

# USER GUIDE FOR WIRELESS ACTIVE TAG 433MHZ WS433-TAG

WS433-TAG-MN-EN-01

DEC-2020

*This document is applied for the following products*



## WS433-TAG-01

<b>SKU</b>	WS433-TAG	<b>HW Ver.</b>	2.5	<b>FW Ver.</b>	2.0
<b>Item Code</b>	WS433-TAG-01	WIRELESS ACTIVE SENSOR TAG 433MHZ, AA 1.5-3.6VDC BATTERY, IP67, C/W STEEL BRACKETS			



## WS433-CL-07

<b>SKU</b>	WS433-CL	<b>HW Ver.</b>	2.5	<b>FW Ver.</b>	2.0
<b>Item Code</b>	WS433-CL-07	WIRELESS SENSOR TAG RECEIVER, INTERNAL ANTENNA, 7M CABLE, RS232, S2X PROTOCOL, C/W STEEL BRACKETS			



## 1. Functions Change Log

Product	HW Ver.	FW Ver.	Release Date	Functions Change
WS433-TAG-01	2.5	5.0	DEC-2019	<ul style="list-style-type: none"><li>Change RF data rate by button</li></ul>

## 2. Specification of SENSOR TAG, WS433-TAG-01




Data speed	Up to 50kbps
Antenna	Internal Antenna
Battery	01 x AA 1.5 - 3.6VDC, working time up to 10 years (depends on configuration)
Frequency Band	ISM 433Mhz, Sub-GHz technology from Texas Instrument, USA
International Compliance	ETSI EN 300 220, EN 303 204 (Europe) FCC CFR47 Part15 (US), ARIB STD-T108 (Japan)
Vietnam Type Approval Certification	QCVN 73:2013/BTTTT, QCVN 96:2015/BTTTT (EMC Compliance)
Security Standard	AES-128
Operating temperature	-40oC..+60oC (with AA L91 Energizer battery)
Housing	Poly-carbonate, IP67
Installation method	Mounted buy screw on a trailer chassis

## 3. Specification of SENSOR TAG

# RECEIVER, WS433-CL-07

Communication	RS232
Data speed	Up to 50kbps
Antenna	Internal Antenna
Power supply	7..48 VDC, max 200mA
Electrical connector	Cable 7m length with PG9 cable gland
RF frequency band	Free license ISM 433.92Mhz (for others 868, 915, 920Mhz, refer related datasheets)
Ready to comply	ETSI EN 300 220, EN 303 204 (Europe) FCC CFR47 Part15 (US), ARIB STD-T108 (Japan)
Vietnam Type Approval Certification	QCVN 73:2013/BTTTT, QCVN 96:2015/BTTTT (DAVITEQ B00122019)
Security Standard	AES-128
Operating temperature	-40oC..+85oC
Housing	Poly-carbonate, IP67
Installation method	Mounted on trailer truck

## 4. Operation Principle of SENSOR TAG, WS433-TAG-01

-  The WS433-CL-07 only connected with **1** sensor WS433-TAG. If there are  $\geq 2$  nearby sensor tags, the WS433-CL-07 will receive the WS433-TAG which has the **largest** RSSI.
-  When WS433-CL-07 has connected to a sensor tag. At that moment, WS433-CL-07 will **lock** with this sensor and **not** accept other sensor tag even if that sensor has a bigger RSSI.
-  When WS433-CL-07 has connected to a certain sensor tag. If within 5 minutes, this sensor tag is separated and not sent data back to the WS433-CL-07. The WS433-CL-07 will return to the state with no sensor connected, then ready to connect to a new nearby sensor tag.

### 4.1 Insert the battery

The following batteries can be used for this sensor tag.

