

# User's Manual

**HST-S1M-CT (for CE/FCC/KC Certification)**

Doc No. HST-S1M-CT\_Manual\_V0.6\_ENG

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# 1 Outline

## 1.1 Summary

This document is a user manual for using HST-S1M-CT. The manual consists of the following. Chapter 2 is the product configurations. Chapter 3 offers detailed instructions on each hardware. Chapter 4 explains the provided application softwares with the software structure.

# 2 Product Structure and Configurations

## 2.1 Product Description

This product is the smallest version of module based upon the HST-C1R main chipset that implements high-resolution radar transmitting and receiving ultra-wideband(UWB) impulse on a single chip.

It measures and analyzes displacement signals generated from the human body to detect biological signals such as respiration. Not only it detects distance and obstacles but also distinguishes humans from animals. It can be used on its own or paired with another device through the provided interface.

The whole product is shielded by shield can. TX and RX are connected to the antenna by a U.FL type RF connector. The external 4 to 6V is converted to 1.2V and 3.3V by the internal constant voltage circuit and used as the system power supply.

Figure #1. Block Diagram

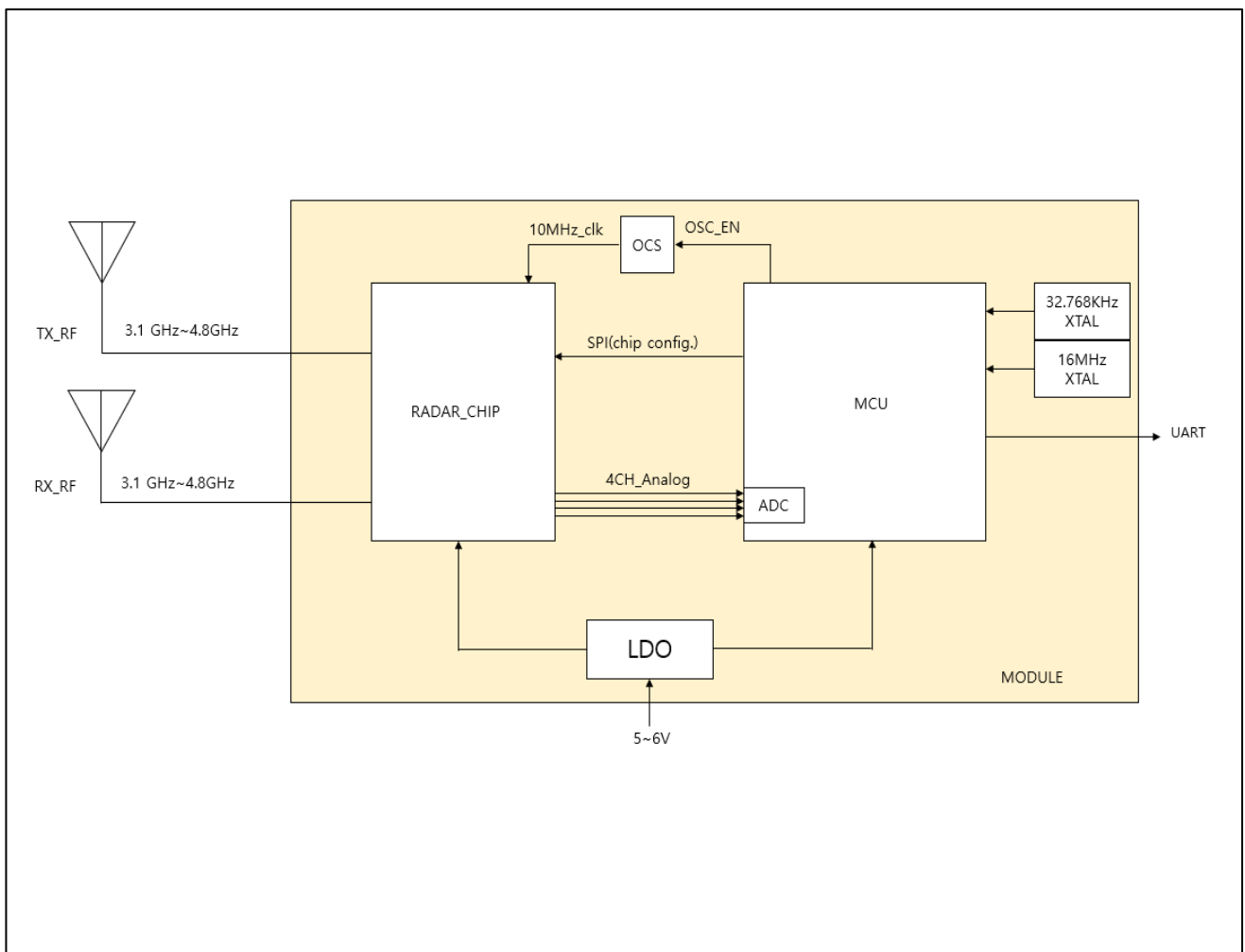


Figure #2. Product image

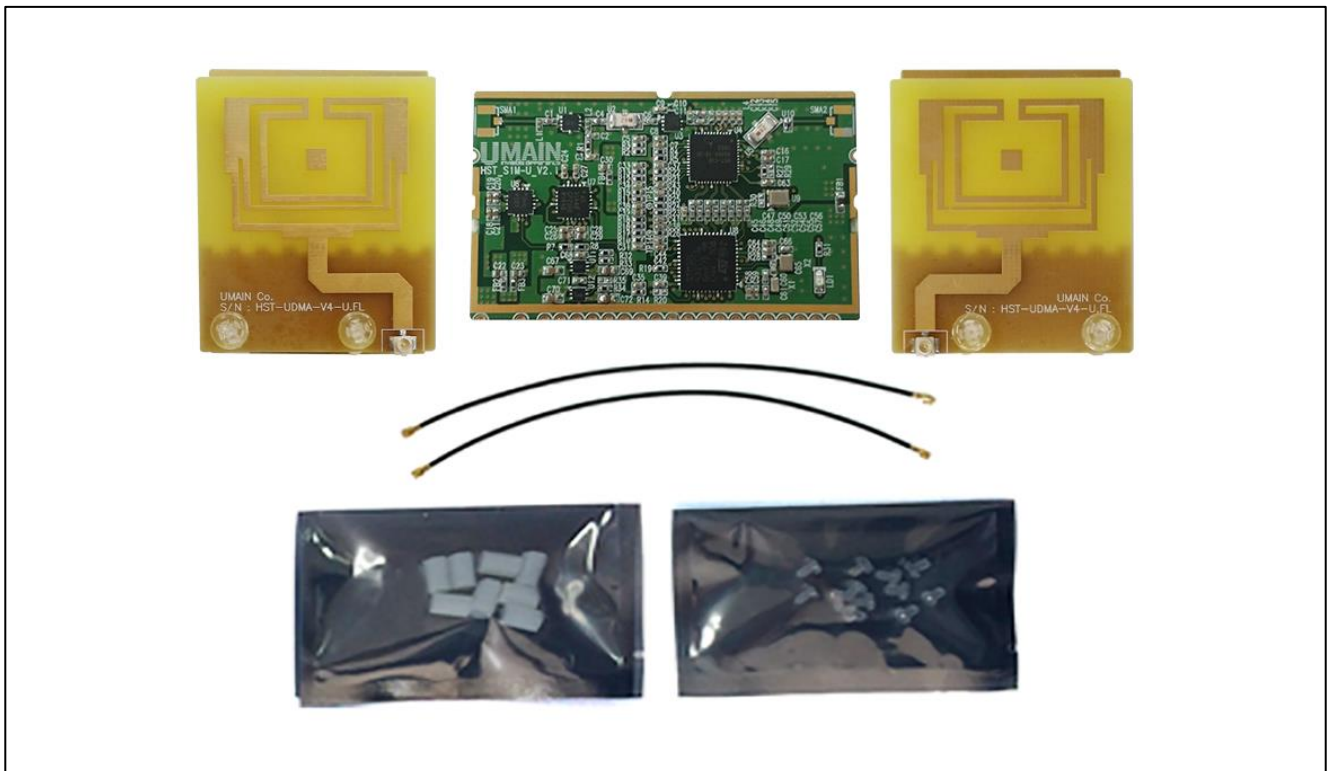


\*\* The product is shipped as one piece or separated at random.

