OMRON

RFID System

# V680 Series
## Hand-held Reader Writer
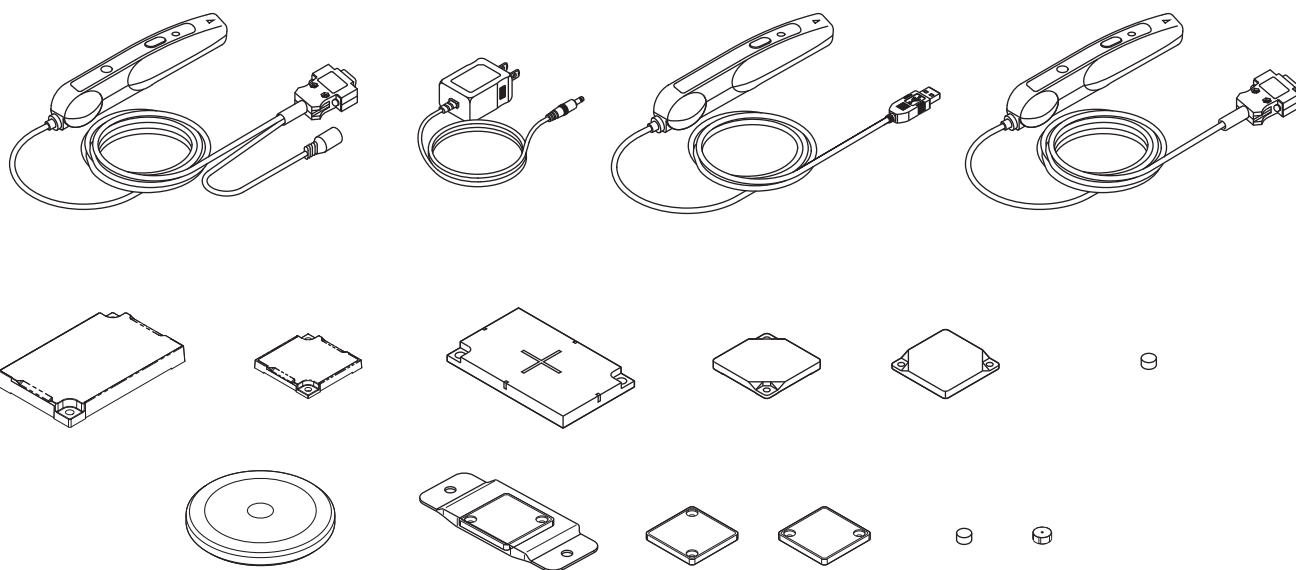## User's Manual

Hand-held Reader Writer

V680-CHUD
V680-CH1D
V680-CH1D-PSI

ID Tags

V680/V680S Series

# Introduction

Thank you for purchasing a V680/V680S-series RFID System. This manual describes the functions, performance, and application methods needed for optimum use of the V680/V680S-series RFID System.

Please observe the following items when using the V680-series RFID System.

- Allow the V680/V680S-series RFID System to be installed and operated only by qualified specialist with a sufficient knowledge of electrical systems.
- Read and understand this manual before attempting to use the V680/V680S-series RFID System and use the V680/V680S-series RFID System correctly.
- Keep this manual in a safe and accessible location so that it is available for reference when required.

Introduction

Section 1

Section 2

Section 3

Section 4

Section 5

Section 6

# RFID System

| V680-CHUD | Hand-held Reader/Writer |
| V680-CH1D | Hand-held Reader/Writer |
| V680-CH1D-PSI | Hand-held Reader/Writer |
| V680 Series | RF Tags |
| V680S Series | RF Tags |

# User's Manual

## READ AND UNDERSTAND THIS DOCUMENT

Please read and understand this document before using the products. Please consult your OMRON representative if you have any questions or comments.

## WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

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THE PRODUCTS CONTAINED IN THIS DOCUMENT ARE NOT SAFETY RATED. THEY ARE NOT DESIGNED OR RATED FOR ENSURING SAFETY OF PERSONS, AND SHOULD NOT BE RELIED UPON AS A SAFETY COMPONENT OR PROTECTIVE DEVICE FOR SUCH PURPOSES. Please refer to sep-arate catalogs for OMRON's safety rated products.

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The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

● Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.

● Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety

  equipment, and installations subject to separate industry or government regulations.

● Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

## PERFORMANCE DATA

Performance data given in this document is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.

## CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the product may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key spec-ifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased prod-ucts.

## DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

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# Safety Precautions

● **Signal Words Used in This Manual**

The following symbols are used in this manual to indicate precautions that must be observed to ensure safe use of the V680/V680S-series RFID System. The precautions provided here contain important safety information. Be sure to observe these precautions.

The following signal words are used in this manual.

| ⚠WARNING | Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally, there may be significant property damage. |
|---|---|

● **Meanings of Alert Symbols**

| | |
|---|---|
| ⚠ | Indicates the possibility of explosion under specific conditions. |
| 🚫 | Indicates general prohibitions for which there is no specific symbol. |

● **Warning**

| ⚠WARNING |
|---|
| This Product is not designed or rated for ensuring safety of persons. Do not use it for such purposes. 🚫 |

# Precautions for Safe Use

Observe the following precautions to ensure safe use of the Product.

1.  Do not use the Product in environments with flammable, explosive, or corrosive gasses.
2.  Do not attempt to disassemble, repair, or modify the Product.
3.  The USB driver must be installed in the personal computer before connecting the V680-CHUD to a personal computer.
4.  Do not subject cables to excessive loads.
5.  Observe all warnings and precautions given in the body of this manual.
6.  Discontinue usage and turn OFF the power supply immediately if you notice any unusual odors, if the Product is abnormally hot, or if the Product starts smoking.
7.  Dispose of the Product as industrial waste.

# Precautions for Correct Use

Always observe the following precautions to prevent operation failures, malfunctions, and adverse effects on performance and equipment.

## 1. Installation and Storage Environment

Do not use or store the Product in the following locations.

• Locations exposed to corrosive gases, dust, metallic powder, or salts

• Locations not within the specified operating temperature range

• Locations subject to rapid changes in temperature or condensation

• Locations not within the specified operating humidity range

• Locations subject to direct vibration or shock outside the specified ranges

• Locations subject to spray of water, oil, or chemicals

## 2. Environment

• This Product uses a frequency band of 13.56 MHz to communicate with RF Tags. Some motors, inverters, switching power supplies, and other devices generate electrical noise that will affect communications with the RF Tags. If any of these devices are located in the vicinity of the Product, they may affect communications with RF Tags, and may possibly damage the RF Tags. Prior to using the Product in the vicinity of any of these devices, perform a test to determine whether the Product can be used under the resulting influence.

• Observe the following precautions to minimize the effects of normal noise.
  (1) Ground all metal objects in the vicinity of the Product to 100 $\Omega$ or less.
  (2) Do not use the Product near high-voltage or high-current lines.

• Connectors are not waterproof. Do not use the Product where mists are present.

• Do not use chemicals that would affect the materials used in the product.

• Be sure the USB connector is properly inserted when using the USB port on the V680-CHUD.

• Always use the specified AC Adaptor (V600-A22) when using the V680-CH1D.

• The communications range is adversely affected if there is any metal material around the RF Tag.

•Transmission will not be possible if the front and back panels are mistakenly reversed and the Unit is mounted to a metallic surface.
  V680-D1KP66MT
  V680-D8KF67M
  V680S-D2KF67M
  V680S-D2KF68M
  V680S-D8KF67M
  V680S-D8KF68M

•The communications range will be reduced when the Unit is not mounted to a metallic surface. mounted to a metallic surface.
  V680-D1KP66MT
  V680-D8KF67M
  V680S-D2KF67M
  V680S-D2KF68M
  V680S-D8KF67M
  V680S-D8KF68M

•The maximum communications range can be obtained when the Antenna faces the RF tag directly. When the RF tag is installed at a tilt, the communications range is reduced. Consider the effect of the RF tag at tilt when installing the RF Tag.

•Provide the mounting distances between plural RF tags to prevent them from malfunctions due to mutual interference

•If the central axis of an antenna and RF tag shifts, a communications range will fall.

•Do not touch the product immediately after usage at high temperatures. Doing so may occasionally result in burning.

### 3. Host Communications

Always confirm that the Product has been started before attempting to communicate with it from the host. Also, when the Product is started, unstable signals may be output from the host interface. When starting operation, clear the reception buffers in the host or take other suitable countermeasures.

### 4. Cleaning

• Do not clean the product with thinners, benzene, or other organic solvents. These will dissolve the resin parts and coating on the case.

# How to Read this Manual

## Meanings of Symbols

Indicates particularly important points related to a function, including precautions and application advice.

CHECK!

Indicates page numbers containing relevant information.

Indicates reference to helpful information and explanations for difficult terminology.

MEMO

# Table of Contents

# Section 1
# Product Overview

# Features

The V680-series Hand-held Reader/Writer incorporates a V680-series Antenna and Controller into a compact design. Data can be read from or written to the RF Tag simply by approaching or touching the RF Tag with the Hand-held Reader/Writer.
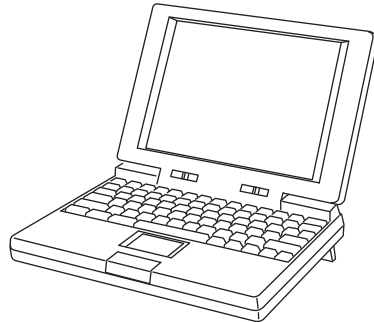


Personal computer

Hand-held Terminal
manufactured by Zebra Technologies Inc.

Hand-held Terminal Recommended
for the V680-CH1D-PSI: Work About Pro

Hand-held Reader/Writers
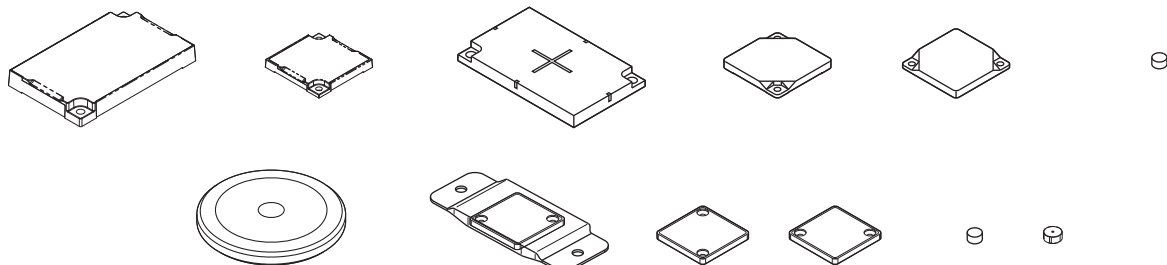
RF Tags

### ■ V680-CHUD

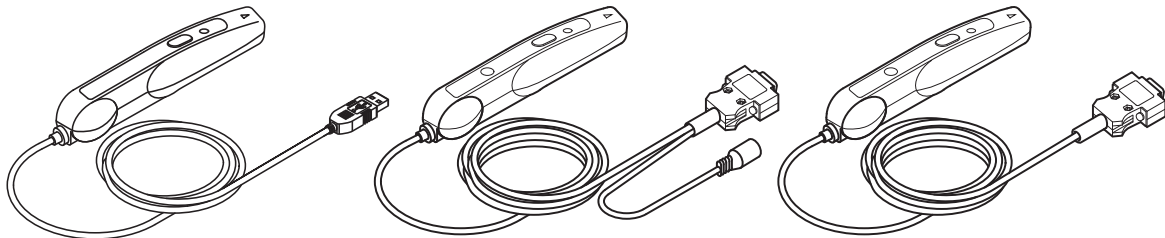This Hand-held Reader/Writer provides a USB connector that conforms to the USB 1.1 standard. Connecting the Hand-held Reader/Writer to a personal computer or Hand-held Terminal gives it superior portability, and operability.

### ■ V680-CH1D

A built-in RS-232C interface allows this Hand-held Reader/Writer to be connected to a personal computer or programmable controller.

### ■ V680-CH1D-PSI

A built-in RS-232C interface allows this Hand-held Reader/Writer to be connected to a Hand-held Terminal, giving it superior portability, and operability.

Section 1

Features

## ■ Differences between Version 1.0 and 1.1

The following functions have been added to version 1.1 in comparison to version 1.0. Functions are upwardly compatible, so version 1.0 can be replaced with version 1.1.

### ▪ CA1D Mode Setting Added for Tag Memory

Setting the Tag memory setting to CA1D Mode enables reading and writing Heat-resistant Tags that were written by the V680-CA1D/-CA2D.

### ▪ Parameter Added to PARAMETER SET (SP) Command

A parameter to set the Tag memory setting was added to the PARAMETER SET (SP) command.

CHECK!

The Tag memory setting is made in the Hand-held Reader/Writer. A different memory map may be used when reading or writing Heat-resistant Tags that were written by the V680-CA1D/-CA2D from a Reader/Writer that is manufactured by a company other than OMRON. Refer to *Operation When Tag Memory Setting Is Set to Standard Mode* in this section.

## ■ Checking the Version

### ▪ Version 1.0

OMRON  ID
V680-CH1D
MADE IN JAPAN

← Nothing

### ▪ Version 1.1

OMRON  ID
V680-CH1D
MADE IN JAPAN

← Present
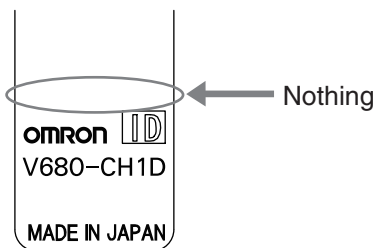
# Using Heat-resistive Tags (V680-D1KP58HTN and V680-D1KP58HT)

This section provides information for using Heat-resistive Tags (V680-D1KP58HTN or V680-D1KP58HT).
If you are not using a Heat-resistive Tag, set the Tag memory setting to Standard Mode.

## Precautions for Saving Data at High Temperatures

If you are using a Heat-resistive Tag, write the data again after saving the data at a high temperature even if it is not necessary to change the data. A " high temperature" is one between 110°C and 200°C.
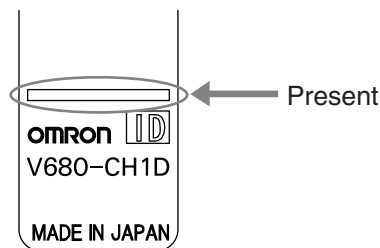
## Using the V680-CA1D/-CA2D

If you are using Heat-resistive Tags (V680-D1KP58HTN or V680-D1KP58HT) and also using the V680-CA1D/-CA2D, set the Tag memory setting of the V680-CH□D (version 1.1 or newer) to CA1D Mode.

CHECK! If you are not using the V680-CA1D/-CA2D, the Tag memory setting does not need to be changed.
Refer to information in *Names and Functions of Components*.

### ■ Combining the V680-CA1D/-CA2D with Other Models

When using other models of Controller with the V680-CA1D/-CA2D, make sure that the version allows setting the Tag memory setting to CA1D Mode.

CHECK! To use the V680-CA5D01-V2/-CA5D02-V2, it must be version 2.3 or newer.
To use the V680-CH□D, it must be version 1.1 or newer.
To use the CS/CJ1W-V680C1□, it must be version 1.2 or newer.

CHECK! Refer to *Checking the Version* for information on product versions.

## ■ Introduction

The address maps in the RF Tags for the V680-D1KP□□ (except for the V680-D1KP58HT) are reversed between the V680-CA1D/-CA2D ID Controllers and V680-CH□D Hand-held Reader/Writer (with Tag memory setting set to CA1D Mode for version 1.1 or newer), and the V680-CH□D (version 1.0) and V680-CH□D (with Tag memory setting set to Standard Mode for version 1.1 or newer) Hand-held Reader/Writers. Therefore, when you use RF Tags with a V680-CA1D/-CA2D ID Controller, always set the Tag memory setting to CA1D Mode in any other models of ID Controller or Hand-held Reader/Writers that are used for the same RF Tags.



Reading/writing OK

V680-CA1D/-CA2D

V680-CH□D
(Version 1.1 or newer: Tag memory setting set to CA1D Mode.)

Address maps reversed.

Reading/writing OK

Standard model: V680-CH□D (Ver.1.0)

V680-CH□D
(Version 1.1 or newer: Tag memory setting set to Standard Mode.)

**Section 1 Using Heat-resistive Tags (V680-D1KP58HTN and V680-D1KP58HT)**
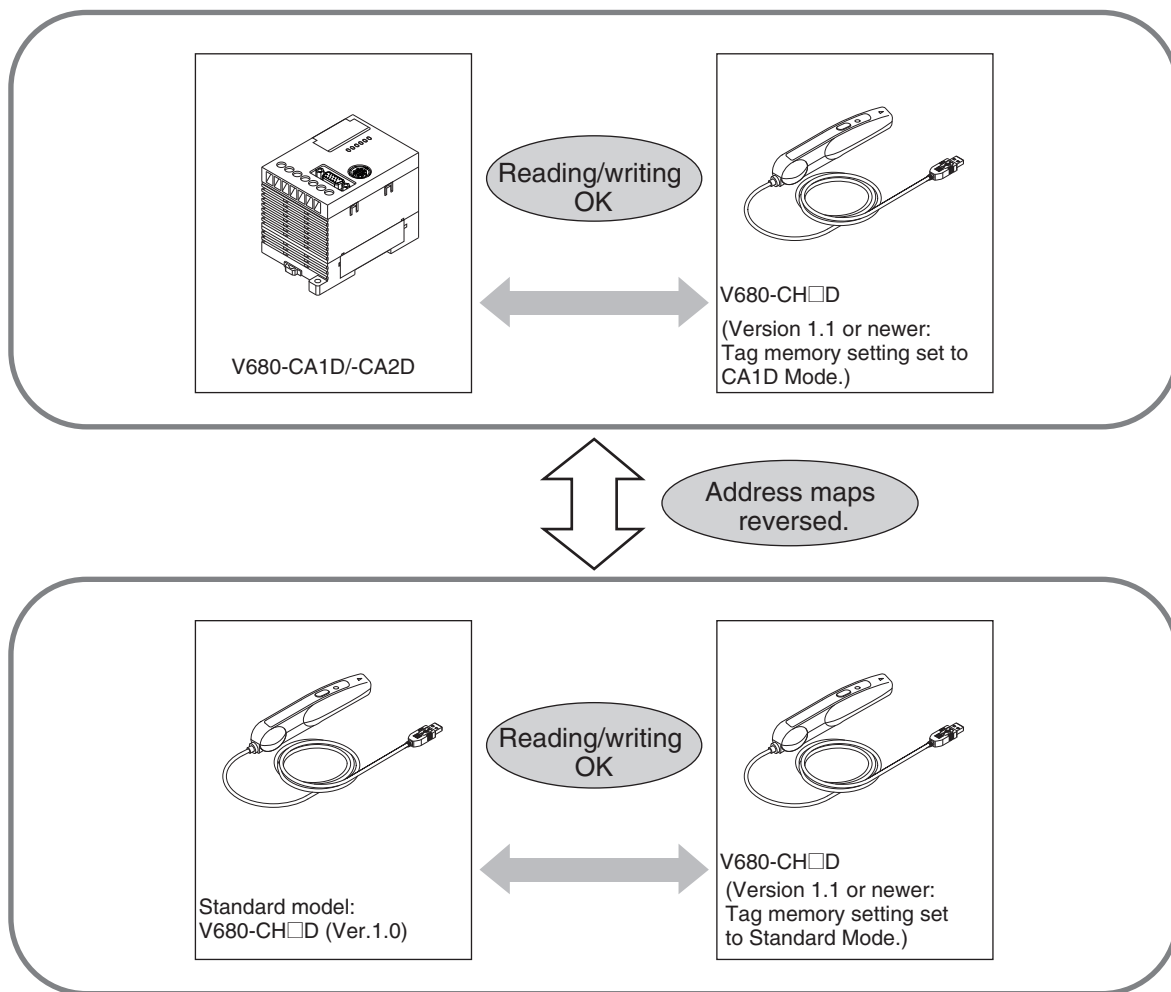
### ■ Applicable RF Tags

Only the V680-D1KP□□ RF Tags can be used when the Tag memory setting is set to CA1D Mode. V680-D□KF□□ RF Tags cannot be used.

▪ RF Tags That Can Be Used

| Models |
| --- |
| V680-D1KP58HT |
| V680-D1KP58HTN |
| V680-D1KP52MT |
| V680-D1KP53M |
| V680-D1KP66T |
| V680-D1KP66MT |

▪ RF Tags That Cannot Be Used

| Models |
| --- |
| V680-D2KF52M |
| V680-D8KF67 |
| V680-D8KF67M |
| V680-D8KF68 |
| V680-D32KF68 |
| V680S-D2KF67 |
| V680S-D2KF67M |
| V680S-D2KF68 |
| V680S-D2KF68M |
| V680S-D8KF67 |
| V680S-D8KF67M |
| V680S-D8KF68 |
| V680S-D8KF68M |

### ■ CA1D Mode Setting for Tag Memory and Write Protection

When setting the Tag memory setting to CA1D Mode, always disable write protection.

### ■ Setting the Tag Memory Setting to CA1D Mode

When changing an existing system to use the V680-CA1D/-CA2D, there are restrictions in the command system and write protection function.

The following settings are required if the Tag memory setting is set to CA1D Mode.

1. Process code J in PARAMETER SET (SP) command: Set the command system setting to 0 to set the command system to V600 commands.
2. Process code H in PARAMETER SET (SP) command: Set the write protection function setting to 1 to disable write protection.
3. Process code L in PARAMETER SET (SP) command: Set the Tag memory setting to 1 to set CA1D Mode.

CHECK! Standard Mode is the default Tag memory setting.

CHECK! For details on the *PARAMETER SET (SP)* command, refer to *PARAMETER SET (SP)* under *V680 Commands or V600 Commands in Section 3 Commands*.

■ **Operation When Tag Memory Setting Is Set to Standard Mode**

When data that was written to a V680-D1KP58HTN RF Tag with the V680-CA1D/-CA2D ID Controller is read from a V680-CH☐D Hand-held Reader/Writer, the data from addresses that are reversed in one-block (eight-byte) units is read.

If you are going to use a V680-CH☐D Reader/Writer in the same line as a V680-CA1D/-CA2D ID Controller, use a V680-CH☐D Reader/Writer with version 1.1 or newer and set the Tag memory setting to CA1D Mode.

| Address | Data written with V680-CA1D/-CA2D | Data read with V680-CH☐D (version 1.0) or V680-CH☐D (version 1.1 or newer with Tag memory setting set to Standard Mode) |
|---|---|---|
| 0000 hex | 01 hex | 00 hex |
| 0001 hex | 23 hex | 00 hex |
| 0002 hex | 45 hex | 00 hex |
| 0003 hex | 67 hex | 00 hex |
| 0004 hex | 89 hex | 00 hex |
| 0005 hex | AB hex | 00 hex |
| 0006 hex | CD hex | 00 hex |
| 0007 hex | EF hex | 00 hex |
| : | : | : |
| : | : | : |
| 03E0 hex | 00 hex | 01 hex |
| 03E1 hex | 00 hex | 23 hex |
| 03E2 hex | 00 hex | 45 hex |
| 03E3 hex | 00 hex | 67 hex |
| 03E4 hex | 00 hex | 89 hex |
| 03E5 hex | 00 hex | AB hex |
| 03E6 hex | 00 hex | CD hex |
| 03E7 hex | 00 hex | EF hex |

Addresses are reversed by block.

Section 1 Using Heat-resistive Tags (V680-D1KP58HTN and V680-D1KP58HT)

### ■ Operation When Tag Memory Setting Is Set to CA1D Mode

If the Tag memory setting for the V680-CH□D (version 1.1 or newer) is set to CA1D Mode, data is read from or written to addresses that are reversed in block units for the V680-D1KP□□ (except for the V680-D1KP58HT) in the same way as for the V680-CA1D/-CA2D. Therefore, data can be read from the same addresses as those to which data was written by the V680-CA1D/-CA2D.

| Address | Data written with V680-CA1D/-CA2D | Data read with V680-CH□D (version 1.1 or newer with Tag memory setting set to CA1D Mode) |
|---|---|---|
| 0000 hex | 01 hex | 01 hex |
| 0001 hex | 23 hex | 23 hex |
| 0002 hex | 45 hex | 45 hex |
| 0003 hex | 67 hex | 67 hex |
| 0004 hex | 89 hex | 89 hex |
| 0005 hex | AB hex | AB hex |
| 0006 hex | CD hex | CD hex |
| 0007 hex | EF hex | EF hex |
| : | : | : |
| : | : | : |
| 03E0 hex | 00 hex | 00 hex |
| 03E1 hex | 00 hex | 00 hex |
| 03E2 hex | 00 hex | 00 hex |
| 03E3 hex | 00 hex | 00 hex |
| 03E4 hex | 00 hex | 00 hex |
| 03E5 hex | 00 hex | 00 hex |
| 03E6 hex | 00 hex | 00 hex |
| 03E7 hex | 00 hex | 00 hex |

Same as data read with V680-CA1D/-CA2D.

### ■ Canceling CA1D Mode

To cancel CA1D Mode, use the PARAMETER SET (SP) command to set the Tag memory setting to Standard Mode.

Process code L: Set the Tag memory setting to Standard Mode. For the V600 protocol, set the tag memory setting to 0. For the V680 protocol, set the tag memory setting to 00.

> For details on the *PARAMETER SET (SP)* command, refer to *PARAMETER SET (SP)* under *V680 Commands or V600 Commands in Section 3 Commands.*
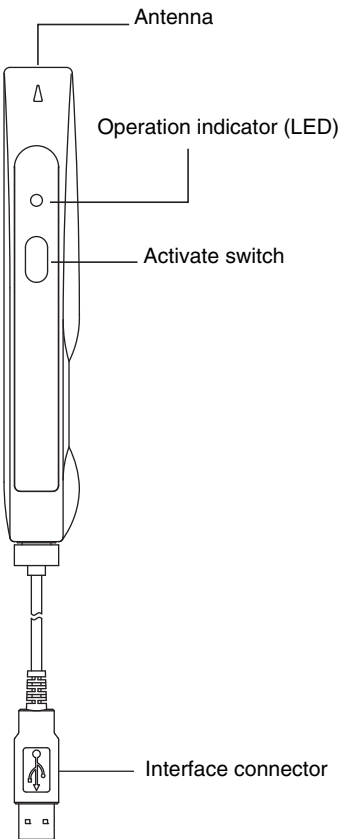> CHECK! 📖 *p.78, p.116*

> When CA1D Mode is canceled, the address mapping with the RF Tags will be different from the ones written in CA1D Mode. This may cause unexpected addresses to be read or written. When canceling CA1D Mode, initialize the data in the RF Tags before using them.
> CHECK!

# Names and Functions of Components

V680-CHUD

Antenna

Operation indicator (LED)

Activate switch

Interface connector

## ■ Operation Indicator (LED)

| Display | Meaning |
|---|---|
| Lit green | A command has been received from the host device. |
| | Communications with the RF Tag have completed normally. |
| Flashing green | When the power is turned ON, after initialization of the Hand-held Reader/Writer is completed. |
| | Communications with the RF Tag are in progress. |
| Lit red | A communications error with the RF Tag has occurred. |
| | A CPU error has occurred. |
| Flashing red | An RF Tag non-existent error has occurred. |
| | A communications error with the host device has occurred. |

CHECK! After the operation indicator is lit or flashing for a certain time, it will turn OFF.

## ■ Activate Switch

When button commands or commands with button communications specifi-
cations (button trigger or button auto) are used and the activate switch is
pressed, communications with the RF Tag will start. (For details on button
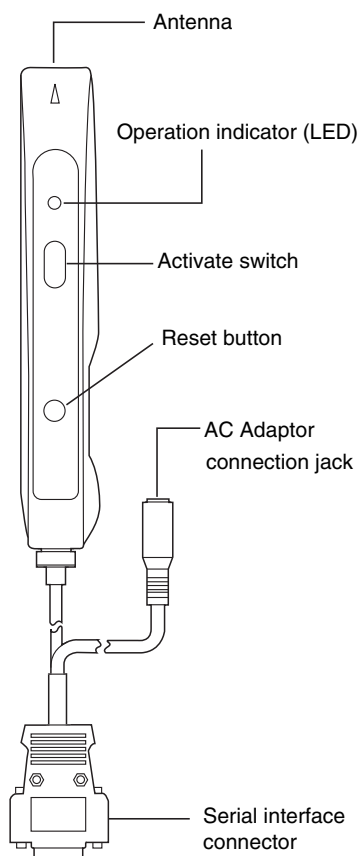communications specifications, refer to *Section 3 Commands.*)

## ■ Interface Connector

This is a USB interface with an A-series plug based on USB 1.1.

## ■ Antenna

To communicate with the RF Tag, move the antenna close to it.

V680-CH1D

Antenna

Operation indicator (LED)

Activate switch

Reset button

AC Adaptor
connection jack

Serial interface
connector

## ■ Operation Indicator (LED)

| Display | Meaning |
|---|---|
| Lit green | A command has been received from the host device. |
| | Communications with the RF Tag have completed normally. |
| Flashing green | •When the power is turned ON, after initialization of the Hand-held Reader/Writer is completed<br>•When the power is turned ON and the reset button is pressed for two seconds or more (initialization stand-by mode). |
| | Communications with the RF Tag are in progress. |
| Lit red | A communications error with the RF Tag has occurred. |
| | A CPU error has occurred. |
| Flashing red | An RF Tag non-existent error has occurred. |
| | A communications error with the host device has occurred. |

CHECK!  After the operation indicator is lit or flashing for a certain time, it will turn OFF.

## ■ Activate Switch

When button commands or commands with button communications specifications (button trigger or button auto) are used and the activate switch is pressed, communications with the RF Tag will start. (For details on button communications specifications, refer to *Section 3 Commands.*)

If the activate switch is pressed with the Hand-held Reader/Writer in the initialization stand-by mode (with the green indicator flashing), the function settings will be initialized.

## ■ Reset Button

Press this button for two seconds or more when the power is first turned ON to put the Hand-held Reader/Writer into the initialization stand-by mode.
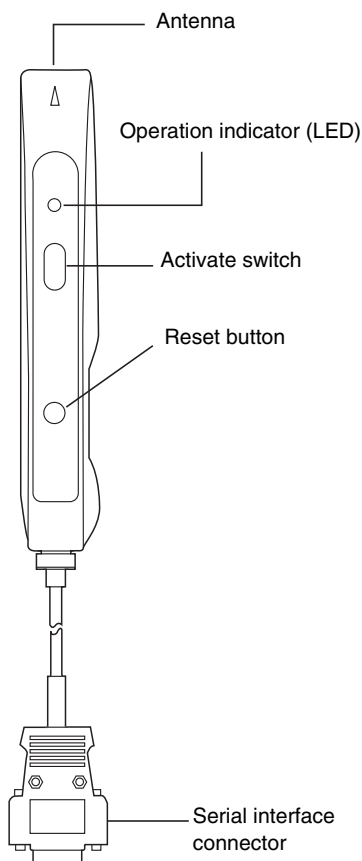
## ■ AC Adaptor Connection Jack

This is a connection jack for the V600-A22 AC Adaptor.

## ■ Serial Interface Connector

This is a serial interface with an RS-232C-compliant D-Sub 9-pin connector.

## ■ Antenna

To communicate with the RF Tag, move the antenna closer to it.
V680-CH1D-PSI

Antenna

Operation indicator (LED)

Activate switch

Reset button

Serial interface
connector

## ■ Operation Indicator (LED)

| Display | Meaning |
|---------|---------|
| Lit green | A command has been received from the host device. |
| | Communications with the RF Tag have completed normally. |
| Flashing green | •When the power is turned ON, after initialization of the Hand-held Reader/Writer is completed.<br>•When the power is turned ON and the reset button is pressed for two seconds or more (initialization stand-by mode). |
| | Communications with the RF Tag are in progress. |
| Lit red | A communications error with the RF Tag has occurred. |
| | A CPU error has occurred. |
| Flashing red | An RF Tag non-existent error has occurred. |
| | A communications error with the host device has occurred. |

CHECK! After the operation indicator is lit or flashing for a certain time, it will turn OFF.

## ■ Activate Switch

When button commands or commands with button communications specifi-cations (button trigger or button auto) are used and the activate switch is pressed, communications with the RF Tag will start. (For details on button communications specifications, refer to *Section 3 Commands*.)

If the activate switch is pressed with the Hand-held Reader/Writer in the ini-tialization stand-by mode (with the green indicator flashing), the function settings will be initialized.

## ■ Reset Button

Press this button for two seconds or more when the power is first turned ON to put the Hand-held Reader/Writer into the initialization stand-by mode.

## ■ Serial Interface Connector

This is a serial interface with an RS-232C-compliant D-Sub 9-pin connector.

## ■ Antenna

To communicate with the RF Tag, move the antenna closer to it.

# System Configuration

V680-CHUD

The V680-CHUD Hand-held Reader/Writer can communicate with host devices that have a USB interface, such as personal computers.

Host Devices



Personal computer
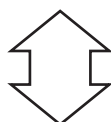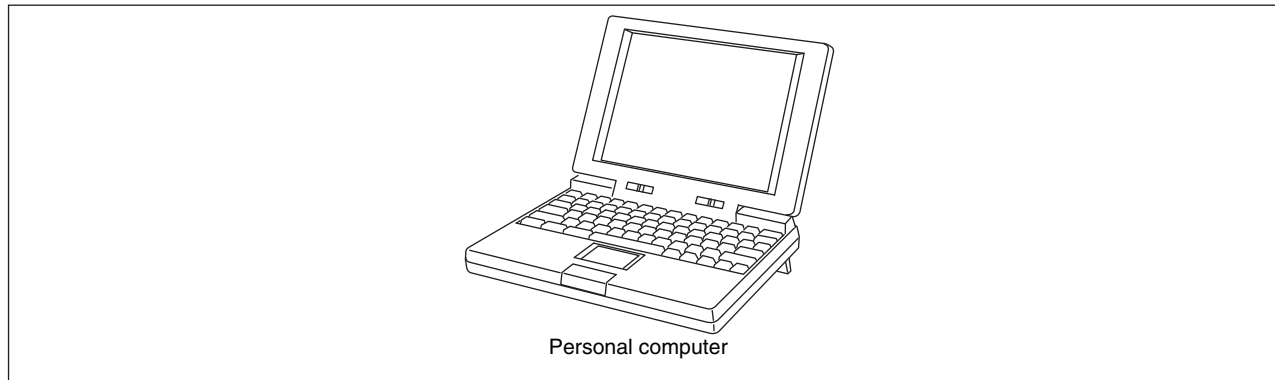
Hand-held Reader/Writer
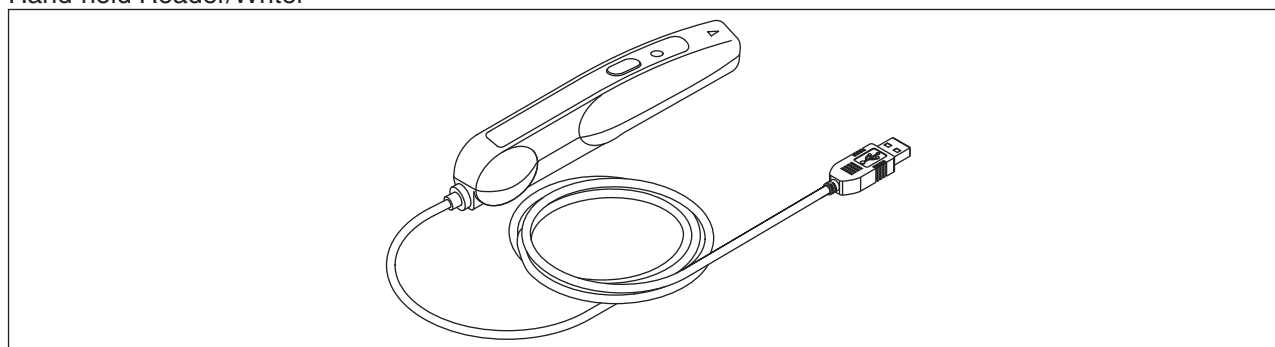


RF Tags
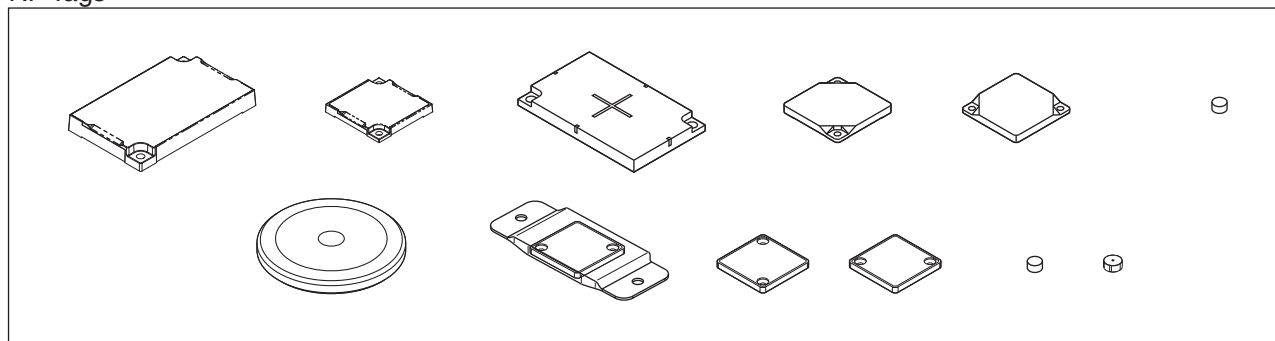


The V680-CHUD Hand-held Reader/Writer can be used with any RF Tag in the V680/V680S Series.