## RECOMMENDED BATTERIES for WIRELESS SENSOR WS433

E91 AA Alkaline battery



-18 .. + 60 oC working temperature

10-year shelf life

3000 mAH Capacity

Price: 1X

L91 AA Lithium battery



-40 .. + 60 oC working temperature

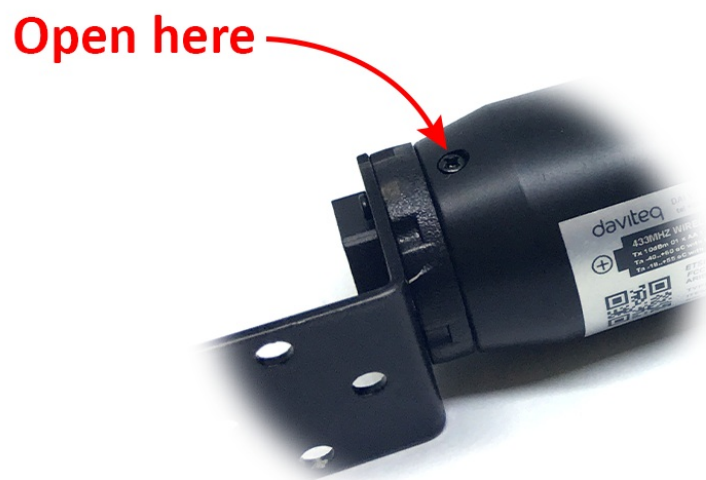
20-year shelf life

3500 mAH Capacity

Price: 3.5X

WS433-SMT-H8.PNG

- **Step 1:** Open the sensor cover with a Phillips screwdriver;



- **Step 2:** Insert 01 x AA 1.5 or 3.6VDC battery, please take note of the poles of the battery;

**⚠ ATTENTION: REVERSED POLARITY OF BATTERY IN 10 SECONDS CAN DAMAGE THE SENSOR CIRCUIT!!!**



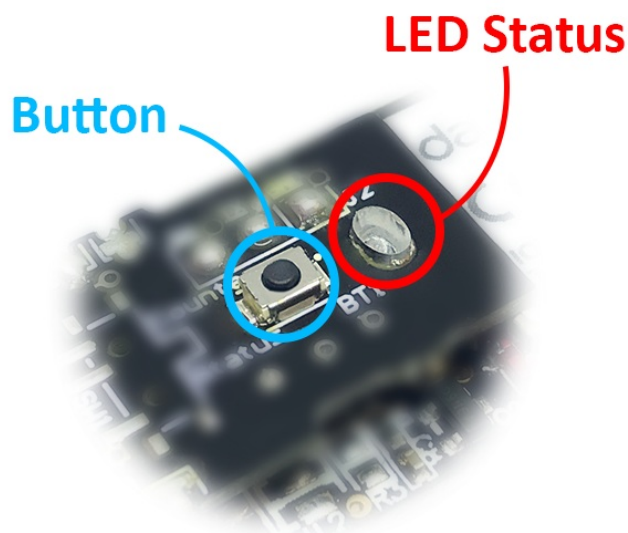
- **Step 3:** Insert the top plastic housing and locking by M2 screw.

## 4.2 Button Function

**⚠ The Sensor tag had been pre-configured, only use this feature if you really want to change the data rate RF.**

Open the cover of the sensor then use the push button to set the data transfer speed for the first 30 seconds when the battery is first installed, after 30 seconds the push button function does not work.

- Press and hold the button for 2 seconds => LED blinks once => Release the button to set Data rate RF 50kbps.
- Press and hold the button for 5 seconds => LED blinks twice => Release the button to set Data rate RF 625bps.
- Press and hold the button for 10 seconds => LED blinks 3 times => Release the button to reset RF parameters (frequency, RF output power, data rate), if held for more than 30 seconds then the button function does not work.



### Reset default WS433:

- **Frequency:** 433.92 MHz
- **RF transmit power:** -10 dBm
- **RF data rate:** 50 kbps

## 4.3 Modbus register of WS433-TAG-01

Modbus Register	Hex address	# of Registers	Description	Range	Default	Format	Property
395	18B	1	RSSI threshold to detect	(-100)-0	-60	uint16	Read/Write
396	18C	1	ASCII send cycle (second)	1-3600	300	uint16	Read/Write
397	18D	1	ASCII send enable	0-1	1	uint16	Read/Write

The WS433-TAG will send the signal to WS433-CL-07 every **60 seconds** (default setting).

WS433-CL-07 sends data back to the black box according to the **ASCII send\_cycle** configured time cycle, the default setting is **300 seconds**.

