# Atmosic MP Tool

## User Guide

**SUMMARY:** This document describes the Atmosic MP Tool for manufacturing testing of the ATM2/ATM3, ATM33/e, and ATM34/e Wireless SoCs on the production lines without using RF testing equipment.



Atmosic™

Doc. No. ATM-UGMPT-0074

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# Acronyms and Abbreviations

| Acronyms | Definition |
|---|---|
| AG | Atmosic Golden Device |
| ATM2 | ATM2201<br>ATM2202<br>ATM2221<br>ATM2231<br>ATM2251 |
| ATM3 | ATM3201<br>ATM3202<br>ATM3221<br>ATM3231 |
| ATM33/e | ATM3325<br>ATM3330<br>ATM3330e |
| ATM34/e | ATM3405<br>ATM3425<br>ATM3430<br>ATM3430e |
| DL | Download Board |
| DUT | Device Under Test |
| EVB | Evaluation Board |
| EVK | Evaluation Kit |
| MP | Mass Production |
| MP Tool | Mass Production Tool |
| NVDS | Non-Volatile Data Storage |
| NVM | Non-Volatile Memory |

| | |
|---|---|
| NVS | Non-Volatile Storage (Zephyr Specific) |
| OTP | One Time Programmable |
| PV | Photovoltaics |
| RAM | Random Access Memory |
| RRAM | Resistive Random Access Memory |
| SoC | System-on-Chip |

# 1. Overview

This document describes the mass production (MP) environment that is used to test ATM2/ATM3, ATM33/e, and ATM34/e Wireless SoCs on production lines without radio-frequency (RF) test equipment. It consists of the following hardware and software items:

- MP Tool is an application software (AtmMPTool.exe) running on MS Windows.
- Atmosic Download Board (DL) provides the capabilities of firmware, NVDS, and OTP programming by MP Tool. This solution provides a cost-effective way to program the DUT. See Figure 2-1 for the content of the Download Board (DL) Kit.
- The Atmosic Golden Device (AG) is a Bluetooth LE RF Tester developed by Atmosic. It provides Bluetooth LE testing through DUTs controlled by MP Tool. Up to 8 DUTs controlled by MP Tool can be tested using 8 DL boards and 1 AG. See Figure 2-2 for the content of the Atmosic Golden Device (AG) Kit.

**Note**:DL and AG Kit information in Table 2-1.

The Atmosic MP Tool software with the AG provides the following functionalities:

- RF Tx Test
- RF Rx Test
- RF Frequency Test
- Crystal Trim
- Write firmware and NVDS
- PV Test

# 2. Hardware and Software Requirements

## 2.1 Supported Hardware

| Name | Description | Kit Part Number |
|---|---|---|
| Download Board (DL) | Product Firmware Download Board | ATMFDL-Mx2xx |
| Atmosic Golden Device (AG) | RF Golden Tester for Bluetooth LE RF Test | ATMAG-BLE or ATMAG2-BLE |

*Table 2-1 DL, and AG Kit Information*

| ATM2 | | ATM3 | | ATM33/e | ATM34/e |
|---|---|---|---|---|---|
| ATM2201-x0x | ATM2201-x1x | ATM3201-x0x | ATM3201-x1x | ATM3325-5DCAQK | ATM3405-2PCAQK |
| ATM2202-x0x | ATM2202-x1x | ATM3202-x0x | ATM3202-x1x | ATM3325-5LCAQK | ATM3425-2PCAQK |
| ATM2221-x0x | ATM2221-x1x | ATM3221-x0x | ATM3221-x1x | ATM3325-5DCACM | ATM3430E-2WCAQN |
| | ATM2231-x1x | | ATM3231-x1x | ATM3330-5DCAQN | |
| | ATM2251-x1x | | | ATM3330e-5DCAQN | |

*Table 2-2 Supported Atmosic Wireless SoCs*

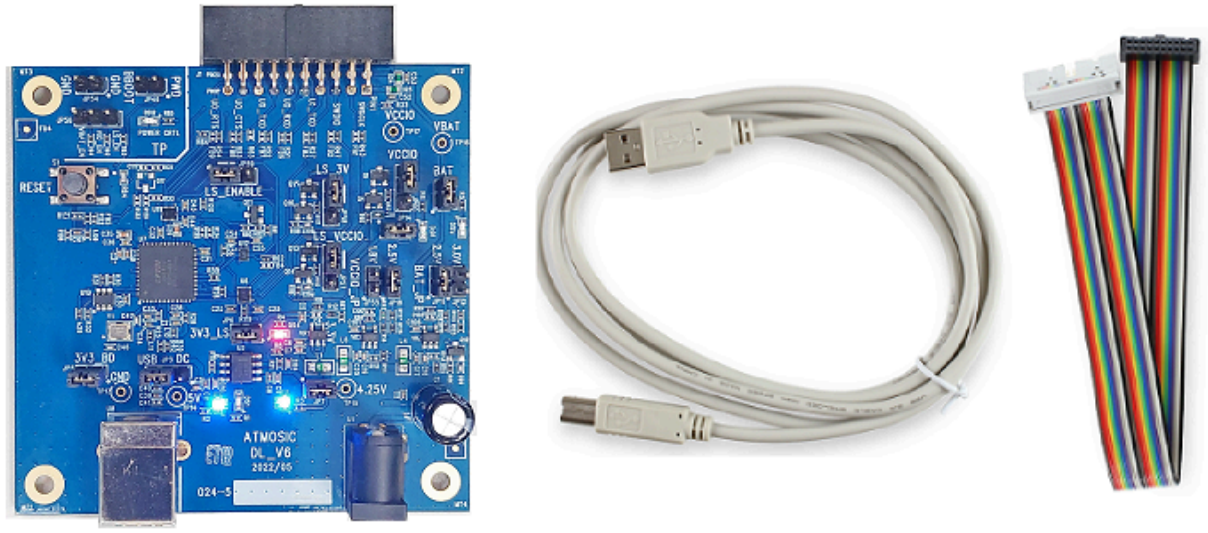


*Figure 2-1 Download Board (DL) Kit*

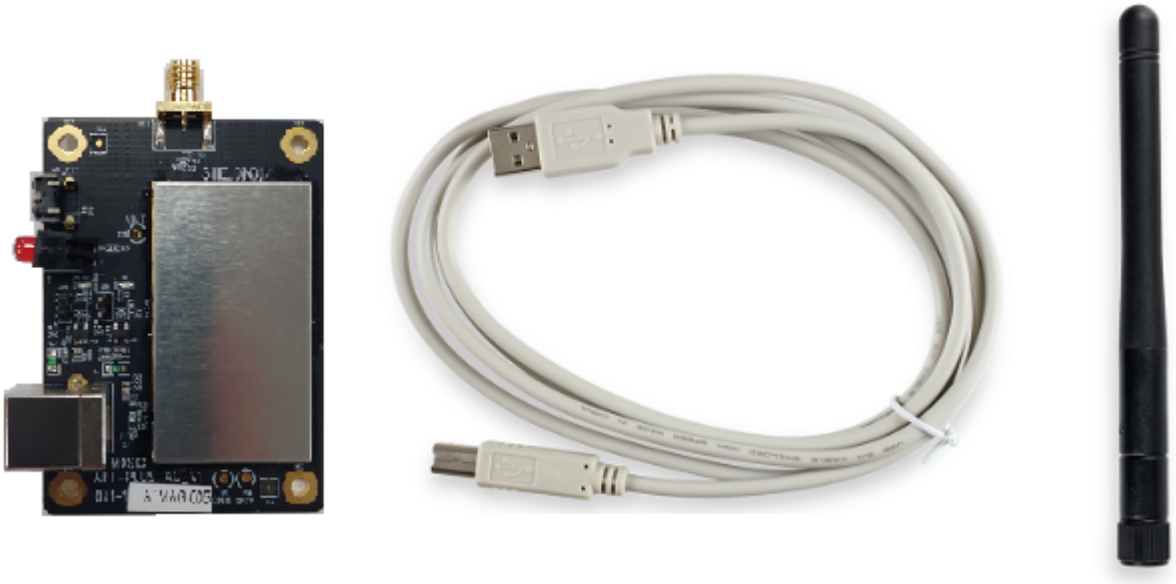


*Figure 2-2 Atmosic Golden Device (AG) Kit*

Note: The Atmosic Production Tester Kit (APT) hardware is deprecated, and no new software support will be provided.

## 2.2 Supported Software

- DL+AG: MP Tool software (version 2.1.9.20 or later)

It is recommended to use the latest version of the MP Tool available on the Atmosic Customer Portal

## 2.3 Supported OS

- Windows 10, Windows 11

# 3. Download (DL) Board and Atmosic Golden Device (AG)

## 3.1 Environment Setup for Download (DL) Board Only

The Download Board does not have an RF module, so it only supports programming. A complete set of the testing suite requires:

- 1 x PC:
  - Operating Systems: Windows 10 or Windows 11
- 1 x Atmosic DL Board (provided by Atmosic):
- 1 x Type-B USB Cable:
- 1 x 2x10 Test Interface Cable:
  - Purpose: Connect from DUT to J1 of DL
- 1 x MP Tool Software
  - MP Tool software (version 2.1.8.20 or later)

The DL_V6 picture is shown in Figure 3-1.

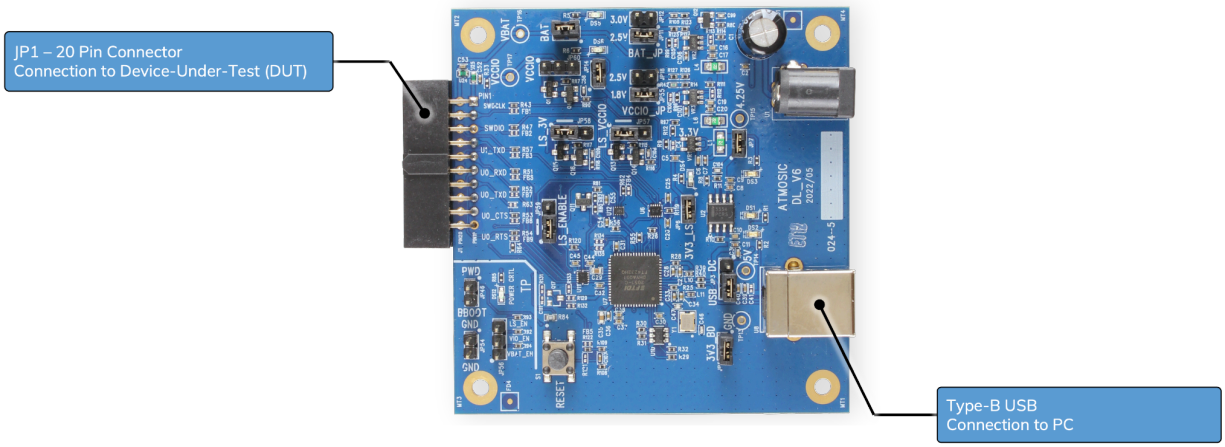



*Figure 3-1 Production Download Board (DL) Configuration*

Figure 3-2 shows a connection setup between a PC, DL, and DUT.


*Figure 3-2 Connection Setup Between PC, DL, and DUT*

### 3.1.1 DL_V6 Jumper Connection with 2.5 V or 1.8 V I/O Voltage

DL_V6 adds a power control function to ensure that the DUT is powered off before the MP Tool test program runs. DL_V6 supports either 2.5 V or 1.8 V I/O voltages.

Since a 2.5 V I/O voltage level is needed to write into OTP, the default jumper settings supporting a 2.5 V I/O voltage are shown in Figure 3-3.

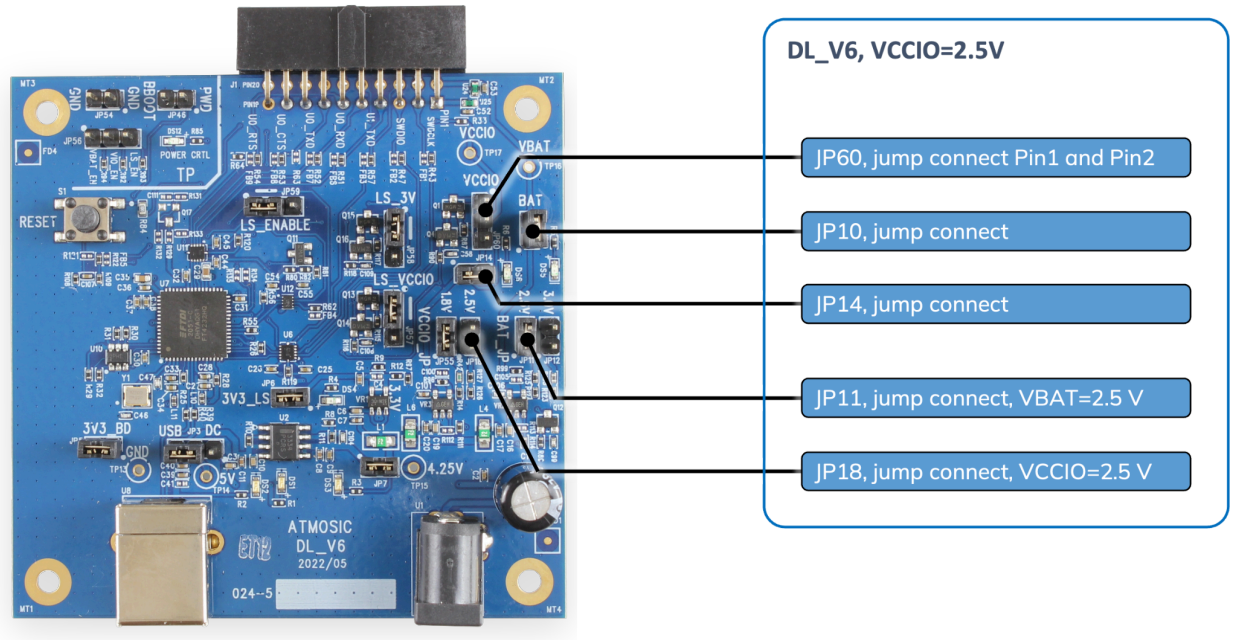



*Figure 3-3 DL_V6 with 2.5 V I/O Voltage Critical Jumper Setting*

If the I/O voltage needs to use 1.8 V I/O, the recommended jumper settings diagram is shown in Figure 3-4.

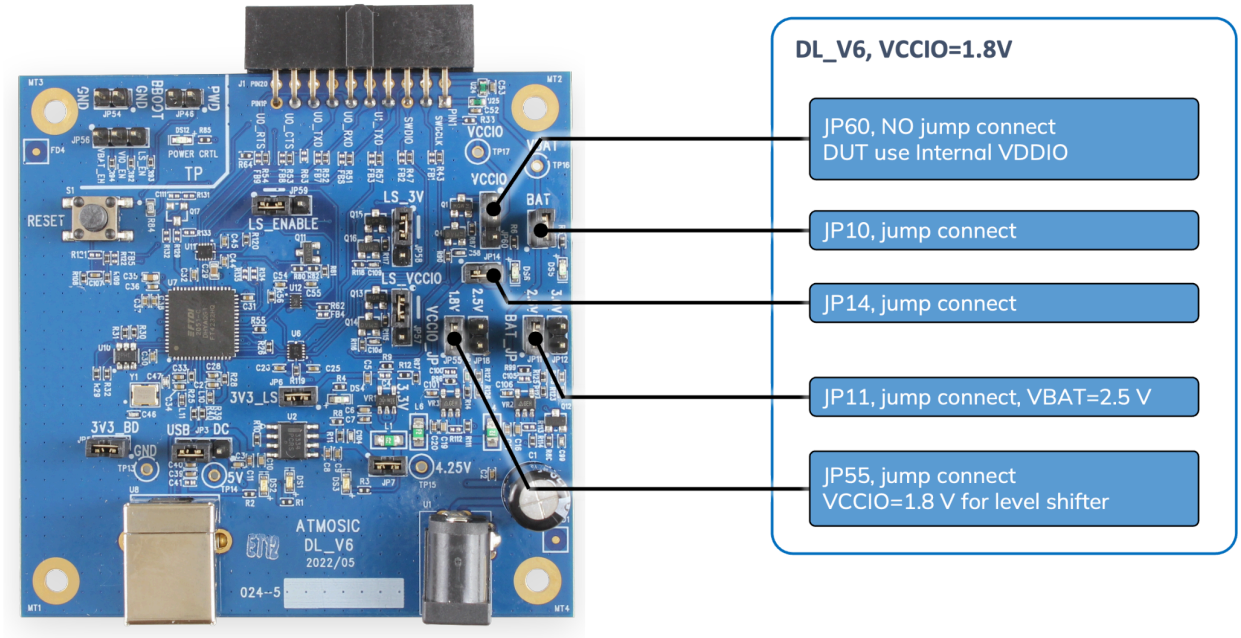



*Figure 3-4 DL_V6 with 1.8 V I/O Voltage Critical Jumper Setting*

## 3.2 Environment Setup for Downloaded Board (DL) & Atmosic Golden Device (AG)

The Download Board does not have an RF module, so it only supports programming. When we need to do RF testing, we need to add the Atmosic Golden Board.

A complete set of the testing suite requires:

- 1 x PC
  - Operating Systems: Windows 10 or Windows 11
- 1 x Atmosic AG
- 1 x Dipole antenna
- n x Atmosic DL Board
  - Quantity: n (with a maximum of 8)
- Type-B USB Cable
  - Quantity: n+1 (DL need n, AG need 1)

- n x 2x10 Test Interface Cable
    - Purpose: Connect from DUT to J1 of DL
- 1 x MP Tool Software
    - MP Tool software (version 2.1.8.20 or later)

Figure 3-5 shows a connection setup between PC, DL, AG, and DUT.

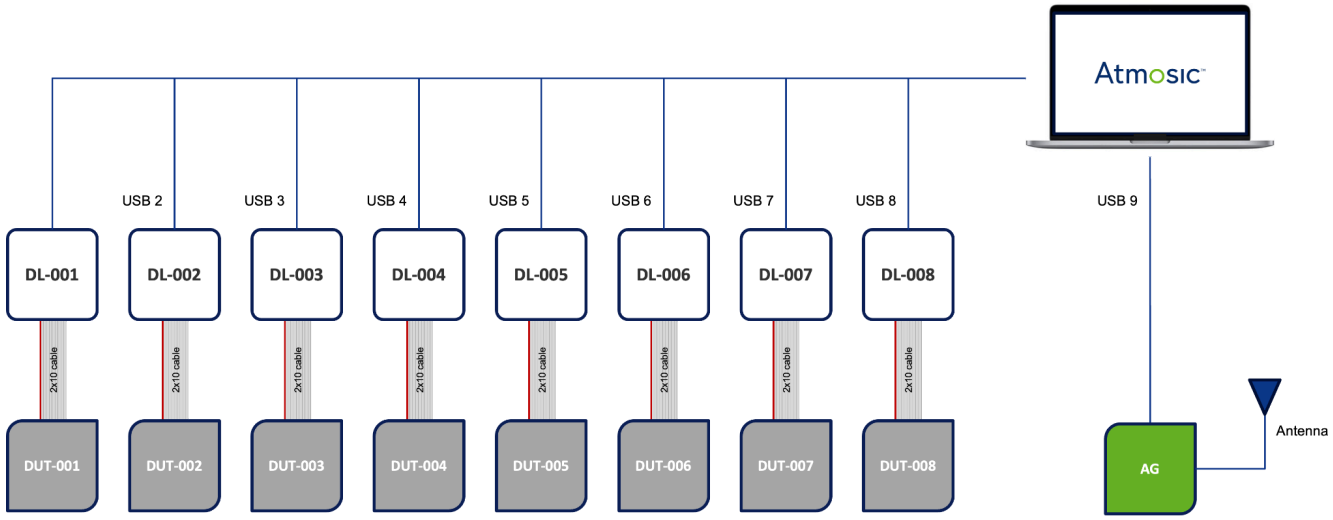



*Figure 3-5 Connection Block Diagram Between PC, DL, AG, and DUT*

## 3.3 DL Board FT4232 EEPROM Update

- Download the zip file and install the FTDI EEPROM updated tool 'FT_Prog_v3.x.xx.xxxInstaller.zip' from https://ftdichip.com/utilities/
- Download the zip file and install the FTDI com port driver 'CDM2xxxxx_Setup.zip' from https://ftdichip.com/drivers/vcp-drivers/

1) Follow the test procedure below to update the EEPROM.

