



## Product Overview

The WDG-6112 connects a computer via USB-C to an OSDP or Wiegand credential reader. Once the reader reads a credential, the credential data is sent to the WDG-6112. Then, data is output to the computer as keystrokes. This can be used to interact with computer applications such as spreadsheet or text programs.

## Applications

- Create credential databases during site takeovers
- Use with an RFID reader to create an enrollment reader solution
- Troubleshoot readers/credential output in the field



Firmware version 1.04  
WDG-6112\_Manual\_230615

## WDG-6112 Manual - Features and Specification

- USB-C connection to computer
- Includes 1 meter (~39 in.) USB-C extension cable (female to male)
- Supports OSDP and Wiegand credential readers
- +5 VDC output for powering credential readers
- Default configuration processes any credential format, outputs number of bits and raw credential data in hexadecimal
- Custom configuration allows processing of up to 10 credential formats simultaneously

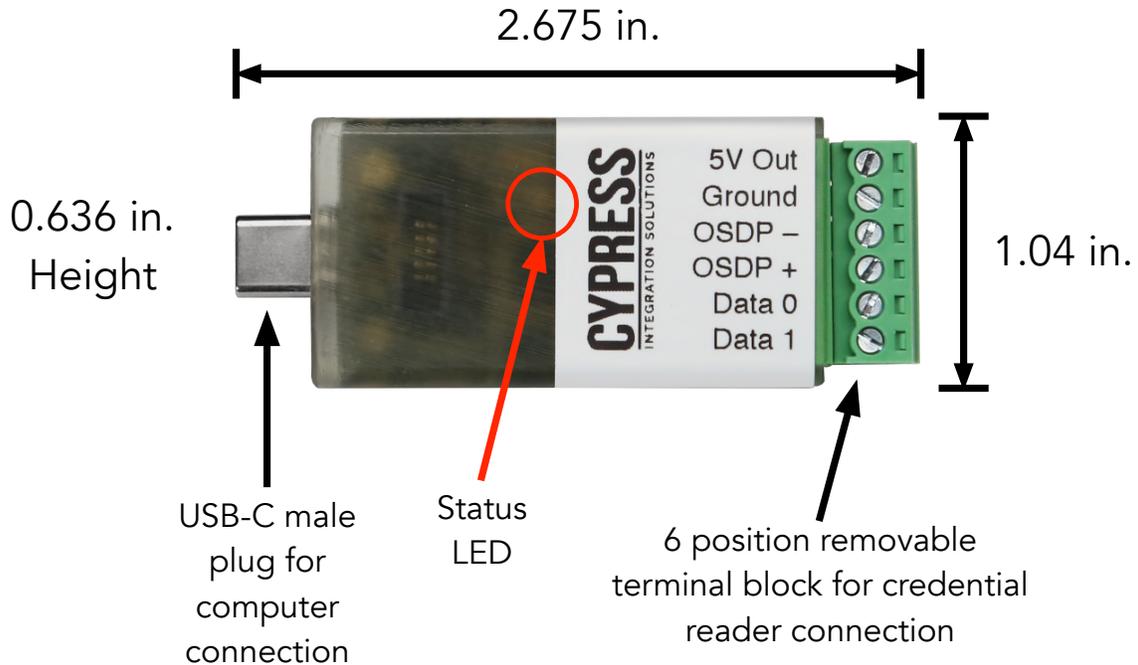
### Specifications

Part Number	Part Number		WDG-6112
Part Number	UPC		816684006135
Physical	Physical Dimensions (L x W x H)		2.675 x 1.04 x 0.636 inches   6.80 x 2.64 x 1.62 cm
	Weight	WDG-6112	1 oz.   28.35 grams
		USB-C Cable	1.2 oz.   34.02 grams
Environmental	Operating Temperature Range		32°F to 185°F   0°C to 85°C
	Enclosure Rating		Not rated for water or dust intrusion. Circuit board is set in epoxy resin.
USB	Features male USB-C port and can connect directly to computer		
	Supports USB 2.0		
	Appears as a USB keyboard during normal operation		
	Appears as USB Mass Storage Device when in configuration mode		
Electrical	Powered by USB-C connection		
	Power draw from USB-C Port		5 VDC @ 50 mA max
	Power output (for credential readers)		5 VDC @ 450 mA max
	Wiegand Input Signal Voltage Rating		0-24 VDC
Additional Features	Includes 1 meter (~39 in.) USB-C extension cable (female to male)		
	Supports OSDP and Wiegand credential readers		
	Automatically discovers connected OSDP reader's device address and baud rate for simple setup		
	Removable 6-position screw terminal block for credential reader connection		
	Simple custom configuration method (see <a href="http://CypressIntegration.com">CypressIntegration.com</a> )		
	Configuration allows processing of up to 10 different credential formats simultaneously		
	Configuration allows specifying multiple fields for credential data (typically facility code and card number values). Additionally, keypresses of any key before, between, and after the multiple data fields can be added.		

## WDG-6112 Manual - Table of Contents

<b>Table of Contents</b>	
<b>Topic</b>	<b>Page</b>
Overview and Specifications	1-2
Approximate Dimensions & Status LED	4
Reader Connection Diagrams	5
Connecting RFID Readers	6
General OSDP Information / Capabilities	7
OSDP Initialization Sequence	8
Test Mode	9
Troubleshooting	10
Checking Computer Connection	11-12
Known Issues	13
Default Configuration / Badge Peeler Mode	14
Configuration Mode	15
Configuration Tool Overview	16
Configuration Tool: Output Configuration	17-22
Configuration Tool: OSDP Options	23-24
Badge Peeler Mode Configuration	25-26
Creating a Configuration	27-33
Calculate Number of Fixed Characters	34-35
OSDP Terminology	36-37

## WDG-6112 Manual - Approximate Dimensions & Status LED



The WDG-6112 has a bi-color red and green Status LED. The LED states and descriptions are listed in Table 1 below.

Normal & Test Mode	
LED State	Description
<b>Solid Red</b>	WDG-6112 is powered on via the USB-C interface
<b>Flashing Red</b>	WDG-6112 is communicating with an OSDP reader
<b>Solid Green</b>	WDG-6112 has received credential data & is sending the data to the connected computer

**Table 1:** WDG-6112 LED States

# WDG-6112 Manual - Reader Connection Diagrams

**WDG-6112 and Wiegand Reader Diagram**



**WDG-6112 and OSDP Reader Diagram**



## WDG-6112 Manual - Connecting RFID Readers

The WDG-6112 supports both Wiegand and OSDP RFID readers. In general, the RFID reader data interface, power input, and ground are connected to the 6-pin header on the WDG-6112. The WDG-6112 supplies 5 VDC and a maximum of 450 mA\* to power the reader. The power supplied to the reader is via the USB port.

\***Note:** Some USB ports may be incapable of outputting the full 450 mA.

### Connecting a Wiegand Reader

Connect the reader's Data 0, Data 1, Ground, and Power Input lines to appropriate pins on the 6-pin header. The WDG-6112 status LED will be solid red whether or not a Wiegand reader is connected. When credential data from the Wiegand reader is received and processed by the WDG-6112, the status LED will flash green once.

### Connecting an OSDP Reader

Connect both the reader's data lines (OSDP+ and OSDP—) , Power Input, and Ground to the appropriate pins on the 6-pin header. The WDG-6112 acts as an OSDP ACU (Access Control Unit), polling the OSDP reader (PD - Peripheral Device). The WDG-6112 automatically finds the OSDP reader by cycling through baud rates, attempting to establish an unencrypted communication session using the broadcast address. When the WDG-6112 is communicating with the OSDP reader, the status LED will flash red. When the OSDP reader sends credential data to the WDG-6112, the status LED will flash green once.

### Connecting Two Readers

Both a Wiegand and OSDP reader can be connected to the WDG-6112 at the same time. In the event that both readers send credential data to the WDG-6112 simultaneously, the OSDP reader is prioritized. The credential data from the OSDP reader is output to the computer, and the credential data from the Wiegand reader is discarded. Only one OSDP reader can be connected to the WDG-6112 at a time.

## WDG-6112 Manual - General OSDP Information / Capabilities

The WDG-6112 is an OSDP ACU (Access Control Unit) that will control the OSDP reader/PD (Peripheral Device). The capabilities of the WDG-6112 as an ACU are detailed below.

### Supported Communication Baud Rates

9600  
19200  
38400  
57600  
115200  
230400

### Supported Device Addresses

Device address 0-126 (0x00 - 0x7E) are supported. The Broadcast Address 127 (0x7F) is supported and used to discover the OSDP reader's devices address.

