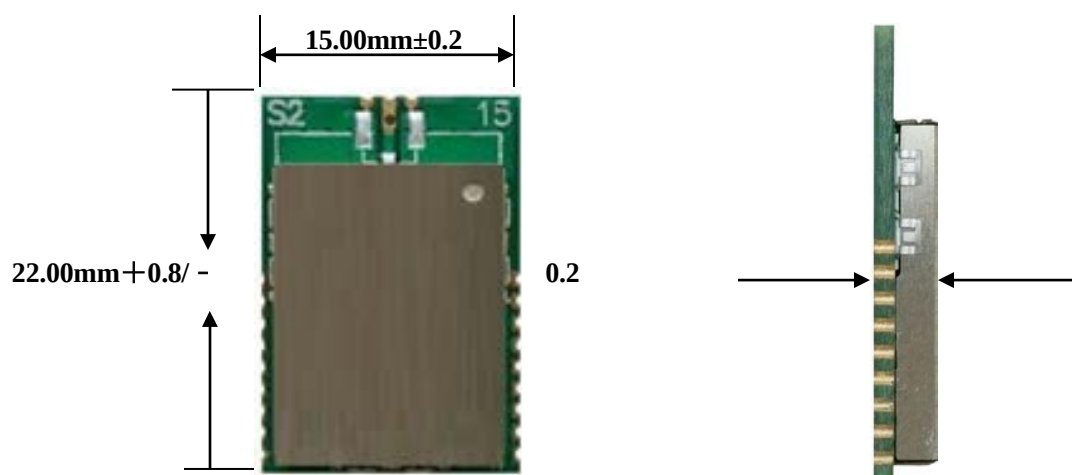


2. RC-S2LP-915-HA (Helical Antenna)

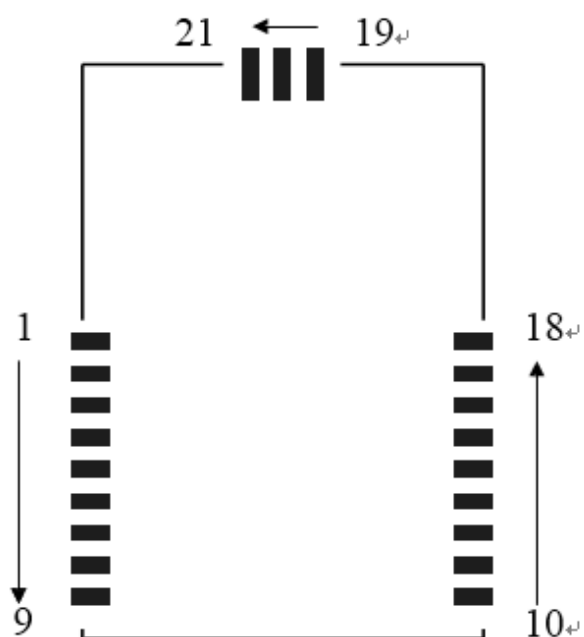


Note: The length of antenna is different for modules with different frequency

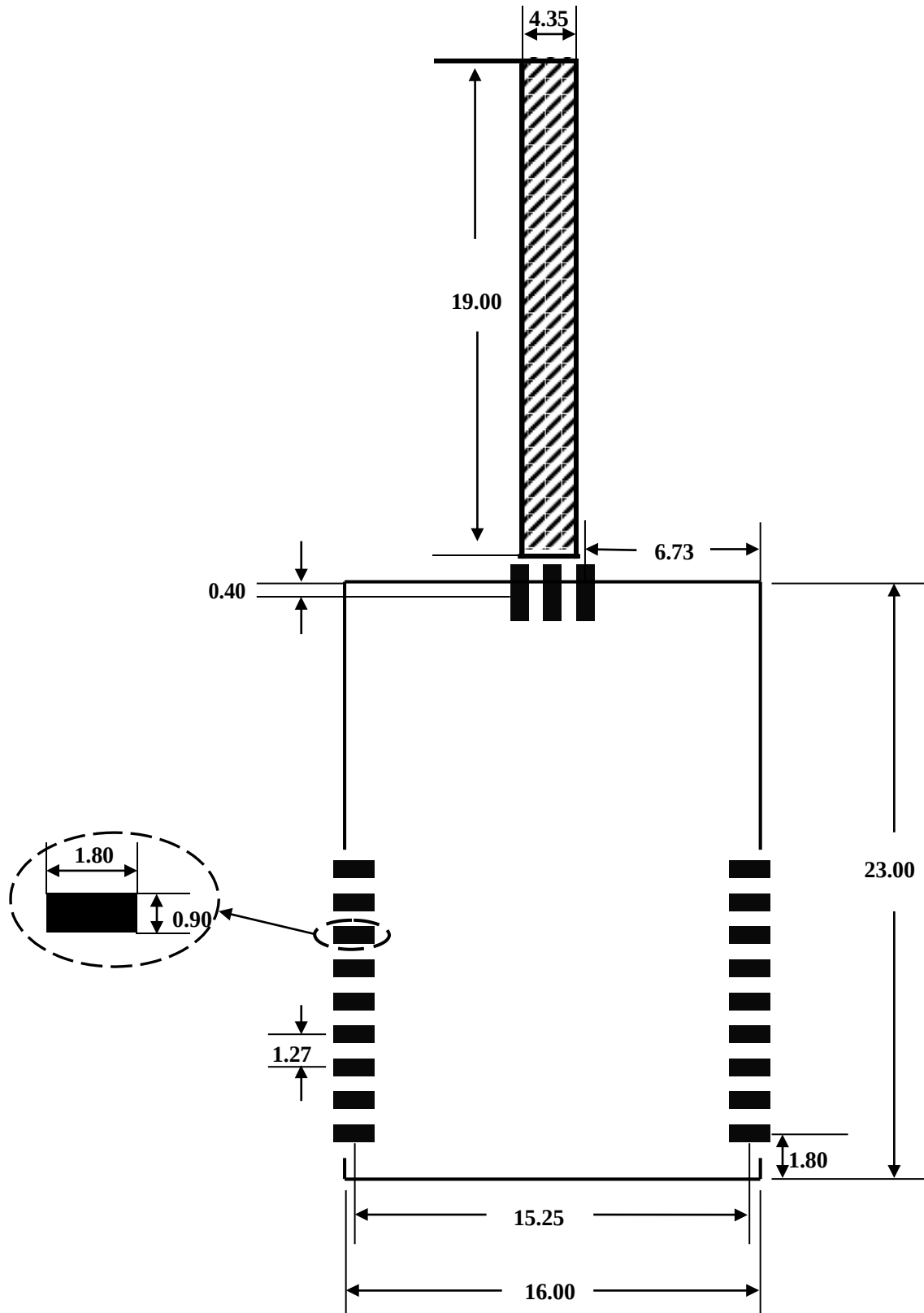
Mechanical Drawing



Terminal Description



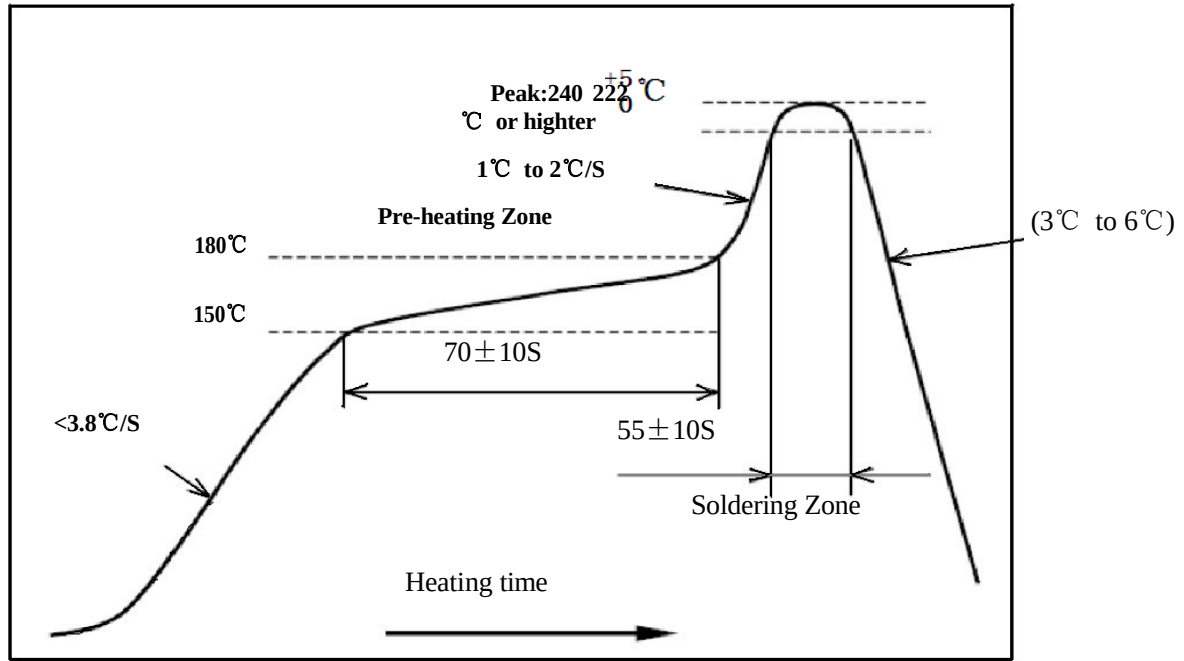
Pad Number	Name	Description	Pin Type
1	SDO	SPI slave data output	Digital out
2	SDI	SPI slave data input	Digital in
3	SCLK	SPI slave clock input	Digital in
4	CSn	SPI chip select	Digital in
5	GPIO0	General purpose I/O that may be configured through the SPI registers to perform various functions	Digital I/O
6	GPIO1	General purpose I/O that may be configured through the SPI registers to perform various functions	Digital I/O
7	GPIO2	General purpose I/O that may be configured through the SPI registers to perform various functions	Digital I/O
