

UHF Scanner

SP1-QUBi Series

Operation Manual (SDKDemo App)



Sep.2021

DENSO WAVE INCORPORATED

0. SP1 Operation manual



Please Note:

SP1 firmware **Ver1.14** or later
Target Setting application **Ver1.04** or later
Sample application **Ver1.20** or later
Using the above.

Target Setting application(File:SP1_BTTargetSetting_version.apk)
Sample application(File:DensoScannerSDK_Demo_version.apk)
are included with the SDK.

Some other applications have the same functions as the BT Target Setting application.

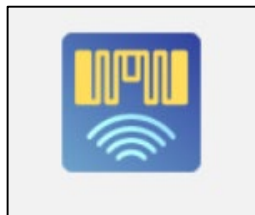
In that case, follow the usage instructions for the application.

This manual describes the operation procedure of the Target Setting and the Sample application.

Connection for each application is required. Therefore, when transitioning from the Target Setting application to the Sample application, it is temporarily disconnected.

0. SP1 Operation manual

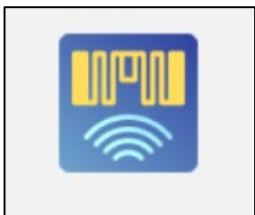
Connecting to a device for the first time:



Register SP1 by Target Setting app.

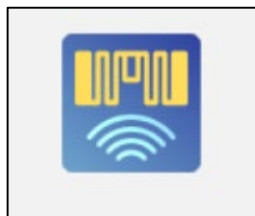
Sample app connects to SP1.

Connecting to the device for the second time or later:



Sample app connects to SP1 automatically.

When changing a device:



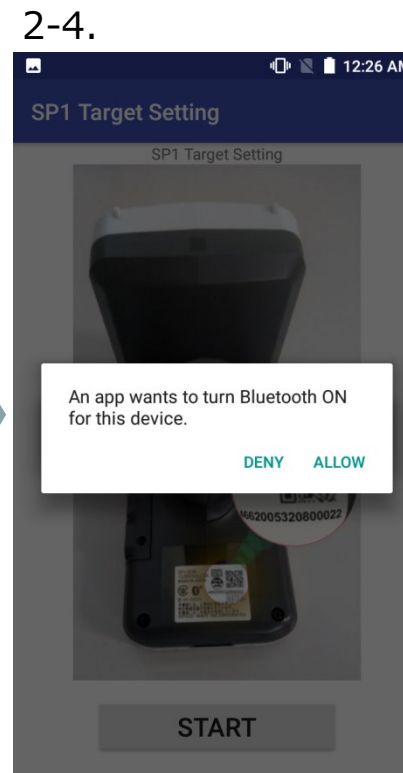
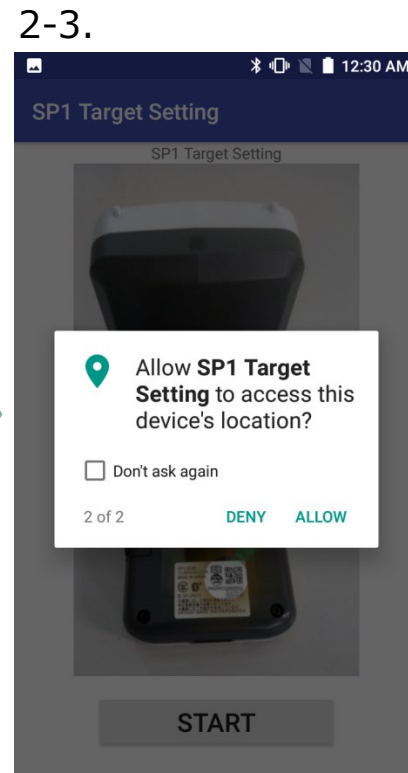
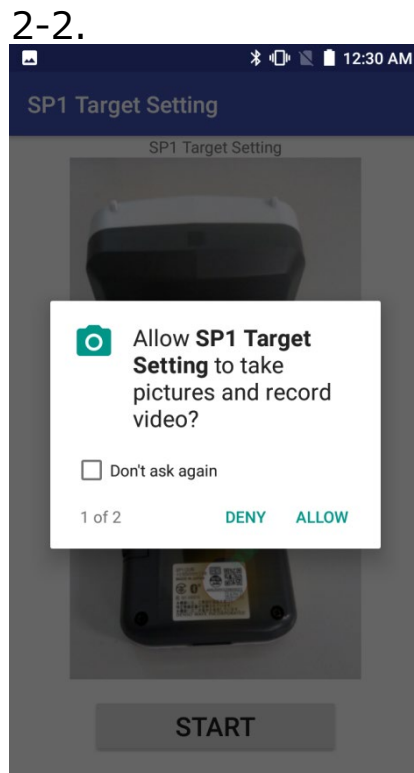
Register SP1 by Target Setting app.

Sample app connects to SP1.