### Supported OSDP Commands and Replies

As an ACU, the WDG-6112 will send commands to and receive replies from the OSDP reader (PD). Because the functionality of the WDG-6112 is limited in scope compared to a full OSDP access controller, it only sends the commands and processes replies shown in Table 2 below.

Commands	Replies
osdp_POLL	osdp_RAW
osdp_ID	osdp_KEYPAD
osdp_COMSET	osdp_NAK
osdp_CHLNG	osdp_CCRYPT
osdp_SCRYPT	osdp_RMAC_I
osdp_KEYSET	
osdp_BUZZ	
osdp_LED	

**Table 2:** WDG-6112 OSDP commands & replies

Other replies that are not listed above will not be processed, meaning that the WDG-6112 will not take any action based on those replies. The OSDP communication will not be interrupted. Examples of common replies that are not processed are `osdp_ISTATR`, `osdp_OSTATR`, and `osdp_LSTATR`. These replies report the status of the OSDP reader's inputs, outputs, and tamper status.

## WDG-6112 Manual - OSDP Initialization Sequence

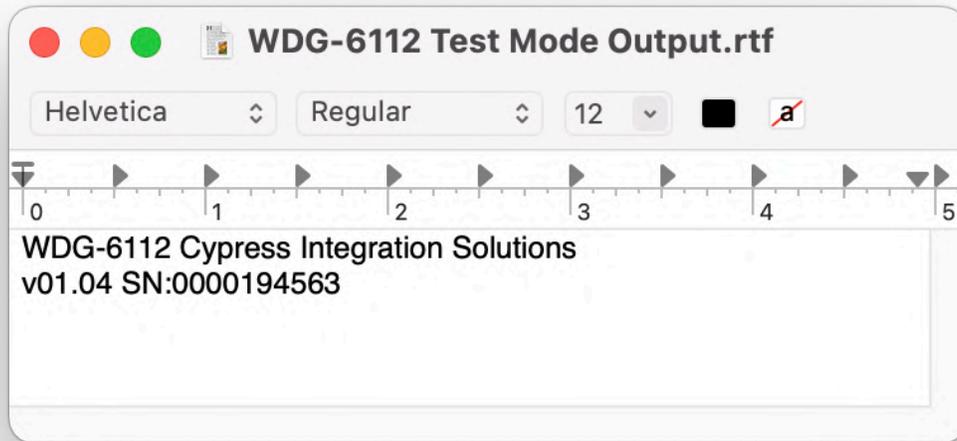
When establishing communication with an OSDP reader, the WDG-6112 performs the sequence outlined in the steps below.

1. The WDG-6112 sends the `osdp_POLL` command on device address 0 at 9600 baud.
2. Step 1 will be attempted 8 times. If a device is found, proceed to step 7.
3. If no device is found, the WDG-6112 will send the `osdp_ID` command on device address 127 (0x7F, broadcast) at 9600 baud.
4. If no device is found, the WDG-6112 will send the `osdp_ID` command on on device address 127 (0x7F, broadcast), cycling through all supported baud rates (9600, 19200, 57600, 115200, and 230400).
5. Step 4 is repeated until a device is found.
6. When a device is found, the `osdp_COMSET` command is set to the device to set its device address to 0 and the baud rate to 9600.
7. If Secure Channel communication is not enabled, skip to step 10.
8. If Secure Channel communication is enabled, the WDG-6112 will attempt to establish a SCS. The `osdp_CHLNG` and `osdp_SCRYPT` commands are sent to the device, using the `SCBK_D` value specified in the OSDP Configuration file.
9. If a new key (SCBK) is required, the WDG-6112 sends the `osdp_KEYSET` command to the device. This sets the device's SCBK to the value specified in the OSDP Configuration file.
10. An unencrypted or SCS has been established between the WDG-6112 and the OSDP reader. The WDG-6112 sends the `osdp_POLL` command to the reader until credential data is received in the form of the `osdp_RAW` or `osdp_KEYPAD` replies.

**Note:** The WDG-6112 uses the OSDP device address and baud rate set in the OSDP config file. By default, it uses device address 0 and 9600 baud.

## WDG-6112 Manual - Test Mode

Test Mode is used to verify the WDG-6112 is communicating with the computer. While in Test Mode, the WDG-6112 outputs a test string (see Figure 1). Afterwards, the WDG-6112 enters normal operation.

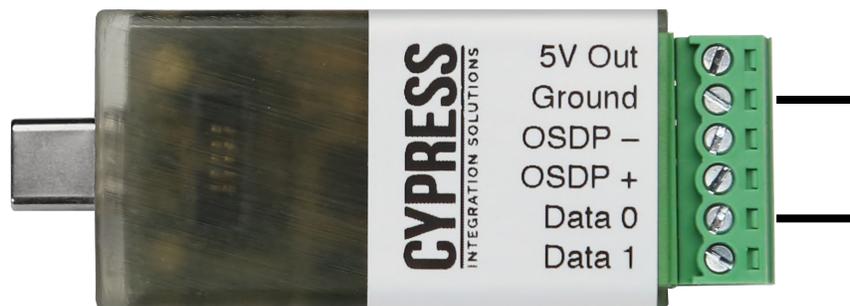


**Figure 1:** WDG-6112 Test Mode output

### Using Test Mode

1. Before powering on the WDG-6112, connect the Data 0 line to Ground.
2. On the computer, open a text editor, such as Notepad (Windows) or TextEdit (Mac).
3. Plug in the WDG-6112 to the computer. It will appear on the computer as a USB keyboard.
4. The test string will appear if the WDG-6112 is communicating with the computer.
5. Disconnect the WDG-6112 from the computer (powering the device down).
6. Remove the jumper wire connecting Data 0 to Ground.
7. Reconnect the WDG-6112 to the computer. The WDG-6112 will perform its normal operations.

Figure 2 below shows the WDG-6112 with a jumper between Data 0 and Ground; this wiring scheme puts the WDG-6112 into Test Mode.



**Figure 2:** WDG-6112 Test Mode wiring

## WDG-6112 Manual - Troubleshooting

If the WDG-6112 is not outputting data as anticipated, please follow the steps below:

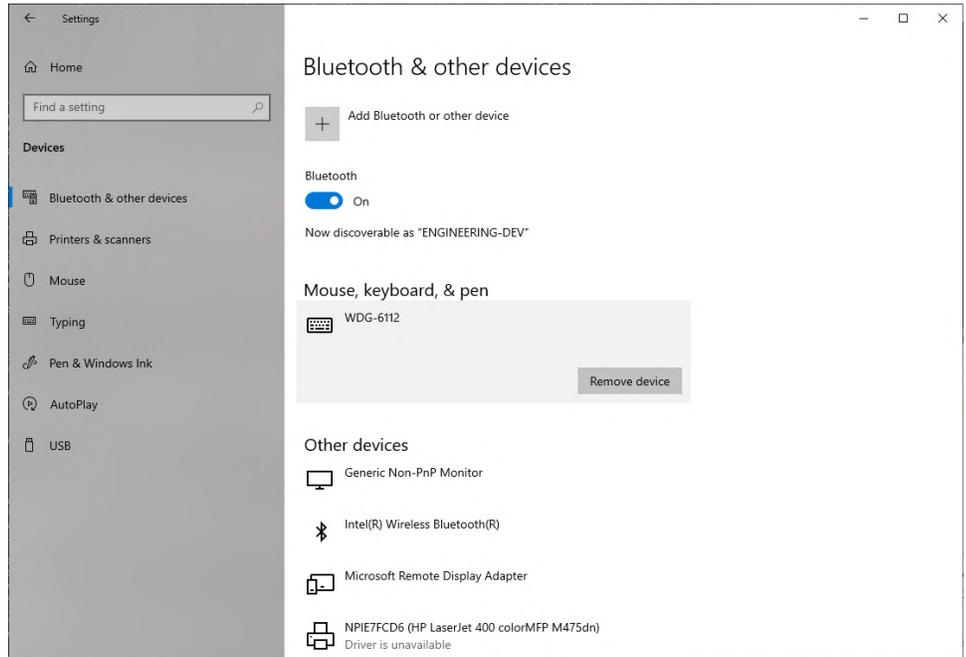
1. **Communication:** Verify the WDG-6112 is communicating with the computer using Test Mode (see pg. 9).
2. **Power:** If powering a Wiegand reader separately from the WDG-6112, ensure there is a common ground between the reader and the WDG-6112. A common ground is not required for an OSDP reader.
3. **Inverted Data Lines:** Flip/reverse the reader data lines.
  - A. **Wiegand reader:** Look for garbage data.
  - B. **OSDP reader:** Will not communicate with the WDG-6112.
4. **Voltage (Wiegand Reader):** Use a multi-meter to check that the Data 0 and Data 1 lines are at 5 VDC (or the typical idle voltage if using a Wiegand reader that operates at a higher voltage).
  - A. Measure the DC voltage between Data 0 and Ground. Then, measure the DC voltage between Data 1 and Ground.
  - B. If the voltage levels of one or both data lines are at or below 4.5 VDC, then disconnect the Wiegand reader from the WDG-6112. The Data 0 and Data 1 lines on the WDG-6112 should read 0 VDC while no Wiegand reader is connected.
  - C. If the voltage levels of one or both of the data lines are at or below 4.5 VDC (while not connected to the WDG-6112), then the Wiegand reader likely needs external pull-up resistors. Connect a 1K to 2K through-hole resistor to the data line(s) and the +5V line. The data line(s) should now be pulled up to 5 VDC.
  - D. If the voltage level for a Wiegand data line is below 1 VDC, then the line is clamped to ground and cannot be recovered.
5. **Configuration:** Verify the configuration is correct.
  - A. Apply the Output Configuration file to the WDG-6112 again (see pg. 15).
  - B. Apply the OSDP Configuration file again (see pg. 15).
  - C. Re-create the configuration file to ensure the parameters are correct.
6. **OSDP:** Verify the OSDP reader connection.
  - A. Check the OSDP reader's device address and baud rate. The WDG-6112 should set these parameters; however, some readers may not apply the `osdp_COMSET` parameters because the readers may not support specific values. Verify the reader supports `osdp_COMSET`, and select values within the supported range.
  - B. If using Secure Channel, check that the WDG-6112's `SCBK_D` matches the reader's `SCBK_D`.