## 2.2 Product Configurations

- UWB Radar Sensor Module 1ea
- Directional Antenna 2ea
- Bottom Panel 2ea
- Plastic Stand Space 8ea

Figure #3. Hardware Configurations



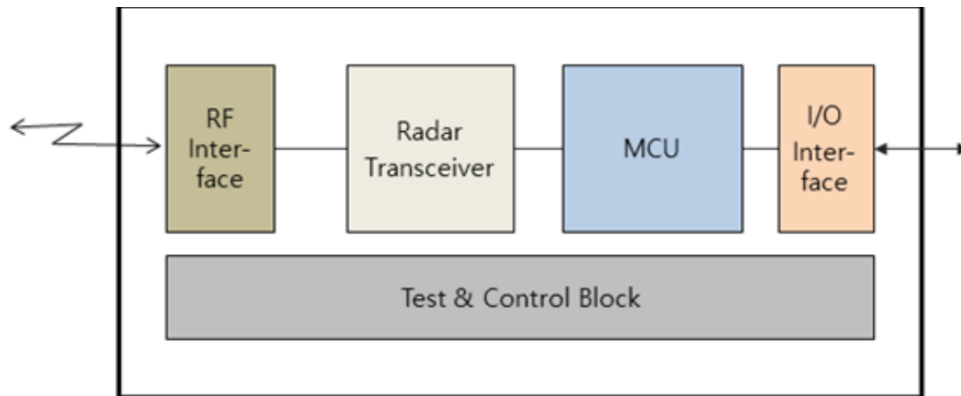
\*\* The product is shipped as one piece or separated at random.

### 3 Hardware Description

HST-S1M-CT has following specifications.

#### 3.1 Summary

Figure #4. Hardware Connection



#### 3.2 Radar Sensor Module

##### 3.2.1 Features and Specifications

Table 1. Features of the Radar Sensor Module

Parameter	Value	Comment
Detecting Range	Max 13.4M or more	For human : 7~8M Can be adjusted within the power limit
Frequency Range	Korea - 3.735~4.8GHz US and Europe – 3.1 ~ 4.8 GHz	
Output Power	52.08 dBμV/m	
Distance Resolution	2.03cm	Can be adjusted within the power limit
Dimension	49mm x 29.5mm	

Table 2. Electrical Specifications

Parameter	Value	Comment
Supply Voltage	5V	
IO-voltage	3.3V	
Max current consumption	200mA	
Operating Temperature range	-40°C ~ +85°C	

