BC2161 Fuse Programming Tool Application Guidelines

D/N: AN0499E

Introduction

The BC2161, designed and produced by Holtek, is an integrated wireless transmitting device. The inclusion of a programmable encoder along with other features ensure that the device can be used in various wireless fixed code/custom code remote controllers. The transmitting frequency bands range from 300MHz to 960MHz and are contained within the Sub-1GHz unlicensed ISM frequency band.

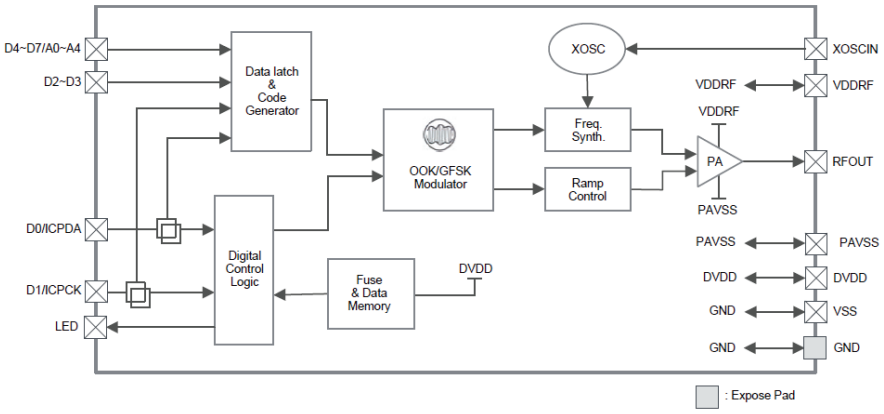
The BC2161 includes an integrated high power amplifier, a digital OOK/GFSK modulation scheme and a programmable encoder. The internal encoder can be setup for compatibility with products such as the HT12E, HT6P20, HT6P427A, etc. but can also be setup to have a custom code format. The device's RF characteristics comply with the International FCC/ETSI norms. The device supports up to 8 key functions, 4.2 billion (2^{32}) encoder addresses and up to +13dBm of transmitting power. It supports both OOK and GFSK modulation schemes and can operate with a transmission rate of up to 24ksps and 100kbps. Additionally, the device provides a 2ms fast key wake-up function for transmitting.

To make the product more convenient to set up and use, the BC2161 has a unique integrated OTP (One Time Programmable) Fuse memory. When used together with software provided by Holtek, users can set the RF transmitting power, frequency band, address, keys, encoding format and other parameters.

This application note will provide further information on the Fuse memory by describing how to use the Fuse programming tools along with several examples.

Functional Description

The BC2161 is a high frequency signal transmitter implemented by non-integer phase-locked frequency multiplication technology. The device includes an integrated non-integer frequency multiplier, frequency modulator and output amplifier. The structure is shown in the following figure.



The Fuse data memory in the block diagram is a unique function of the BC2161, which when used together with the Holtek programming software, allows the easy configuration of the BC2161 parameters, such as RF transmitting power, frequency band, address, keys, encoding formats and so on. Users must note that the programmed bits are non-recoverable, i.e. the Fuse memory can only be programmed once.

Hardware Connection

Programmer: e-Link or e-WriterPro.

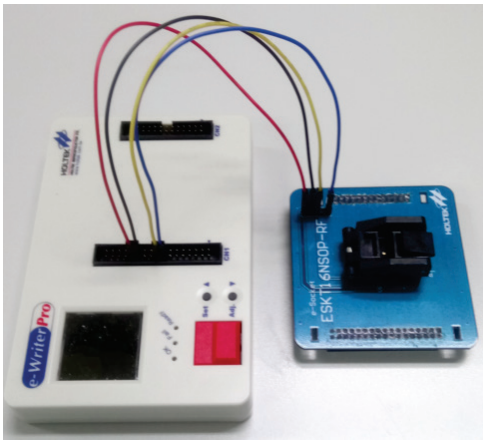
http://www.holtek.com/e-link

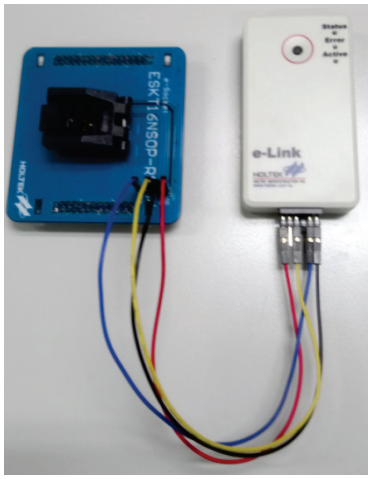
http://www.holtek.com/e-writerpro

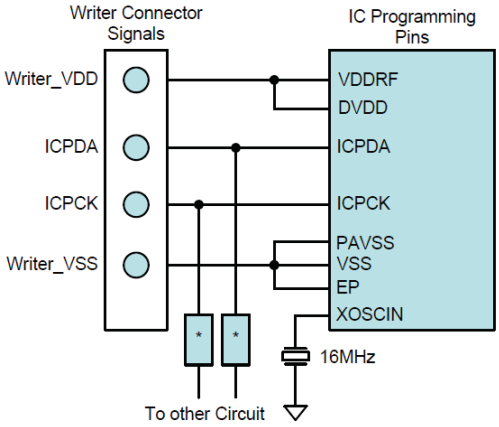
e-Socket programming socket: ESKT8SOP-RF / ESKT16NSOP-RF.

http://www.holtek.com/e-socket

Connection Method







Software Download

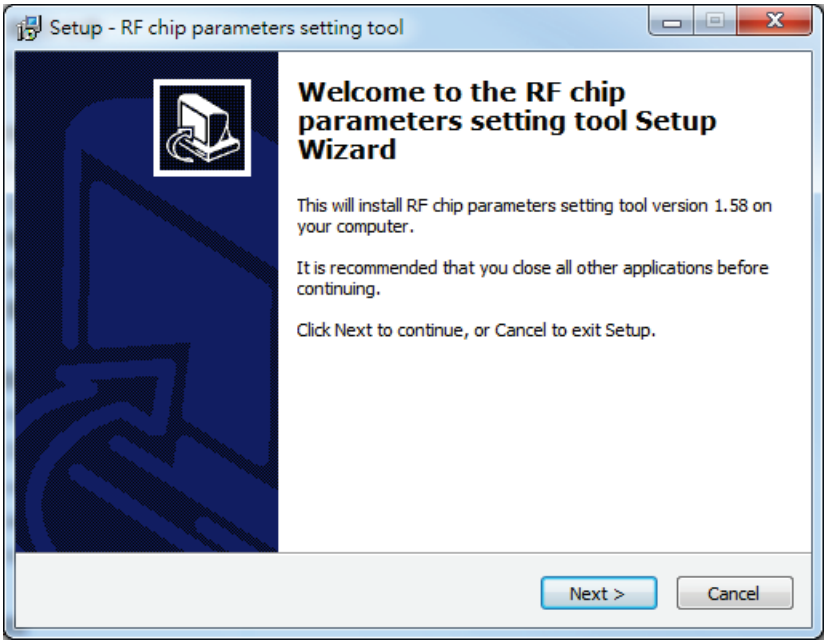
To locate the software search using the keyword “BC2161” on the Home page of the Holtek official website and then click on the “Software & Tools” option in the product page. Users can also refer to the following link directly:

http://www.holtek.com/productdetail/-/vg/BC2161

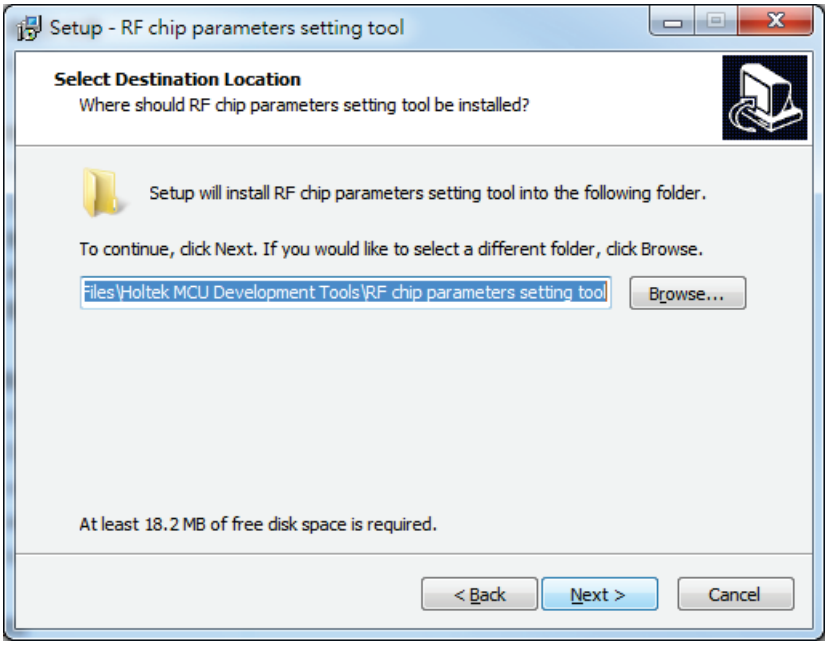
Then click on the “RF Chip Parameters Setting Tool” to download.

Software Installation

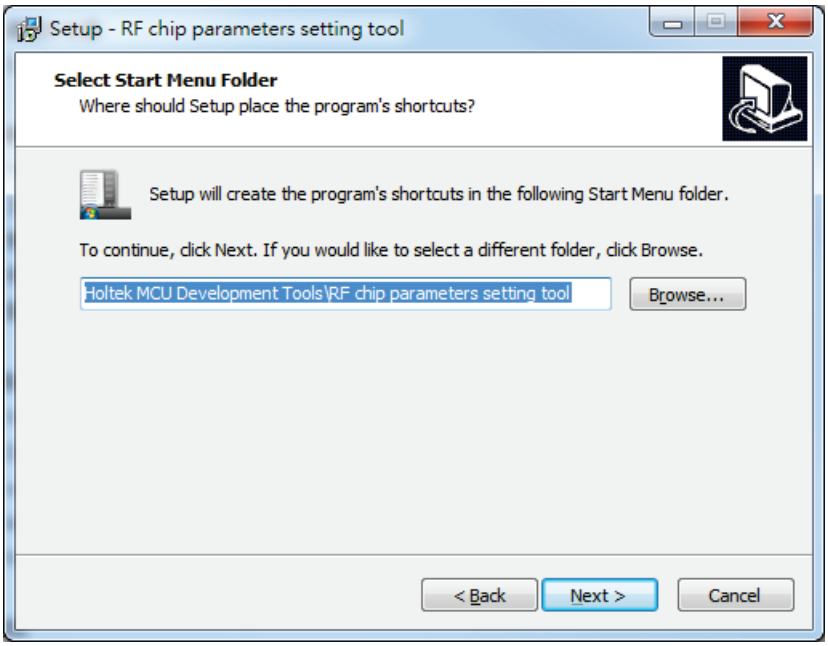
After the download and file decompress has completed, an installation file will appear, click on it to start the installation.



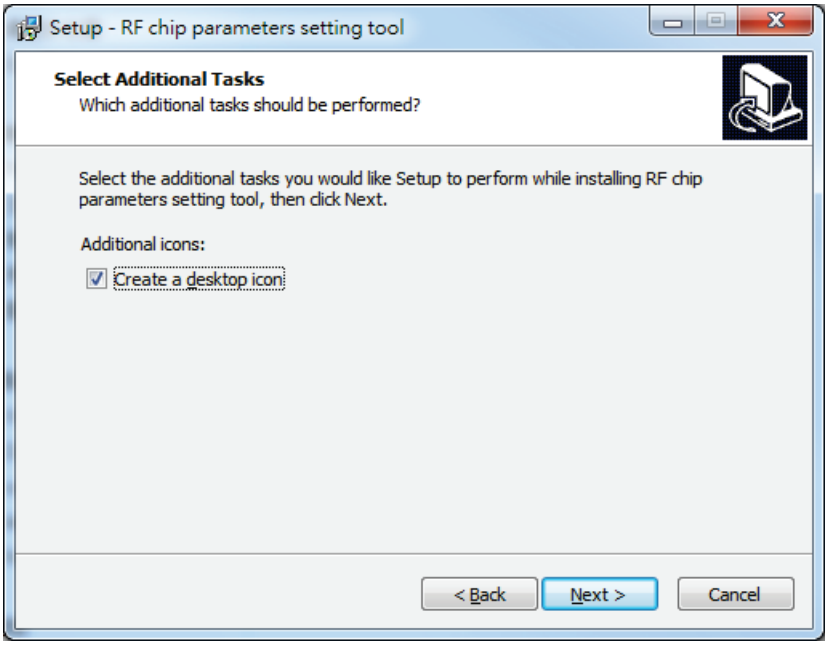
Select the installation path. This can be setup manually or the default path can be used.



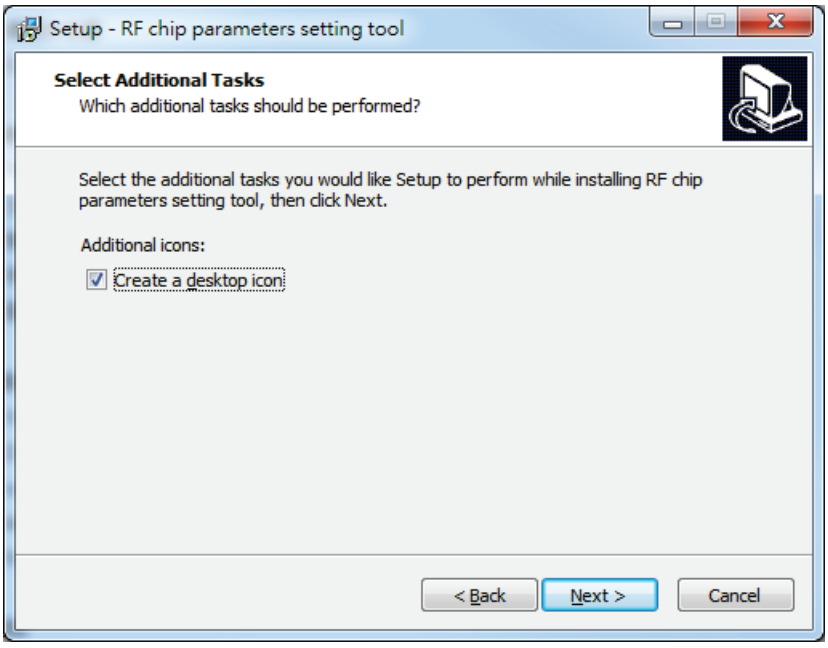
Select the installation directory. This can be setup manually or the default file name can be used.