1-1. How to use the Target Setting App

1. Power on SP1 → Flashing blue LED → means waiting to be Paired and Connected.
2. Start the "Target Setting" App and press "Allow" to the messages that appear.
(See the screen shots below).
- 3-1. Press "Start" then camera starts
* Since Android 10 and later, Android specifications have changed, so please turn on the "Use location" in advance on the Android setting screen. If this setting is OFF, "Target Setting" App will not be able to pair with the device.

2-1. "Target Setting" App ⇒ 



1-2. How to use the Target Setting App

- 3-2. Read the QR Code on the underside of the SP1 with the camera.
- 3-3. It tries to connect to SP1. **If connection fails, follow the guide displayed on the screen.**
4. If the connection is successful, this screen is displayed.

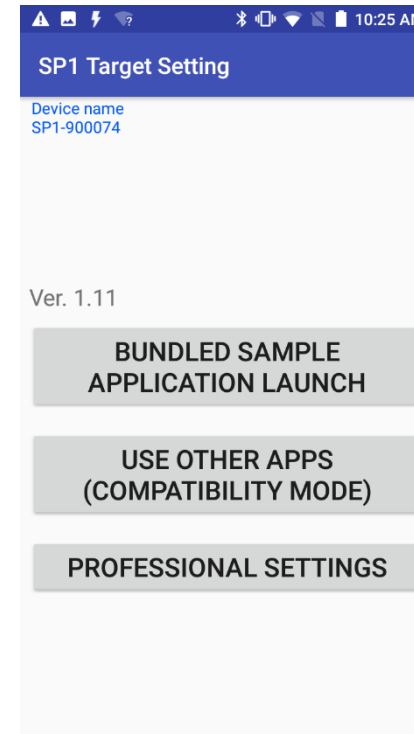
3-2.



3-3.



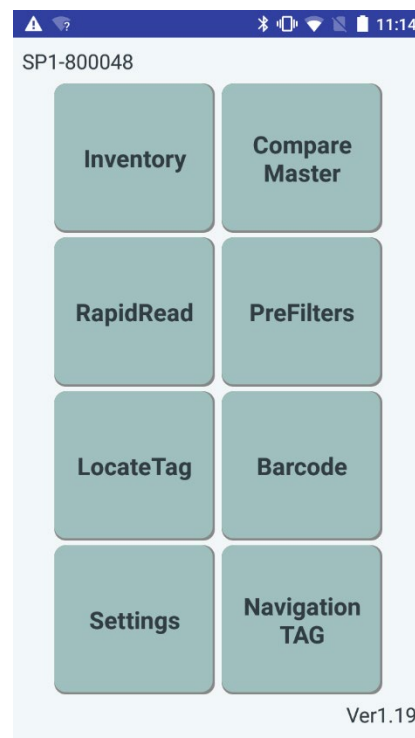
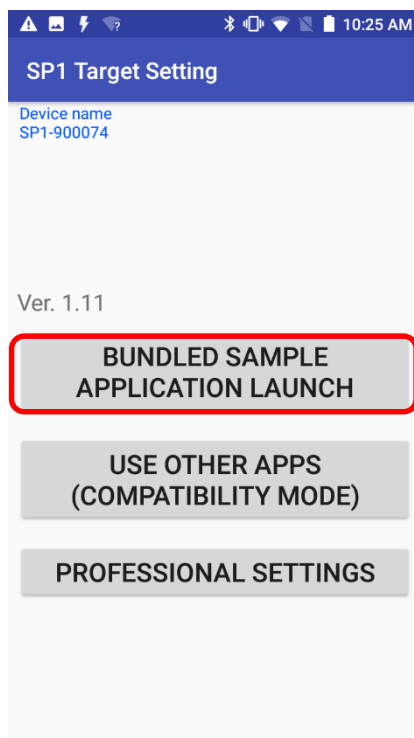
4.



1-3. How to use the Target Setting App

- 4-1. When using the bundled sample app, select Launch BUNDLED SAMPLE APPLICATION LAUNCH.
Sample application starts and automatically connects to SP1 after a few seconds.
*If other application is unable to connect to SP1, select USE OTHER APPS (COMPATIBILITY MODE).

4-1.



The following settings are automatically set.

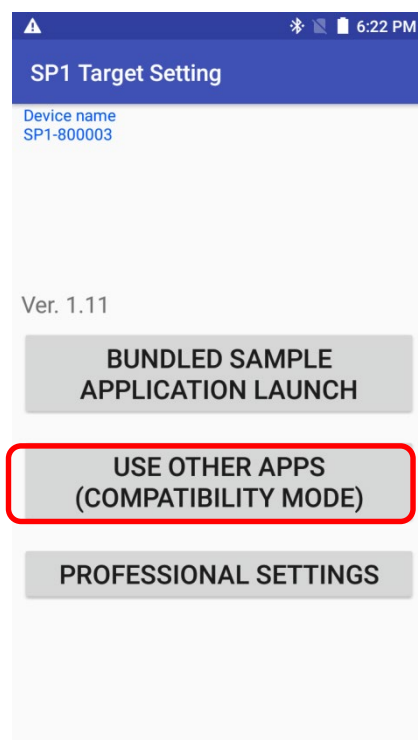
Reconnect Operation "Automatic Anytime"
Master Timeout "No Timeout"
Slave Timeout "No Timeout"

1-4. How to use the Target Setting App



4-2. If you use other application, select USE OTHER APPS.
After selecting, this application will be terminated.
And start other applications with pressing and holding the PAIR key.