# WDG-6112 Manual - Checking Computer Connection

This section shows how the WDG-6112 appears on Windows 10, Windows 11, and macOS Ventura.

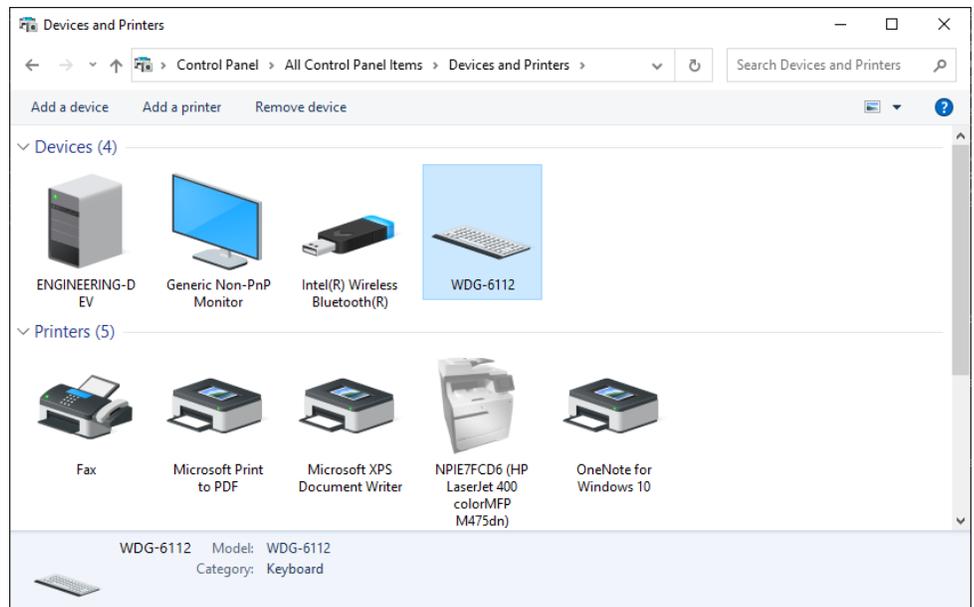
**Windows 10** - The WDG-6112 can be found in the Settings menu and the Control Panel.

In the Settings menu, click on “Devices” and then “Bluetooth & other devices”. The WDG-6112 will be listed in the “Mouse, keyboard, & pen” section as shown in Figure 3.



**Figure 3:** WDG-6112 appears as USB keyboard

Alternatively, the WDG-6112 can be found in the Control Panel. From the Control Panel menu, click on “Devices and Printers”. The WDG-6112 will be listed in the “Devices” section as shown in Figure 4.

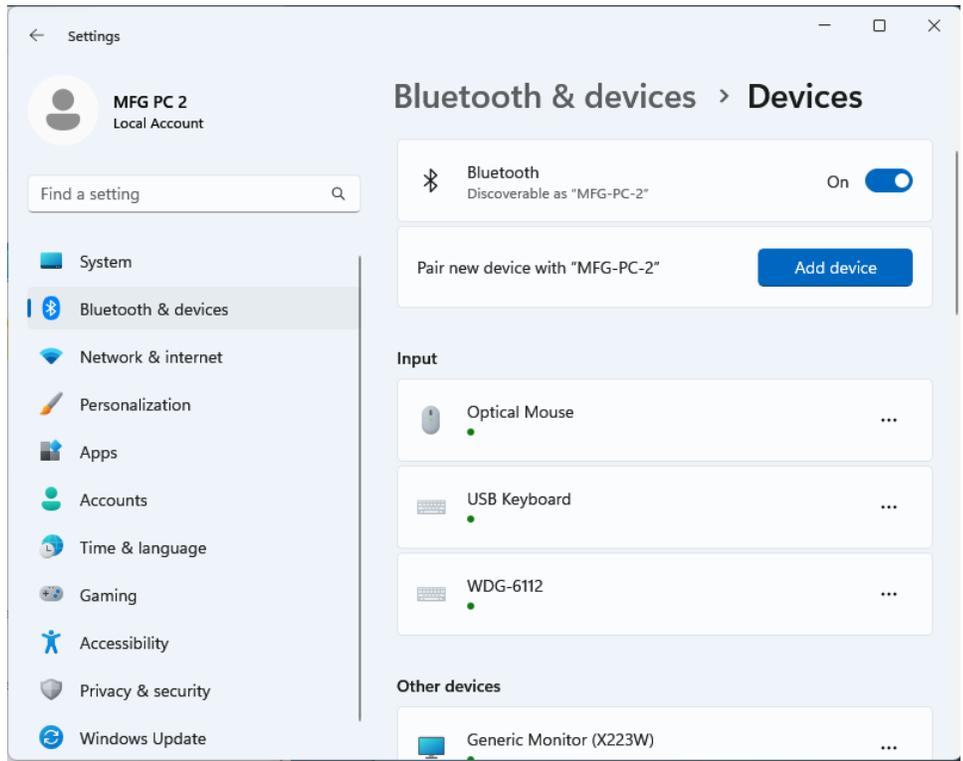


**Figure 4:** WDG-6112 appears as USB keyboard

# WDG-6112 Manual - Checking Computer Connection (Cont.)

**Windows 11** - The WDG-6112 can be found in the Settings menu.

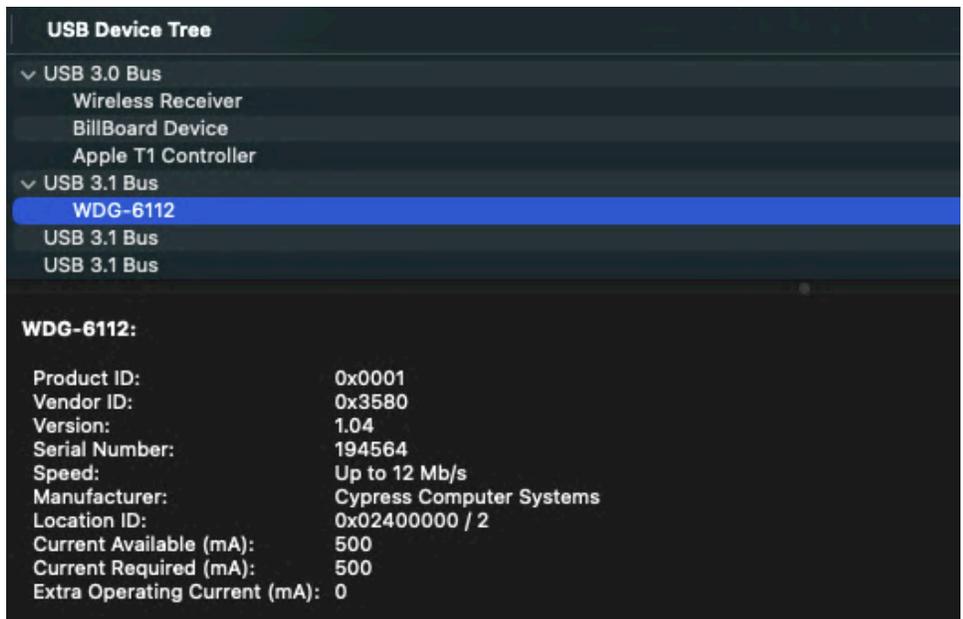
In the Settings menu, click on “View more devices”. The WDG-6112 will be in the Input section as a keyboard, as shown in Figure 5.