1-a) Open FT_Prog and click the 'Scan and Parse' button to find the FT4232 device

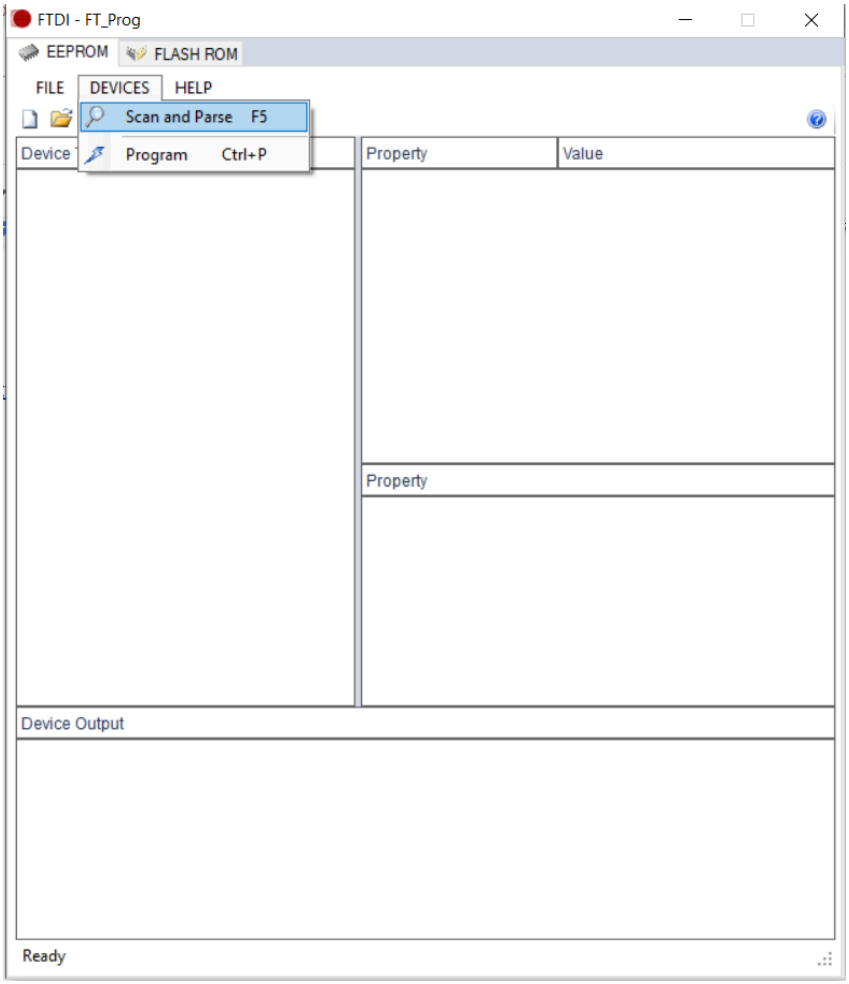



*Figure 3-6 FT_Prog: Scan and Parse*

1-b) Enable ‘Pull Down IO Pins in USB Suspend’

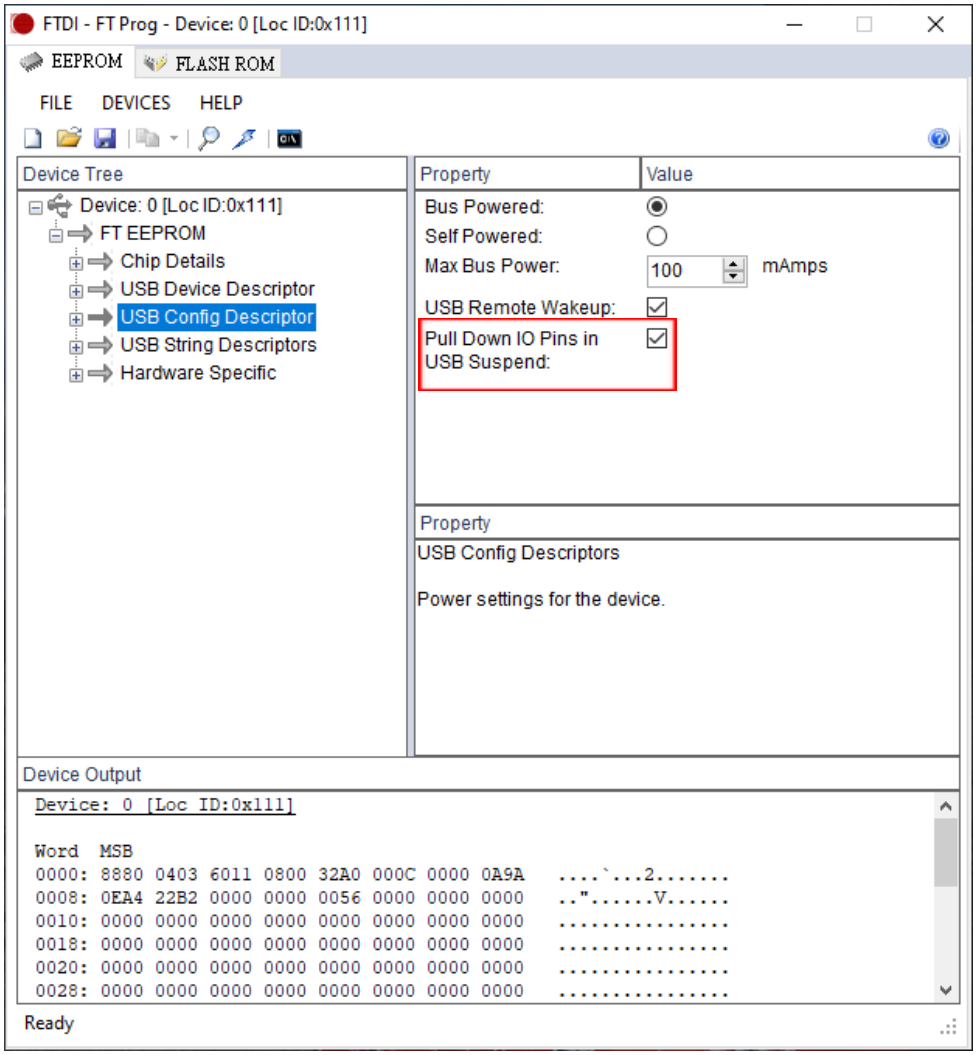



*Figure 3-7 FT_Prog: Pull Down IO Pins in USB Suspend*

1-c) Change the ‘Production Description’ and ‘Serial Number’ as follows:

- Production Description: ATMDL
- Serial Number: The format is like ATMDL000000XXX (XXX is the board ID that show on the MP Tool)

1-d) Change Port A function to ‘D2XX Direct’

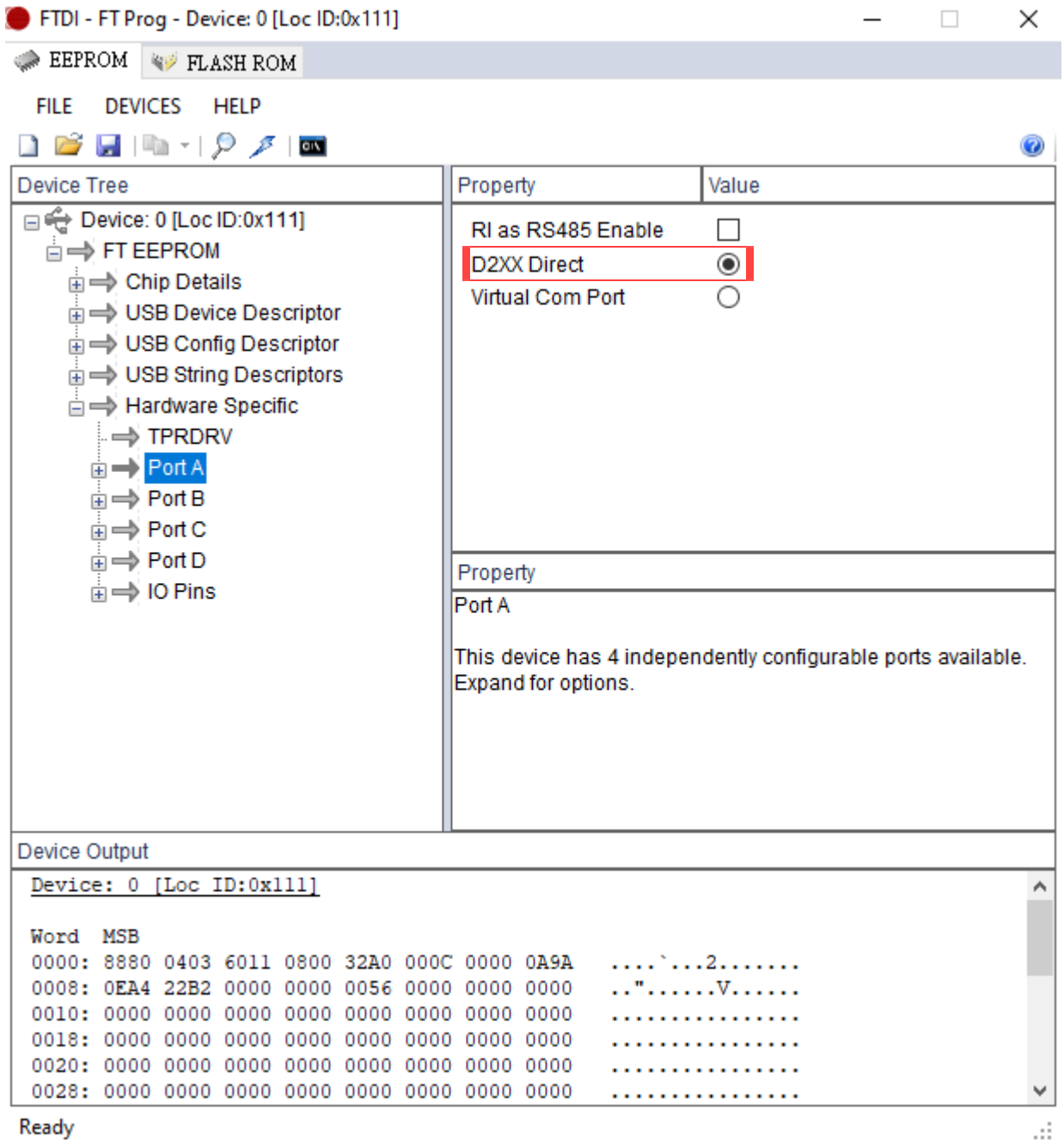



*Figure 3-8 FT_Prog: Change Port Function*

1-e) Program EEPROM and plug in the USB connector

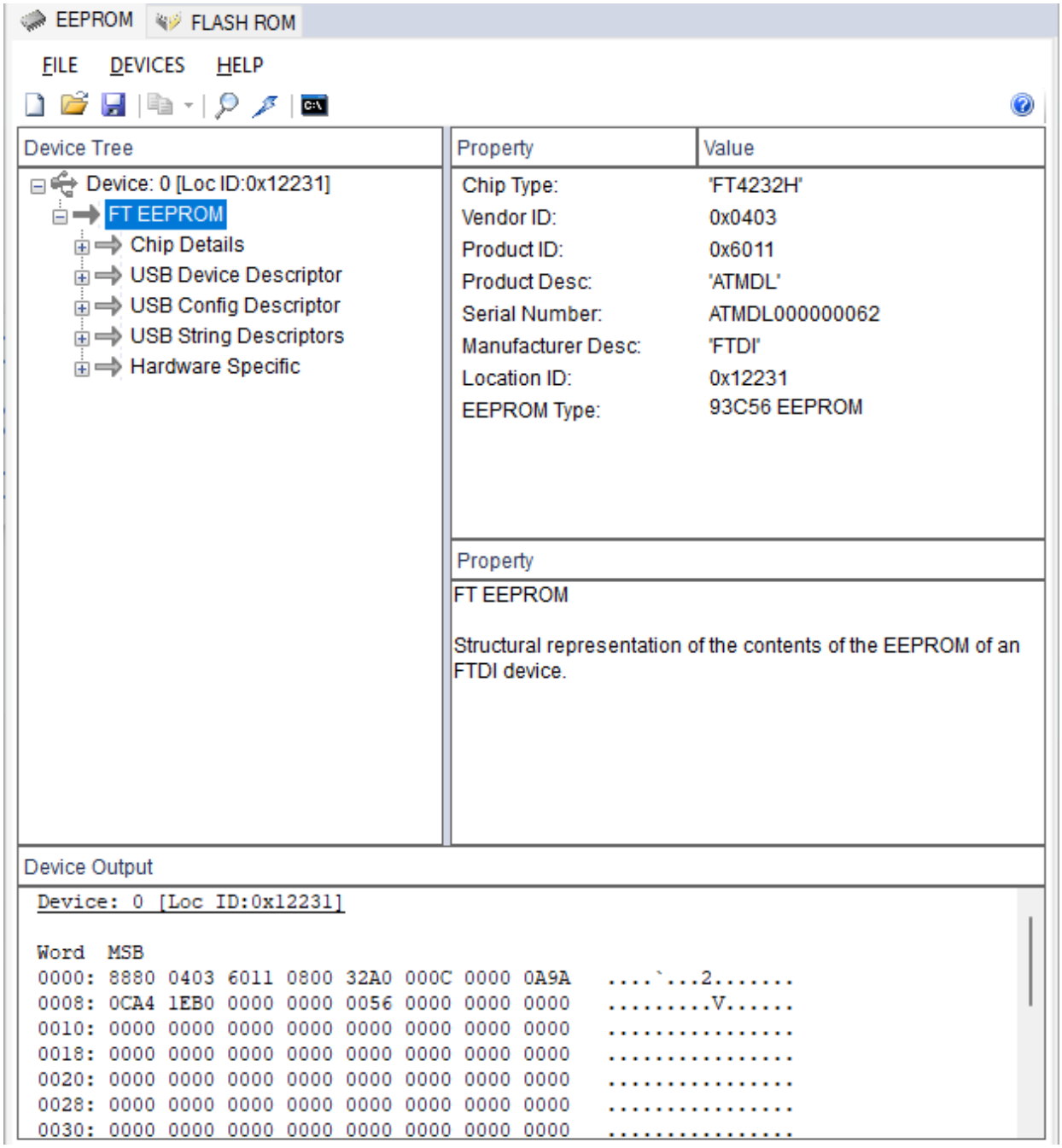



*Figure 3-9 FT_Prog: Program EEPROM*

# 4. Hardware Setup

There is a Type-B USB port on the DL board or the AG board that is connected to the FTDI chip FT4232H, which provides four UART ports.

The test point connector is the interface between the DUT and DL board as shown in Figure 4-1. It provides a host computer access to some commonly needed interfaces to the DUT such as:

- Power and Ground:
  - VBAT
  - VCCIO
  - GND
- Serial Wire Debug (SWD):
  - SWDCLK
  - SWDIO
- 4-wire HCI UART for RF Test Control:
  - UART0_TXD
  - UART0_RXD
  - UART0_CTS: Optional
  - UART0_RTS: Optional
- Status Control Signal:
  - PWD: Used to Reset/PWD the DUT
  - BBOOT: Used to configure the DUT into CPU idle state for programming OTP and Flash

- TMC: Test Mode Control, pull high to enable Test Mode, which enables SWD. If TMC is already pulled high on the DUT side, this pin doesn't need to be connected

- Debug UART:
  - UART1_TXD: Optional, for debugging only

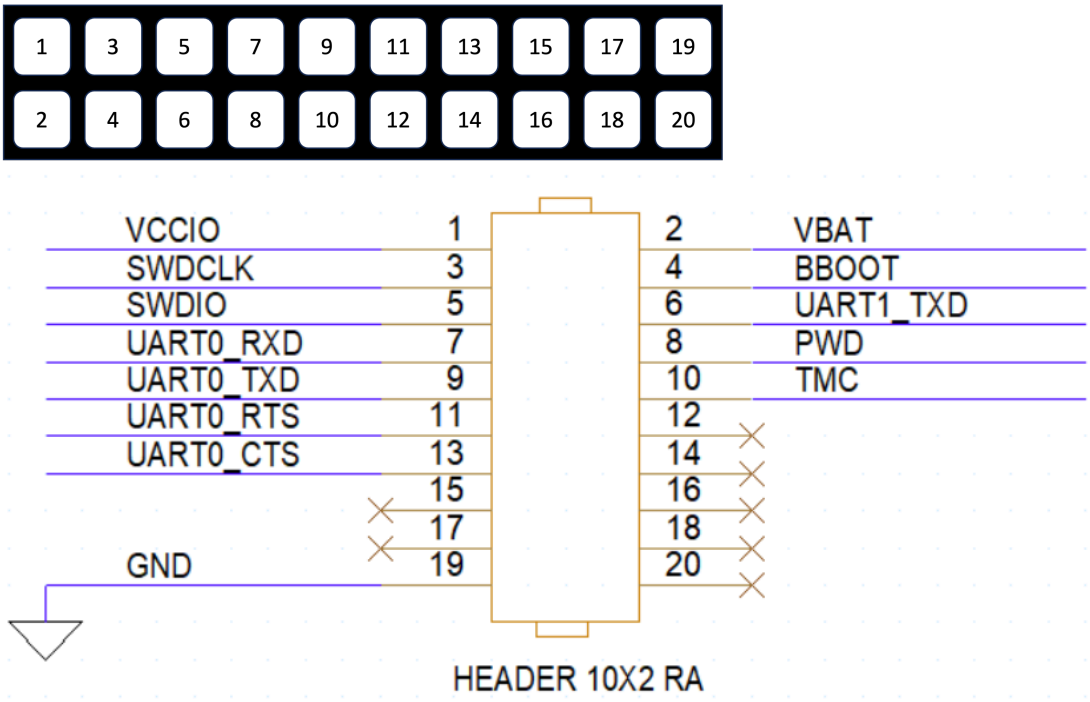



*Figure 4-1 Test Point Connector Pin Definition*

# 5. DUT Design Requirements for Manufacturing

The DUT must have a matching set of headers or test points that allow the DL board to connect to it for downloading firmware or executing mass production tests by the MP Tool. The interface between the DUT and DL is shown in Figure 4-1.

The MP Tool's configuration for UART to GPIO mapping must match the DUT. This configuration is detailed in the Burn test code section.

# 6. Software Setup

## 6.1 Uninstall Any Previous Versions of the MP Tool

If any earlier version of the MP Tool was installed, execute its uninstaller located at *C:\AtmosicMP\unInst_MP.exe* and wait for the uninstaller to complete. Then click Close. See Figure 6-1.

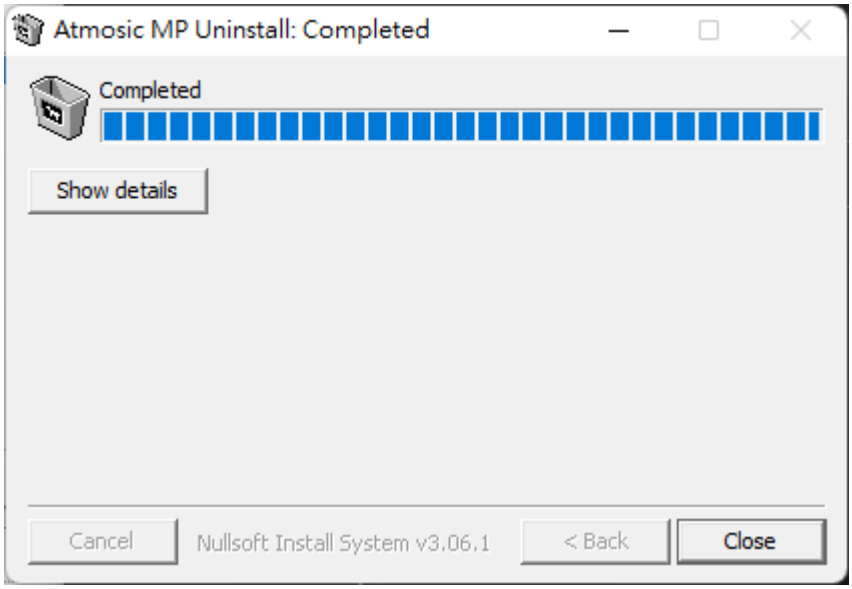



*Figure 6-1 Uninstall Previous MP Tool Version Completed*

## 6.2 Install Atmosic MP Tool

The setup package of Windows Installer for the Atmosic MP Tool is a compressed file named *AtmosicMP_Inst_20xxxxxx_vx.x.x.x.zip*. Extract the file and double-click the *AtmosicMP_Inst_20xxxxxx_vx.x.x.x.exe* to start the Atmosic MP Tool Installer.

The Atmosic MP Tool will occupy up to 75 MB of disk space and should be located in the *C:\AtmosicMP* folder. Ensure enough disk space is available before installing the Atmosic MP Tool. Click the `Install` to continue.

Figure 6-2 shows the Atmosic MP Tool Destination Folder.

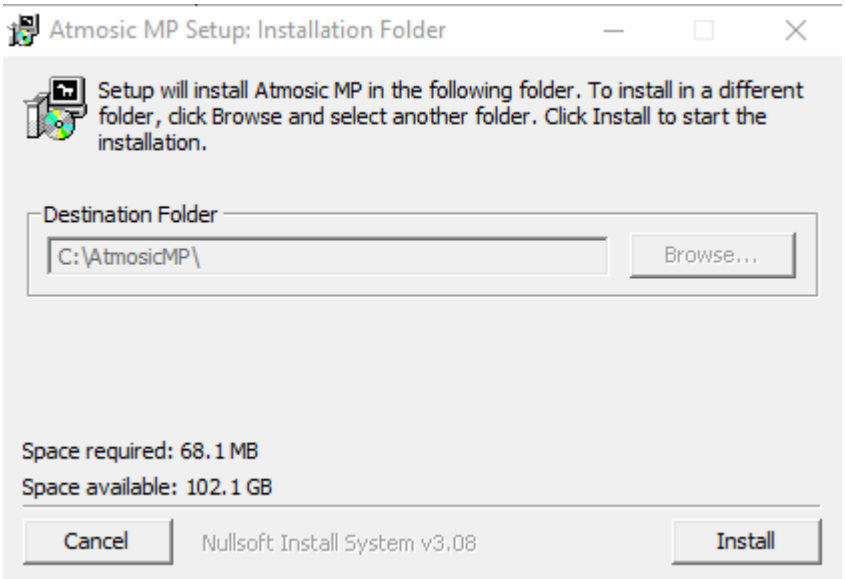



*Figure 6-2 Atmosic MP Tool Destination Folder*

Figure 6-3 shows the screen after the installer is completed. The installer will create a folder named AtmosicMP in Start Menu\Atmosic, and create shortcuts to invoke Atmosic MP Tool features that will be discussed in the next section.

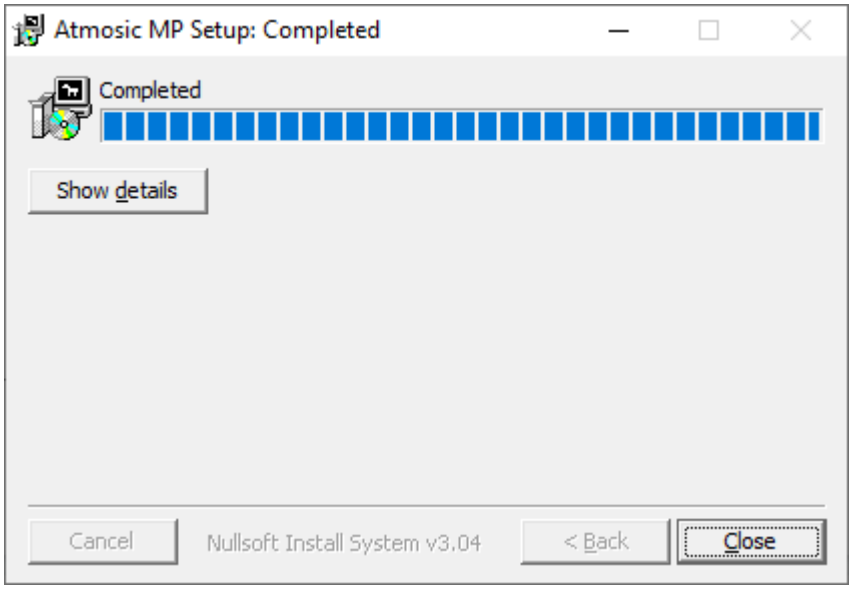



*Figure 6-3 Atmosic MP Tool Setup Completed*

## 6.3 Atmosic Production Tool Shortcuts

The Atmosic Production Tool Installer will create shortcuts in Start Menu\AtmosicMP after the installer is completed. The shortcuts include installing or removing the MFx interface and MP API document as shown in Figure 6-4.

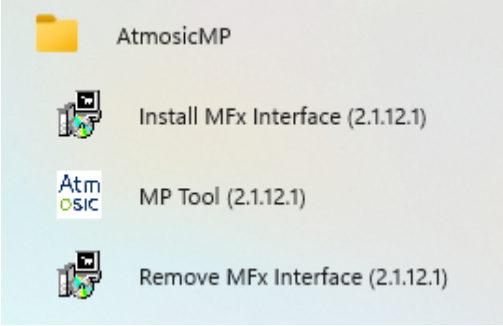



*Figure 6-4 Start Menu Shortcuts*

## 6.4 Install MFx Interface

Connect the DL board or the AG board to the laptop and wait for approximately 30 seconds to install the FTDI driver. If the computer cannot install this automatically, download the D2xx driver from the FTDI website and install it manually.

Open the Windows Device Manager (open the Run dialog box by pressing and holding the Windows key, then press the R key).

Type in devmgmt.msc then click *OK* to verify whether the Atmosic MFx interface existed or not.

If there are 4 COM ports listed in the Device Manager after plug-in of the DL board or the AG board to the laptop as shown in Figure 6-5, click the Install MFx Interface shortcut in the Start Menu/AtmosicMP folder. The COM port numbers were assigned by the Windows OS.

If not, download the FTDI driver and install it before installing the MFx interface driver.


*Figure 6-5 COM Port Setup in Device Manager*

The first COM port (such as COM3 in Figure 6-5) is used to program firmware, NVDS, or OTP. (Need to change to Atmosic MFx driver)

The second COM port (such as COM4 in Figure 6-5) is used to dump logs from DUT.

The third COM port (such as COM5 in Figure 6-5) is used to communicate between Atmosic DUT and laptop through HCI commands.

The fourth COM port (such as COM6 in Figure 6-5) is not used.

Install the Atmosic MFx driver, see Figure 6-6.

The install can be found under the Start Menu/AtmosicMP folder Install MFx Interface.