For details on Hand-held Reader/Writer and RF Tag models, refer to *Section 6 Appendices*.

p.132, p.150

CHECK!

When using a V680-D8KF□□, to use the V680-CHUD of production after October 2014.

CHECK!

V680-CH1D

A built-in RS-232C serial interface in the V680-CH1D Hand-held Reader/Writer allows communication with personal computers and programmable controllers that are equipped with an RS-232C interface.

Host Devices

Programmable controller
(Some models require a conversion connector.)

Personal computer

Hand-held Reader/Writer

V680-CH1D

V600-A22 (option)
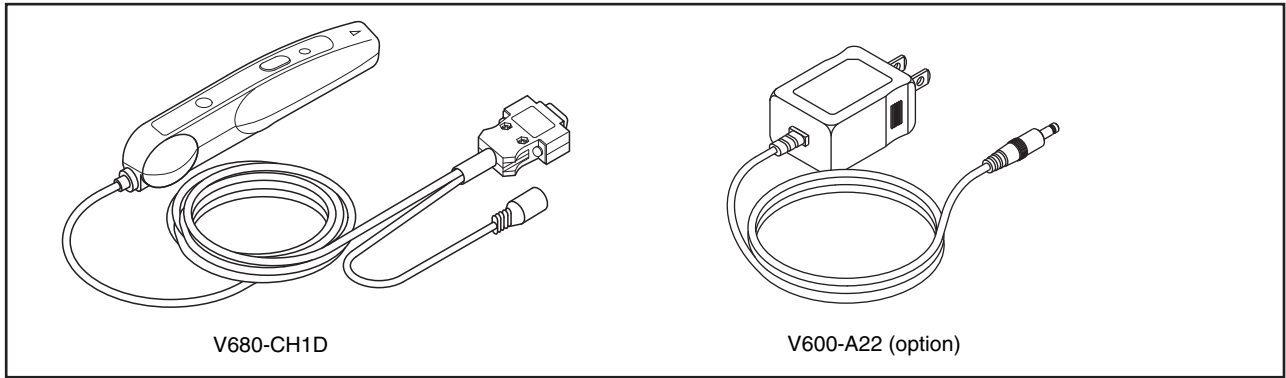
RF Tags

The V680-CH1D Hand-held Reader/Writer can be used with any RF Tag in the V680/V680S Series.

For details on Hand-held Reader/Writer and RF Tag models, refer to *Section 6 Appendices*.

CHECK!    p.132, p.150

When using a V680-D8KF☐☐, to use the V680-CH1D of production after October 2014.

CHECK!

V680-CH1D-PSI

A built-in RS-232C serial interface in the V680-CH1D-PSI Hand-held Reader/Writer allows communications with personal computers and programmable controllers that are equipped with an RS-232C interface

Host Devices



Recommended Hand-held Terminal:
Work About Pro manufactured by Zebra Technologies Inc.
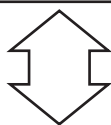
Hand-held Reader/Writer
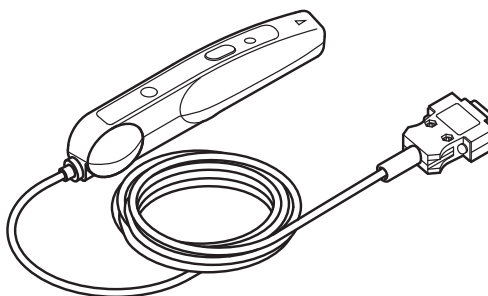


V680-CH1D-PSI

RF Tags



The V680-CH1D-PSI Hand-held Reader/Writer can be used with any RF Tag in the V680/V680S Series.

For details on Hand-held Reader/Writer and RF Tag models, refer to *Section 6 Appendices*.
CHECK!   p.132, p.150

When using a V680-D8KF□□, to use the V680-CH1D-PSI of production after October 2014.
CHECK!

# Operation Flowchart

V680-CHUD

**Preparation**

Connect the V680-CHUD to the host device.
When connecting for the first time, the USB driver must be installed.

p.31 to p.34

**Test**

Perform the communications test between the host device and Hand-held Reader/Writer.
p.54

Perform the communications test between the RF Tag and Hand-held Reader/Writer.
p.54

Check the ambient environment.

p.132

**Transmission**

Operate the system using real commands.

p.55

V680-CH1D

Preparation

Connect the V680-CH1D to the host device.

p.46

Communications preparation

Set the communications parameters between the host device and Hand-held Reader/Writer.
p.49

Test

Perform the communications test between the host device and Hand-held Reader/Writer.
p.54

Perform the communications test between the RF Tag and Hand-held Reader/Writer.
p.54

Check the ambient environment.

p.132

Transmission

Operate the system using real commands.

p.55

V680-CH1D-PSI

| Preparation | Connect the V680-CH1D-PSI to the host device.<br><br>p.48 |

▼

| Communications preparation | Set the communications parameters between the host device and Hand-held Reader/Writer.<br>p.49 |

▼

| Test | Perform the communications test between the host device and Hand-held Reader/Writer.<br>p.54 |
| | Perform the communications test between the RF Tag and Hand-held Reader/Writer.<br>p.54 |
| | Check the ambient environment.<br><br>p.132 |

▼

| Transmission | Operate the system using real commands.<br><br>p.55 |

MEMO

# Section 2
# Communications Preparations

# V680-CHUD Communications Preparations

## Connections

### ■ Connecting the Cable

**1.** Connect the cable connector to the USB connector on the host device, making sure that the connector is oriented correctly and not inserted at an angle.
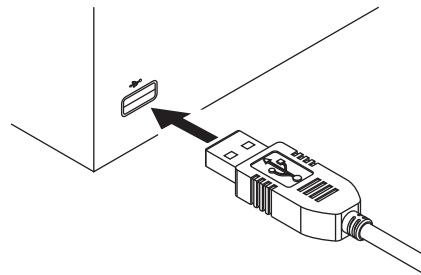
### ■ Removing the Cable

**1.** Remove the cable.

Close the software application at the host device and then pull out the connector in a straight line, not at an angle.

CHECK! If the connector is removed while the software is running at the host device, operation may stop due to a software malfunction error. Restart the software if operation becomes impossible.
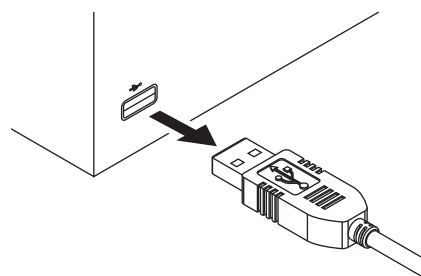
# Installing the USB Driver (V680-CHUD)

When connecting the Hand-held Reader/Writer to the host device for the first time, the USB driver must be installed at the host device.

## ■ Downloading the USB Driver

 Download the USB Driver for the V680-CHUD from the web site.
For details, ask your OMRON sales representative.

## ■ Installing the USB Driver

The V680-CHUD supports the Windows XP, Windows 7 or Windows 10 operating system. Install the driver in the host personal computer using the following procedure.
Operation on other operating systems is not supported.

**Windows XP**

**1.** Turn ON the power to the personal computer and start Windows XP.

**2.** Connect the Hand-held Reader/Writer to the personal computer.

CHECK! For details on connection methods, refer to *Connections*.

p.30

Wait for the following window to be displayed.

**3.** When the following dialog box is displayed, select the *Install from a list or specific location (Advanced)* Option and click the *Next* Button.



Found New Hardware Wizard

Welcome to the Found New Hardware Wizard

This wizard helps you install software for:

V680-CHUD

If your hardware came with an installation CD or floppy disk, insert it now.

What do you want the wizard to do?

○ Install the software automatically (Recommended)
◉ Install from a list or specific location (Advanced)

Click Next to continue.

< Back    Next >    Cancel
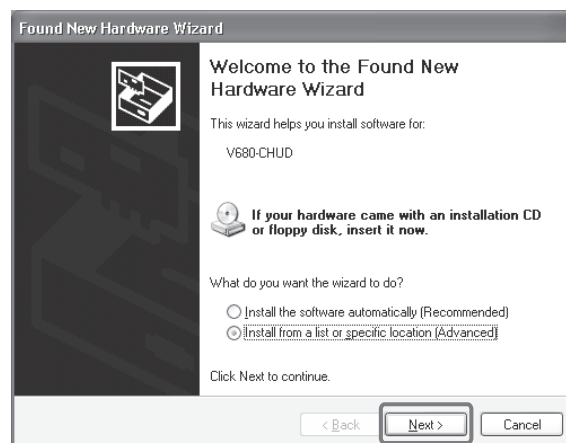
**4.** Click the *Browse* Button when the Found New Hardware Wizard Dialog Box appears, select the folder in which the downloaded file *V680-CHUD_100.inf* was saved, and click the *Next* button.
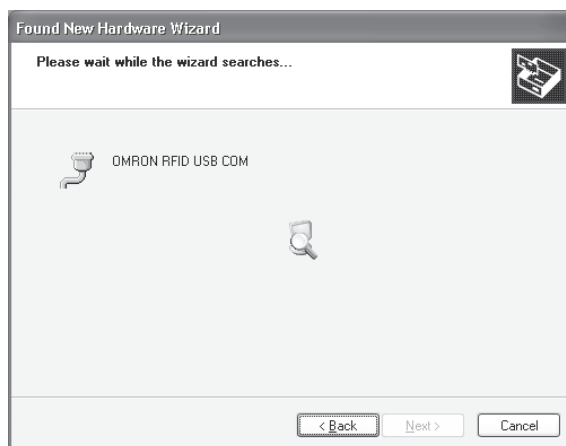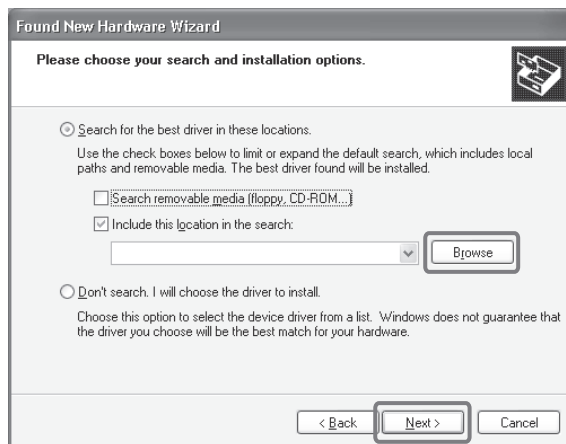




**5.** Click the *Continue Anyway* Button.
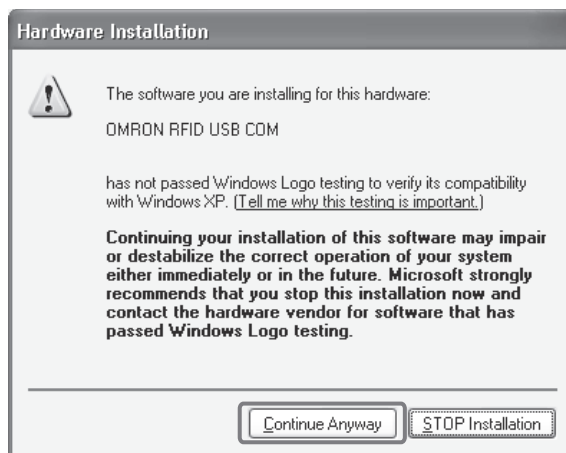
**6.** The USB Driver installation will begin.
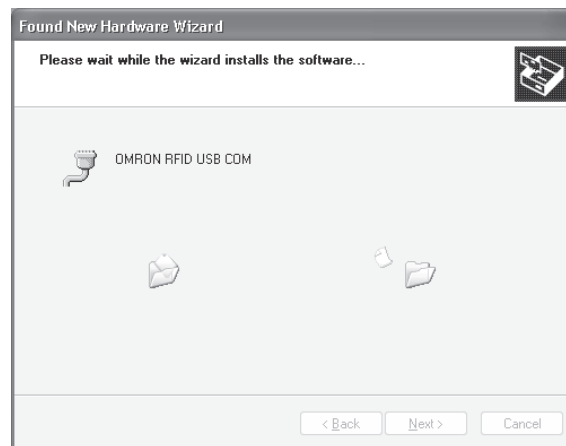
**7.** When the following window is displayed, installation has been completed.
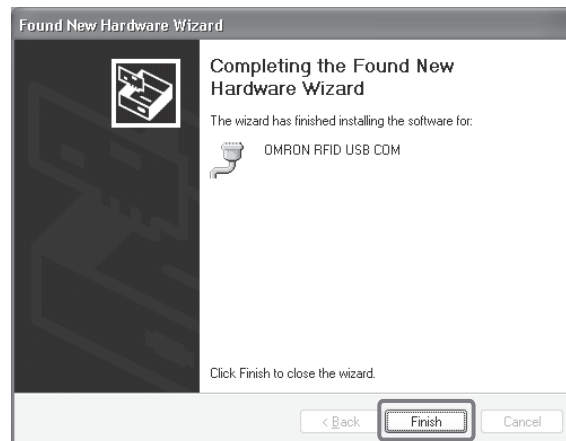
**8.** Click the *Finish* Button.

▪ Checking Installation

Check that the driver is correctly installed.

**1.** Connect the Hand-held Reader/Writer to the personal computer.

**2.** On the *Start Menu*, select *Control Panel* - *System*.

**3.** Click the *Device Manager* Button in the Hardware Tab Page.
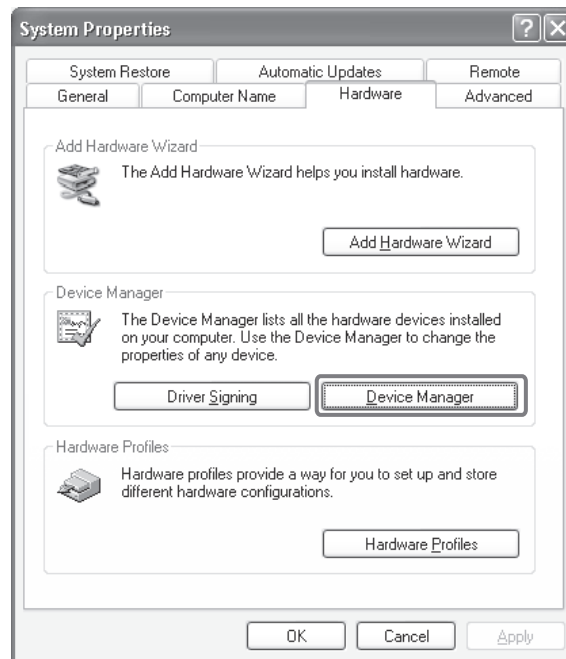


**4.** Select *Ports (COM & LPT)*, and check that *OMRON RFID USB COM* is displayed.

The driver is correctly installed if this port is displayed.
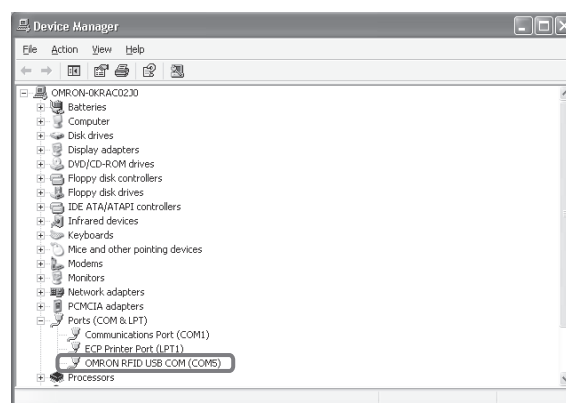


Communications with the Hand-held Reader/Writer can be performed with the COM number displayed in parentheses after *OMRON RFID USB COM*.

**Windows 7**

**1.** Turn ON the power to the personal computer and start Windows 7.

**2.** Connect the ID Controller to the computer via USB.

Refer to *Connections* for information on the connection method.

CHECK!　　p.30
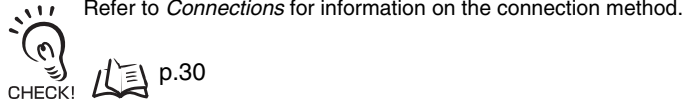
**3.** Select *Settings - Control Panel - System and Security* from the Windows Start Menu.
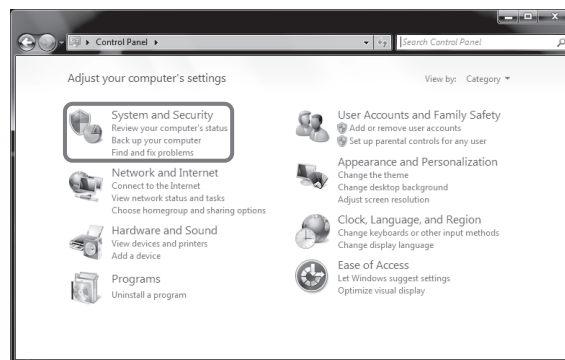


**4.** Click the *Device Manager* Button.
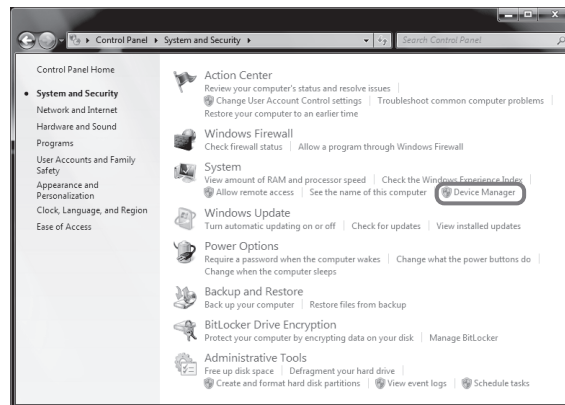
**5.** Right-click the *Other devices - V680-CHUD* and click the *Properties*.
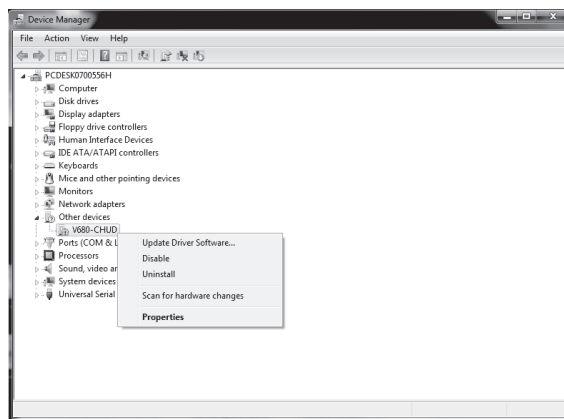


**6.** Click the *Update Driver* Button.
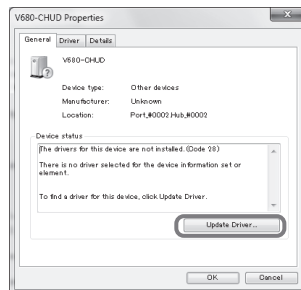


**7.** Once the following dialog box has been displayed, click the *Browse my computer for driver software* Button.
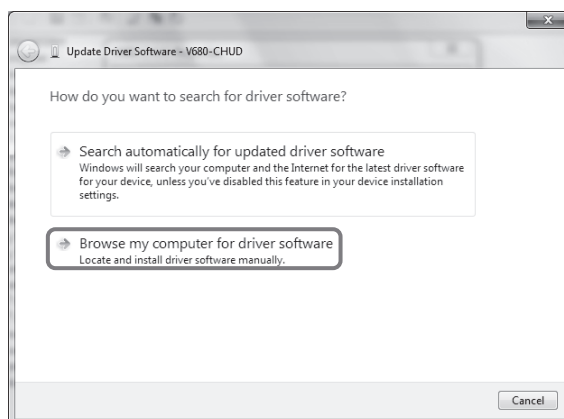
**8.** Click the *Browse* Button and select the folder where the downloaded V680-CHUD_100_win7_□□.inf is to be saved. Then click the *Next* Button.
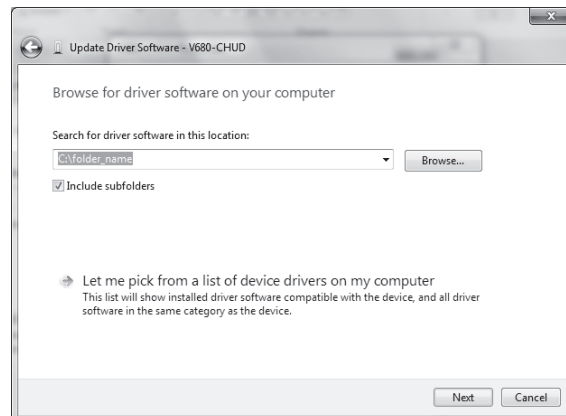


**9.** Click the *Install this driver software anyway* Button.
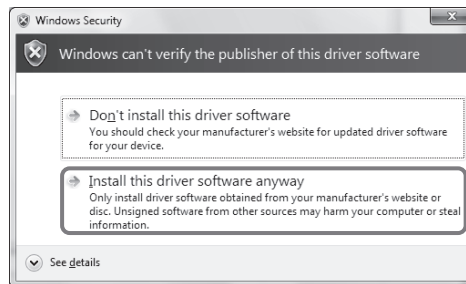


The following dialog box will be displayed when the software installation has been completed.



**10.** Click the *Close* Button.

■ Checking Installation
Use the following procedure to confirm that the driver has been correctly installed.

**1.** Turn ON the power to the personal computer and start Windows 7.

**2.** Connect the ID Controller to the computer via USB.

Refer to *Connections* for information on the connection method.

CHECK!  📖 p.30
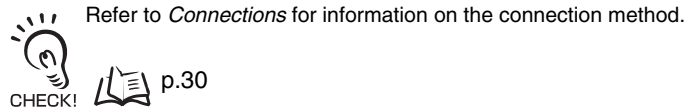
**3.** Select *Settings - Control Panel - System and Security* from the Windows Start Menu.



**4.** Click the *Device Manager* Button.
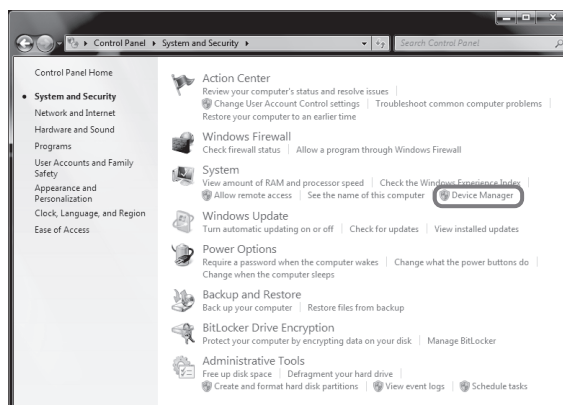
**5.** Right-click the *Other devices - V680-CHUD* and click the *Properties*.
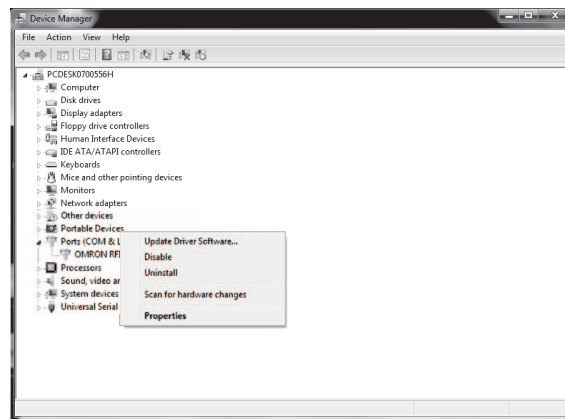


**6.** Select *Ports (COM & LPT)*, and check that OMRON RFID USB COM is displayed.

If the driver is correctly installed, the property window for the V680-CHUD will be displayed as follows:
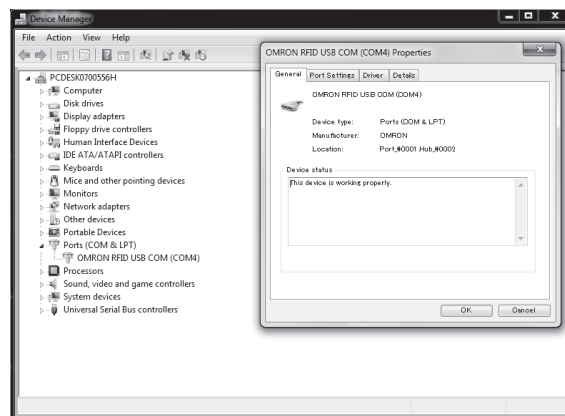


Communications with the ID Controller can be performed with the COM number displayed in parentheses after OMRON RFID USB COM.

**Windows 10**

**1.** Turn ON the power to the personal computer and start Windows 10.

**2.** Connect the ID Controller to the computer via USB.

Refer to *Connections* for information on the connection method.

CHECK!    📖 p.30

**3.** Select *Settings - Windows System - Control Panel - System and Security* from the Windows Start Menu.
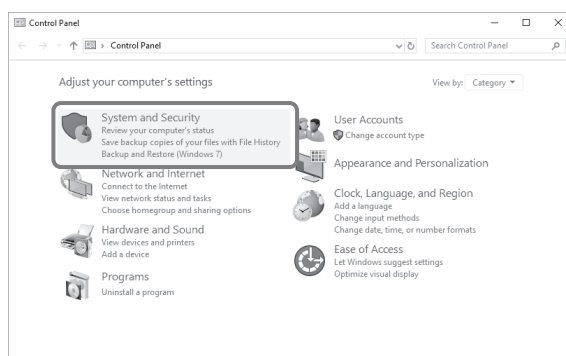


**4.** Click the *System* Button.
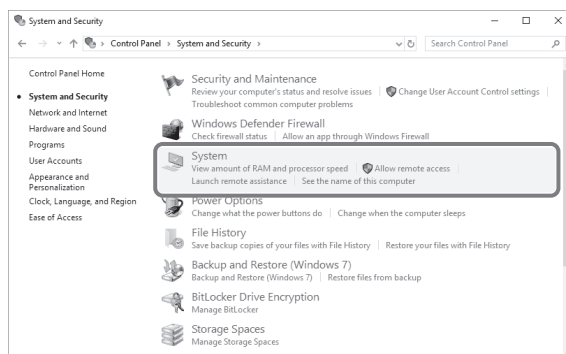
**5.** Click the *Device Manager* Button.
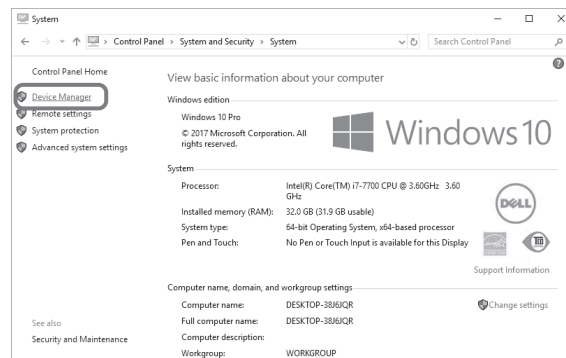


**6.** Right-click the *Ports - USB Serial Device (COM)* and click the *Update driver*.



**7.** Once the following dialog box has been displayed, click the *Browse my computer for driver software* Button.

Section 2

V680-CHUD Communications Preparations
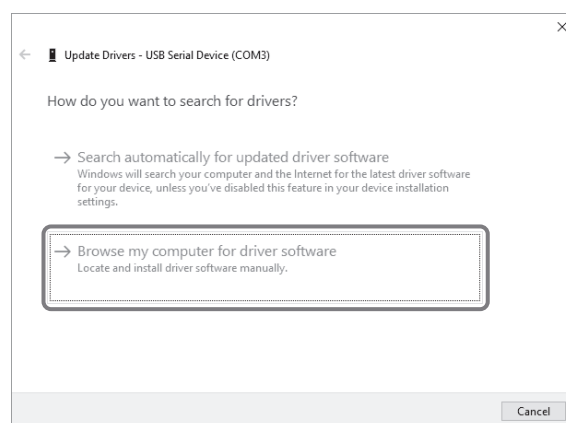
**8.** Click the *Browse* Button and select the folder where the downloaded V680-CHUD_100_win10_☐☐.bat is to be saved. Then click the *Next* Button.
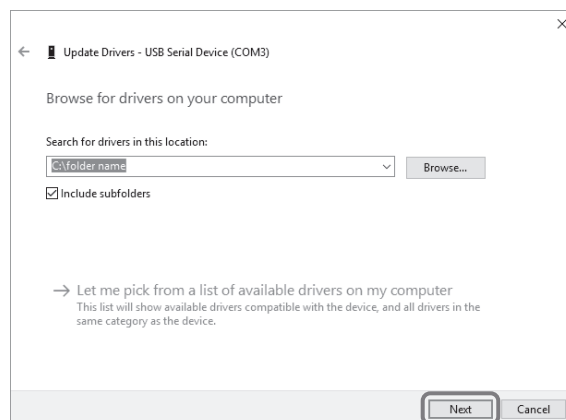


**9.** The USB Driver installation will begin.
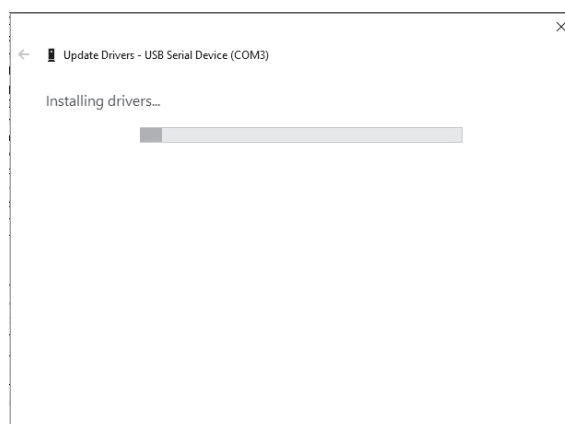


The following dialog box will be displayed when the software installation has been completed.



**10.** Click the *Close* Button.

§ Checking Installation

Use the following procedure to confirm that the driver has been correctly installed.

**1.** Turn ON the power to the personal computer and start Windows 10.

**2.** Connect the ID Controller to the computer via USB.

Refer to *Connections* for information on the connection method.

CHECK!

**3.** Select *Settings - Windows System - Control Panel - System and Security* from the Windows Start Menu.
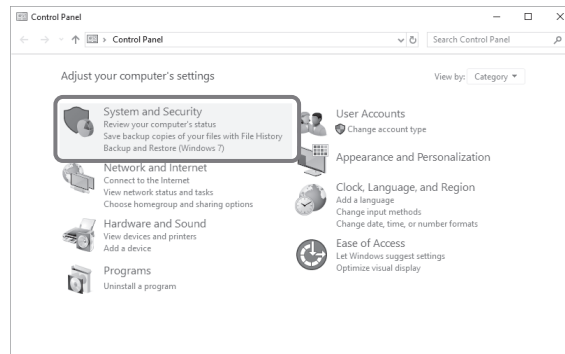


**4.** Click the *System* Button.
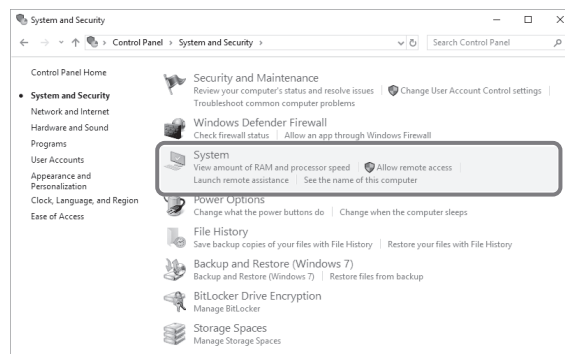
**5.** Click the *Device Manager* Button.
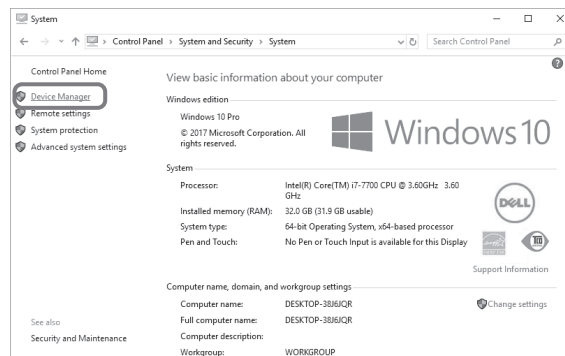


**6.** Right-click the *Ports - OMRON RFID USB (COM)*, and check the *Update driver.*

If the driver is correctly installed, the property window for the V680-CHUD will be displayed as follows:
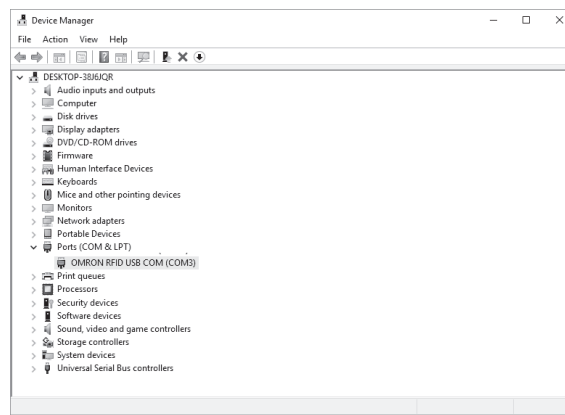


Communications with the ID Controller can be performed with the COM number displayed in parentheses after OMRON RFID USB COM.