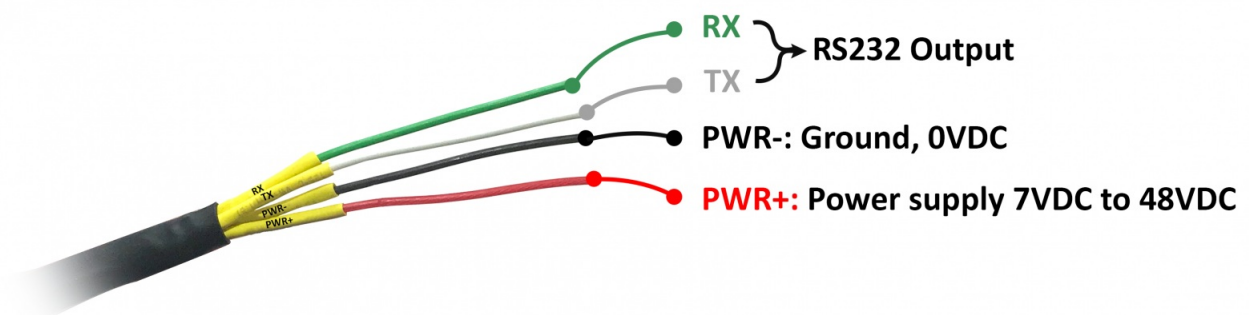
## 4.4 Datagram from Tx pin of RS232 port:

**DV,[Sensor Type],[ID Sensor tag],[% sensor battery],[RF signal strength],[error code],[value 1],[value 2],[Checksum][\r\n]**

- When **[error code] = 1** means that WS433-CL-07 has no wireless sensor tag connected yet.
- When the WS433-CL-07 is not connected to the WS433-TAG, if there is a sensor tag nearby, it will send all 3 packets with **RSSI > RSSI threshold**, the WS433-CL-07 receives that sensor tag and **[error code] = 0**, the buzzer of WS433-CL-07 will beep **once**.
- When the WS433-CL-07 is not connected to the WS433-TAG, if there are **≥ 2** nearby sensor tags, the WS433-CL-07 will receive the sensor tag which has the largest RSSI.
- When **[error code] = 0** means that WS433-CL-07 has connected to a sensor tag. At that moment, WS433-CL-07 will lock this sensor tag, not accept other sensor tag even if that sensor tag has a bigger **RSSI**.
- When **[error code] = 0** means that WS433-CL-07 has connected to a certain sensor tag. If within **5 minutes**, this sensor tag is separated and not sent back to the WS433-CL-07. Then **[error code] = 1** and WS433-CL-07 will return to the state with no sensor tag connected, then ready to connect to a new nearby sensor tag.

## 5. Operation Principle of WS433-CL-07

### 5.1 IO Wiring



**i** Each cable includes wires which are marked labels according to types of connection. (user should not cut these labels before installation to avoid confusion).

**i** The signal wire **Tx (WS433-CL-07)** will connect to the **Rx (Black box)** wire and vice versa.

- **Red:** PWR+(7...48VDC)
- **Black:** PWR-(0VDC)

- **Green:** RX
- **White:** TX

The signal cable from the sensor should be protected by a corrugated hose or the Ø16 protection tube, keep the cable avoid high-temperature areas.

## 5.2 Hall sensor and button function

**Button and Hall sensor (using magnets for activation) have the same function and are only available for the first 5 minutes after power on.**

**Press and hold** the push button or bring the **magnet** near the Hall sensor:

- For **2s** => see the LED blink **once** or the buzzer will ring **1 Beep** => Release the push button or Take the magnet out to set RF data rate RF **50 kbps**
- For **5s** => see the LED blink **twice** or the buzzer beep **2 Beep** => release the push button or take the magnet out to set RF data rate RF **625 bps**
- For **10s** => see the LED blinking **3 times** or the buzzer buzzes **3 Beep** => release the push button or take the magnet to perform the **User factory reset** (User factory reset = reset frequency, RF transmit power, data rate, Slave ID, Modbus operating parameters, compare time for data status).
- If it takes more than **30 seconds**, the button will be **deactivated**.