4-2.

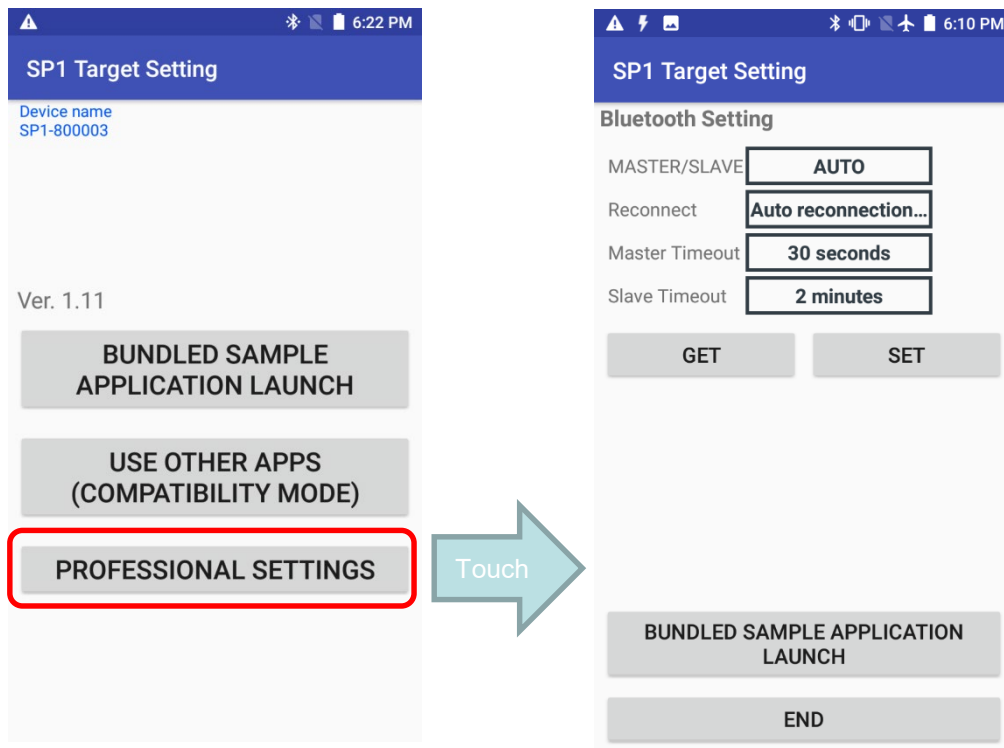


1-5. How to use the Target Setting App

4-3. It is possible to set SP1 Bluetooth by selecting the PROFESSIONAL SETTINGS.

**If you change the settings, some app may not be able to connect to SP1. Please set carefully.*

4-3.



The writing in **red** is default value.

[MASTER/SLAVE]

Master:SP1 always works as Bluetooth Master.

Slave:SP1 always works as Bluetooth Slave.

Auto:First time, SP1 works as Bluetooth Slave. The second or later connection, SP1 works as Bluetooth Master.

[Reconnect]

Manual: Bluetooth always activated by pressing the PAIR key after disconnection.

Auto reconnection after out of range:

Only when moving out of Bluetooth coverage area, Bluetooth starts automatically after disconnection.

***PAIR key is required for other cases.**

Automatic Anytime: Always start Bluetooth after disconnecting.

[Master timeout]

Timeout value for Bluetooth Master. If set to None, timeout will not occur.

Default is 30 seconds.

[Slave timeout]

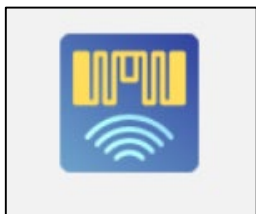
Timeout value for Bluetooth Slave. If set to None, timeout will not occur.

Default is 2 minutes.

