TOSHIBA

TOSHIBA Bar Code Printer

B-SX/SA Series

RFID Analyze Tool Operation Specification

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TOSHIBA TEC CORPORATION

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1. SCOPE

This document describes the operational specifications of the RFID Analyze Tool (hereinafter referred to as “RFID Analyze Tool”) which analyzes the location of RFID tags to be used by the B-SX series or B-SA series bar code printers equipped with either of the following optional RFID kit:
B-9704-RFID-H1-QM,
B-9704-RFID-U1-US
B-9704-RFID-U1-EU,
B-SX704-RFID-H2 (Japanese model),
B-SX704-RFID-U2 (Japanese model), or
B-SA704-RFID-U2-EU-R.

2. GENERAL

Printers, which are equipped with an RFID kit, can print data on the surface of RFID labels as well as encode data of RFID tags.
When encoding data, a front feed or back feed is required depending on the positional relationship between an antenna of a printer and an RFID tag embedded in an RFID label.
The printer can set a front/back feed amount using the RFID Tag Position Adjustment Command ([ESC]@003). An optimal value of the front/back feed amount differs depending on the type of RFID tag, the shape of RFID tag antenna, the location of RFID tag embedded in RFID label, variation among modules, and other factors. It is recommended to obtain the optimal front/back feed amount under actual usage conditions.
The Analyze Tool is used for determining the optimal feed amount.

3. SYSTEM CONFIGURATION

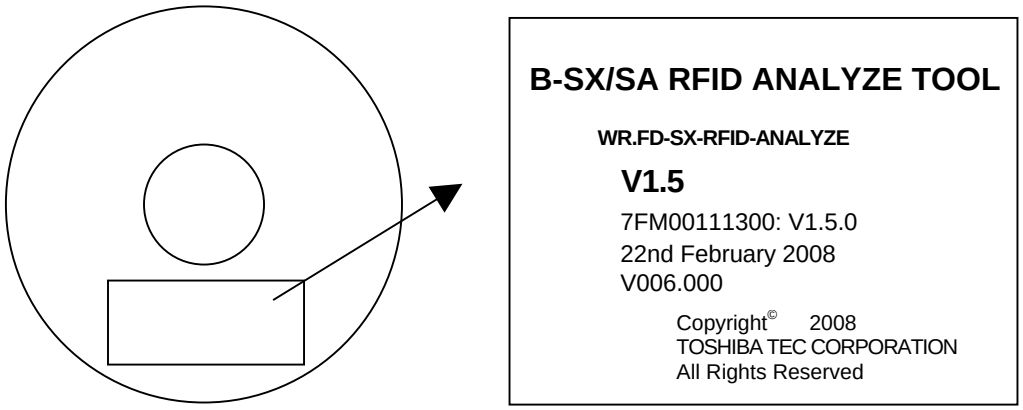
- System
  DOS/V computer, Windows2000 or WindowsXP
  (Performance is not guaranteed under an operation system other than the above.)
- Interface
  Serial port between personal computer and printer
- Memory capacity
  16 MB or more (32 MB or more is recommended)
- Free space of hard disk
  10 MB or more

* Windows is a registered trademark of Microsoft Corporation in the United States and other countries.

4. SOFTWARE INSTALLATION

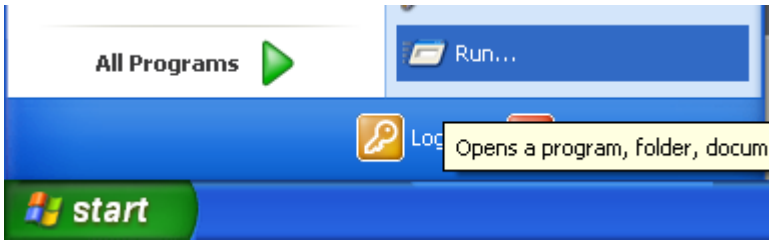
[Setup Disk]

The Installation Setup Disk consists of one CD-ROM.

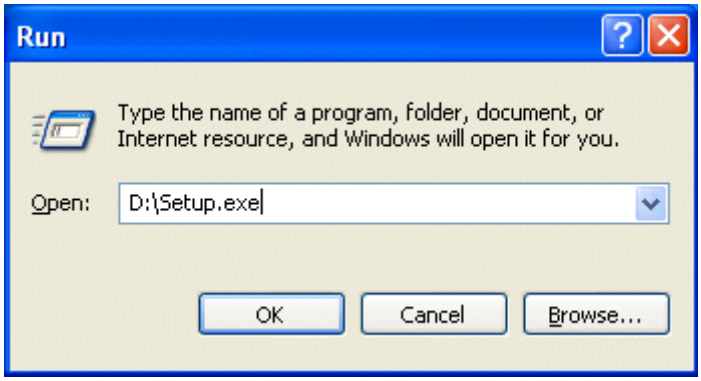


[Installation Procedure]

1. Start Windows and put the CD-ROM in the CD-ROM drive.
2. Click “Start”, then choose “Run”.



3. When the “Run” screen appears, enter “D:\Disk1\Setup.exe” in the “Open” entry field, then click on the [OK] button. (In the case the CD-ROM drive is drive D:.)



4. For the subsequent procedures, follow the instructions on the screens to complete the installation.
5. When the installation completes successfully, the screen, which notifies the completion of the installation of the RFID Analyze Tool, appears.

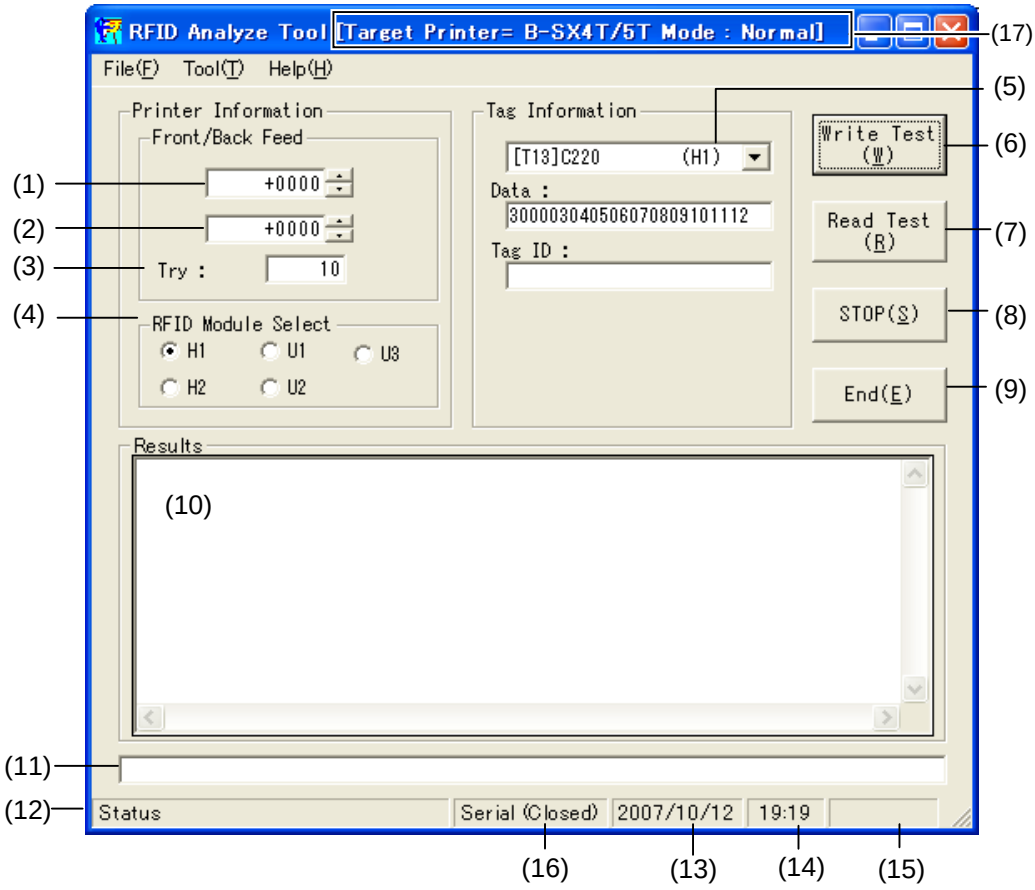
5. OPERATIONAL PROCEDURES

5.1 EXPLANATION OF THE FUNCTIONS OF THE APPLICATION

Start the Analyze Tool application.

5.1.1 Main Screen

RFID Analyze Tool Main Screen

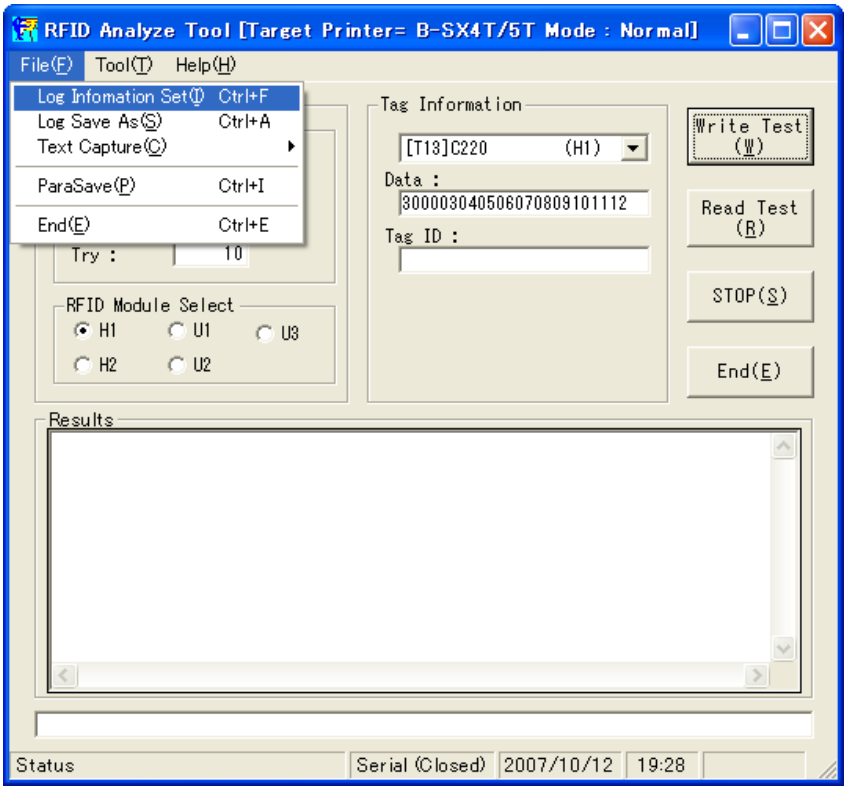


(1) Feed amount in + direction: +9999 to –9999
(2) Feed amount in – direction: +9999 to –9999
(3) The number of tests performed: 999 to 0
(4) RFID module type selection:
H1: B-9704-RFID-H1-QM
U1: B-9704-RFID-U1-US/EU
H2: B-SX704-RFID-H2
U2: B-SX704-RFID-U2
U2: B-SA704-RFID-U2-EU-R

(5) Tag type selection
(6) Starts a write test.
(7) Starts a read test.
(8) Stops the test.
(9) Closes the RFID Analyze Tool.
(10) Test result viewing area
(11) Displays the RFID module status
(12) Displays the test status
(13) Date
(14) Time
(15) Displays the capture sign when “Text Capture” is enabled
(16)Communication status display area
(17) Printer model and test mode display area

5.1.2 File Menu

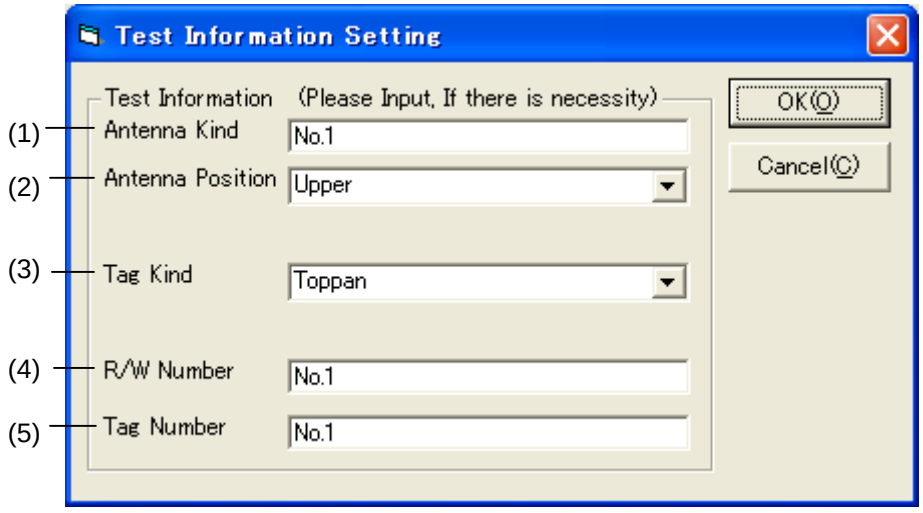
(1)
(2)
(3)
(4)
(5)



File Menu Screen

(1) Log Information Set: Enables setting the log information.
(2) Log Save As: Saves a log in text format.
(3) Text Capture: Saves a log in CSV format.
(4) ParaSave: Saves the parameter settings.
(5) End: Closes the RFID Analyze Tool.