**Figure 5:** WDG-6112 appears as USB keyboard

**macOS Ventura 13.4** - The WDG-6112 can be found in the System Report.

Open the Apple menu, click on “About this Mac”. In the new window, click on “System Report”. In the Hardware sidebar menu, click on “USB”. The WDG-6112 will be found on one of the USB busses, as shown in Figure 6. The System Report gives specific information about the WDG-6112. This includes the serial number, firmware version, and manufacturer. Cypress Computer Systems is Cypress Integration Solutions.



**Figure 6:** WDG-6112 appears as USB keyboard

## **WDG-6112 Manual - Known Issues**

This section notes minor known issues with the WDG-6112 firmware version 1.04.

### **Windows**

It may take 30 or more seconds for a Windows computer to recognize the WDG-6112 when it is in Configuration Mode.

### **Mac**

When using a USB extension cable, the WDG-6112 can only be plugged into the cable in one orientation. If the WDG-6112 is not recognized by the Mac, try plugging the WDG-6112 into the extension cable in the opposite orientation.

## WDG-6112 Manual - Default Configuration / Badge Peeler Mode

From the factory, the WDG-6112 units use the Badge Peeler Mode configuration. Badge Peeler Mode outputs the bit length and raw data of any credential; this makes it useful for troubleshooting readers or verifying unknown credential data. When credential data is received, the WDG-6112 will output two fields. The first field is the number of bits in decimal. An "=" is used as a field separator between the first and second fields. The second field is the credential data in hexadecimal. The second field's number of characters is variable based on the number of bits received from the reader. After the second field, the Enter key is pressed.

```
<credential length>=<credential data><enter key>
```

```
Field 1           - <credential length> (variable length in decimal)
Field Separator   - "="
Field 2           - <credential data> (variable length in hexadecimal)
Suffix Character  - <enter key>
```

### 26-Bit Credential Example

```
Facility Code = 1 (dec) = 01 (hex) = 00000001 (binary)
Card Number   = 84 (dec) = 0054 (hex) = 0000000001010100 (binary)
```

```
Bit Number      - 01234567890123456789012345
Raw Bit Stream  - 10000000100000000010101000
Bit Designation - PFFFFFFFFCCCCCCCCCCCCCCCCCCP
```

```
10 0000 0010 0000 0000 1010 1000 = 20200A8 (hex)
```

```
1 00000001 0000000001010100 0
P FFFFFFFFF CCCCCCCCCCCCCCCC P
```

```
P = Parity Bit
F = Facility Code
C = Card Number
```

```
WDG-6112 Output: 26=20200A8
```

For information on configuring the WDG-6112 into Badge Peeler Mode, creating custom Badge Peeler configurations, and using Badge Peeler Mode with user configurations see the Badge Peeler Configuration section (see pg. 25).

## WDG-6112 Manual - Configuration Mode

Configuration Mode is used to upload configuration files created with the Configuration Tool to the WDG-6112. While in Configuration Mode, the WDG-6112 will not accept or output credential data from a Wiegand reader, or communicate with an OSDP reader.

Configuration Mode is used to upload both Output Configuration and OSDP Configuration files. Both types of configuration files can be loaded onto the WDG-6112 at the same time.

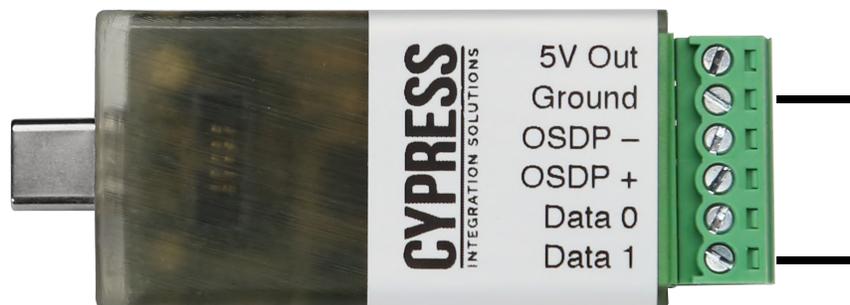
### Uploading a Configuration File

1. Before powering on the WDG-6112, connect the Data 1 line to Ground.
2. Plug in the WDG-6112 to the computer. It will appear on the computer as a USB mass storage device\*.
3. Drag and drop the WDG-6112 configuration file onto the WDG-6112 drive. Do NOT load other files onto the WDG-6112 while in Configuration Mode.
4. Once the configuration file is loaded onto the WDG-6112, unmount the WDG-6112.
5. Disconnect the WDG-6112 from the computer (powering the device down).
6. Remove the jumper wire connecting Data 1 to Ground.
7. Reconnect the WDG-6112 to the computer. The new configuration is now applied.

**\*Note:** On Windows computers, the WDG-6112 will appear in File Explorer as “USB Drive (D:)”. The drive letter may change based on other drives connected to the Windows computer. On Mac computers, the WDG-6112 appears as “WDG-6112” in Finder.

The configuration file is deleted from the WDG-6112 after it is applied. It is recommended to always keep a copy of the configuration file for future use.

Figure 7 below shows the WDG-6112 with a jumper between Data 1 and Ground; this wiring scheme puts the WDG-6112 into Configuration Mode.



**Figure 7:** WDG-6112 Configuration Mode wiring

## WDG-6112 Manual - Configuration Tool Overview

The Configuration Tool allows users to create configuration files for the WDG-6112, and upload them to it. This tool is an HTML file and is accessible in a web browser (e.g., Chrome, Firefox, or Safari) on the [WDG-6112 product page](#). The Configuration Tool can also be downloaded through a web browser as an HTML file for use offline.

The Configuration Tool is divided into two sections: Output Configuration and OSDP options.

### Output Configuration Features

- Specify multiple credential formats for processing.
- Specify any credential format, and define multiple data fields (typically facility code and card number).
- Specify credential data output as decimal or hexadecimal.
- Specify a fixed number of characters/digits output for each field, or make the number of characters/digits for a field dynamic based on the size of the data.
- Specify keypresses sent before, between, and after the two data fields.
- Create, name, and download configuration files.

### OSDP Configuration Features

- Specify the OSDP reader's device address. This is the device address the WDG-6112 will poll when connected to an OSDP reader.
- Specify the OSDP reader's baud rate. This is the baud rate the WDG-6112 will use to communicate with the OSDP reader.
- Enable automatic I/O behavior on the OSDP Reader when a credential is received: beep-on-read and blink-on-read (LED).
- Enable Secure Channel communication with the OSDP reader.
- Specify the Default Secure Channel Base Key (SCBK\_D) and Secure Channel Base Key (SCBK).
- Create, name, and download OSDP configuration files.

# WDG-6112 Manual - Configuration Tool: Output Configuration

The Output Configuration section creates badge format templates. Expected badges are then parsed and output into the given human-readable format. Figure 8 below illustrates this section.

In this section, there are six sub-sections: Badge Fields, New Badge Field, Badge Representation, Output List, Output Formats, and Create Configuration.

The Configuration Tool version number is displayed in the top right corner of the window.