# V680-CH1D Communications Preparations

## Pin Arrangement of the Host Device Interface Connector

V680-CH1D



Connector from Mating Side

| Pin No. | Signal (See note.) | Code (See note.) | Signal direction |
|---|---|---|---|
| 1 | --- | | --- |
| 2 | Receive data | RD | Hand-held Reader/Writer to host device |
| 3 | Send data | SD | Host device to Hand-held Reader/Writer |
| 4 | --- | --- | --- |
| 5 | Signal ground | SG | --- |
| 6 | (Reserved) | --- | --- |
| 7 | Request send | RS | Loops inside connector |
| 8 | Enable send | CS | |
| 9 | --- | --- | --- |

**Note:** The names of signals at the host device are abbreviated with codes.

**Note:** For conversion to a 25-pin connector, the SGC-X9P/25P-2 manufactured by Sunhayato, or an equivalent, is recommended.

## ■ Connection with the Host Device

Use the following procedure to connect the V680-CH1D to the host device.

**1.** Connect the V680-CH1D to the RS-232C interface of the host device.
   • When connecting to an IBM PC/AT or compatible:
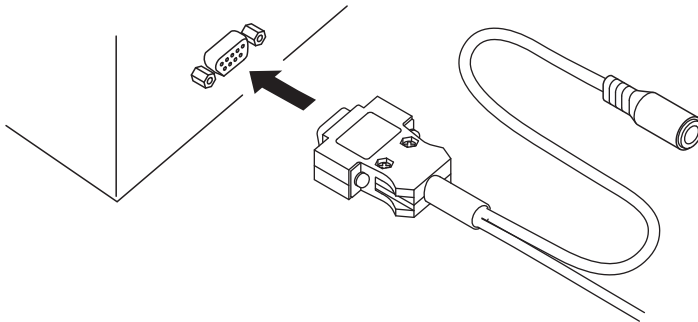


   • When connecting to a PC9801-series computer (D-Sub 25-pin connector):
   To convert from a 9-pin connector to a 25-pin connector, use an SGC-X9P25P-2 conversion connec-
   tor manufactured by Sunhayato, or an equivalent product.



SGC-X9P25P-2
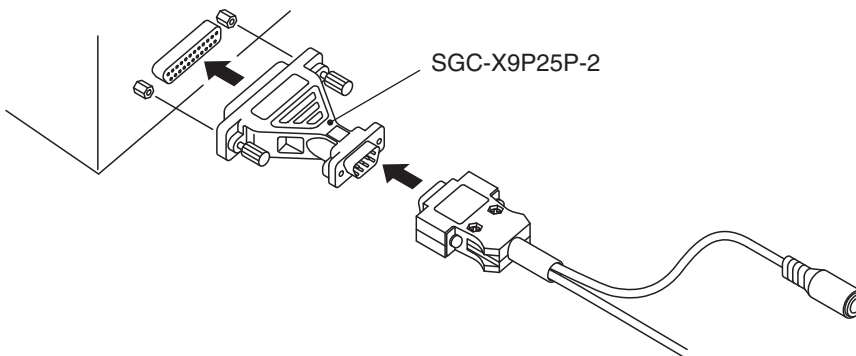
**2.** Connect the V600-A22 AC Adaptor to the V680-CH1D.
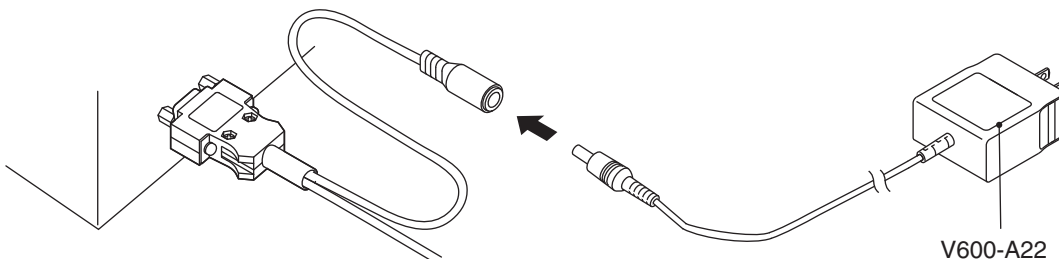


V600-A22

**3.** Plug the V600-A22 AC Adaptor into a 100- to 120-VAC power outlet.

CHECK!
   • Do not use any AC adaptor other than the specified one (V600-A22).
   • Using any AC adaptor other than the specified one may cause a malfunction, damage, or fire in the V600-CH1D.
   • Some host devices require a conversion connector.

▪ When connecting to a CQM1, CJ1, CS1, etc.

Prepare a connection cable as shown in the connection examples below.

Note: Because both the V680-CH1D interface connector and the interface connector of the CQM1, CJ1, and CS1 are sockets, a conversion connector is necessary to connect them. Also, the pin arrangement of the CQM1, CJ1, and CS1 interface connector is different from the RS-232C pin arrangement of a personal computer.

V680-CH1D

| Pin No. | Signal |
|---------|--------|
| 1 | --- |
| 2 | RD |
| 3 | SD |
| 4 | --- |
| 5 | SG |
| 6 | --- |
| 7 | RS |
| 8 | CS |
| 9 | --- |

CQM1/CJ1/CS1

| Pin No. | Signal |
|---------|--------|
| 1 | --- |
| 2 | SD |
| 3 | RD |
| 4 | RS |
| 5 | CS |
| 6 | --- |
| 7 | --- |
| 8 | --- |
| 9 | SG |

Loop
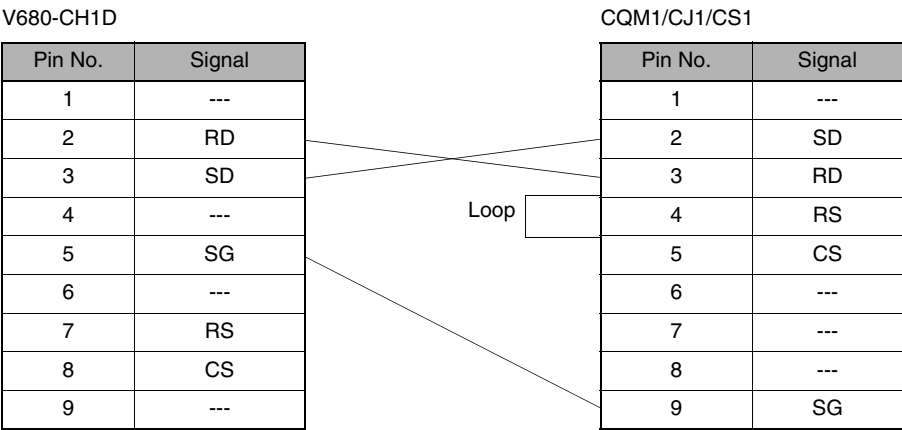
# V680-CH1D-PSI Communications Preparations

## Pin Arrangement of the Host Device Interface Connector

V680-CH1D-PSI

5          1

9          6

Connector from Mating Side

| Pin No. | Signal (See note.) | Code (See note.) | Signal direction |
|---|---|---|---|
| 1 | --- | | --- |
| 2 | Receive data | RD | Hand-held Reader/Writer to host device |
| 3 | Send data | SD | Host device to Hand-held Reader/Writer |
| 4 | --- | --- | --- |
| 5 | Signal ground | SG | --- |
| 6 | Reserved | --- | --- |
| 7 | Request send | RS | Loops inside connector |
| 8 | Enable send | CS | |
| 9 | 5 VDC | --- | Host device to Hand-held Reader/Writer |

**Note:** The names of signals at the host device are abbreviated with codes.

### ■ Connection with the Host Device

Use the following procedure to connect the V680-CH1D-PSI to the host device.

**1.** Connect the V680-CH1D-PSI to the RS-232C interface of the host device.
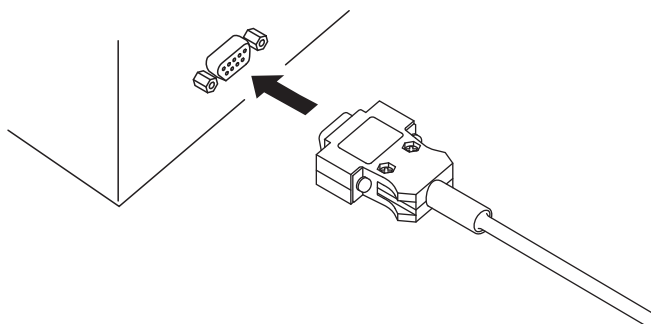
# Setting the Hand-held Reader/Writer

## Settings

The following settings are used to operate the Hand-held Reader/Writer.
• Serial communications parameters (baud rate, transmission code, parity check, stop bits)
• Basic function settings (Auto Command OFF)
These settings can be changed by sending a setting command from the host device. To operate the Hand-held Reader/Writer with the new setting, the power must be turned OFF then ON again, or the ABORT command must be used.

### ■ Serial Communications Parameters

The following settings are related to serial communications. Use the COMMUNICATIONS CONDI-TIONS SETTING (TR) command.

| Item | Contents |
|------|----------|
| Baud rate (bps) | 2,400, 4,800, 9,600*, 19,200, 38,400 |
| Transmission code | 7-unit ASCII 7* or 8-unit JIS 8 |
| Parity check | Even parity*/odd parity/none |
| Stop bits | 2*/1 |

Note: Items marked by an asterisk (*) are set as the default when shipped from the factory.

### ■ Basic Function Settings

The Auto Command OFF function can be set. Use the BASIC FUNCTIONS SETTING (FN) command.

| Item | Contents |
|------|----------|
| Auto Command OFF function | Yes (1 minute)*, No |

Note: Items marked by an asterisk (*) are set as the default when shipped from the factory.

## Reading the Settings

Use the SET INFORMATION READ (UL) command to read the settings of the Hand-held Reader/Writer. The information read by the SET INFORMATION READ command is set in the backup memory of the Hand-held Reader/Writer. For this reason, care must be taken when the power is first turned ON after the settings have been changed because the operational settings of the Hand-held Reader/Writer will be different.

# Setting the Operating Parameters

To optimize Hand-held Reader/Writer performance and reliability, operating parameters can be set to match the application. The following parameters can be set: the inter-character monitoring time, response delay time, auto command cancel time, write protection setting, and protocol.

Usually there will be no problem if the default settings are used, but the system can be optimized by setting following parameters.

These parameters are stored in the internal memory of the Hand-held Reader/Writer and are saved even if the power is turned OFF. When the internal settings are changed with the PARAMETER SET command (SP), it is not necessary to reset the Hand-held Reader/Writer. The changes will be effective immediately after the PARAMETER SET command is executed.

> **CHECK!** The PARAMETER SET command is also used to read the parameter settings. For details on the PARAMETER SET command, refer to *PARAMETER SET (SP)* in *Section 3*.
> p.78, p.116

## ■ Inter-character Monitoring Time

The Hand-held Reader/Writer recognizes a command when it receives the end code of a command string that is sent from the host device. However, if for some reason the command is only partially received, the Hand-held Reader/Writer will monitor for a fixed period of time after the last character in the command string is received. If the complete command string is not received after the fixed period of time has expired, a format error (end code: 14) will be returned.
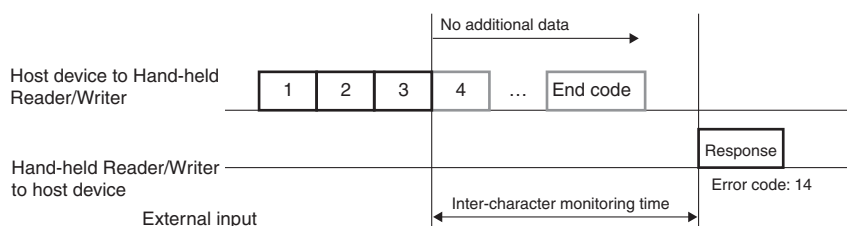


| Setting range |
|---|
| 0 to 9,999 (ms) |

**Note:** Default value: 99 (ms)

## ■ Response Delay Time

The start of returning a response can be changed by setting the response delay time.

> **CHECK!** The actual time from when sending the command has been completed until returning the response is started is the Hand-held Reader/Writer's internal processing time (minimum: 0 ms) plus the response delay time (a set value).
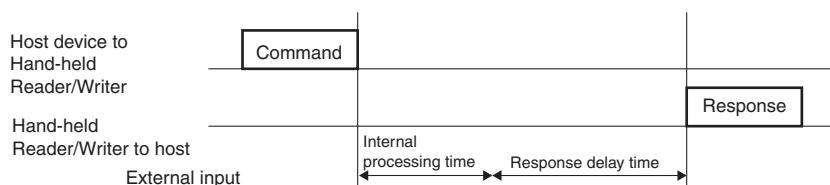


| Setting range |
|---|
| 0 to 99 (ms) |

**Note:** Default value: 20 (ms)

## ■ Auto Command Cancel Time

The auto command cancel time is used to set the amount of time from after an auto command is sent until the command processing will be aborted.

After waiting for the tag for a fixed period of time, an " RF Tag non-existent" error (error code: 72) will be returned to the host device.

Host device to
Hand-held
Reader/Writer    Command

Hand-held
Reader/Writer to host
device           Auto command      Response
                 cancel time       Error code: 72
        External input

| Setting range |
| --- |
| 0 to 99 (s) |

**Note:** Default value: 60 (s)
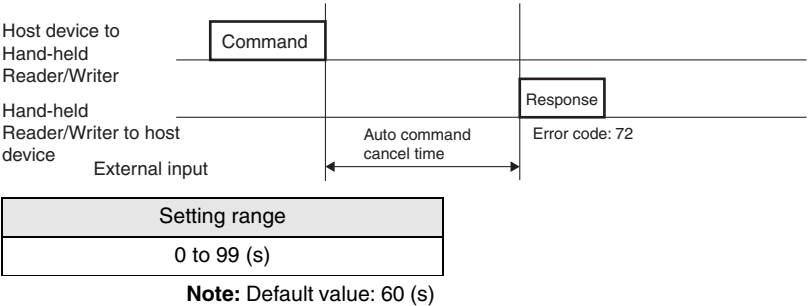
## ■ Write Protection Enable Setting

The write protection enable setting can be used to enable or disable write protection.

00: Write protection function disabled

01: Write protection function enabled default value

CHECK!

For details on write protection settings, refer to *Write Protection Function* in *Section 4*.

## ■ Protocol Switch

The protocol switch is used to set whether the Hand-held Reader/Writer will use the V680 command format or the V600 command format.

0: V600 commands (default value)

1: V680 commands

CHECK!

For details, refer to *Section 3 Commands*.

## ■ Tag Memory Setting

The CA1D Mode in the Tag memory setting is used only when using the V680-CA1D/-CA2D.

If you are using the V680-CA1D/-CA2D, set the Tag memory setting to CA1D Mode.

If you are not using the V680-CA1D/-CA2D, set the Tag memory setting to Standard Mode.

0: Standard Mode (default value)

1: CA1D Mode

CHECK!

Refer to Using Heat-resistive Tags (V680-D1KP58HTN and V680-D1KP58HT) in *Section 1 Product Overview* for information on using Using Heat-resistive Tags (V680-D1KP58HTN or V680-D1KP58HT).

CHECK!

CA1D Mode can be used with version 1.1 or newer.

Use the VERSION READ (VS) command to read the product version. For details on the VERSION READ (VS) command, refer to *VERSION READ (VS)* under *V680 Commands or V600 Commands* in *Section 3 Commands*.

# Initializing the Settings

A setting command is used to set the Hand-held Reader/Writer but if the communications parameters are not known or if the setting contents are damaged, it is possible that communications will no longer be possible with the host device. If this occurs, press both the reset button and the activate switch when turning ON the power. This will return all settings to the defaults set when the Hand-held Reader/Writer was shipped from the factory, allowing communications with the host device again.

## ■ Reset Procedure

**1.** Turn ON the power while pressing the reset button.

**2.** Keep the reset button depressed for two seconds or more. The green operation indicator will start flashing.

**3.** With the green operation indicator flashing, remove your finger from the reset button and press the activate switch.

**4.** When the activate switch is pressed, the operation indicator will stop flashing green. This indicates that all of the settings have been initialized.

**Note:** If the activate switch is not pressed within 30 seconds from the time that the operation indicator starts flashing green, the settings will not be initialized.

The V680-CHUD does not have a reset button. To reset the V680-CHUD, shut down the software on the host device, and disconnect and reconnect the connector.

CHECK!

# Communications Test

## Test Run Procedure

```
┌─────────────────────────────┐
│ Connect the Hand-held Reader/Writer │
│ to the host device.          │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│ Visually check the indicator display. │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐         ┌──────────────────────────────────────────────┐
│ Execute the online test from the host │  │ Check communications between the host device and Hand-held │
│ device.                      │─────────│ Reader/Writer using the test command.          │
└─────────────────────────────┘         └──────────────────────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐         ┌──────────────────────────────────────────────┐
│ Test run the system.         │─────────│ Check operation using real commands.           │
└─────────────────────────────┘         └──────────────────────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│ Finish                       │
└─────────────────────────────┘
```
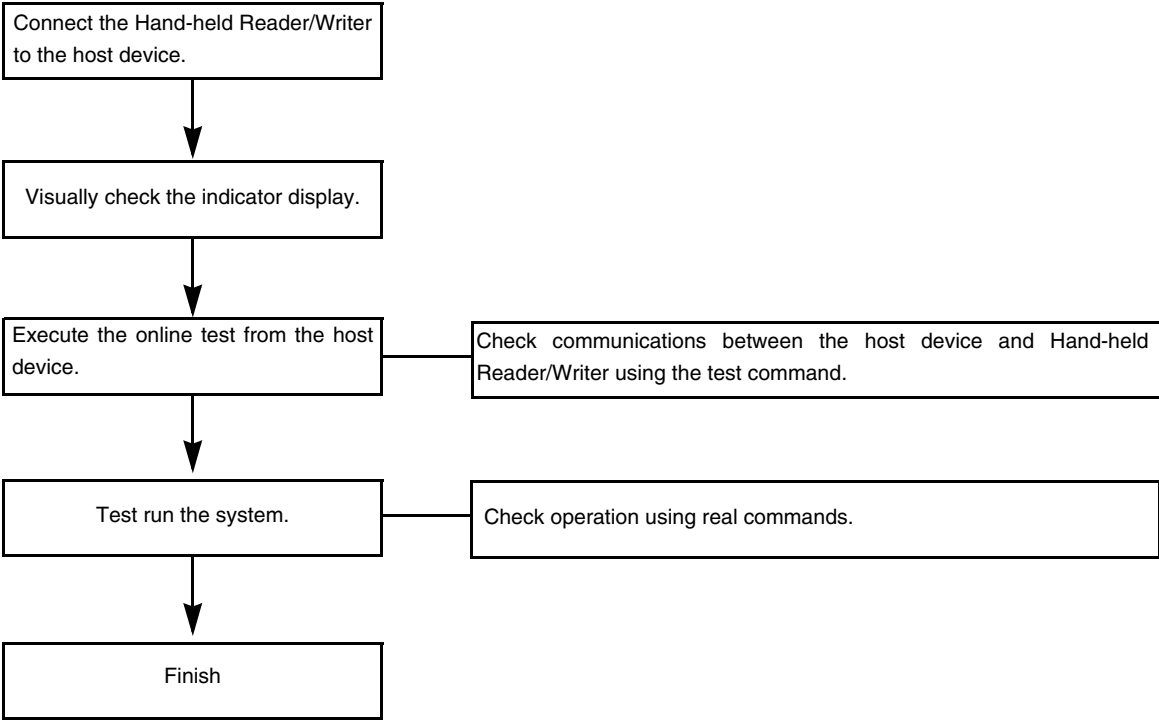
## Communications Test between Host Device and Hand-held Reader/Writer

Use the test command to test communications between the Hand-held Reader/Writer and host device. Before performing communications with the RF Tag, check the Hand-held Reader/Writer connections and communications.

**1.** Send the test command from the host device.

> For detail on the test command, refer to *TEST (TS)*.
>
> CHECK! 📖 p.79, p.110

▼

**2.** If communications is normal, the Hand-held Reader/Writer will return the received data.

> If a response is not returned, refer to *Troubleshooting*.
>
> CHECK! 📖 p.127

## Communications Test between RF Tags and Hand-held Reader/Writer

Use actual commands to test communications between the RF Tags and the Hand-held Reader/Writer.

**1.** Send the READ command (RD) with an SA communications specification from the host device.

> For details on the READ command, refer to *READ (RD)*.
> If using V600 commands, refer to the Auto Read command (AR).
>
> CHECK! 📖 p.65, p.92

▼

The Hand-held Reader/Writer will communicate with the RF Tag and the operation indicator will flash green.

**2.** Move the antenna of the Hand-held Reader/Writer close to the RF Tag.



▼
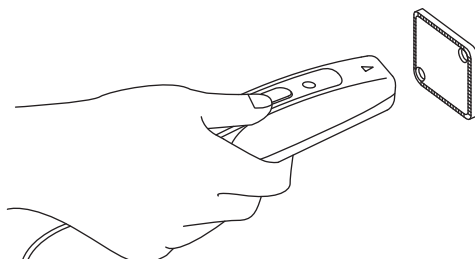
The Hand-held Reader/Writer will read the data in the RF Tag when the Hand-held Reader/Writer moves within the interrogation zone. As a result, the operation indicator will light green and then turn OFF.

# Section 3
# Commands

# Communicating with RF Tags

## Specifying Data Code

Whether the read or write data is treated as an ASCII (or JIS 8) or hexadecimal is specified in each command.

### ■ ASCII (JIS 8 Code)

- One character of ASCII or JIS 8 code data occupies 1 byte (1 address) of the RF Tag memory.

**• RF Tag**

| Address (hex) | | | |
|---|---|---|---|
| 0010 | 4 | F | "O" |
| 0011 | 4 | D | "M" |
| 0012 | 5 | 2 | "R" |
| 0013 | 4 | F | "O" |
| 0014 | 4 | E | "N" |

1 byte

- **Examples for Specifying ASCII Text**

V600 Commands

| W | T | A | 1 | 0 | 0 | 1 | 0 | O | M | R | O | N | * | CR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

Command code — ASCII setting — Processing area number setting — Start address — Write data — Terminator

V680 Commands

| W | T | S | T | A | 1 | 0 | 0 | 1 | 0 | O | M | R | O | N | * | CR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

Command code — Communications specification — ASCII setting — Processing area number setting — Start address — Write data — Terminator
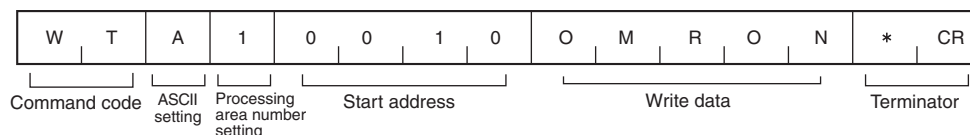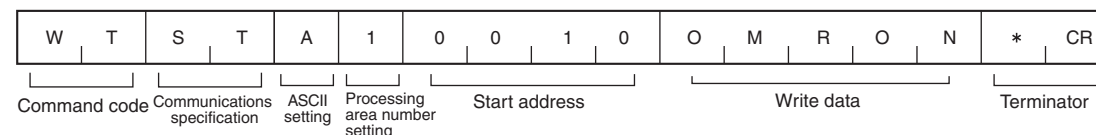
### ■ Hexadecimal

- One character is treated as a hexadecimal number. Therefore, only numerals 0 through 9 and A to F can be accepted.
- Two characters of data occupy 1 byte (1 address) of the RF Tag memory. Therefore, specify data in 2-character units (in even numbers) when using a WRITE command. If an odd number of characters is specified by mistake, an error will occur.

**• RF Tag**

| Address (hex) | | |
|---|---|---|
| 0010 | 1 | 9 |
| 0011 | 9 | 6 |

1 byte

- **Examples for Specifying Hexadecimal**

V600 Commands

| W | T | H | 1 | 0 | 0 | 1 | 0 | 1 | 9 | 9 | 6 | * | CR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

Command code — Hexa-decimal code setting — Process-ing area number setting — Start address — Write data — Terminator

V680 Commands

| W | T | S | T | H | 1 | 0 | 0 | 1 | 0 | 1 | 9 | 9 | 6 | * | CR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

Command code — Hexa-decimal code setting — Process-ing area number setting — Start address — Write data — Terminator
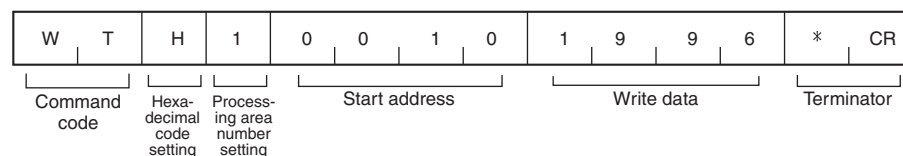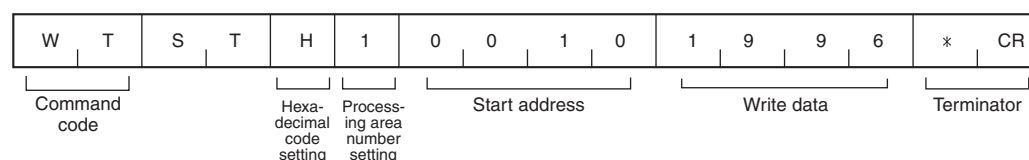
# V600 and V680 Command Comparison

The V680-series Hand-held Reader/Writer can use commands in either the V600 command format or the V680 command format. By using V600 commands, production lines that previously used a V600-series Reader/Writer can use the same application with the V680-series Hand-held Reader/Writer. New functionality can be used by using V680 commands.

The PARAMETER SET (SP) command is used to switch between the two command formats. V680 and V600 commands are handled as shown in the following tables.

## Communications Commands

| V680 commands | | | | V600 commands | | |
|---|---|---|---|---|---|---|
| Command name | Command code | Communications specification | Data specifica-tion | Command name | Command code | Data specifica-tion |
| READ | RD | ST | A/H | READ | RD | A/H |
| | | SA | A/H | AUTO READ | AR | A/H |
| | | BT | A/H | BUTTON READ | BR | A/H |
| | | BA | A/H | BUTTON AUTO READ | UR | A/H |
| WRITE | WT | ST | A/H | WRITE | WT | A/H |
| | | SA | A/H | AUTO WRITE | AW | A/H |
| | | BT | A/H | BUTTON WRITE | BW | A/H |
| | | BA | A/H | BUTTON AUTO WRITE | UW | A/H |
| DATA FILL | DF | ST | A/H | DATA FILL | FL | A/H |
| | | SA | A/H | AUTO DATA FILL | AF | A/H |
| DATA CHECK | MD | ST | C/K | DATA CHECK | MD | C/K |
| OVERWRITE COUNT CONTROL | MD | ST | S/L | OVERWRITE COUNT CONTROL | MD | S |
| CALCULATION WRITE | --- | --- | --- | CALCULATION WRITE | CW | A/S |
| ID CODE READ | ID | ST | H | ID CODE READ | ID | H |
| READ WITH ERROR CORRECTION | QR | ST | A/H | --- | --- | --- |
| WRITE WITH ERROR CORRECTION | QW | ST | A/H | --- | --- | --- |

## Communications Subcommands

| V680 commands | | | V600 commands | | |
|---|---|---|---|---|---|
| Command name | Command code | Data specifi-cation | Command name | Command code | Data specifi-cation |
| COMMAND PROCESSING TERMINATE | AA | --- | COMMAND PROCESSING TERMINATE | AA | --- |
| ABORT (reset) | XZ | --- | ABORT (reset) | XZ | --- |

## Controller Control Commands

| V680 commands | | V600 commands | |
|---|---|---|---|
| Command name | Command code | Command name | Command code |
| COMMUNICATIONS CONDITIONS SETTING | TR | COMMUNICATIONS CONDITIONS SETTING | TR |
| BASIC FUNCTIONS SETTING | FN | BASIC FUNCTIONS SETTING | FN |
| SET INFORMATION READ | UL | SET INFORMATION READ | UL |
| PARAMETER SET | SP | PARAMETER SET | SP |

Section 3   V600 and V680 Command Comparison

## Host Commands

| V680 commands | | V600 commands | |
|---|---|---|---|
| Command name | Com-mand code | Command name | Com-mand code |
| TEST | TS | TEST | TS |
| VERSION READ | VS | VERSION READ | VS |

# V680 Commands

## Communications with the RF Tag

There are four types of communications specifications for communicating with RF Tags using the Hand-held Reader/Writer.

| Name | Communications specification | Description |
|------|------------------------------|-------------|
| Single trigger | ST | When the Hand-held Reader/Writer receives a command, it communicates with an RF Tag and then returns a response. |
| Single auto | SA | When the Hand-held Reader/Writer receives a command, it waits to detect an RF Tag in the Antenna's communication area. When the Hand-held Reader/Writer detects an RF Tag, it communicates with the RF Tag and then returns a response. |
| Button trigger | BT | When the Hand-held Reader/Writer receives a command, it communicates with the RF Tag when the activate switch is pressed, and then returns a response. |
| Button auto | BA | When the Hand-held Reader/Writer receives a command, it waits to detect an RF Tag in the Antenna's communication area after the activate switch is pressed. When the Hand-held Reader/Writer detects an RF Tag, it communicates with the RF Tag and then returns a response. |

CHECK! Depending on the command, there are limitations on the communications specification that can be used.

For communication specifications that can be used, refer to *V600 and V680 Command Comparison* in this chapter.

## Single Trigger (ST) Communications Specifications

After the antenna end of the Hand-held Reader/Writer has been moved close to an RF Tag, a single trigger (ST) communications specification is sent from the host device to communicate with the RF Tag.

1. Move the antenna end of the Hand-held Reader/Writer close to the RF Tag.

A

Host device

Hand-held Reader/Writer

RF Tag

C

Communications with RF Tag

B

Command

D
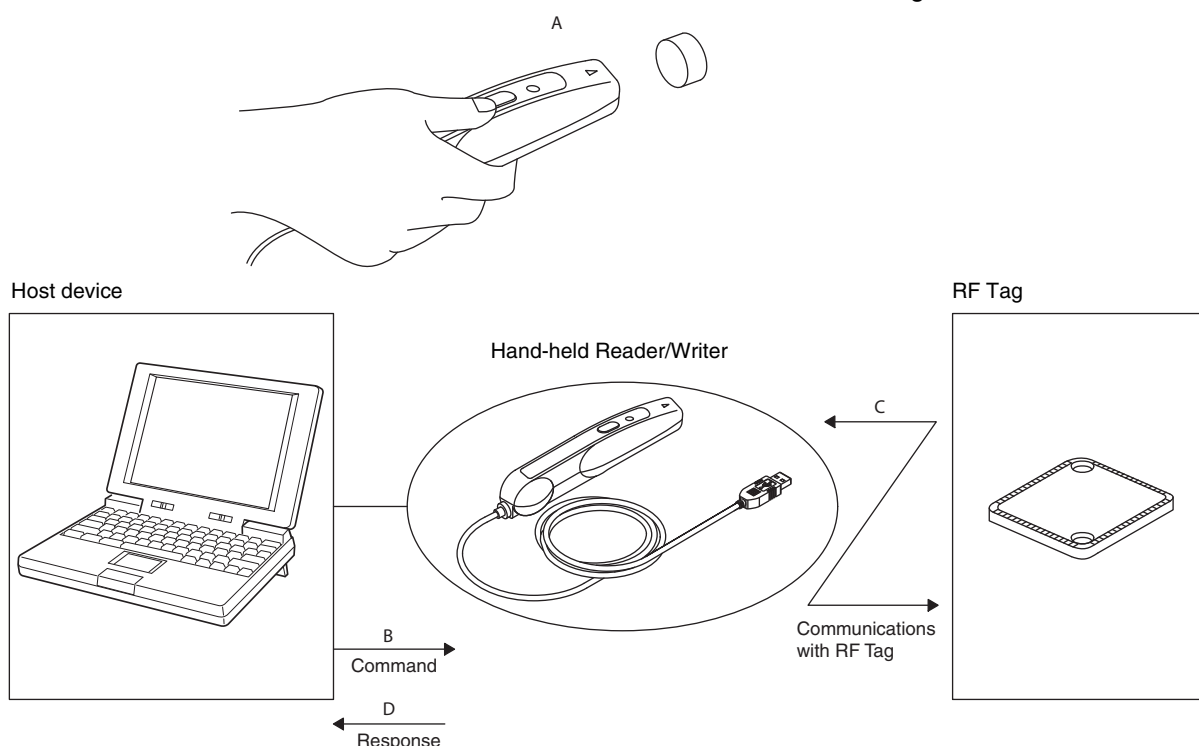
Response

2. Send the command from the host device to the Hand-held Reader/Writer.
3. The Hand-held Reader/Writer will communicate with the RF Tag.
4. A response will be returned from the Hand-held Reader/Writer to the host device.
   If communications end normally, the operation indicator (LED) will light green and then turn OFF.
   If an RF Tag is not detected within the Hand-held Reader/Writer's communication area when the command is sent from the host device, an RF Tag Non-existent Error will occur. At this time, the operation indicator will flash red.

# Single Auto (SA) Communications Specifications

A single auto (SA) communications specification is used to communicate with an RF Tag when the antenna end of the Hand-held Reader/Writer is moved close to an RF Tag after the command has been sent from the host device.
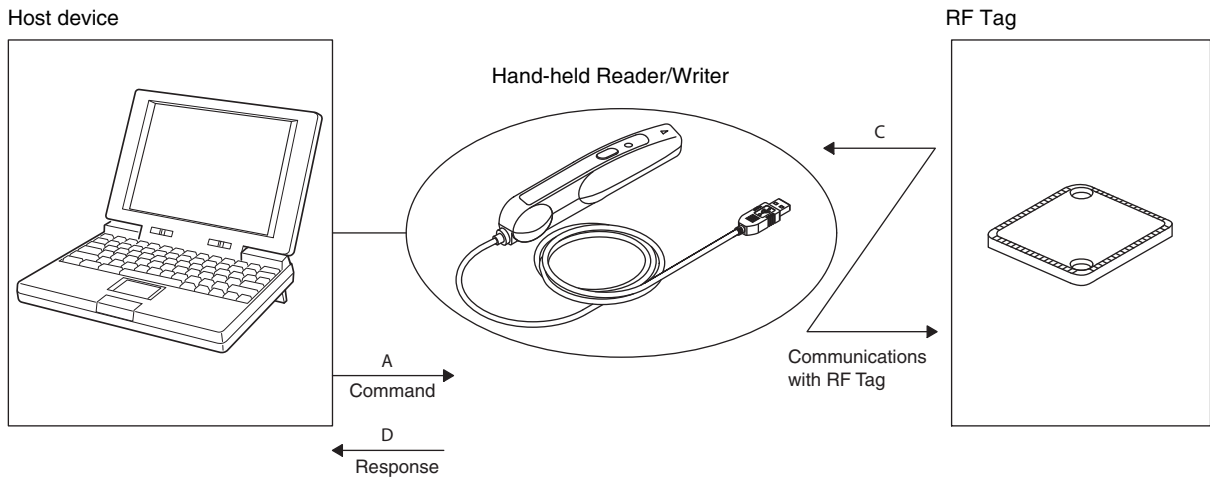
Host device

Hand-held Reader/Writer

RF Tag

C

A
Command

Communications
with RF Tag

D
Response

1. Send the command from the host device to the Hand-held Reader/Writer.
2. The Hand-held Reader/Writer will enter the communications stand-by state with the RF Tag, and the operation indicator (LED) will flash green.