(1) Log Information Set



Test information setting screen

(1) Antenna Kind: Antenna type
(2) Antenna Position: Position of the antenna
(3) Tag King: Tag type
(4) R/W Number: Read/Write test number
(5) Tag Number: Tag number

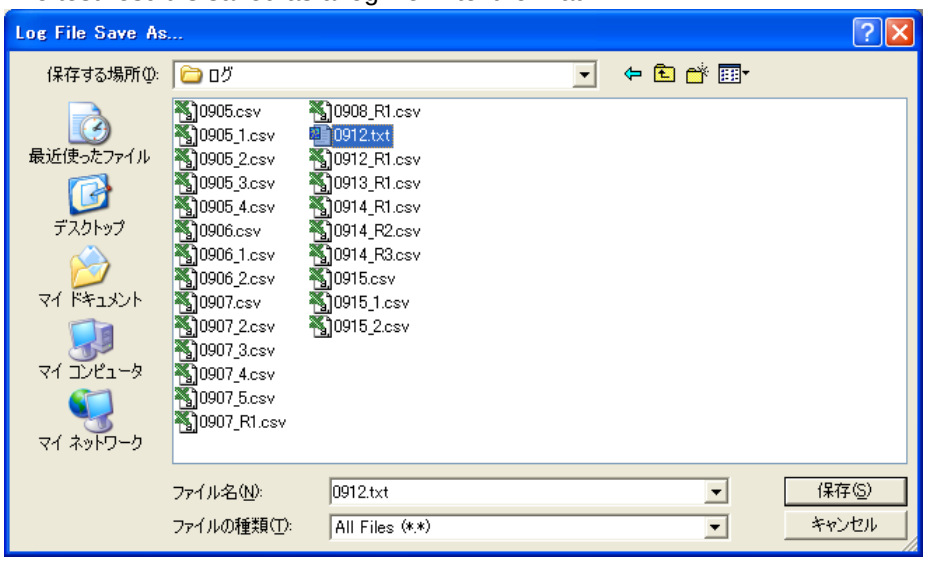
- The test information is displayed on the test result viewing area when a write/read test is performed.
- When “Text Capture” is enabled, the test information is registered in the header of every test and stored in the file.
- Data to be displayed or stored are as follows:

Display area
Antenna Kind No.1
Antenna Position Upper
Tag Kind Toppan
R/W Number No.1
Tag Number No.1

CSV file/Log file
Date&Time = 06/09/19 18:13:27:
Antenna Kind No.1
Antenna Position Upper
Tag Kind Toppan
R/W Number No.1
Tag Number No.1

(2) Log Save As

The test result is saved as a log file in text format.



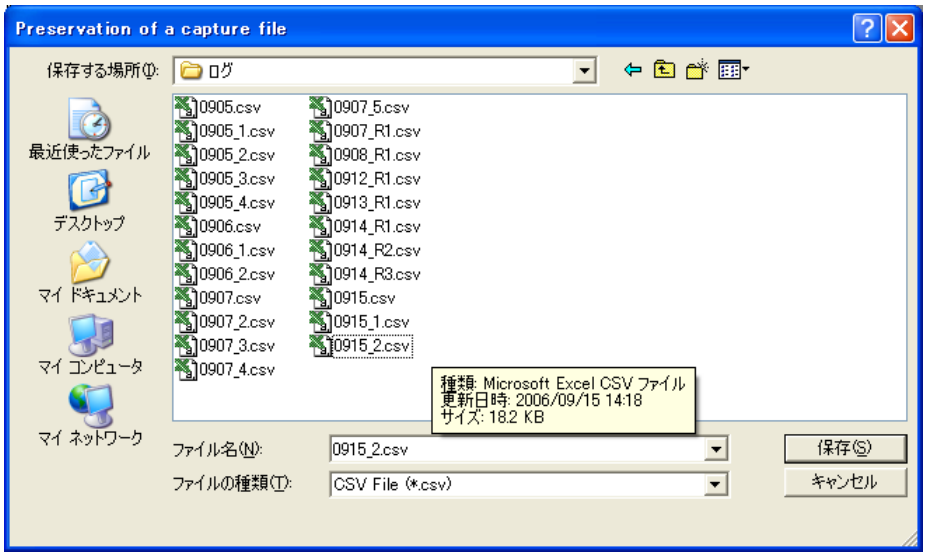
Log file designation screen

Data displayed on the test result viewing area is saved in text format.
Example) Data is saved as shown below. (File name: 0912.txt)

```
Date : 2006/09/19 Time :13:52:00
  Write Test Results
  < Power Level :00000014 >
+0030 : 5/5
+0060 : 5/5
  0000 : 5/5
-0030 : 5/5
-0060 : 5/5
```

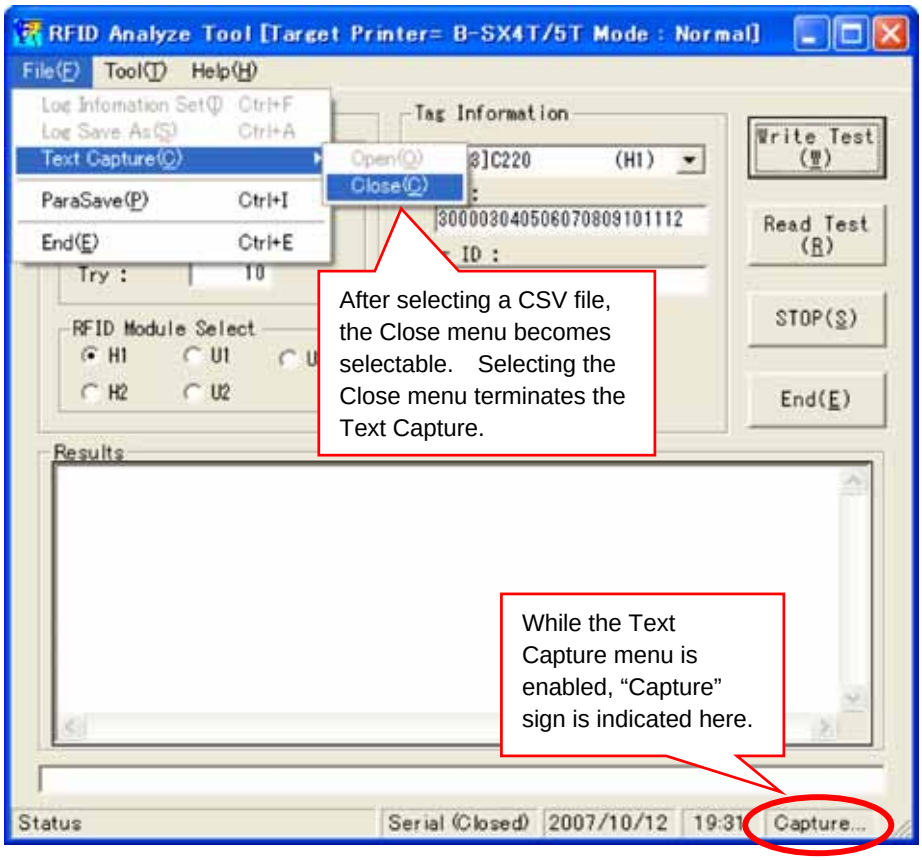
(3) Text Capture

The test result is automatically saved in the designated file in CSV format.
First, choose a file in which the log is to be saved.



Log file designation screen

After designating a file, the “Open” of the Text Capture menu is grayed out and the “Close” becomes selectable, instead.



RFID Analyze Tool Main screen and File menu

While the “Capture” sign is displayed on the bottom of the screen, the result of a write test or a read test will be automatically saved in the designated CSV file.

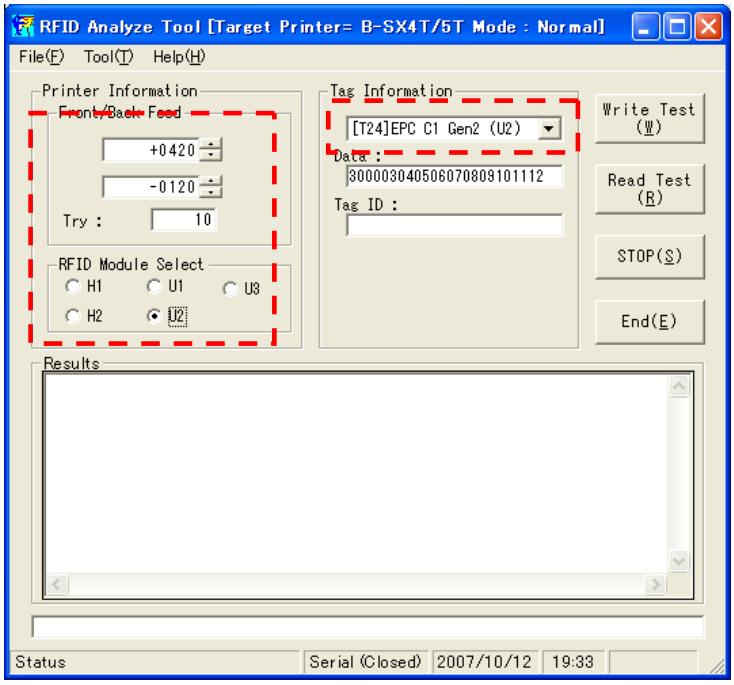
Example) Data saved in the selected CSV file (File name: 0915_2.csv)

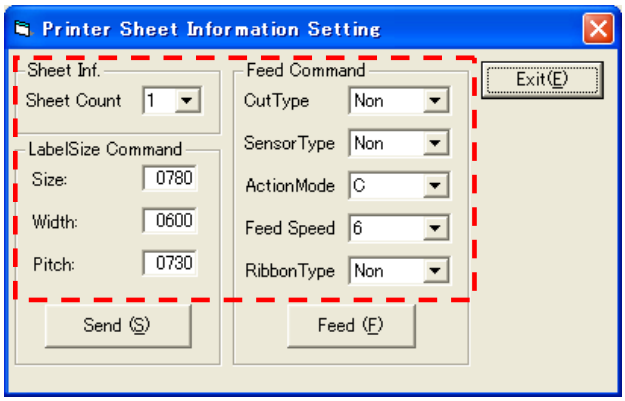
```
Date&Time = 06/09/19 13:51:19:
日付,時間,連番,位置,Try 回数,OK,NG,OK 回数,PWR Value,RFL Value,AGC Value,ErrorCode,Read EPC,Write Data
06/09/19,13:51:23,1,P: +0030,5,1,0,1,20,,,,,W:000304050607080910111230
06/09/19,13:51:24,2,P: +0030,5,1,0,2,20,,,,,W:030405060708091011123000
06/09/19,13:51:24,3,P: +0030,5,1,0,3,20,,,,,W:040506070809101112300003
06/09/19,13:51:25,4,P: +0030,5,1,0,4,20,,,,,W:050607080910111230000304
06/09/19,13:51:25,5,P: +0030,5,1,0,5,20,,,,,W:060708091011123000030405
06/09/19,13:51:26,1,P: +0060,5,1,0,1,20,,,,,W:070809101112300003040506
06/09/19,13:51:27,2,P: +0060,5,1,0,2,20,,,,,W:080910111230000304050607
                                :
                                :
06/09/19,13:51:39,4,P: -0060,5,1,0,4,20,,,,,W:300003040506070809101112
06/09/19,13:51:39,5,P: -0060,5,1,0,5,20,,,,,W:000304050607080910111230
```