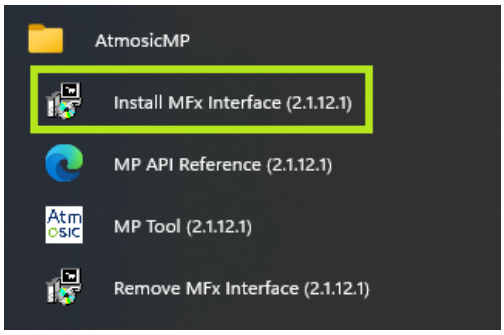



*Figure 6-6 Atmosic MFx Driver*

After installing the Atmosic MFx driver, the first COM port will change to libusbK USB Devices (such as Atmosic MFG (Interface 0) in Figure 6-7).

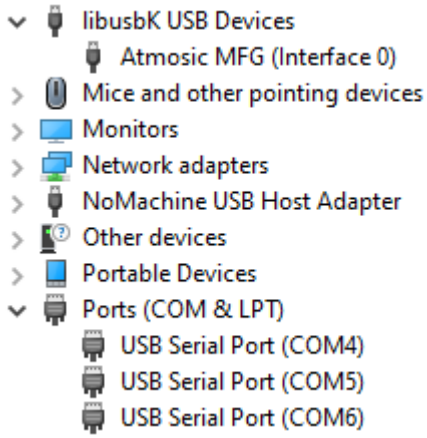



*Figure 6-7 COM Port Assignment*

## 6.5 Uninstall MFx Interface

All Atmosic MFx Interfaces that are installed in the Windows OS will be uninstalled after performing the Uninstall MFx Interface program.

# 7. Adjust Serial Port Latency Timer

Setting a lower latency timer will speed up the testing process when the test item uses the UART HCI command.

Open the Windows Device Manager (open the Run dialog box by pressing and holding the Windows key, then press the R key).

Type-in devmgmt.msc then click *OK* to verify whether the Atmosic MFx interface existed or not.

As shown in Figure 7-1, for every USB Serial Port, right-click and select *Properties*.

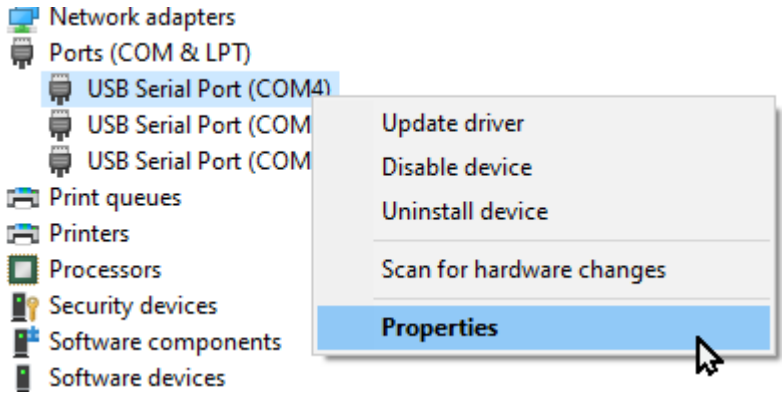



*Figure 7-1 COM Port Setup in Device Manager*

See Figure 7-2, select Port Settings, then click *Advanced.*

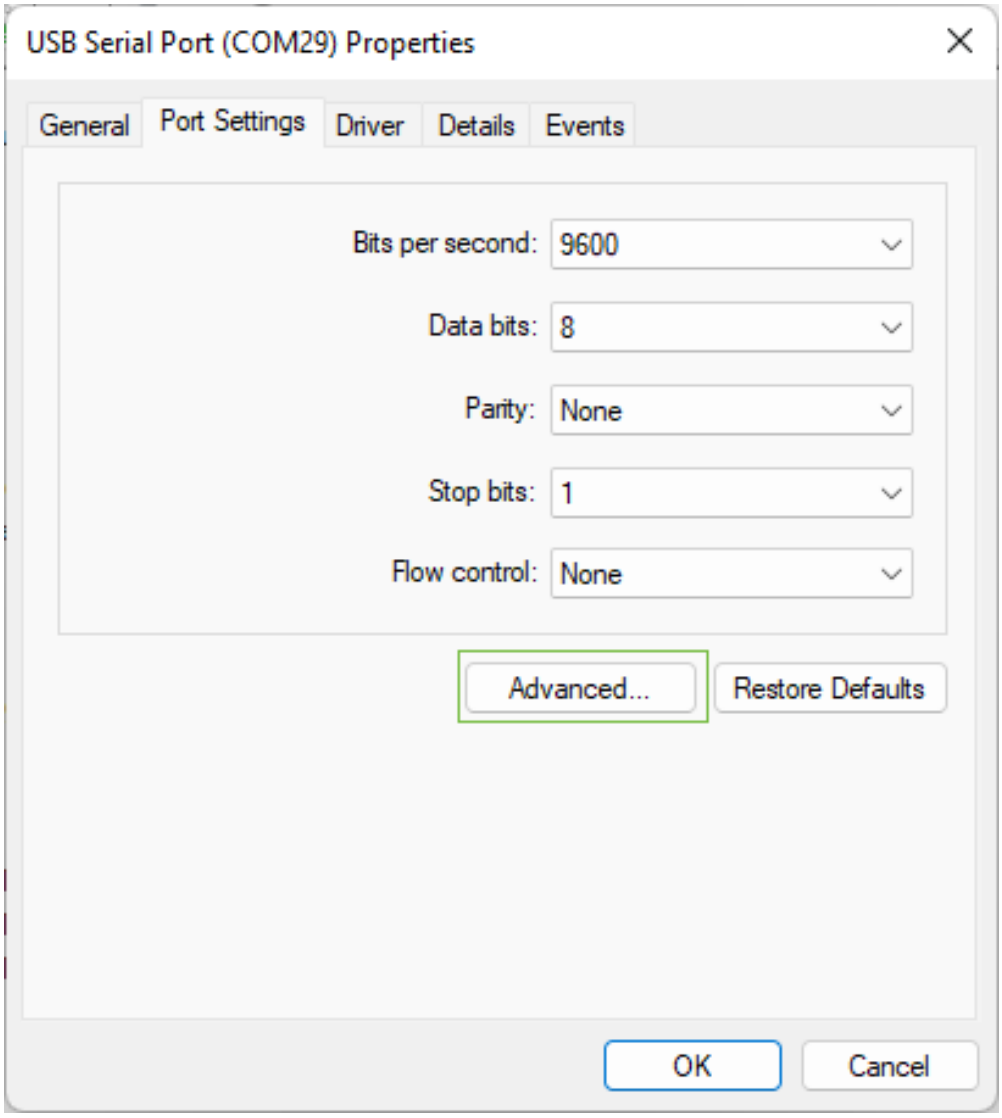



*Figure 7-2 USB Serial Port Properties*

See Figure 7-3, change `Latency Timer` to 1 msec (millisecond).

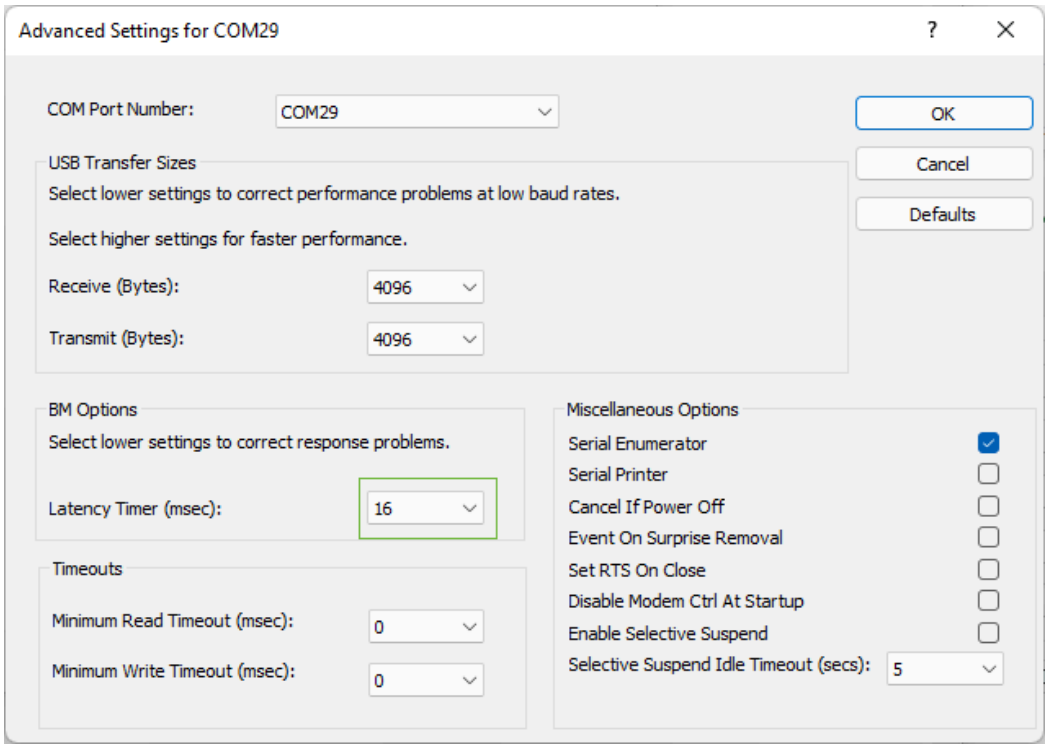



*Figure 7-3 Advanced Setting for COM Ports*

# 8. GUI Mode Quick Start

In GUI mode, refer to the settings in this chapter first, following sections are steps to quickly start testing. Launch the GUI MP Tool from the Start Menu/AtmosicMP folder.

## 8.1 Startup Dialog

The following dialog will display after running the MP Tool.

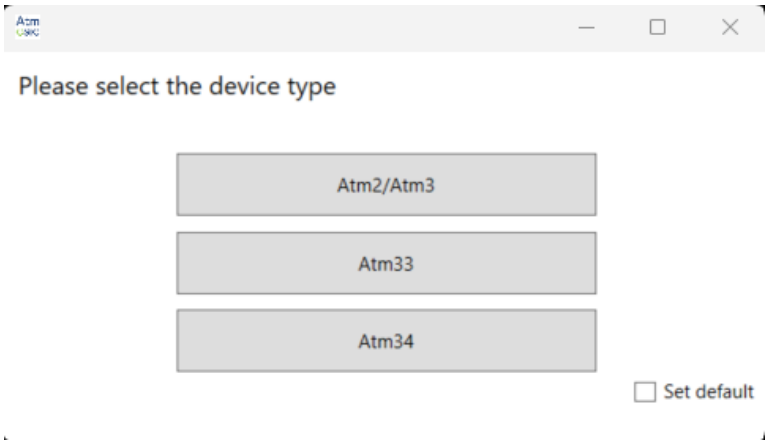



*Figure 8-1 Startup dialog*

Choose the DUT's Atmosic Wireless SoC that is being tested. To auto-select the same option next time, select 'Set default'.

## 8.2 Unlock Setting Page

When you want to modify the option in the Setting Page, you need to unlock the Setting Page first:

- Select the "Unlock" button under the "Setting" button on the Menu

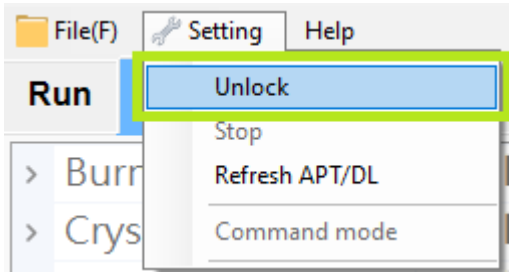



*Figure 8-2 Unlock button*

- Type in the password (the default password is Atmosic123) and press "Enter"

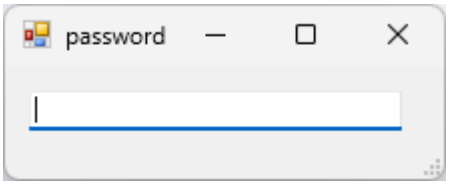



*Figure 8-3 Password window*

## 8.3 Select ATM File

To program Flash (ATM2/ATM3) or RRAM(ATM33/e and ATM34/e), choose an ATM file as shown in Figure 8-4.

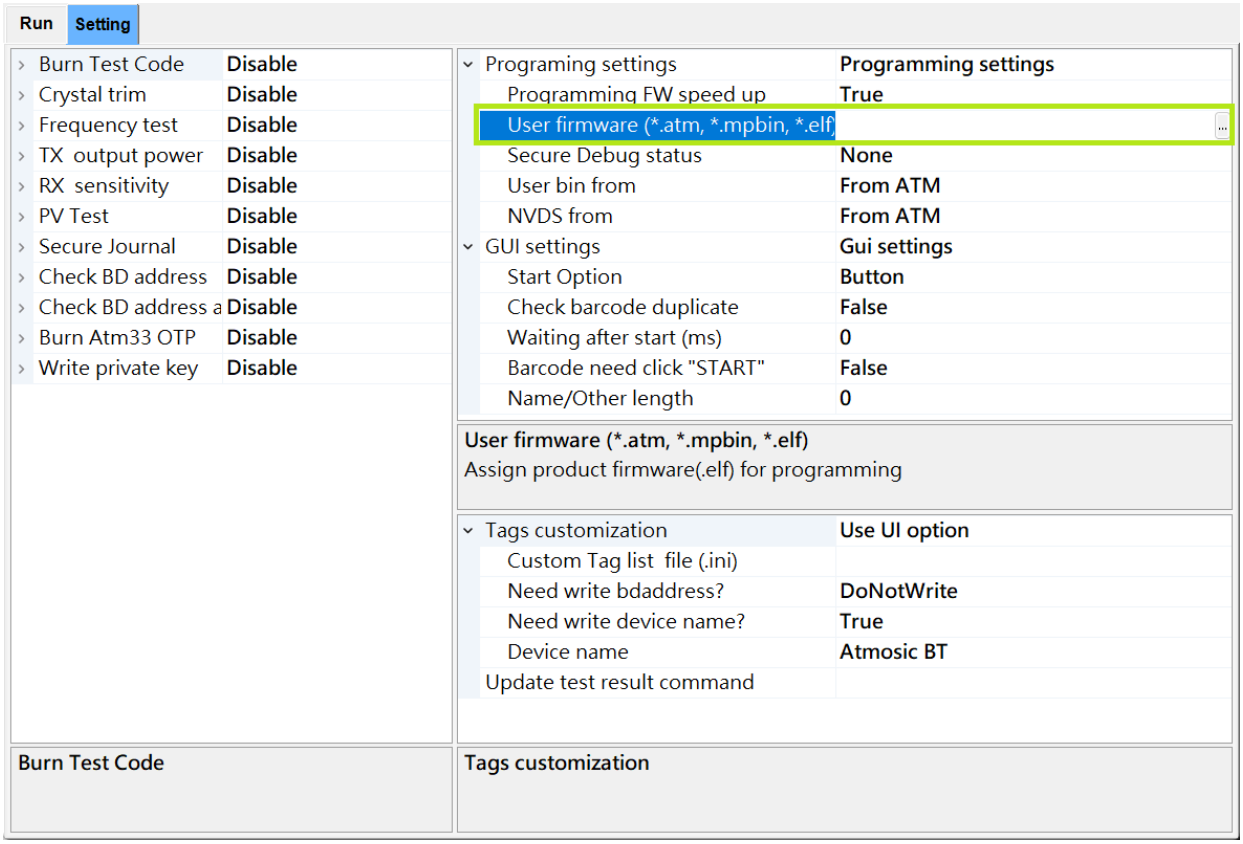



*Figure 8-4 Select ATM File*

***Note**: If ATM File is not selectable, the `Setting` Tab is in a lock state. Review* the *Unlock Setting Page to unlock the `Setting` Tab.*

## 8.4 RF Testing

### 8.4.1 Test Items

There are four test items:

- Crystal trim
- Frequency test
- TX output power
- RX sensitivity

Set these items to *Enable* to enable these items. See Figure 8-5.

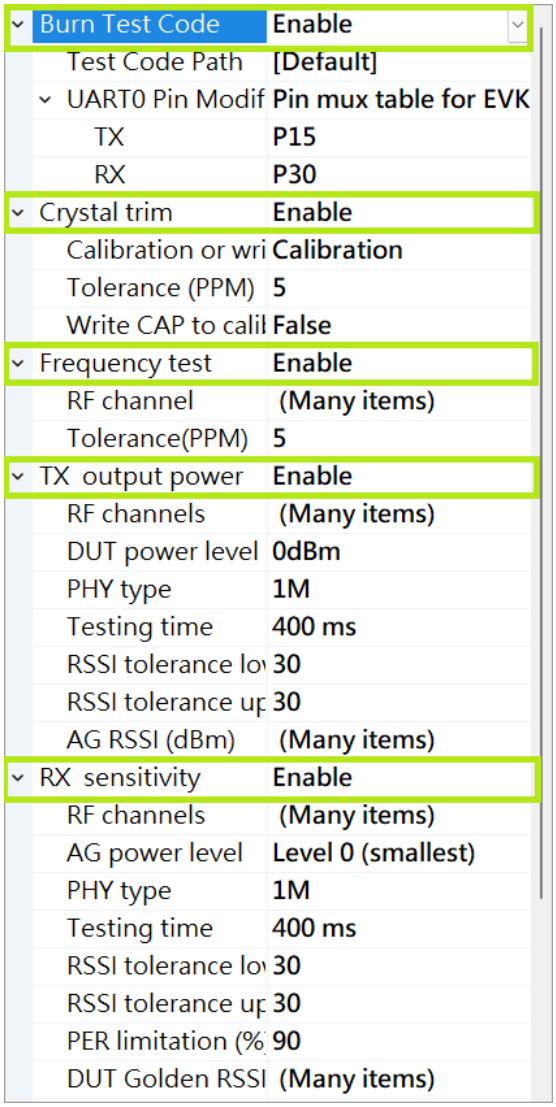
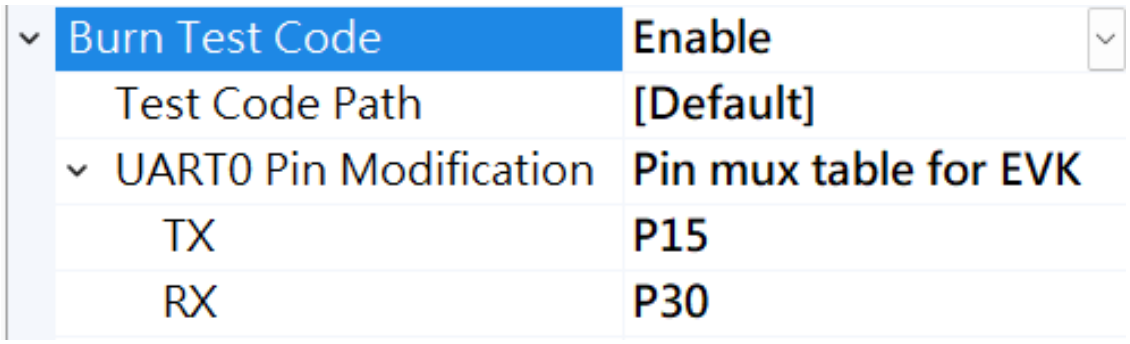



*Figure 8-5 Choose Test Options*

All RF Tests require the use of the HCI command from the HCI Vendor example in the SDK. If you do not have the HCI Vendor loaded on the DUT, the user can enable the Burn Test Code (or ATMx2xx Burn Test Code for ATM2/ATM3) and configure the correct UART pin mux for the DUT. See Figure 8-6.



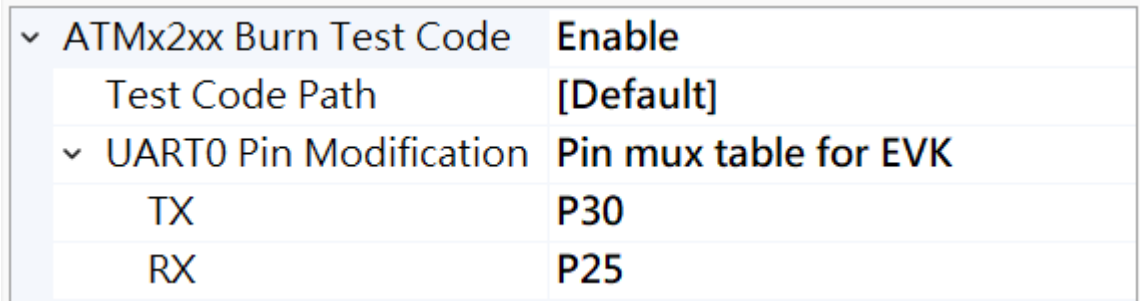



*Figure 8-6 Burn Test Code*

# 9. Atmosic Mass Production Tool User Interface

The MP Tool is used for mass production tests on ATM2/ATM3, ATM33/e, and ATM34/e Wireless SoCs. The procedure includes crystal trim, frequency test, TX test, RX test, and program firmware.

After installation, users can launch AtmMPTool.exe from the Start Menu/AtmosicMP folder of the Windows OS.

MP Tool will generate production log files for each test. These log files are saved in the log folder. It can be opened by clicking the Open Production Log Folder menu item.

See Figure 9-1.

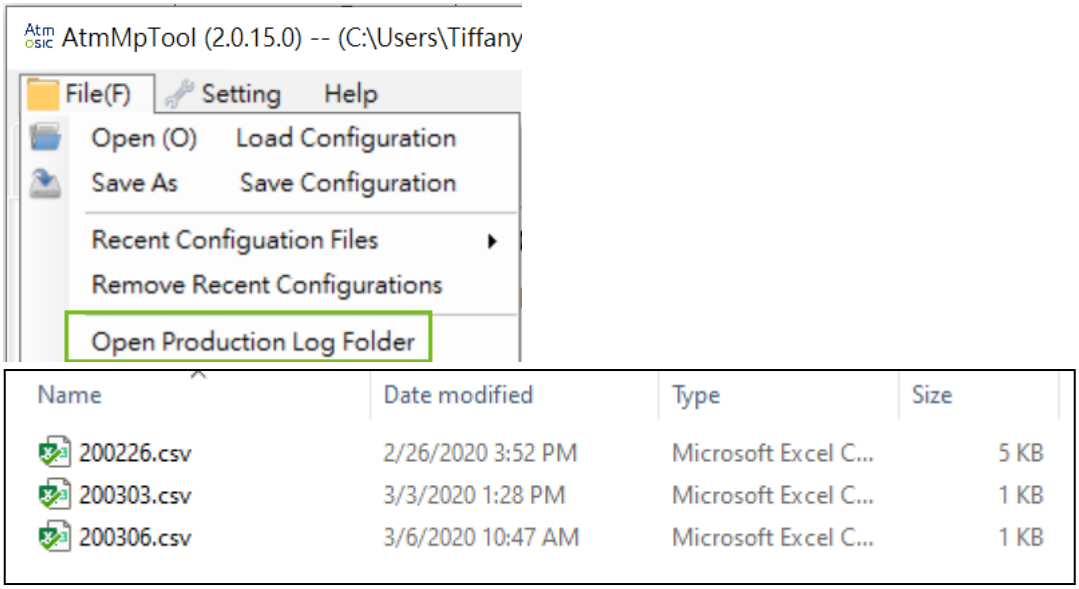



*Figure 9-1 Production Logs*

The production logs were written in .csv format and one file every day.

The GUI contains three parts:

- [Menus]: Used for saving the config, refreshing devices, unlocking the Setting Tab, and selecting a language.
- [Run Tab]: Used for controlling the running of tests.
- [Setting Tab]: Used for setting the parameters of test items.

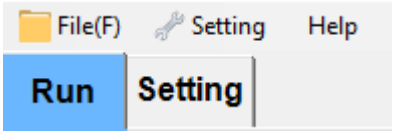



*Figure 9-2 MP Tool Run Menu*

Quick Start Operation Steps:

1) Unlock the Setting Tab. (A password is required and the initial value is Atmosic123)

2) Set the test parameters of enabled test items in the Setting Tab. (Or load setting from File)

3) Click the START button on the Run Tab to start the test on DUTs.