CHECK!
If an RF Tag is not detected within one minute of sending the command, a timeout will occur and an RF Tag Non-existent Error will occur. As a result, the operation indicator will flash red.

3. Communications with the RF Tag will be performed when the antenna end of the Hand-held Reader/Writer is moved close to the RF Tag.

②
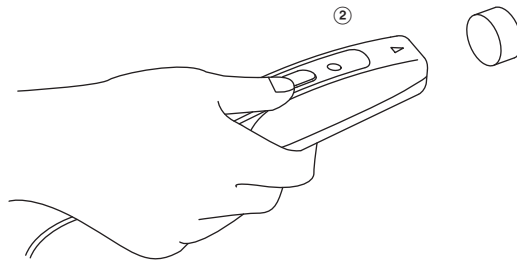
4. A response is returned from the Hand-held Reader/Writer to the host device.
   If communications end normally, the operation indicator (LED) will light green and then turn OFF.

# Button Trigger (BT) Communications Specifications

A button trigger (BT) communications specification is used to communicate with an RF Tag when the antenna is moved close to an RF Tag and the activate switch is pressed after the command has been sent from the host device.



Host device

Hand-held Reader/Writer

C  Press

RF Tag

D

Communications
with RF Tag

A
Command

E
Response

1. Send the command from the host device to the Hand-held Reader/Writer. The operation indicator will light green.
2. Move the antenna end of the Hand-held Reader/Writer close to the RF Tag.
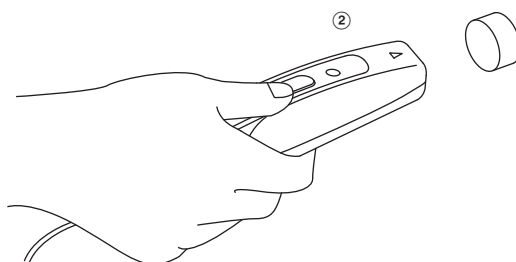


3. Press the Hand-held Reader/Writer activate switch.
4. The Hand-held Reader/Writer will communicate with the RF Tag.
5. A response is returned to the host device from the Hand-held Reader/Writer.
   If communications end normally, the operation indicator (LED) will light green and then turn OFF.
   If an RF Tag is not detected within the Hand-held Reader/Writer's communication area when the activate switch is pressed, an RF Tag Non-existent Error will occur.
   At this time, the operation indicator will flash red.

# Button Auto (BA) Communications Specifications

A button auto (BA) communication specification is used to execute auto commands after the command is sent from the host device and the activate switch of the Hand-held Reader/Writer is pressed.

Host device

Hand-held Reader/Writer

RF Tag

B   Press

D

A
Command

Communications
with RF Tag

E
Response
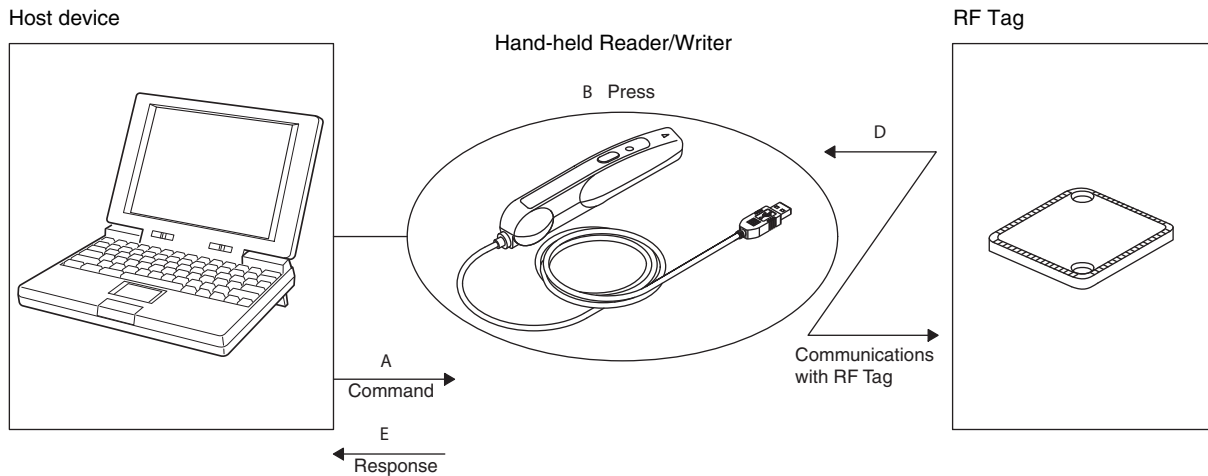
1. Send the command from the host device to the Hand-held Reader/Writer. The operation indicator will light green.
2. Press the Hand-held Reader/Writer activate switch.
3. The Hand-held Reader/Writer will enter the communication stand-by state with the RF Tag, and the operation indicator (LED) will flash green.

> If the RF Tag is not detected within one minute of sending the command, a timeout will occur and an RF Tag Non-existent Error will occur. As a result, the operation indicator will flash red.
>
> CHECK!

4. Communications with the RF Tag will be performed when the antenna end of the Hand-held Reader/Writer is moved close to an RF Tag.

②

5. A response is returned from the Hand-held Reader/Writer to the host device.
   If communications end normally, the operation indicator (LED) will light green and then turn OFF.

# Command and Response Formats

The formats of commands sent from the host device to the Hand-held Reader/Writer and responses returned from the Hand-held Reader/Writer to the host device are described below.

The command and response both consist of a single frame. Each frame (including the terminator) consists of up to 2,114 characters. (When specifying hexadecimal for using the WRITE command, the maximum is 4,218 characters.)

## ■ Command Frame



| Name | Description |
|---|---|
| Command code | Contains the two-character code (see page 88) that indicates command. |
| Communications specification | Contains the two-character code that indicates the method used to communicate with the RF Tag (see page 59.) |
| Data | Contains the parameters or write data used to execute the command.<br>• Data settings, processing specifications<br>• Start address<br>• Write data, number of bytes to be written<br>• Number of read bytes<br>• Number of check block bytes, decrement count<br>• Specified data<br>• Message data<br>• Parameter data<br>• Baud rate, data length, parity, and stop bit specifications<br>• Auto command OFF specification<br>• Settings for the TR command, settings for the FN command, and system setting data |
| Terminator | Indicates end of command/response. |

## ■ Response Frame



| Name | Description |
|---|---|
| End code | Indicates the execution result for the command.<br>For information on end codes, refer to *End Codes*.<br>p.82 |
| Fixed value | Always 1. |
| Resend flag | Always 0. |
| Data | The data for the response.<br>• Read data<br>• UID<br>• Processing terminate timing<br>• Parameter data<br>• Message data<br>• Model information |

**Note:** Other than the above items, the same data as the command frame is returned in the response.

Section 3

V680 Commands

# Command List

Commands can be classified into four major types.

## ■ Communications Commands

The following commands are used for communications with the RF Tag.

| Command code | Command name | Processing specification | Function | Page |
|---|---|---|---|---|
| RD | READ | A/H | Reads memory data from the RF Tag. | p.65 |
| WT | WRITE | A/H | Writes data to the memory of the RF Tag. | p.66 |
| DF | DATA FILL | A/H | Writes the specified data to the specified number of bytes begin-ning from the specified start address. | p.67 |
| MD | DATA CHECK | C/K | Calculates or compares memory check codes in the RF Tag. | p.70 |
| | OVERWRITE COUNT CON-TROL | S/L | Controls the number of overwrites for RF Tags. | p.69 |
| ID | ID CODE READ | H | Reads the UID in the RF Tag. | p.71 |
| QR | READ WITH ERROR COR-RECTION | A/H | Reads memory data from the RF Tag.<br>Verifies data reliability using the check code. | p.72 |
| QW | WRITE WITH ERROR COR-RECTION | A/H | Writes data to the memory of the RF Tag.<br>Writes a check code to enable verifying data reliability. | p.73 |

## ■ Communications Subcommands

The following commands are used to cancel or reset command execution.

| Command code | Command name | Processing spec-ification | Function | Page |
|---|---|---|---|---|
| AA | COMMAND PROCESSING TERMINATE | - | Forcedly ends communications with the RF Tag. | p.74 |
| XZ | ABORT | - | Resets the Hand-held Reader/Writer. | p.74 |

## ■ Controller Control Commands

These commands are used to reset the Controller or set serial communications.

| Command code | Command name | Function | Page |
|---|---|---|---|
| TR | COMMUNICATIONS CONDITIONS SETTING | Sets communications parameters for communications with the host device. | p.75 |
| FN | BASIC FUNCTIONS SETTING | Sets the Auto Command OFF function. | p.76 |
| UL | SET INFORMATION READ | Reads the settings data for the Hand-held Reader/Writer. | p.77 |
| SP | PARAMETER SET | Sets, reads, or initializes Hand-held Reader/Writer parameters. | p.78 |

## ■ Host Commands

These commands are used to test communications between the Hand-held Reader/Writer and host device.

| Command code | Command name | Function | Page |
|---|---|---|---|
| TS | TEST | Confirms the communications status between the Hand-held Reader/Writer and host device. The data sent from the host device is returned as is. | p.79 |
| VS | VERSION READ | Reads the Hand-held Reader/Writer's software model, software version, and software creation date. | p.80 |

# Communications Commands

Details of communications commands used to communicate with the RF Tag are provided here.

## ■ READ (RD)

This command reads up to 2 Kbytes of data from the RF Tag.

Command

| Command code | Communications specification | Data setting | Fixed value | Read area start address | Number of bytes to read | Terminator |
|---|---|---|---|---|---|---|
| R D | × × | A / H | 1 | × × × × | × × × × | ✻ C R |
| 2 | 2 | 1 | 1 | 4 | 4 | 2 |

| | |
|---|---|
| Communications specification | Specifies the method for communicating with the RF Tag.<br>Refer to *Communications with the RF Tag* for details on the communications specification.<br>📖 p.59 |
| Data setting | Sets the code format used to send responses for read data.<br>A: ASCII<br>H: Hexadecimal |
| Fixed value | Always 1. |
| Read area start address | Specifies the start address of the area to be read from the RF Tag in 4-digit hexadecimal.<br>Setting range: 0000 to FFFF hex |
| Number of bytes to read | Specifies the number of bytes to be read from the RF Tag in 4-digit hexadecimal.<br>The maximum number of bytes that can be read at one time is 2 Kbytes, as follows:<br>Setting range: 0001 to 0800 hex<br>•ASCII: 2,048 bytes (2,048 characters)<br>•Hexadecimal: 2,048 bytes (4,096 characters) |

Response

| Command code | End code | Fixed value | Resend flag | Read data | Terminator |
|---|---|---|---|---|---|
| R D | 0 0 | 1 | 0 | × × ... × × | ✻ C R |
| 2 | 2 | 1 | 1 | n | 2 |

| | |
|---|---|
| End code | Indicates the execution result for the command.<br>The end code 00 indicates normal completion.<br><br>For details on end codes, refer to *End Codes*.<br>📖 p.82 |
| Fixed value | Always 1. |
| Resend flag | Always 0. |
| Read data | Specifies the data read from the RF Tag.<br>The characters in ASCII indicate the number of read bytes and the characters in hexadecimal indicate the number of read bytes x 2. |

## ■ WRITE (WT)

The WRITE command writes up to 2 Kbytes of data to the memory of an RF Tag.

Command

| Command code | Communications specification | Data setting | Fixed value | Write area start address | | | | Write data | | | | | Terminator | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| W | T | × | × | A/H | 1 | × | × | × | × | × | × | ... | × | × | ∗ | CR |
| 2 | | 2 | | 1 | 1 | | | 4 | | | | n | | | 2 | |

| | |
|---|---|
| Communications specification | Specifies the method for communicating with the RF Tag. Refer to *Communications with the RF Tag* for details on the communications specification. 📖 p.59 |
| Data setting | Sets the code format used to send responses for read data. A: ASCII H: Hexadecimal |
| Fixed value | Always 1. |
| Write area start address | Specifies the start address of the area in the RF Tag to be written to in 4-digit hexadecimal. Setting range: 0000 to FFFF hex |
| Write data | Specifies the write data to the RF Tag. Up to 2 Kbytes of data can be written with one command. ASCII: 2,048 bytes (2,048 characters) Hexadecimal: 2,048 bytes (4,096 characters) |

Response

| Command code | End code | | Fixed value | Resend flag | Terminator | |
|---|---|---|---|---|---|---|
| W | T | 0 | 0 | 1 | 0 | ∗ | CR |
| 2 | | 2 | | 1 | 1 | | 2 |

| | |
|---|---|
| End code | Indicates the execution result for the command. The end code 00 indicates normal completion. For details on end codes, refer to *End Codes*. 📖 p.82 |
| Fixed value | Always 1. |
| Resend flag | Always 0. |

### ■ DATA FILL (DF)

The DATA FILL command writes the designated data for the specified number of bytes beginning from the specified start address.

CHECK! This command can be used to write data regardless of the write protection setting. Confirm that there is no important data in the area being written before executing this command.

Command

| Command code | Communications specification | Data setting | Fixed value | Write area start address | Number of write bytes | Write data | Terminator |
|---|---|---|---|---|---|---|---|
| D F | × × | A / H | 1 | × × × × | × × × × | × × × × | * C R |
| 2 | 2 | 1 | 1 | 4 | 4 | 2 or 4 | 2 |

| Communications specification | Specifies the method for communicating with the RF Tag. Refer to *Communications with the RF Tag* for details on the communications specification. p.59 |
|---|---|
| Data setting | Sets the code format used to send responses for read data. A: ASCII H: Hexadecimal |
| Fixed value | Always 1. |
| Write area start address | Specifies the start address of the area in the RF Tag to be written to in 4-digit hexadecimal. Setting range: 0000 to FFFF hex |
| Number of write bytes | Specifies the number of bytes of data to write to the RF Tag in 4-digit hexadecimal. Setting range: 0000 to FFFF hex (0000: The RF Tag will be written up to the end address.) |
| Write data | Specifies the write data to the RF Tag. ASCII: 2 digits specified. Hexadecimal: 4 digits specified. |

Response

| Command code | End code | Fixed value | Resend flag | Terminator |
|---|---|---|---|---|
| D F | 0 0 | 1 | 0 | * C R |
| 2 | 2 | 1 | 1 | 2 |

| End code | Indicates the execution result for the command. The end code 00 indicates normal completion. For details on end codes, refer to *End Codes*. p.82 |
|---|---|
| Fixed value | Always 1. |
| Resend flag | Always 0. |

Example

This examples shows how to write 00101 hex to the memory area with addresses 0030 to 0006 (hex) for an RF Tag in which the same data and address is written. The communications specification is ST.

Command

| Command code | | Communications specification | | Data setting | Fixed value | Write area start address | | | | Number of write bytes | | | | Write data | | | | Terminator | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D | F | S | T | H | 1 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 6 | 0 | 1 | 0 | 1 | ∗ | C R |
| 2 | | 2 | | 1 | 1 | 4 | | | | 4 | | | | 4 | | | | 2 | |

Response

| Command code | | End code | | Fixed value | Resend flag | Terminator | |
|---|---|---|---|---|---|---|---|
| D | F | 0 | 0 | 1 | 0 | ∗ | C R |
| 2 | | 2 | | 1 | 1 | 2 | |

| Address (hex) | Before Writing | |
|---|---|---|
| 002F | 2 | F |
| 0030 | 3 | 0 |
| 0031 | 3 | 1 |
| 0032 | 3 | 2 |
| 0033 | 3 | 3 |
| 0034 | 3 | 4 |
| 0035 | 3 | 5 |
| 0036 | 3 | 6 |
| | | |

| Address (hex) | Before Writing | |
|---|---|---|
| 002F | 2 | F |
| 0030 | 0 | 1 |
| 0031 | 0 | 1 |
| 0032 | 0 | 1 |
| 0033 | 0 | 1 |
| 0034 | 0 | 1 |
| 0035 | 0 | 1 |
| 0036 | 3 | 6 |
| | | |

## ■ OVERWRITE COUNT CONTROL (MD S/L)

The OVERWRITE COUNT CONTROL command is used to manage overwrite counts for EEPROM RF Tags. The specified overwrite count control area data is updated to enable determining when the EEPROM's write life has expired.

Command

| | | | | | Area start address | | | | | Terminator |
|---|---|---|---|---|---|---|---|---|---|---|
| Command code | Communications specification | Processing specification | Fixed value | | | | | Decrement count | | |
| M D | × × | S / L | 1 | × | × | × | × | × | × | ∗ C R |
| 2 | 2 | 1 | 1 | | 4 | | | 2 | | 2 |

| Communications specification | Specifies the method for communicating with the RF Tag.<br>For details on communications specifications, refer to *Communications with the RF Tag*.<br>📖 p.59 |
|---|---|
| Processing specification | Specifies the check process.<br>S: Subtraction (Overwrite control count can be set by user. 16,700,000 writes max.) See note.<br>L: Addition (Overwrite control count fixed at 100,000 writes.) |
| Fixed value | Always 1. |
| Area start address | Specifies the start address of the overwrite count control area in 4-digit hexadecimal.<br>Setting range: 0000 to FFFD hex |
| Decrement count | Specifies the number of refresh operations in 2-digit hexadecimal.<br>Setting range: 00 to FF hex (00 Performs overwrite count check only.)<br><br>For details, refer to *RF Tag Service Life Detection*.<br>📖 p.123 |

**Note:** The write life for EEPROM RF Tags is 100,000 at 25°C.

Response

| | | | Fixed | Resend | |
|---|---|---|---|---|---|
| Command code | End code | | value | flag | Terminator |
| M D | 0 | 0 | 1 | 0 | ∗ C R |
| 2 | 2 | | 1 | 1 | 2 |

| End code | Indicates the execution result for the command.<br>The end code 00 indicates normal completion.<br><br>For details on end codes, refer to *End Codes*.<br>📖 p.82 |
|---|---|
| Fixed value | Always 1. |
| Resend flag | Always 0. |

For details on OVERWRITE COUNT CONTROL, refer to *RF Tag Service Life Detection*.

CHECK! 📖 p.123

## ■ DATA CHECK (MD C/K)

This command writes or compares the CRC code using the specified check block unit. The CRC code is calculated from the generated polynomial expression $X^{16} + X^{12} + X^5 + 1$.

Command

| Command code | Communications specification | Processing specification | Fixed value | Check block start address | Number of check block bytes | Terminator |
|---|---|---|---|---|---|---|
| M  D | ×  × | C/K | 1 | ×  ×  ×  × | ×  × | *  C R |
| 2 | 2 | 1 | 1 | 4 | 2 | 2 |

| Communications specification | Specifies the method for communicating with the RF Tag. For details on communications specifications, refer to *Communications with the RF Tag*.    p.59 |
|---|---|
| Process setting | Specifies the check process. K: Check code calculation C: Check code comparison |
| Fixed value | Always 1. |
| Check block start address | Specifies the start address of the check block in 4-digit hexadecimal. Setting range: 0000 to 1FFD hex |
| Number of check block bytes | Specifies the number of bytes in the check block in 2-digit hexadecimal. Setting range: 00h, 03 to FF hex (00 = 256 bytes)<br><br>The number of check block bytes is the check code calculation area + 2 bytes. For details, refer to *Memory Check Function in RF Tag*.    p.125 |

Response

| Command code | End code | Fixed value | Resend flag | Terminator |
|---|---|---|---|---|
| M  D | 0  0 | 1 | 0 | *  C R |
| 2 | 2 | 1 | 1 | 2 |

| End code | Indicates the execution result for the command. An end code of 00 indicates normal completion.<br><br>For details on end codes, refer to *End Codes*.    p.82 |
|---|---|
| Fixed value | Always 1. |
| Resend flag | Always 0. |

CHECK!

For details on the memory check, refer to *Memory Check Function in RF Tag*.    p.125

■ **ID CODE READ (ID)**

Reads the ID code from the RF Tag.

Command

| Command code | Communica- tions specification | Data setting | Fixed value | | Terminator |
|---|---|---|---|---|---|
| I D | × × | H | 1 | ∗ | C R |
| 2 | 2 | 1 | 1 | | 2 |

| Communications specifi- cation | Specifies the method for communicating with the RF Tag. For details on communications specifications, refer to *Communications with the RF Tag*. 📖 p.59 |
|---|---|
| Data setting | Always H. |
| Fixed value | Always 1. |

Response

| Command code | End code | Fixed value | Resend flag | UID | | | | | Terminator |
|---|---|---|---|---|---|---|---|---|---|
| I D | 0 0 | 1 | 0 | × | × … | × | × | ∗ | C R |
| 2 | 2 | 1 | 1 | | 0 or 16 | | | | 2 |

| End code | Indicates the execution result for the command. The end code 00 indicates normal completion. For details on end codes, refer to *End Codes*. 📖 p.82 |
|---|---|
| Fixed value | Always 1. |
| Resend flag | Always 0. |
| UID | The UID is an ID that uniquely identifies an RF Tag. (Unique Identifier) Note: A ID code will not be attached if an error occurs. |

CHECK!

The ID READ command is used to write the ID code to the RF Tag's memory, and therefore will be affected by the ambient temperature. Be careful when using the RF Tag in environments with high ambient temperatures.

## ■ READ WITH ERROR CORRECTION (QR)

Reads the data in the area written by the WRITE WITH ERROR CORRECTION (QW) command from the RF Tag. Be sure to read data from the same area written by the WRITE WITH ERROR CORRECTION (QW) command.

Command

| Command code | Communica-tions specification | Data setting | Fixed value | Read area start address | Number of bytes to read | Terminator |
|---|---|---|---|---|---|---|
| Q  R | ×  × | A/H | 1 | ×  ×  ×  × | ×  ×  ×  × | *  CR |
| 2 | 2 | 1 | 1 | 4 | 4 | 2 |

| Communications specification | Specifies the method for communicating with the RF Tag.<br>For details on communications specifications, refer to *Communications with the RF Tag*.<br>📖 p.59 |
|---|---|
| Data setting | Sets the code format used to send responses for read data.<br>A: ASCII<br>H: Hexadecimal |
| Fixed value | Always 1. |
| Read area start address | Specifies the start address of the area to be read from the RF Tag in 4-digit hexadecimal.<br>Setting range: 0000 to FFFA hex |
| Number of bytes to read | Specifies the number of bytes to be read from the RF Tag in 4-digit hexadecimal. The maximum number of bytes that can be read at one time is 510 bytes, as follows:<br>Setting range: 0001 to 01FE hex<br>• ASCII: 510 bytes (510 characters)<br>• Hexadecimal: 510 bytes (1,020 characters) |

Response

| Command code | End code | Fixed value | Resend flag | Read data | Terminator |
|---|---|---|---|---|---|
| Q  R | 0  0 | 1 | 0 | ×  ×  …  ×  × | *  CR |
| 2 | 2 | 1 | 1 | n | 2 |

| End code | Indicates the execution result for the command.<br>The end code 00 indicates normal completion.<br><br>For details on end codes, refer to *End Codes*.<br>📖 p.82 |
|---|---|
| Fixed value | Always 1. |
| Resend flag | Always 0. |
| Read data | Specifies the data read from the RF Tag.<br>The characters in ASCII indicate the number of read bytes and the characters in hexadecimal indicate the number of read bytes x 2. |

■ **WRITE WITH ERROR CORRECTION (QW)**

The WRITE WITH ERROR CORRECTION (QW) command writes data to the RF Tag. The command also writes the RF Tag memory check and error correction codes as 5 bytes of write data. Do not change this code, it is required by the READ WITH ERROR CORRECTION (QR) command.

Command

| Command code | Communica-tions specification | Data setting | Fixed value | Write area start address | | | | Write data | | | | | Terminator | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Q | W | × | × | A/H | 1 | × | × | × | × | × | × | … | × | × | ∗ | C R |
| 2 | | 2 | | 1 | 1 | | | 4 | | | | | n | | | 2 |

| Communications specifi-cation | Specifies the method for communicating with the RF Tag.<br>For details on communications specifications, refer to *Communications with the RF Tag*.<br>📖 p.59 |
|---|---|
| Data setting | Sets the code format used to send responses for write data.<br>A: ASCII<br>H: Hexadecimal |
| Fixed value | Always 1. |
| Write area start address | Specifies the start address of the area in the RF Tag to be written to in 4-digit hexadecimal.<br>Setting range: 0000 to FFFA hex |
| Write data | Specifies the write data to the RF Tag.<br>The maximum number of bytes that can be read at one time is 510 bytes, as follows:<br>ASCII: 510 bytes (510 characters)<br>Hexadecimal: 510 bytes (1,020 characters) |

Response

| Command code | | End code | | Fixed value | Resend flag | Terminator | |
|---|---|---|---|---|---|---|---|
| Q | W | 0 | 0 | 1 | 0 | ∗ | C R |
| 2 | | 2 | | 1 | 1 | 2 | |

| End code | Indicates the execution result for the command.<br>The end code 00 indicates normal completion.<br><br>For details on end codes, refer to *End Codes*.<br>📖 p.82 |
|---|---|
| Fixed value | Always 1. |
| Resend flag | Always 0. |

# Communications Subcommands

Communications subcommands are used together with communications commands. Communications with the RF Tag cannot be performed using only these subcommands.

## ■ COMMAND PROCESSING TERMINATE (AA)

Terminates the processing of the communications commands and restores the command wait status.

Command

Command code | Processing specification | Fixed value | Terminator

| A | A | 0 | 1 | ∗ | C R |
| 2 | | 1 | 1 | | 2 |

| Processing specification | Always 0. |
| --- | --- |
| Fixed value | Always 1. |

Response

Command code | End code | Fixed value | Resend flag | Processing terminate timing | Terminator

| A | A | 0 | 0 | 1 | 0 | 0 | × | ∗ | C R |
| 2 | | 2 | | 1 | 1 | 2 | | | 2 |

| End code | Indicates the execution result for the command.<br>00: Normal completion<br>15: Command processing not executed.<br><br>For details on end codes, refer to *End Codes*.<br>p.82 |
| --- | --- |
| Fixed value | Always 1. |
| Resend flag | Always 0. |
| Termination timing | Indicates the timing for terminating command processing.<br>00: Terminate before RF Tag detection.<br>01: Terminate during RF Tag detection. |

## ■ ABORT (XZ)

This command is used to restore the Hand-held Reader/Writer to command wait status when there is no response from the Hand-held Reader/Writer due to some problem during communications with the host device or with an RF Tag.

CHECK! The ABORT (XZ) command can be used only with the V680-CH1D.
Do not use it with the V680-CHUD.

Command

Command code | Terminator

| X | Z | ∗ | C R |
| 2 | | 2 | |

Response

None

## ■ COMMUNICATIONS CONDITIONS SETTING (TR)

This command is used to set serial communications parameters. The Hand-held Reader/Writer must be restarted to make the changes take effect.

CHECK!
The COMMUNICATIONS CONDITIONS SETTING (TR) command can be used only with the V680-CH1D.
Do not use it with the V680-CHUD.

CHECK!
A memory error will occur if the power supply is interrupted while parameters are being changed.

Command

| Command code | Baud rate | Data length | Parity | Stop bits | | Terminator |
|---|---|---|---|---|---|---|
| T R | × | × | × | × | ∗ | C R |
| 2 | 1 | 1 | 1 | 1 | | 2 |

| Baud rate | Sets the baud rate.<br>0: 9,600 bps<br>1: 2,400 bps<br>2: 4,800 bps<br>3: 19,200 bps<br>4: 38,400 bps<br>Default setting: 9,600 bps |
|---|---|
| Data length | Sets the data length.<br>0: 7 bits<br>1: 8 bits<br>Default setting: 7 bits |
| Parity | Sets the parity.<br>0: Even parity<br>1: Odd parity<br>2: No parity<br>Default setting: Even parity |
| Stop bits | Sets the number of stop bits.<br>0: 2 bits<br>1: 1 bit<br>Default setting: 2 bits |

Response

| Command code | End code | Fixed value | Resend flag | | Terminator |
|---|---|---|---|---|---|
| T R | 0 0 | 1 | 0 | ∗ | C R |
| 2 | 2 | 1 | 1 | | 2 |

| End code | Indicates the execution result for the command.<br>00: Normal completion<br><br>For details on end codes, refer to *End Codes*.<br>p.82 |
|---|---|
| Fixed value | Always 1. |
| Resend flag | Always 0. |

## ■ BASIC FUNCTIONS SETTING (FN)

This command is used to set the Auto Commands OFF function. The Hand-held Reader/Writer must be restarted to make the changes take effect.

CHECK!    A memory error will occur if the power supply is interrupted while parameters are being changed.

Command

| Command code | Auto Command OFF specification | Fixed value | Terminator |
|---|---|---|---|
| F  N | × | 0 | ∗  C R |
| 2 | 1 | 1 | 2 |

| Auto Command OFF specifications | Designates whether the Auto Command OFF function is used.<br>0: Auto Command OFF used.<br>1: Auto Command OFF not used.<br>Default setting: Auto Command OFF used. |
|---|---|
| Fixed value | Always 0. |

Response

| Command code | End code | Fixed value | Resend flag | Terminator |
|---|---|---|---|---|
| F  N | 0  0 | 1 | 0 | ∗  C R |
| 2 | 2 | 1 | 1 | 2 |

| End code | Indicates the execution result for the command.<br>00: Normal completion<br><br>For details on end codes, refer to *End Codes*.<br>p.82 |
|---|---|
| Fixed value | Always 1. |
| Resend flag | Always 0. |

## ■ SET INFORMATION READ (UL)

This command is used to read the settings of the Hand-held Reader/Writer.

CHECK! Only the Auto Command OFF function is supported by the V680-CHUD.
The settings made with the COMMUNICATIONS CONDITIONS SETTING (TR) command are not valid for the V600-CHUD.

Command

Command code | Terminator

| U | L | ∗ | C R |
| 2 | | 2 | |

Response

Command code | End code | Fixed value | Resend flag | Settings for TR command | | | | | | Settings for FN command | | |

| U | L | 0 | 0 | 1 | 0 | T | R | × | × | × | × | : | F | N | × | 0 | : |
| 2 | | 2 | | 1 | 1 | | | | | | | | | | | | |

Baud rate / Data length / Parity / Stop bits
Auto Command OFF specification / Fixed value

Hand-held Reader Writer system data | Terminator

| S | I | 0 | 0 | 0 | 0 | 0 | 0 | ∗ | C R |
| | | 8 | | | | | | 2 | |

| End code | Indicates the execution result for the command.<br>00: Normal completion<br><br>For details on end codes, refer to *End Codes*.<br>📖 p.82 | |
|---|---|---|
| Fixed value | Always 1. | |
| Resend flag | Always 0. | |
| Settings for TR command | Baud rate | 0: 9,600 bps<br>1: 2,400 bps<br>2: 4,800 bps<br>3: 19,200 bps<br>4: 38,400 bps |
| | Data length | 0: 7 bits<br>1: 8 bits |
| | Parity | 0: Even parity<br>1: Odd parity<br>2: No parity |
| | Stop bits | 0: 2 bits<br>1: 1 bit |
| Settings for FN command | Auto Command OFF Specification | 0: Auto Command OFF used.<br>1: Auto Command OFF not used. |
| | Fixed value | Always 0. |
| System data | SI000000 | |

## ■ PARAMETER SET (SP)

The PARAMETER SET command is used to set conditions for communicating with RF Tags. The various parameters are set in the Hand-held Reader/Writer.

CHECK! The Hand-held Reader/Writer does not need to be reset when internal settings are changed. The new settings are effective immediately.

CHECK! A memory error will occur if the power supply is interrupted while parameters are being changed.

Command

| Command code | Process code | Parameter data (for changed parameters only) | Terminator |
|---|---|---|---|
| S P | × × Upper digit Lower digit | × × × × | ∗ C R |
| 2 | 2 | 0 to 4 | 2 |

| Process code (Upper digit) | Specifies the process to perform for the parameter.<br>0: Change the internal setting.<br>1: Read internal setting.<br>9: Return internal setting to default value. | |
|---|---|---|
| Process code (Lower digit) | Specifies the parameter.<br>1: Inter-character monitoring time<br>2: Response delay time<br>4: Auto command cancel time<br>H: Write protection setting<br>J: Protocol switch<br>L: Tag memory setting (See note 1.) | |
| Parameter data (for changed parameters only) | Data No. (See note 2.) | Settable values |
| | 1 | Specify 4 decimal digits. 0000 to 9999 (ms)<br>0000: No monitoring, Default value: 0100 (ms) |
| | 2 | Specify 2 decimal digits. 00 to 99 (ms)<br>00: No delay, Default value: 20 (ms) |
| | 4 | Specify 2 decimal digits. 01 to 99 (s)<br>Default value: 60 (s) |
| | H | 00: Write protection OFF<br>01: Write protection ON (default value) |
| | J | 00: V600 protocol (default value)<br>01: V680 protocol |
| | L | 00: Standard Mode (default value)<br>01: CA1D Mode |

**Note 1.:** Parameter L is enabled only with version 1.1 or newer.
**Note 2.:** The data number of the parameter data is the number specified for the lower digit of the process code.
The settable values for the data number are the same as for the parameter specified by the lower digit of the process code.

Response

| Command code | End code | Fixed value | Resend flag | Parameter data | Terminator |
|---|---|---|---|---|---|
| S P | 0 0 | 1 | 0 | × × × × | ∗ C R |
| 2 | 2 | 1 | 1 | 0 to 4 | 2 |

| End code | Indicates the execution result for the command.<br>00: Normal completion<br>For details on end codes, refer to *End Codes*.<br>p.82 |
|---|---|
| Fixed value | Always 1. |
| Resend flag | Always 0. |
| Parameter data | Attached only when parameter data is being obtained. |

# Host Commands

## ■ TEST (TS)

This command returns test messages sent from the host device without changing anything.

The TEST command is used for communications tests between the host device and the Hand-held Reader/Writer.

Command

Command code | Message data | Terminator

| T | S | × | × | × | … | × | ∗ | C R |

2 | n | 2

| Message data | Any text string for testing communications containing 514 characters max. |

Response

Command code | End code | Fixed value | Resend flag | Message data | Terminator

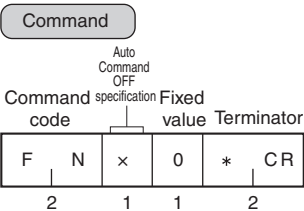| T | S | 0 | 0 | 1 | 0 | × | × | × | … | × | ∗ | C R |

2 | 2 | 1 | 1 | n | 2

| End code | Indicates the execution result for the command.<br>00: Normal completion<br><br>For details on end codes, refer to *End Codes*.<br>p.82 |
| Fixed value | Always 1. |
| Resend flag | Always 0. |
| Message data | Any text string for testing communications containing 514 characters max. |

■ **VERSION READ (VS)**

The VERSION READ command reads the Hand-held Reader/Writer's software model, software version, and software creation date.