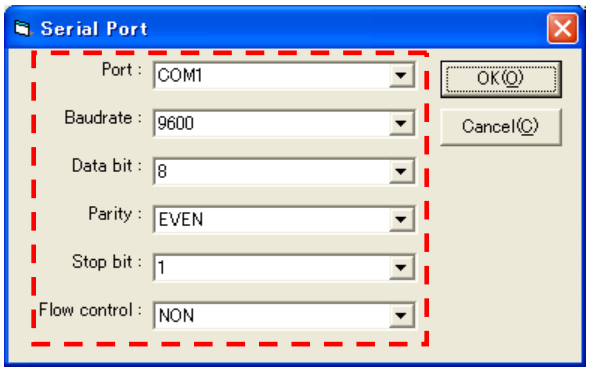
Date, Time, Serial number, Position, Try count, OK, NG, Number of successes, Power value, RFL value, AGC value, Error code, Read EPC, Write data

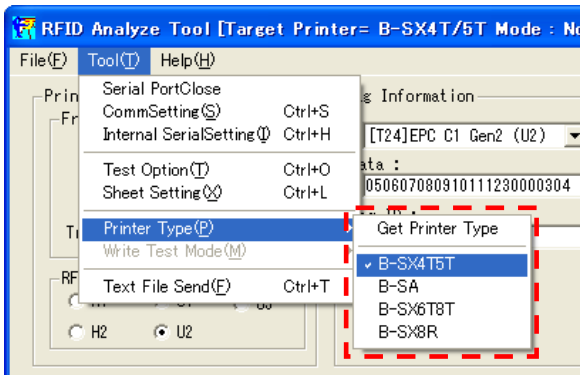
(4) ParaSave

To increase the efficiency of the test, the current test information (parameter settings) can be saved and retrieved when the program is executed next time.
Information to be saved: Feed amount, number of try times, module selected, tag information, conditions for communication with the printer, label size, feed command, sheet count, printer model, and test mode.









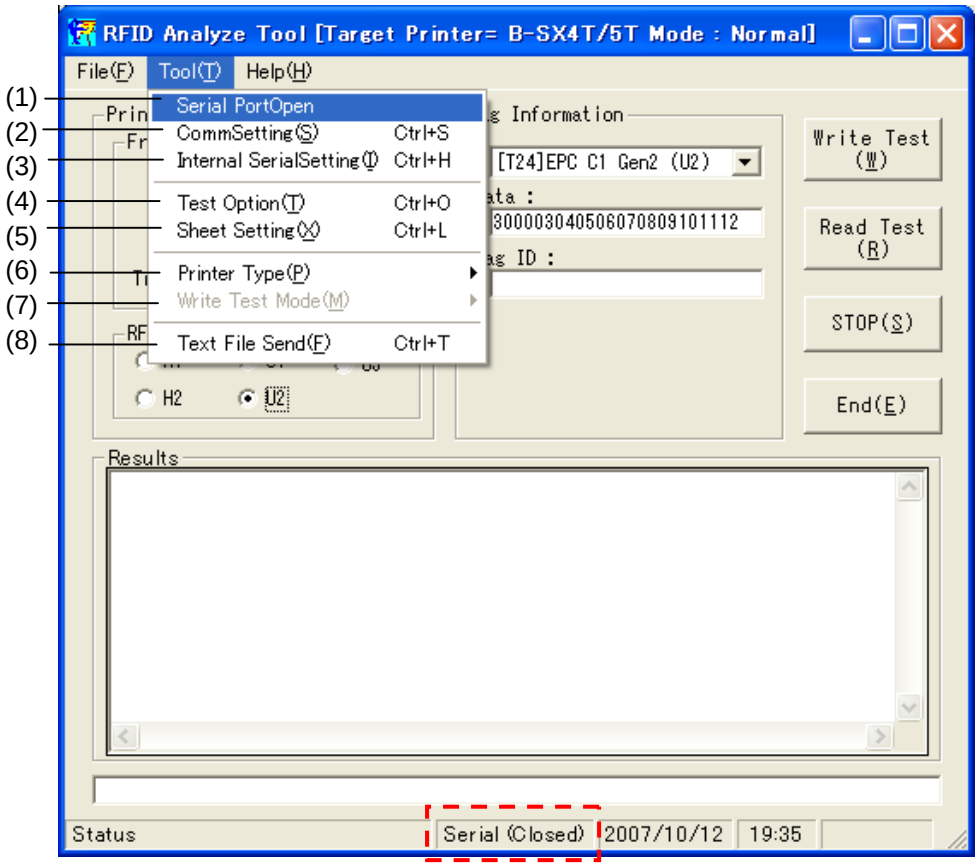
: Data to be saved.

(5) End

The RFID Analyze Tool is closed.

5.1.3 Tool Menu

(1) Port Open



Tool Menu Screen

(1) Serial PortOpen: Opens or closes the printer port.

- "Serial PortOpen": The printer port is ready to be opened. After the port is opened, "Serial PortClose" will be displayed in the Tool menu and "Serial (Open)" will be displayed on the status bar.
- "Serial PortClose": The printer port is ready to be closed. After the port is closed, "Serial PortOpen" will be displayed in the Tool menu and "Serial (Close) will be displayed on the status bar
- "LAN Connect": The LAN port is ready to be opened. After the LAN port is opened, "LAN DisConnect" will be displayed in the Tool menu and "7:Connect" will be displayed on the status bar.
- "LAN DisConnect": The LAN port is ready to be closed. After the LAN port is closed, "LAN Connect" will be displayed in the Tool menu and "0:Close" will be displayed on the status bar.

(2) CommSetting: Enables setting the communication conditions between the printer and the PC.

(3) Internal SerialSetting: Setting the communication conditions between the printer and the RFID module.

(4) Test Option: Enables setting the test options (Only when the U1 or U2 type is selected.)

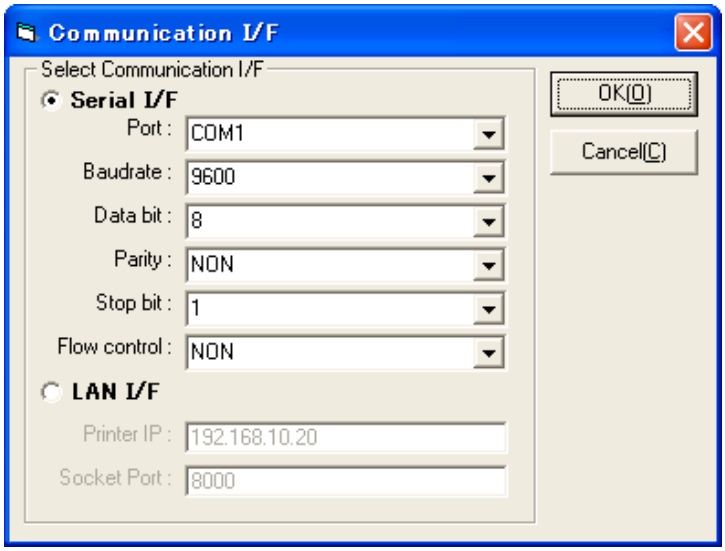
(5) Sheet Setting: Enables setting the media model.

(7) Write Test Mode: Enables choosing a write test mode.

(8) Text File Send: Sends a text file to the printer.

(2) CommSetting

Set the communication conditions between the printer and the PC.

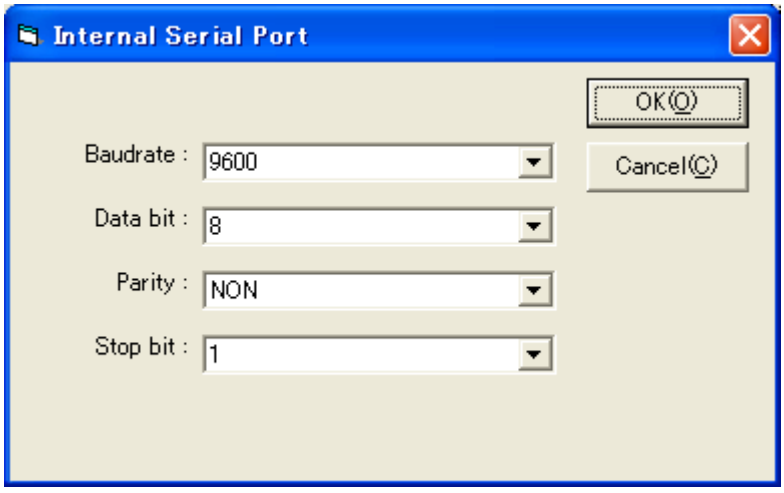


Communication Interface Screen

- In the case of the LAN interface, a socket communication is used.
- Serial port may not be selectable depending on the printer types.
- The above settings can be saved by a parameter save function.

(3) Internal Serial Port Setting

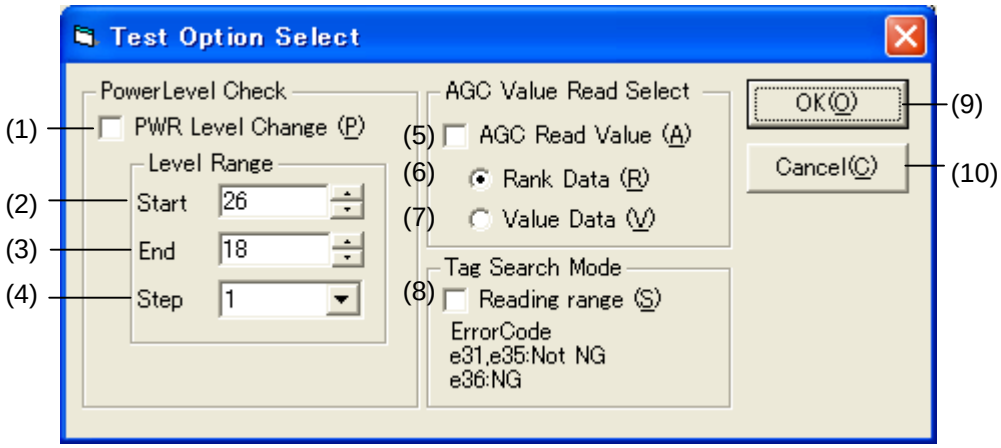
Set the communication conditions between the printer and the RFID module.
(Usually, the settings are not necessary to be changed.)



Internal Serial Port Screen

(4) Test Option

This menu is available only when the U2 type is selected. (However, when the U1 type is selected, only the Power Level Change and Level Range are programmable.)



Test Option Select Screen

(1) PWR Level Change:

When checked, a write or read test can be performed while changing the output level of the RFID module, without changing the tag position. This enables finding the optimal output level for writing data onto the tag.

Setting range of the power level: B-SX704-RFID-U2: 18 to 26
B-SA704-RFID-U2-EU-R: 9 to 18
U1: 0 to 255

(2) Start: Enables setting the value for the starting power level.

(3) End: Enables setting the value for the end power level.

(4) Step: Enables setting the step value.

(5) AGC Read Value:

When checked, the Advanced Gain Control (AGC) data is read every time a data write or read is performed.

- Rank Data is equal to the AGC threshold value of the printer.
- Value data is a value sent from the RFID module without any conversion.

Usually, the rank data is used.

The AGC levels are different between the RFID module firmware version V968 or earlier and V971 or greater. Refer to the following table.