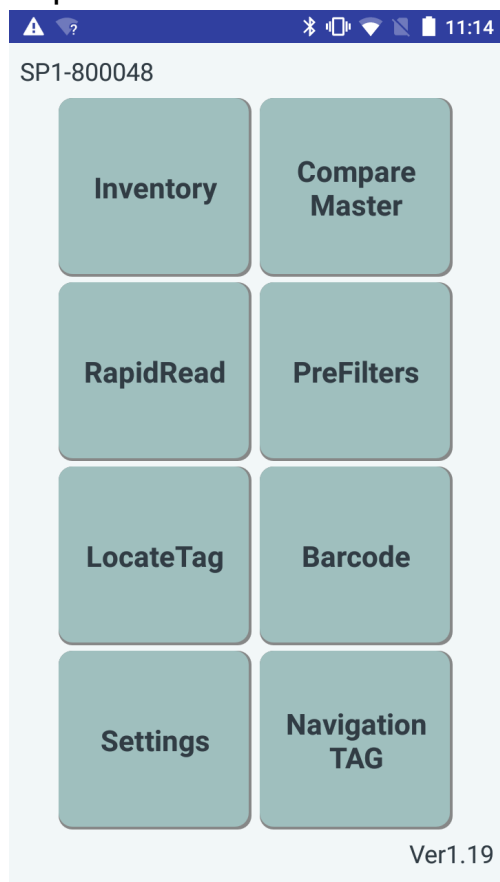
2-1. How to use the SP1 Demo SDK



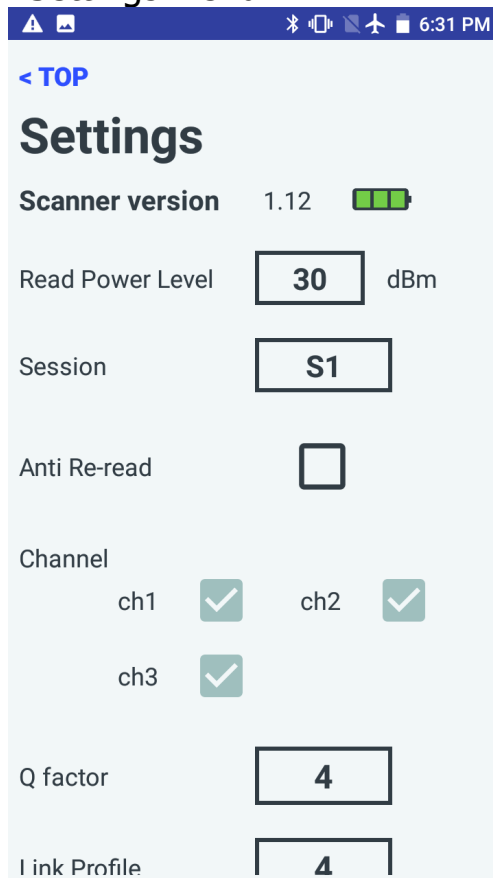
Start the "SP1DemoSDK"



Top Menu



Settings Menu



Setup RFID, Barcode reading function

【Read Power Level】

Set up reading distance with RF tag: between 4 and 30 dBm.

- The bigger the number, the further distance you can read.
- If you use between 4-10, check the operation (small distance).

【Session】

S0: Mainly used for performance tests or searches

The session flag reverts to A state immediately.

S1: Used for small level or continuous inventories.

The session flag reverts to A state after 0.5 – 5 sec

S2, 3: Used for large inventories and where multiple RFID readers are used in an inventory (different sessions). Session flag remains in B state whilst in RF field. It is reset to A state between 2 – 30 sec after the RF is removed.

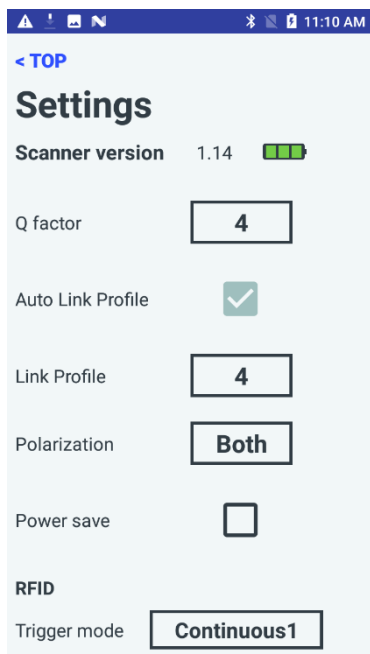
【Anti-Reread】

Tags that are read are stored in the SP1's memory. If this option is enabled, duplicate tags are not sent to the application (the SP1 only sends new tags once).

【Channel】

Selects the RF channels that the SP1 uses., There are various setting ex. "Enable all units, all channels", "Specified units and channels" when it use several Terminals at the same time.

2-2. How to use the SP1 Demo SDK



【Q factor】

Defines the number of 'slots' (tags) that are allowed in an inventory round. Higher number means more tags but slower inventory. A '0' setting alters the 'Q' value automatically depending on the quantity of tags seen – best for inventories.

【Auto Link Profile(Autopilot)】

This defines the auto connecting speed between the SP1 and tags.

When enabled, SP1 automatically switches and uses the appropriate Link Profile according to the tag reading status. When disabled, the following 【Link Profile】 setting value (fixed) is used. If this setting is enabled on Europe models, the output is limited to 24 dBm.