## 9.1 Menus

### 9.1.1 File Menu

There are five menu items as shown in Figure 9-3:

- [Open] - Load the configuration file into the application.
- [Save as] - Save the current test configuration to a file.
- [Recent Configuration Files] - Recent list of configuration files.
- [Remove Recent Configurations] - Remove the recent list.
- [Open Production Log Folder] - Open production log folder.

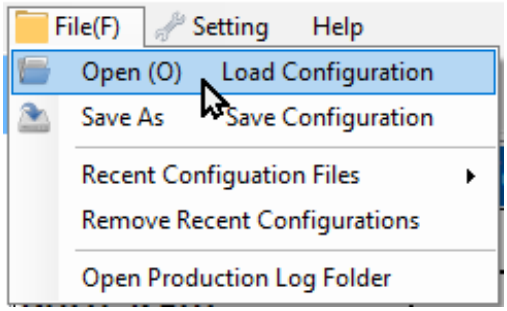



*Figure 9-3 MP Tool File Menu*

### 9.1.2 Setting Menu

There are four menu items as shown in Figure 9-4

- [Unlock] Unlock the Setting Tab from read-only mode.
- [Stop] Stop testing after testing is started.
- [Refresh DL] Search for any updated DL. Generally, DLs are searched automatically during program startup. This is used when a user plugs in/out DLs without relaunching the MP Tool.
- [Command mode] Enter command line mode, user can perform the unit test by typing predefined commands.

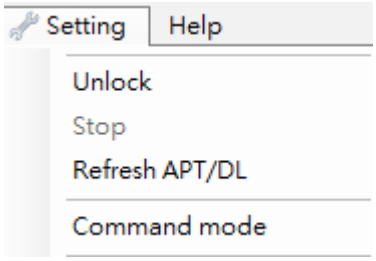



*Figure 9-4 MP Tool Setting*

### 9.1.3 Help Menu

Figure 9-5 shows the MP Tool Help Menu.

- Language: Switch the language between English and Simplified Chinese.
- About Atmosic Manufacturing Tool: Information about the tool

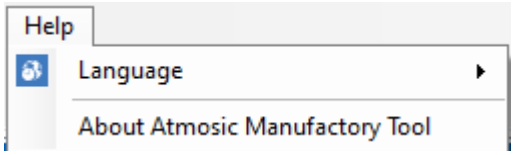



*Figure 9-5 MP Tool Help Menu*

## 9.2 Run Tab

There are three main parts in the Run Tab as shown in Figure 9-6:

1) The Start/Stop button is used for controlling each test iteration.

2) The Debug log window shows a detailed log of the current test.

3) The Test Item progression table indicates the current testing schedule.

Run Tab before testing:

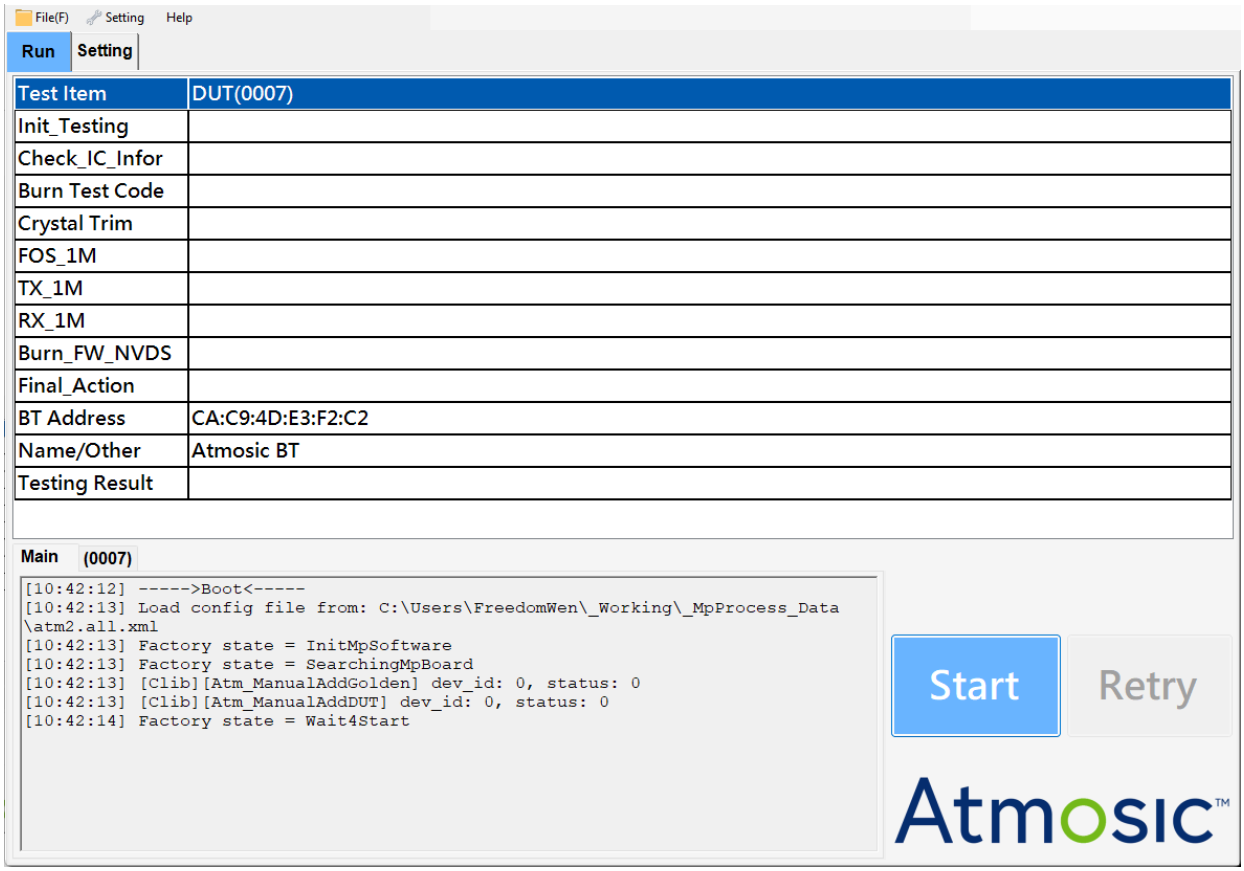



*Figure 9-6 Run Tab Before Testing*

Before running, all names of test items will show in the first column of the progression table.

Run Tab under testing:

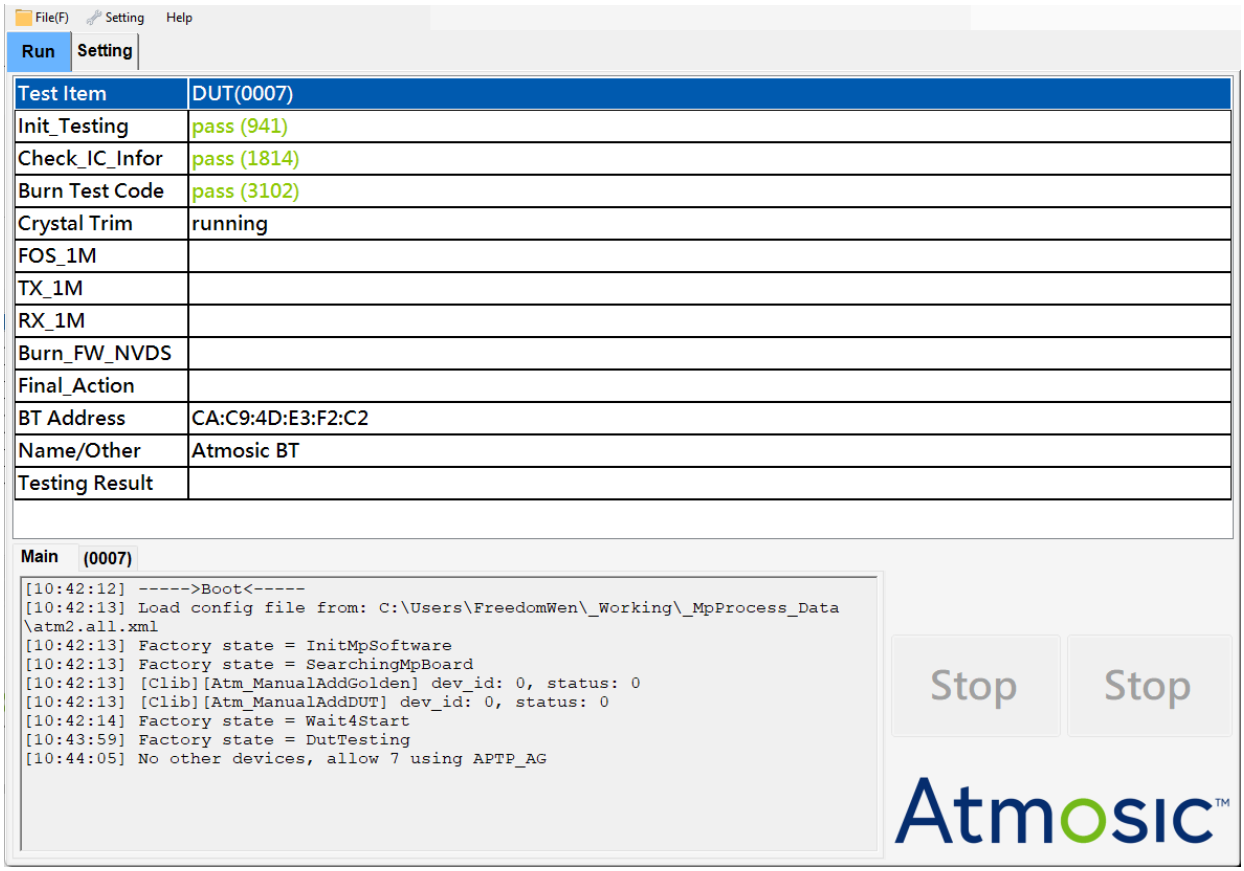



*Figure 9-7 Run Tab Under Testing*

When running, the corresponding row will show pass or fail and its execution time in milliseconds. See Figure 9-7.

Run Tab after testing is successful:

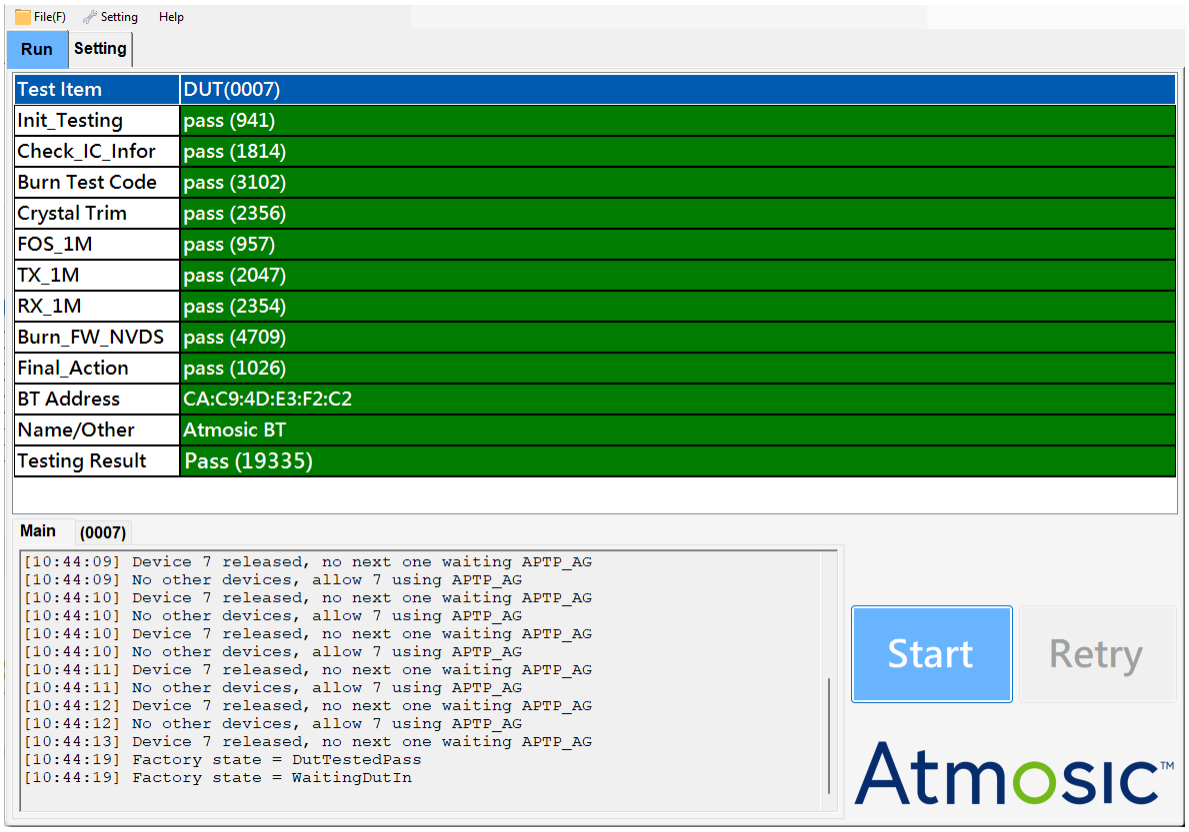



*Figure 9-8 Run Tab After Testing Success*

After it is finished and all items pass, the background will become green. See Figure 9-8.

Run Tab after testing fails:

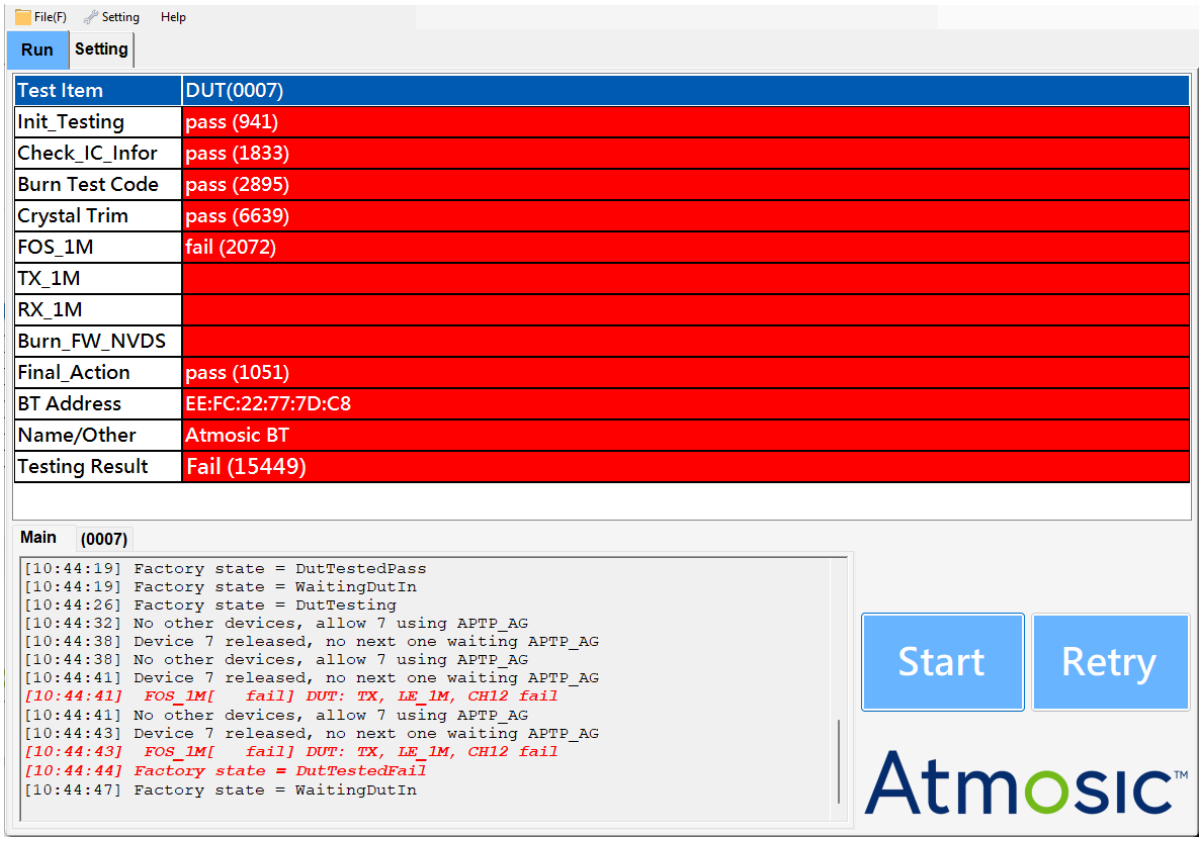



*Figure 9-9 Run Tab After Testing Fails*

The background color will become red if there is a failed item. See Figure 9-9.

## 9.3 Settings Tab

There are three main parts in the Setting Tab as shown in Figure 9-10:

1) Testing

2) Programming Flash and OTP

3) Bluetooth address and name

To start setting the parameter, unlock the Tab by clicking on the unlock menu item.

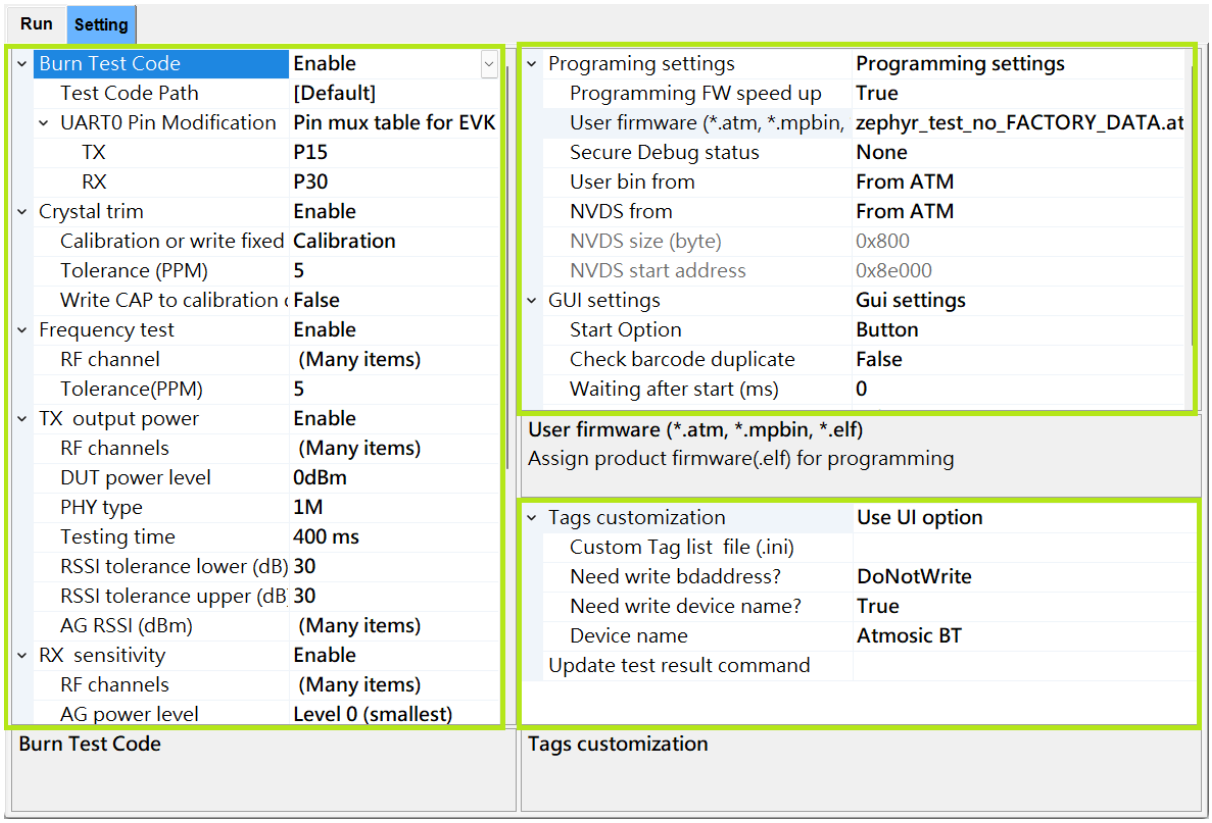
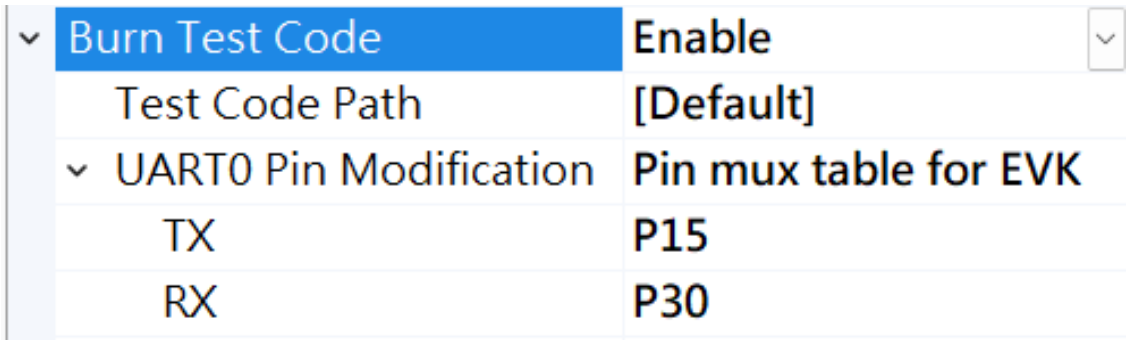



*Figure 9-10 Setting Tab*

## 9.4 Burn Test Code

All RF Tests require the use of the HCI command from the HCI Vendor example in the SDK. If the user does not have the HCI Vendor loaded on the DUT, the user can enable the Burn Test Code (or ATMx2xx Burn Test Code for ATM2/ATM3) and configure the correct UART pin mux for your DUT. See Figure 9-11.



