

HLM9521

Hardware Datasheet



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File Modification History

Version	Date	Author	Change Description
V1.0.0	22-11-12	Hylintech	Initial version.
V1.1.0	22-11-28	Hylintech	Update module reference design circuit.

1 Mechanical Dimensions

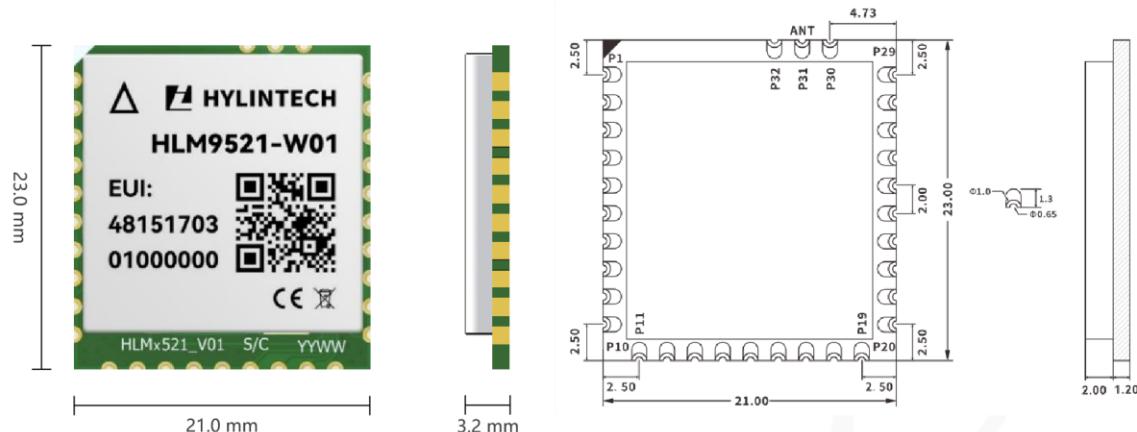


Figure 1-1 Module Top and Side Dimensions

2 Pin Definition

Table 1-1 Pin definition

Pin num	Pin name	Port type	Default value	Function description
1	GND	GND	-	Power ground
7	NRST	INPUT	PULL-UP	Reset signal pin. Pull-up resistor inside the module. If the pin is not used, leave the pin unconnected.
8	GND	GND	-	Power ground
9	VCC	POWER	-	Supply voltage, typical value: 3.3V
10	GND	GND	-	Power ground
13	CMD_TXD	OUTPUT	HIGH	
14	CMD_RXD	INPUT	HIGH-IMPEDANCE	
20	DBG_TXD	OUTPUT	HIGH	Debug Pin, Log out
24	SWDIO	I/O	-	SWD Pin
25	SWCLK	I/O	-	SWD Pin
30	GND	GND	-	

31	ANT	RF	-	Radio Singal Input and Output
32	GND	GND	-	
Other	NC	NC	-	

3 Specification

Table 1-2 Module technical parameters

Main parameter	Min	Typ	Max	Unit	Remark
F_a		10		ppm	Frequency accuracy @ 25°C
T_{op}	-40		85	°C	Operating temperature range
VDD	1.8	3.3	3.6	V	Maximum power (22dBm) decreases when the supply voltage is below 3.2V. The module does not operate when the supply voltage is below 1.8V
Tx Power	20	21	22	dBm	Supply voltage: 3.3V
Power consumption	Tx	100	120	140	mA @Max Tx power(22dBm) @ 25°C
	Rx	5.3	5.5	5.7	
	Sleep		2	3	μA @ 25°C
Tx Power	20	21	22	dBm	Supply voltage: 3.3V
2~10 harmonics			-40	dBm	@Max Tx power(22dBm)
Rx Sensitivity		-123		dBm	SF7BW125, Rx Boosted gain, PER≤1%, PL 64Bytes