【Link Profile】

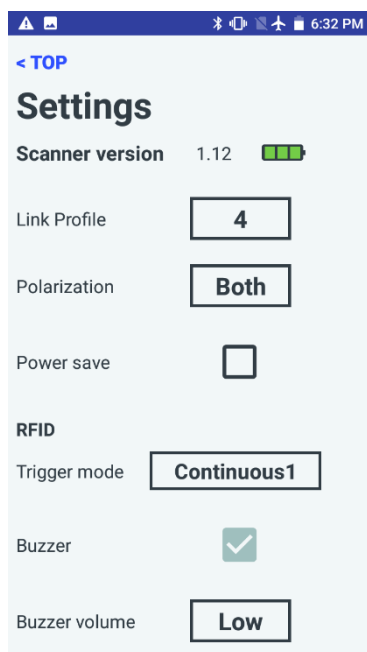
This defines the connecting speed between the SP1 and tags when 【Auto Link Profile(Autopilot)】 is disabled. For EU model settings see below.

It is important to check carefully which profile to use in advance, because it's depending on real environment.

Link Profile	Modulation	Tari	Response	Link frequency	Data speed
1	PR-ASK	25us	Miller-4	250kHz	62.5kbps
2	PR-ASK	25us	Miller-4	300kHz	75kbps
4	PR-ASK	12.5us	Miller-2	400kHz	200kbps
5	PR-ASK	12.5us	FM0	400kHz	400kbps

- **Link profile 1:** Most reliable with fewest errors, but slowest; the BHT-1281QULWB-CE uses this mode. Best for difficult or noisy environments.
- **Link profile 2:** Faster than profile 1, but it becomes more sensitive to the surrounding environment.
- **Link profile 4:** Faster still, but best used in a 'clean' and noise-free environment. Be careful!
- **Link profile 5:** This is the fastest mode, but is prone to errors/re-reads. It is used in the "RapidRead" test option, but is not recommended for normal use.

2-3. How to use the SP1 Demo SDK



【Polarization】

Switches the polarization of SP1's built-in antenna.

Vertical : Responds strongly to tags in the vertical orientation, but horizontal tag reading is reduced.

Horizontal : Responds strongly to tags in the horizontal orientation, but vertical tag reading is reduced.

Both : Vertical and horizontal tags are read equally well (the antennas are switched automatically).

【Power save】

By automatically controlling the RF module during reading, power consumption is reduced.

R F I D

【Trigger mode】

Auto OFF : When the trigger is pressed, the scanner reads for approximately five seconds, then stops even though the trigger may still be pressed.

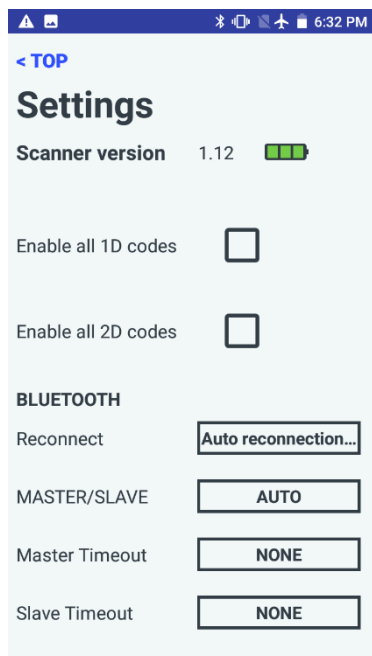
Momentary : The scanner starts reading when the trigger is pressed and stops when it is released.

Alternate : The scanner alternates between reading and off every time the trigger switch is pressed & released.

Continuous reading mode 1 : When you turn the scanner on, it reads without pressing the trigger. Reading is continuous until telling the reader to stop.

Continuous reading mode 2 : When you turn the scanner on, it reads without pressing the trigger. Reading is performed until the reading is completed. Afterwards, it enters 'waiting' mode. To read again, execute a 'read start instruction' after a 'read stop instruction'.

2-4. How to use the SP1 Demo SDK



【Buzzer】 : Set buzzer sounder ON or OFF.

【Buzzer volume】 : Select the volume level (High, medium, low)

BARCODE

【Trigger mode】

Auto OFF : When the trigger is pressed, the scanner reads for approximately five seconds, then stops even though the trigger may still be pressed.

Momentary : The scanner starts reading when the trigger is pressed and stops when it is released.

Alternate : The scanner alternates between reading and off every time the trigger switch is pressed & released.

Continuous reading mode 1 : When you turn the scanner on, it reads without pressing the trigger. Reading is continuous until telling the reader to stop.

Continuous reading mode 2 : When you turn the scanner on, it reads without pressing the trigger. Reading is performed until the reading is completed. Afterwards, it enters 'waiting' mode. To read again, execute a 'read start instruction' after a 'read stop instruction'.

Trigger Release Mode : The aimer* illuminates when the trigger key is pressed. When the trigger key is released, the illumination LED turns on and the SP1 starts reading a code. The SP1 goes into standby state when a code is read or after 5 seconds.

【Enable all 1D codes】

Enables/Disables the 1D barcode symbologies. Readable codes are as follows.