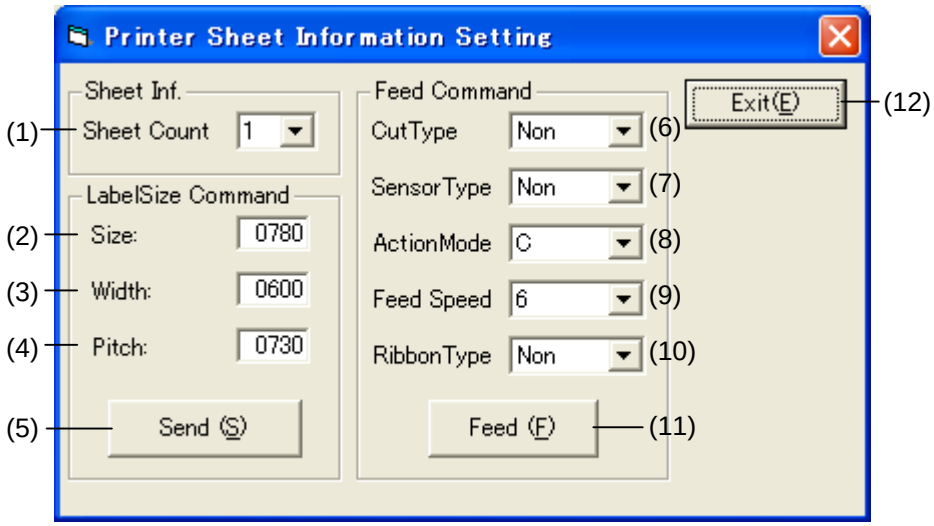
For example, Rank 1 of the firmware V968 or earlier falls within Ranks 1 to 5 of the firmware V971 or greater. Rank 14 of the firmware V968 or earlier is corresponding to Rank 16 of the firmware V971 or greater.

V968 or earlier	Rank					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	Value					73	6a	61	58	4f	46	3d	34	2b	28	24	20	1c	18	14	10

V971 or greater	Rank	1	2	3	4	5	6	7	8	9	10	11	12	13	14		15		16		
	Value	73	6b	64	5f	5a	55	50	4b	46	40	38	30	2b	24		1b		16		

(6) Rank Data: The AGC read value indicated by rank.
(7) Value Data: The AGC read value indicated as it is. (No conversion)
(8) Reading range: The read range of the tag is searched.
The positions where an error “e36” does not occur are considered as OK (readable).
The positions where no response is returned from the tag are considered as an error.
Error code: “e31”: Timeout (Tag is existing.)
“e35”: Data write failed. (Tag is existing.)
“e36”: Tag is not existing.
“e37”: Communication error (Tag is existing.)
(9) OK button
(10) Cancel button

(5) Sheet Setting



Printer Sheet Information Setting Screen

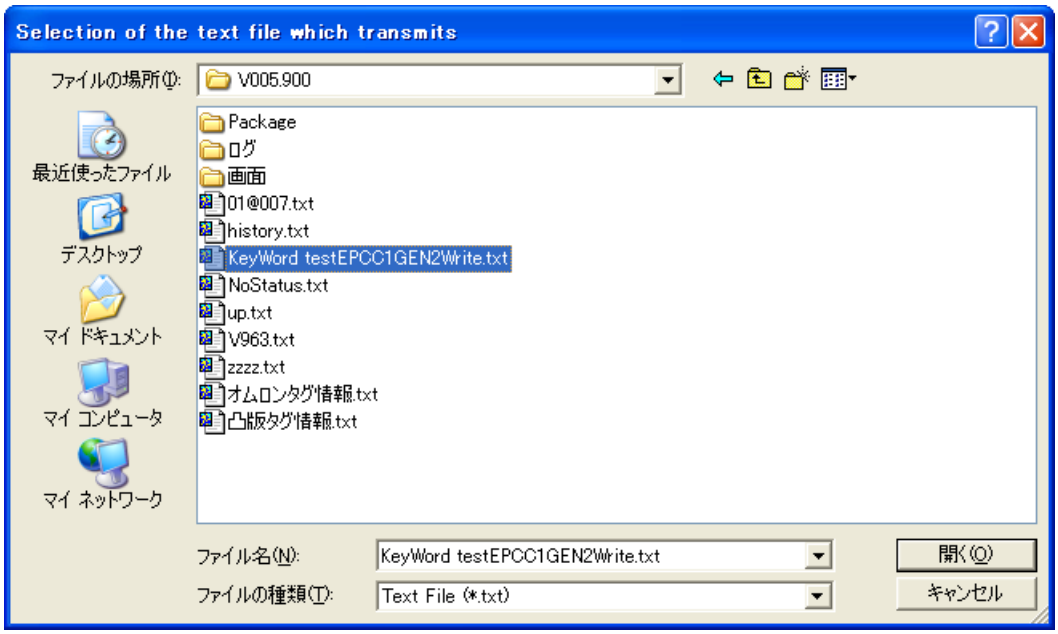
(1) Sheet Count: The number of tags to be tested. (1 – 5)
After the test of one tag is completed, the media will be automatically fed and the same test will be repeated until the designated number of tags have been done.
(2) Size: Media length
(3) Width: Media width
(4) Pitch: Media pitch
(5) Send: Sends a label size set command
The size of the media to be tested is sent. (No printer status check is performed.)
Every time the media size is changed, the label size set command needs to be sent. (The information of the label size is retained even after the printer power is turned off.)
(6) Cut Type: Enables a selection of the cutter operation.
(7) Sensor Type: Enables a selection of the sensor type.
(8) Action Mode: Enables a selection of the operation mode.
(9) Feed Speed: Enables setting the feed speed.
(10) Ribbon Type: Enables selecting whether the ribbon is used or not.

(11) Feed: Sends a feed command.
A feed command is sent to the printer. (A printer status check is performed.) When an error occurs on the printer, an error message will be displayed as the following example shows.

(12) Exit: Exit button

NOTES:
1. For details of the errors, the label size set command, and the feed command, refer to the "External Equipment Interface Specification" of the applicable printer.
2. Information transmitted to the printer by using the Send button or the Feed button can be saved by a parameter save function.

(6) Text File Send

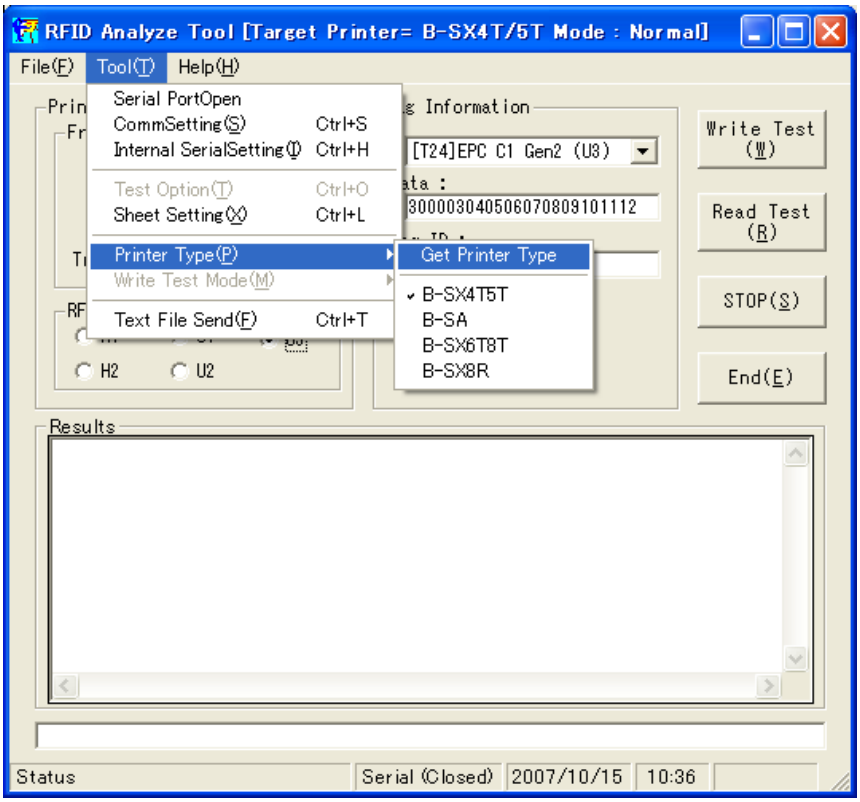


Selection of the text file which transmits screen

- A designated file is sent to the printer. (No printer status check is performed.)
- The contents of the file are not checked.
- The size of the file should be 4KB or less.

NOTE: For details of the errors, the label size set command, and the feed command, refer to the "External Equipment Interface Specification" of the printer.

(7) Printer Type

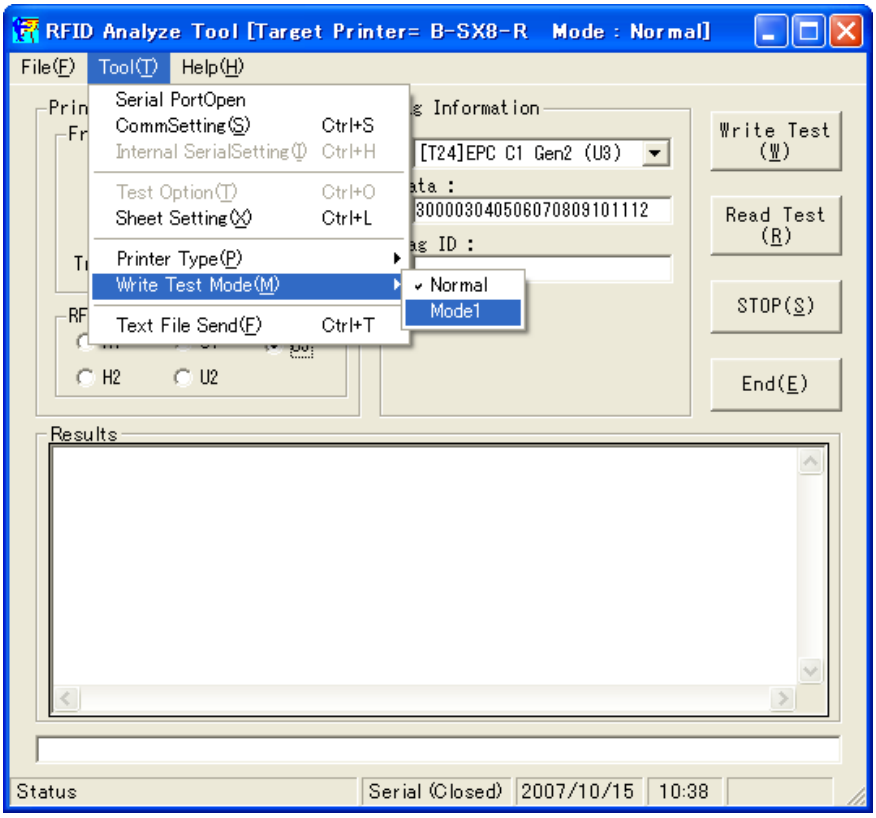


Tool menu screen

- Choose a printer model to be used. (B-SX6T8T and B-SX8R are not available at present.)
- It is possible to obtain a printer type via LAN interface for the following firmware version:
  B-SX4T/SX5T: V4.5 or later
  B-SA4T: V1.6 or later
  Otherwise, a printer type is obtained via the serial interface only.
- This information can be saved by a parameter save function.

(8) Write Test Mode (Reserved. This menu is available only to the B-SX8R(Note).)