Command

Command code  Terminator

| V | S | ∗ | C R |
|---|---|---|---|
| 2 | | 2 | |

Response

Command code | End code | Fixed value | Resend flag | | | | | | | Terminator

| V | S | 0 | 0 | 1 | 0 | Software model | : | Software version | : | Creation date | ∗ | CR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | | 2 | | 1 | 1 | 16 | 1 | 4 | 1 | 10 | 2 | |

| Software model | The software creation date.<br>For the V680-CHUD: V680-CHUD$000000<br>For the V680-CH1D: V680-CH1D$000000<br>For the V680-CH1D-PSI: V680-CH1D$000000 |
|---|---|
| Software version | The software version.<br>∗.∗∗ |
| Software creation date | The software creation date.<br>20∗∗/∗∗/∗∗ |

# Other Commands

## ■ UNDEFINED COMMAND RESPONSE (IC)

This command is returned as the response when the Hand-held Reader/Writer cannot read the command header.

> Response

| Command code | | End code | | Fixed value | Resend flag | Terminator | |
|---|---|---|---|---|---|---|---|
| I | C | × | × | 1 | 0 | ∗ | C R |
| 2 | | 2 | | 1 | 1 | 2 | |

## ■ Error Response

If an error occurs during communications with the host device, or the RF Tag, error notification is provided in the end code.

> Response

| Command code | | End code | | Fixed value | Resend flag | Terminator | |
|---|---|---|---|---|---|---|---|
| × | × | × | × | 1 | 0 | ∗ | C R |
| 2 | | 2 | | 1 | 1 | 2 | |

## End Codes

End codes are given in 2-digit hexadecimal.

| Status | End code | Meaning |
|---|---|---|
| Normal | 00 | Normal completion |
| Host communications error | 10 (See note.) | Vertical parity error |
| | 11 (See note.) | Framing error |
| | 12 (See note.) | Overrun error |
| | 14 | Format error |
| | 15 | Execution status error |
| | 18 | Frame length error |
| Lower communications error | 70 | RF Tag communications error |
| | 71 | Mismatch error |
| | 72 | RF Tag non-existent error |
| | 76 | Error end code for the DATA CHECK command or OVERWRITE COUNT CONTROL command (verification error or overwrite count exceeded) or error for READ WITH ERROR CORRECTION or DATA CHECK command |
| | 77 | Warning for READ WITH ERROR CORRECTION or DATA CHECK command |
| | 79 | RF Tag error |
| | 7A | Address error |
| | 7C | Antenna error |
| | 7D | Write protection error |
| Memory error | 93 | Internal memory error |

**Note:** Vertical parity errors, framing errors, and overrun errors do not occur for the V680-CHUD.

For details on each error, refer to *Error Tables*.

CHECK!

# V600 Commands

There are 4 types of commands for communicating with the RF Tag using the Hand-held Reader/Writer.

• Normal commands

• Button commands

• Auto commands

• Button auto commands

## Normal Commands

Normal commands are sent from the host device for communications with the RF Tag, after the antenna end of the Hand-held Reader/Writer has been moved close to the RF Tag.

1. Move the antenna end of the Hand-held Reader/Writer close to the RF Tag.



Host device

Hand-held Reader/Writer

RF Tag

C

Communications
with RF Tag

B
Command

D
Response
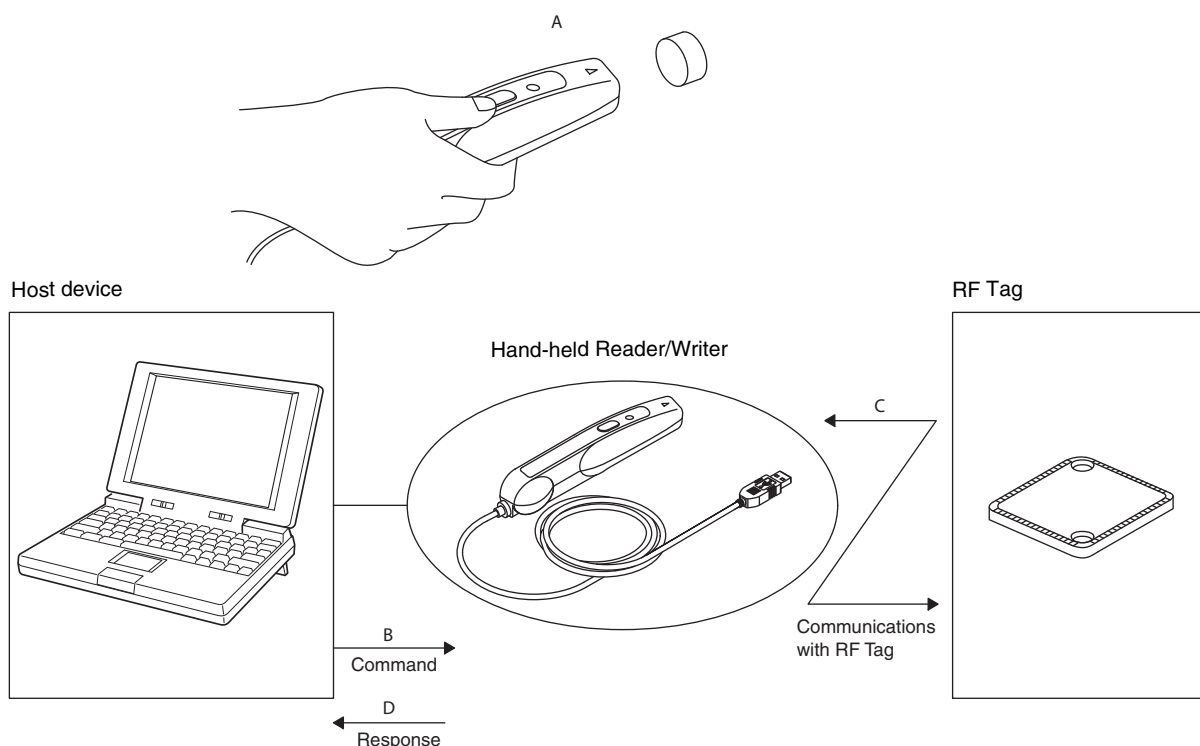
2. Commands are sent from the host device to the Hand-held Reader/Writer.

3. The Hand-held Reader/Writer communicates with the RF Tag.

4. A response is returned from the Hand-held Reader/Writer to the host device.

   If communications end normally, the operation indicator (LED) will light green and then turn OFF.

   If the RF Tag is not detected within the Hand-held Reader/Writer's communication area when the command is sent from the host device, an RF Tag Non-existent Error will occur.

   At this time, the operation indicator will flash red.

# Button Commands

Button commands used to perform communications with the RF Tag are activated when the activate switch is pressed after commands are sent from the host device, and the antenna end of the Hand-held Reader/Writer has been moved close to the RF Tag.



1. A command is sent from the host device to the Hand-held Reader/Writer. As a result, the operation indicator will light green.
2. Move the antenna end of the Hand-held Reader/Writer close to the RF Tag.
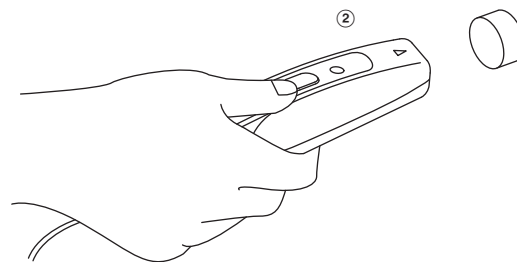


3. Press the Hand-held Reader/Writer activate switch.
4. The Hand-held Reader/Writer communicates with the RF Tag.
5. A response is returned to the host device from the Hand-held Reader/Writer.
   If communications end normally, the operation indicator (LED) will light green and then turn OFF.
   If the RF Tag is not detected within the Hand-held Reader/Writer's communication area when the activate switch is pressed, an RF Tag Non-existent Error will occur.
   At this time, the operation indicator will flash red.

# Auto Commands

Auto commands can execute communications with the RF Tag when the antenna end of the Hand-held Reader/Writer has been moved close to the RF Tag after the command is sent from the host device.



Host device

Hand-held Reader/Writer

RF Tag

C

Communications with RF Tag

A
Command

D
Response

1. A command is sent from the host device to the Hand-held Reader/Writer.
2. The Hand-held Reader/Writer enters the communications stand-by state with the RF Tag, and the operation indicator (LED) flashes green.

> If the RF Tag is not detected within one minute of sending the command, a timeout will occur and an RF Tag Non-existent Error will occur. As a result, the operation indicator will flash red.
>
> CHECK!

3. Communications with the RF Tag are performed when the antenna end of the Hand-held Reader/ Writer is moved close to the RF Tag.



4. A response is returned to the host device from the Hand-held Reader/Writer.
   If communications end normally, the operation indicator (LED) will light green and then turn OFF.

# Button Auto Commands

Button auto commands execute auto commands after a command is sent from the host device and the activate switch of the Hand-held Reader/Writer is pressed.

Host device    Hand-held Reader/Writer    RF Tag

B  Press

D

Communications
with RF Tag

A
Command

E
Response

1. A command is sent from the host device to the Hand-held Reader/Writer. As a result, the operation indicator will light green.
2. Press the Hand-held Reader/Writer activate switch.
3. The Hand-held Reader/Writer enters the communications stand-by state with the RF Tag, and the operation indicator (LED) flashes green.

> If the RF Tag is not detected within one minute of sending the command, a timeout will occur and an RF Tag Non-existent Error will occur. As a result, the operation indicator will flash red.
>
> CHECK!

4. Communications with the RF Tag are performed when the antenna end of the Hand-held Reader/Writer is moved close to the RF Tag.

② 

5. A response is returned to the host device from the Hand-held Reader/Writer.
   If communications end normally, the operation indicator (LED) will light green and then turn OFF.

# Command and Response Formats

The formats of commands sent from the host device to the Hand-held Reader/Writer and responses returned from the Hand-held Reader/Writer to the host device are described below.

The command and response both consist of a single frame. The frame (including the terminator) consists of up to, 2,114 characters.

## ■ Command Frame

1 frame (maximum frame length: 2,114 characters)

| Command code | | Data | | | | | Terminator | |
|---|---|---|---|---|---|---|---|---|
| × | × | × | × | … | × | × | * | C R |
| 2 | | | n | | | | 2 | |

| Name | Description |
|---|---|
| Command code | Contains the two-character code (see page 88) that indicates the command. |
| Data | Contains the data for the command.<br>• Data setting, processing specification<br>• Start address<br>• Write data, number of bytes to be written<br>• Number of read bytes<br>• Number of calculation area bytes, calculation data<br>• Number of check block bytes, decrement count<br>• Specified data<br>• Message data<br>• Parameter data<br>• Baud rate, data length, parity, and stop bits specification<br>• Auto command OFF specification<br>• Settings for the TR command, settings for the FN command, and system setting data. |
| Terminator | Indicates end of command/response. |

## ■ Response Frame

| Command code | | End code | | Data | | | | | Terminator | |
|---|---|---|---|---|---|---|---|---|---|---|
| × | × | × | × | × | × | … | × | × | * | C R |
| 2 | | 2 | | | n | | | | 2 | |

| Name | Description |
|---|---|
| End code | Indicates the execution result for the command.<br>For information on end codes, refer to *End Codes*.<br>📖 p.82 |
| Fixed value | Always 1. |
| Resend flag | Always 0. |
| Data | Contains the data for the response.<br>• Read data<br>• UID<br>• Processing terminate timing<br>• Calculation data<br>• Message data<br>• Parameter data<br>• Model information |

**Note:** Other than the above items, the same data as the command frame is returned in the response.

# Command List

Commands can be classified into four major types.

## ■ Communications Commands

The following commands are used for communications with the RF Tag.

| Command code | Command name | Function | Page |
|---|---|---|---|
| RD | READ | Reads memory data from the RF Tag. | p.89 |
| WT | WRITE | Writes data to the memory of the RF Tag. | p.91 |
| AR | AUTO READ | Reads data from the RF Tag when the RF Tag enters the interrogation zone. | p.92 |
| AW | AUTO WRITE | Writes data to the memory of the RF Tag when the RF Tag enters the interrogation zone. | p.94 |
| BR | BUTTON READ | Reads data from the memory of the RF Tag when the activate switch is pressed. | p.96 |
| BW | BUTTON WRITE | Writes data to the memory of the RF Tag when the activate switch is pressed. | p.98 |
| UR | BUTTON AUTO READ | Reads data from the RF Tag when the RF Tag enters the interrogation zone after the activate switch is pressed. | p.99 |
| UW | BUTTON AUTO WRITE | Writes data to the memory of the RF Tag when the RF Tag enters the interrogation zone after the activate switch is pressed. | p.101 |
| CW | CALCULATION WRITE | Writes the calculation results for the memory data to the RF Tag. | p.102 |
| FL | DATA FILL | Writes data for the specified number of write bytes beginning from the write start address specified in the command. | p.103 |
| AF | AUTO DATA FILL | Writes the specified data to the specified number of bytes beginning from the specified start address when the RF Tag approaches. | p.104 |
| MDC/K | DATA CHECK | Calculates or compares memory check codes in the RF Tag. | p.106 |
| MDS | OVERWRITE COUNT CONTROL | Controls the number of overwrites for RF Tags. | p.107 |
| ID | ID CODE READ | Reads the UID in the RF Tag. | p.108 |

## ■ Communications Subcommands

These commands are used to cancel command execution.

| Command code | Command name | Function | Page |
|---|---|---|---|
| AA | COMMAND PROCESS-ING TERMINATE | Forcedly ends communications with the RF Tag. | p.109 |
| XZ | ABORT | Resets the Hand-held Reader/Writer. | p.112 |

## ■ Controller Control Commands

These commands are used to reset the Controller or set serial communications.

| Command code | Command name | Function | Page |
|---|---|---|---|
| TR | COMMUNICATIONS CON-DITIONS SETTING | Sets communications parameters for communications with the host device. | p.113 |
| FN | BASIC FUNCTIONS SET-TING | Sets the Specify Auto Command OFF function. | p.114 |
| UL | SET INFORMATION READ | Reads the settings data for the Hand-held Reader/Writer. | p.115 |
| SP | PARAMETER SET | Sets, reads, or initializes Hand-held Reader/Writer parameters. | p.116 |

## ■ Host Commands

These commands are used to test communications between the Hand-held Reader/Writer and host device.

| Command code | Command name | Function | Page |
|---|---|---|---|
| TS | TEST | Confirms the communications status between the Hand-held Reader/Writer and host device. The data sent from the host device is returned as is. | p.110 |
| VS | VERSION READ | Reads the Hand-held Reader/Writer's software model, software version, and software creation date. | p.111 |

# Communications Commands

Details of communications commands used to communicate with the RF Tag are provided here.

## ■ READ (RD)

This command reads data from the RF Tag. If the RF Tag is not in the interrogation zone, an error response (end code: 72 = RF Tag non-existent) will be returned.

Command

Processing area number: 1



Processing area number: 2



| Data setting | Sets the code format used to send responses for read data.<br>A: ASCII<br>H: Hexadecimal<br><br>When multiple processing areas are used, ASCII and hexadecimal can be specified at the same time within a single command frame. |
|---|---|
| Processing area number setting | Specifies the processing area number.<br>Setting range: 1 to 9, A (A = 10) |
| Read area start address | Specifies the start address of the area to be read from the RF Tag in 4-digit hexadecimal.<br>Setting range: 0000 to FFFF hex<br><br>When multiple processing areas are used, specify the areas in order starting from the smallest address. The same area cannot be specified twice. |
| Number of bytes to read | Specifies the number of bytes to be read from the RF Tag in 2-digit hexadecimal. The maximum number of bytes that can be read at one time is 256 bytes, as follows:<br>• ASCII: 256 bytes (256 characters)<br>• Hexadecimal: 256 bytes (512 characters)<br><br>Setting range: 00 to FF hex (00 = 256 bytes)<br><br>When multiple processing areas are used, set so that the total number of bytes from all areas to be read is within 256 bytes, as follows:<br>Area (1) bytes +...+ Area (N) bytes ≤ 256 bytes |

Response

### Processing Area Number: 1

| Command code | End code | Read data | Terminator |
|---|---|---|---|
| R D | 0 0 | × × ... × × | * C R |
| 2 | 2 | n | 2 |

### Processing Area Number: 2

| Command code | End code | Read data Area (1) | Read data Area (2) | Terminator |
|---|---|---|---|---|
| R D | 0 0 | × × ... × × | × × ... × × | * C R |
| 2 | 2 | n | n | 2 |

Area (1) setting     Area (2) setting

| | |
|---|---|
| End code | Indicates the execution result for the command.<br>The end code 00 indicates normal completion.<br><br>For details on end codes, refer to *End code List*.<br>    p.118 |
| Read data | Specifies the data read from the RF Tag.<br>The characters in ASCII indicate the number of read bytes and the characters in hexadecimal indicate the number of read bytes x 2. |

## ■ WRITE (WT)

This command writes data to the RF Tag. If the RF Tag is not in the interrogation zone, an error response (end code: 72 = RF Tag non-existent) will be returned.

Command

### Processing Area Number: 1

| Command code | Data setting | Processing area number setting | Write area start address | Write data | Terminator |
|---|---|---|---|---|---|
| W T | A/H | 1 | × × × × | × × × × | * CR |
| 2 | 1 | 1 | 4 | n | 2 |

### Processing Area Number: 2

| Command code | Data setting | Processing area number setting | Write area start address | Number of write bytes | Write data | Data setting | Write area start address | Number of write bytes | Write data | Terminator |
|---|---|---|---|---|---|---|---|---|---|---|
| W T | A/H | 2 | × × × × | × × | × ... × | A/H | × × × × | × × | × ... × | * CR |
| 2 | 1 | 1 | 4 | 2 | n | 1 | 4 | 2 | n | 2 |

Area (1) setting       Area (2) setting

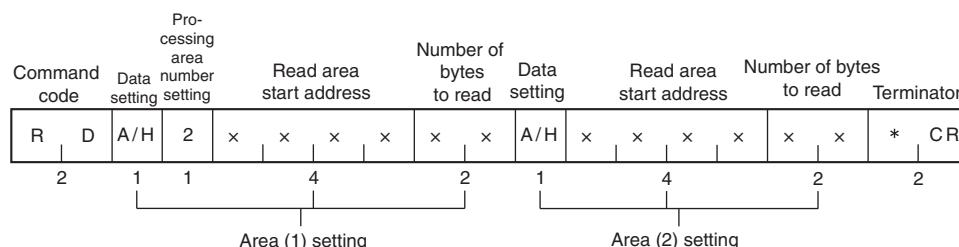| Data setting | Sets the code format used to send responses for write data.<br>A: ASCII<br>H: Hexadecimal<br><br>When multiple processing areas are used, ASCII and hexadecimal can be specified at the same time within a single command frame. |
|---|---|
| Processing area number setting | Specifies the processing area number.<br>Setting range: 1 to 9, A (A = 10) |
| Write area start address | Specifies the start address of the area in the RF Tag to be written to in 4-digit hexadecimal.<br>Setting range: 0000 to FFFF hex<br><br>When multiple processing areas are used, specify the areas in order starting from the smallest address. The same area cannot be specified twice. |
| Number of write bytes | When multiple processing areas are used, specifies the number of bytes to be written to the RF Tag in 2-digit hexadecimal. The maximum number of bytes that can be written at one time is 256 bytes, as follows:<br>• ASCII: 256 bytes (256 characters)<br>• Hexadecimal: 256 bytes (512 characters)<br>Setting range: 01 to FF hex<br><br>When multiple processing areas are used, set so that the total number of bytes to be written for all areas is within 256 bytes, as follows:<br>Area (1) bytes +...+ Area (N) bytes ≤ 256 bytes |
| Write data | Specifies the write data from the RF Tag.<br>The characters in ASCII indicate the number of write bytes and the characters in hexadecimal indicate the number of write bytes x 2. |

Response

| Command code | End code | Terminator |
|---|---|---|
| W T | 0 0 | * CR |
| 2 | 2 | 2 |

| End code | Indicates the execution result for the command.<br>The end code 00 indicates normal completion.<br><br>For details on end codes, refer to *End code List*.<br>📖 p.118 |
|---|---|

## ■ AUTO READ (AR)

This command reads data from the RF Tag when the RF Tag enters the interrogation zone. The Hand-held Reader/Writer responds when the communications between the Hand-held Reader/Writer and RF Tag have ended.

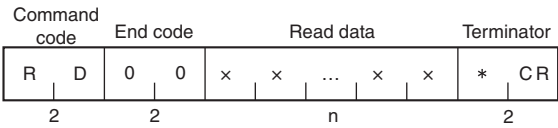Command

Processing Area Number: 1



Processing Area Number: 2



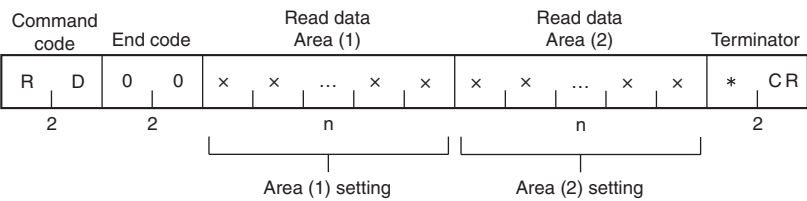| Data setting | Specifies the code format used to send responses for write data. A: ASCII H: Hexadecimal<br><br>When multiple processing areas are used, ASCII and hexadecimal can be specified at the same time within a single command frame. |
| --- | --- |
| Processing area number setting | Specifies the processing area number. Setting range: 1 to 9, A (A = 10) |
| Read area start address | Specifies the start address of the area in the RF Tag to be read from in 4-digit hexadecimal. Setting range: 0000 to FFFF hex<br><br>When multiple processing areas are used, specify the areas in order starting from the smallest address. The same area cannot be specified twice. |
| Number of read bytes | When multiple processing areas are used, specifies the number of bytes to be read from the RF Tag in 2-digit hexadecimal. The maximum number of bytes that can be read at one time is 256 bytes.<br>• ASCII: 256 bytes (256 characters)<br>• Hexadecimal: 256 bytes (512 characters)<br>Setting range: 00 to FF hex (00 = 256 bytes)<br><br>When multiple processing areas are used, set so that the total number of bytes to be read for all areas is within 256 bytes, as follows:<br>    Area (1) bytes +...+ Area (N) bytes ≤ 256 bytes |

( Response )

## Processing Area Number: 1

| Command code | End code | Read data | Terminator |
|---|---|---|---|

| A | R | 0 | 0 | × | × | … | × | × | * | C R |
|---|---|---|---|---|---|---|---|---|---|---|

2          2                    n              2

## Processing Area Number: 2

| Command code | End code | Read data area (1) | Read data area (2) | Terminator |
|---|---|---|---|---|

| A | R | 0 | 0 | × | × | … | × | × | × | × | … | × | × | * | C R |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

2          2                    n                        n              2

Area (1) setting            Area (2) setting

| End code | Indicates the execution result for the command. The end code 00 indicates normal completion.<br><br>For details on end codes, refer to *End code List*.<br>📖 p.118 |
|---|---|
| Read data | Specifies the data read from the RF Tag.<br>The characters in ASCII indicate the number of read bytes and the characters in hexadecimal indicate the number of read bytes x 2. |

## ■ AUTO WRITE (AW)

This command writes data to the RF Tag when the RF Tag enters the interrogation zone. The Hand-held Reader/Writer responds when communications between the Hand-held Reader/Writer and RF Tag have ended.

Command

Processing Area Number: 1



Processing Area Number: 2



| Data setting | Sets the code format used to send responses for write data.<br>A: ASCII<br>H: Hexadecimal<br><br>When multiple processing areas are used, ASCII and hexadecimal can be specified at the same time within a single command frame. |
|---|---|
| Processing area number setting | Specifies the processing area number.<br>Setting range: 1 to 9, A (A = 10) |
| Write area start address | Specifies the start address of the area in the RF Tag to be written to in 4-digit hexadecimal.<br>Setting range: 0000 to FFFF hex<br><br>When multiple processing areas are used, specify the areas in order starting from the smallest address. The same area cannot be specified twice. |
| Number of write bytes | When multiple processing areas are used, specifies the number of bytes to be written to the RF Tag in 2-digit hexadecimal.<br>The maximum number of bytes that can be written at one time is 256 bytes.<br>• ASCII: 256 bytes (256 characters)<br>• Hexadecimal: 256 bytes (512 characters)<br>Setting range: 01 to FF hex<br><br>When multiple processing areas are used, set so that the total number of bytes to be written for all areas is within 256 bytes,6 bytes, as follows:<br>    Area (1) bytes +...+ Area (N) bytes ≤ 256 bytes |
| Write data | Indicates the data to be written to the RF Tag.<br>The characters in ASCII indicate the number of write bytes and the characters in hexadecimal indicate the number of write bytes × 2 |

Response

Command
code       End code    Terminator

| A | W | 0 | 0 | * | C R |
|---|---|---|---|---|------|

  2           2            2

| End code | Indicates the execution result for the command.<br>The end code 00 indicates normal completion.<br><br>For details on end codes, refer to *End code List*.<br>p.118 |
|----------|--------------------------------------------------------|

## ■ BUTTON READ (BR)

After this command is received by the Hand-held Reader/Writer, data is read from the RF Tag by pressing the activate switch. If the activate switch is pressed and the RF Tag is not in the interrogation zone, an error response (end code: 72 = RF Tag non-existent) will be returned.

Command

Processing Area Number: 1



Processing Area Number: 2



| Data setting | Sets the code format used to send responses for read data.<br>A: ASCII<br>H: Hexadecimal<br><br>When multiple processing areas are used, ASCII and hexadecimal can be specified at the same time within a single command frame. |
|---|---|
| Processing area number setting | Specifies the processing area number.<br>Setting range: 1 to 9, A (A = 10) |
| Read area start address | Specifies the start address of the area in the RF Tag to be read from in 4-digit hexadecimal.<br>Setting range: 0000 to FFFF hex<br><br>When multiple processing areas are used, specify the areas in order starting from the smallest address. The same area cannot be specified twice. |
| Number of read bytes | Specifies the number of bytes to be read from the RF Tag in 2-digit hexadecimal.<br>The maximum number of bytes that can be read at one time is 256 bytes.<br>• ASCII: 256 bytes (256 characters)<br>• Hexadecimal: 256 bytes (512 characters)<br>Setting range: 00 to FF hex (00 = 256 bytes)<br><br>When multiple processing areas are used, set so that the total number of bytes to be read for all areas is within 256 bytes, as follows:<br>    Area (1) bytes +...+ Area (N) bytes ≤ 256 bytes |

Response

## Processing Area Number: 1

| Command code | End code | Read data | Terminator |
|---|---|---|---|

| B | R | 0 | 0 | × | × | ... | × | × | * | C R |
|---|---|---|---|---|---|---|---|---|---|---|

2 — 2 — n — 2

## Processing Area Number: 2

| Command code | End code | Read data area (1) | Read data area (2) | Terminator |
|---|---|---|---|---|

| B | R | 0 | 0 | × | × | ... | × | × | × | × | ... | × | × | * | C R |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

2 — 2 — n — n — 2

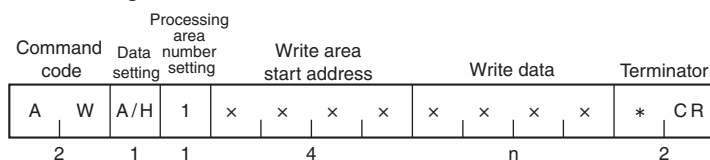Area (1) setting — Area (2) setting

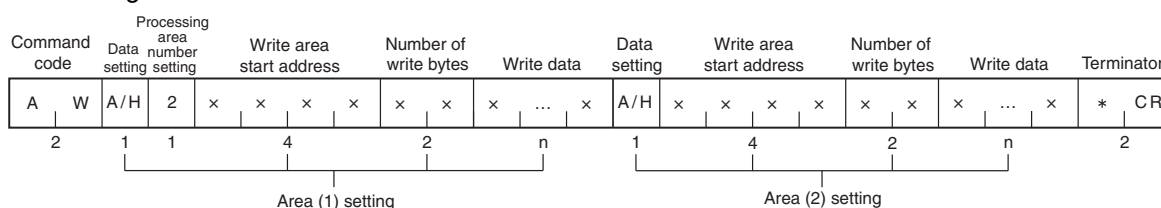| End code | Indicates the execution result for the command.<br>The end code 00 indicates normal completion.<br><br>For details on end codes, refer to *End code List*.<br> |
|---|---|
| Read data | Indicates the data read from the RF Tag.<br>The characters in ASCII indicate the number of read bytes and the characters in hexadecimal indicate the number of read bytes x 2. |

## ■ BUTTON WRITE (BW)

After this command is received by the Hand-held Reader/Writer, data is written to the RF Tag by pressing the activate switch. If the activate switch is pressed and the RF Tag is not in the interrogation zone, an error response (end code: 72 = RF Tag non-existent) will be returned.

Command

Processing Area Number: 1

| Command code | Data setting | Processing area number setting | Write area start address | | | | Write data | | | | Terminator | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B | W | A/H | 1 | × | × | × | × | × | × | × | × | ∗ | CR |
| 2 | 1 | 1 | 4 | | | | n | | | | 2 | |

Processing Area Number: 2

| Command code | Data setting | Processing area number setting | Write area start address | | | | Number of write bytes | | Write data | | | Data setting | Write area start address | | | | Number of write bytes | | Write data | | | Terminator | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B | W | A/H | 2 | × | × | × | × | × | × | × | … | × | A/H | × | × | × | × | × | × | × | … | × | ∗ | CR |
| 2 | 1 | 1 | 4 | | | | 2 | | n | | | 1 | 4 | | | | 2 | | n | | | 2 | |

Area (1) setting            Area (2) setting

| | |
|---|---|
| Data setting | Sets the code format used to send responses for write data.<br>A: ASCII<br>H: Hexadecimal<br><br>When multiple processing areas are used, ASCII and hexadecimal can be specified at the same time within a single command frame. |
| Processing area number setting | Specifies the processing area number.<br>Setting range: 1 to 9, A (A = 10) |
| Write area start address | Specifies the start address of the area in the RF Tag to be written to in 4-digit hexadecimal.<br>Setting range: 0000 to FFFF hex<br><br>When multiple processing areas are used, specify the areas in order starting from the smallest address. The same area cannot be specified twice. |
| Number of write bytes | When multiple processing areas are used, specifies the number of bytes to be written to the RF Tag in 2-digit hexadecimal.<br>The maximum number of bytes that can be written at one time is 256 bytes.<br>• ASCII: 256 bytes (256 characters)<br>• Hexadecimal: 256 bytes (512 characters)<br>Setting range: 01 to FF hex<br><br>When multiple processing areas are used, set so that the total number of bytes to be written for all areas is within 256 bytes, as follows:<br>    Area (1) bytes +...+ Area (N) bytes ≤ 256 bytes |
| Write data | Indicates the data to be written to the RF Tag.<br>The characters in ASCII indicate the number of write bytes and the characters in hexadecimal indicate the number of write bytes x 2. |

Response

| Command code | | End code | | Terminator | |
|---|---|---|---|---|---|
| B | W | 0 | 0 | ∗ | CR |
| 2 | | 2 | | 2 | |

| | |
|---|---|
| End code | Indicates the execution result for the command.<br>The end code 00 indicates normal completion.<br><br>For details on end codes, refer to *End code List*.<br>📖 p.118 |

## ■ BUTTON AUTO READ (UR)

After this command is received by the Hand-held Reader/Writer, data will be read from the RF Tag after the activate switch is pressed and the Hand-held Reader/Writer is close to the RF Tag. The Hand-held Reader/Writer responds when communications between the Hand-held Reader/Writer and RF Tag have ended.
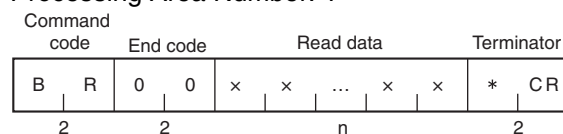
Command

Processing Area Number: 1

| Command code | Data setting | Processing area number setting | Read area start address | Number of read bytes | Terminator |
|---|---|---|---|---|---|
| U R | A/H | 1 | × × × × | × × | * C R |
| 2 | 1 | 1 | 4 | 2 | 2 |

Processing Area Number: 2

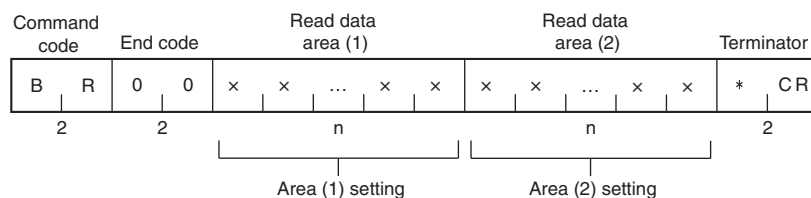| Command code | Data setting | Processing area number setting | Read area start address | Number of read bytes | Data setting | Read area start address | Number of read bytes | Terminator |
|---|---|---|---|---|---|---|---|---|
| U R | A/H | 2 | × × × × | × × | A/H | × × × × | × × | * C R |
| 2 | 1 | 1 | 4 | 2 | 1 | 4 | 2 | 2 |

Area (1) setting — Area (2) setting

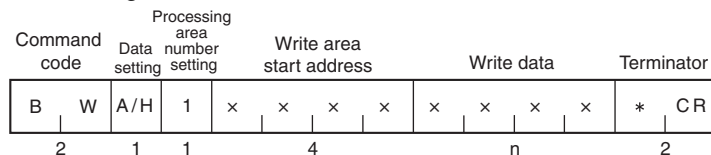| Data setting | Sets the code format used to send responses for read data.<br>A: ASCII<br>H: Hexadecimal<br><br>When multiple processing areas are used, ASCII and hexadecimal can be specified at the same time within a single command frame. |
|---|---|
| Processing area number setting | Specifies the processing area number.<br>Setting range: 1 to 9, A (A = 10) |
| Read area start address | Specifies the start address of the area in the RF Tag to be read from in 4-digit hexadecimal.<br>Setting range: 0000 to FFFF hex<br><br>When multiple processing areas are used, specify the areas in order starting from the smallest address. The same area cannot be specified twice. |
| Number of read bytes | Specifies the number of bytes to be read from the RF Tag in 2-digit hexadecimal.<br>The maximum number of bytes that can be read at one time is 256 bytes.<br>• ASCII: 256 bytes (256 characters)<br>• Hexadecimal: 256 bytes (512 characters)<br>Setting range: 00 to FF hex (00 = 256 bytes)<br><br>When multiple processing areas are used, set so that the total number of bytes to be read for all areas is within 256 bytes, as follows:<br>Area (1) bytes +...+ Area (N) bytes ≤ 256 bytes |

Response

### Processing Area Number: 1

| Command code | End code | Read data | Terminator |
|---|---|---|---|
| U | R | 0 | 0 | × | × | ... | × | × | * | C R |
| 2 | 2 | n | 2 |

### Processing Area Number: 2

| Command code | End code | Read data area (1) | Read data area (2) | Terminator |
|---|---|---|---|---|
| U | R | 0 | 0 | × | × | ... | × | × | × | × | ... | × | × | * | C R |
| 2 | 2 | n | n | 2 |

Area (1) setting   Area (2) setting

| End code | Indicates the execution result for the command.<br>The end code 00 indicates normal completion.<br><br>For details on end codes, refer to *End code List*.<br>📖 p.118 |
|---|---|
| Read data | Indicates the data read from the RF Tag.<br>The characters in ASCII indicate the number of read bytes and the characters in hexadecimal indicate the number of read bytes x 2. |

## ■ BUTTON AUTO WRITE (UW)

After this command is received by the Hand-held Reader/Writer, data will be written to the RF Tag after the activate switch is pressed and the Hand-held Reader/Writer is close to the RF Tag. The Hand-held Reader/Writer responds when communications between the Hand-held Reader/Writer and RF Tag have ended.