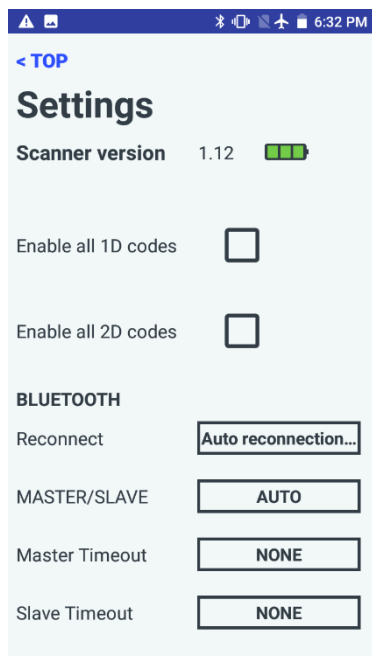
[EAN-13/-8 (JAN-13/-8) 、UPC-A/-E、UPC/EAN (with add-on) 、Interleaved 2 of 5、CODABAR (NW-7) 、CODE39、CODE93、CODE128、GS1-128 (EAN-128) 、GS1 DataBar (RSS)]

【Enable all 2D codes】

Enables/Disables the 2D barcode symbologies. Readable codes are as follows.

[QRcode、micro QRcode、SQRC、pdf417、microPDF417、Maxcode、DataMatrix (ECC200) 、GS1 DataBar Composite (EAN.UCC Composite)]

2-5. How to use the SP1 Demo SDK



BLUETOOTH

【Reconnect】

Manual: Bluetooth always activated by pressing the PAIR key after disconnection.

Auto reconnection after out of range:

Only when moving out of Bluetooth coverage area, Bluetooth starts automatically after disconnection.

*PAIR key is required for other cases.

Automatic Anytime: Always start Bluetooth after disconnecting.

【MASTER/SLAVE】

Master: SP1 always works as Bluetooth Master.

Slave: SP1 always works as Bluetooth Slave.

Auto: First time, SP1 works as Bluetooth Slave. The second or later connection, SP1 works as Bluetooth Master.

【Master timeout】

Timeout value for Bluetooth Master. If set to None, timeout will not occur.

Default is 30 seconds.

【Slave timeout】

Timeout value for Bluetooth Slave. If set to None, timeout will not occur.

Default is 2 minutes.

2-6. How to use the SP1 Demo SDK



Inventory is a reading Tag function.

【Start】

Start reading tag data.

【Clear】

Clear the data.

【File output】

Output the read data in CSV file format.

The output folder is internal storage/SP1Sample.

The output file can be used as master data on “Compare Master” function.

2-7. How to use the SP1 Demo SDK



2:10 PM

< TOP

Compare Master

Master_file_name

Actual / Stock

0 / 2000

[0 / Unlisted]

Unlisted EPC

Start

Clear

Select Master

Result output

Compare Master is a matching function.

【Start】

Start reading tag and matching.

【Clear】

Clear the data.

【Select Master】

Select a master file. The file which is outputted on “Inventory” can be used.

【Result output】

Output the result as a file.

The output folder is internal storage/SP1Sample.

Actual: Number of collated data

Stock: Number of master data

Unlisted EPC: Number of read tags outside master data

Result output file example

2019/04/02 10:41:10

uncounted

E2003098041901240940B9BE

E2806E8F00000039005A6F0F

E2806810000000394019AD84

unlisted

E28068100000003940195AA6

33123ECB670005C000000212

uncounted : unmatched tag in master data

unlisted : read tags outside master data

2-8. How to use the SP1 Demo SDK



PreFilter is a mask function applied to Tag data.

< TOP

PreFilters

Bank Offset(bit)

Pattern

Set

Clear

Load

【Bank】

Specify the Tag's data bank
UII (EPC), TID, USER

【Offset(bit)】

Specify the offset (start) bit number in the chosen Bank.
Example: When you want to target ABCD of xxxxABCD, Offset (bit) = 16

【Pattern】

Specify the data pattern in hexadecimal.

【Set】

Set the data.

【Clear】

Clear the data.

【Load】

Load the previous data.

2-9. How to use the SP1 Demo SDK

A function to search for tags.

【Read】

Select read output from 4, 10, 15, 20.

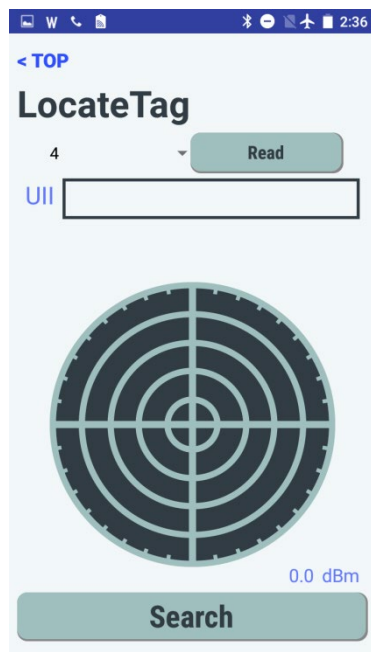
Press [**Read**] to wait for reading, so press the trigger and read the tag to be searched.
Data is entered in the UII column.