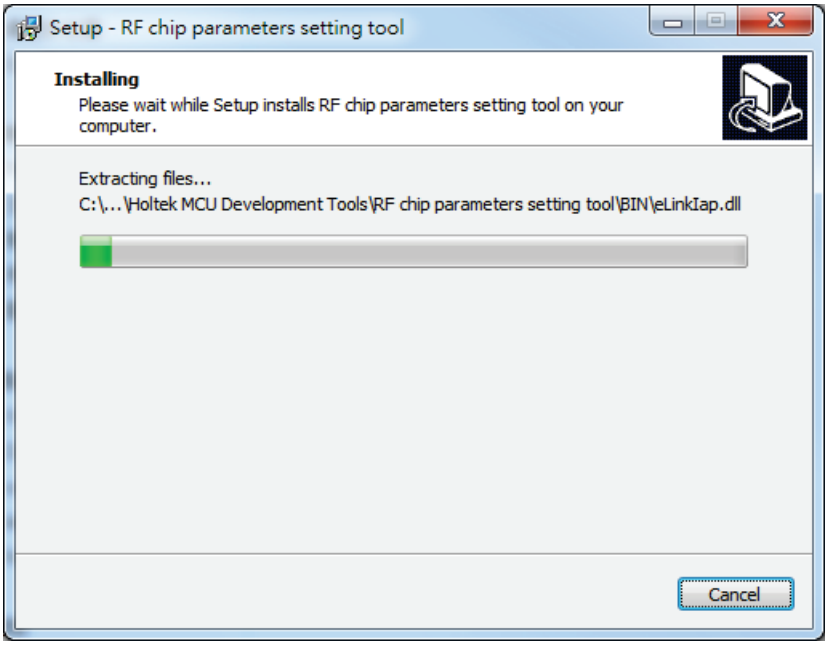
Setup the desktop shortcut.



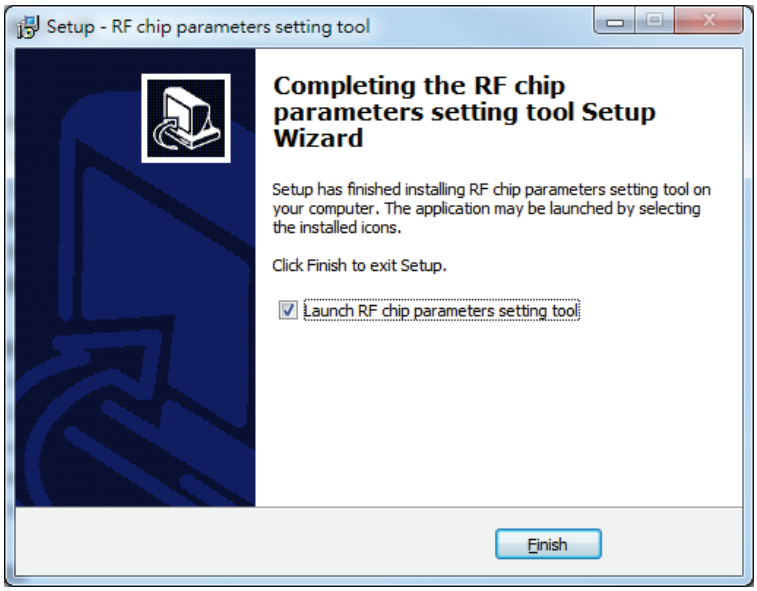
Click on “Install” to start the installation.



During installation the following screen will appear.

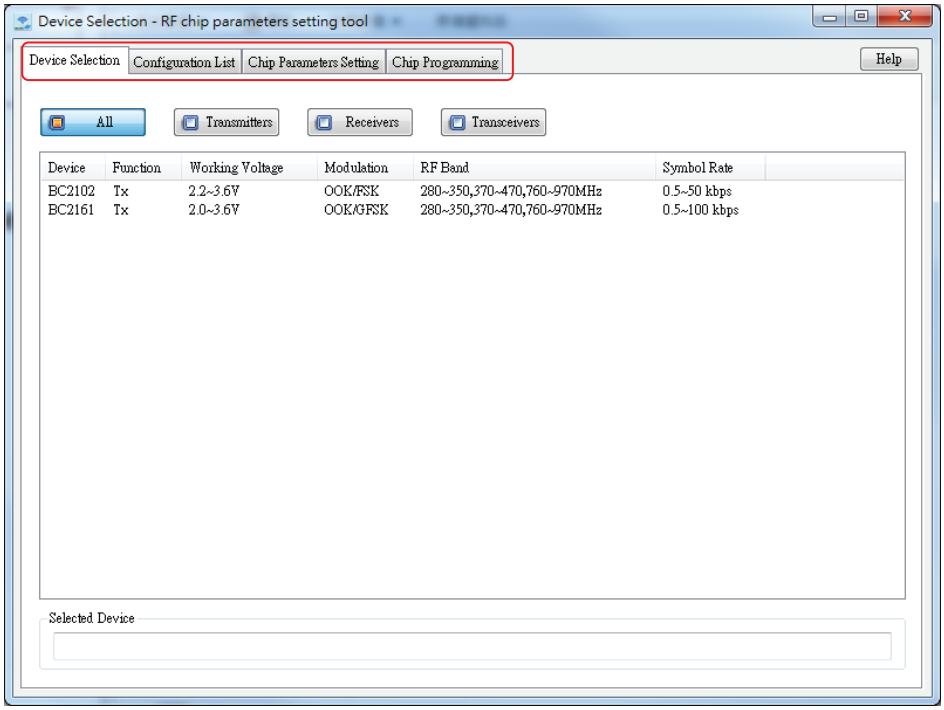


Click on “Finish”. Check the option shown in the following picture which can initiate the software directly.



Software Function

After the programming software execution, there are 4 main function options listed.



1. Device Selection
2. Configuration List
3. Chip Parameter Setting
4. Chip Programming

Device Selection

Select the corresponding IC.

Configuration List

List the different parameter files which have been set and stored in the “Chip Parameter Setting”.

Chip Parameter Setting

The BC2161 provides a number of parameter settings, refer to the corresponding datasheet for more detailed information.

- Crystal C-load
- RF Band
- Tx Power
- Fine Tune Level
- Modulation
- CRC_SEL
- Encoder
- LED_SWD
- TXD_REV
- TXD_INV
- etc.