Command

Processing Area Number: 1

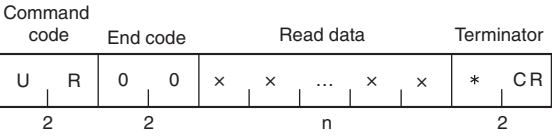| Command code | Data setting | Processing area number setting | Write area start address | Write data | Terminator |
|---|---|---|---|---|---|
| U W | A / H | 1 | × × × × | × × × × | ∗ C R |
| 2 | 1 | 1 | 4 | n | 2 |

Processing Area Number: 2

| Command code | Data setting | Processing area number setting | Write area start address | Number of write bytes | Write data | Data setting | Write area start address | Number of write bytes | Write data | Terminator |
|---|---|---|---|---|---|---|---|---|---|---|
| U W | A / H | 2 | × × × × | × × | × … × | A / H | × × × × | × × | × … × | ∗ C R |
| 2 | 1 | 1 | 4 | 2 | n | 1 | 4 | 2 | n | 2 |

Area (1) setting — Area (2) setting
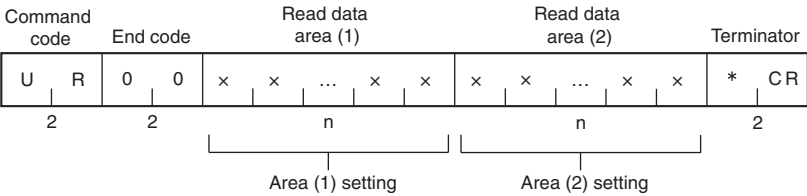
| | |
|---|---|
| Data setting | Sets the code format used to send responses for write data.<br>A: ASCII<br>H: Hexadecimal<br><br>When multiple processing areas are used, ASCII and hexadecimal can be specified at the same time within a single command frame. |
| Processing area number setting | Specifies the processing area number.<br>Setting range: 1 to 9, A (A = 10) |
| Write area start address | Specifies the start address of the area in the RF Tag to be written to in 4-digit hexadecimal.<br>Setting range: 0000 to FFFF hex<br><br>When multiple processing areas are used, specify the areas in order starting from the smallest address. The same area cannot be specified twice. |
| Number of write bytes | When multiple processing areas are used, specifies the number of bytes to be written to the RF Tag in 2-digit hexadecimal.<br>The maximum number of bytes that can be written at one time is 256 bytes.<br>• ASCII: 256 bytes (256 characters)<br>• Hexadecimal: 256 bytes (512 characters)<br>Setting range: 01 to FF hex<br><br>When multiple processing areas are used, set so that the total number of bytes to be written for all areas is within 256 bytes, as follows:<br>    Area (1) bytes +...+ Area (N) bytes ≤ 256 bytes |
| Write data | Indicates the data to be written to the RF Tag.<br>The characters in ASCII indicate the number of write bytes and the characters in hexadecimal indicate the number of write bytes x 2. |

Response

| Command code | End code | Terminator |
|---|---|---|
| U W | 0 0 | ∗ C R |
| 2 | 2 | 2 |

| | |
|---|---|
| End code | Indicates the execution result for the command.<br>The end code 00 indicates normal completion.<br><br>For details on end codes, refer to *End code List*.<br>📖 p.118 |

## ■ Calculation Write (CW)

The RF Tag's memory data and calculation data is calculated in hexadecimal and the result is written to the RF Tag. If an overflow during addition or underflow during subtraction occurs, the data will not be written and an error response (end code: 76 = Data check error) will be returned.

Command

| Command code | Data setting | Processing area number setting | Calculation area start address | | | | Number of calculation area bytes | | Calculation data | Terminator | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| C    W | A / S | 1 | × | × | × | × | × | × | | * | C R |
| 2 | 1 | 1 | 4 | | | | 2 | | Specified number of bytes | 2 | |

| | |
|---|---|
| Processing specification | Specifies the calculation method.<br>A: Add hexadecimal<br>S: Subtract hexadecimal |
| Processing area number setting | Always 1. |
| Calculation area start address | Specifies the start address of the area to be written to in 4-digit hexadecimal.<br>Setting range: 0000 to FFFF hex |
| Number of calculation area bytes | Specifies the number of bytes in the area for calculating data in 2-digit hexadecimal.<br>Setting range: 01 to 04 hex |
| Calculation data | Specifies the numerical values to be calculated in hexadecimal. |

Response

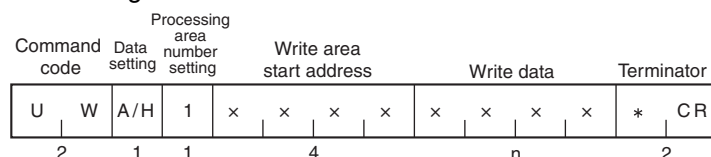| Command code | End code | | Calculation data | Terminator | |
|---|---|---|---|---|---|
| C    W | 0 | 0 | | * | C R |
| 2 | 2 | | Specified number of bytes | 2 | |

| | |
|---|---|
| End code | Indicates the execution result for the command.<br>The end code 00 indicates normal completion.<br><br>For details on end codes, refer to *End code List*.<br>　　　p.118 |
| Calculation data | Returns the calculation result data written to the RF Tag.<br>If an overflow during addition or underflow during subtraction occurs, the end code 76 (data check error) will be returned. The data prior to the calculation will not be added to the response. |

Section 3 V600 Commands

## ■ DATA FILL (FL)

Writes fill data for the specified number of bytes beginning from the start address specified in the RF Tag. The write data is specified in hexadecimal.

If there is no Tag in the interrogation zone when the Hand-held Reader/Writer receives the command from the host device, the Hand-held Reader/Writer will return an error response (end code: 72 = RF Tag non-existent).

CHECK! This command can be used to write data regardless of the write protection setting. Confirm that there is no important data in the area being written before executing this command.

Command

Command code | Data setting | Processing area number setting | Write area start address | Number of write bytes | Specified data | Terminator

| F | L | H | 1 | × | × | × | × | × | × | × | × | * | C R |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | | 1 | 1 | | 4 | | | 2 | | 2 | | 2 | |

| Data setting | Always H. |
|---|---|
| Processing area number setting | Always 1. |
| Write area start address | Specifies the start address of the area in the RF Tag to be written to in 4-digit hexadecimal. Setting range: 0000 to FFFF hex |
| Number of write bytes | Specifies the data to be written to the RF Tag in 2-digit hexadecimal. Setting range: 00 hex to FF hex (00 = 256 bytes) |
| Specified data | Indicates the data to be written to the RF Tag in hexadecimal. |

Response

Command code | End code | Terminator

| F | L | 0 | 0 | * | C R |
|---|---|---|---|---|---|
| 2 | | 2 | | 2 | |

| End code | Indicates the execution result for the command. The end code 00 indicates normal completion. For details on end codes, refer to *End code List*. |
|---|---|

### ▪ Example

Writing 01 hex to the 6 bytes in memory starting from address 0030 (hex) for an RF Tag in which the data at each address is the same as the address.

Command | Process area number setting

Command code | Data setting | Write area start address | Number of write bytes | Specified data | Terminator

| F | L | H | 1 | 0 | 0 | 3 | 0 | 0 | 6 | 0 | 1 | * | C R |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | | 1 | 1 | | 4 | | | 2 | | 2 | | 2 | |

Response

Command code | End code | Terminator

| F | L | 0 | 0 | * | C R |
|---|---|---|---|---|---|
| 2 | | 2 | | 2 | |

| (hex) | Before Writing | |
|---|---|---|
| 002F | 2 | F |
| 0030 | 3 | 0 |
| 0031 | 3 | 1 |
| 0032 | 3 | 2 |
| 0033 | 3 | 3 |
| 0034 | 3 | 4 |
| 0035 | 3 | 5 |
| 0036 | 3 | 6 |

| (hex) | After Writing | |
|---|---|---|
| 002F | 2 | F |
| 0030 | 0 | 1 |
| 0031 | 0 | 1 |
| 0032 | 0 | 1 |
| 0033 | 0 | 1 |
| 0034 | 0 | 1 |
| 0035 | 0 | 1 |
| 0036 | 3 | 6 |

## ■ AUTO DATA FILL (AF)

Writes the fill data to the specified number of bytes beginning from the start address specified in the RF Tag when the RF Tag approaches. The write data is specified in hexadecimal. A response will be returned when communications with the RF Tag have been completed.

CHECK!
This command can be used to write data regardless of the write protection setting. Confirm that there is no important data in the area being written before executing this command.

Command

| Command code | Data setting | Processing area number setting | Write area start address | Number of write bytes | Specified data | Terminator |
|---|---|---|---|---|---|---|
| A F | H | 1 | × × × × | × × | × × | * C R |
| 2 | 1 | 1 | 4 | 2 | 2 | 2 |

| Data setting | Always H. |
|---|---|
| Processing area number setting | Always 1. |
| Write area start address | Specifies the start address of the area in the RF Tag to be written to in 4-digit hexadecimal. Setting range: 0000 to FFFF hex |
| Number of write bytes | Specifies the data to be written to the RF Tag in 2-digit hexadecimal. Setting range: 00 to FF hex (00 = 256 bytes) |
| Specified data | Indicates the data to be written to the RF Tag in hexadecimal. |

Response

| Command code | End code | Terminator |
|---|---|---|
| A F | 0 0 | * C R |
| 2 | 2 | 2 |

| End code | Indicates the execution result for the command. The end code 00 indicates normal completion. For details on end codes, refer to *End code List*. p.118 |
|---|---|

▪ Example

Writing 01 hex to the 6 bytes in memory starting from address 0030 (hex) for an RF Tag in which the data at each address is the same as the address.

| (hex) | Before Writing | |
|---|---|---|
| 002F | 2 | F |
| 0030 | 3 | 0 |
| 0031 | 3 | 1 |
| 0032 | 3 | 2 |
| 0033 | 3 | 3 |
| 0034 | 3 | 4 |
| 0035 | 3 | 5 |
| 0036 | 3 | 6 |

**Command** — Process area number setting

| Command code | Data setting | Process area number setting | Write area start address | | | | Number of write bytes | | Specified data | | Terminator | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | F | H | 1 | 0 | 0 | 3 | 0 | 0 | 6 | 0 | 1 | ∗ CR |
| 2 | 1 | 1 | | 4 | | | 2 | | 2 | | 2 | |

**Response**

| Command code | | End code | | Terminator | |
|---|---|---|---|---|---|
| F | L | 0 | 0 | ∗ | CR |
| 2 | | 2 | | 2 | |

| (hex) | After Writing | |
|---|---|---|
| 002F | 2 | F |
| 0030 | 0 | 1 |
| 0031 | 0 | 1 |
| 0032 | 0 | 1 |
| 0033 | 0 | 1 |
| 0034 | 0 | 1 |
| 0035 | 0 | 1 |
| 0036 | 3 | 6 |

Section 3 V600 Commands

## ■ DATA CHECK (MDC/K)

This command writes or compares the CRC code using the specified check block unit. The CRC code is calculated from the generated polynomial expression $X^{16} + X^{12} + X^5 + 1$.

Command

|  |  | Processing area | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Command code | Process setting | number setting | Check block start address | | | | Number of check block bytes | | Terminator |
| M  D | C/K | 1 | × | × | × | × | × | × | *  CR |
| 2 | 1 | 1 | 4 | | | | 2 | | 2 |

| Process setting | Specifies the check process.<br>K: Check code calculation<br>C: Check code comparison |
| --- | --- |
| Processing area number setting | Always 1. |
| Check block start address | Specifies the start address of the check block in 4-digit hexadecimal.<br>Setting range: 0000 to FFFD hex |
| Number of check block bytes | Specifies the number of bytes in the check block in 2-digit hexadecimal.<br>Setting range: 00, 03 to FF hex (00 = 256 bytes)<br><br>The number of check block bytes is the check code calculation area + 2 bytes.<br>For details, refer to *Memory Check Function in RF Tag*.<br>p.125 |

Response

| Command code | End code | Terminator |
| --- | --- | --- |
| M  D | ×  × | *  CR |
| 2 | 2 | 2 |

| End code | Indicates the execution result for the command.<br>The end code 00 indicates normal completion.<br><br>For details on end codes, refer to *End code List*.<br>p.118 |
| --- | --- |

For details on the memory check, refer to *Memory Check Function in RF Tag*.

CHECK!  p.125

## ■ OVERWRITE COUNT CONTROL (MDS)

This command is used to control the number of overwrite operations performed by EEPROM RF Tags. This command determines whether the EEPROM overwrite count has been exceeded when the specified number of overwrites is subtracted from the specified overwrite count control area data.

Command

| Command code | Mode setting | Processing area number setting | Area start address | | | | Decrement count | | Terminator | |
|---|---|---|---|---|---|---|---|---|---|---|
| M | D | S | 1 | × | × | × | × | × | × | ∗ | C R |
| 2 | 1 | 1 | | 4 | | | 2 | | 2 | |

| | |
|---|---|
| Mode setting | Always S. |
| Processing area number setting | Always 1. |
| Area start address | Specifies the start address of the overwrite count control area in 4-digit hexadecimal.<br>Setting range: 0000 to FFFD hex |
| Decrement count | Specifies the number of refresh operations in 2-digit hexadecimal.<br>Setting range: 00 to FF hex (00 = Performs overwrite count check only)<br>If the decrement count is larger than the remaining number of overwrite operations, the decrement count is overwritten to 0 and a data error warning is returned in the response.<br><br>For details, refer to *MDS Command*.<br>p.123 |

Response

| Command code | | End code | | Terminator | |
|---|---|---|---|---|---|
| M | D | 0 | 0 | ∗ | C R |
| 2 | | 2 | | 2 | |

| | |
|---|---|
| End code | Indicates the execution result for the command.<br>00: Normal completion<br>76: Data error warning<br><br>For details on end codes, refer to *End code List*.<br>p.118 |

CHECK! For details on controlling the overwrite count, refer to *MDS Command*.

p.123

■ **ID CODE READ (ID)**

Reads the ID code in the RF Tag.

Command

| Command code | Data setting | | Terminator | |
|:---:|:---:|:---:|:---:|:---:|
| I D | H | ∗ | C R | |
| 2 | 1 | 2 | | |

| Data setting | Always H. |
|---|---|

Response

| Command code | End code | UID | Terminator |
|:---:|:---:|:---:|:---:|
| I D | 0 0 | × × … × × | ∗ C R |
| 2 | 2 | 0 or 16 | 2 |

| End code | Indicates the execution result for the command. The end code 00 indicates normal completion. For details on end codes, refer to *End code List*. p.118 |
|---|---|
| UID | The UID is an ID that uniquely identifies an RF Tag. (Unique Identifier) Note: An ID code will not be attached if an error occurs. |

CHECK!

The ID READ command writes the ID code to the RF Tag's memory, and will thus be affected by the ambient temperature. Be careful when using the RF Tag in environments with high ambient temperatures.

## Communications Subcommands

Communications subcommands are used together with communications commands. Communications with the RF Tag cannot be performed using only these subcommands.

### ■ COMMAND PROCESSING TERMINATE (AA)

Terminates the processing of the communications commands and restores the command wait status.

Command

| Command code | Terminator |
| :---: | :---: |
| A A | * CR |
| 2 | 2 |

Response

| Command code | End code | Termination timing | Terminator |
| :---: | :---: | :---: | :---: |
| A A | 0 0 | × | * CR |
| 2 | 2 | 1 | 2 |

| End code | Indicates the execution result for the command. 00: Normal completion 15: Command processing not executed. For details on end codes, refer to *End code List*.  p.118 |
| :--- | :--- |
| Termination timing | Indicates the timing for terminating command processing. 0: Terminate before RF Tag detection. 1: Terminate during RF Tag detection. |

# Host Commands

## ■ TEST (TS)

This command returns test messages sent from the host device without changing anything.

The TEST command is used for communications tests between the host device and the Hand-held Reader/Writer.

Command

| Command code | Message data | Terminator |
|---|---|---|

| T | S | × | × | × | … | × | ∗ | C R |
|---|---|---|---|---|---|---|---|---|

2          n          2

| Message data | Any text string for testing communications containing 514 characters max. |
|---|---|

Response

| Command code | End code | Message data | Terminator |
|---|---|---|---|

| T | S | 0 | 0 | × | × | × | … | × | ∗ | C R |
|---|---|---|---|---|---|---|---|---|---|---|

2       2           n           2

| End code | Indicates the execution result for the command.<br>00: Normal completion<br><br>For details on end codes, refer to *End code List*.<br>📖 p.118 |
|---|---|
| Message data | Any text string for testing communications containing 514 characters max. |

# ■ VERSION READ (VS)

Command

Command code  Terminator

| V | S | ∗ | C R |
|---|---|---|---|
| 2 | | 2 | |

Response

Command code  End code                                                                           Terminator

| V | S | 0 | 0 | Software model | : | Software version | : | Creation date | ∗ | CR |
|---|---|---|---|---|---|---|---|---|---|---|
| 2 | | 2 | | 16 | 1 | 4 | 1 | 10 | 2 | |

| Software model | The software creation date.<br>For the V680-CHUD: V680-CHUD$000000<br>For the V680-CH1D: V680-CH1D$000000<br>For the V680-CH1D-PSI: V680-CH1D$000000 |
|---|---|
| Software version | The software version.<br>∗.∗∗ |
| Software creation date | The software creation date.<br>20∗∗/∗∗/∗∗ |

# Controller Control Commands

These commands are used to reset the Controller or set serial communications.

## ■ ABORT (XZ)

This command is used to restore the Hand-held Reader/Writer to command wait status when there is no response from the Hand-held Reader/Writer due to some problem during communications with the host device or with an RF Tag.

The ABORT (XZ) command can be used only with the V680-CH1D.
Do not use it with the V680-CHUD.

CHECK!

Command

Command
code    Terminator

| X | Z | * | C R |
|---|---|---|------|
| 2 |   | 2 |      |

Response

None

## ■ COMMUNICATIONS CONDITIONS SETTING (TR)

This command is used to set serial communications parameters. The Hand-held Reader/Writer must be restarted to make the changes take effect.

The COMMUNICATIONS CONDITIONS SETTING (TR) command can be used only with the V680-CH1D.
Do not use it with the V680-CHUD.

CHECK!

Command

Command code  Baud rate  Data length  Parity  Stop bits  Terminator

| T | R | × | × | × | × | ∗ | C R |
|---|---|---|---|---|---|---|-----|
| 2 |   | 1 | 1 | 1 | 1 |   | 2   |

| Baud rate | Sets the baud rate.<br>0: 9,600 bps<br>1: 2,400 bps<br>2: 4,800 bps<br>3: 19,200 bps<br>4: 38,400 bps<br>Default setting: 9,600 bps |
|---|---|
| Data length | Sets the data length.<br>0: 7 bits<br>1: 8 bits<br>Default setting: 7 bits |
| Parity | Sets the parity.<br>0: Even parity<br>1: Odd parity<br>2: No parity<br>Default setting: Even parity |
| Stop bits | Sets the number of stop bits.<br>0: 2 bits<br>1: 1 bit<br>Default setting: 2 bits |

Response

Command code  End code  Terminator

| T | R | 0 | 0 | ∗ | C R |
|---|---|---|---|---|-----|
| 2 |   | 2 |   |   | 2   |

| End code | Indicates the execution result for the command.<br>00: Normal completion<br><br>For details on end codes, refer to *End code List*.<br>p.118 |
|---|---|

## ■ BASIC FUNCTIONS SETTING (FN)

This command is used to set the Auto Commands OFF function. The Hand-held Reader/Writer must be restarted to make the changes take effect.

CHECK!  A memory error will occur if the power supply is interrupted while parameters are being changed.

Command

Auto Command
OFF
specification

| Command code | | Fixed value | Terminator | |
|---|---|---|---|---|
| F | N | × | 0 | ∗ CR |
| 2 | 1 | 1 | | 2 |

| Auto Command OFF specifications | Designates whether the Auto Command OFF function is used. <br> 0: Auto Command OFF used. <br> 1: Auto Command OFF not used. <br> Default setting: Auto Command OFF used. |
|---|---|
| Fixed value | Always 0. |

Response

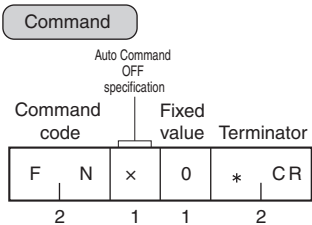| Command code | | End code | Terminator | |
|---|---|---|---|---|
| F | N | 0 | 0 | ∗ CR |
| 2 | | 2 | | 2 |

| End code | Indicates the execution result for the command. <br> 00: Normal completion <br><br> For details on end codes, refer to *End code List*. <br> p.118 |
|---|---|

## ■ SET INFORMATION READ (UL)

This command is used to read the settings of the Hand-held Reader/Writer.

CHECK!

Only the Auto Command OFF function is supported by the V680-CHUD.
The settings made with the COMMUNICATIONS CONDITIONS SETTING (TR) command are not valid for the V600-CHUD.

CHECK!

A memory error will occur if the power supply is interrupted while parameters are being changed.

Command

Command
code    Terminator

| U | L | * | C R |
|---|---|---|------|
| 2 | | 2 | |

Response

Command
code     End code          Settings for TR command                    Settings for
                                                                      FN command

| U | L | 0 | 0 | T | R | × | × | × | × | : | F | N | × | 0 | : |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | | 2 | | | | | | | | | | | | | |

Data
length    Stop
          bits          Fixed value

Baud       Parity       Auto Command
rate                    OFF specification

Hand-held Reader Writer system data    Terminator

| S | I | 0 | 0 | 0 | 0 | 0 | 0 | * | C R |
|---|---|---|---|---|---|---|---|---|------|
| | | | | 8 | | | | | 2 |

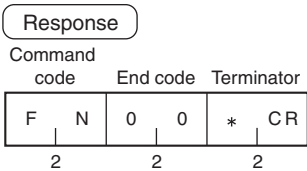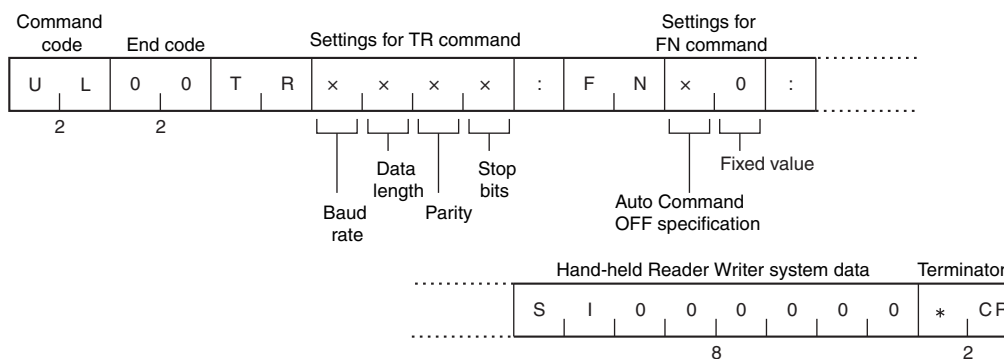| End code | Indicates the execution result for the command.<br>00: Normal completion<br><br>For details on end codes, refer to *End code List*.<br>p.118 | |
|---|---|---|
| Settings for TR command | Baud rate | 0: 9,600 bps<br>1: 2,400 bps<br>2: 4,800 bps<br>3: 19,200 bps<br>4: 38,400 bps |
| | Data length | 0: 7 bits<br>1: 8 bits |
| | Parity | 0: Even parity<br>1: Odd parity<br>2: No parity |
| | Stop bits | 0: 2 bits<br>1: 1 bit |
| Settings for FN command | Auto Command OFF Specification | 0: Auto Command OFF used.<br>1: Auto Command OFF not used. |
| | Fixed value | Always 0. |
| System data | SI000000 | |

## ■ PARAMETER SET (SP)

The PARAMETER SET command is used to set conditions for communicating with RF Tags. The various parameters are set in the Hand-held Reader/Writer.

> **CHECK!** The Hand-held Reader/Writer does not need to be reset when internal settings are changed. The new settings are effective immediately.

> **CHECK!** A memory error will occur if the power supply is interrupted while parameters are being changed.

Command

```
            Command                    Parameter data
              code    Process code     (for changed
                                       parameters only)    Terminator

            S   P   ×      ×    ×   ×   ×   ×      *  C R
                    Upper digit Lower digit
             2        2               0 to 4          2
```

| | |
|---|---|
| Process code (Upper digit) | Specifies the process to perform for the parameter.<br>0: Change the internal setting.<br>1: Read internal setting.<br>9: Return internal setting to default value. |
| Process code (Lower digit) | Specifies the parameter.<br>1: Inter-character monitoring time<br>2: Response delay time<br>4: Auto command cancel time<br>H: Write protection setting<br>J: Protocol switch<br>L: Tag memory setting (See note 1.) |

| Parameter data (for changed parameters only) | Data No.<br>(See note 2.) | Settable values |
|---|---|---|
| | 1 | Specify 4 decimal digits. 0000 to 9999 (ms)<br>0000: No monitoring, Default value: 0100 (ms) |
| | 2 | Specify 2 decimal digits. 00 to 99 (ms)<br>00: No delay, Default value: 20 (ms) |
| | 4 | Specify 2 decimal digits. 01 to 99 (s)<br>Default value: 60 (s) |
| | H | 00: Write protection OFF<br>01: Write protection ON (default value) |
| | J | 00: V600 protocol (default value)<br>01: V680 protocol |
| | L | 0: Standard Mode (default value)<br>1: CA1D Mode |

**Note 1.:** Parameter data L is enabled only with version 1.1 or newer.
**Note 2.:** The data number of the parameter data is the number specified for the lower digit of the process code.
The settable values for the data number are the same as for the parameter specified by the lower digit of the process code.

Response

```
            Command
              code    End code     Parameter data     Terminator

            S   P   0     0    ×   ×   ×   ×      *  C R
             2        2             0 to 4            2
```

| | |
|---|---|
| End code | Indicates the execution result for the command.<br>00: Normal completion<br>For details on end codes, refer to *End code List*.<br>📖 p.118 |
| Parameter data | Attached only when parameter data is being obtained. |

# Other Commands

## ■ UNDEFINED COMMAND RESPONSE (IC)

This command is returned as the response when the Hand-held Reader/Writer cannot read the command header.

> Response

Command
code          End code    Terminator

| I | C | × | × | ∗ | C R |
|---|---|---|---|---|-----|

  2       2       2

## ■ Error Response

If an error occurs during communications with the host device, or the RF Tag, error notification is provided in the end code.

> Response

Command
code          End code    Terminator

| × | × | × | × | ∗ | C R |
|---|---|---|---|---|-----|

  2       2       2

# End code List

End codes are indicated in 2-digit hexadecimal.

| Status | End code | Meaning |
|---|---|---|
| Normal | 00 | Normal completion |
| Host communications error | 10 *1 | Vertical parity error |
| | 11 *1 | Framing error |
| | 12 *1 | Overrun error |
| | 14 | Format error |
| | 15 | Execution status error |
| | 18 | Frame length error |
| Lower communications error | 70 | RF Tag communications error |
| | 71 | Mismatch error |
| | 72 | RF Tag non-existent error |
| | 76 | Data error |
| | 7A | Address error |
| | 7C | Antenna error |
| | 7D | Write protection error |
| Memory error | 93 | Internal memory error |

*1) Vertical parity errors, framing errors, and overrun errors do not occur for the V680-CHUD.

For details on each error, refer to *Error Tables*.

CHECK!          p.128

# Section 4
# Functions

Section 4

Functions

# Hand-held Reader/Writer Functions

## Multiple Area Control

The Hand-held Reader/Writer can read and write across several non-consecutive RF Tag memory areas (10 areas max.) at one time. To use this feature, the number of control areas is specified using the NUMBER OF CONTROL AREAS command. ASCII and hexadecimal can be used simultaneously for the one command control, but reading and writing cannot be performed simultaneously.

Example: Data in the Following 3 Areas are Read

| Area (1): | Address | 0010 (hex) |
|---|---|---|
| | Number of bytes | 05 bytes |
| | Code setting | ASCII |
| Area (2): | Address | 0030 (hex) |
| | Number of bytes | 02 bytes |
| | Code setting | Hexadecimal |
| Area (3): | Address | 0035 (hex) |
| | Number of bytes | 03 bytes |
| | Code setting | Hexadecimal |

(hex)

| Area (1) | 0010 | 4 | F | "O" |
|---|---|---|---|---|
| | 0011 | 4 | D | "M" |
| | 0012 | 5 | 2 | "R" |
| | 0013 | 4 | F | "O" |
| | 0014 | 4 | E | "N" |

| Area (2) | 0030 | 1 | 2 |
|---|---|---|---|
| | 0031 | 3 | 4 |

| Area (3) | 0035 | 3 | 1 |
|---|---|---|---|
| | 0036 | 3 | 2 |
| | 0037 | 3 | 3 |

Command  R D A 3 0 0 1 0 0 5 H 0 0 3 0 0 2 H 0 0 3 5 0 3 * CR
Response  R D 0 0 O M R O N 1 2 3 4 3 1 3 2 3 3 * CR

Area (1)    Area (2)    Area (3)

CHECK! Refer to *Command and Response Formats* for more details on ASCII and hexadecimal.

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CHECK! Multiple area control can be used only for V600 commands and cannot be used with the V680.

## Auto Command OFF Function

If communications with the RF Tag do not begin within one minute (see note) after an auto command or button auto command is sent from the host device to the Hand-held Reader/Writer after entering the RF Tag wait status, the Auto Command OFF function automatically aborts the auto command and returns an "RF Tag non-existent" error (error code 72) to the host device. When the Auto Command OFF function is not used, the auto command will not be aborted even if one minute passes after entering the RF Tag wait status.
This function is set using the BASIC FUNCTIONS SETTING (FN) command.

**Note:** The one-minute detection time limit before the timeout will occur can be changed by using the PARAMETER SET command (SP).

CHECK! Refer to the section on the *BASIC FUNCTIONS SETTING (FN)* for details on the setting method.

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# Write Protection Function

The write protection function prevents important data stored in the RF Tag, such as the product type and model, from being overwritten by other data and lost. Use the following method to set write protection after writing important data.

CHECK!   📖 p.116   The write protection function can be enabled or disabled with the PARAMETER SET command (SP).

## Setting Write Protection

The write protection function is set in the four bytes of addresses 0000 through 0003 (hex) of the RF Tag's memory. The status of the most significant bit of address 0000 (hex) determines whether or not the write protection function is enabled for individual RF Tags.

| Address (hex) \ Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|
| 0000 | Yes/No | Upper two digits of start address | | | | | | |
| 0001 | Lower two digits of start address | | | | | | | |
| 0002 | Upper two digits of end address | | | | | | | |
| 0003 | Lower two digits of end address | | | | | | | |

- Write-protection Bit (most significant bit of address 0000 (hex))
  1: Data is write-protected
  0: Data is not write-protected
- Write Protection Setting Area
  Start address: 0000 to 7FFF(hex)
  End address: 0000 to FFFF(hex)

▪ Settings to Write-protect Addresses 0006 through 07FF (hex)

| Address (hex) \ Bit | Upper digit | | | | Lower digit | | | |
|---|---|---|---|---|---|---|---|---|
| 0000 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 8 | | | | 0 | | | |
| 0001 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| | 0 | | | | 6 | | | |
| 0002 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| | 0 | | | | 7 | | | |
| 0003 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | F | | | | F | | | |

▪ Settings to Not Write-protect Addresses

| Address (hex) \ Bit | Upper digit | | | | Lower digit | | | |
|---|---|---|---|---|---|---|---|---|
| 0000H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | | | | 0 | | | |
| 0001H | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| | 0 | | | | 6 | | | |
| 0002H | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| | 0 | | | | 7 | | | |
| 0003H | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | F | | | | F | | | |

CHECK!   The DATA FILL command will write data even to areas of the Tag for which write protection has been set. Confirm that there is no important data in the area being written before executing this command.
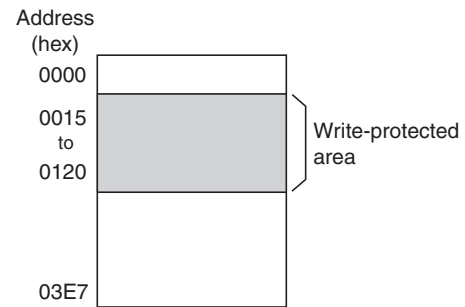
▪ Write Protection Setting Examples

**(1) Settings to Write-protect Addresses 0015 to 0120 (hex)**
(Start address < End address)
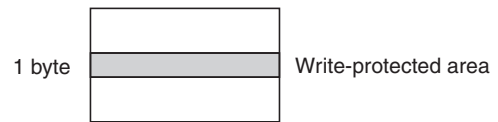
| Address (hex) \ Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |
|---|---|---|---|---|---|---|---|---|---|
| 0000 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | (Hexadeci-mal) |
| 0000 | | 8 | | | | 0 | | | |
| 0001 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | |
| 0001 | | 1 | | | | 5 | | | |
| 0002 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| 0002 | | 0 | | | | 1 | | | |
| 0003 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | |
| 0003 | | 2 | | | | 0 | | | |

Address (hex)
0000
0015 to 0120 — Write-protected area
03E7

**(2) Settings to Write-protect 1 Byte**
(Start address = End address)
Specify the same address for the start and end addresses.

1 byte — Write-protected area

**(3) Settings when the End Address Is Greater Than the Final Address in the RF Tag**
(End address > Last address in RF Tag)
The RF Tag memory area is allocated from address 0000 to 03E7 (hex) when using the V680-D1KP☐☐. Therefore, the addresses up to 03E7 (hex) will be write-protected.

0000
03E7 — Write-protected area

**(4) Settings when the Start Address Is Greater Than the End Address**
(Start address > End address)
The area between 0004 (hex) and the end address
and the area between the start address and 03E7 (hex) are write-protected when using the V680-D1KP☐☐.

0000
0006 — End address
03E7 — Start address
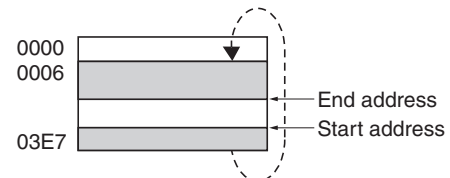
▪ Canceling Write Protection
• Canceling Write Protection for an RF Tag
To cancel write protection, turn OFF the most significant bit of address 0000 (hex). The write protection will be cancelled and the start and end addresses that are set for 0000 to 0003 (hex) will be ignored.

• Canceling Write Protection for the Hand-held Reader/Writer
Use the PARAMETER SET command (SP) to disable the write protection function.
If write protection is disabled for the Hand-held Reader/Writer, even turning ON the most significant bit of address 0000 (hex) in the RF Tag will not enable write protection.