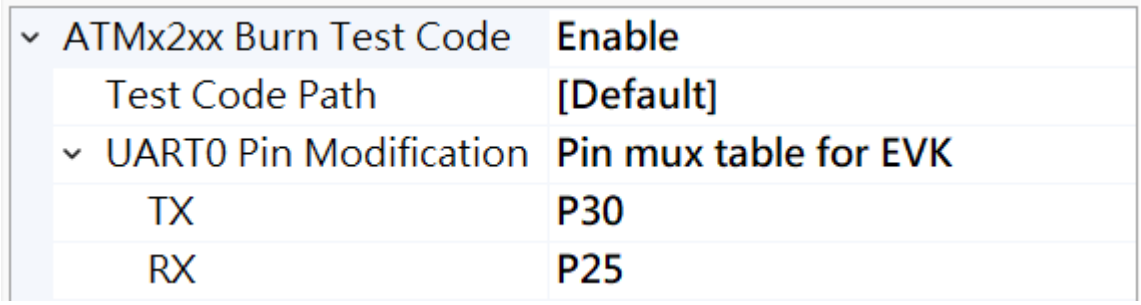
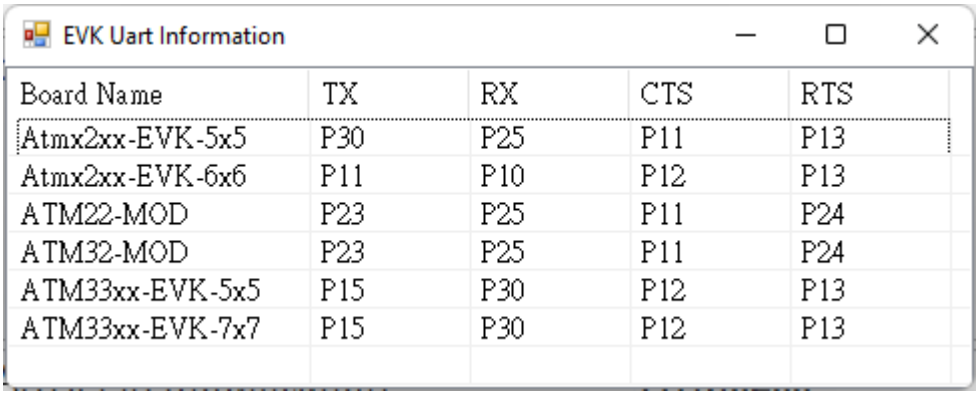



*Figure 9-11 Burn Test Code*

If your board is Atmosic's EVK or module, you can open the EVK pin table, which provides the default mappings, see Figure 9-12.




| Board Name | TX | RX | CTS | RTS |
|---|---|---|---|---|
| Atmx2xx-EVK-5x5 | P30 | P25 | P11 | P13 |
| Atmx2xx-EVK-6x6 | P11 | P10 | P12 | P13 |
| ATM22-MOD | P23 | P25 | P11 | P24 |
| ATM32-MOD | P23 | P25 | P11 | P24 |
| ATM33xx-EVK-5x5 | P15 | P30 | P12 | P13 |
| ATM33xx-EVK-7x7 | P15 | P30 | P12 | P13 |

*Figure 9-12 UART Setting for EVK (EVB) and Modules*

## 9.5 Crystal Trim

This test item trims the crystal offset by measuring the frequency offset of the crystal signal using the AG board. After trimming, users can write the crystal CAP (capacitance) to OTP in ATM2/ATM3 or Secure Journal in ATM33/ATM34. When performing Crystal Trim, the AG board will tune the capacitance of the crystal circuit and measure the frequency offset by the AG board. Figure 9-13 shows the Crystal Trim Setting.

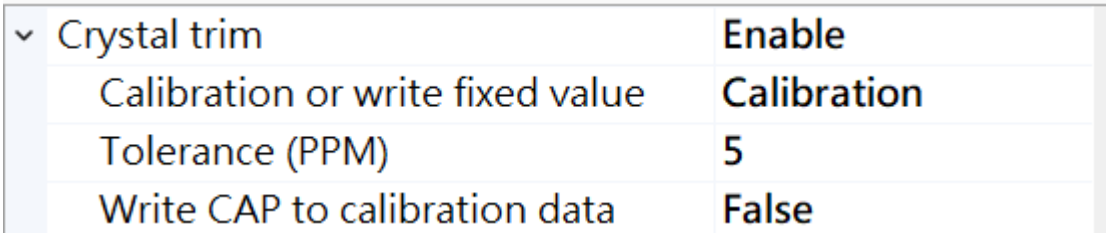



*Figure 9-13 Crystal Trim Setting*

The Calibration or write fixed value can choose this test run calibration flow or only write fixed value.

The Tolerance (PPM) is the accuracy requirement of crystal trim.

Set the `Write CAP to calibration data` to `True` will overwrite the CAP to the calibration area.

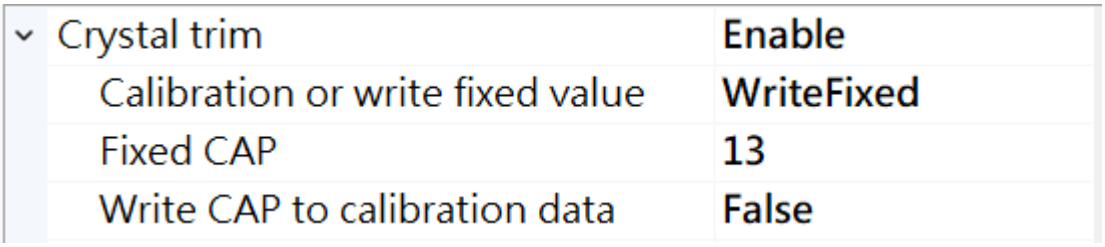



*Figure 9-14 Crystal Trim settings for writing fixed CAP value*

Set the `Calibration or write a fixed value` to `WriteFixed` will use the Fixed CAP value for each test. The Fixed CAP is used when you want to write the same CAP for all DUTs. Figure 9-14 shows the Crystal Trim Setting.

See Figure 9-15 for test status.

```
[15:25:08]  Burn Test Code[running] started
[15:25:10]  Burn Test Code[   pass] Program RAM success.
[15:25:10]  Crystal Trim[running] started
[15:25:10]  Crystal Trim[running] 0x0D != 0x0D, trim!
[15:25:10] [Clib][Atm_MpRf16MXtalCalTest] cval: 10, Freq Delta: -22460
[15:25:11] [Clib][Atm_MpRf16MXtalCalTest] cval: 08, Freq Delta:  67626
[15:25:12] [Clib][Atm_MpRf16MXtalCalTest] cval: 0C, Freq Delta:  14159
[15:25:12] [Clib][Atm_MpRf16MXtalCalTest] cval: 0E, Freq Delta: -5126
[15:25:13] [Clib][Atm_MpRf16MXtalCalTest] cval: 0D, Freq Delta:  3906
[15:25:13] [Clib][Atm_MpRf16MXtalCalTest] trim result fval: 0D, Freq Delta:  3173
[15:25:14]  Crystal Trim[   pass] OK, CAP: 0x0D FREQ: 3173Hz
[15:25:14]  FOS_1M[running] started.
```

*Figure 9-15 Crystal Trim Test Status*

## 9.6 Frequency Test

This test measures the frequency offset of the radio. Figure 9-16 shows the Frequency Test Setting.

The `Tolerance (PPM)` is the accuracy criteria by percentage per million (PPM) for passing this test.

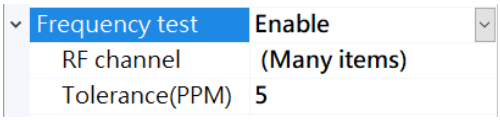



*Figure 9-16 Frequency Test Setting*

After starting the test, DUT will start to transmit continuous TX and AG will measure the frequency of the DUT. The DUT's frequency must be in the target frequency ± Tolerance (PPM).

Figure 9-17 shows the test status.

```
[15:25:14]  Crystal Trim[   pass] OK, CAP: 0x0D FREQ: 3173Hz
[15:25:14]  FOS_1M[running] started.
[15:25:15] [Clib][Atm_MpRfFosTest] Freq Delta: 4882
[15:25:15]  FOS_1M[running] CH12: Frequency offset = 4882Hz, 2.0ppm
[15:25:15]  FOS_1M[   pass] pass
[15:25:15]  TX_1M[running] started
[15:25:15]  TX_1M[running] TX Setting: LE_1M, CH00, 0dBm
[15:25:15]  TX_1M[running] DUT: TX, LE_1M, CH00, PER=11/767(1.43%), RSSI(-44)
[15:25:15]  TX_1M[running] TX Setting: LE_1M, CH12, 0dBm
```

*Figure 9-17 Frequency Test Status*

## 9.7 TX Output Power

DUT transmits continuous TX packets on the specified RF channels, power level, and PHY type, and the AG measures the DUT's RSSI Figure 9-18 shows the TX Output Power Setting.

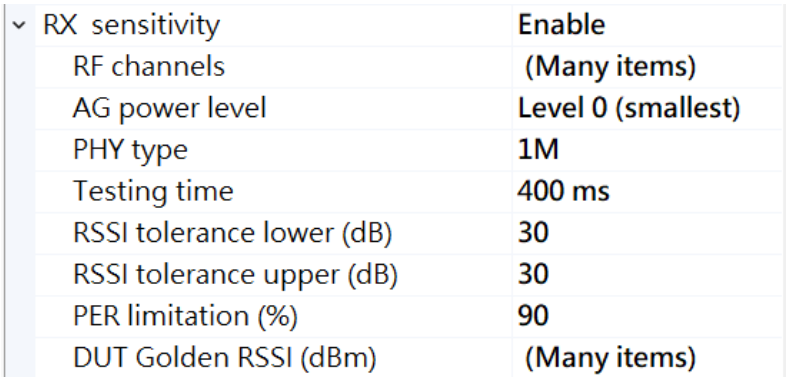
| | |
|---|---|
| TX output power | **Enable** |
| RF channels | **(Many items)** |
| DUT power level | **0dBm** |
| PHY type | **1M** |
| Testing time | **400 ms** |
| RSSI tolerance lower (dB) | **30** |
| RSSI tolerance upper (dB) | **30** |
| AG RSSI (dBm) | **(Many items)** |

*Figure 9-18 TX Output Power Setting*

The test result should be in the range of DUT power level ± RSSI Tolerance (dB). Otherwise, it will report a failure.

## 9.8 RX Sensitivity

RX Sensitivity tests the PER of the DUT. AG transmits a burst of TX packets on the specified RF channels, power level, and PHY type, and DUT starts to receive for a certain time. Figure 9-19 shows the RX Sensitivity Setting.



| RX sensitivity | Enable |
|---|---|
| RF channels | (Many items) |
| AG power level | Level 0 (smallest) |
| PHY type | 1M |
| Testing time | 400 ms |
| RSSI tolerance lower (dB) | 30 |
| RSSI tolerance upper (dB) | 30 |
| PER limitation (%) | 90 |
| DUT Golden RSSI (dBm) | (Many items) |

*Figure 9-19 RX Sensitivity Setting*

If the PER is lower than the value from the setting page, RX sensitivity passes. The default is 90%. Otherwise, it will report a failure. Figure 9-20 shows the RX Sensitivity Status.

```
[21:05:41]  RX_1M[running] RX Setting: CH0 Power:Level 1, Path Loss: 1dB
[21:05:42]  RX_1M[running] DUT:RX, LE_1M, CH00, PER=0/1198(0.00%), DUT RSSI(-72).
[21:05:42]  RX_1M[running] RX Setting: CH19 Power:Level 1, Path Loss: 1dB
[21:05:43]  RX_1M[running] DUT:RX, LE_1M, CH19, PER=0/1069(0.00%), DUT RSSI(-73).
[21:05:43]  RX_1M[running] RX Setting: CH39 Power:Level 1, Path Loss: 1dB
[21:05:44]  RX_1M[running] DUT:RX, LE_1M, CH39, PER=7/1213(0.58%), DUT RSSI(-75).
[21:05:44]  RX_1M[   pass] Success
```

*Figure 9-20 RX Sensitivity Status*

## 9.9 User Firmware (.atm, .mpbin) / NVDS file (.bin) / Tags Customization

After selecting the files to `User firmware (.atm, .mpbin)` and `NVDS file (.bin)`, the MP Tool will program the Flash after all the RF-related test items have passed through the SWD interface. Figure 9-21 shows the User Firmware/Tags Setting.

To use the enhancement method in programming FW, set `True` for Programming FW speed up.

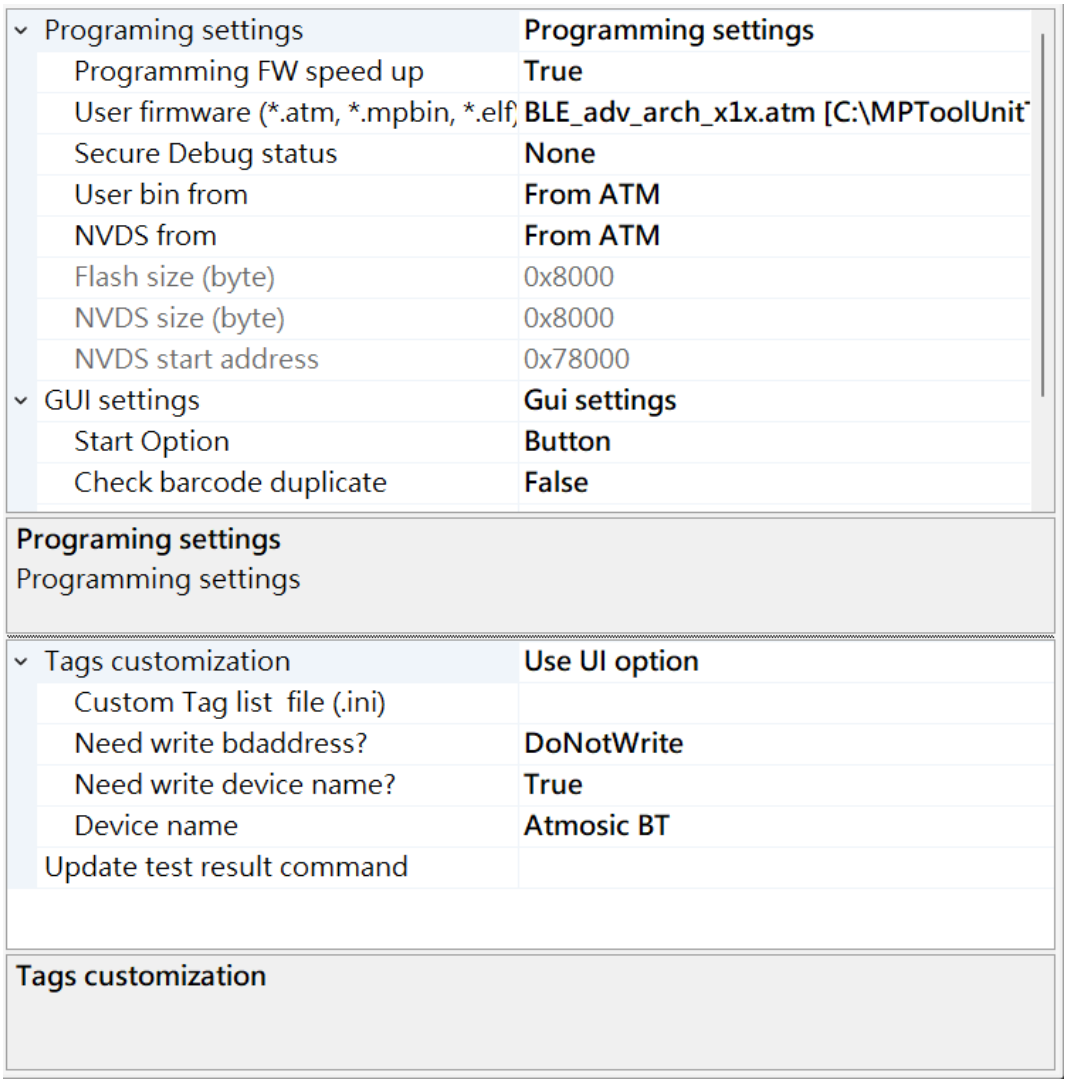



*Figure 9-21 User Firmware/Tags Setting*

### 9.9.1 Custom Tag List File

The Tags customization is used to give every DUT a different Bluetooth address, name (if needed), and application-specific tag. The application-specific tag could be defined by assigning a Custom Tag List file using the following format:

```
<Number of Entry(decimal)> = <Tag(hex)>
<Length(hex)>
0=<Data(hex)>
1=<Data(hex)>
2=...
  ...
```

*Figure 9-22 Tags customization*

Figure 9-23 shows 500 entries with tag 0xAA and its data length is 48 bytes (0x30).

```
500 = AA 30
0=e5a72e4629d341389dbe26eef485d08ab643f236356342bfa3b4f63c7cbc6558bf4f7c6a56394a018cfecac61078755f
1=646c921C03ac48bfbab22230fd36760f7e3c32f08226434ea50c3ec8ff6f3b6c32109069ce0042329e70bf4ee8b5a7c8
2=f7791bac37dc4c4ebd8882c160fd17b294e7cf1c52e94642810014ccf33d883ec1873d1ff6214239bfa3ebadc9c1a6f0
3=. . .
```

*Figure 9-23 Example of 500 Entries*

### 9.9.2 Write BD Address

The MP Tool supports writing BD addresses and Device Names. Please refer to the table below for the specific storage locations supported.

| Storage Location | Flash/RRAM NVDS (WriteToNVDS) | OTP/Secure Journal (WriteToCaliArea) | NVS(Zephyr) |
|---|---|---|---|
| BD Address | V | V | Not supported |

On Zephyr OS, BD address is stored in OTP/Secure Journal.

On the MP Tool GUI, you can switch the write position by using the settings field in the image below Figure 9-24.

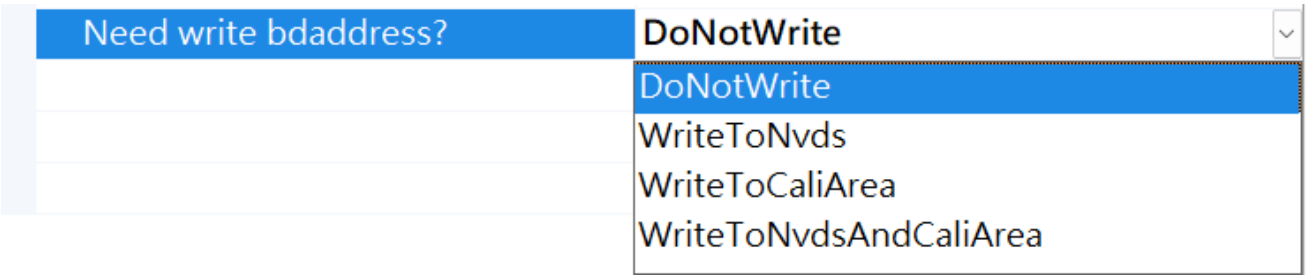



*Figure 9-24 Need to write the bdaddress*

If the "Need write bdaddress" option is set to "WriteToNvds", "WriteToCaliArea," or "WriteToNvdsAndCaliArea", the "Address generation method" will become visible, there are two kinds of address generation methods:

- Auto generate address
- Manual assignment

If auto generate address mode is selected, the address will be generated randomly as a static random address of Bluetooth standard on each DUT.

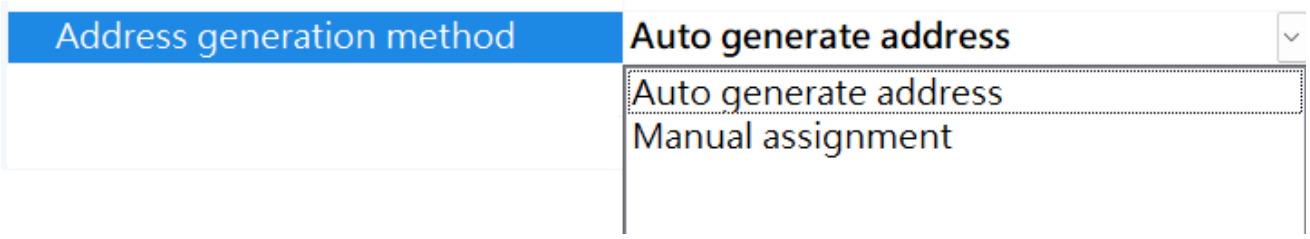



*Figure 9-25 Address generation method*

If the manual assignment is selected, the user needs to define the address range as an address pool.

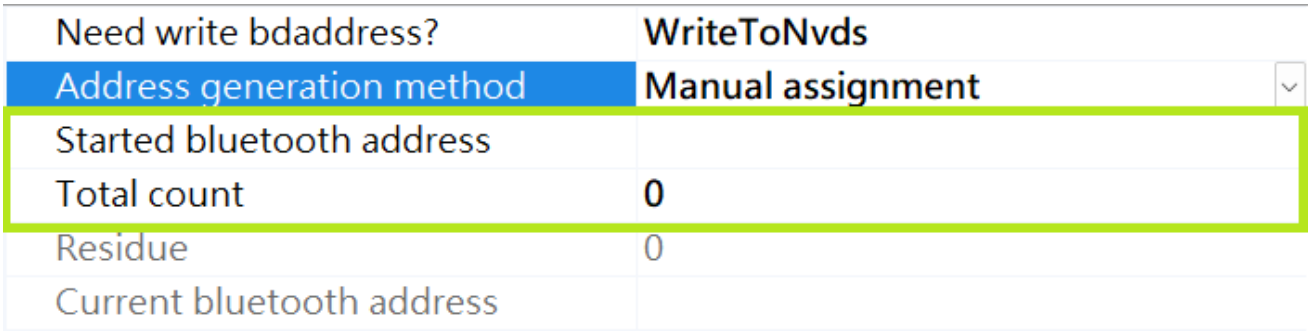



*Figure 9-26 Generate Address by Manual Assignment*

The Bluetooth address pool is started from the `Started Bluetooth address` and has a `Total count` number of addresses. These addresses will be assigned to each tested

DUT. The `Residue` indicates the number of unused addresses in the pool. The `Current bluetooth address` indicates the next address, which will be assigned to the next DUT. If DUT fails a test, the address will be reused for the next DUT.

If the pool is empty when the addresses run out, some messages will be shown to the user and MP Tool will not assign an address to DUT until the user specifies a new address pool. Figure 9-27 shows an Out of Address Error.

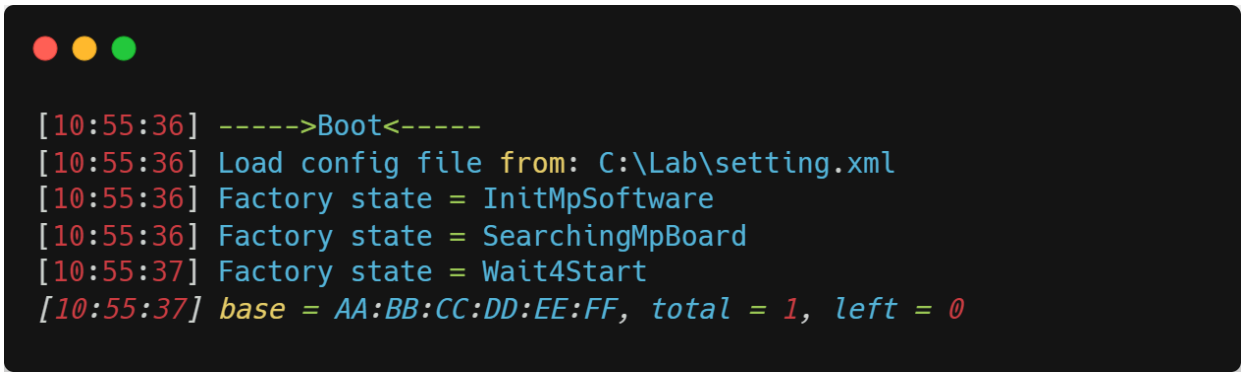



*Figure 9-27 Out of Address Error*

### 9.9.3 Write Device Name

The MP Tool supports writing BD addresses and Device Names. Please refer to the table below for the specific storage locations.

| Storage Location | Flash/RRAM NVDS | OTP / Secure Journal | NVS(Zephyr) |
|---|---|---|---|
| Device Name | V | Not Supported | V |

On the MP Tool GUI, you can switch the write position by using the settings field in the image below Figure 9-28

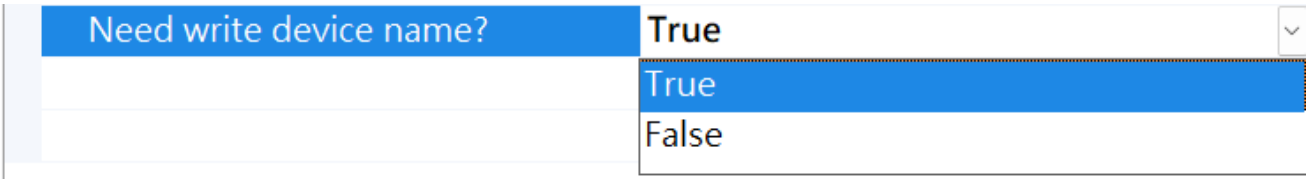



*Figure 9-28 Need write device name*

The `Device name` is used to specify the DUT's name. It could be treated with a c# string with an extra parameter of the uint64 form of the assigned Bluetooth address.