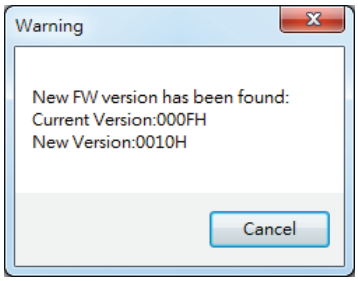
Chip Programming

- Load File → load the pre-configured parameter file
- Download → use together with the e-WriterPro
- Read → read the current Fuse setting values
- Blank Check → check if the IC has been programmed
- Program → click to start programming
- Verity → check if the programmed values are correct
- Smart Programming → use together with the e-WriterPro

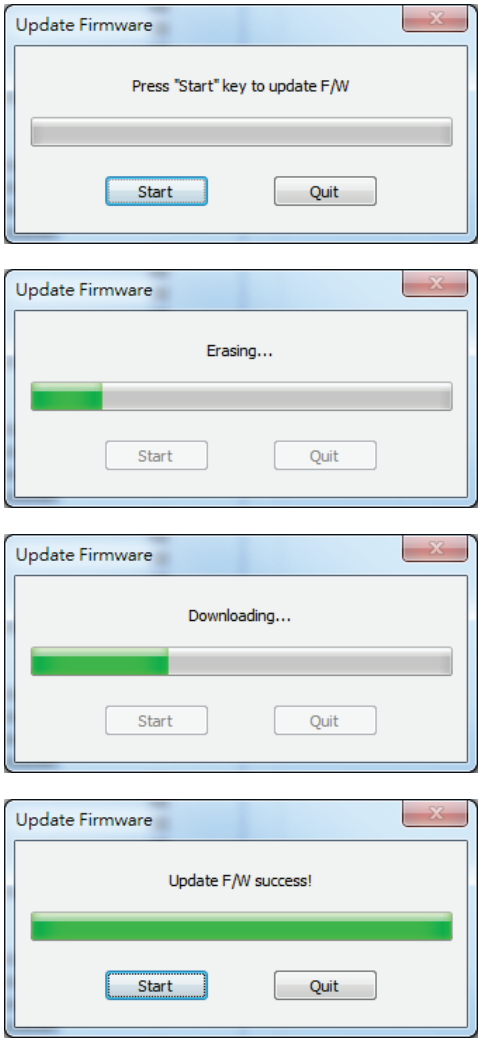
Usage Considerations

When connecting to the BC2161, the following window will pop up, indicating that there is a new version of the Holtek software. Users can select to update the software or not.

If not, click on “OK” directly.



If yes, click on the “Help” button at the upper right, select “Update Firmware” to initiate an update.



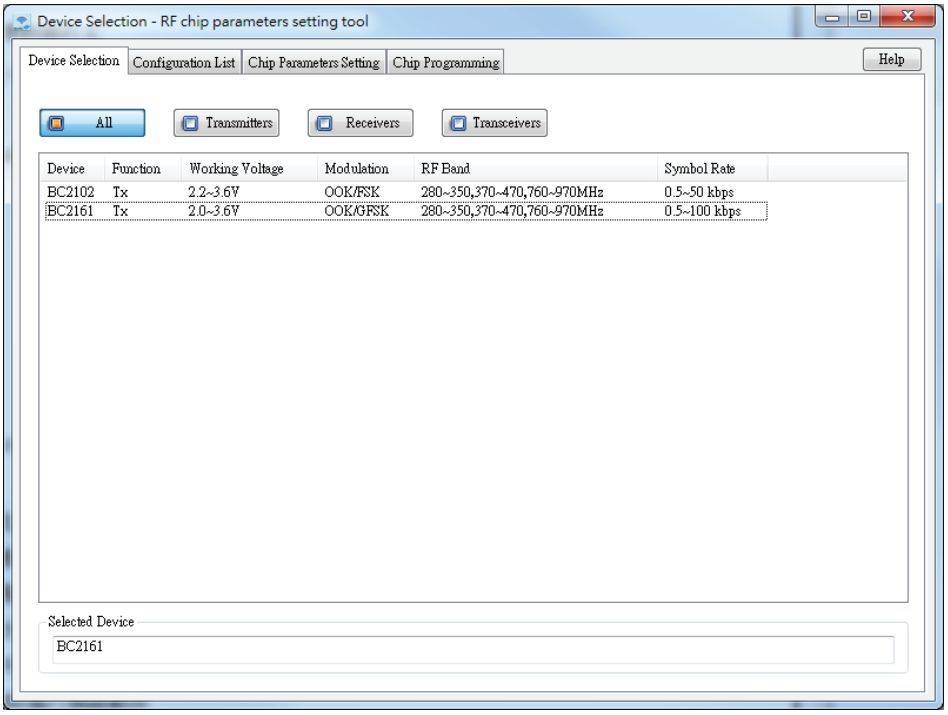
After the update is finished, click on “Quit” to exit.

Example 1

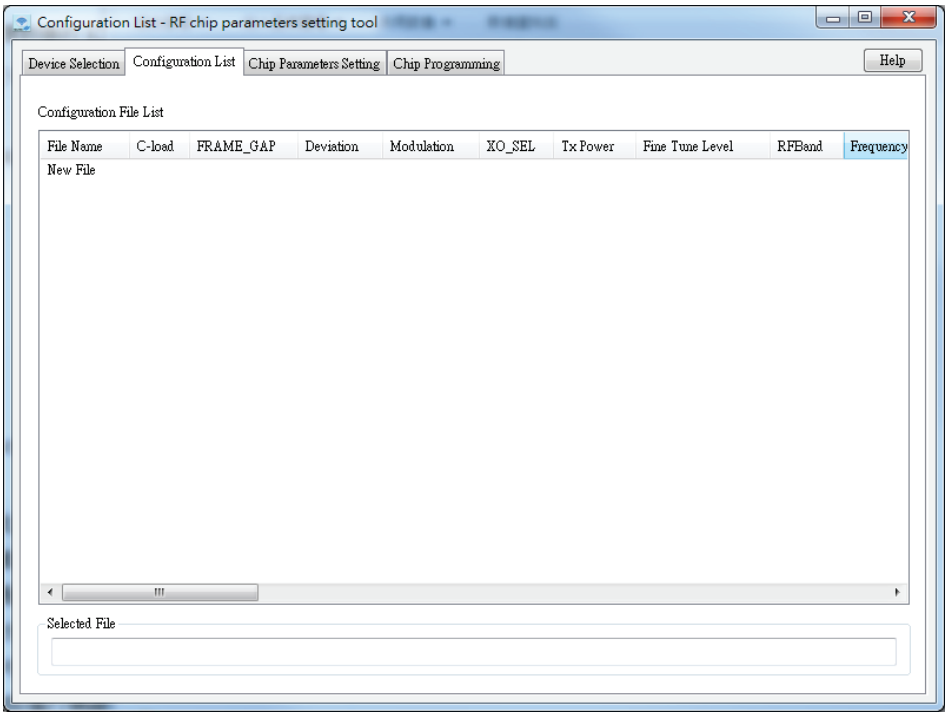
Purpose: Pre-configure the RF parameter files.