## 5.3 Datagram from Tx pin of RS232 port:

**DV,[Sensor Type],[ID Sensor tag],[% sensor battery],[RF signal strength],[error code],[value 1],[value 2],[Checksum][\r\n]**

Description	Explain
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DV	Product of DAVITEQ
Sensor Type	Type of sensor connected
ID Sensor tag	ID of sensor
% sensor battery	Sensor battery percentage (value = 10, 30, 60, 99%)
RF	Signal strength: 0 .. 4 (4 is strongest)
Error code	<ul style="list-style-type: none"> <li>0: No error</li> <li>1: Error</li> </ul>
Value 1 and Value 2	The value of wireless sensor (wireless tag), each value has <b>04</b> bytes in HEXA
Calculation for <b>Checksum</b>	Sum of bytes in the string of { DV,[Sensor Type],[ID Sensor tag],[% of sensor battery],[RF signal strength],[error code],[value 1],[value 2], } → Then perform <b>AND</b> with 0xFF then convert to HEXA code.
[\r\n]	for ending, Enter and new line

### For Example:

#### 1. Wireless tag for trailer WS33-TAG:



**DV,15,020201112,99,2,0,00000000,00000000,ED\r\n**

Description	Explain
15	wireless tag for trailer WS433-TAG
020201112	ID Sensor tag
99	% sensor battery
2	RF signal strength
0	No error
00000000	→ not used for this sensor
00000000	→ not used for this sensor
ED	checksum

#### 2. Wireless temperature sensor WS433-M12F-ATE:



**DV,01,020201111,99,4,0,41D9999A,41D9999A,85\r\n**

Description	Explain
01	temperature sensor
020201111	ID Sensor tag
99	% sensor battery
4	RF signal strength
0	No error



41D9999A	Convert to <b>Float*</b> → 27.2°C <i>*Because the sensor Type 01 specifies: both HEXA value of value 1 and value 2 are Float.</i>
41D9999A	
85	checksum

## 6. Installation

All the device such as WS433-TAG-01 and WS433-CL-07 should be fixed on trailers or tractors with screws;