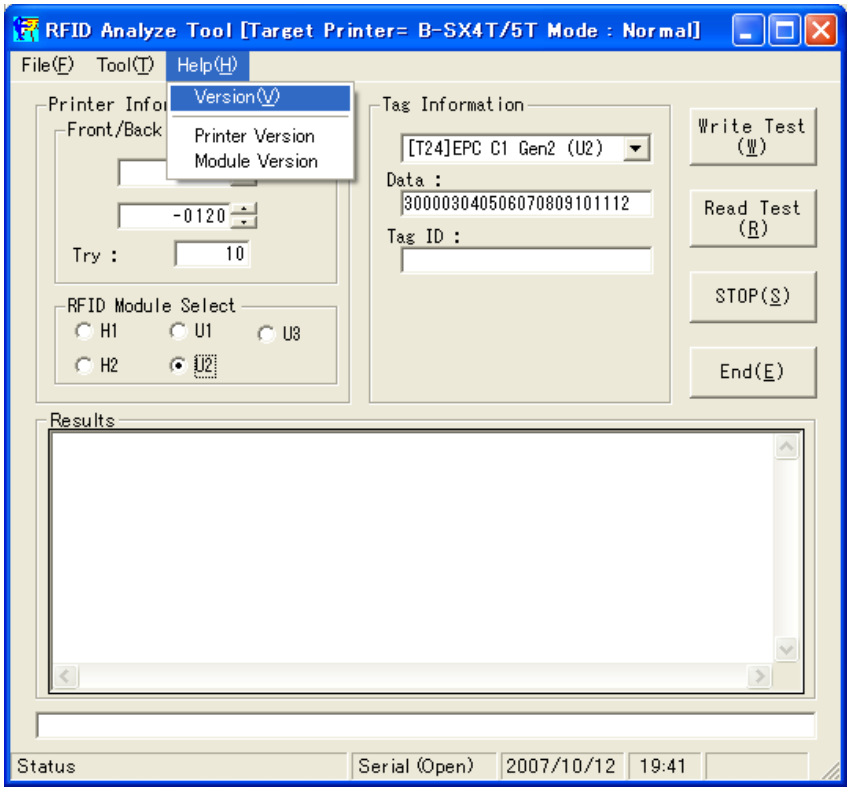
Note: The “B-SX8R” is a test model of the RFID-enabled B-SX8R for Japanese market.



Tool menu screen

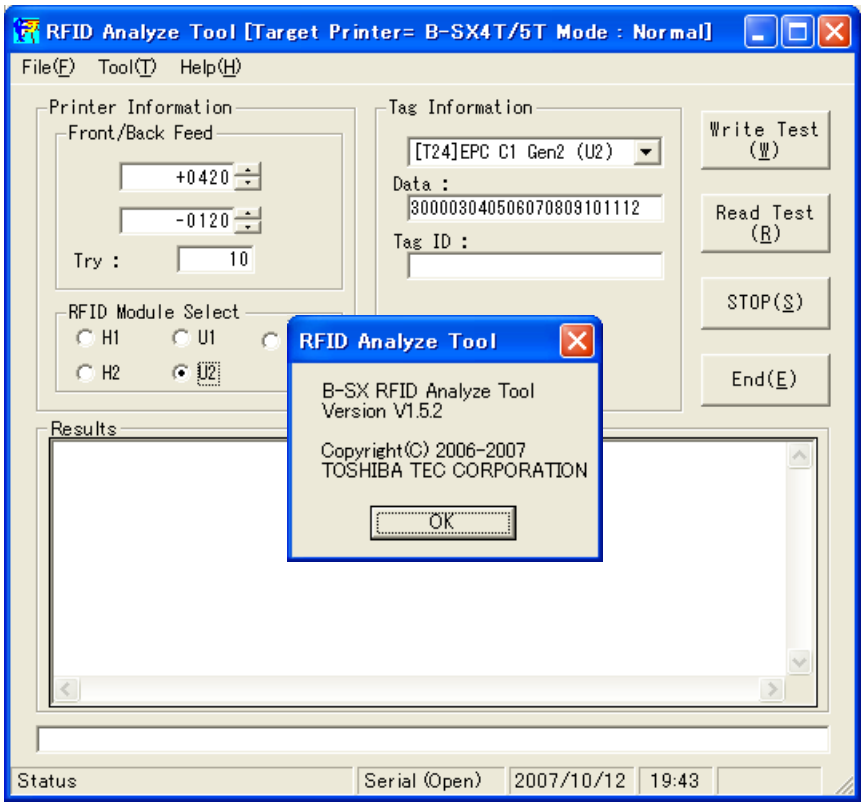
- Choose a test mode. (Selectable only when the printer type is set to B-SX8R.)
- Normal mode: Conventional test method ・・・ U1 or U2 module is used and a test is performed while changing a tag position.
- Mode 1: Exclusively for the B-SX8R ・・ An @003 command is used to change a stop position from page to page.
- A test result reflects in print data.
- This information can be saved by a parameter save function.

5.1.4 Help menu



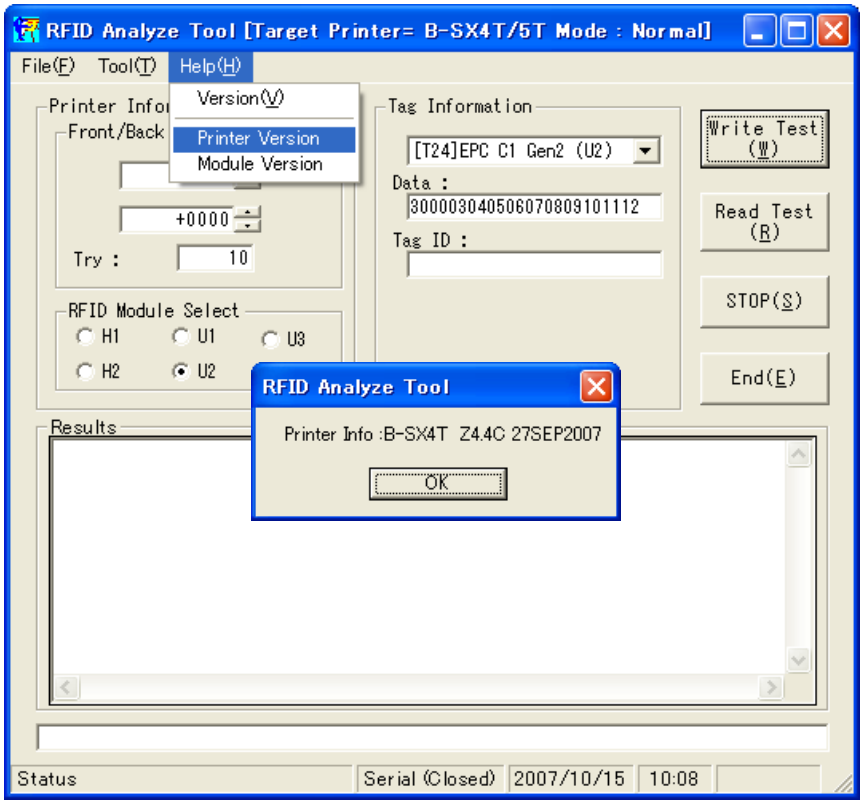
Help Menu Screen

(1) Version information



RFID Analyze Tool Version Information Screen

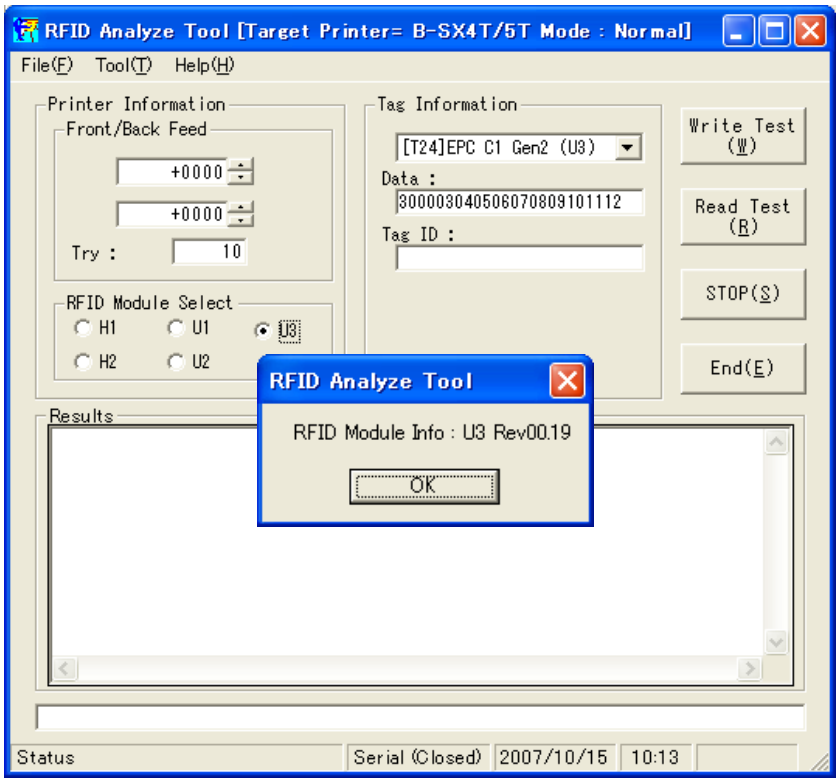
(2) Printer Version



Printer Version Information

NOTE: It is possible to obtain a printer type via LAN interface for the following firmware version:
B-SX4T/SX5T: V4.5 or later
B-SA4T: V1.6 or later
Otherwise, a printer type is obtained via the serial interface only.

(3) Module Version



RFID module version information

NOTE: Printer version and module version are indicated next to the date and time of log file.
Example) CSV file information (In the case of U2 type module)

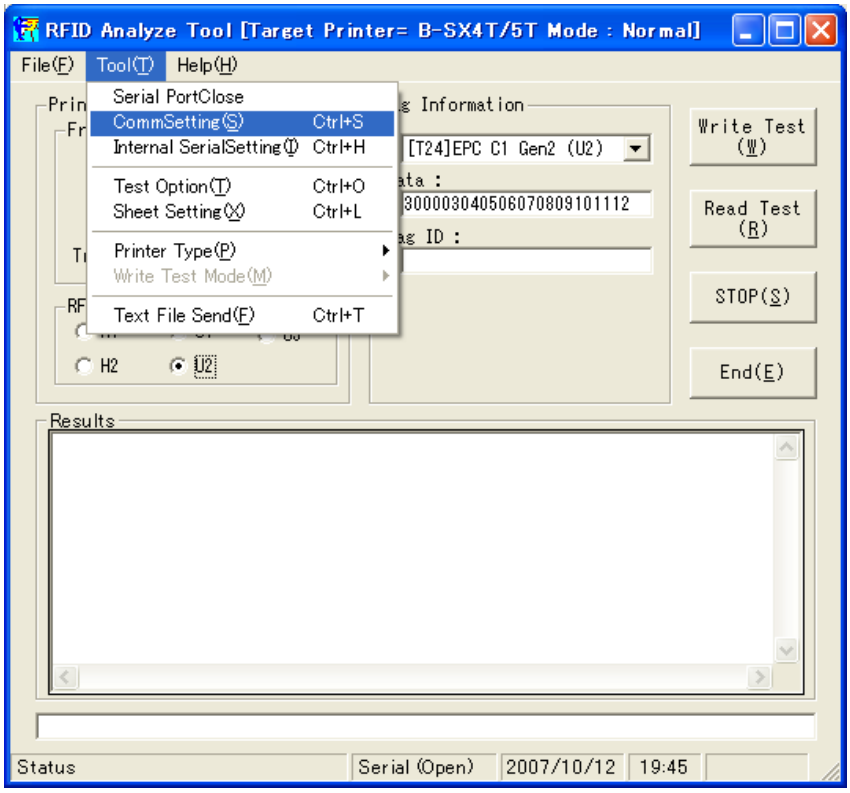
Date&Time = 07/10/16 09:47:24: Printer Information = B-SX4T Z4.4C 27SEP2007 Module Information = U2 JPN #00PV971