4 Reference Circuit

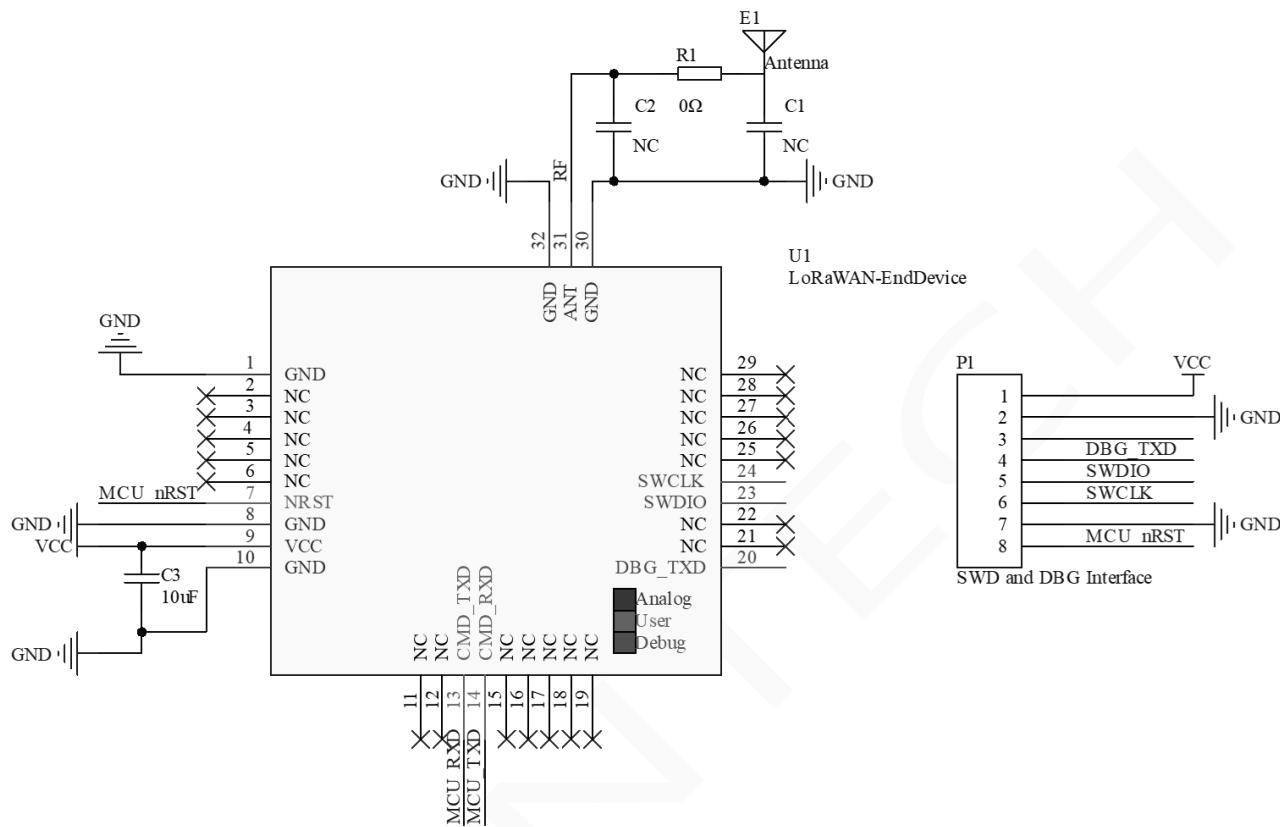


Figure 1-2 Module reference Circuit

Instructions:

PCB Trace between antenna and module ANT pin need to be matched to 50-ohm impedance.

It is recommended that users add a matching network between the module ANT pin and the antenna pins (e.g., the π -circuit C2, R1, C1).

It is recommended that the C3 tolerance of the filter capacitor be larger than 1uF.

The NRST pin has been pulled up inside the module.

The SWD pins and Debug Pin (P1) are used for debugging.

FCC Statement

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

NOTE: 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 important announcement

Radiation Exposure 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 20cm between the radiator and your body.

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/Canada.

This device is intended only for OEM integrators under the following conditions:

1. The antenna must be installed such that 20 cm is maintained between the antenna and users, and
2. The transmitter module may not be co-located with any other transmitter or antenna,

As long as the three 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.

Important Note:

In the event that these conditions cannot be met (for example certain laptop 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 **End Product Labeling**

The final end product must be labeled in a visible area with the following " Contains FCC ID: 2A4G5-HLM9521".

Manual Information to the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as shown in this manual.

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01

2.2 List of applicable FCC rules

CFR 47 FCC PART 15 SUBPART C has been investigated. It is applicable to the modular transmitter

2.3 Specific operational use conditions

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system.

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.

2.7 Antennas

This radio transmitter FCC ID:2A4G5-HLM9521 has been approved by Federal Communications Commission to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Model	Frequency	Type	Connector	Peak gain (dBi)
LORA	902-928MHz	Sucker Antenna	/	1.03

2.8 Label and compliance information

The final end product must be labeled in a visible area with the following " Contains FCC ID: 2A4G5-HLM9521".

2.9 Information on test modes and additional testing requirements

Host manufacturer is strongly recommended to confirm compliance with FCC requirements for the transmitter when the module is installed in the host.

2.10 Additional testing, Part 15 Subpart B disclaimer

Host manufacturer is responsible for compliance of the host system with module installed with all other applicable requirements for the system such as Part 15 B.

2.11 Note EMI Considerations

Host manufacturer is recommended to use D04 Module Integration Guide recommending as "best practice" RF design engineering testing and evaluation in case non-linear interactions generate additional non-compliant limits due to module placement to host components or properties.

2.12 How to make changes

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system. According to the KDB 996369 D02 Q&A Q12, that a host manufacturer only needs to do an evaluation (i.e., no C2PC required when no emission exceeds the limit of any individual device (including unintentional radiators) as a composite. The host manufacturer must fix any failure.