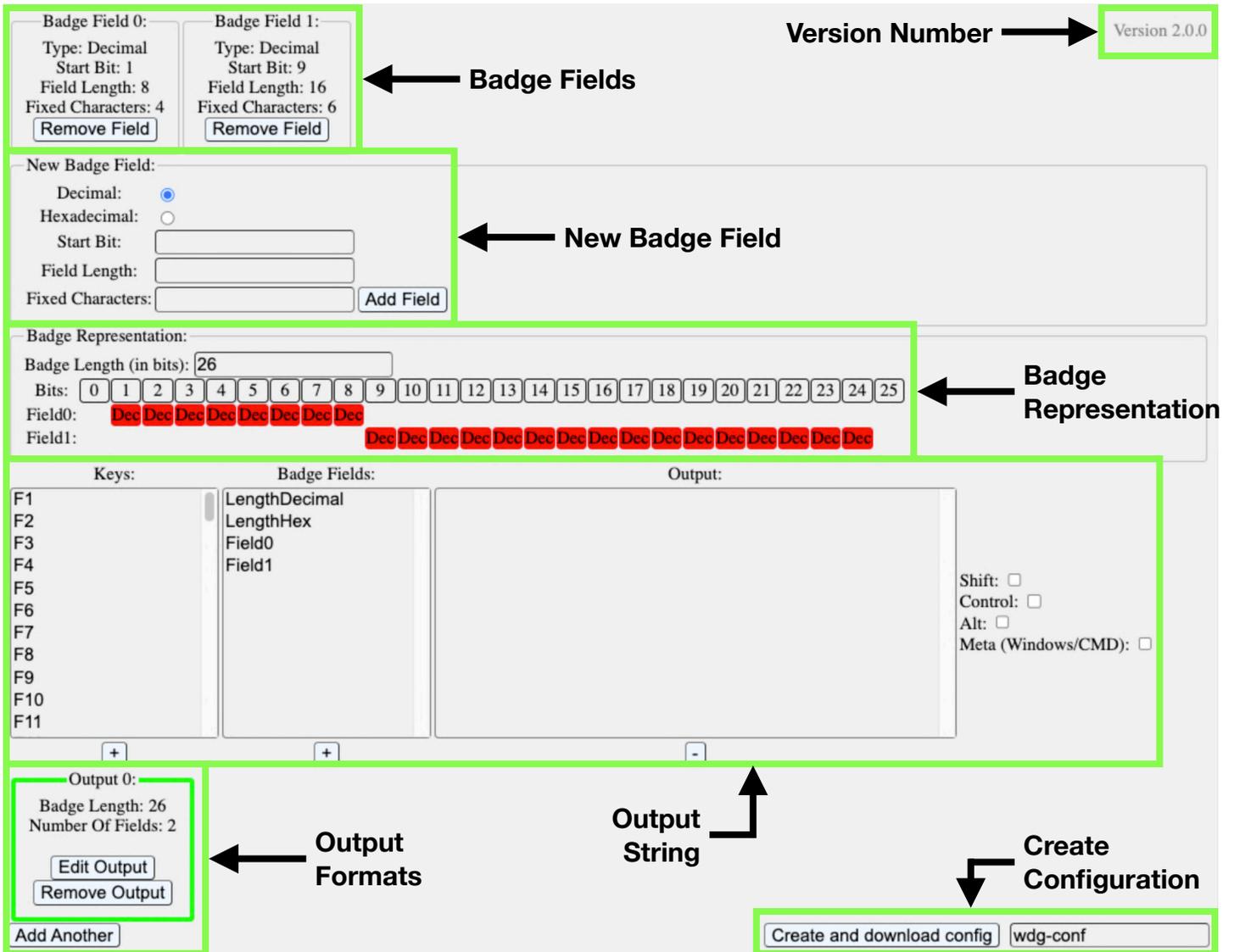
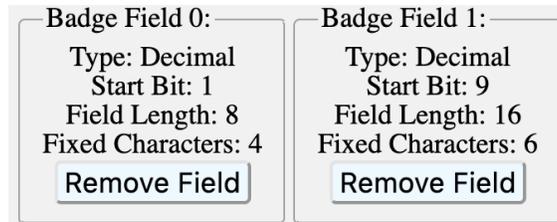


Figure 8: Configuration Tool overview

## WDG-6112 Manual - Configuration Tool: Output Configuration (Cont.)

### Badge Fields

The Badge Field section shows a breakdown of each badge format. Badge fields allow the WDG-6112 to pick out specific pieces or data fields of a badge. For example, a standard 26-bit badge has two parity bits, one facility code field, and one card number field. As seen in Figure 9 below, standard 26-bit badges have two data fields. Up to five badge fields can be specified, and their bits can overlap. Badge fields can be removed from the configuration via the “Remove Field” button.



Badge Field 0:	Badge Field 1:
Type: Decimal	Type: Decimal
Start Bit: 1	Start Bit: 9
Field Length: 8	Field Length: 16
Fixed Characters: 4	Fixed Characters: 6
<input type="button" value="Remove Field"/>	<input type="button" value="Remove Field"/>

**Figure 9:** Default 26-bit Badge Fields

### New Badge Fields

Badge fields can be added to the configuration via the “New Badge Field” input form. Below, Figure 10 shows this input form.



New Badge Field:

Decimal:  Hexadecimal:

Start Bit:

Field Length:

Fixed Characters:

**Figure 10:** New Badge Field section

**Type** - Designates how the badge field’s data is encoded when output to the computer. The data can be encoded as either decimal or hexadecimal by selecting the desired encoding.

**Start Bit** - Designates which bit this badge field begins.\* The start bit begins counting at bit 0.

**Field Length** - Designates how many bits are in this badge field.\*

\***Note:** Any unassigned bits are not included in the output.

## WDG-6112 Manual - Configuration Tool: Output Configuration (Cont.)

**Fixed Characters** - Forces a Badge Field to be output as the specified number of characters in the “Fixed Characters” field; the Badge Field is zero-padded to match the required number of characters. Specifying a value of zero will result in a dynamic output; the number of output characters vary based upon the credential data received. Below is an example:

### 26-Bit Credential with Fixed Characters

Field 0 (Facility Code): 4 fixed characters  
Field 1 (Card Number): 6 fixed characters  
WDG-6112 Output: 26=0001-000084

### 26-Bit Credential with Dynamic Characters

Field 0 (Facility Code): 0 fixed characters  
Field 1 (Card Number): 0 fixed characters  
WDG-6112 Output: 26=1-84

## Badge Representation

The Badge Representation section shows a breakdown of each selected Badge Field. Badge lengths determine which output format the WDG-6112 applies when it receives a card read. For example, when 26-bit credential data is received from the reader, if a 26-bit output format is specified by the current configuration, the data will be output according to the configuration. If a 26-bit output format is not specified, the credential data is ignored. Below, Figure 11 shows the default 26-bit badge representation.

The number of bits are specified in the Badge Length field, matching the length of the credential format. The Bits diagram shows the full number of bits, each bit is numbered. Each Badge Field is shown in red below the Bits diagram, aligned based on the starting bit value. Each bit in the Badge Field diagrams contain the text “Dec” or “Hex” to indicate how the field is encoded.

The WDG-6112 supports credential lengths of up to 256 bits.



**Figure 11:** Badge Representation section

# WDG-6112 Manual - Configuration Tool: Output Configuration (Cont.)

## Output String

The Output String section allows users to specify the order of keypresses and Badge Fields output in sequence when the WDG-6112 receives credential data matching the bit length of one of the Output Formats. Figure 12 below shows this section.

**Keys** - A list of all keys on a US keyboard. Selecting a key and clicking the “+” button below the list will add the key to the Output List. Multiple keys can be added to the list. Capital letters, symbols, and other special keys are a combination of standard and function keys. To add a special key, check the appropriate function key. Then, select the standard key under the Keys list. Finally, click the “+” button below the Keys list. The checked function key will stay checked after adding the standard key to the list, if it is no longer required it needs to be unchecked. The supported function keys are “Shift”, “Control”, “Alt”, and the Windows or CMD (depending on the operating system being used).

For example, an “!” can be added by following these steps. Click the “Shift” function key checkbox. Then, select the “1” key from the Keys list. Next, click the “+” button under the keys list. Now, “Shift+1” will appear in the Output List, and the WDG-6112 will output the “!” character.

**Badge Fields** - A list of all created Badge Fields will appear here, along with the “LengthDecimal” and “LengthHex” options. Selecting any of these options and clicking the “+” button below the Badge Fields list will add the field to the Output List. The selected Badge Field data will be output by the WDG-6112. The length options will output the number of bits received by the WDG-6112, either in decimal or hexadecimal depending on the option selected. This feature can be used to identify the credential format or length in the WDG-6112 output.

**Output List** - A list of all selected keys and Badge Fields listed in output order. The items in this list are output from top to bottom. Selecting an item in the list and clicking the “-” button will remove it from the list.

Click on the Output List to select it. While selected, pressing any key on the keyboard will add it to the Output List. Pressing a function key will automatically check or uncheck that function key’s checkbox.