Tool: Software only

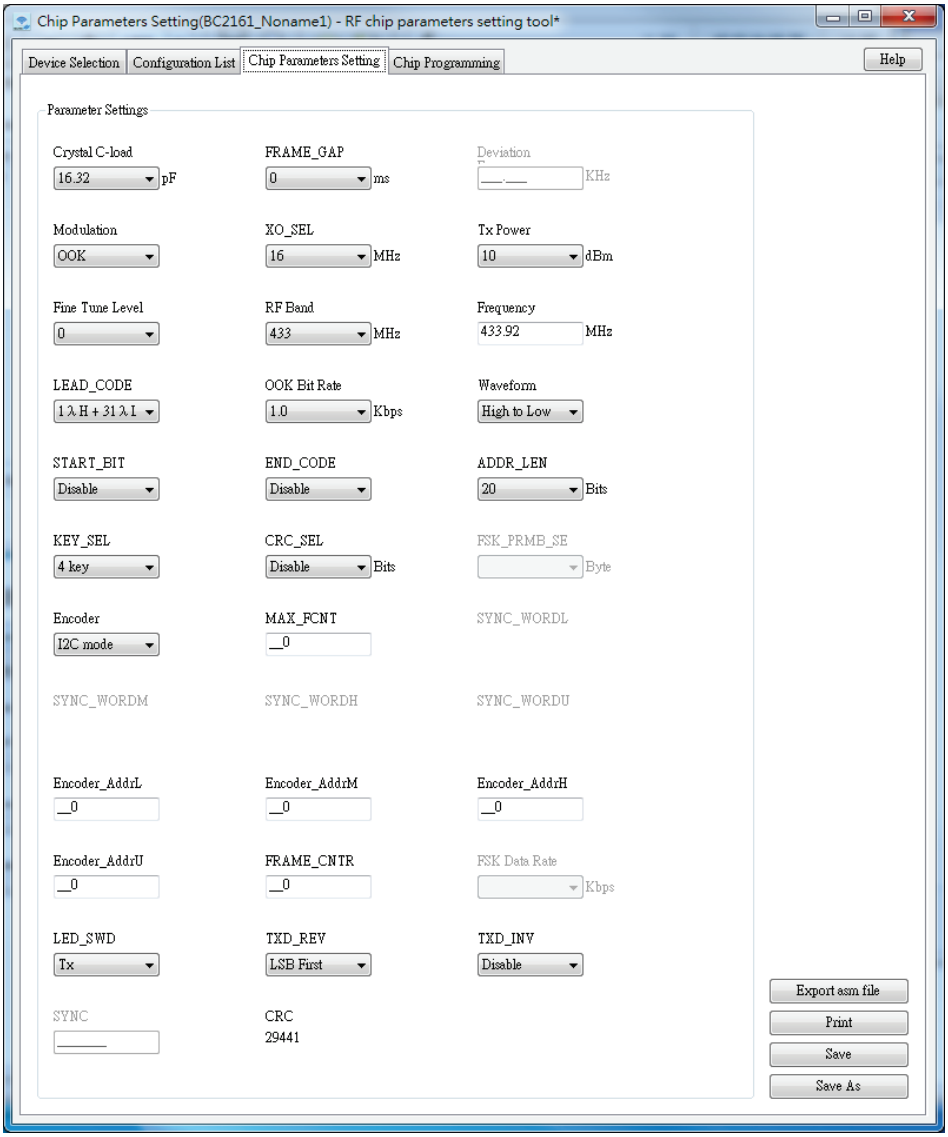
Setp1: Click on the desktop shortcut, the following window will pop up.



Step2: Double click “BC2161”, switch to the “Configuration List” page.



Step3: Double click “New File”, the software will automatically switch to the “Chip Parameter Setting” page.



Step4: Clicking on “Save As” at the bottom right after the configuration is complete. Here users can define their own file name.

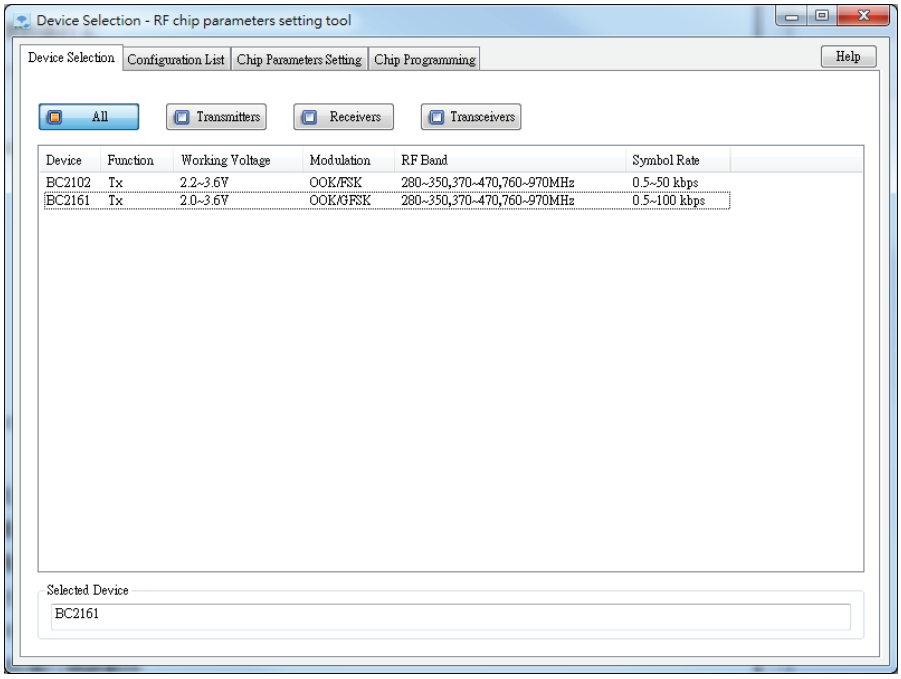
By clicking on “Save”, the software will store the file with a system default name.

Example 2

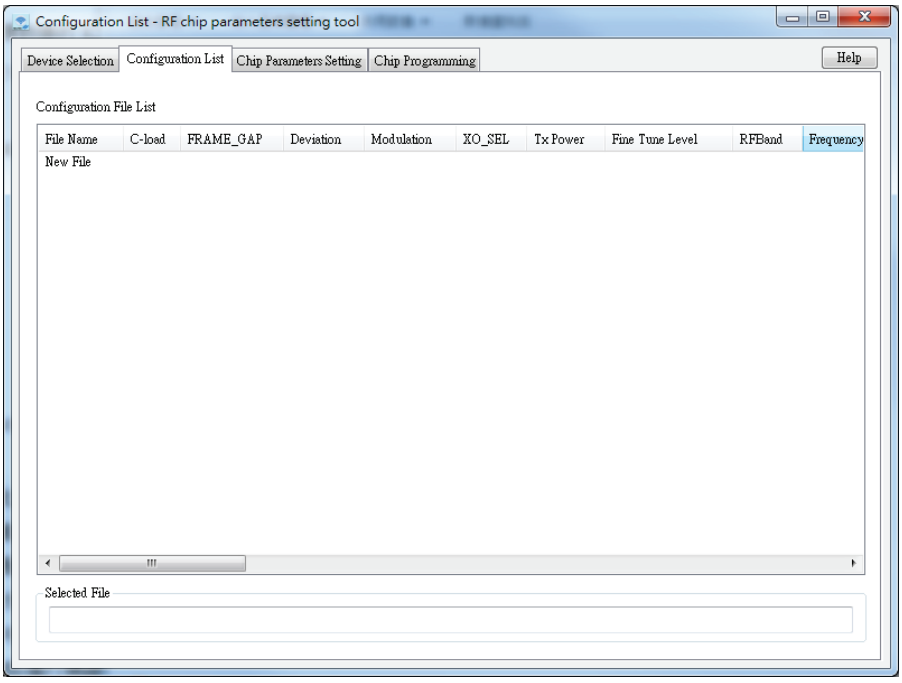
Purpose: Check whether the BC2161 IC has already been programmed, otherwise check the device programmed values.