### 3.3 Antenna

#### 3.3.1 Features and Specifications

Figure #5. Antenna

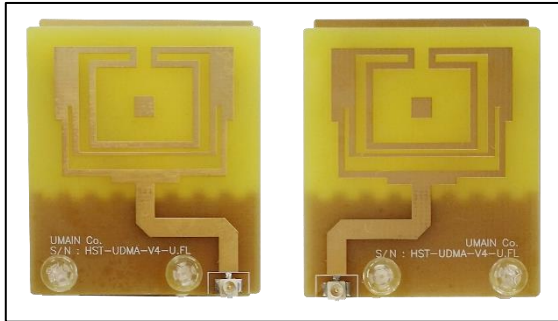


Figure #6. Antenna Plane

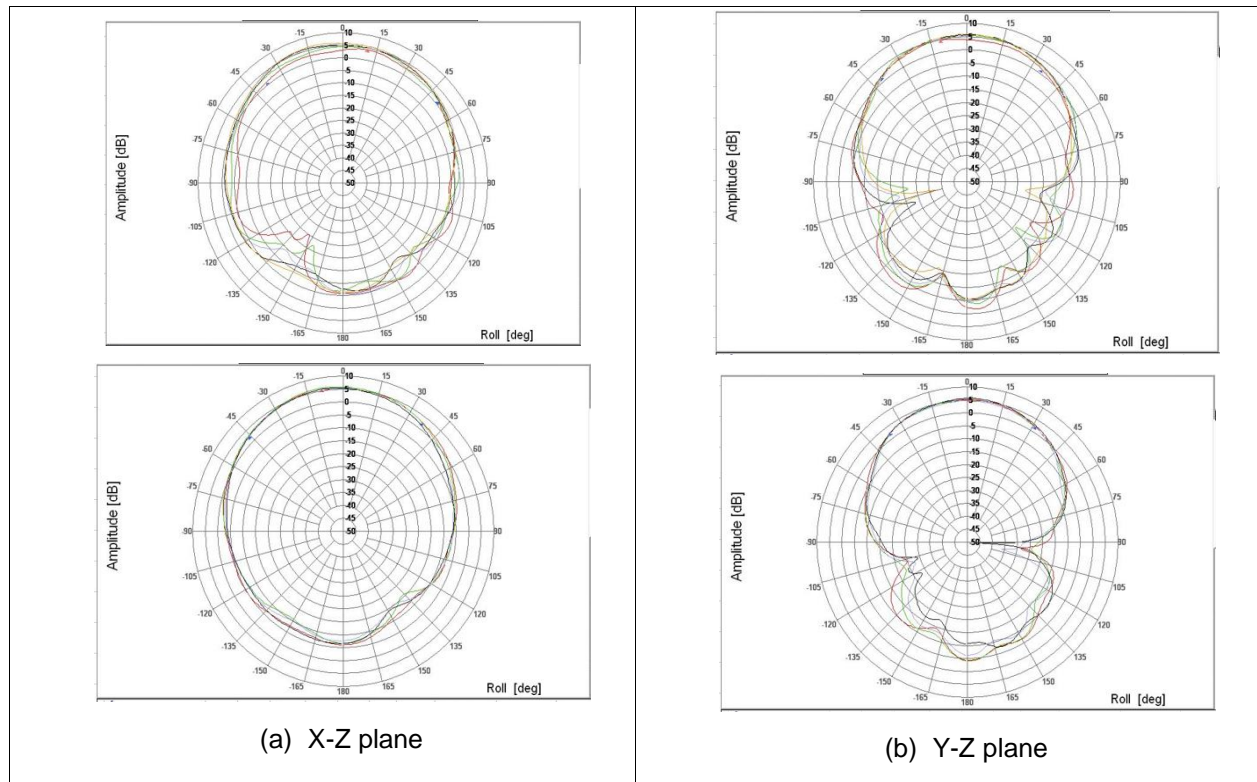


Table 3. Antenna Specifications

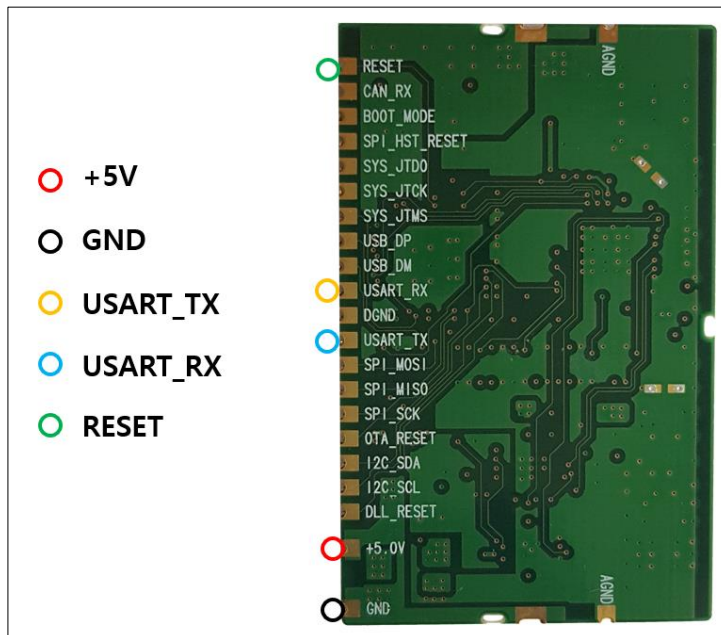
Parameter	Value
Type	UWB Directional Antenna
Material	FR-4
Gain	XZ Plane : 4.91(min.) dBi YZ Plane : 4.66(min.) dBi
Antenna angle (3.8GHz ~ 4.5GHz)	81.60°(X-Z plane) ~ 69.61°(Y-Z plane)
Size	34mm x 44mm x 17mm

## 4 Software Description

### 4.1 Hardware Connection

- After connecting 3 pins of Reset, USART\_TX, USART\_RX, connect + 5V, GND to supply power.
- Output begins through serial after power is supplied. The reset pin is Active High, and the low value cause the board to reboot.
- Caution : Reset pin should be supplied with 3.3V. Do not supply with 5V.

Figure #7. Radar Module Connection



### 4.2 Instructions on using the radar module

#### 4.2.1 Conditions

The conditions to set HST-S1M-CT is as follows. They shall be satisfied only once at the first setting.