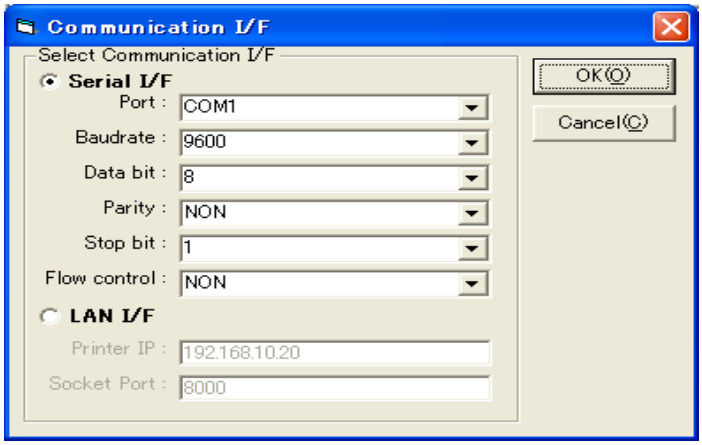
5.2 OPERATING PROCEDURE

5.2.1 Connect the printer and a PC using serial port or LAN.

5.2.2 Start the RFID Analyze Tool.

5.2.3 Perform a port setting in accordance with the setting of the printer.



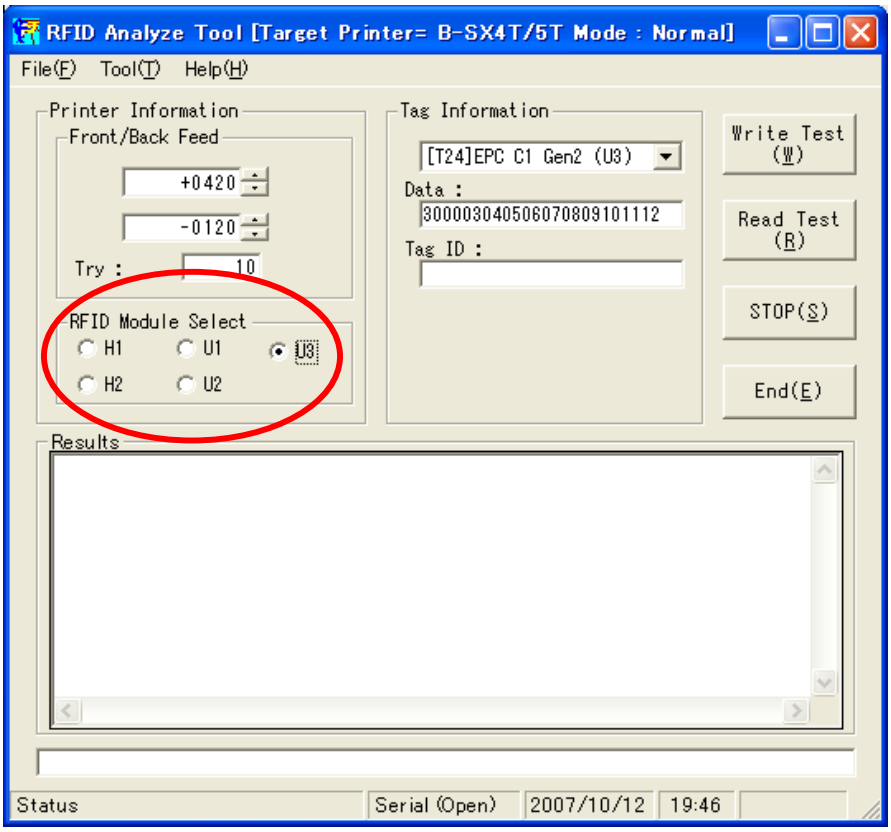


Serial Port Screen

- The data bit for the Analyze Tool is fixed to 8. Make sure that the data length for the printer is set to 8 bits.
- The command flame for the Analyze Tool is "{ | }". Make sure that the control code for the printer is set to "AUTO" or "{ | }".
- For LAN communication, IP address and socket port number need to be entered.
  Default IP address: 192.168.10.20 Socket port number: 8000

5.2.4 Selection of Module

Select the type of module used for the analysis:
For B-9704-RFID-H1-QM, select “H1”.
For B-9704-RFID-U1-US/EU, select “U1”.
For B-SX704-RFID-H2, select “H2”.
For B-SX704-RFID-U2, select “U2”.
For B-SA704-RFID-U2-EU-R, select “U2”.



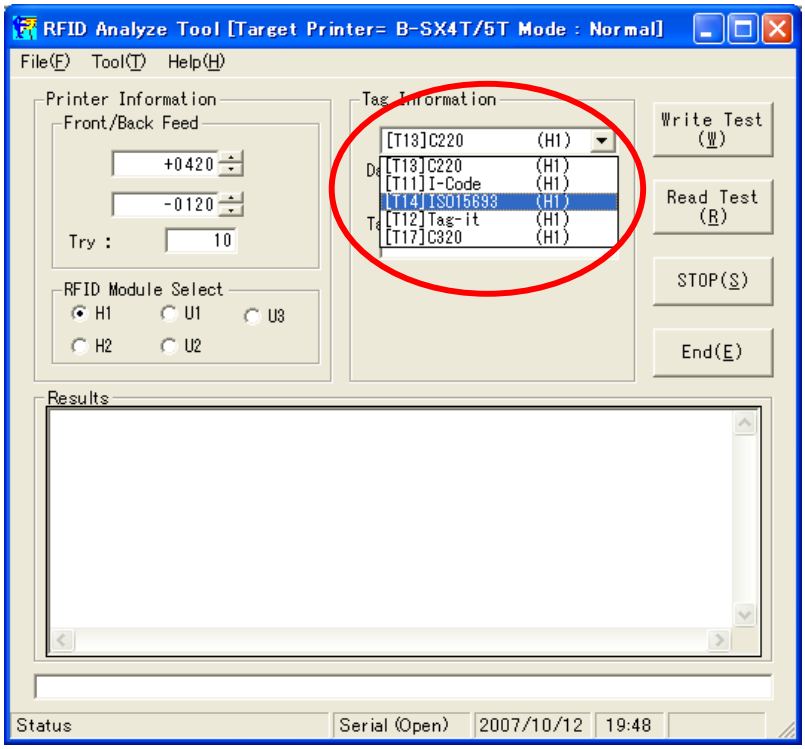
Main Menu Screen

NOTE: Selectable tag types are different depending on the RFID module types.

H1: 5 types, U1: 3 types, H2: 1 type, U2: 1 type

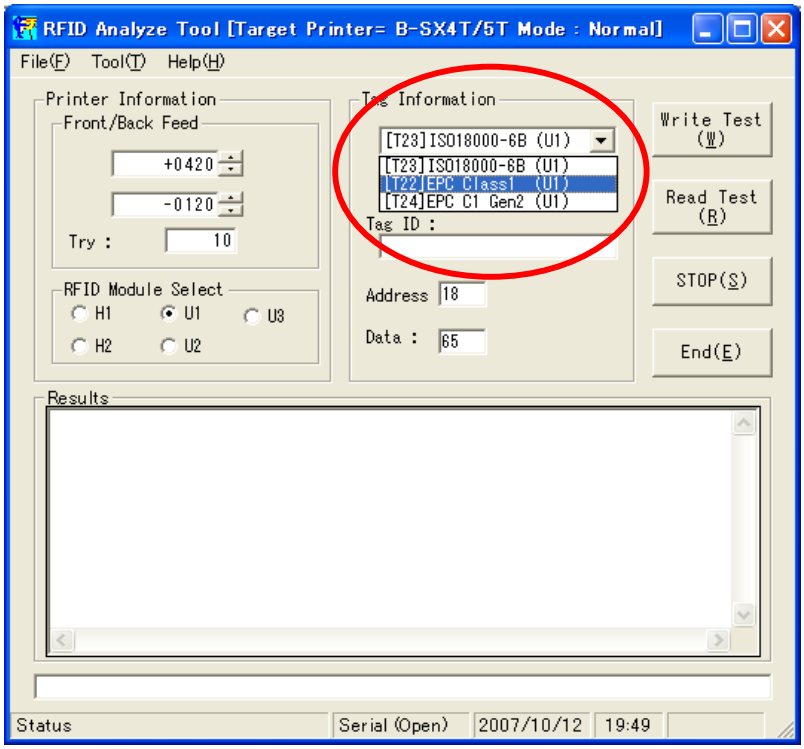
5.2.5 Selection of Tag

Select the type of tag to be analyzed.
For the B-9704-RFID-H1-QM, select the type from C220 (H1), I-Code (H1), ISO15693 (H1), Tag-it (H1) and C320 (H1).



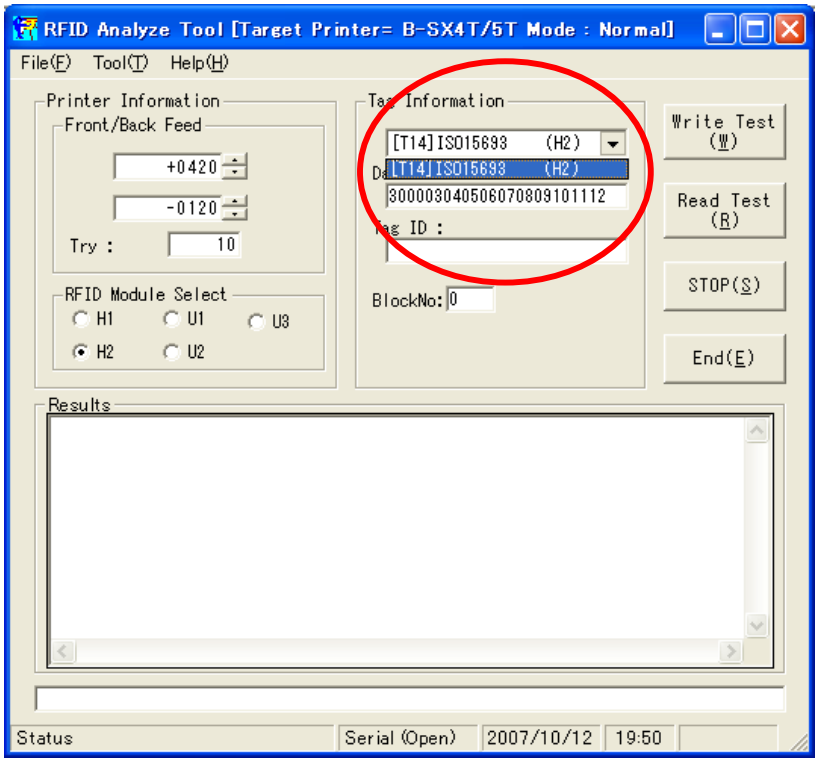
When H1 is selected

For the B-9704-RFID-U1-US/EU, select the type from ISO18000-6B (U1), EPC Class1 (U1), and EPC C1 Gen2 (U1).



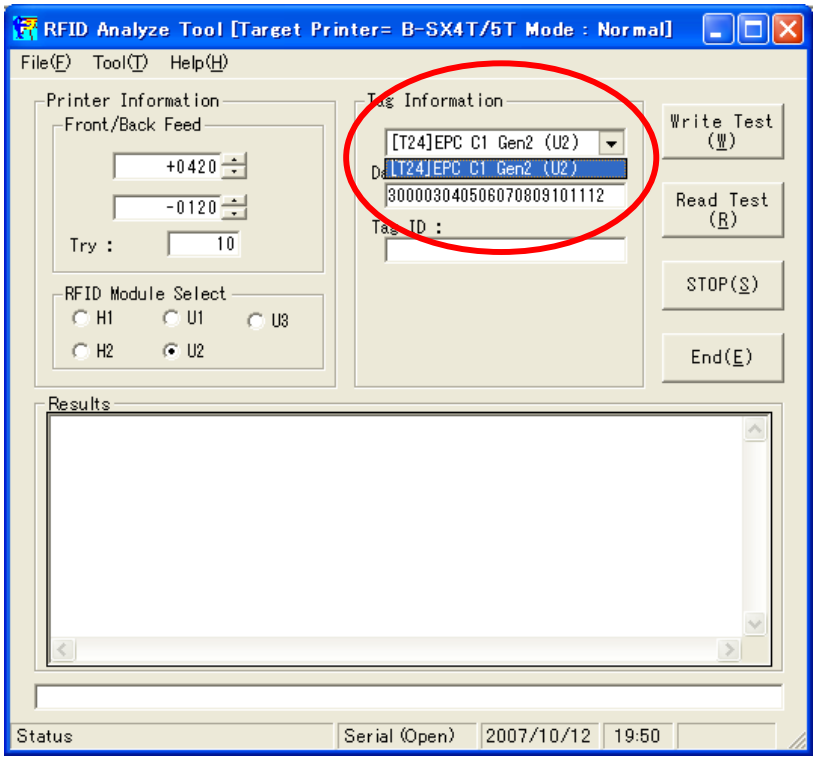
When U1 is selected

For B-SX704-RFID-H2, select ISO15693 (H2).