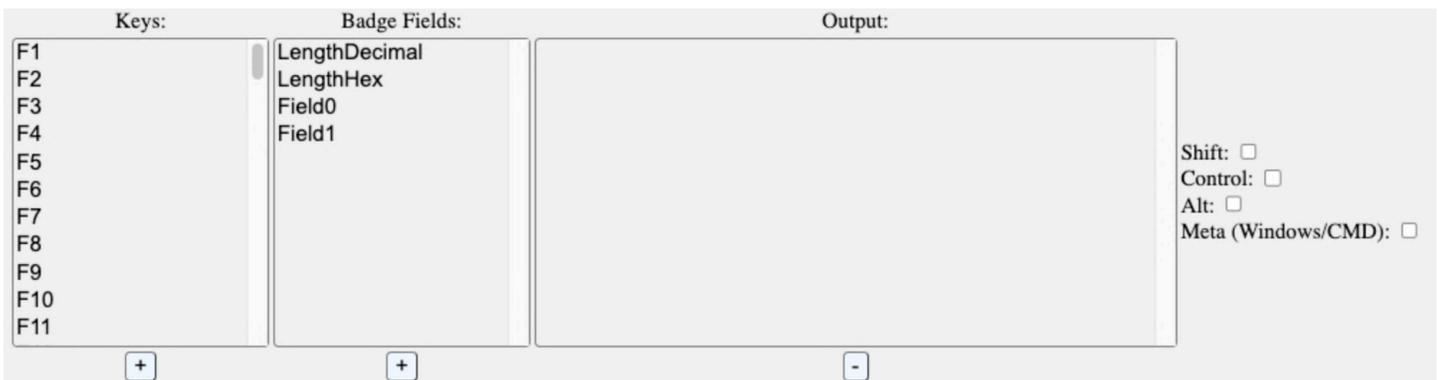


Figure 12: Output String section

## WDG-6112 Manual - Configuration Tool: Output Configuration (Cont.)

Below is an example of a populated Output List.

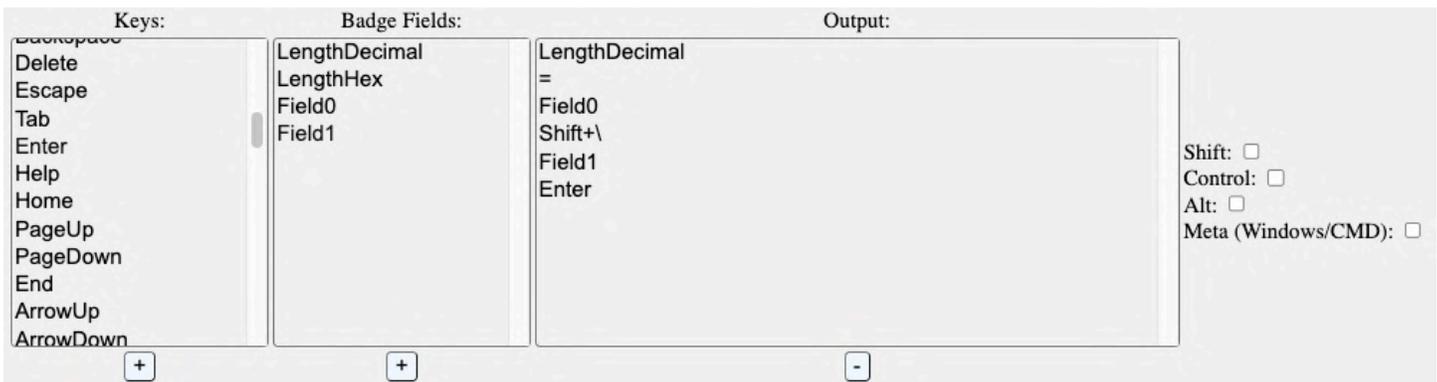
The WDG-6112 outputs the length of the credential in decimal, followed by the “=” character, followed by the Field0 data, followed by the “|” (pipe) character, followed by the Field1 data, and finally the Enter key.

```
<Length(Dec)>=<Field0>|<Field1><Enter>
```

```
Raw Credential Read: 20200A8 (hex)
    Facility Code: 01 (hex)    = 01 (dec)
    Card Number:   0054 (hex) = 84 (dec)
```

```
WDG-6112 Output: 26=0001|000084
```

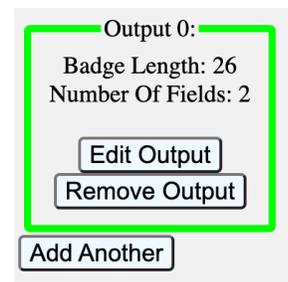
Below, Figure 13 shows how this example would appear.



**Figure 13:** Example Output String section

### Output Formats

Output Formats define the translation from raw credential data to human-readable text. Up to ten Output Formats are supported; users can create multiple configurations of different badge lengths in a single configuration file. For example, one Output Format can be for 26-bit credentials, while another can be for 35-bit credentials. This can be seen in Figure 14 to the right.



**Figure 14:** An Output Format

Output 0 is always present, as any configuration must contain at least one Output Format. Output Formats can be created by clicking the “Add Another” button. An individual Output Format can be selected by clicking the “Edit Button”. A selected Output Format will have a green outline around it, indicating it is currently selected. All parameters in the above subsections pertain to the selected Output Format.

Additionally, Output Formats can be removed from the overall configuration file. Click the “Remove Output” button on the Output Format to delete it. The “Remove Output” button does nothing if there is only one Output Format.

## WDG-6112 Manual - Configuration Tool: Output Configuration (Cont.)

### Create Configuration

The Create Configuration section allows users to name, create, and download a WDG-6112 configuration file. The file name is limited to 8 characters. By default, the configuration file is named “wdg-conf”. After naming the configuration file, click on the “Create and download config” button. The configuration file will be automatically downloaded by the web browser. WDG-6112 configuration files use the .cfg file extension. This is shown in Figure 15 below.



**Figure 15:** Create and download configuration

# WDG-6112 Manual - Configuration Tool: OSDP Configuration

## OSDP Configuration

Due to the flexibility of OSDP, the WDG-6112 supports various configuration options. These only apply when an OSDP reader connected to the WDG-6112; these settings will not be used when using a Wiegand reader. Below Figure 16 shows the “OSDP Options” section.

OSDP Options:

Reader address:

Reader speed:

Enable beep-on-read:

Enable blink-on-read:

Enable Secure Channel:

Default Secure Channel Base Key (SCBK\_D):

Secure Channel Base Key (SCBK):

**Figure 16:** OSDP Options section

**Reader Address** - Defines the OSDP device address the WDG-6112 will use to poll the connected OSDP reader. After discovering the connected reader, the WDG-6112 sends the `osdp_COMSET` command to configure the reader’s OSDP device address to match this value.

**Reader Speed** - Defines the baud rate the WDG-6112 will use to poll the connected OSDP reader. After discovering the connected reader, the WDG-6112 sends the `osdp_COMSET` command to configure the reader’s baud rate to match this value. The following baud rates are supported: 9600, 19200, 38400, 57600, 115200, and 230400.

**Enable Beep-On-Read** - When checked, the WDG-6112 commands the attached reader to activate its buzzer when credential data is received. The WDG-6112 sends an `osdp_BUZ` command after an `osdp_RAW` reply is received; the reader’s buzzer is activated for 500 ms (0.5s). This provides audible user feedback on a successful card read. Beep-on-read can be used in conjunction with blink-on-read.

**Enable Blink-On-Read** - When checked, the WDG-6112 commands the attached reader to activate its LED when credential data is received. The WDG-6112 sends an `osdp_LED` command after an `osdp_RAW` reply is received; the reader’s red LED is activated for 1000ms (1.0s). This provides visual user feedback on a successful card read. Blink-on-read can be used in conjunction with beep-on-read.

## WDG-6112 Manual - Configuration Tool: OSDP Configuration (Cont.)

**Enable Secure Channel** - When this option is checked, the WDG-6112 will only attempt to initiate a SCS with the attached OSDP reader, and will not initiate an unencrypted session.

**Default Secure Channel Base Key (SCBK\_D)** - This parameter defines SCBK\_D for the WDG-6112 to use. By default, this value matches the SCBK\_D defined in the OSDP Spec; however, some manufacturers define their own SCBK\_D values. If the SCBK\_D parameter doesn't match the reader's SCBK\_D, then a SCS cannot be initiated.

**Secure Channel Base Key (SCBK)** - This parameter defines a new SCBK for the connected reader. First, the WDG-6112 initiates a SCS with the SCBK\_D. Then, the WDG-6112 sends the new SCBK to the reader via the `osdp_KEYSET` command.

After setting the OSDP configuration parameters as needed, the configuration can be named, created, and downloaded. The file name is limited to 8 characters. The default file name is "wdg-com". Click on the "Download OSDP Config" button to create and download the OSDP configuration file.

The OSDP configuration file is uploaded to the WDG-6112 in the same way as the Output configuration file, see [Configuration Mode](#) section of this document.