# RF Tag Service Life Detection

The OVERWRITE COUNT CONTROL command (MDS/MDL) can be used to determine whether the Tag overwrite limit has been exceeded. With the MDS command, the overwrite count is subtracted from the data in the user-specified overwrite count control area to determine whether the number of overwrites has been exceeded. The MDL command can also be used to determine whether the overwrite count (100,000 times) has been exceeded. The MDL command for RF Tags with a maximum number of 100,000 overwrites.

## MDS Command

The overwrite count control area consists of 3 bytes from the start address. The decrement value from the overwrite count is written in this area, and if this value is 0 (00 hex) an end code 76 will be given as a warning. Therefore, to enable control of the number of overwrites, the maximum number of overwrites must be written to the overwrite count control area beforehand.

The user-specified number of overwrites can be set to up to 16,700,000. The number of overwrites in the specifications for EEPROM RF Tags, however, is 100,000 overwrites (0186A0 hex) at 25°C max., so be sure to set the number of overwrites to 100,000 or lower

The number of overwrites is controlled using hexadecimal values, and can be read using the READ command.

If the control area data is already 0, the control area value will not be refreshed, and only a warning will be returned as a response. When the refresh count is set as 00 hex, the count will not be updated, and only an overwrite count check will be performed.

Area start address →

| Upper digit |
| Middle digit |  3 bytes
| Lower digit |
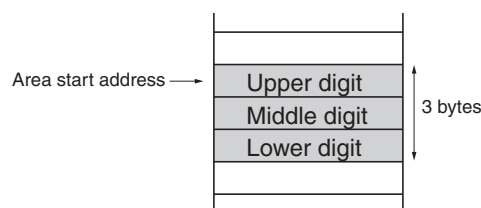
For details on the command format, refer to *OVERWRITE COUNT CONTROL (MD S/L)*.

CHECK!  p.69

▪ Example Using the OVERWRITE COUNT (MDS) Command

Example: When the three bytes from address 0010 (hex) are used as the overwrite count area.

1. The overwrite count initial value of 100,000 times is written in the control area.
   "WTSTH100100186A0"

| 0010 | 01 hex |
| 0011 | 86 hex |
| 0012 | A0 hex |

2. Enter the overwrite count of 5.
   "MDSTS1001005"
   A total of 5 times will be decremented from 100,000.

| 0010 | 01 hex |
| 0011 | 86 hex |
| 0012 | 9B hex |

3. The accumulated count is 100,000 times.
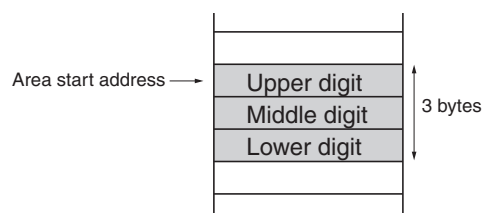   When "MDSTS1001000" is executed, it will be "MD7610" (overwrite count exceeded.)

| 0010 | 00 hex |
| 0011 | 00 hex |
| 0012 | 00 hex |

Section 4

RF Tag Service Life Detection

# MDL Command

The overwrite count control area consists of 3 bytes from the start address. The decrement value from the overwrite count is written in this area, and if this value is 100,000 (0186A0 hex) or higher, an end code 76 will be given as a warning.

The number of overwrites is controlled using hexadecimal values, and can be read using the READ command.

If the control area data is already 100,000, the control area value will not be refreshed, and only a warning will be returned as a response. When the refresh count is set as 00 hex, the count will not be updated, and only an overwrite count check will be performed.

Area start address →
| | |
|---|---|
| Upper digit | |
| Middle digit | 3 bytes |
| Lower digit | |

For details on the command format, refer to *OVERWRITE COUNT CONTROL (MD S/L)*.

CHECK!

- Example Using Overwrite Count Control Command (MDL)

In the following example, the three bytes starting from address 0010 (hex) is the overwrite count control area.

1.  The control area is cleared.
    "WTSTH10010000000"

| 0010 | 00 hex |
|---|---|
| 0011 | 00 hex |
| 0012 | 00 hex |

2.  The overwrite count of 4 is entered.
    "MDSTL1001004"

| 0010 | 00 hex |
|---|---|
| 0011 | 00 hex |
| 0012 | 04 hex |

3.  Enter the overwrite count of 5.
    "MDSTL1001005"
    The total overwrite count becomes 9 times.

| 0010 | 00 hex |
|---|---|
| 0011 | 00 hex |
| 0012 | 09 hex |

4.  The accumulated count is 100,000 times.
    When "MDSTL1001000" is executed, it will be
    "MD7610" (overwrite count exceeded.)

| 0010 | 01 hex |
|---|---|
| 0011 | 86 hex |
| 0012 | A0 hex |

# Memory Check Function in RF Tag

A memory check can be made using the DATA CHECK command (MD C/K). A CRC (Cyclic Redundancy Check) code calculation, overwrite, and comparison are made, using the check block units specified by the user. The CRC code is calculated from the generated polynomial expression $x^{16} + x^{12} + x^5 + 1$.

The calculation area is the portion of the check block specified by the start address and the number of bytes excluding the last two bytes. The last two bytes are the check code area. When check code write is specified (transaction code: K), the CRC of the calculation area data is calculated and written to the check code area. When data comparison is specified (transaction code: C), the CRC of the calculation area data is calculated and a comparison made with the check code area data. If they coincide, end code 00 is returned, indicating normal transmission, and if they do not coincide, end code 76 is returned as a warning.
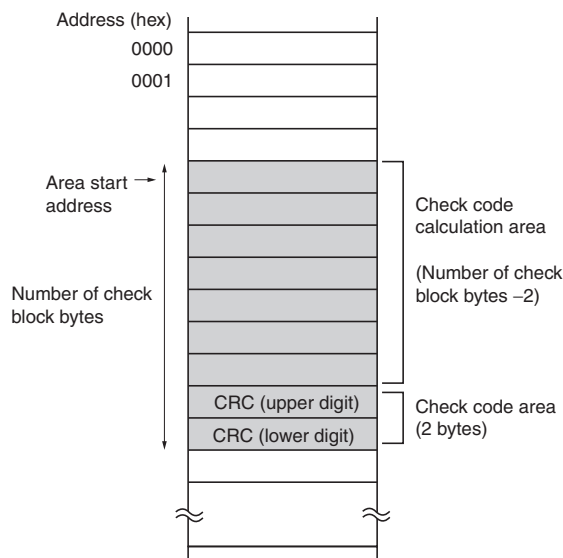
*For details on the command format, refer to DATA CHECK (MD C/K).*

CHECK!

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Address (hex)
0000
0001

Area start address →

Number of check block bytes

Check code calculation area

(Number of check block bytes −2)

CRC (upper digit)
CRC (lower digit)

Check code area (2 bytes)

## ■ Example Using the RF Tag's DATA CHECK Command

In the following example, the data in address 0010 to 0012 (hex) is checked

1. In this example, the following data already exists in the memory.

| | |
|---|---|
| 0010 | 12 hex |
| 0011 | 34 hex |
| 0012 | 56 hex |
| 0013 | |
| 0014 | |

2. Execute MDSTK1001005 (calculation transaction).
The CRC code 5CD6 calculated from the data 123456 is written to addresses 0013H and 0014H.

| | |
|---|---|
| 0010 | 12 hex |
| 0011 | 34 hex |
| 0012 | 56 hex |
| 0013 | 5C hex |
| 0014 | D6 hex |

3. Execute MDSTC1001005 (comparison transaction).
The normal response MD0010 will be returned if the data coincides.

| | |
|---|---|
| 0010 | 12 hex |
| 0011 | 34 hex |
| 0012 | 56 hex |
| 0013 | 5C hex |
| 0014 | D6 hex |

If the data error occurs, MD7610 (a data error warning) will be returned.

| | | |
|---|---|---|
| 0010 | 00 hex | ←Data error |
| 0011 | 34 hex | |
| 0012 | 56 hex | |
| 0013 | 5C hex | |
| 0014 | D6 hex | |

Section 4

Memory Check Function in RF Tag

# RF Tag Memory Error Correction

The WRITE WITH ERROR CORRECTION command (QW) can be used to write an RF Tag memory check code and error correction code to the five bytes of memory after the write data. The READ WITH ERROR CORRECTION command (QR) performs a tag memory check and makes 1-bit memory error corrections.

When a 1-bit memory error is corrected, a warning that a 1-bit memory error occurred is given by returning an end code of 77, and the normal data with the error corrected will be returned. When a 2-bit or larger memory error is detected, a memory error (end code 76) saying that error correction was not possible is given and the read data will not be returned.
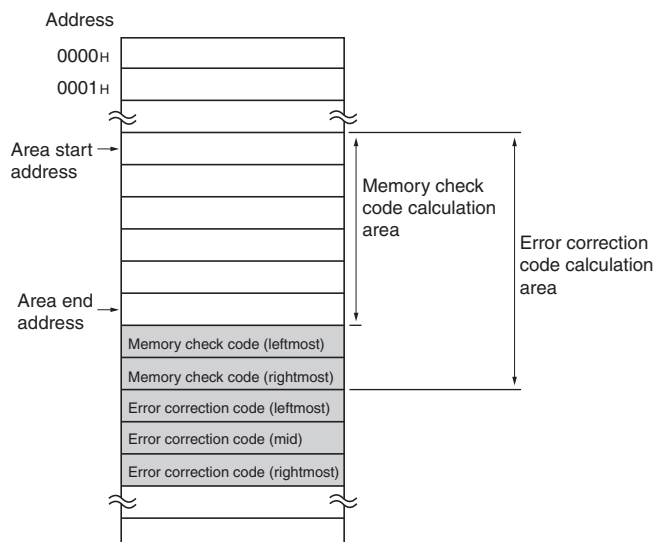


> For details on the command format, refer to *READ WITH ERROR CORRECTION (QR)* and *WRITE WITH ERROR CORREC-TION (QW)*.
>
> CHECK!　　p.72, p.73

## ■ Example of Using the Memory Error Correction Function

The following example shows how to perform a data check for addresses 0010 to 0015 (hex).

1. Send the WRITE WITH ERROR CORRECTION (QR) command.
   Command:
   QWSTH10010313233343536*[CR]

2. Write data is written to addresses 0010 to 0015 (hex). The RF Tag memory check code and a 5-byte error correction code are written to addresses 0016 to 001A (hex).



3. Send the READ WITH ERROR CORRECTION (QW) command.
   Command: QRSTH100100006*[CR]
   ● Response When Read Data Is Correct:
   QR0010313233343536*[CR]

   ● Response When a 2-bit or Longer Memory Error Is Detected:
   QR76*[CR]

   ● Response When a 1-bit Memory Error Is Corrected:
   QR7710313233343536*[CR]

# Section 5
# Troubleshooting

# Error Tables

If an error occurs in the Hand-held Reader/Writer, the operation indicator will light or flash red to indicate the type of error.

## Fatal Errors (Operation Stops)

If a fatal error occurs, the operation indicator will be lit red and all operations of the Hand-held Reader/Writer will stop until the power is turned OFF and then ON again.
Communications with the host will still be possible even if a memory error occurs.

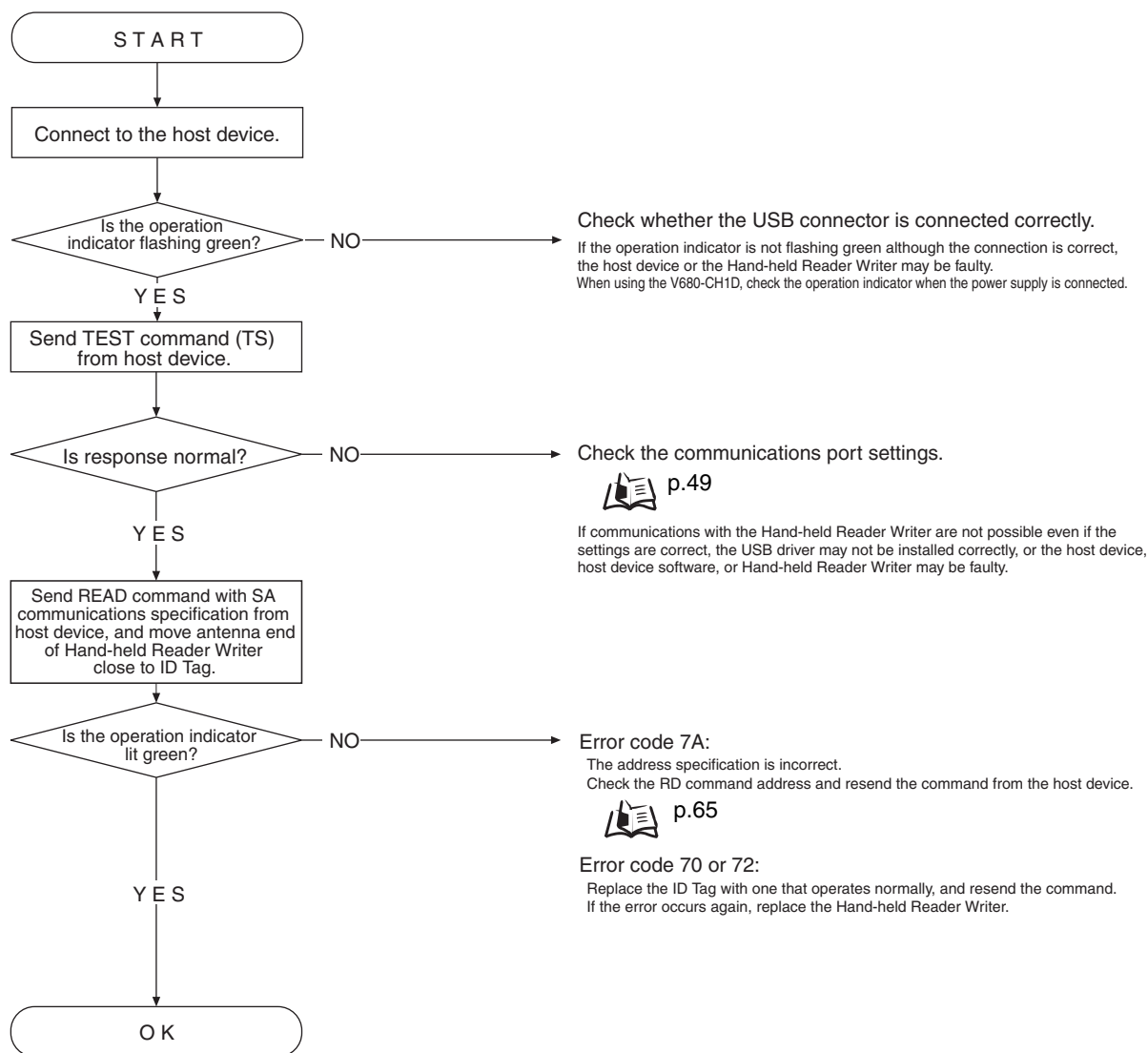| Name | Operation indicator | Description |
|---|---|---|
| Hardware error | Lit red | Hand-held Reader/Writer cannot be operated normally. |
| Memory error | Lit red | The contents of the backup memory in the Hand-held Reader/Writer is corrupted. |

## Non-fatal Errors (Operation Continues)

If a non-fatal error occurs, the operation indicator will light or flash red (or flashing red) and an error code will be returned to the host device.

| Name | Operation indicator | Description |
|---|---|---|
| Parity error | Flashing red | A parity error has occurred in communications with the host device. |
| Framing error | Flashing red | A framing error has occurred in communications with the host device. |
| Overrun error | Flashing red | An overrun error has occurred in communications with the host device. |
| Format error | Flashing red | The command from the host device was incorrectly formatted. |
| Frame length error | Flashing red | Command exceeding the maximum frame length was received. |
| RF Tag communications error | Lit red | Communications with the RF Tag could not be performed correctly. |
| Mismatch error | Lit red | Write control was not performed correctly. |
| RF Tag non-existent error | Flashing red | A command that was not an auto command was sent when the RF Tag was not in the interrogation zone. A command OFF occurred with the auto command. |
| Address error | Lit red | An address that exceeded the RF Tag memory area was designated. |
| Write protection error | Lit red | A write protection area was designated with a WRITE command. |

# Troubleshooting Flowchart

If an error occurs, be sure to understand the conditions thoroughly, then accurately determine the likelihood of the error re-occurring, whether the problem is related to another device, and other factors causing the error, and refer to the following flowcharts for troubleshooting.

```
            ( S T A R T )
                  |
   +--------------------------------+
   |   Connect to the host device.  |
   +--------------------------------+
                  |
          < Is the operation >---- NO ---->  Check whether the USB connector is connected correctly.
          < indicator flashing green? >      If the operation indicator is not flashing green although the connection is correct,
                  |                           the host device or the Hand-held Reader Writer may be faulty.
                 YES                          When using the V680-CH1D, check the operation indicator when the power supply is connected.
                  |
   +--------------------------------+
   |   Send TEST command (TS)       |
   |   from host device.            |
   +--------------------------------+
                  |
          < Is response normal? >---- NO ---->  Check the communications port settings.
                  |                                  [book] p.49
                 YES
                  |                             If communications with the Hand-held Reader Writer are not possible even if the
                  |                             settings are correct, the USB driver may not be installed correctly, or the host device,
                  |                             host device software, or Hand-held Reader Writer may be faulty.
   +--------------------------------+
   |   Send READ command with SA    |
   |   communications specification |
   |   from host device, and move   |
   |   antenna end of Hand-held     |
   |   Reader Writer close to ID    |
   |   Tag.                         |
   +--------------------------------+
                  |
          < Is the operation indicator >---- NO ---->  Error code 7A:
          < lit green? >                                 The address specification is incorrect.
                  |                                       Check the RD command address and resend the command from the host device.
                 YES                                          [book] p.65
                  |
                  |                                     Error code 70 or 72:
                  |                                       Replace the ID Tag with one that operates normally, and resend the command.
                  |                                       If the error occurs again, replace the Hand-held Reader Writer.
              ( O K )
```

Section 5 Troubleshooting Flowchart

MEMO

# Section 6
# Appendices

Section 6

Appendices

# Specifications and Dimensions

## General Specifications

| Item | Specification | | | |
|---|---|---|---|---|
| | V680-CHUD | | V680-CH1D | V680-CH1D-PSI |
| | 0.8 m | 1.9 m | | |
| Supply voltage | 5.0 VDC ±5% (at Reader/Writer connector) | | | |
| Ambient operating temperature | 0 to 40°C | | | |
| Ambient operating humidity | 35% to 85% (with no condensation) | | | |
| Ambient storage temperature | −25 to 65°C | | | |
| Ambient storage humidity | 35% to 85% (with no condensation) | | | |
| Degree of protection | IEC60529, IP63 (See note.) | | | |
| Weight | Approx. 110 g (with cables and connectors) | Approx. 140 g (with cables and connectors) | Approx. 170 g (with cables and connectors) | Approx. 120 g (with cables and connectors) |
| Current consumption | 500 mA max. (supply voltage: 5.0 V) | | | |
| Material | Case: ABS resin; Nameplate: PET resin | | | |
| Vibration resistance | 10 to 150 Hz, 0.2-mm double amplitude at 15 m/s² acceleration in 6 directions 10 times for 8 minutes each | | | |
| Shock resistance | 150 m/s² (approx. 15G), 3 times each in 6 directions (up, down, right, left, forward, reverse) | | | |
| Insulation resistance | 50 MΩ min. (at 500 VDC) between connector terminals and case | | | |
| Dielectric strength | 1,000 VAC, 50/60 Hz for 1 min between connector terminals and case (leakage current: 1 mA max.) | | | |
| Cable length | 0.8 m | 1.9 m | 2.5 m | 0.8 m |

**Note:** This does not include the connector section. The main unit is not resistant to chemicals or oils.

## Performance Specifications

| Item | Specification |
|---|---|
| Diagnostic function | Checks for CPU errors, memory errors, and communications errors |

## V600-A22 Specifications

| Item | Specification |
|---|---|
| Input voltage | 100 to 120 VAC at 50/60 Hz |
| Input current | 300 mA AC (load current: 2.0 A) |
| Output voltage | 5 VDC±0.25 V |
| Ambient operating temperature | 0 to 40°C |
| Ambient storage temperature | −20 to 85°C (with no icing) |
| Ambient storage humidity | 5% to 95% (with no condensation) |
| Insulation resistance | 100 MΩ min. (at 500 VDC) between input terminals and output terminals |
| Dielectric strength | 2,000 VAC for 1 min between input terminals and output terminals (leakage current: 10 mA max.) |
| Weight | Approx. 70 g |
| Applicable standards | UL |

# Communications Specifications

## ■ Host Communications Interface Specifications

V680-CHUD

| Item | Specification |
|---|---|
| Connectors (connector connection status) | Series A plug |
| USB specifications | Ver 1.1 |
| Baud rate | Full speed (12 Mbps) |
| Device class | COM class |
| Vendor ID | Hexadecimal format [0590] |
| Product ID | Hexadecimal format [0048] |

CHECK!

Use the host communications interface as the COM port for the host device.

V680-CH1D, V680-CH1D-PSI

| Item | V680-CH1D | V680-CH1D-PSI |
|---|---|---|
| Connector | D-Sub 9-pin (applicable to IBM PC/AT or compatible) (See note 1.) | D-Sub 9-pin |
| Standard compliance | RS-232C | |
| Transmission line connection | 1:1 | |
| Communications method | Two-wire, half duplex | |
| Synchronization method | Asynchronous (stop bit: 1 or 2) (See note 2.) | |
| Baud rate | 2,400, 4,800, 9,600, 19,200, 38,400 bps (See note 2.) | |
| Transmission code | 7-unit ASCII or 8-unit JIS (See note 2.) | |
| Communications control | 1:1 | |
| Error detection | Vertical parity (even/odd/none) (See note 2.) | |

**Note 1:** For conversion to a 25-pin connector, use the SGC-X9P/25P-2 manufactured by Sunhayato, or an equivalent.
**2:** Set by a settings command.

# Dimensions

## V680-CHUD



| Dimension L |
|---|
| 800±60 |
| 1900±60 |

Operation indicator
Activate switch

23
11
45
65
25.5

160.5
L
Antenna
33
23
10.5

Ferrite core
Vinyl-insulated round cable, 3.8 mm dia.
Standard length: 0.8 or 1.9 m

(Unit: mm)

## V680-CH1D



Operation indicator
Activate switch
Reset button

23
11
45
65
48
25.5

Vinyl-insulated round cable,
3.8 mm dia.
Standard length: 2.5 m

160.5
2500±60
44.9
Antenna
33
23
10.5

Ferrite core
24.99
32.2
Connector

Vinyl-insulated flat cable, 1.8 mm dia. × 2
Standard length: 0.19 m

190±20

Connector
13 dia.
45

(Unit: mm)

## V680-CH1D-PSI

Operation indicator    Activate switch    Reset button

23
11
45
65
48
25.5

Vinyl-insulated round cable,
3.8 mm dia.
Standard length: 2.5 m

160.5
Antenna
10.5
33
23

800 +50 -110
44.9

Ferrite core

24.99
32.2

Connector

(Unit: mm)

## V600-A22

25.4±1
54±1
48±1

4+0.1 dia.

9.5±0.3

(Unit: mm)

# Communication Specifications

Communication with the currently available V680/V680S-series RF Tags is possible.

## ■ Communications Ranges

| RF Tag | Communications range | | RF Tag | Communications range |
|---|---|---|---|---|
| V680-D1KP52MT | Read    0 to 9.0 mm | | V680-D2KF52M | Read    0 to 7.0 mm |
| | Write    0 to 7.5 mm | | | Write    0 to 7.0 mm |
| V680-D1KP52MT Embedded in metal (iron) | Read    0 to 3.0 mm | | V680-D2KF52M Embedded in metal (iron) | Read    0 to 2.0 mm |
| | Write    0 to 2.5 mm | | | Write    0 to 2.0 mm |
| V680-D1KP53M | Read    0 to 9.0 mm | | V680-D8KF67M | Read    0 to 22.0 mm |
| | Write    0 to 7.5 mm | | | Write    0 to 22.0 mm |
| V680-D1KP53M Embedded in metal (iron) | Read    0 to 3.0 mm | | V680-D8KF67 | Read    0 to 28.0 mm |
| | Write    0 to 2.5 mm | | | Write    0 to 28.0 mm |
| V680-D1KP66MT | Read    0 to 21.0 mm | | V680-D8KF68 | Read    0 to 32 mm |
| | Write    0 to 18.0mm | | | Write    0 to 32 mm |
| V680-D1KP66T | Read    0 to 27.0 mm | | V680-D32KF68 | Read    0 to 32 mm |
| | Write    0 to 25.0 mm | | | Write    0 to 32 mm |
| V680-D1KP66T-SP | Read    0 to 25.0 mm | | V680S-D2KF67 | Read    0 to 22.0 mm |
| | Write    0 to 23.0 mm | | | Write    0 to 22.0 mm |
| V680-D1KP58HT | Read    0 to 19.0 mm | | V680S-D2KF67M | Read    0 to 22.0 mm |
| | Write    0 to 17.0 mm | | | Write    0 to 22.0 mm |
| V680-D1KP58HTN | Read    0 to 19.0 mm | | V680S-D2KF68 | Read    0 to 22.0 mm |
| | Write    0 to 17.0 mm | | | Write    0 to 22.0 mm |
| | | | V680S-D2KF68M | Read    0 to 22.0 mm |
| | | | | Write    0 to 22.0 mm |
| | | | V680S-D8KF67 | Read    0 to 22.0 mm |
| | | | | Write    0 to 22.0 mm |
| | | | V680S-D8KF67M | Read    0 to 22.0 mm |
| | | | | Write    0 to 22.0 mm |
| | | | V680S-D8KF68 | Read    0 to 22.0 mm |
| | | | | Write    0 to 22.0 mm |
| | | | V680S-D8KF68M | Read    0 to 22.0 mm |
| | | | | Write    0 to 22.0 mm |

The above communications ranges given here are for reference only. The communications ranges are from tests conducted a room temperature(23 °C).

Note 1: RF Tag Installation Conditions

- V680-D1KP52MT       Embedded in resin/Embedded in metal (iron)

- V680-D1KP53M        Embedded in resin/Embedded in metal (iron)

- V680-D1KP66MT       Metal (iron) on the back surface of the RF Tag.

- V680-D1KP66T        Resin on the back surface of the RF Tag.
                      RF Tag (no metal on back surface)

- V680-D1KP66T-SP     Resin on the back surface of the RF Tag.
                      RF Tag (no metal on back surface)

- V680-D1KP58HT       Resin on the back surface of the RF Tag.
                      RF Tag (no metal on back surface)

- V680-D1KP58HTN      Resin on the back surface of the RF Tag.
                      RF Tag (no metal on back surface)

- V680-D2KF52M        Embedded in resin/Embedded in metal (iron)

- V680-D8KF67M        Metal (iron) on the back surface of the RF Tag.

- V680-D8KF67         Resin on the back surface of the RF Tag.
                      RF Tag (no metal on back surface)

- V680-D8KF68         Resin on the back surface of the RF Tag.
                      RF Tag (no metal on back surface)

- V680-D32KF68        Resin on the back surface of the RF Tag.
                      RF Tag (no metal on back surface)

- V680S-D2KF67        Resin on the back surface of the RF Tag.
                      RF Tag (no metal on back surface)

- V680S-D2KF67M       Metal (iron) on the back surface of the RF Tag.

- V680S-D2KF68        Resin on the back surface of the RF Tag.
                      RF Tag (no metal on back surface)

- V680S-D2KF68M       Metal (iron) on the back surface of the RF Tag.

- V680S-D8KF67        Resin on the back surface of the RF Tag.
                      RF Tag (no metal on back surface)

- V680S-D8KF67M       Metal (iron) on the back surface of the RF Tag.

- V680S-D8KF68        Resin on the back surface of the RF Tag.
                      RF Tag (no metal on back surface)

- V680S-D8KF68M       Metal (iron) on the back surface of the RF Tag.

**Section 6    Specifications and Dimensions**

# ■ Interrogation Zone (Reference)

● V680-D1KP52MT
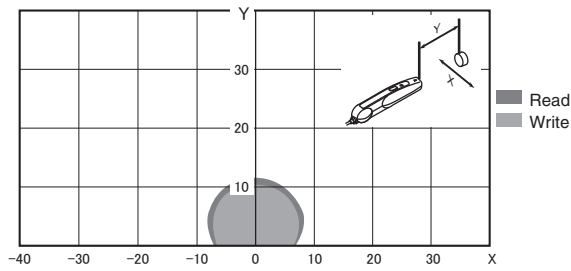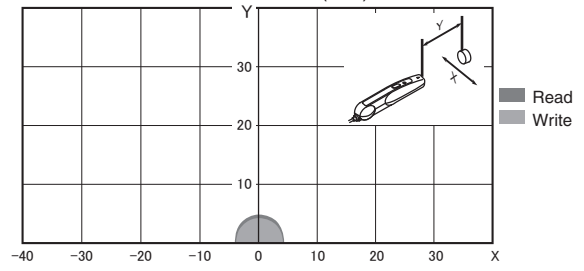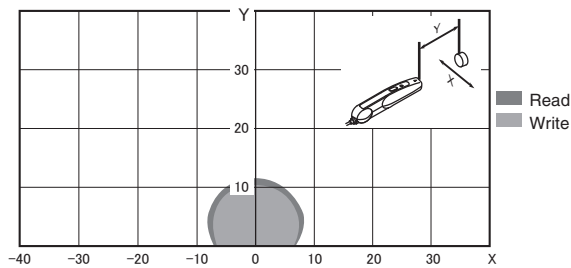


Read
Write

● V680-D1KP52MT
Embedded in metal (iron)



Read
Write

● V680-D1KP53M



Read
Write

● V680-D1KP53M
Embedded in metal (iron)



Read
Write

● V680-D1KP66T



Read
Write
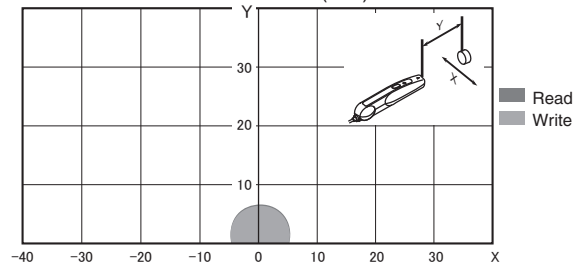
● V680-D1KP66T-SP
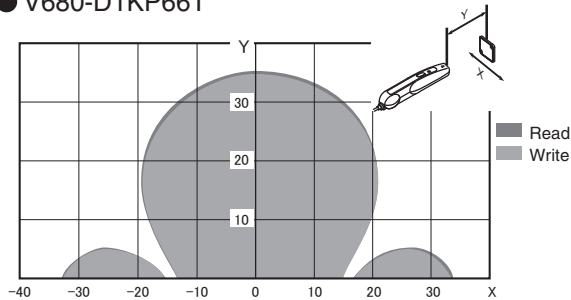


Read
Write

● V680-D1KP66MT
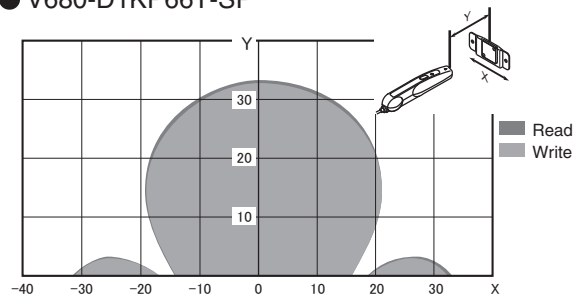


Read
Write
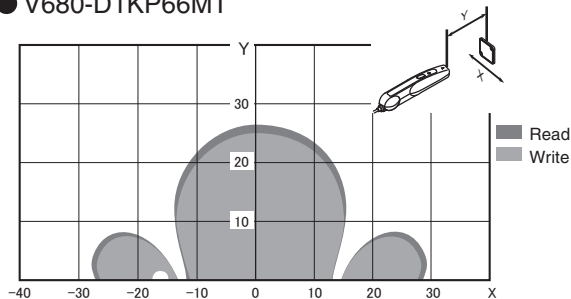
● V680-D1KP58HT
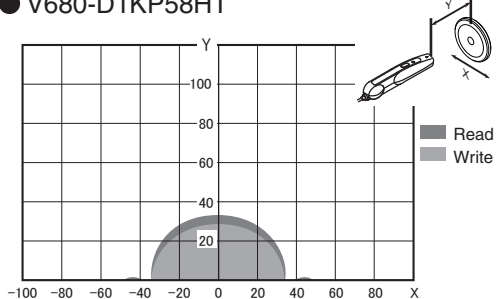


Read
Write

● V680-D2KF52M
· Read / Write
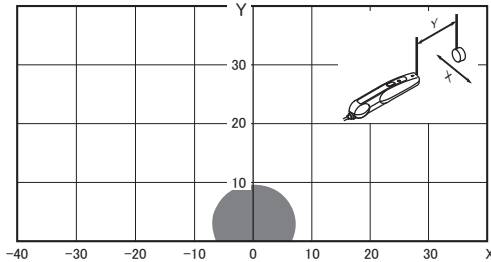


● V680-D2KF52M
· Read / Write    Embedded in metal (iron)
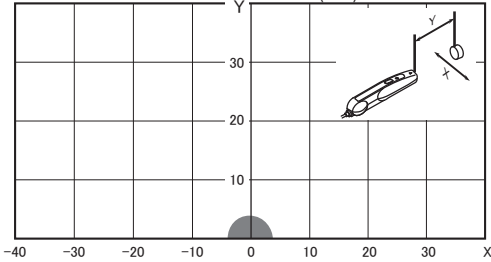


● V680-D8KF67
· Read / Write
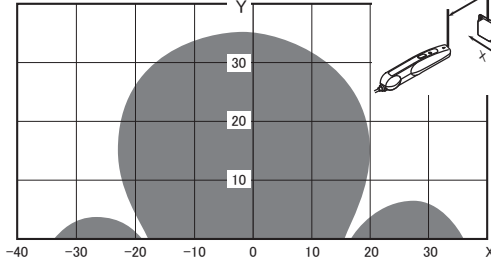


● V680-D8KF67M
· Read / Write
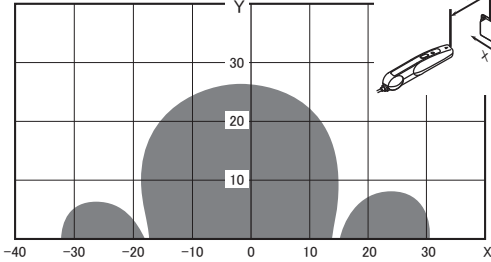


● V680-D8KF68/V680-D32KF68
· Read / Write



**Section 6  Specifications and Dimensions**
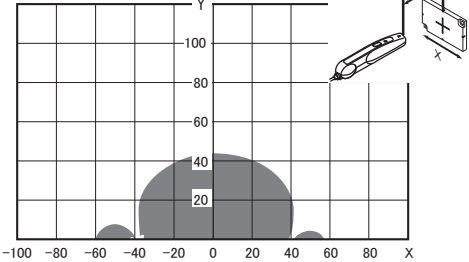
● V680S-D2KF67

・Read / Write
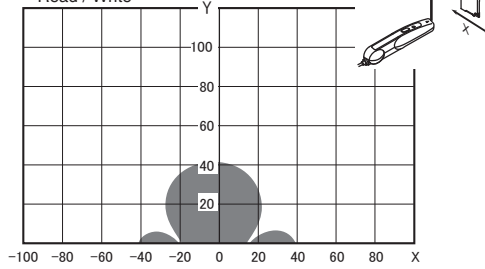
● V680S-D2KF67M

・Read / Write
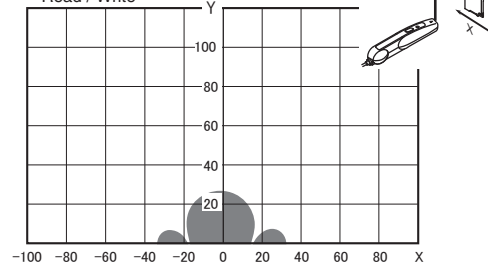
● V680S-D2KF68

・Read / Write
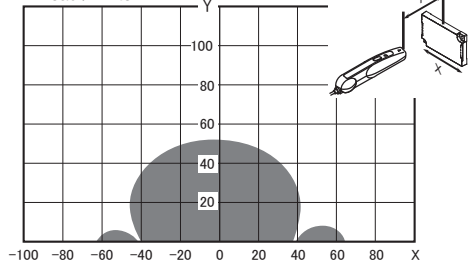
● V680S-D2KF68M

・Read / Write
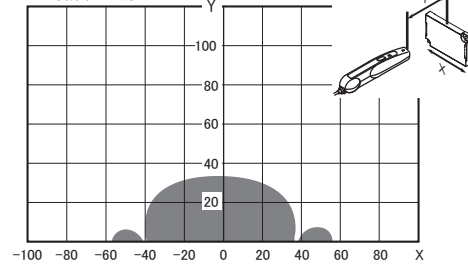
● V680S-D8KF67

・Read / Write
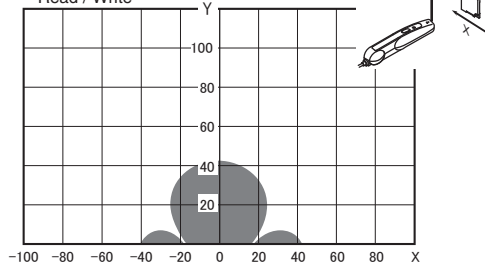
● V680S-D8KF67M

・Read / Write
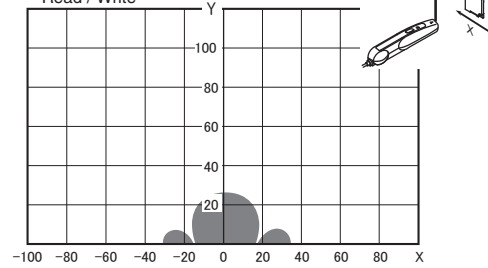
● V680S-D8KF68

・Read / Write
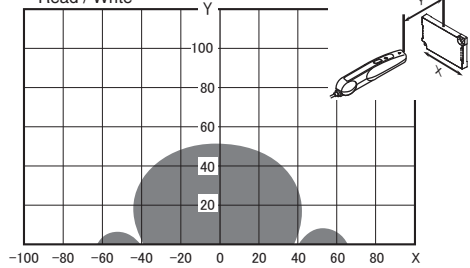
● V680S-D8KF68M

・Read / Write
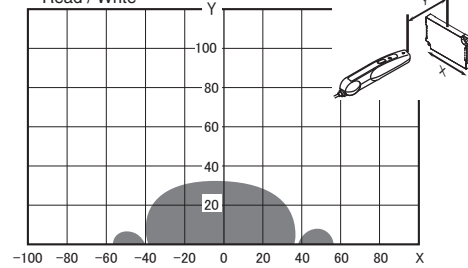
# Communications Time

TAT represents the total time from when a command is first sent from the host device until a response is received. The communication time represents the time required for communications between the Hand-held Reader/Writer and the RF Tag, not including communications with the host device.