Tool: e-Link + e-Socket or e-Link + user's own PCB

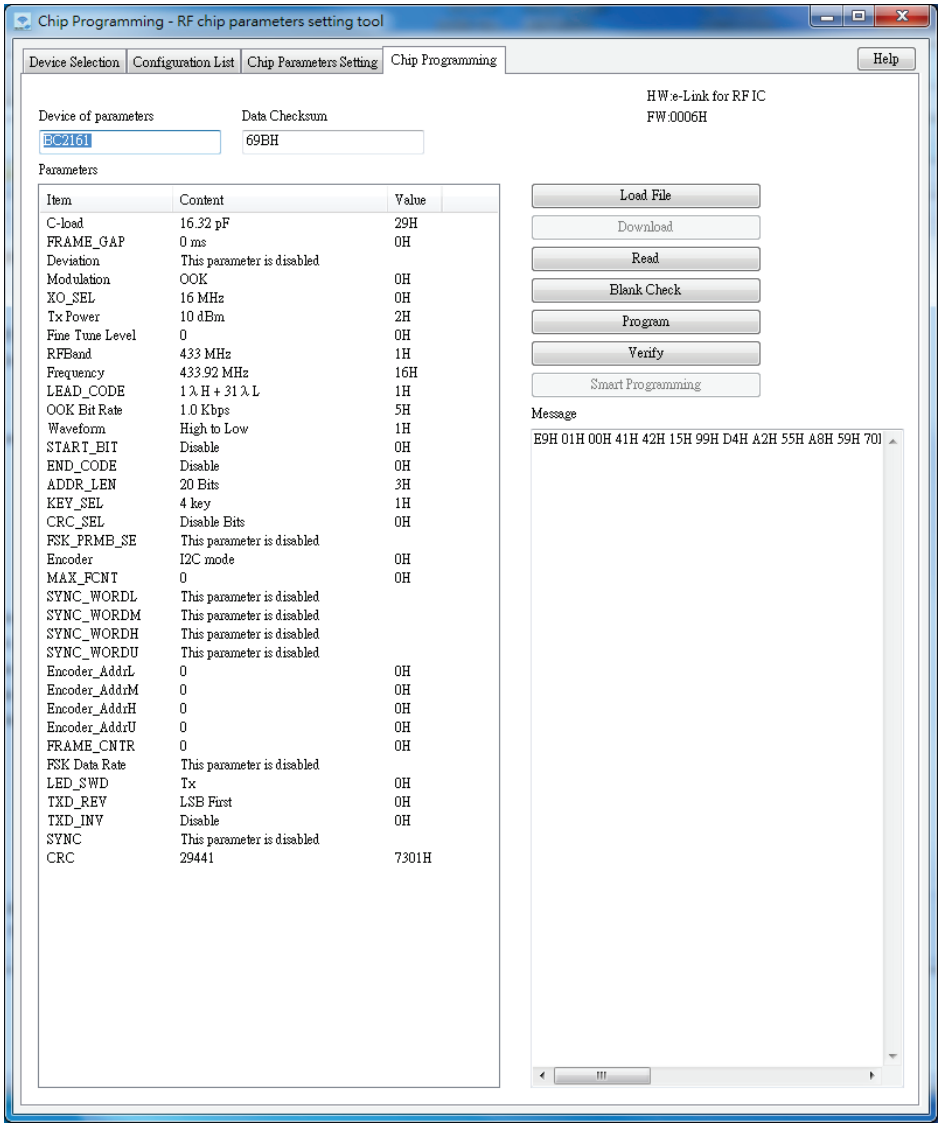
Setp1: Click on the desktop shortcut.



Step2: Double click "BC2161", switch to the "Configuration List" page, and then double click "New File".



Step3: Switch to the “Chip Programming” page, the values shown in the window are the BC2161 Default settings.



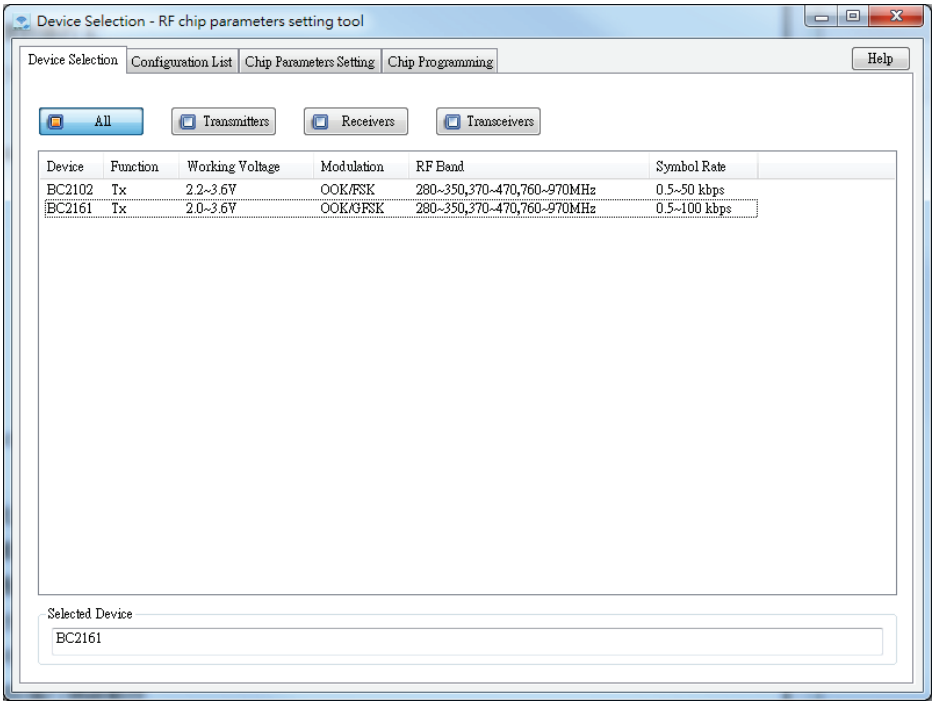
Step4: Users can also click on the “Read” / “Blank Check” to check if the Fuse has been programmed or not. This will be shown in the “Message” window at the bottom right.

Example 3

Purpose: IC programming. Create new parameter setting values directly or use the pre-configured parameter file.