8	GPIO3	General purpose I/O that may be configured through the SPI registers to perform various functions	Digital I/O
9	GND	Connect to GND	Ground pin
10	SDN	Shutdown input pin. SDN should be = '0' in all modes, but SHUTDOWN mode	Digital in
11	GND	Connect to GND	Ground pin
12	GND	Connect to GND	Ground pin
13	VCC	1.8 V to 3.6 V power	Power Supply
14	VCC	1.8 V to 3.6 V power	Power Supply
15	GND	Connect to GND	Ground pin
16	GND	Connect to GND	Ground pin
17	GND	Connect to GND	Ground pin
18	GND	Connect to GND	Ground pin
19	GND	Connect to GND	Ground pin
20	ANT	Connect to an external Antenna	Antenna Interface
21	GND	Connect to GND	Ground pin

Recommended PCB Layout for Package**Unit: mm**

Specifications**1. 915MHz**

Parameter			Min	Typ	Max	Unit
Operating Voltage			1.8	-	3.6	V
Operating Temperature			-40	-	85	℃
Current Consumption	UA Antenna	TX	-	30	33.7	mA
		RX	-	8.0	8.7	
	HA Antenna	TX	-	38	40	
		RX	-	8.0	8.2	
	sleep		-	-	0.6	uA
TX Power			-	-	94	dBuV/m
RX Sensitivity		DR=0.3Kbps	-	-	-131	dBm
Storage Temperature			-40		105	℃

Soldering Recommendations



FCC COMPLIANCE

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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 undesired operation.

FCC Label Instructions:

The outside of final products that contains this module device must display a label referring to the enclosed module. This exterior label can use wording such as: "Contains Transmitter Module FCC ID: 2ANH5-RC-S2LP-915 .

Any similar wording that expresses the same meaning may be used.

Regulatory Module Integration Instructions

2.2 List of applicable FCC rules

This device complies with part 15.249 of the FCC Rules.