【Search】

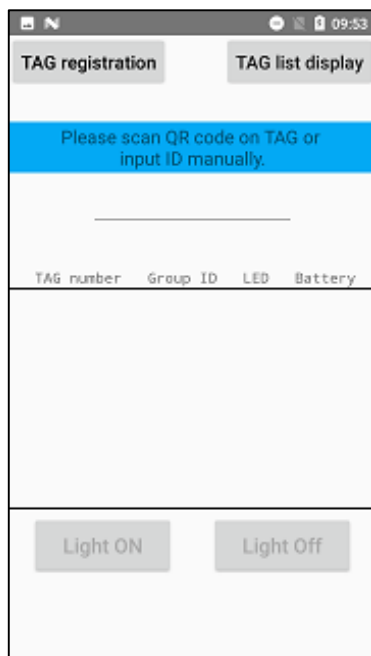
Press to start searching.

When a tag is close (signal strength is high): The circle becomes small and red.

When a tag is at a distance (signal strength low): The circle becomes large yellow.



2-10. How to use the SP1 Demo SDK



This function that turns on/off the TAG and acquires the battery status.

This consists of the following.

- ① TAG registration
- ② Turn on/off TAG
- ③ TAG list display

Each TAG has the same TAG number as the QR code attached to the TAG.

The TAG number is 12 alphanumeric characters. You can also register a group ID for each TAG.

The group ID is a number from 1 to 9999. You can register the same group ID for multiple TAGs.

You can turn on/off one TAG by choosing the TAG number. By choosing the group ID, you can turn on/off TAGs at once.

The procedure for turning on/off the TAG is as follows.

【When using TAG ID】

- ① On the "Register TAG" screen, scan the QR code attached to the TAG and register the TAG on the application.
- ② On the "Turn on/off TAG" screen, enter the TAG number (by scanning QR code) of the TAG to turn on/off.
- ③ On the "Turn on/off TAG" screen, press the "Turn on" or "Turn off" buttons.

【When using TAG group No.】

- ① On the "Register TAG" screen, scan the QR code attached to the TAG and register the TAG on the application.
- ② On the "Register TAG" screen, enter the group ID (1 to 99999) for the registered TAG and register.
- ③ On the "Turn on/off TAG" screen, enter the group ID to turn on/off.
- ④ On the "Turn on/off TAG" screen, press the "Turn on" or "Turn off" buttons.

You can check the battery status of the TAG on the "Turn on/off TAG" screen and "TAG list display" screen.

For details, refer to the "Navigation TAG App Operation Manual".

3-1. Master data example

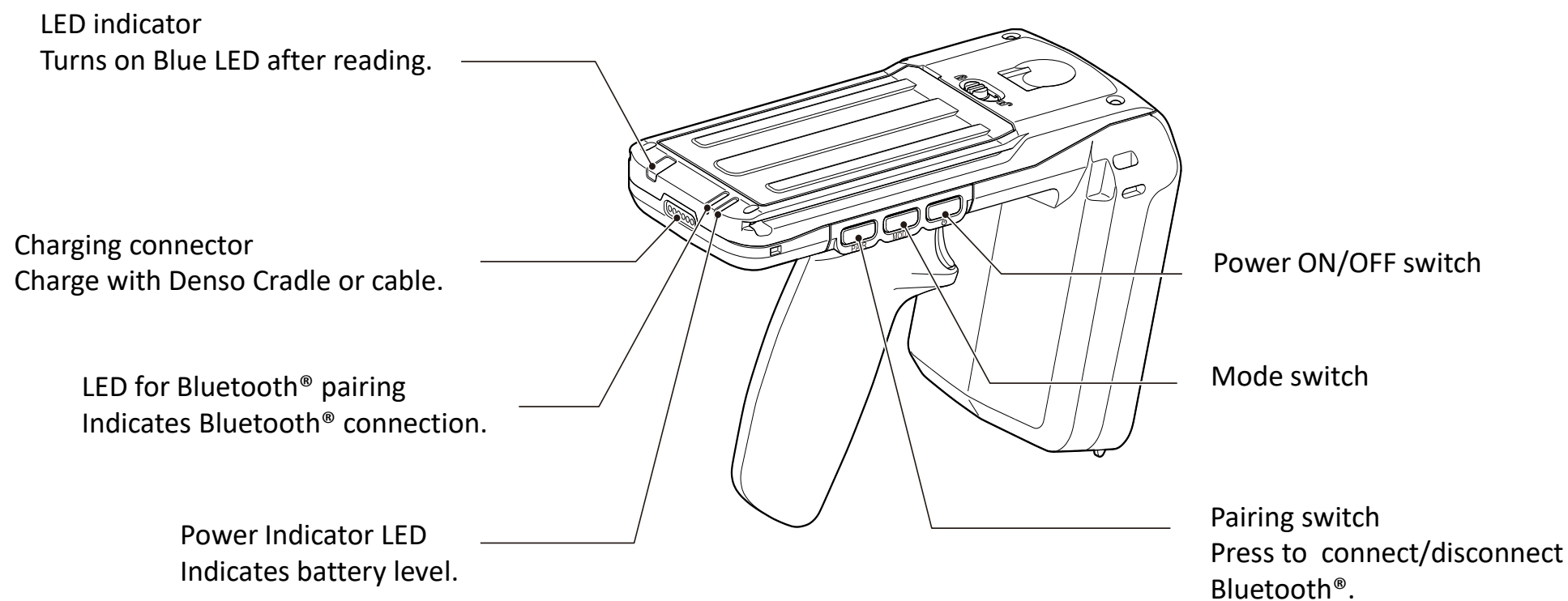


E2003098041901240940B9BE
E2806E8F00000039005A6F0F
E2806810000000394019AD84

4-1. SP1 Diagram

UHF Scanner
SP1 SERIES

**Operation
Manual**



4-2. SP1 Functions (Buttons)