Tool: e-Link + e-Socket or e-Link + user's own PCB

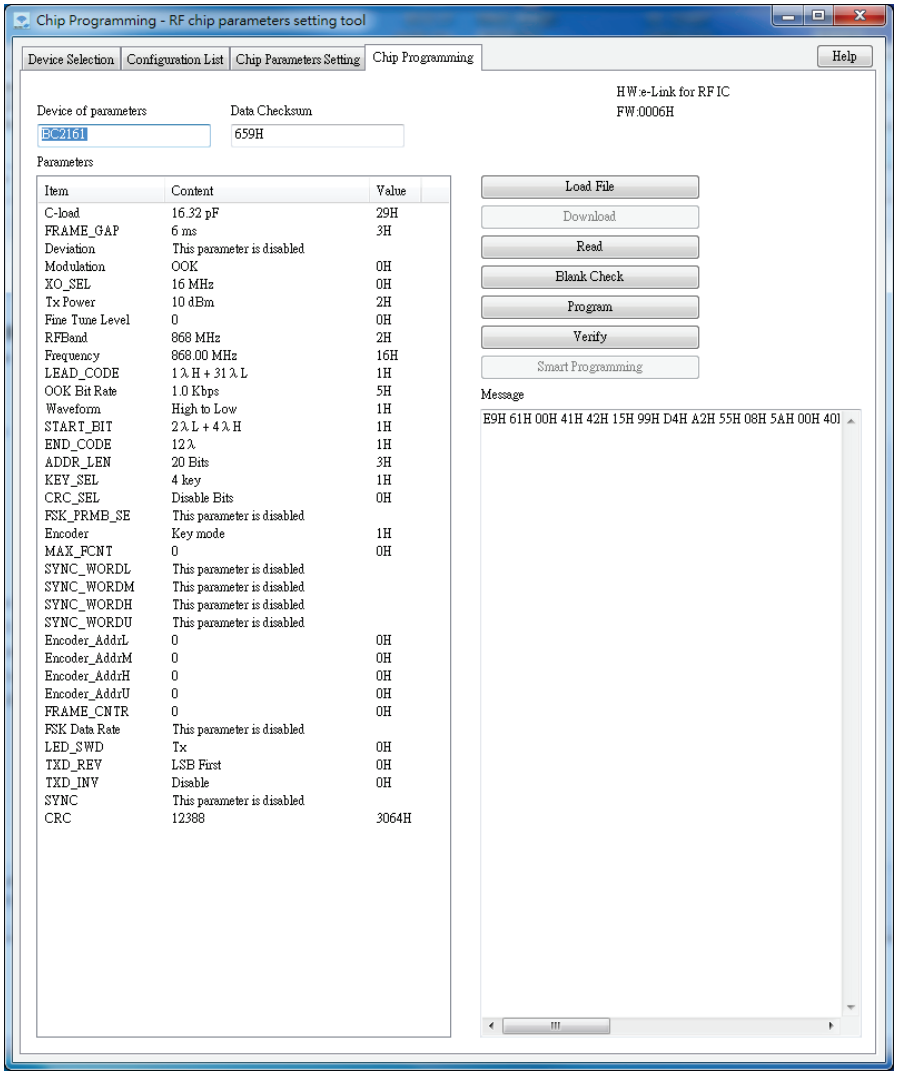
Setp1: Click on the desktop shortcut.



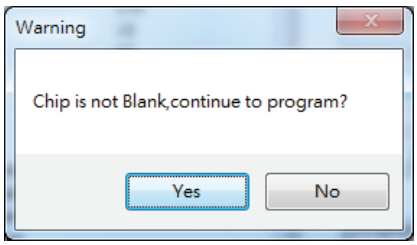
Step2: Confirm the hardware connection; double click "BC2161" in the "Device Selection" page after which the software will switch to the "Chip Programming" page.

Step3: To create individual RF parameter settings, switch to the "Configuration List" page and double click the "New File". The software will automatically switch to the "Chip Parameters Setting" page in which users can select the desired settings.

Step4: Switch to the "Chip Programming" page after completing the desired configuration in the "Chip Parameters Setting" page. The relevant parameters setup in Step3 will be listed in the "Parameters" window at the left while the Fuse value will be shown in Hexadecimal format in the "Message" window at the bottom right.



Step5: After the above steps are all completed, click on “Program” to start programming. The Holtek software will automatically execute a single Blank Check before programming to ensure correct programming. If the result is normal, which means the device has not been programmed, the programming will then be executed automatically. Otherwise the programming operation will be paused and a prompt message will pop up, waiting for users’ further action, as the following figure shows.



Step6: If users want to use the pre-configured RF parameters for IC programming, click on “Load” after Step2 has completed. In this case, the software will directly switch to the system default folder. Users only need to select the desired file and click to load it.

Step7: Users can check the “Parameters” and “Message” windows to see if the RF parameters in the loaded file are correct.

If there are any errors or setting changes, switch to the “Chip Parameters Setting” page for re-configuration and then switch back to the “Chip Programming” page.
If the settings are correct, execute the programming operation.

Example 4

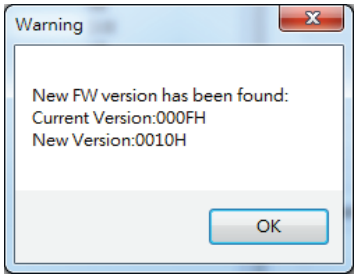
Purpose: Use the e-WriterPro tool for programming.

Tool: e-WriterPro + e-Socket - inserted into the e-WriterPro Line Pin.

Setp1: Click on the desktop shortcut, the following prompt message will pop up.

The message informs users that there is a new version of the Holtek software, which users can select to update or not.

If not, click on “OK”.



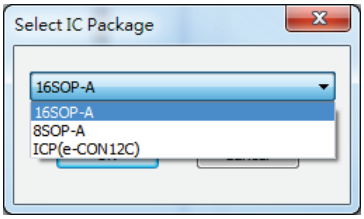
If yes, click on the “Help” button at the upper right, select “Update Firmware” to initiate an update.

Setp2: Double click “BC2161” in the “Device Selection” page. Users can now create new parameter setting values or use the pre-configured parameter file. Refer to Example 3.

Setp3: If users want to create new parameter settings, click on “Download” in the “Chip Programming” page.

The “Select IC Package” window will pop up.

The BC2161 provides e-Sockets with both 8-pin and 16-pin types. Users can select the package type, either 16-pin SOP-A or 8-pin SOP-A, according to their specific requirements.



An ICP mode is also provided by Holtek as an option. Users can select this mode for direct On Board programming.

Setp4: The programming will be initiated after the download operation has completed.

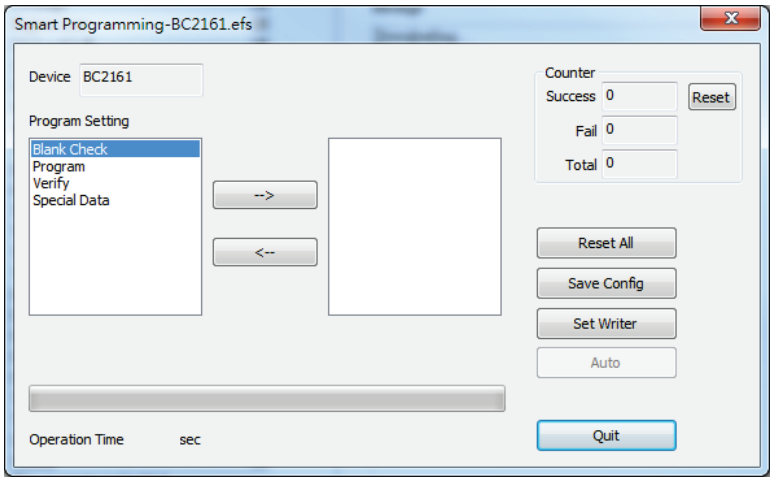
Example 5

Purpose: Use the e-WriterPro and use Smart Programming for offline programming.