According to the definition of mobile and fixed device is described in Part 2.1091(b), this device is a mobile device.

2.3 Summarize the specific operational use conditions

This module can be used in household electrical appliances as well as lighting

equipments. The input voltage to the module should be nominally 3.0 to 3.6V VDC ,typical value 3.3VDC and the ambient temperature of the module should not exceed 105°C.

This module using only one kind of antennas with maximum gain is 2.15dBi .Other antenna arrangement is not covered by this certification.

The two antenna types are not field replaceable. If antennas need to be changed, the certification should be re-applied.

2.4 Limited module procedures

Not applicable

2.5 Trace antenna designs

Not applicable

2.6 RF exposure considerations

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment .This equipment should be installed and operated with minimum distance 20cm between the radiator& your body. If the device built into a host as a portable usage, the additional RF exposure evaluation may be required as specified by§ 2.1093.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. Country Code selection feature to be disabled for products marketed to the US.

2.7 Antennas

Module contains a Ipex socket for antenna. Serial Module contains a helical antenna.

2.8 Label and compliance information

The outside of final products that contains this module device must display a label referring to the enclosed module. This exterior label can use wording such as: “Contains Transceiver Module FCC ID: 2ANH5-RC-S2LP-915 ”,or “Contains FCC ID: 2ANH5-RC-S2LP-915 ”, Any similar wording that expresses the same meaning may be used.

2.9 Information on test modes and additional testing requirements

a)The modular transceiver has been fully tested by the module grantee on the required number of channels, modulation types, and modes, it should not be necessary for the host installer to re-test all the available transmitter modes or settings. It is recommended that the host product manufacturer, installing the modular transceiver, perform some investigative measurements to confirm that the resulting composite system does not exceed the spurious emissions limits or band edge limits (e.g., where a different antenna may be causing additional emissions).

b) The testing should check for emissions that may occur due to the intermixing of emissions with the other transmitters, digital circuitry, or due to physical properties of the host product (enclosure). This investigation is especially important when integrating multiple modular transceivers where the certification is based on testing each of them in a stand-alone configuration. It is important to note that host product manufacturers should not assume that because the modular transceiver is certified that they do not have any responsibility for final product compliance.

c) If the investigation indicates a compliance concern the host product manufacturer is obligated to mitigate the issue. Host products using a modular transceiver are subject to

all the applicable individual technical rules as well as to the general conditions of operation in Sections 15.5, 15.15, and 15.29 to not cause interference. The operator of the host product will be obligated to stop operating the device until the interference has been corrected.

2.10 Additional testing, Part 15 subpart B disclaimer

The final host / module combination 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.

The host integrator installing this module into their product must ensure that the final composite product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation and should refer to guidance in KDB 996369.

Frequency spectrum to be investigated

For host products with certified modular transmitter, the frequency range of investigation of the composite system is specified by rule in Sections 15.33(a)(1) through (a)(3), or the range applicable to the digital device, as shown in Section 15.33(b)(1), whichever is the higher frequency range of investigation.

Operating the host product

When testing the host product, all the transceivers must be operating. The transceivers can be enabled by using publicly-available drivers and turned on, so the transceivers are active. In certain conditions it might be appropriate to use a technology-specific call box (test set) where accessory devices or drivers are not available.

When testing for emissions from the unintentional radiator, the transceiver shall be placed in the receive mode or idle mode, if possible. If receive mode only is not possible then, the radio shall be passive (preferred) and/or active scanning. In these cases, this would need to enable activity on the communication BUS (i.e., PCIe, SDIO, USB) to ensure the unintentional radiator circuitry is enabled. Testing laboratories may need to add attenuation or filters depending on the signal strength of any active beacons (if applicable) from the enabled radio(s). See ANSI C63.4, ANSI C63.10 and ANSI C63.26 for further general testing details.

The module is mainly used for transmitting and receiving a small amount of data over short distance. Through SPI command transmission, baud rate, modulation and other parameters can be set.