After the WDG-6112 applies an OSDP configuration file, all OSDP configuration files are deleted from the internal file system and are unrecoverable. This is a security measure to prevent the SCBK from being exposed.

## WDG-6112 Manual - Badge Peeler Mode Configuration

Badge Peeler Mode is the WDG-6112 default configuration (see pg. 8). The method outlined below returns the WDG-6112 Badge Peeler Mode after using another configuration.

The Configuration Tool allows the user to create a Badge Peeler configuration using a special Badge Field and Badge Length. Certain parameters of Badge Peeler Mode can also be changed using the configuration tool. Creating a Badge Peeler configuration is detailed below.

1. **Remove Default Badge Fields:** Delete Badge Field 0 and Badge Field 1 by clicking the “Remove Field” button on each.
2. **Add New Badge Field:** In the “New Badge Field” section, select “Hexadecimal”. Then, enter 0 in the “Start Bit”, “Field Length”, and “Fixed Characters” fields. Next, click the “Add Field” button.
3. **Remove all bits:** In the “Badge Representation” section, enter 0 in the “Badge Length” field. Then, click outside of the “Badge Length” field and observe that there is no diagram showing the total number of bits and the Field 0 bits.
4. **Create Output String:** In the “Output String” section, add the items as shown in Figure 17.
5. **Download Output Configuration:** Name and download the file.
6. **Upload:** Upload the configuration file using the steps detailed in the Configuration Mode section (see pg. 15).

# WDG-6112 Manual - Badge Peeler Mode Configuration (Cont.)

Version 2.0.0

Badge Field 0:  
Type: Hexadecimal  
Start Bit: 0  
Field Length: 0  
Fixed Characters: 0

New Badge Field:  
Decimal:   
Hexadecimal:   
Start Bit:   
Field Length:   
Fixed Characters:

Badge Representation:  
Badge Length (in bits):   
Bits:  
Field0:

Keys:	Badge Fields:	Output:
F16 Space Backspace Delete Escape Tab Enter Help Home PageUp PageDown	LengthDecimal LengthHex Field0	LengthDecimal = Field0 Enter

Shift:   
Control:   
Alt:   
Meta (Windows/CMD):

Output 0:  
Badge Length: 0  
Number Of Fields: 1

**Figure 17:** Badge Peeler Output Configuration

## Modified Badge Peeler Modes

Modified Badge Peeler configurations can be made. The raw credential data can be output as decimal, instead of hexadecimal. Additionally, keypresses can be changed to fit a specific application.

A Badge Peeler Output Format can be added to a configuration with other credential specific Output Formats. This provides a catch-all Output Format, allowing the user to see what data is being received, despite it not matching any specified credentials. In this scenario, if an Output Format is created to process a specific credential format (26-bit, for example), that credential will be processed by the WDG-6112 according to the Output Format. If non-26-bit credential data is received, it will be processed according to the Badge Peeler Output Format.

## WDG-6112 Manual - Creating a Configuration

This section will go through the steps for creating an Output Configuration and OSDP Configuration. This example will be using an OSDP reader, accepting 26-bit credentials, 32-bit credentials, 35-bit credentials, and 37-bit credentials.

### 1. Open Configuration Tool

Open the WDG-6112 configuration tool (see [CypressIntegration.com](http://CypressIntegration.com)). (File name: WDG-CONFIG\_vX.X.X.html). **Note:** The HTML file can be downloaded for offline use.

When first opened, the configuration tool lists one Output Format (Output 0), which is configured for standard 26-bit credentials. If standard 26-bit credentials are not used in the configuration, then the Output Format needs to be edited to match the credential format being used. This example supports 26-bit credentials.

### 2. Edit 26-bit Output Format

The Badge Fields for 26-bit credentials are defined by default. The default Badge Fields are configured for decimal output and a fixed number of output characters. If different Badge Field parameters are required, then the existing Badge Field(s) will need to be deleted and recreated. In this example, the 26-bit credentials will have a decimal output, but a dynamic character output.

### 3. Create Output String

This example is outputting the credential data to a spreadsheet. First, the length of the credential is output in decimal in the first column. Then, the TAB character is output to navigate to the second column. Field 0 is output in the second column. Next, the TAB character is output to navigate to the third column. Field 1 is output in the third column. Finally, the ENTER character is output to navigate to the first column in the line below.

Below, on the next page, Figure 17 shows the parameters for Output 0.



# WDG-6112 Manual - Creating a Configuration (Cont.)

## 4. Create 32-bit Output Format

Click the “Add Another” button under Output 0. This will create Output 1. The default parameters of each new Output Format are for standard 26-bit credentials, which will need to be edited in this case.

The example follows Steps 1-3 for the 32-bit credentials. Below Figure 18 shows the parameters for Output 1.

The screenshot shows a configuration interface for badge fields and outputs. At the top right, it says "Version 2.0.0".

**Badge Field 0:**  
Type: Decimal  
Start Bit: 1  
Field Length: 10  
Fixed Characters: 0  
Remove Field

**Badge Field 1:**  
Type: Decimal  
Start Bit: 11  
Field Length: 20  
Fixed Characters: 0  
Remove Field

**New Badge Field:**  
Decimal:   
Hexadecimal:   
Start Bit:   
Field Length:   
Fixed Characters:  Add Field

**Badge Representation:**  
Badge Length (in bits):   
Bits: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31  
Field0: Dec  
Field1: Dec Dec

**Keys:**  
Backspace  
Delete  
Escape  
Tab  
Enter  
Help  
Home  
PageUp  
PageDown  
End  
ArrowUp

**Badge Fields:**  
LengthDecimal  
LengthHex  
Field0  
Field1

**Output:**  
Shift:   
Control:   
Alt:   
Meta (Windows/CMD):

**Output 0:**  
Badge Length: 26  
Number Of Fields: 2  
Edit Output  
Remove Output

**Output 1:** (highlighted with a green border)  
Badge Length: 32  
Number Of Fields: 2  
Edit Output  
Remove Output

Buttons at the bottom: Add Another, Create and download config, wdg-conf

Figure 18: Example parameters for Output 1





## WDG-6112 Manual - Creating a Configuration (Cont.)

### 8. Create OSDP Configuration

Now, the OSDP Configuration parameters need to be defined so the WDG-6112 can communicate with the OSDP reader.

The OSDP reader's address is set by the "Reader address" field; in this example, the OSDP address is 1. The WDG-6112 will configure the reader with the specified device address using the `osdp_COMSET` command when it is first connected to the OSDP reader.

The OSDP reader's baud rate is set by the "Reader speed" field; in this example, the OSDP baud rate is 57600. The WDG-6112 will configure the reader with the selected baud rate using the `osdp_COMSET` command with it is first connected to the OSDP reader.

This example requires the "Enable beep-on-read" and "Enable blink-on-read" features to provide feedback to the user, indicating that the card has been read by the OSDP reader and the credential data has been received by the WDG-6112. Both of these options are checked in this example.

The "Enable Secure Channel" option secures the connection between the OSDP reader and the WDG-6112. When using Secure Channel, the `SCBK_D` and `SCBK` values must be specified. By default, these two values are set to the default value defined by the OSDP Specification. The `SCBK_D` must match the value inside the reader. Some readers, from the factory, have the OSDP Specification default value. Other manufacturers load their own value into the reader, and the the value can be changed by the user. The `SCBK` value is specified by the user. This example uses a random 16-byte string (32 hexadecimal characters). The WDG-6112 configures the reader with the specified `SCBK` after connecting to the reader using the `osdp_KEYSET` command and the `SCBK_D` value.

Below Figure 22 shows these OSDP Configuration parameters in the tool.



The screenshot shows a configuration window titled "OSDP Options:". It contains several fields and checkboxes:

- Reader address:** A text input field containing the value "1".
- Reader speed:** A dropdown menu showing "57600".
- Enable beep-on-read:** A checked checkbox.
- Enable blink-on-read:** A checked checkbox.
- Enable Secure Channel:** A checked checkbox.
- Default Secure Channel Base Key (SCBK\_D):** A text input field containing the hexadecimal string "303132333435363738393A3B3C3D3E3F".
- Secure Channel Base Key (SCBK):** A text input field containing the hexadecimal string "B7EFC38858DEB653656299A586C33FB4".
- Download OSDP Config:** A button next to a text input field containing "wdg-com1".

**Figure 22:** Example OSDP Configuration

## WDG-6112 Manual - Creating a Configuration (Cont.)

### 9. Download OSDP Configuration

Enter a name for the OSDP Configuration file. This example file name is “wdg-com1”. After the file is named, click the “Download OSDP Config” button to download the OSDP Configuration file. This is shown in Figure 23 below.