For example, if the current DUT Bluetooth address is 7C:69:6B:00:03:FF and the Device name is AT-{0:X3}, then the result would be AT-3FF.

### 9.9.4 Program Zephyr Firmware

In MP Tool, you don't need to set up Zephyr, as long as you load Zephyr's ATM, MP Tool will automatically conform to Zephyr's burning process.

## 9.10 OTP File (.nvm) (ATM2/ATM3 Only)

This property is used to assign a specific NVM file to update OTP. After selecting the file, the OTP area will be programmed in the last step of the MP Tool process. Usually, the NVM file is used for OTP applications or some complement HW parameters setting.

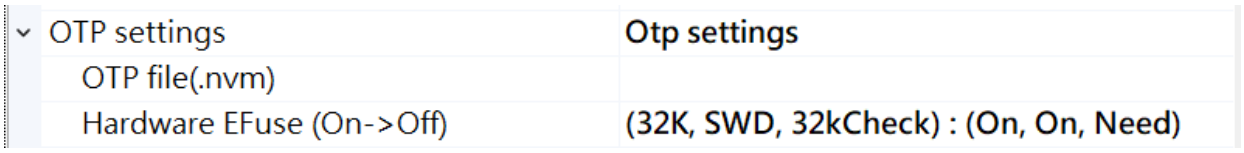



*Figure 9-29 OTP Settings*

The option “Hardware EFuse” has some options to modify the hardware config bit in the DUT, however, this is an irreversible operation. If the user wants to select this option, please have test runs to make sure the use of setting these bits is expected for your design.

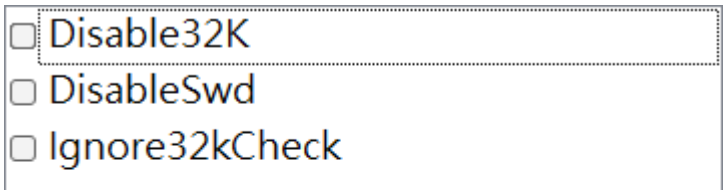



*Figure 9-30 Hardware EFuse Settings*

## 9.11 Start Option

The `Start Option` property is for users to choose how to start the MP Tool process. Currently, two options are supported, `Button Start` and `SN Input Start`.

When `Button Start` is selected, the user clicks the Start/Stop button to control the testing procedure.

When `SN Input Start` is selected, the user inputs the serial number into the SN text box and then press enter to start.

The serial number default is 12 hexadecimal letters. Figure 9-31 shows the selection of start options. Figure 9-32 shows the SN text box which waits for start.

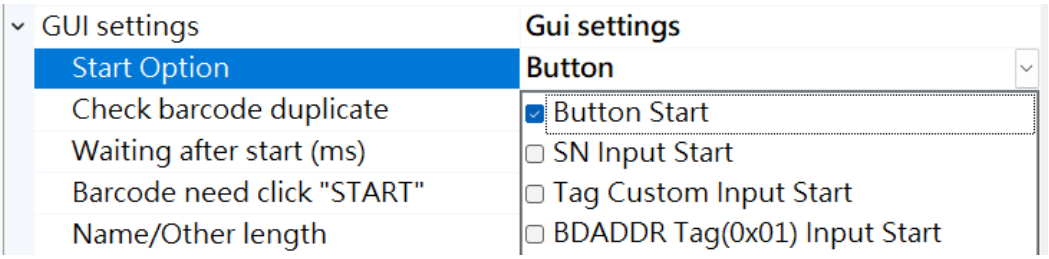



*Figure 9-31 Start Option*

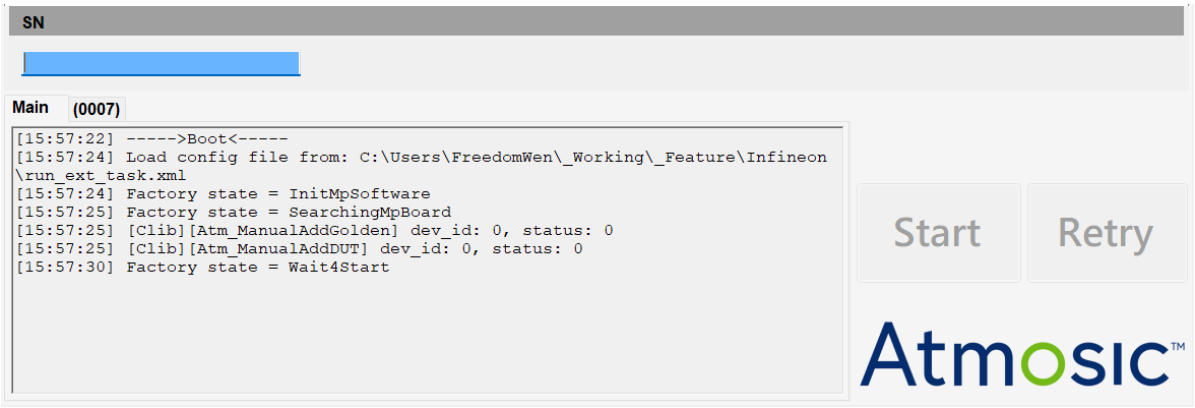



*Figure 9-32 SN Text Box*

## 9.12 PV Harvesting Test

This test is for PV harvesting-enabled applications to test their functionality by using harvesting detection signals in the ATM3, ATM33e, or ATM34e. The test setup is illustrated in Figure 9-33.

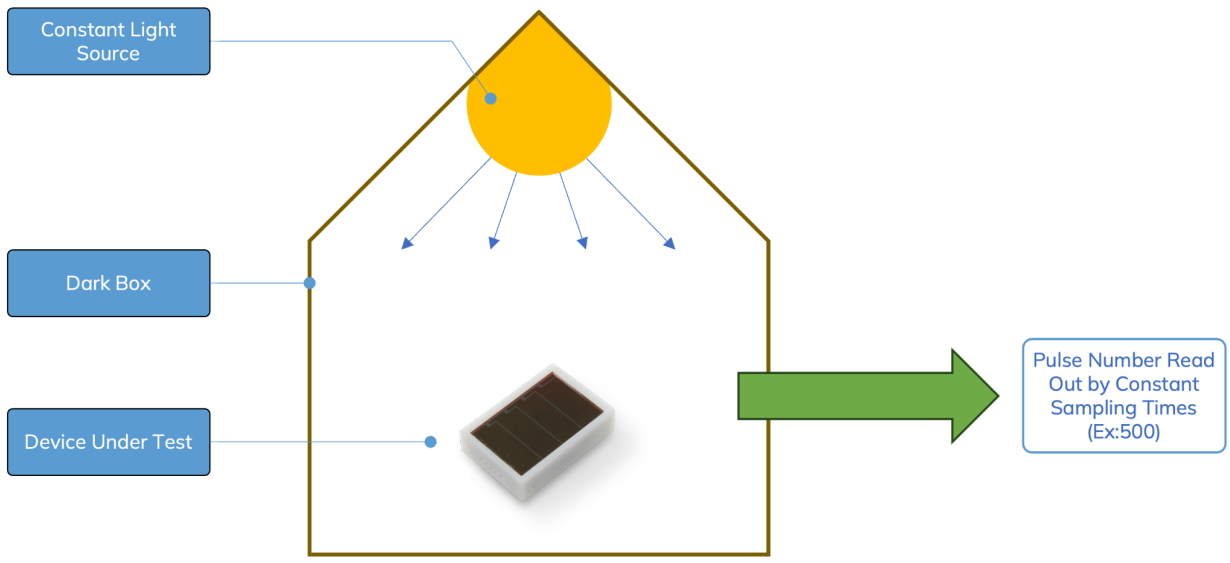



*Figure 9-33 PV Test Setup*

The harvesting detection signal monitors the incoming harvesting power from the VHARV pin and the duty-cycled behavior of the switching supply that supplies power to the chip.

This test polls the harvesting detection signal 500 times and records the times it is high to roughly estimate the harvesting power consumed by the chip, which is also an indicator of the harvesting function.

***Note**: This test only indicates if the chip harvesting function is working. It's not a precise measurement of the actual light level or harvested energy.*

Figure 9-34 shows the setting that can be adjusted based on the PV cell model and light level.

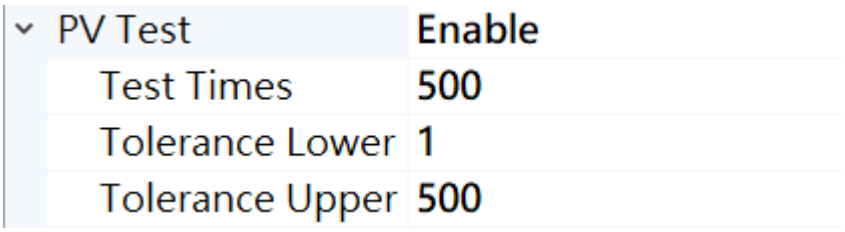



*Figure 9-34 PV Test Setting*

- Test Times
  - The number of times that polls the harvesting detection signal. The default value is 500. This is also a necessary value.
- Tolerance Lower
  - The lower limit of the harvesting power.
- Tolerance Upper
  - The upper limit of the harvesting power. The maximum value should equal the value of the Test Times.

The tolerance varies from different light levels in the production line and also different PV cell models. Atmosic suggests that customers test a batch of the DUT and find the appropriate criteria.

## 9.13 Programming User Data to External Flash (ATM33/ATM34)

This section outlines the 4 methods for managing user data.

### 9.13.1 From ATM

To load user data directly from an ATM file, you can load and set the `User bin from` to `From ATM`:

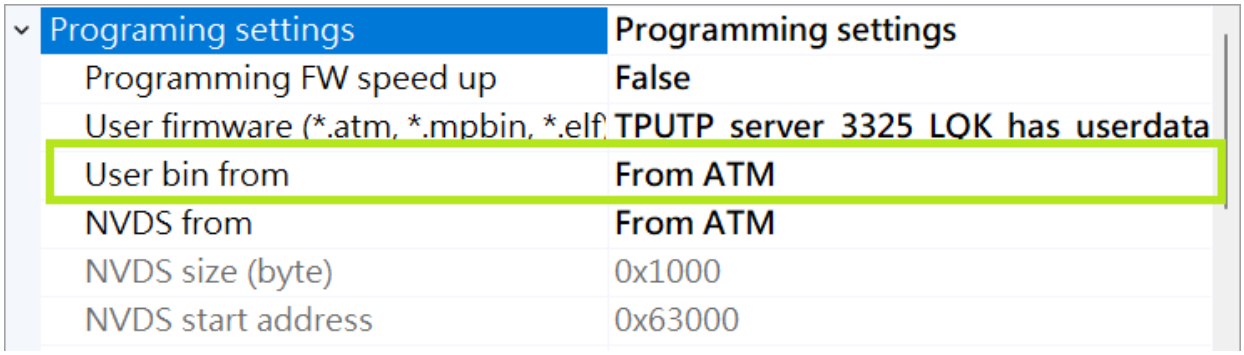



*Figure 9-35 User Data From ATM File*

Below is a command example for creating an ATM file in SDK:

```
make BOARD=ATMEVK_3330e_QN \
    USE_MCUBOOT=1 \
    ATMWSTK=PD100 \
    MCUBOOT_SECONDARY_EXT_FLASH=1 \
    USER_OTA_DATA_FILE=<user_data_bin> \
    build_archive
```

*Figure 9-36 Build ATM file command*

### 9.13.2 From User bin Setting File (XML)

If you want to be able to write independently, you can use XML setting files.

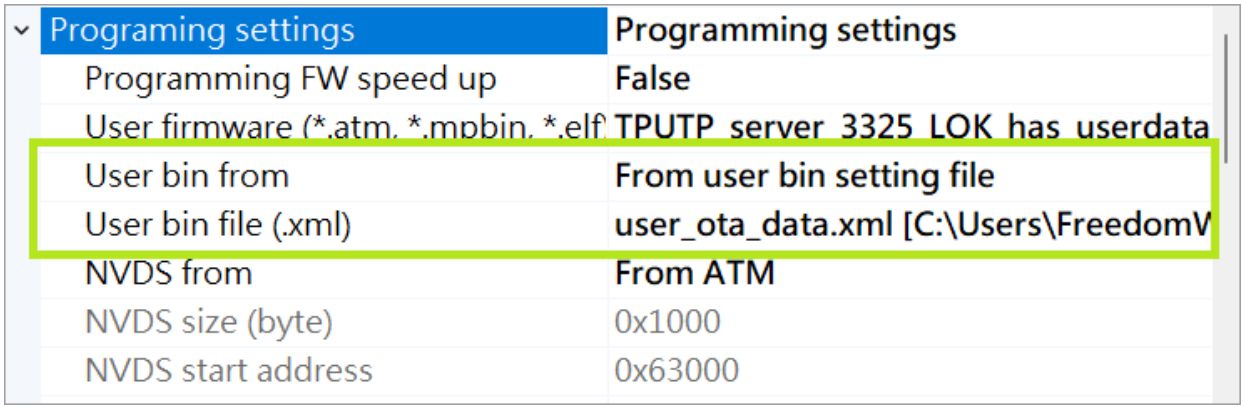



*Figure 9-37 User Data From XML Setting File*

The format of the XML setting file is as follows:

```
<?xml version="1.0"?>
<Bins>
    <Bin>
    <Name>SEC_OTA_DATA</Name>
    <Address>0x24b000</Address>
    <Region_start>0x4b000</Region_start>
    <Region_size>0xb5000</Region_size>
    <Path>D:\\TestFW\\flash_nvds.bin</Path>
    </Bin>
</Bins>
```

*Figure 9-38 XML Settings*

### 9.13.3 Merge User bin Setting and .atm File

To update some user data in an ATM file, you can use this option and load an ATM file and XML file.

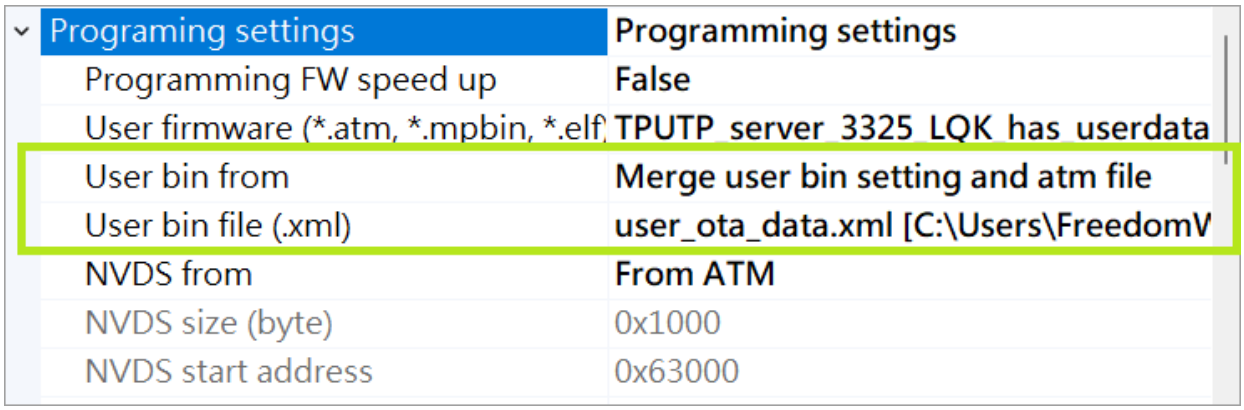



*Figure 9-39 Merge User bin Setting and atm File*

### 10.13.4 Disable Program User Data

Users who have an ATM file with User Data but the user doesn't want to write user data should use this option.

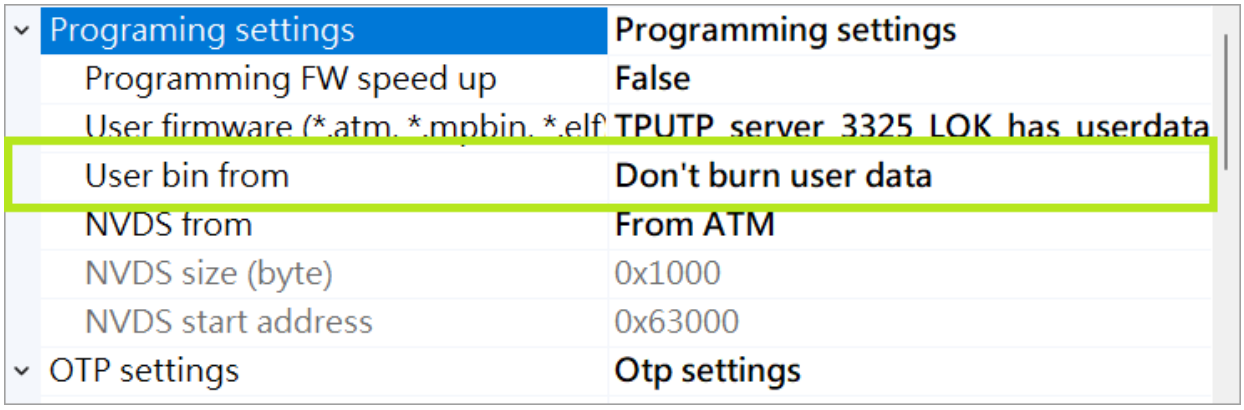



*Figure 9-40 Don't Burn User Data*

## 9.14 Programming OTP (ATM33)

***Note:*** *Changing the OTP is irreversible. Proceed with caution*.

ATM33 features a 64-bit OTP. Use the 'Burn Atm33 OTP' option for updates.

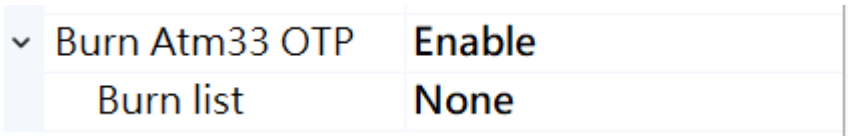



*Figure 9-41 Burn ATM33 OTP Interface*

Click on the corresponding button in the "Burn list" to open the dialog box.

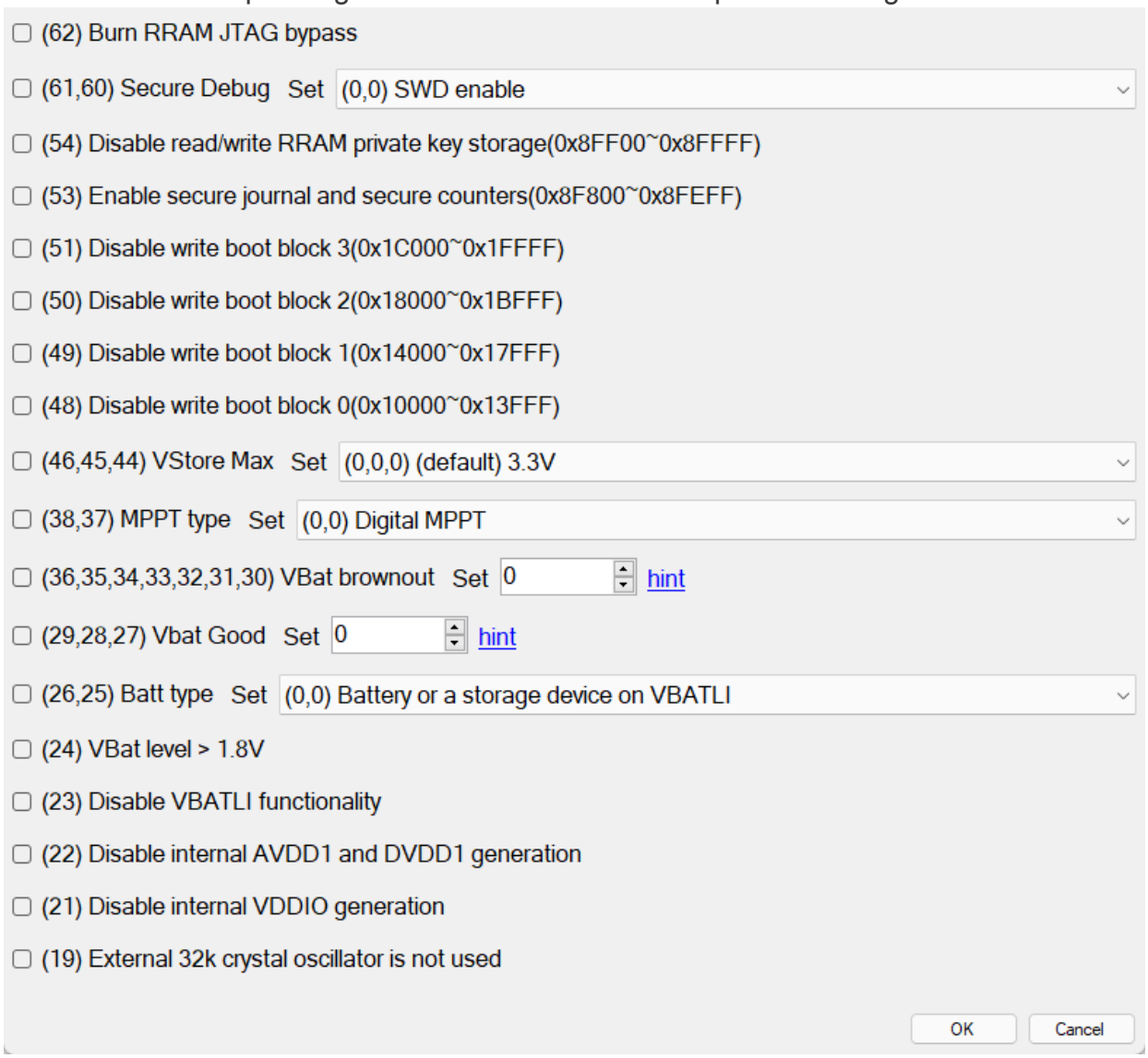



*Figure 9-42 ATM33 OTP Dialog*

The dialog contains three types of options:

1) Single-bit options


*Figure 9-43 Single-bit Option*

For single-bit options, selection is immediate and the text will turn red upon selection.

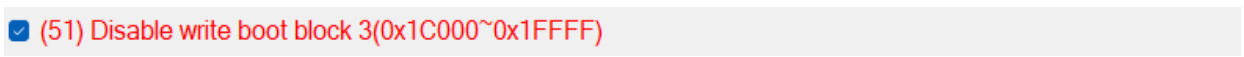



*Figure 9-44 Single-bit Option Selected*

2) Multi-bit options with dropdown selection


*Figure 9-45 Multi-bit Options via Dropdown*

3) Multi-bit options with manual value input


*Figure 9-46 Multi-bit Options via Manual Input*

For multi-bit options, a two-step confirmation is required:

a) Select the checkbox


*Figure 9-47 Checkbox Selection for Multi-bit via Dropdown*


*Figure 9-48 Checkbox Selection for multi-bit via Manual Input*

b) Enter the desired value

After both steps, the option text will turn red to indicate successful selection.


*Figure 9-49 Multi-bit via Dropdown After Checkbox and Value Set*

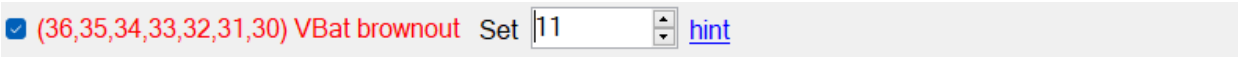



*Figure 9-50 Multi-bit via Manual Input After Checkbox and Value Set*

After setting these options and clicking ‘OK’, the dialog will notify you of the OTP bits that will be altered.