Button	Behavior	Detail
Power Button 	Power ON/OFF	When pressed for more than one second in the power off state, the power is turned on. When pressed for more than three seconds in the power on state, the power is turned off.
	Checking the remaining battery level	The remaining battery level can be checked by lighting of the indicator LED by pressing the power button quickly (Less than 1 second). The remaining battery level is displayed in three stages.
Pairing Button 【PAIR】	Connect Bluetooth®	Holding down the button for one second or more and the Bluetooth® wireless link will be ready for use. When it is connected, the LED indicator illuminates in blue.
	Disconnect Bluetooth®	Holding down the button for one second or more, breaks the Bluetooth® wireless link .
	Disable Bluetooth®	Holding down the button for three seconds or more disables the scanner's Bluetooth® wireless link.
Mode Button 【MODE】	Switch the pairing mode	Holding down the button for three seconds or more and the Bluetooth® pairing mode (master mode/slave mode) will be switched.
	Check the pairing mode	When pressed the button for less than one second, the display LED lights in the color corresponding to the current pairing mode. Blue: Slave mode Red: Master mode
Trigger Switch	Reading a RF tag/code	Press the button to read a RF tag or a barcode.
※	Return to factory default settings	With the BHT power OFF, press this key combination (mode button + pairing button + power) for more than three seconds. Then SP1 return to factory default settings and turns off.

※ : Mode button, Pairing button and Power button.

4-3. SP1 Functions (LED's)



LED	Status	Detail
Display LED indicator	Red light	RF tag communicationg
	Blue light	RF Tag / Barcode reading complete
	Red flashes (flashing at short intervals, three times)	RF tag communication error (*1)
	Red flashes (flashing at medium intervals, three times)	Data transfer error (*2)
	Red flashes (Continuous flashing at middle intervals)	Equipment error (*2)
	Red flashes (Continuous flashing at long intervals)	Tag / Barcode Buffer full (*3)
	Blue lights (one second)	Current pairing mode : slave
	Red lights (one second)	Current pairing mode : master
Pairing LED indicator	Blue flashes (flashing: long intervals)	Ready for pairing
	Blue flashes (flashing: short intervals)	Pairing completed (iOS device only)
	Blue lights (Continuous flashing)	Connection complete
Power LED indicator	Green lights (one second)	Remaining battery level: 40% or more
	Orange lights (one second)	Remaining battery level: 39%~10%
	Red lights illumination (one second)	Remaining battery level: less than 10%
	Orange flashes (Continuous flashing)	Warning remaining battery level: 39%~10%
	Red flashes (Continuous flashing)	Warning remaining battery level: less than 10%
	Green light (Charging)	Charging complete
	Red light (Charging)	Charging
	Red flashes (Charging)	Charging error

*1 : Please check the RFID tag, surrounding environment, host side application etc.

*2 : If it happens even after turning the power off/on again, it may be a malfunction of the equipment.

Please contact the system administrator.

*3 : Batch mode only. Please transfer the data to the host application.

4-4. SP1 Functions (Beeper)



Function	Status	Detail
Power	Frequency 2.8->3.1->3.1-> 2.8KHz 4 times (ON 70ms、 OFF 70ms)	Power ON
	Low beep 5 times (ON 100ms、 OFF 100ms)、	Detection of battery deterioration
	Low, Intermittent sounding, 3 minute intervals 5 times (ON 100ms、 OFF 100ms)	Remaining battery level Less than 10%
	High, Long beep 1 time (ON 480ms)	Power OFF
Barcode/RFID	Short beep 1 time (ON 80ms)	Barcode reading complete
	Short beep 1 time (ON 80ms)	RFID tag reading complete
	Low, Short beep 5 times (ON 70ms、 OFF 70ms)	RFID tag error
	High, Short beep 5 times (ON 70ms、 OFF 70ms)	Reading data transfer error
	High, Short 5 times (ON 70ms、 OFF 70ms)	Setting writing error
	Low, Short beep 2 times (ON 70ms、 OFF 70ms)	Switching master -> slave
	Low, Short beep 3 times (ON 70ms、 OFF 70ms)	Switching slave -> master
Bluetooth®	High,Short beep 3 times (60ms、 60ms)	Bluetooth ON/Connect
	High, Long beep 1 times (480ms)	Bluetooth connection failing/Disconnect