**Figure 23:** Example OSDP Configuration download

### 10. Upload Configurations

Both the Output Configuration and OSDP Configuration files can be uploaded to the WDG-6112 at the same time. Follow the steps listed in the Configuration Mode section (see pg. 15).

The goal for this example configuration is to have the WDG-6112 enter the credentials into a spreadsheet. Below Table 3 demonstrates how this example configuration outputs the four different credentials.

WDG-6112 Credential Test

Length	Facility Code	Card Number
26	1	17
32	998	100054
35	4096	25079
37	N/A	500016

**Table 3:** Example Configuration output

# WDG-6112 Manual - Calculate Number of Fixed Characters

## How to Calculate the Number of Fixed Characters for Badge Fields

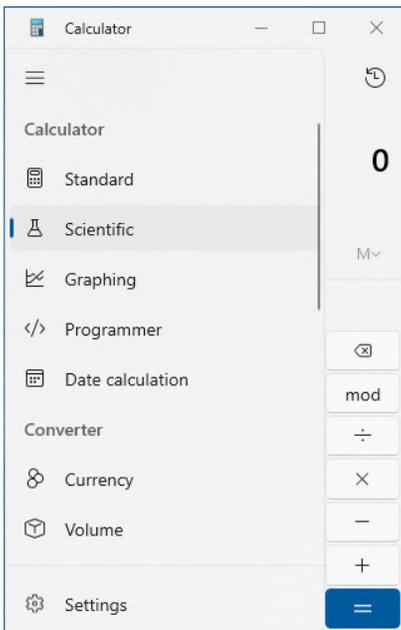
Depending on the application and the range of numbers in the credentials, finding the appropriate number of fixed characters for a Badge Field can seem unclear. The number of fixed characters can be calculated based on the total number of bits in the Badge Field. This method will ensure that all possible values for the Badge Field will be output in full. Below is the equation for calculating the number of fixed characters, where  $n$  is the total number of bits in the badge field.

$$\text{Fixed Characters} = \log_{10}(2^n)$$

This equation can be easily calculated on a scientific calculator, either a physical calculator or a computer calculator. Below are steps to discover the number of fixed characters for a 20-bit Badge Field.

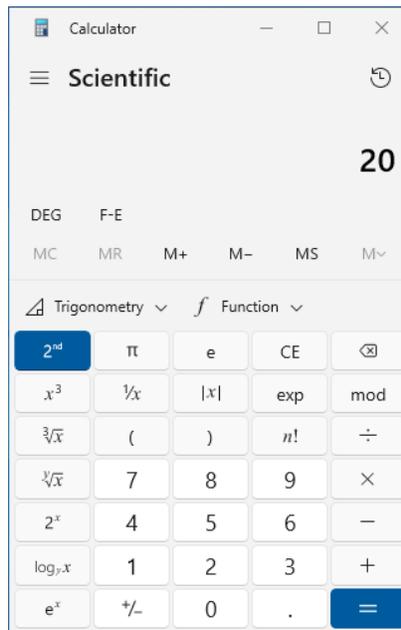
### Step 1

Open the Calculator application and in the menu. Select “Scientific” as shown below.



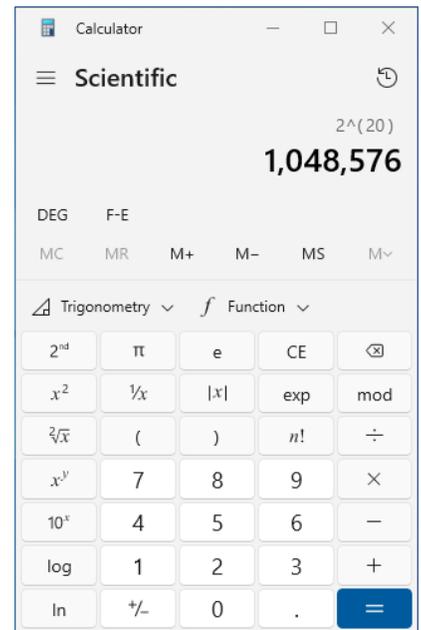
### Step 2

Enter the number of bits. For example, 20. Click the “2<sup>nd</sup>” button to get to the 2<sup>x</sup> function.



### Step 3

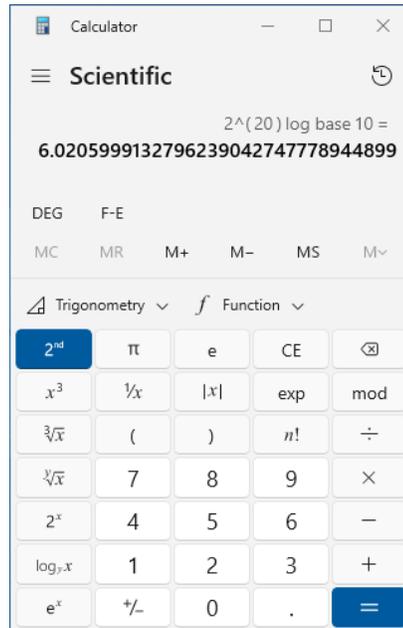
Click the 2<sup>x</sup> button to get the maximum value that can be stored in a 20-bit number.



## WDG-6112 Manual - Calculate Number of Fixed Characters (Cont.)

### Step 4

Click the “2nd” button, then click the  $\log_y x$  button. Enter 10 for the log base, and then click the “=” button.



### Step 5

In this example, the result of this mathematical operation is 6.02... The result of this equation will always be a non-whole number; round up the result to the nearest whole number. In this scenario, the result is rounded up to seven. Seven fixed characters will allow all 20-bit numbers to be displayed in the Badge Field output.

## WDG-6112 Manual - OSDP Terminology

This section lists and defines in general terms OSDP terminology use in this manual.

**Access Control Unit (ACU):** Typically, the access controller, the ACU is the device on the OSDP bus that controls the PDs. The ACU only sends commands to the PDs and waits for replies.

**Peripheral Device (PD):** Typically a reader, but many other devices can be PDs, any device on the OSDP bus that is not the ACU. PDs receive commands from the ACU and send replies.

**Device Address:** OSDP Peripheral Devices are assigned an address, all PDs on the OSDP bus must have a unique address. This address is used in commands from the ACU and in replies from the PD to indicate which device the message is being sent to/from.

**Baud Rate:** Data transfer rate, expressed in bits per second.

**Secure Channel Base Key (SCBK):** 16 byte key set by the user used to initiate Secure Channel communication sessions.

**Secure Channel Base Key Default (SCBK\_D):** Default SCBK value. Default value set by the manufacturer or the default value defined in the OSDP specification.

**Secure Channel Session (SCS):** OSDP communication sessions using the Secure Channel Protocol, which, among other things, encrypts the data payload in OSDP messages.

**Unencrypted Communication Session:** OSDP communication sessions without data payload encryption.

**Broadcast Address:** An ACU can discover a PD with an unknown address by using the broadcast address. The broadcast address is 7F (or 127 in decimal).

**osdp\_POLL:** ACU command to inquire status changes or new input data.

**osdp\_NAK:** Negative acknowledge reply from the PD. Indicates the PD had an error processing the previous command.

**osdp\_ACK:** Positive acknowledge reply from the PD. The PD properly processed the previous command or nothing to report to ACU.

**osdp\_RAW:** PD reply with card data payload. Card data is a raw string of bits.

**osdp\_KEYPAD:** PD reply with keypad data payload. Keypad data is a string of ASCII characters.

**osdp\_ID:** ACU command to request a device identification report.

**osdp\_PDID:** PD reply with a device identification report.

## WDG-6112 Manual - OSDP Terminology (Cont.)

**osdp\_CAP:** ACU command to request a device capability report.

**osdp\_PDCAP:** PD reply with a device capability report.

**osdp\_COMSET:** ACU command to change a PD's Address and/or Baud Rate.

**osdp\_COM:** PD reply to report its updated communication settings.

**osdp\_LED:** ACU command to control LEDs on a PD.

**osdp\_BUZ:** ACU command to control buzzers on a PD.

**osdp\_CHLNG:** ACU command to begin the Secure Channel Session Connection Sequence.

**osdp\_CCRYPT:** PD reply to begin the Secure Channel Session Connection Sequence.

**osdp\_SCRYPT:** ACU command to finalize the Secure Channel Session Connection Sequence.

**osdp\_RMAC\_I:** PD reply to finalize the Secure Channel Session Connection Sequence.

**osdp\_KEYSET:** ACU command to change a PD's SCBK. A PD only accepts this command while in a Secure Channel Session.