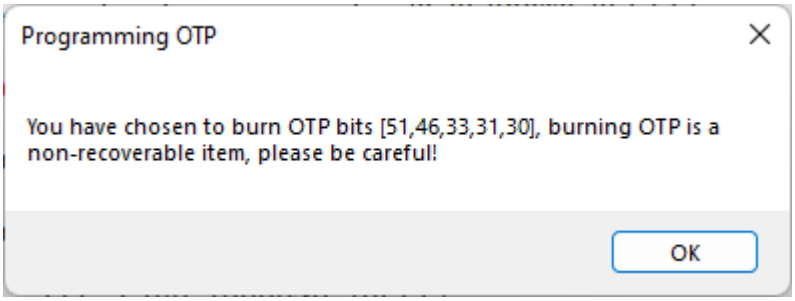



*Figure 9-51 Dialog Notification for OTP Bit Changes*

Additionally, on the Run page, a message box will appear and the corresponding test list entry will turn red as a further alert.

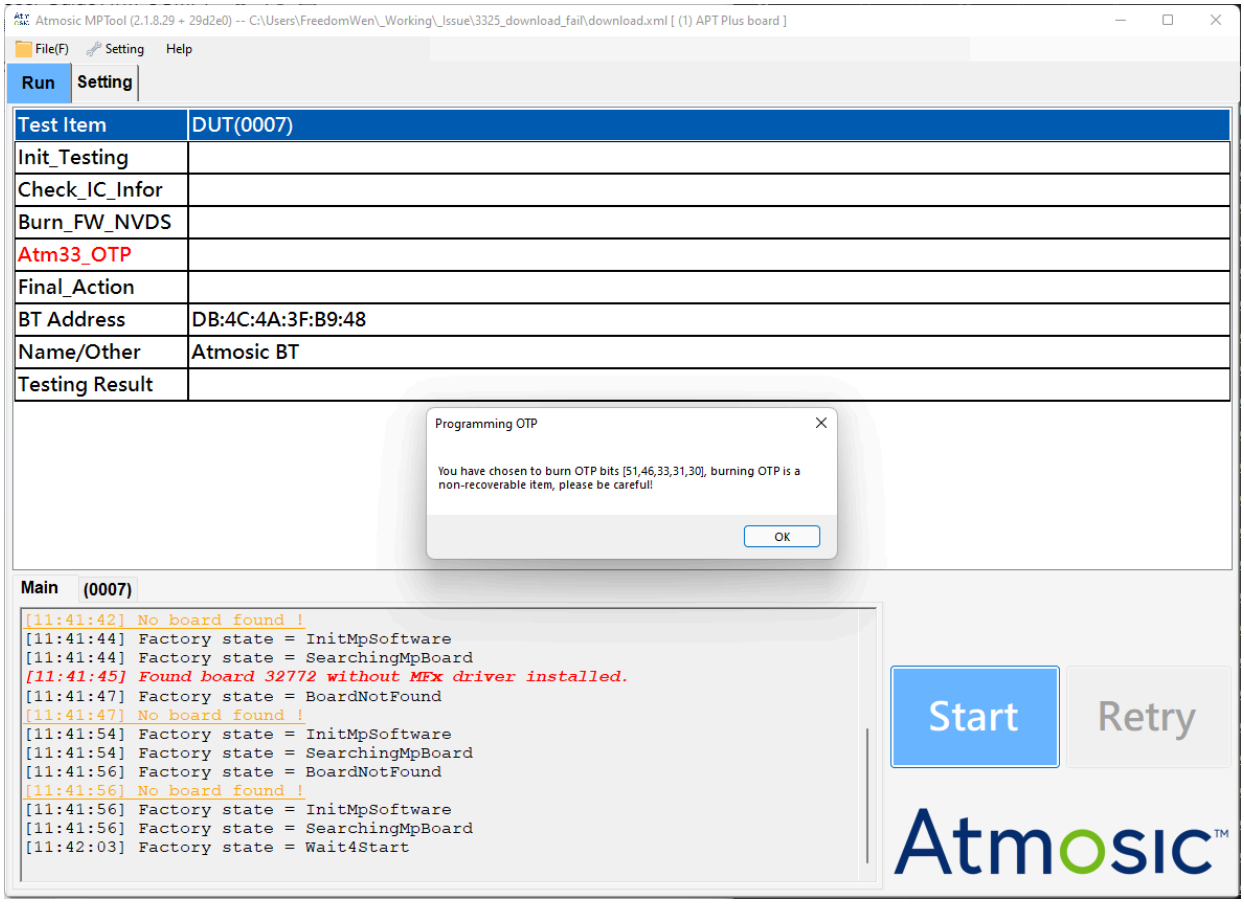



*Figure 9-52 Run Page Alert*

If you have saved these test settings, a warning will also pop up when reloading them.

## 9.15 Check BD Address

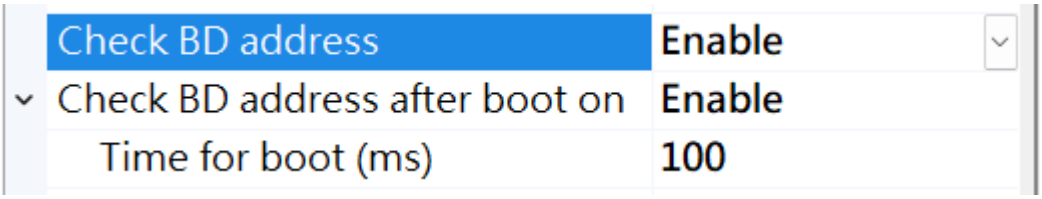



*Figure 9-53 Test options for check BD address / check BD address after boot on*

You can enable these two test tasks if you want to make an additional validation check if the BD address in the DUT is correct after burning.

The "Check BD Address" process is: after programming, reset to boot mode, then dump NVDS and check.

The process of "Check BD address after boot on" is: after programming, first reset to normal mode, go through <Time for boot> ms, then reset to boot mode, and finally dump NVDS and check.

## 9.16 Program Private Key

This task provides options for typing Hex string to write private keys to a DUT. There are 8 pairs of keys and each slot supports up to 32 bytes.

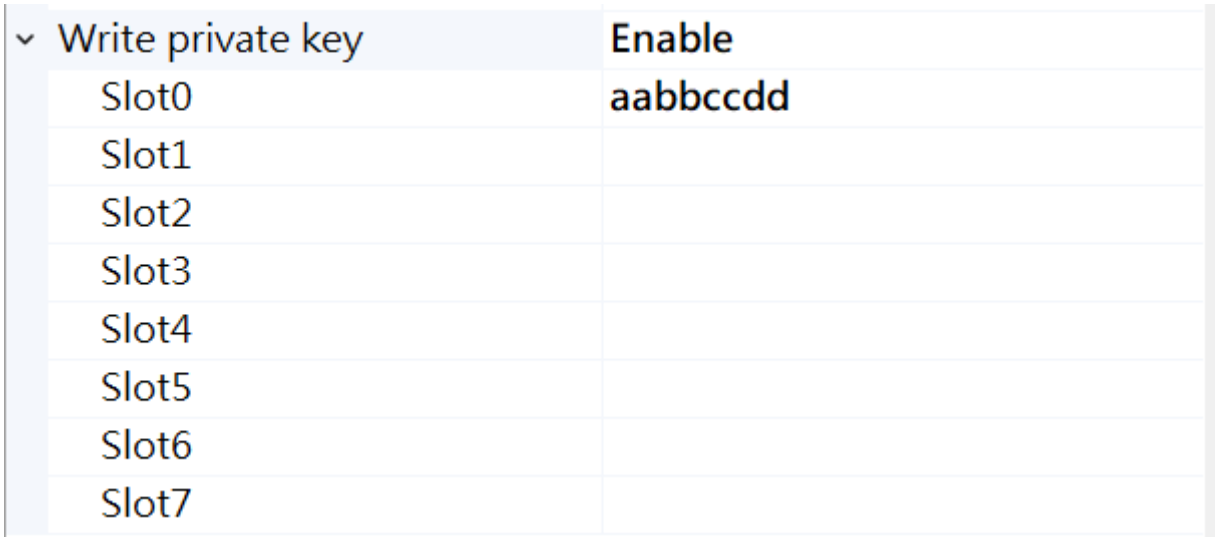



*Figure 9-54 Program Private Key*

## 9.17 Program Secure Journal

### 9.17.1 Generate a Blank Secure Journal Binary File

Use the CLI command, to generate the file (Generate a blank secure journal file)

```
AtmMPTool FILE SECJRNL <file> BLANK
```

### 9.17.2 Add Secure Journal Tag into the Binary File

Use the CLI command, Secure Journal Tag Addition with File

```
AtmMPTool FILE SECJRNL <file> TAG ADD <tag> <hex data> <new file>
```

### 9.17.3 Select the Secure Journal File in the GUI Option

Change the task “Secure Journal” to enable, and you can select the secure journal file for the task.

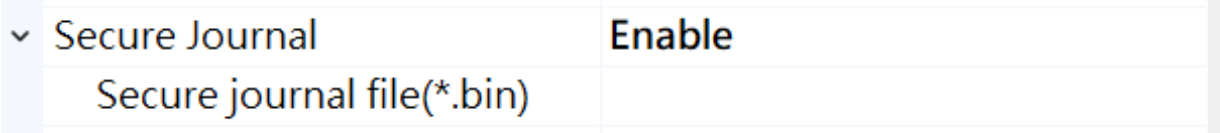



*Figure 9-55 Secure Journal*

# 10. Atmosic MP Tool Console Mode

## 10.1 Use Console Mode

Use console mode to run AtmMPTool.exe with the command directly. For example:

```
AtmMpTool.exe APT DISC
```

*Figure 10-1 AtmMPTool.exe*

```
Microsoft Windows [Version 10.22000.2360]
(c) Microsoft Corporation. All rights reserved.

C:\AtmosicMP>cd bin

C:\AtmosicMP\bin>AtmMPTool.exe APT DISC
Find 1 APT/DL boards(s).
Board DevID: 7.

========================================================================
Success
========================================================================
```

*Figure 10-2 Call AtmMPTool.exe in the cmd.exe*

## 10.2 Detailed Command Descriptions

The Atmosic Mass Production Tool also provides console mode for user control. The user needs to go to the working directory in C:\AtmosicMP\bin and input the command. The user should follow the command format of the `AtmMPTool.exe MP Tool` parameters.

There are a few conventions in these command formats:

- S symbol is a fixed string S. The matched input could be case-insensitive.
- <S> symbol is for dynamic inputs, such as an ID or a file name. The matched input would depend on the situation of the real execution environment.

- (S1|S2|...|Sn) symbol is one of the fixed strings between S1 to Sn. The matched input shall be one of S1 to Sn being case-insensitive.
- [S] symbol is for enumerated numbers. Only predefined numbers are allowed.
- <<S>> symbol is optional and the definition is the same as <S>.
- [[S]] symbol is optional and the definition is the same as [S].

## 10.3 CLI Environment Setting

### 10.3.1 Windows System Environment Variable

This section shows the Windows operating system environment variables used to adjust the CLI test.

| Variable name | Description |
|---|---|
| SKIP_DETAIL_LOG | To simplify the log generated by the CLI in the console (cmd.exe), set this environment variable to 1.<br>(e.g., set SKIP_DETAIL_LOG=1) |

### 10.3.2 Set Chip Type

Set <chip type> into the file ‘CliGlobalValue.xml’, when some commands show ‘No explicit IC type, please set chip type first.’

| Command |
|---|
| • AtmMPTool GLOBAL CHIP_TYPE <chip type> |

| Parameter | |
|---|---|
| <chip type> | Atm2\|Atm3\|Atm33\|Atm34 |
| **Result** | SUCCESS or FAIL |

### 10.3.3 Set Testing Log Refresh

The production test will write detailed logs in the log folder. Use this command to create a new log file of the current time and import subsequent logs into the file.

| Command |
| --- |
| • AtmMPTool LOG REFRESH |

| Parameter | |
| --- | --- |
| No parameters | |
| **Result** | the next log will be written to the new log file |

### 10.3.4 Set Testing Log Finished

Call this command to update the final status on the file name of the log.

| Command |
| --- |
| • AtmMPTool LOG FINISHED |

| Parameter | |
| --- | --- |
| No parameters | |
| **Result** | update the log file name if this testing has an error message |

## 10.4 Test Board Control

### 10.4.1 Board Discovery

Discover the connected DL boards by using the following command.

| Command |
| --- |
| • AtmMPTool APT DISC |

| Parameter | |
| --- | --- |

| | |
|---|---|
| DISC | Discover DL boards |
| **Result** | Return all <DevID> of DL boards |

## 10.4.2 FTDI Pin Control

| **Command** |
|---|

- AtmMPTool APT <DevID> AG FTDI_CONTROL (NO_POWER) (<CONTROL_FLOW...>)

| **Parameter** | |
|---|---|
| NO_POWER | If setting this parameter, the default VBAT, VCCIO, and LS pin would be set to low |
| <CONTROL_FLOW…> | Follow the format <ACTION_LABLE> <delay_ms> <ACTION_LABLE> <delay_ms> <ACTION_LABLE>....to control these pins<br><br>The valid ACTION_LABLE:<br>● VBAT_H: control VBAT pin to high<br>● VBAT_L: control VBAT pin to low<br>● VCCIO_H: control VCCIO pin to high<br>● VCCIO_L: control VCCIO pin to low<br>● LS_H: control LS pin to high<br>● LS_L: control LS pin to low<br>● BBOOT_H: control BBOOT pin to high<br>● BBOOT_L: control BBOOT pin to low<br>● PWD_H: control PWD pin to high<br>● PWD_L: control PWD pin to low<br><br>Example 1 - sends AtmMPTool APT 50 AG FTDI_CONTROL NO_POWER VBAT_H 50 VCCIO_H 150 LS_H to:<br>1. Default VBAT, VCCIO, and LS are low<br>2. Set VBAT to high<br>3. Delay 50 ms<br>4. Set VCCIO to high<br>5. Delay 150 ms<br>6. Set LS to high<br><br>Example 2 sends AtmMPTool APT 50 AG FTDI_CONTROL BBOOT_H 20 PWD_H 0 PWD_L 20 BBOOT_L to:<br>1. Default VBAT, VCCIO, and LS are high<br>2. Set BBOOT to high<br>3. Delay 20 ms<br>4. Set PWD to high |

| | |
|---|---|
| | 5. Delay 0 ms<br>6. Set PWD to low<br>7. Delay 20 ms<br>8. Set BBOOT to low |
| **Result** | SUCCESS or FAIL |

### 10.4.3 Power On

For the DL Board, before starting the test, run this command to power on the device.

| **Command** |
|---|
| • AtmMPTool APT <DevID> AG POWER_ON |

| **Parameter** | |
|---|---|
| No parameters | |
| **Result** | SUCCESS or FAIL |

### 10.4.4 Power Off

For the DL Board, after doing all testing, you must run this command to power off the device.

| **Command** |
|---|
| • AtmMPTool APT <DevID> AG POWER_OFF |

| **Parameter** | |
|---|---|
| No parameters | |
| **Result** | SUCCESS or FAIL |

## 10.5 Program & Dump Storage

### 10.5.1 DUT Firmware Programming

Program firmware to Flash.

| Command |
|---|

- AtmMPTool APT <DevID> DUT FLASH FW <atm file> [EUD] [NCE]
- AtmMPTool APT <DevID> DUT FLASH FFW <atm file> [EUD] [NCE]

| Parameter | |
|---|---|
| FW/FFW | FW - Program firmware and verification.<br>FFW - Program firmware and verification. The program uses a speed-up process. |
| <atm file> | File pathname (.atm)<br>For Example, C:\AtmosicMP\Test.atm for firmware |
| [EUD]<br>Optional | Erase upgrade data or not<br>1 for erasing<br>If not provided, the default value is 1 |
| [NCE]<br>Optional | Do chip erase before programming Flash |
| **Result** | SUCCESS or FAIL |

### 10.5.2 DUT NVDS Programming or Pull

Program NVDS data to Flash (for ATM2/ATM3).

| Command |
|---|

- AtmMPTool APT <DevID> DUT FLASH (NVDS|PNVDS) <file> <addr> <size>
- AtmMPTool APT <DevID> DUT FLASH (NVDS|PNVDS) <file>

| Parameter | |
|---|---|
| (NVDS\|PNVDS) | NVDS - Program NVDS data to Flash |

| | |
|---|---|
| | PNVDS - Pull NVDS data from Flash |
| <file> | NVDS file pathname (.bin)<br>For Example, C:\AtmosicMP\flash_nvds.bin |
| <addr><br>Optional | NVDS start address<br>This information is customer-specific<br>If not provided, the default address of NVDS is 0x78000 |
| <size><br>Optional | NVDS maximal size<br>This information is customer-specific<br>If not provided, the default maximum size of NVDS is 0x8000 (32 KB) |
| **Result** | SUCCESS or FAIL |

### 10.5.3 DUT Firmware Validation

Validate firmware in Flash.

| **Command** |
|---|

- AtmMPTool APT <DevID> DUT FLASH VFW <file> <addr>
- AtmMPTool APT <DevID> DUT FLASH VFW <file>

| **Parameter** | |
|---|---|
| <file> | File to be programmed, bin file for firmware<br>For Example, C:\AtmosicMP\Test.bin |
| <addr><br>optional | FW start address<br>This information is customer-specific<br>If not defined, the default address of FW is 0x0 |
| **Result** | SUCCESS or FAIL |

### 10.5.4 DUT Flash Firmware and NVDS Programming Concurrently

Program firmware and NVDS data to Flash at the same time.

| **Command** |
|---|

- AtmMPTool APT <DevID> DUT FLASH BOTH <ATM> <NVDS BIN> [EUD] [NCE]
- AtmMPTool APT <DevID> DUT FLASH FBOTH <ATM> <NVDS BIN> [EUD] [NCE]

| Parameter | |
|---|---|
| BOTH/FBOTH | BOTH: using legacy program process<br>FBOTH: using fast_load program process |
| <ATM> | FW file (.atm) to be programmed<br>For Example, C:\AtmosicMP\Test.atm<br>(elf file is only supported in ATM2/ATM3 2.2) |
| <NVDS BIN> | NVDS file (.bin) to be programmed<br>For Example, C:\AtmosicMP\flash_nvds.bin |
| [EUD]<br>Optional | Erase upgrade data or not<br>1 for erasing<br>If not provided, the default value is 1 |
| [NCE]<br>Optional | Do chip erase before programming Flash |
| **Result** | SUCCESS or FAIL |

### 10.5.5 DUT Flash Erase

Remove Flash according to Address and Size.

| Command |
|---|

- AtmMPTool APT <DevID> DUT FLASH ERASE <FADR> <FSIZE>

| Parameter | |
|---|---|
| <FADR> | Start address<br>If not provided, the default is 0 |
| <FSIZE> | Erase Size<br>If not provided, the default value will be the Flash size |
| **Result** | SUCCESS or FAIL |

### 10.5.6 Dump Flash to Bin File

Dump Flash to a bin file.

| Command |
| --- |
| • AtmMPTool APT <DevID> DUT FLASH DUMP BIN <bin file> (<addr>) (<size>) |

| Parameter | |
| --- | --- |
| <bin file> | output file name |
| <addr> | start address (default is 0x0) |
| <size> | size (default is dump to end) |
| **Result** | Save the binary content of the IC Flash to a file |

### 10.5.7 Flash Chip Erase

Erase all contents of the Flash.

| Command |
| --- |
| • AtmMPTool APT <DevID> DUT FLASH CHIP_ERASE |

| Parameter | |
| --- | --- |
| No parameters | |
| **Result** | Erase all contents of the Flash |

### 10.5.8 Check Flash Protection (Only for ATM2/ATM3)

Check if the Flash is protected or not.

| Command |
| --- |
| • AtmMPTool APT <DevID> DUT FLASH CHECK_PROTECTING |

| Parameter | |
| --- | --- |

| No parameters | |
|---|---|
| **Result** | If it fails, show the error status and its error reason |

### 10.5.9 DUT RRAM Firmware Programming (ATM33/ATM34 supported)

Program firmware to RRAM.

| **Command** |
|---|

- AtmMPTool APT <DevID> DUT RRAM FW <atm file>

| **Parameter** | |
|---|---|
| <atm file> | File path(*.atm), created from SDK command `make build_archive` |
| **Result** | SUCCESS or FAIL |

### 10.5.10 DUT RRAM NVDS Programming (ATM33/ATM34 supported)

Program NVDS data to RRAM.

| **Command** |
|---|

- AtmMPTool APT <DevID> DUT RRAM NVDS <file> <addr>

| **Parameter** | |
|---|---|
| <file> | NVDS file pathname (.bin). E.g, C:\AtmosicMP\flash_nvds.bin |
| <addr> | NVDS start address |
| **Result** | SUCCESS or FAIL |

### 10.5.11 DUT RRAM Erase (ATM33/ATM34 supported)

Erase data to 0xff by address, size, or all size for the RRAM.

| **Command** |
|---|

- AtmMPTool APT <DevID> DUT RRAM ERASE <ADDR> <SIZE>

| Parameter | |
|---|---|
| <ADDR> | Start address |
| <SIZE> | Erase Size |
| **Result** | SUCCESS or FAIL |

### 10.5.11 Programming Private Key(ATM33/ATM34 supported)

| Command |
|---|

- AtmMPTool APT <DevID> DUT SECJRNL PRIVATEKEY <SLOT_INDEX> <KEY>

| Parameter | |
|---|---|
| <SLOT_INDEX> | 0~7 |
| <KEY> | Hex string (max size: 32 bytes) |
| **Result** | SUCCESS or FAIL |

### 10.5.12 DUT RRAM Firmware and NVDS Programming Concurrently (ATM33/ATM34 supported)

Program firmware and NVDS data to Flash at the same time.

| Command |
|---|

- AtmMPTool APT <DevID> DUT RRAM BOTH <ATM> <NVDS BIN>
- AtmMPTool APT <DevID> DUT RRAM FBOTH <ATM> <NVDS BIN>

| Parameter | |
|---|---|
| BOTH/FBOTH | BOTH: using legacy program process<br>FBOTH: using fast_load program process |
| <ATM> | FW file (.atm) to be programmed |

| | |
|---|---|
| | For Example, C:\AtmosicMP\Test.atm |
| <NVDS BIN> | NVDS file (.bin) to be programmed<br>For Example, C:\AtmosicMP\flash_nvds.bin |
| **Result** | SUCCESS or FAIL |

### 10.5.13 DUT RAM Programming (Only for ATM2/ATM3)

Program DUT RAM

| **Command** |
|---|
| • AtmMPTool APT <DevID> DUT FLASH RAM <file> |

| **Parameter** | |
|---|---|
| <file> | For RAM: If not provided, C:\AtmosicMP\fw\DTM.bin will be used |
| **Result** | SUCCESS or FAIL |

### 10.5.14 DUT OTP Programming (Only for ATM2/ATM3)

Program DUT OTP data.

| **Command** |
|---|
| • AtmMPTool APT <DevID> DUT FLASH (OTP\|POTP) <file> |

| **Parameter** | |
|---|---|
| (OTP\|POTP) | OTP - Program OTP data to OTP **(CANNOT REVERT SETTING!)**<br>POTP - Pull OTP data from OTP |
| <file> | For OTP: Read this file and program to OTP<br>For POTP: Pull data from OTP and write to this file |
| **Result** | SUCCESS or FAIL |

### 10.5.15 DUT Secure Journal Push (ATM33/ATM34 supported)

Dump/Program secure journal data from/to RRAM.

| Command |
|---|
| • AtmMPTool APT <DevID> DUT SECJRNL PUSH <file> (<lock_new_data>) |

| Parameter | |
|---|---|
| <file> | NVDS file pathname (.bin). E.g, C:\AtmosicMP\flash_nvds.bin |
| <lock_new_data> | Set to 1 to protect the added data. |
| **Result** | SUCCESS or FAIL |

### 10.5.16 DUT Secure Journal Dump (ATM33/ATM34 supported)

Dump/Program secure journal data from/to RRAM.

| Command |
|---|
| • AtmMPTool APT <DevID> DUT SECJRNL DUMP <file> |

| Parameter | |
|---|---|
| <file> | NVDS file pathname (.bin). E.g, C:\AtmosicMP\flash_nvds.bin |
| **Result** | SUCCESS or FAIL |

## 10.6 Test Code

### 10.6.1 Programming Test Code

For ATM2/ATM3/ATM33, before performing RF or HCI command testing, you can run this command to program the default HCI vendor to the DUT. Programming the HCI vendor is through the SWD interface.