### ATTENTION:

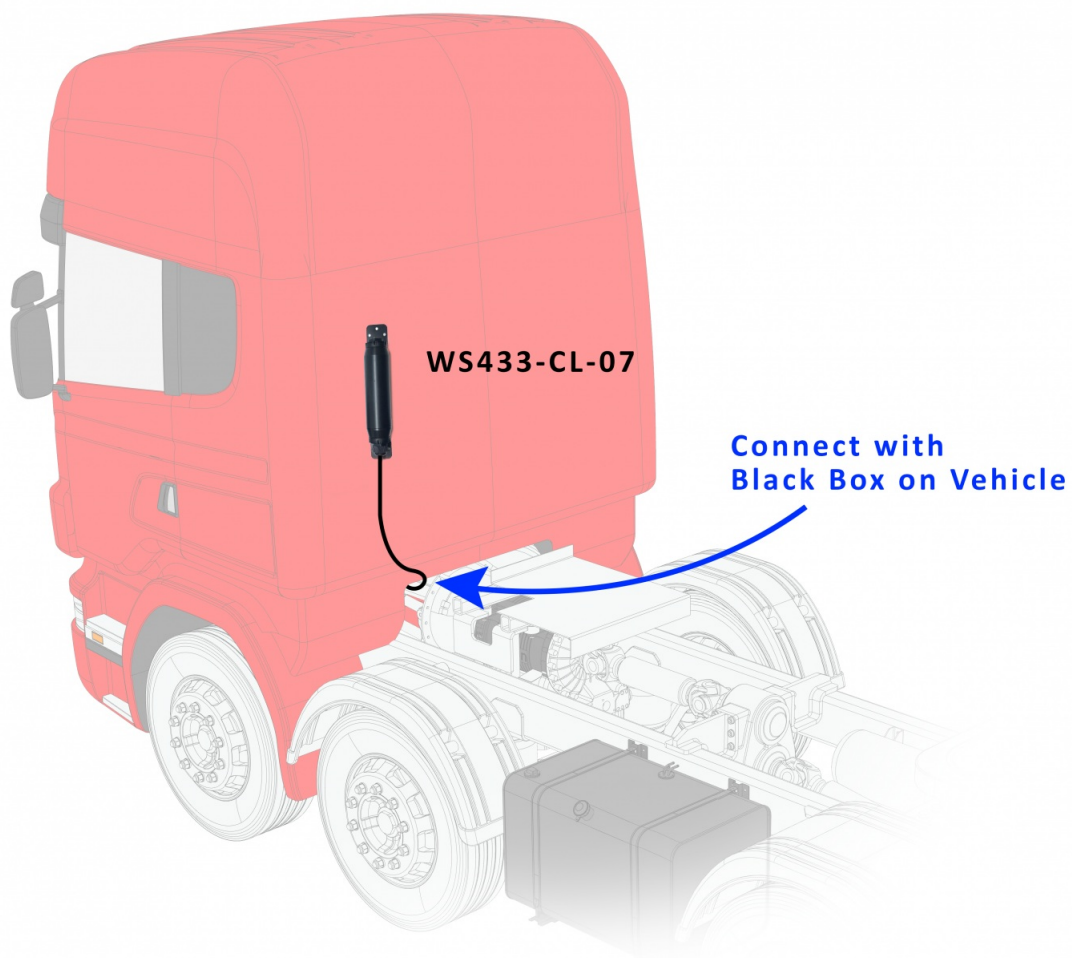
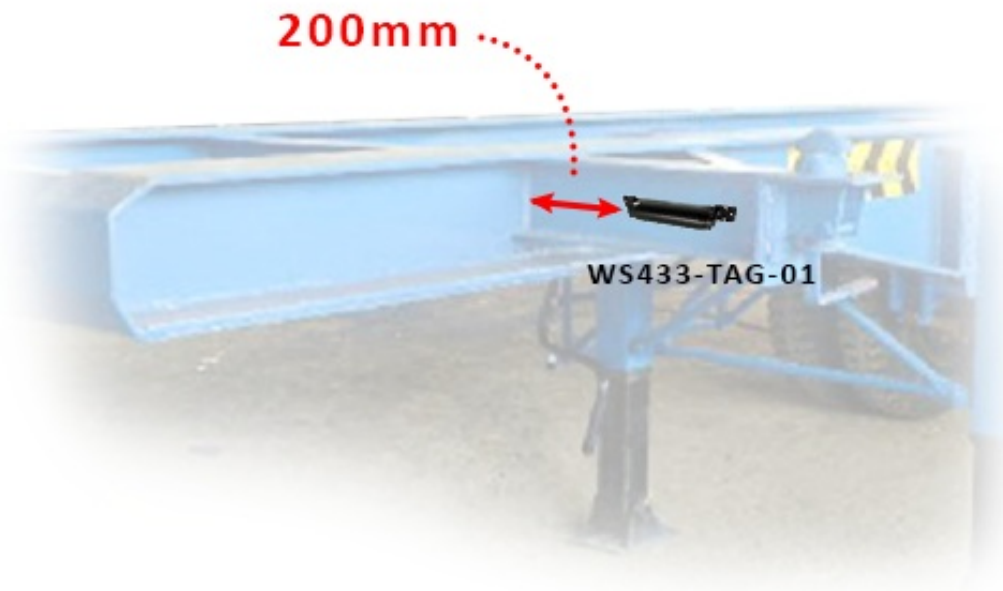
⚠ **DO NOT** install the Wireless sensor tag inside a completed metallic box or housing, because the RF signal can not pass through the metallic material. The housing is made from Non-metallic materials like plastic, glass, wood,... is acceptable.

### NOTE:

⚠ The WS433-TAG and WS433-CL-07 sensors should be installed as close together as possible;

The maximum distance to connect is **3 meters** (If installed outside this distance, WS433-TAG and WS433-CL-07 will lose connection).





## 7. Troubleshooting

No.	Phenomena	Reason	Solutions
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1	Wireless sensor WS433-TAG not connected to WS433-CL-07	<ul style="list-style-type: none"> <li>No power supply;</li> <li>The distance was too far beyond 3 meters.</li> </ul>	<ul style="list-style-type: none"> <li>Check that the battery is empty or not installed correctly;</li> <li>Reinstall sensor within 3-meter distance.</li> </ul>
2	Can't read Tx signal from WS433-CL-07	<ul style="list-style-type: none"> <li>No power supply;</li> <li>Wrong connection of signal wire Tx and Rx.</li> </ul>	<ul style="list-style-type: none"> <li>Check the power supply;</li> <li>Reconnect the Tx and Rx wires as instructed.</li> </ul>

## 8. Support contacts

Manufacturer



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