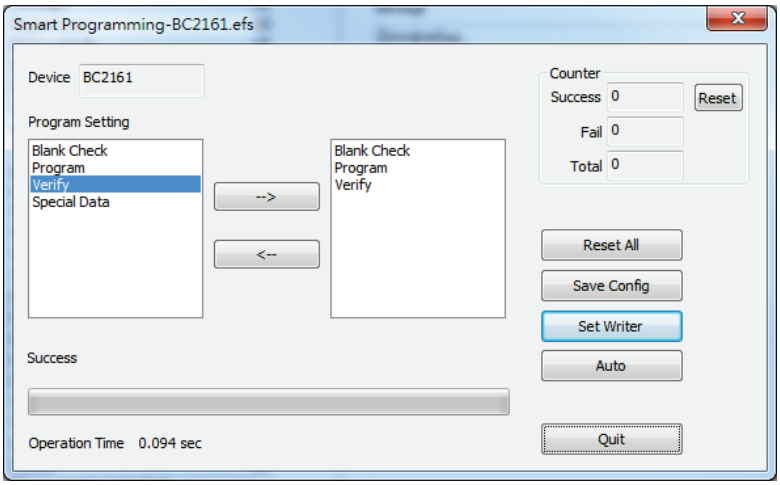
Tool: e-WriterPro + e-Socket (Inserted into the e-WriterPro Line Pin).

Implement the above steps until the process arrives at the step to execute a “Download” in the “Chip programming” page.

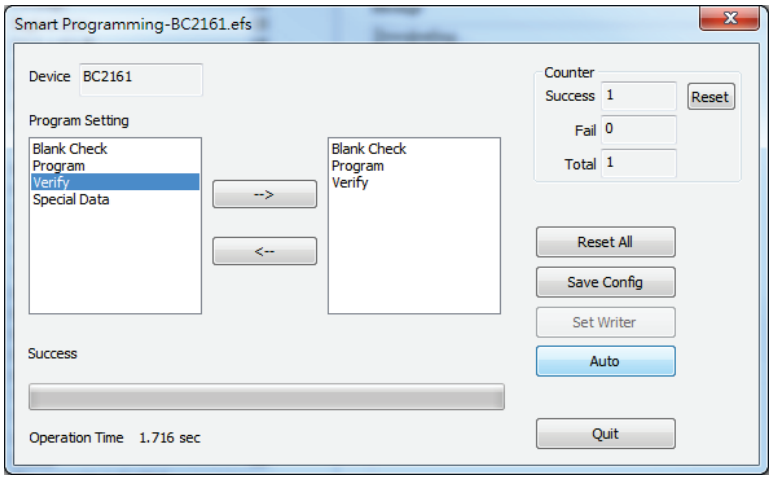
Setp1: Click on “Smart Programming” in the “Chip Programming” page, the following window will pop up.



Setp2: Select the “Blank Check” / “Program” / “Verify” optionally and add these options to the right field. Click on “Save Config” followed by “Set Writer”.
The “Auto” button will be available after these actions are implemented.



Setp3: During programming, users can click on the “Auto” button or press the red button on the e-WriterPro directly to execute the functions selected in Step2. This example selects Blank Check, Program and Verify functions. After the execution has successfully completed, a “Success” prompt message will pop up.



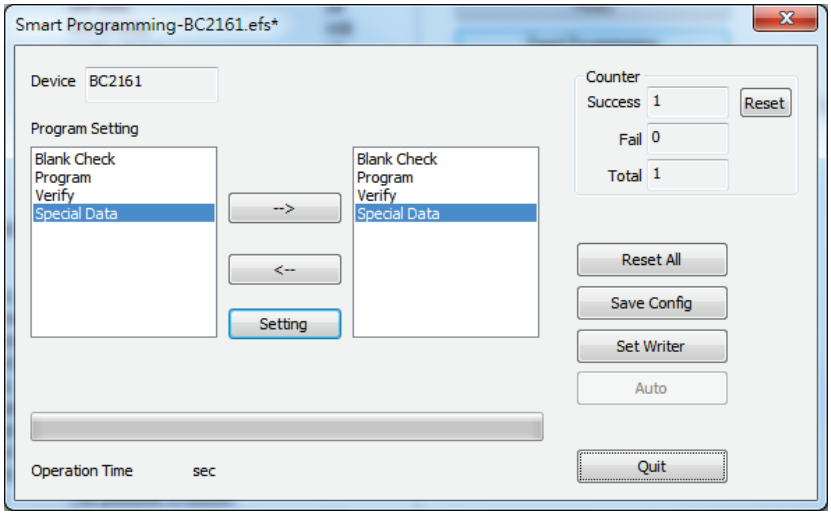
Setp3-1: In addition to executing programming using a PC users can also select Offline programing as follows:
Connect the e-WriterPro to the Holtek Adapter and then connect the power supply. Then press the red button on the e-WriterPro directly to initiate offline programming.

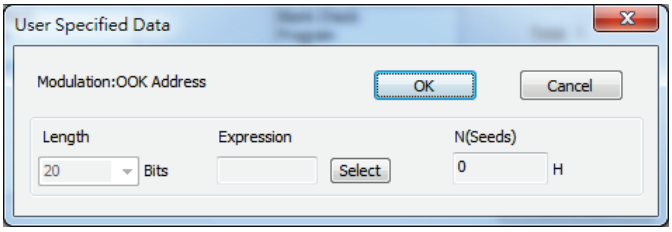
Smart Programming Additional Function

Function: Addresses can increment or decrement automatically with a fixed value.

Condition: Continuous programming.

Setp1: In the “Smart Programming” window, select “Special Data” and click on the “Setting” button.



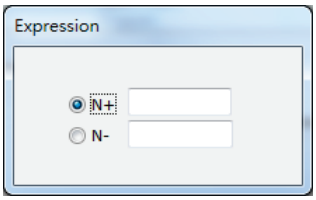


Setp2: In the “User Specified Data” page:

The length is unalterable as the setting value comes from the ADDR_LEN in the “Chip Parameter Setting” page.

N(Seeds) is unalterable as the setting value comes from the Encoder_AddrL/M/H/U in the “Chip Parameter Setting” page.

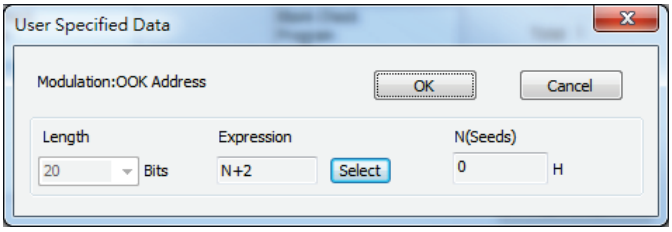
Expression: Click on “Select”, the following window will pop up.



Operation method:

1. Enter the fixed value that the address will automatically increment or decrement.
2. Select automatically increment or decrement.

For example, fill in “2”, then select “N+”. The software will switch back to the “User Specified Data” window.



Setp3: After the above steps have completed, users can click on the “Auto” button or press the red button on the e-WriterPro to initiate the selected function. Offline programming is also an alternative way to start the execution.

Conclusion

This document has introduced how to use the Holtek BC2161 Fuse programming tools. If users have any related suggestions please contact Holtek.

Reference Files

Reference file: BC2161 Datasheet

For more information, refer to the Holtek official website http://www.holtek.com/en.

Version and Modify Information

Date	Author	Issue
2018.07.12	何信智(Walers Ho) 林時瑋(Titan Lin)	First version

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