When H2 is selected

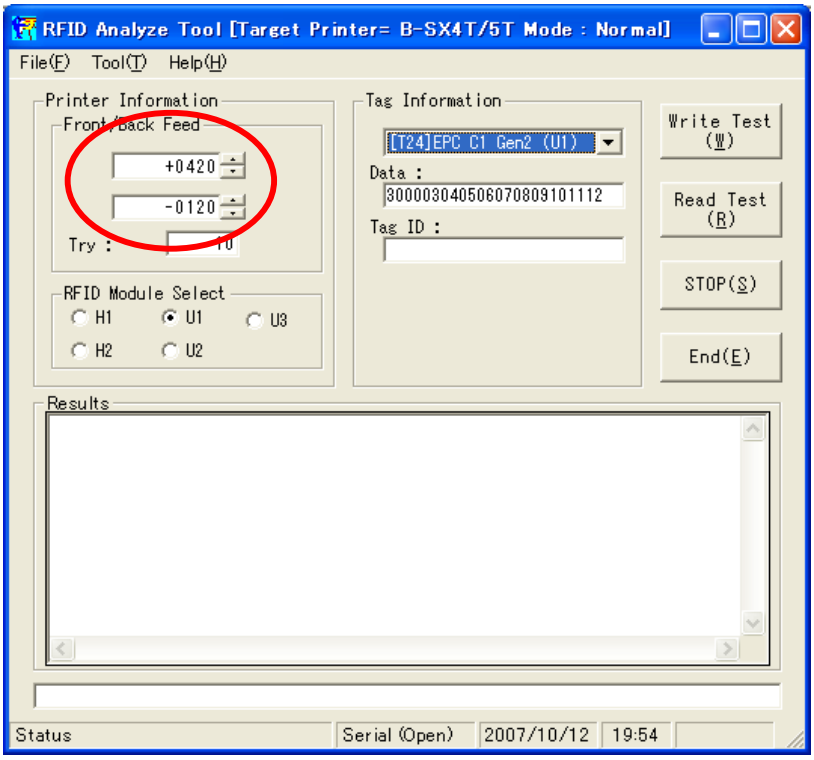
For the B-SX704-RFID-U2 or B-SA704-RFID-U2-EU-R, select EPC C1 Gen2 (U2).



When U2 is selected

5.2.6 Setting of Feed Amount Range

Set the upper and lower limit values for the feed amount (in 0.1 mm units) using the increase/decrease arrows.
The Analyze Tool can analyze read/write performance while feeding media for 3mm at a time, within the range between the upper and lower limit values.

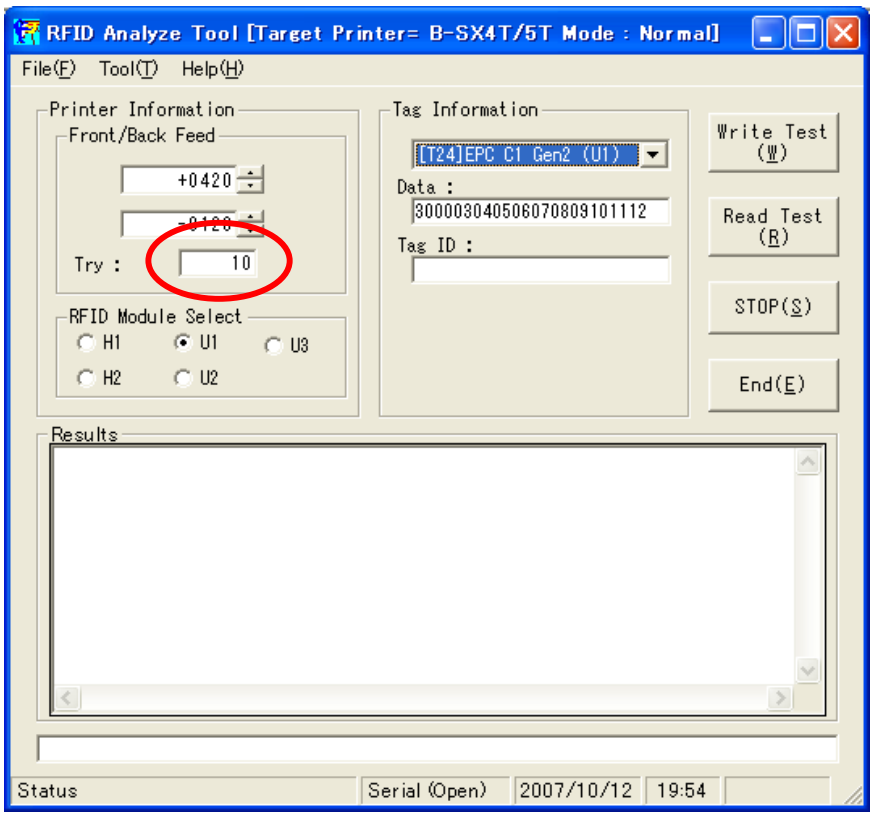


When U1 is selected

NOTE: Setting the Front/Back Feed to **"+" values** performs **a reverse feed**, and **"–" values** performs **a forward feed**.

5.2.7 Setting the Number of Read/Write Times

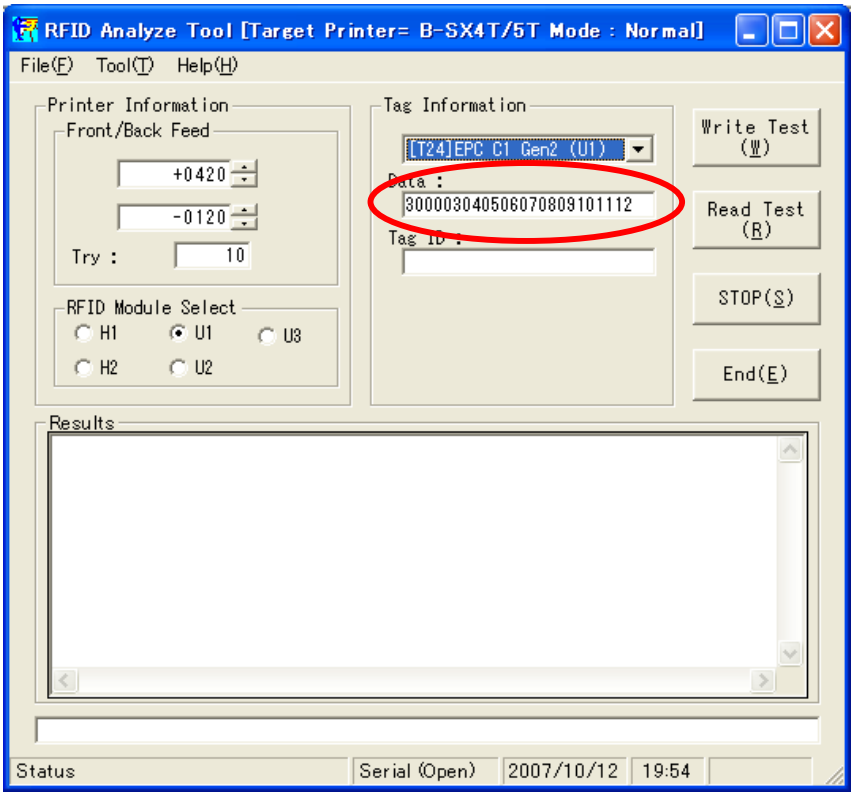
Specify the number of times a data read/write is performed at each stop position.



When U1 is selected.

5.2.8 Setting the Data to be Written

Set the data to be written onto the RFID tag.



When U1 is selected.

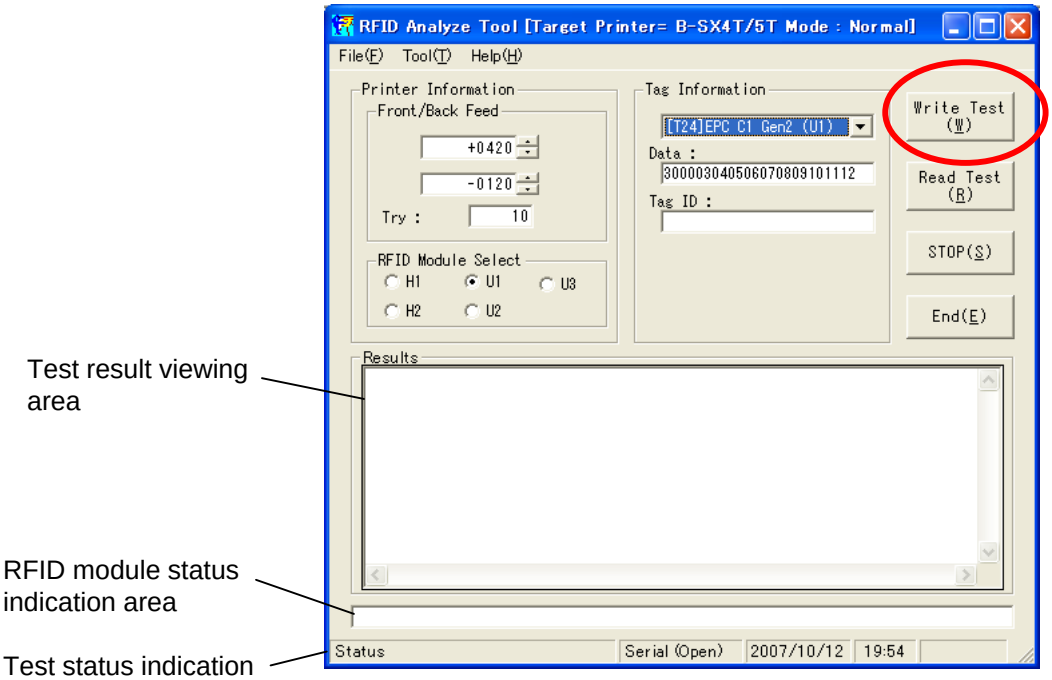
Data contents and the number of data to be written are different depending on the tag types.
As this tool does not check the contents of data to be written, refer to the data sheet of each tag type.

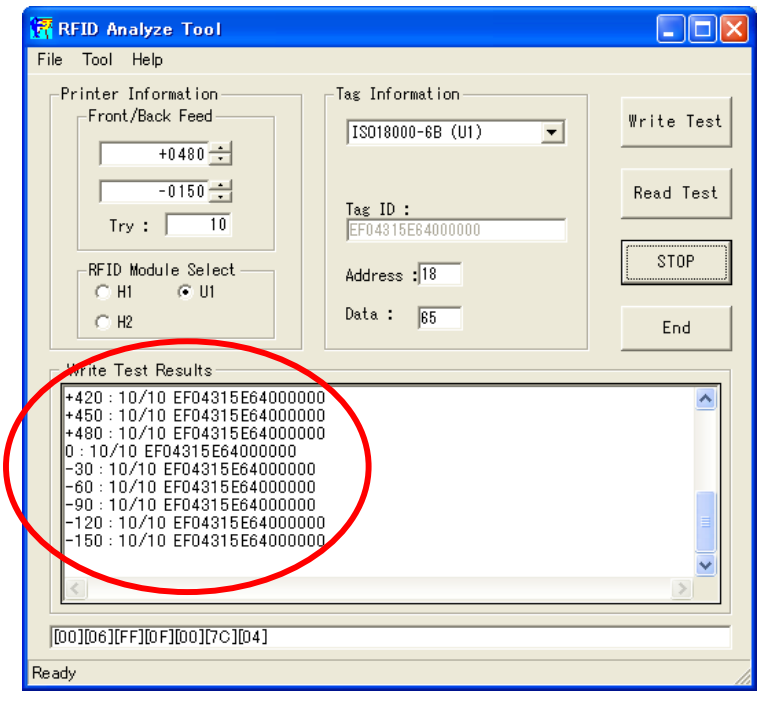
Note: When the U2 type module tries to write same data that has already been written onto the same tag, a data write operation is not performed and results in OK. To properly perform a write test on the U2 type module, entered data to be written is automatically changed each time of a retry, by rotating the data in units of 2 digits.