- 1) Once power is supplied to the board, there must not be any movement in front of the module during 5 seconds within the distance to be measured.
- 2) After keeping no motions, detection begins 5 seconds after “Start” is displayed as serial data.

The conditions to run HST-S1M-CT is as follows. They must be satisfied at each operation.

- 1) Sensor must be fixed at one place.
- 2) Keep no obstacles for the best accuracy.

#### 4.2.2 Communication Setup

Table 4. Communication Setup for Distance Detection

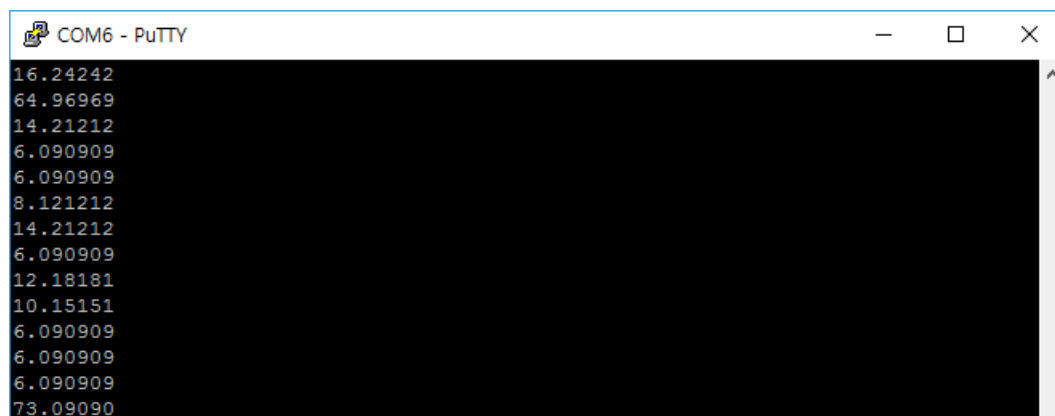
<b>Definition</b>	It outputs the distance value of an object at the nearest location from the sensor When the sensor is fixed at one place.	
<b>통신설정</b>	BaudRate	115200
	Stop bis	1

	Parity bit	None
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### 4.2.3 Output

- It begins to operate after “Start” is displayed through serial data.
- As shown in Fig. 9, the numeric value is output as serial data and displayed as the 5th decimal place.
- The unit of the numeric value is [cm].

Figure #8. Output of Distance Detection



## 5 Regulatory Approval

HST-S1M-CT is designed to meet UWB Specifications f CE, FCC and KC.

### 5.1 CE

CE certified (pending). This device may be used in any country in the Europe Union.

This device is made by Umain Inc.

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### 5.2 FCC

FCC certified (pending)

FCC ID : 2AN8QUMI-HST-S1M-CT

This device compiles 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 operations.

This device is made in Korea.

### 5.3 KC

KC certified

KC certification No. MSIP-CRM-umi-HST-S1M-CT



## 6 Contact

Repair Service or Purchase

Email : [sales@umain.co.kr](mailto:sales@umain.co.kr) / TEL: +82 (0)70 7005 8538

Technical Support

Email : [support@umain.co.kr](mailto:support@umain.co.kr)

## FCC MODULAR APPROVAL INFORMATION

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.
- (2) This device must accept any interference received, including interference that may cause undesired operation.

CAUTION: 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.

### FCC 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 & your body.

## OEM INTEGRATION INSTRUCTIONS:

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

The module must be installed in the host equipment such that 20 cm is maintained between the antenna and users, and the transmitter module may not be co-located with any other transmitter or antenna. The module shall be only used with the internal on-board antenna that has been originally tested and certified with this module. External antennas are not supported. As long as these 3 conditions above are met, further transmitter test 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.). The end-product may need Verification testing, Declaration of Conformity testing, a Permissive Class II Change or new Certification. Please involve a FCC certification specialist in order to determine what will be exactly applicable for the end-product.

### Validity of using the module certification:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the FCC ID of the module 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. In such cases, please involve a FCC certification specialist in order to determine if a Permissive Class II Change or new Certification is required.

### Upgrade Firmware:

The software provided for firmware upgrade will not be capable to affect any RF parameters as certified for the FCC for this module, in order to prevent compliance issues.

### End product labeling:

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following:

“Contains FCC ID: 2AN8QUMI-HST-S1M-CT” .

### Information that must be placed in the end user manual:

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 show in this manual.