Example

| RDH1……∗CR | | RD001122……∗CR |
|---|---|---|
| Command | Communication time | Response |
| | TAT | |
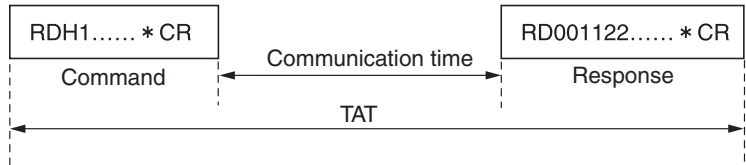
## ■ V680-D1KP52MT/V680-D1KP66MT/V680-D1KP66T/V680-D1KP58HT

### ▪ V680-CH1D TAT
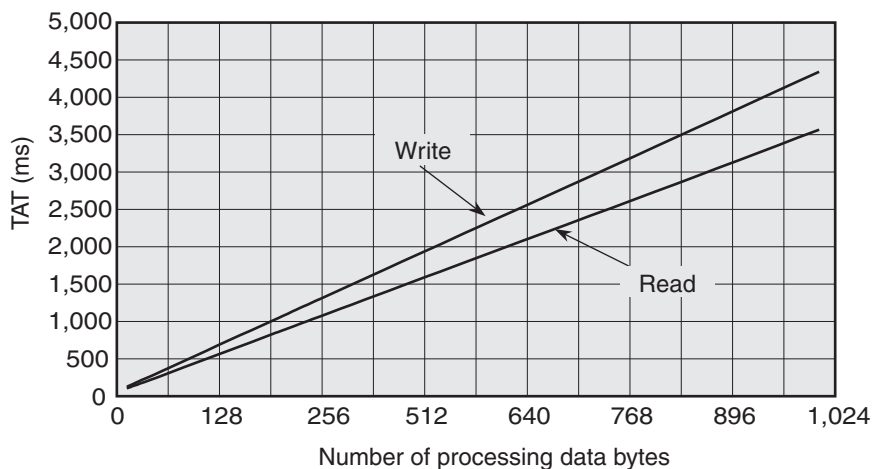


TAT (ms) vs Number of processing data bytes, with Write and Read curves.

Note 1) In V680 mode, communications specifications for TAT data with the host device represent values with a baud rate of 9,600 bps, a bit length of 8 bits, 1 stop bit, and even parity. In this example, characters are sent consecutively, with no spaces between them.

2) The number of bytes in the TAT data is the number for hexadecimal encoding.

### ▪ V680-CHUD TAT



TAT (ms) vs Number of processing data bytes, with Write and Read curves.

Section 6 **Specifications and Dimensions**
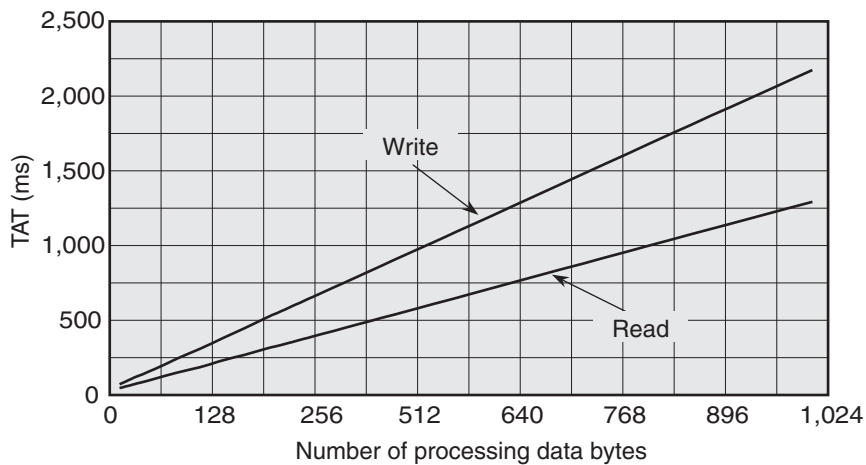
▪ Communication Time
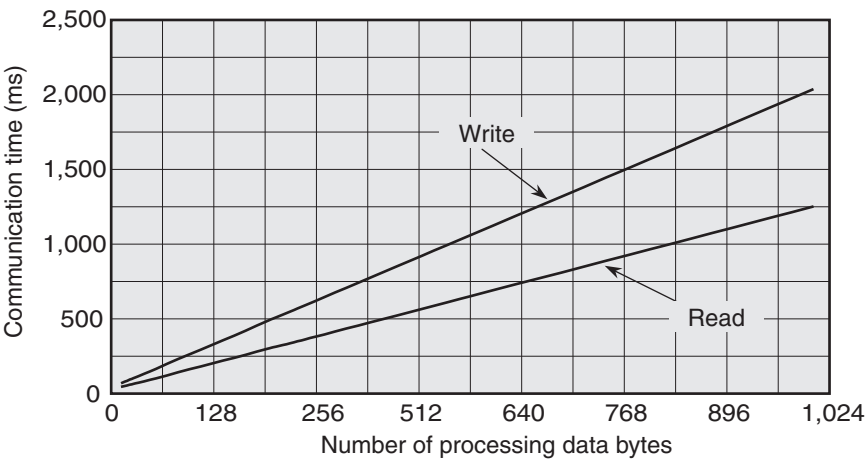


Calculation Method

| Operation | Communication time (ms) |
|-----------|-------------------------|
| Read | T=1.2N+27.3 |
| Write | T=2.0N+414.4 |

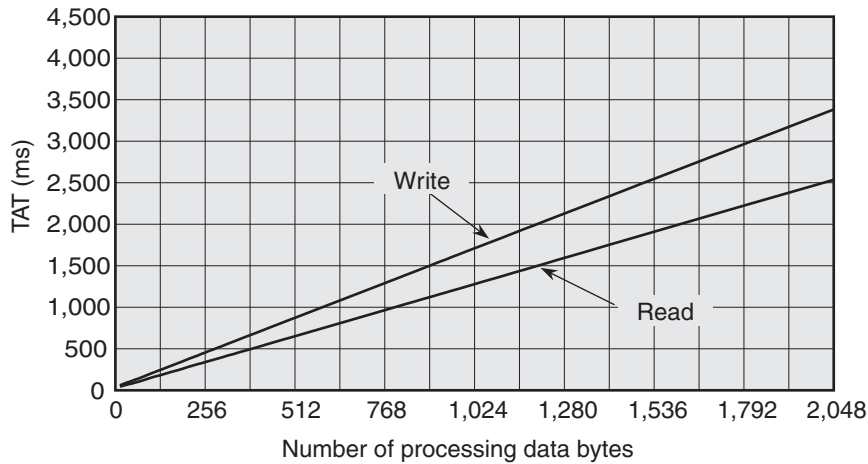N: Number of processing data bytes
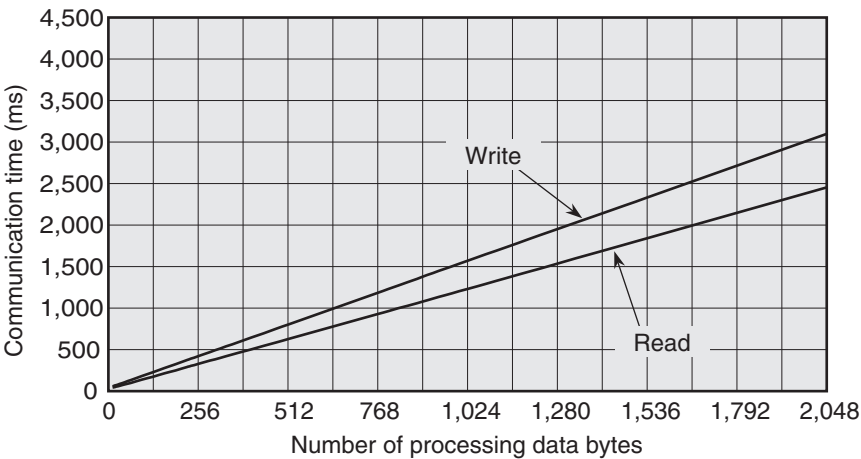
## ■ V680-D2KF52M/V680S-D2KF6□

### ▪ V680-CH1D TAT
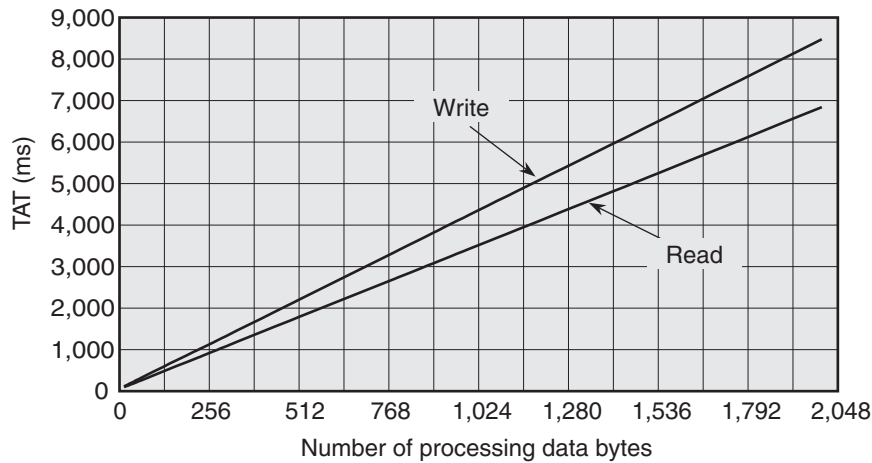


Note 1)  In V680 mode, communications specifications for TAT data with the host device represent values with a baud rate of 9,600 bps, a bit length of 8 bits, 1 stop bit, and even parity. In this example, characters are sent consecutively, with no spaces between them.

2)  The number of bytes in the TAT data is the number for hexadecimal encoding.

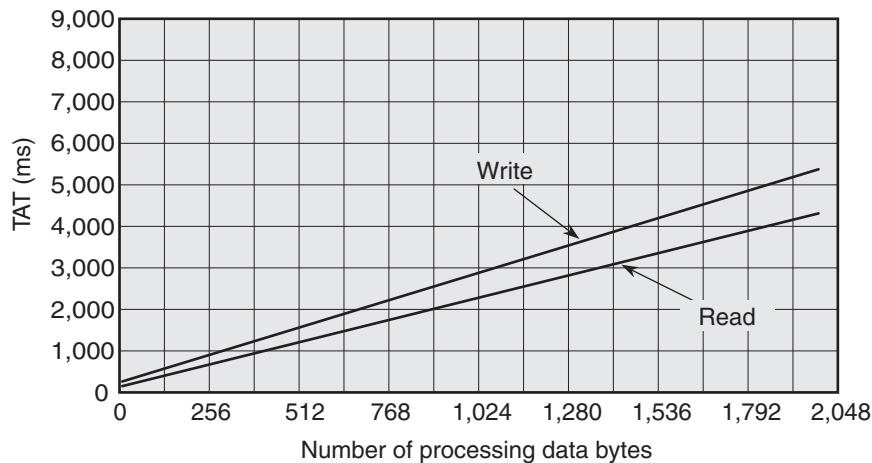### ▪ V680-CHUD TAT
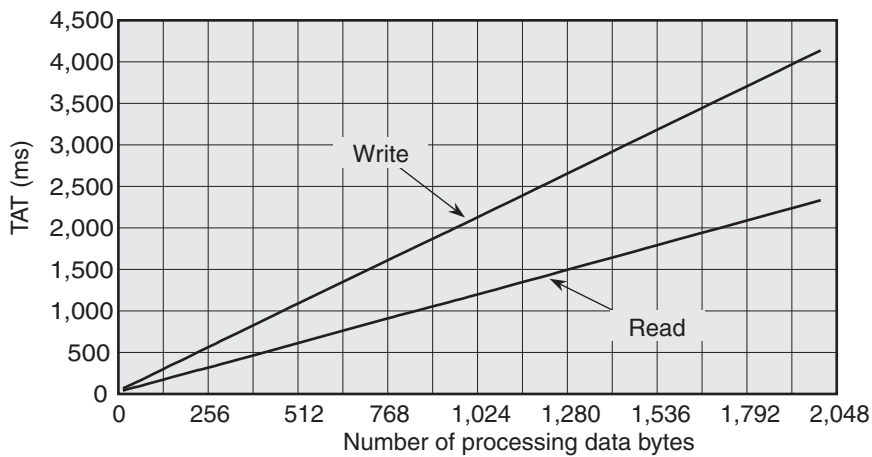
▪ Communication Time
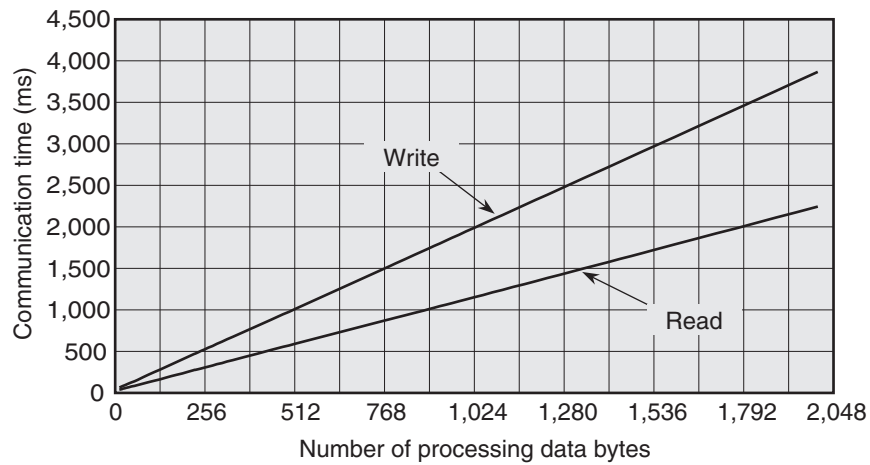


Calculation Method

| Operation | Communication time (ms) |
|-----------|------------------------|
| Read | T=1.1N+26.1 |
| Write | T=1.9N+40.3 |

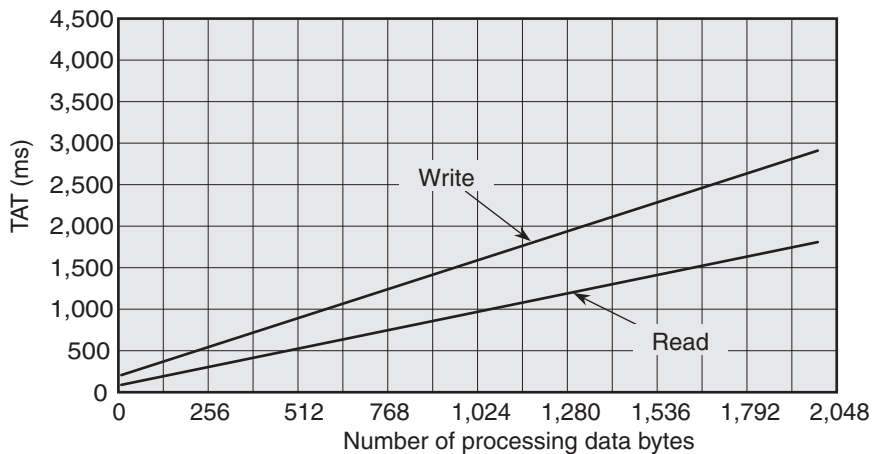N: Number of processing data bytes

## ■ V680-D8KF68/V680-D32KF68

### ▪ V680-CH1D TAT
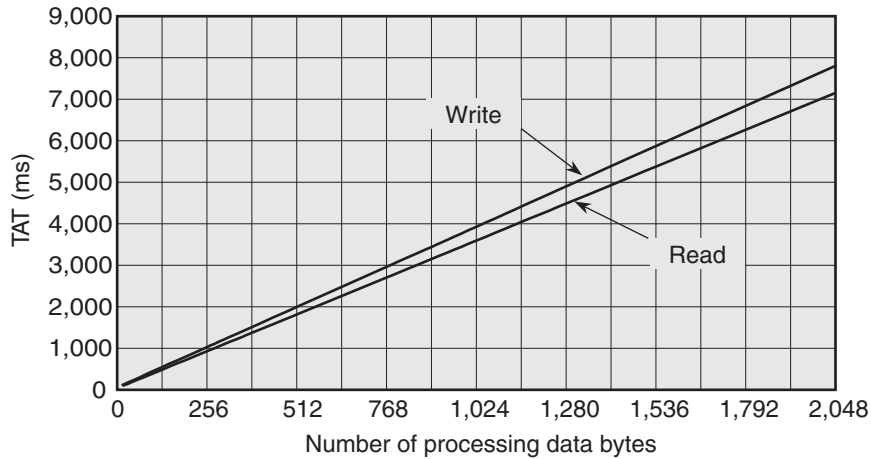


Note 1) In V680 mode, communications specifications for TAT data with the host device represent values with a baud rate of 9,600 bps, a bit length of 8 bits, 1 stop bit, and even parity. In this example, characters are sent consecutively, with no spaces between them.

2) The number of bytes in the TAT data is the number for hexadecimal encoding.

### ▪ V680-CHUD TAT

Section 6 **Specifications and Dimensions**

▪ Communication Time



Calculation Method

| Operation | Communication time (ms) |
|-----------|--------------------------|
| Read | T=1.2N+27.7 |
| Write | T=1.5N+41.4 |

N: Number of processing data bytes

## ■ V680S-D8KF6□

### ▪ V680-CH1D TAT



Note 1) In V680 mode, communications specifications for TAT data with the host device represent values with a baud rate of 9,600 bps, a bit length of 8 bits, 1 stop bit, and even parity. In this example, characters are sent consecutively, with no spaces between them.

2) The number of bytes in the TAT data is the number for hexadecimal encoding.

### ▪ V680-CHUD TAT

▪ Communication Time
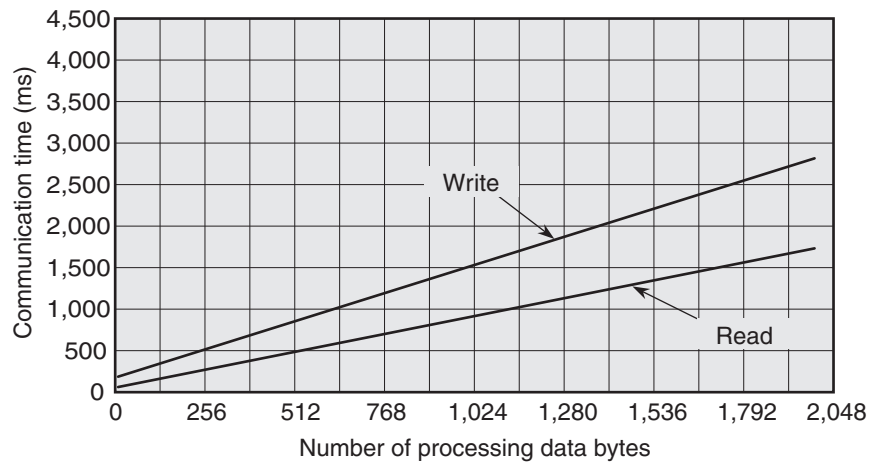


Calculation Method

| Operation | Communication time (ms) |
|-----------|-------------------------|
| Read      | T=0.8N+45               |
| Write     | T=1.3N+167              |

N: Number of processing data bytes

# RF Tag Memory Map

## ■ V680-D1KP□□

| Address (hex) | Data |
|---|---|
| 0000 | |
| 0001 | |
| 0002 | |
| 0003 | |
| : | User area |
| : | |
| 03E6 | |
| 03E7 | |

1 byte

## ■ V680-D2KF□□ and V680S-D2KF6□

| Address (hex) | Data |
|---|---|
| 0000 | |
| 0001 | |
| 0002 | |
| 0003 | |
| : | User area |
| : | |
| 07CE | |
| 07CF | |

1 byte

## ■ V680-D8KF68 and V680S-D8KF6□

| Address (hex) | Data |
|---|---|
| 0000 | |
| 0001 | |
| 0002 | |
| 0003 | |
| : | User area |
| : | |
| 1FFE | |
| 1FFE | |

1 byte

## ■ V680-D32KF68

| Address (hex) | Data |
|---|---|
| 0000 | |
| 0001 | |
| 0002 | |
| 0003 | |
| : | User area |
| : | |
| 7FE6 | |
| 7FE7 | |

1 byte

For more information on RF Tag memory capacity and memory type, refer to *RF Tag Memory Capacities and Memory Types (V680 Series)*.

# RF Tag Memory Capacities and Memory Types (V680 Series)

(As of October 2014)

| Model | Memory capacity (user memory) | Memory type | Life expectancy |
|---|---|---|---|
| V680-D1KP52MT<br>V680-D1KP66T<br>V680-D1KP66MT | 1,000 bytes | EEPROM | Write endurance: 100,000 times per block (25°C)<br><br>Data retention: 10 years after writing (85°C or less) |
| V680-D1KP58HT | | | Write endurance: 100,000 times per block (25°C)<br>Data retention: 10 years after writing (85°C or less)<br>Note: Data can be retained at temperatures exceeding 110°C for a cumulative total of 10 hours. |
| V680-D2KF52M | 2,000 bytes | FRAM | Access frequency: 10 billion times<br><br>Data retention: 10 years after writing (55°C or less) |
| V680-D8KF67<br>V680-D8KF67M<br>V680-D8KF68 | 8,192 bytes | | Access frequency: 10 billion times<br><br>Data retention: 10 years after writing (70°C or less) |
| V680-D32KF68 | 32,744 bytes | | |
| V680S-D2KF67<br>V680S-D2KF67M<br>V680S-D2KF68<br>V680S-D2KF68M | 2,000 bytes | FRAM | Access frequency: One trillion times<br><br>Data retention: 10 years after writing (85°C or less) |
| V680S-D8KF67<br>V680S-D8KF67M<br>V680S-D8KF68<br>V680S-D8KF68M | 8,192 bytes | | |

Note: For details, refer to the following manuals.

| Model | Manual name | Man. No. |
|---|---|---|
| V680-D1KP52MT<br>V680-D1KP53M<br>V680-D1KP66T<br>V680-D1KP66MT | V680-series RFID System User's Manual for Amplifiers, Antennas, and RF Tags (EEPROM model) | Z262 |
| V680-D1KP58HT | V680-series Heat-resistive RFID System User's Manual | Z221 |
| V680-D1KP58HTN | V680-series RFID System User's Manual for Amplifiers, Antennas, and RF Tags (EEPROM model) | Z262 |
| V680-D2KF52M<br>V680-D8KF67<br>V680-D8KF67M<br>V680-D8KF68<br>V680-D32KF68<br>V680S-D2KF67<br>V680S-D2KF67M<br>V680S-D2KF68<br>V680S-D2KF68M<br>V680S-D8KF67<br>V680S-D8KF67M<br>V680S-D8KF68<br>V680S-D8KF68M | V680-series RFID System User's Manual for Amplifiers, Antennas, and RF Tags (FRAM) | Z248 |

# List of ASCII Characters

| Left digit \ Right digit → b8 to b5 ↓ b4 to b1 | Column \ Row | 0000 / 0 | 1001 / 1 | 0010 / 2 | 0011 / 3 | 0100 / 4 | 0101 / 5 | 0110 / 6 | 0111 / 7 | 1000 / 8 | 1101 / 9 | 1010 / 10 | 1011 / 11 | 1100 / 12 | 1101 / 13 | 1110 / 14 | 1111 / 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0000 | 0 | NUL | $TC_7$(DLE) | (SP) | 0 | @ | P | ` | p | Undefined | Undefined | Undefined | Undefined | Undefined | Undefined | Undefined | Undefined |
| 0001 | 1 | $TC_1$(SOH) | $DC_1$ | ! | 1 | A | Q | a | q | | | | | | | | |
| 0010 | 2 | $TC_2$(STX) | $DC_2$ | " | 2 | B | R | b | r | | | | | | | | |
| 0011 | 3 | $TC_3$(ETX) | $DC_3$ | # | 3 | C | S | c | s | | | | | | | | |
| 0100 | 4 | $TC_4$(EOT) | $DC_4$ | $ | 4 | D | T | d | t | | | | | | | | |
| 0101 | 5 | $TC_5$(NEQ) | $TC_8$(NAK) | % | 5 | E | U | e | u | | | | | | | | |
| 0110 | 6 | $TC_6$(ACK) | $TC_9$(SYN) | & | 6 | F | V | f | v | | | | | | | | |
| 0111 | 7 | BEL | $TC_{10}$(ETB) | ' | 7 | G | W | g | w | | | | | | | | |
| 1000 | 5 | $FE_0$(BS) | CAN | ( | 8 | H | X | h | x | | | | | | | | |
| 1001 | 9 | $FE_1$(HT) | EM | ) | 9 | I | Y | i | y | | | | | | | | |
| 1010 | 10 | $FE_2$(LF) | SUB | * | : | J | Z | j | z | | | | | | | | |
| 1011 | 11 | $FE_3$(VT) | ESC | + | ; | K | [ | k | { | | | | | | | | |
| 1100 | 12 | $FE_4$(FF) | $IS_4$(FS) | , | < | L | \ | l | \| | | | | | | | | |
| 1101 | 13 | $FE_5$(CR) | $IS_3$(GS) | - | = | M | ] | m | } | | | | | | | | |
| 1110 | 14 | SO | $IS_2$(RS) | . | > | N | ^ | n | - | | | | | | | | |
| 1111 | 15 | SI | $IS_1$(US) | / | ? | O | - | o | DEL | | | | | | | | |

Note 1: The item in column 5, row 12 is a backlash (\) in ASCII.

2: Do not use the undefined areas.

# Degree of Protection

International protection degrees (IP-□□) are determined by the following tests. Be sure to check the sealing capability under the actual operating environment and conditions before actual use.

## ■ IEC (International Electrotechnical Commission) Standards (IEC60529 November 2001)
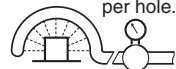
IP-□ □
└ (B)
└ (A)
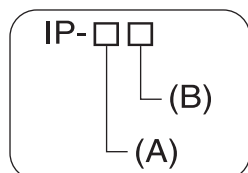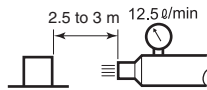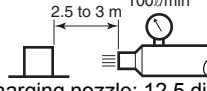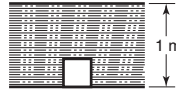
### Degree of Protection from Solid Materials

| Degree | | Protection |
|---|---|---|
| 0 | | No protection |
| 1 | 50 mm dia. | Protects against penetration of any solid object such as a hand that is 50 mm or more in diameter. |
| 2 | 12.5 mm dia. | Protects against penetration of any solid object, such as a finger, that is 12.5 mm or more in diameter. |
| 3 | 2.5 mm | Protects against penetration of any solid object, such as a wire, that is 2.5 mm or more in diameter. |
| 4 | 1 mm | Protects against penetration of any solid object, such as a wire, that is 1 mm or more in diameter. |
| 5 | | Protects against penetration of dust of a quantity that may cause malfunction or obstruct the safe operation of the product. |
| 6 | | Protects against penetration of all dust. |

### Degree of Protection Against Water

| Degree | Protection | | Test method (with fresh water) | |
|---|---|---|---|---|
| 0 | No protection | Not protected against water. | No test | |
| 1 | Protection against water drops | Protects against vertical drops of water towards the product. | Water is dropped vertically towards the product from the test machine for 10 min. | 200 mm |
| 2 | Protection against water drops | Protects against drops of water approaching at a maximum angle of 15° to the left, right, back, and front of vertical towards the product. | Water is dropped for 2.5 min each (i.e., 10 min in total) towards the product inclined 15° to the left, right, back, and front from the test machine. | 15° 200 mm |

Section 6 Degree of Protection

| Degree | Protection | | Test method (with fresh water) | |
|---|---|---|---|---|
| 3 | Protection against sprinkled water | Protects against sprinkled water approaching at a maximum angle of 60° from vertical towards the product. | Water is sprinkled at a maximum angle of 60° to the left and right from vertical for 10 min from the test machine. | Water rate is 0.07 liter/min per hole. |
| 4 | Protection against water spray | Protects against water spray approaching at any angle towards the product. | Water is sprayed at any angle towards the product for 10 min from the test machine. | Water rate is 0.07 liter/min per hole. |
| 5 | Protection against water jet spray | Protects against water jet spray approaching at any angle towards the product. | Water is jet sprayed at any angle towards the product for 1 min per square meter for at least 3 min in total from the test machine. | 2.5 to 3 m  12.5 ℓ/min  Discharging nozzle: 6.3 dia. |
| 6 | Protection against high pressure water jet spray | Protects against high-pressure water jet spray approaching at any angle towards the product. | Water is jet sprayed at any angle towards the product for 1 min per square meter for at least 3 min in total from the test machine. | 2.5 to 3 m  100 ℓ/min  Discharging nozzle: 12.5 dia. |
| 7 | Protection underwater | Resists the penetration of water when the product is placed underwater at specified pressure for a specified time. | The product is placed 1 m deep in water (if the product is 850 mm max. in height) for 30 min. | 1 m |
| 8 (See note.) | Protection underwater | Can be used continuously underwater. | The test method is determined by the manufacturer and user. | |

Note: OMRON Test Method

Usage condition: 10 m or less under water in natural conditions

1. No water ingress after 1 hour under water at 2 atmospheres of pressure.

2. Sensing distance and insulation resistance specifications must be met after 100 repetitions of half hour in 5°C water and half hour in 85°C water.

About IPX9K

IPX9K is a protection standard regarding high temperature and high-pressure water which is defined by the German standard (DIN 40050 PART9).

Water is sprayed on 80 °C hot water with the water pressure of 80 to 100BAR from a nozzle to the test piece.

Amount of water is 14 to 16 liters/minute.

The distance between the test piece and a nozzle is 10 to 15 cm, and the directions of water-drainage are 0 degrees, 30 degrees, 60 degrees, and 90 degrees horizontally.

They are evaluated with the test piece is rotating on a horizontal plane by 30 seconds in each direction.

90°  60°  30°  0°  10 to 15 cm
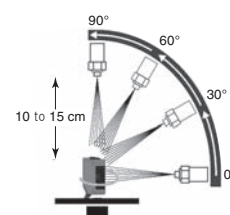
## ■ Oil resistance (OMRON in-house standard)

| Protection | |
|---|---|
| Oil-resistant | No adverse affect from oil drops or oil spray approaching from any direction. |
| Oil-proof | Protects against penetration of oil drops or oil spray approaching from any direction. |

**Note.** Oil resistance has been tested using a specific oil as defined in the OMRON test method. (JIS C 0920:2003, Appendix 1)

# Revision History

A manual revision code appears as a suffix to the catalog number at the bottom of the front and rear pages.

Man. No. Z272-E1-07

Revision code

| Revision code | Date | Revised contents |
|---|---|---|
| 01 | November 2007 | Original production |
| 02 | September 2008 | Added information on installing the USB driver for Vista. |
| 03 | August 2010 | Added information on the V680-D1KP53M/-D8KF67/-D8KF67M/-D1KP58HT.<br>Added information on international standards and certification.<br>Made other minor corrections. |
| 03A | January 2011 | Minor corrections (p.59) |
| 04 | February 2014 | Added items for V680S-D2KF67/-D2KF67M/-D2KF68/-D2KF68M RF Tags.<br>Deleted items for V680-D2KF67 RF Tags.<br>and made other minor corrections. |
| 04A | April 2014 | Changed the type of Hand-held Terminal manufactured by Motorola Solutions, Inc. |
| 05 | October 2014 | Added items for V680S-D8KF67/-D8KF67M/-D8KF68/-D8KF68M RF Tags.<br>and made other minor corrections. |
| 06 | March 2015 | Changed the type of Hand-held Terminal manufactured by Zebra Technologies, Inc. |
| 07 | January 2019 | Added installation method on Windows 10 to "Installing the USB Driver".<br>Deleted installation method on Windows Vista from "Installing the USB Driver". |