Example) 1st try: 123456789012 → 2nd try: 345678901212 → 3rd try: 567890121234 …

5.2.9 Start-up of Write Test

Click on the “Write Test” button to start a write test.
During the write test, total number of write succeeded/total number of write performed is shown in the test status indication area, then status data from the module is shown in the RFID module status indication area.
When the test is completed, the test result is shown in the test result viewing area.





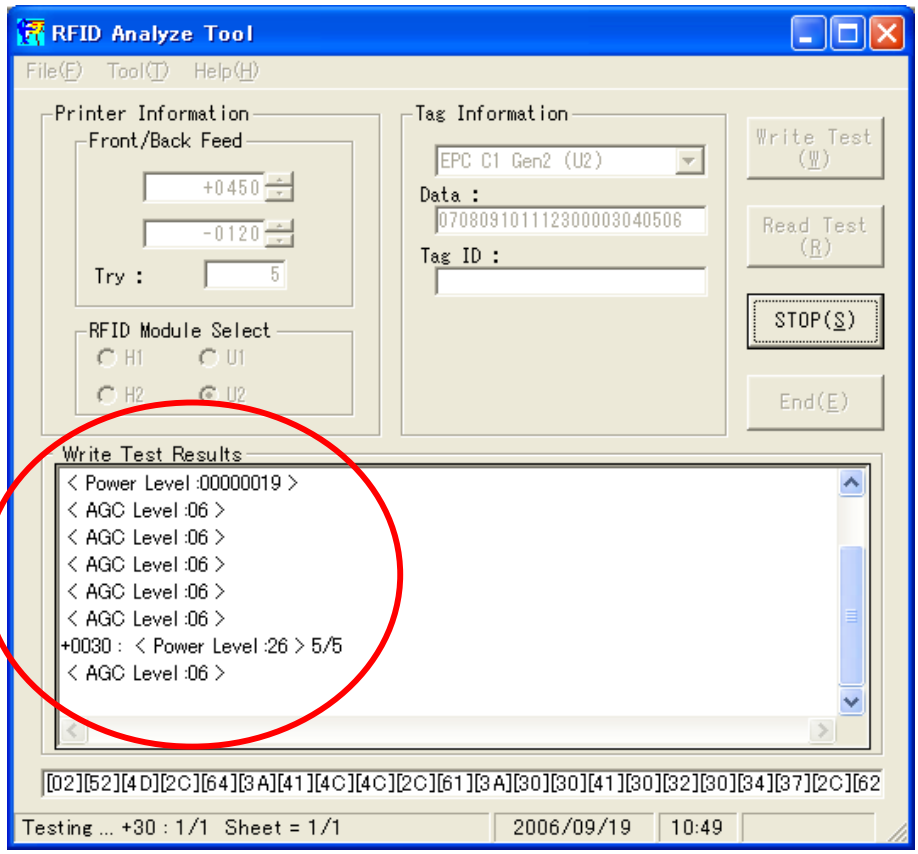
Test result (Example) Module: U1, Type of tag: ISO-18000-6B

-30 : 10/10 EF04315E64000000

- EF04315E64000000: Tag ID
- 10/10: Total number of write succeeded/total number of write performed
- -30: Tag position (–3.0 mm from the start position)

Write test result (Example) Module: U2 type, Tag type: EPC C1 Gen2

Test option: Level range 26 to 18, AGC read is enabled.



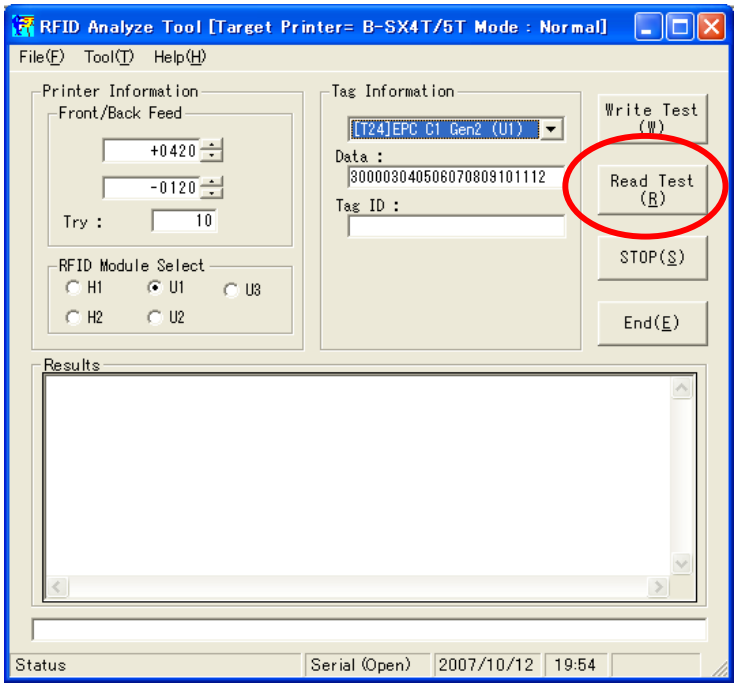
When U2 is selected

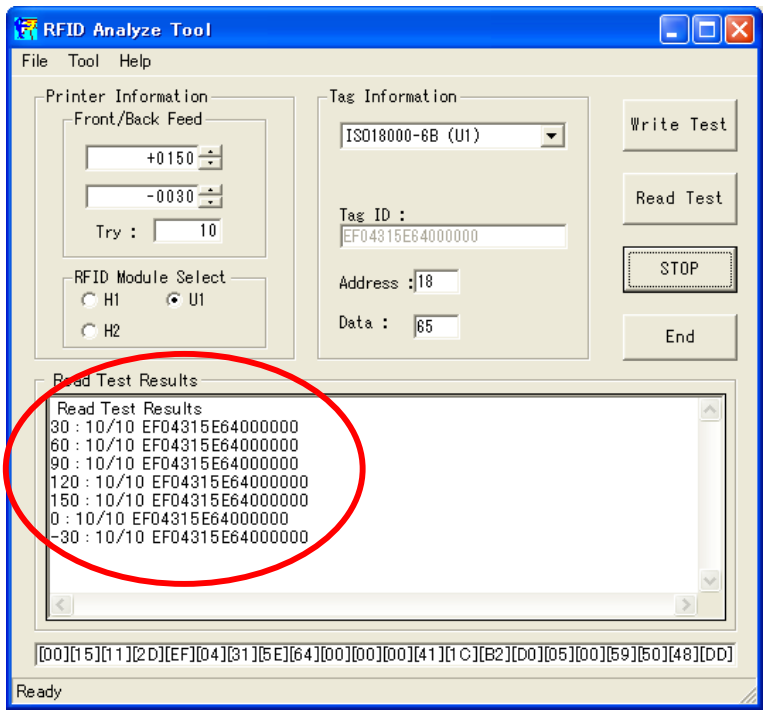
<AGC Level 06> AGC 1st data: Rank 06 level
<AGC Level 06> AGC 2nd data: Rank 06 level
<AGC Level 06> AGC 3rd data: Rank 06 level
<AGC Level 06> AGC 4th data: Rank 06 level
<AGC Level 06> AGC 5th data: Rank 06 level
+30: <PowerLevel 26> 5/5

- 5/5 → Total number of write succeeded/total number of write performed
- <PowerLevel 26> → Power Level 26: Output of the antenna = Level 26
- +30 → +30: Tag position (+3.0 mm from the start position)

5.2.10 Start-up of Read Test

Click on the “Read Test” button to start a read test.
During the read test, total number of read succeeded/total number of read performed is shown in the test status indication area, then status data from the module is shown in the RFID module status indication area.
When the test is completed, test result is shown in the test result viewing area.





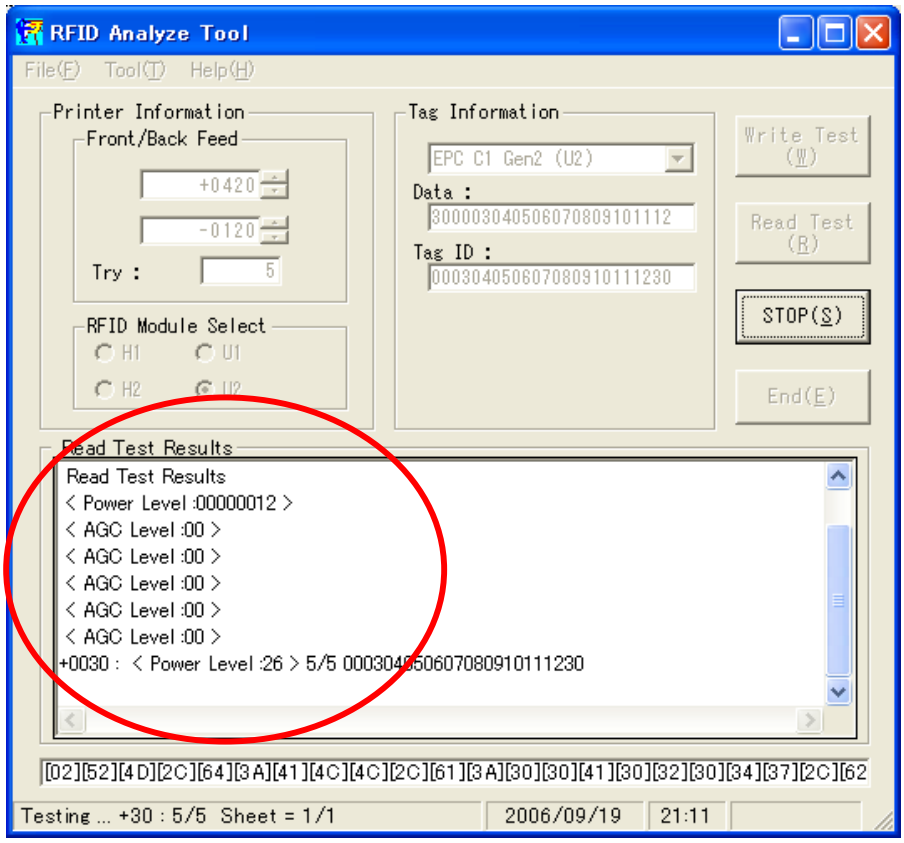
Test result (Example) Module: U1, Type of tag: ISO-18000-6B

+30 : 10/10 EF04315E64000000

- EF04315E64000000: Tag ID
- 10/10: Total number of read succeeded/total number of write performed
- +30: Tag position (+3.0 mm from the start position)

Read test result (Example) Module: U2 type, Tag type: EPC C1 Gen2

Test option: Level range 26 to 18, AGC read is enabled.



When U2 is selected

Read test results

<Power Level : 00000012>

<AGC Level 00> AGC 1st data: Rank 00 level

<AGC Level 00> AGC 2nd data: Rank 00 level

<AGC Level 00> AGC 3rd data: Rank 00 level

<AGC Level 00> AGC 4th data: Rank 00 level

<AGC Level 00> AGC 5th data: Rank 00 level

+0030: <Power Level: 26> 5/5 000304050607080910111230

- Total number of read succeeded/total number of read performed, and EPC code
- Power Level 26: Output of the antenna = Level 26
- +30: Tag position (+3.0 mm from the start position)

5.2.11 Result of Analysis

It is recommended to perform a write test, not a read test because the printer's basic operation is to write data on RFID tags.

It is also recommended to obtain a center value of the upper and lower limit values in the range where read/write was successfully performed.

For example, when read/write performance was good in the range from +90 to –30, the value to be selected would be +30.

For some types of tags, read/write can be performed but success rate is not high (i.e., success rate: 8/10, 80/100, not reaching 100%). In such cases, try to improve read/write success rate by increasing the maximum number of read/write retries and read/write retry time-out in the printer setting. Using the "Adjustment for retry" feature can further improve write success rate.

For details of this setting, refer to the "External Equipment Interface Specification" of the applicable printer.