When running this command, it will auto-detect the chip type and set it to the file ‘CliGlobalValue.xml’. The command can be skipped as shown in the Set Chip Type section.

| Command |
| --- |
| • AtmMPTool APT <DevID> DUT BURN_TEST_CODE |

| Parameter | |
| --- | --- |
| No parameters | |
| **Result** | SUCCESS or FAIL |

### 10.6.2 Change the UART Pin Mux

If the product's UART pin definition does not equal the default setting, use this command to change it before calling UART RX enable.

| Command |
| --- |
| • AtmMPTool APT <DevID> DUT UART MUX <Tx pin> <Rx pin> <Cts pin> <Rts pin> |

| Parameter | |
| --- | --- |
| <Tx pin><Rx pin><br><Cts pin><Rtx pin> | Key in I/O number |
| **Result** | Change the UART pin mux setting command working status |

### 10.6.3 Set UART Baud Rate

Call this command to set the baud rate to the CLI common setting, this setting will continue until the next time this command is called again.

| Command |
| --- |
| • AtmMPTool SETTING BAUDRATE <baud rate> |

| Parameter | |
| --- | --- |
| <baud rate> | UART baud rate |
| **Result** | Update global setting |

### 10.6.4 Set UART Rx Enable

To use UART after downloading the default RAM code, use this command.

| Command |
|---|
| • AtmMPTool APT <DevID> DUT UART RX_ENABLE |

| Parameter | |
|---|---|
| No parameters | |
| **Result** | Show the UART Rx enable command working status |

## 10.7 RF Testing Command

### 10.7.1 DUT/AG HCI Reset Command

Reset AG or DUT.

| Command |
|---|
| • AtmMPTool APT <DevID> (AG\|DUT) RESET |

| Parameter | |
|---|---|
| (AG\|DUT) | AG - Atmosic Golden (Not allowed with DL board)<br>DUT - Device under test |
| **Result** | SUCCESS or FAIL |

***Note**: Users must download HCI firmware to use this command.*

### 10.7.2 DUT/AG Tx Test

Apply the AG or DUT to Bluetooth LE Tx mode.

| Command | |
|---|---|
| • AtmMPTool APT <DevID> (AG\|DUT) TEST TX [PHY] [CHNL] [PKTYPE] <PktLen> <Tms> | |

| Parameter | |
|---|---|
| (AG\|DUT) | AG - Atmosic Golden (Not allowed with DL board)<br>DUT - Device under test |
| [PHY] | 1 - 1M<br>2 - 2M<br>3 - Coded (S8)<br>4 - Coded (S2) |
| [CHNL] | 0 ~ 39 |
| [PKTYPE] | 0 - PRBS9<br>1 - 11110000<br>2 - 10101010<br>3 - PRBS15<br>4 - 11111111<br>5 - 00000000<br>6 - 00001111<br>7 - 01010101 |
| <PktLen> | 0 ~ 255 |
| <Tms> | Time in ms for continuously transmitting packets<br><br>0: Infinite<br>1 ~ 8000 |
| **Result** | Return how many packets transmitted |

***Note**: Users must download HCI firmware to use this command.*

### 10.7.3 DUT/AG Rx Test

Apply the AG or DUT to Bluetooth LE Rx mode.

| Command |
|---|

- AtmMPTool APT <DevID> (AG|DUT) TEST RX [PHY] [CHNL] [PKTYPE] <PktLen> <Tms>
- AtmMPTool APT <DevID> (AG|DUT) TEST END

| Parameter | |
|---|---|
| (AG\|DUT) | AG - Atmosic Golden (Not allowed with DL board)<br>DUT - Device under test |
| [PHY] | 1 - 1M<br>2 - 2M<br>3 - Coded (S8) |

| | |
|---|---|
| | 4 - Coded (S2) |
| [CHNL] | 0 ~ 39 |
| [PKTYPE] | 0 - PRBS9<br>1 - 11110000<br>2 - 10101010<br>3 - PRBS15<br>4 - 11111111<br>5 - 00000000<br>6 - 00001111<br>7 - 01010101 |
| <PktLen> | 0 ~ 255 |
| <Tms> | Any number from 1 to 8000. If it is not set to 0, the DUT will automatically end the reception after Tms and display the number of received packets.<br>If it is set to 0, the DUT will continue to receive until the user sends TEST END. |
| **Result** | Return how many packets received |

***Note**: Users must download HCI firmware to use this command.*

### 10.7.4 DUT/AG Tx Power Gain

Command and parameters for setting the Tx power to AG or DUT.

| **Command** |
|---|
| • AtmMPTool APT <DevID> (AG\|DUT) GAIN [GAINIDX] |

| **Parameter** | |
|---|---|
| (AG\|DUT) | AG - Atmosic Golden (Not allowed with DL board)<br>DUT - Device under test |
| [GAINIDX] | 0 - (-20dBm)<br>1 - (-10dBm)<br>2 - (-6dBm)<br>3 - (-4dBm)<br>4 - (-2dBm)<br>5 - 0dBm<br>6 - 2dBm<br>7 - 4dBm |
| Result | SUCCESS or FAIL |

***Note**: Users must download HCI firmware to use this command.*

## 10.7.5 DUT/AG Test ADV

Start or stop advertising

| **Command** |
|---|

- AtmMPTool APT <DevID> (AG|DUT) TEST ADV START <payloads>
- AtmMPTool APT <DevID> (AG|DUT) TEST ADV STOP

| **Parameter** | |
|---|---|
| (START\|STOP) | Testing start or stop |
| <payloads> | Use --0x<tag>.(ascii\|hex)=data to set payload context<br>E.g. --0x09.ascii=001122334455 |
| **Result** | Show the ADV command working status |

***Note**: Users must download HCI firmware to use this command.*

## 10.7.6 DUT/AG Set/Get Runtime Crystal CAP

Set or get runtime crystal CAP value.

| **Command** |
|---|

- AtmMPTool APT <DevID> (AG|DUT) CAP SET <val>
- AtmMPTool APT <DevID> (AG|DUT) CAP GET

| **Parameter** | |
|---|---|
| (SET \| GET) | SET: set output I/O pin to low(0) or high(1)<br>GET: get I/O pin low or high |
| <val> | 0 ~ 31 |
| **Result** | Show the CAP value setting command working status |

***Note**: Users must download HCI firmware to use this command.*

### 10.7.7 DUT/AG RSSI Test

This command needs to be executed after performing an RX TEST command to obtain the RSSI value. About the RX Test, refer to the section DUT/AG Rx Test.

| Command | |
|---|---|
| • AtmMPTool APT <DevID> (AG\|DUT) TEST RSSI | |
| **Parameter** | |
| (AG\|DUT) | AG - Atmosic Golden (Not allowed with DL board)<br>DUT - Device under test |
| **Result** | Return DUT RSSI value |

***Note**: Users must download HCI firmware to use this command.*

## 10.8 Component Testing

### 10.8.1 DUT/AG Test WuRx

WuRx test commands.

| Command | |
|---|---|
| • AtmMPTool APT <DevID> (AG\|DUT) TEST WURX SEND_TX_PACKET<br>• AtmMPTool APT <DevID> (AG\|DUT) TEST WURX RESET_RX<br>• AtmMPTool APT <DevID> (AG\|DUT) TEST WURX CHECK_RX_COUNT <count1_limit> <count2_limit> | |
| **Parameter** | |
| (SEND_TX_PACKET \|<br>RESET_RX \|<br>CHECK_RX_COUNT) | SEND_TX_PACKET: send WURX waveform<br>RESET_RX: reset the DUT to catch the WuRx packet<br>CHECK_RX_COUNT: check WuRx packet count |
| <count1_limit>, <count2_limit> | set a limit for the count |
| **Result** | Show the WuRx command working status and register the change log |

### 10.8.2 DUT/AG I/O Setting

Control GPIO pin action or get GPIO pin status.

| Command |
| --- |

- AtmMPTool APT <DevID> (AG|DUT) IO (SETUP|SET) <io> <0|1>
- AtmMPTool APT <DevID> (AG|DUT) IO GET <io>

| Parameter | |
| --- | --- |
| (SETUP\|SET\|GET) | SETUP: set I/O pin to input(0) or output(1)<br>SET: set output I/O pin to low(0) or high(1)<br>GET: get I/O pin low or high |
| <io> | number of the pin |
| **Result** | Show the I/O setting command working status |

***Note**: Users must download HCI (DTM) firmware to use this command.*

### 10.8.3 DUT Get PV Count

Poll the harvesting detection signal according to the number of test times and return the times it is high to roughly estimate the harvesting power consumed by the chip.

| Command |
| --- |

- AtmMPTool APT <DevID> DUT PV_GET <TEST TIMES>

| Parameter | |
| --- | --- |
| <TEST TIMES> | Test times(500~65535) |
| **Result** | PV count value(0~65535) |

***Note**: Users must download HCI (DTM) firmware to use this command with the DUT role.*

## 10.9 Data Viewer

### 10.9.1 View Flash NVDS (ATM2/ATM3 supported)

Display the value of NVDS in the Flash.

| Command |
| --- |

- AtmMPTool APT <DevID> DUT FLASH DUMP NVDS <addr> <size> TAG <id>

| Parameter | |
|---|---|
| <addr> | The address of NVDS start address. |
| <size> | The size of the NVDS area |
| <id> | Tag ID, please refer to Common OTP/NVDS Tag ID |
| **Result** | NVDS value for the tag and the command result of SUCCESS or FAIL |

### 10.9.2 View RRAM NVDS (ATM33/ATM34 supported)

Display the value of NVDS by TAG ID in the RRAM.

| Command |
|---|

- AtmMPTool APT <DevID> DUT RRAM DUMP NVDS <addr> <size> TAG <id>

| Parameter | |
|---|---|
| <addr> | The address of NVDS start address. |
| <size> | The size of the NVDS area |
| <id> | Tag ID, please refer to Common OTP/NVDS Tag ID |
| **Result** | NVDS value for the tag and the command result of SUCCESS or FAIL |

### 10.9.3 View OTP NVDS (ATM2/ATM3 supported)

Display the value of NVDS by TAG ID in the OTP.

| Command |
|---|

- AtmMPTool APT <DevID> DUT OTPNVDS TAG <ID>

| Parameter | |
|---|---|

| | |
|---|---|
| <id> | Tag ID, please refer to Common OTP/NVDS Tag ID |
| **Result** | NVDS value for the tag and the command result of SUCCESS or FAIL |

### 10.9.4 View Crystal CAP in OTP NVDS (ATM2/ATM3 supported)

Display the crystal CAP in the OTP.

| **Command** |
|---|

- AtmMPTool APT <DevID> DUT OTPNVDS CAP

| **Parameter** | |
|---|---|
| No parameters | |
| **Result** | Crystal CAP and the command result of SUCCESS or FAIL |

### 10.9.5 View Secure Journal NVDS (ATM33/ATM34 supported)

Display the value of NVDS by TAG ID in the Secure Journal.

| **Command** |
|---|

- AtmMPTool APT <DevID> DUT SECJRNL TAG <ID>

| **Parameter** | |
|---|---|
| <id> | Tag ID, please refer to Common OTP/NVDS Tag ID |
| **Result** | NVDS value for the tag and the command result of SUCCESS or FAIL |

### 10.9.6 View Crystal CAP in Secure Journal NVDS (ATM33/ATM34 supported)

Display the crystal CAP in the Secure Journal.

| **Command** |
|---|

- AtmMPTool APT <DevID> DUT SECJRNL CAP

| Parameter | |
|---|---|
| **No parameters** | |
| **Result** | Crystal CAP and the command result of SUCCESS or FAIL |

## 10.10. ATM File Modifier

### 10.10.1 Show ATM File Information

Show the information from the ATM file.

| Command |
|---|

- AtmMPTool FILE ATM <file> SHOW

| Parameter | |
|---|---|
| <file> | Input atm file path |
| **Result** | Display the information on the console |

### 10.10.2 Export FW Bin File from ATM File

Export FW bin file from ATM file.

| Command |
|---|

- AtmMPTool FILE ATM <in_file> EXP_FW <out_file>

| Parameter | |
|---|---|
| <in_file> | input atm file path |
| <out_file> | output bin file path |
| **Result** | Export FW bin to file path |

### 10.10.3 Export NVDS Bin File from ATM File

Export NVDS bin file from ATM file.

| Command |
|---|
| • AtmMPTool FILE ATM <in_file> EXP_NVDS <out_file> |

| Parameter | |
|---|---|
| <in_file> | input atm file path |
| <out_file> | output bin file path |
| **Result** | Export NVDS bin to file path |

## 10.11 Flash/RRAM NVDS File Modifier

### 10.11.1 NVDS File Content Display

This command shows the content of NVDS (.bin) files.

| Command |
|---|
| • AtmMPTool FILE NVDS <file> SHOW |

| Parameter | |
|---|---|
| <file> | File path that used to be read and displayed |
| **Result** | Shows the content of the file with rows of tags |

### 10.11.2 Create Blank Flash/RRAM NVDS File

This command can create NVDS files.

| Command |
|---|
| • AtmMPTool FILE NVDS <file> BLANK |

| Parameter | |
|---|---|
| <file> | The path used to generate the new file |
| **Result** | Shows the content of the file with rows of tags |

### 10.11.3 NVDS Tag Addition with File

This command adds specific TAG and its data from the content of the NVDS (.bin) file and output to a new file.

For Tag ID, refer to the section Common OTP/NVDS Tag ID.

| Command |
|---|

- AtmMPTool FILE NVDS <file> TAG ADD <tag> <hex data> <new file>

| Parameter | |
|---|---|
| <file> | File path of the original file |
| <tag> | Tag number<br>Hex format, e.g., 01, 45, ... |
| <hex data> | Data with hex format, e.g, 6 bytes data would be input by 112233445566 |
| <new file> | File path to save |
| **Result** | <new file> will be saved and show success |

### 10.11.4 Flash/RRAM NVDS File Merge

This command merges two NVDS (.bin) files.

| Command |
|---|

- AtmMPTool FILE NVDS <file> MERGE <add file> <new file>

| Parameter | |
|---|---|
| <file> | File path of the original file |

| | |
|---|---|
| <add file> | File path of the added file |
| <new file> | File path to save |
| **Result** | <new file> will be saved and show success |

## 10.12 OTP NVDS File Modifier

### 10.12.1 OTP NVDS File Content Display

This command shows the content of OTP (.nvm) files.

| **Command** |
|---|
| • AtmMPTool FILE OTP <file> SHOW |

| **Parameter** | |
|---|---|
| <file> | File path that used to be read and displayed |
| **Result** | Shows the content of the file with rows of tags |

### 10.12.2 OTP NVDS Tag Addition with File

This command adds specific TAG and its data from the content of the OTP (.nvm) file and output to a new file.

For Tag ID, refer to the section Common OTP/NVDS Tag ID.

| **Command** |
|---|
| • AtmMPTool FILE OTP <file> TAG ADD <tag> <hex data> <new file> |

| **Parameter** | |
|---|---|
| <file> | File path of the original file |
| <tag> | Tag number |

| | |
|---|---|
| | Hex format, e.g., 01, 45, ... |
| <hex data> | Data with hex format, e.g, 6 bytes data would be input by 112233445566 |
| <new file> | File path to save |
| **Result** | <new file> will be saved and show success |

### 10.12.3 OTP NVDS File Merge

This command merges two OTP (.nvm) files.

| **Command** |
|---|
| • AtmMPTool FILE OTP <file> MERGE <add file> <new file> |

| **Parameter** | |
|---|---|
| <file> | File path of the original file |
| <add file> | File path of the added file |
| <new file> | File path to save |
| **Result** | <new file> will be saved and show success |

### 10.12.4 Set 16 MHz Crystal Capacitor to OTP NVDS File

Use this command to replace 11.13.2 OTP NVDS Tag Addition with File.

| **Command** |
|---|
| • AtmMPTool FILE OTP <file> TAG SET_CAP <value> <new file> |

| **Parameter** | |
|---|---|
| <file> | File path of the original file |
| <value> | 0~31 |
| <new file> | File path to save |

| Result | <new file> will be saved and show success |
|---|---|

## 10.13 Secure Journal File Modifier

### 10.13.1 Generate a Blank Secure Journal Binary File

| Command |
|---|

- AtmMPTool FILE SECJRNL <file> BLANK

| Parameter | |
|---|---|
| <file> | The file path of the target file. |
| **Result** | SUCCESS or FAIL |

### 10.13.2 Secure Journal Tag Addition with File

This command adds specific TAG and its data from the content of the Secure Journal (.bin) file and output to a new file.

For Tag ID, refer to the section Common OTP/NVDS Tag ID.

| Command |
|---|

- AtmMPTool FILE SECJRNL <file> TAG ADD <tag> <hex data> <new file>

| Parameter | |
|---|---|
| <file> | File path of the original file |
| <tag> | Tag number<br>Hex format, e.g., 01, 45, ... |
| <hex data> | Data with hex format, e.g, 6 bytes data would be input by 112233445566 |
| <new file> | File path to save |
| **Result** | <new file> will be saved and show success |

### 10.13.3 Set 16 MHz Crystal Capacitor to Secure Journal File

You can use this command.

| Command |
| --- |
| • AtmMPTool FILE SECJRNL <file> TAG SET_CAP <value> <new file> |

| Parameter | |
| --- | --- |
| <file> | File path of the original file |
| <value> | 0~255 |
| <new file> | File path to save |
| **Result** | <new file> will be saved and show success |

## 10.14 Hardware Configuration Programming

### 10.14.1 Disable SWD (Only for ATM2/ATM3)

Program DUT HW OTP data.

| Command |
| --- |
| • AtmMPTool APT <DevID> DUT FLASH NSWD |

| Parameter | |
| --- | --- |
| No parameters | |
| **Result** | SUCCESS or FAIL |

### 10.14.2 Set No 32 kHz Crystal on Board (Only for ATM2/ATM3)

| Command |
| --- |
| • AtmMPTool APT <DevID> DUT FLASH N32C |

| Parameter | |
|---|---|
| No parameters | |
| **Result** | SUCCESS or FAIL |

### 10.14.3 DUT Set OTP Bits (Only For ATM33/e)

Set OTP bits to 1.

| Command |
|---|

- AtmMPTool APT <DevID> DUT OTP_SET <BIT LIST>

| Parameter | |
|---|---|
| <BIT LIST> | The list for the OTP index (e.g. 24,25,51,52) |
| **Result** | SUCCESS or FAIL |

## 10.15 Secure Debug

### 10.15.1 Set Secure Debug PEM File

To execute a CLI command on the DUT with secure debug enabled, the user must configure the PEM file to authenticate the DUT.

| Command |
|---|

- AtmMPTool GLOBAL SET_SECURE_DEBUG_PEM <pemfile>

| Parameter | |
|---|---|
| <pemfile> | The file path of the PEM file, which can authenticate the DUT. |
| **Result** | SUCCESS or FAIL |

### 10.15.2 Clean Secure Debug PEM File

After you set the PEM file, you can call this command to clear the setting.

| Command |
| --- |
| • AtmMPTool GLOBAL CLEAN_SECURE_DEBUG_PEM |

| Parameter | |
| --- | --- |
| No parameters | |
| **Result** | SUCCESS or FAIL |

### 10.15.3 Set Secure Debug PEM File for Programmed ATM

| Command |
| --- |
| • AtmMPTool GLOBAL SET_PROGRAMMED_PEM <pemfile> |

| Parameter | |
| --- | --- |
| <pemfile> | The file path of the PEM file, which can authenticate the DUT after programming the new FW. |
| **Result** | SUCCESS or FAIL |

### 10.15.4 Clean secure debug PEM file for programmed ATM

After you set the PEM file for the program, you can call this command to clear the setting.

| Command |
| --- |
| • AtmMPTool GLOBAL CLEAN_PROGRAMMED_PEM |

| Parameter | |
| --- | --- |
| No parameters | |
| **Result** | SUCCESS or FAIL |

# 11. Multiple DUT Testing in CLI Mode

The Atmosic CLI command can execute testing or programming a maximum of eight DUTs at the same time.

Multiple DUT testing under CLI mode:

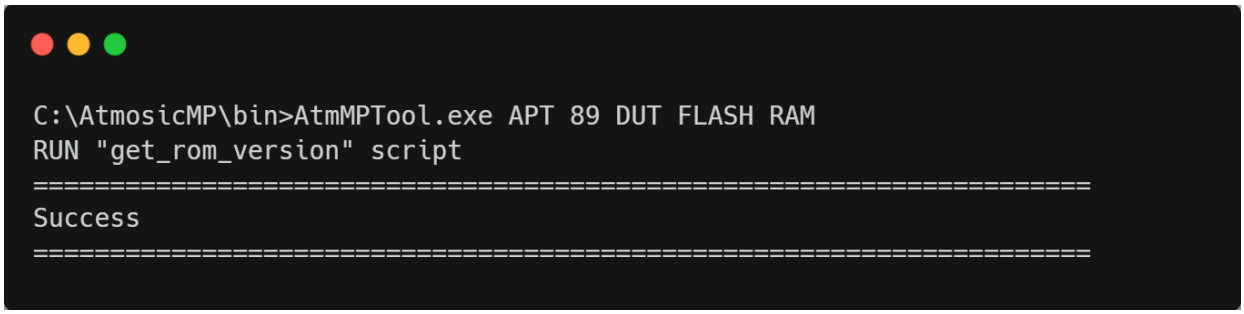



*Figure 11-1 Multiple DUT testing under CLI mode*

# 12. Advanced Features and Operational Insights

## 12.1 Power Control

### 12.1.1 Using the MP Tool GUI

The GUI power control is automatic. The GUI options and configuration are similar to previous versions.

### 12.1.2 Using the MP Tool Console Mode

**Using Download Board**

The download board DL_V5 (or later) and the MP Tool version v2.0.14 (or later) support DUT's power control. It is important to update the following 3 processes:

- On application opening
  ***Run this command before setting the DUT on the fixture***
  Set all FTDI pins to low (same as power-off)

```
CMD: AtmMpTool.exe APT <DEVID> AG FTDI_CONTROL LS_L 450 VCCIO_L 50 VBAT_L
```

*Figure 12-1 Set FTDI pin to low*

- Before testing
  Change FTDI pins to trigger DUT power-up

```
CMD: AtmMpTool.exe APT <DEVID> AG FTDI_CONTROL VBAT_H 50 VCCIO_H 450 LS_H
```

*Figure 12-2 Trigger DUT power-up*

- After testing
  Set all FTDI pins to low

```
CMD: AtmMpTool.exe APT <DEVID> AG FTDI_CONTROL LS_L 450 VCCIO_L 50 VBAT_L
```

*Figure 12-3 Set FTDI pins to low*

For more information about the FTDI pins control command, refer to the FTDI Pin Control section.

## 12.2 Protect Bootloader for Secure Boot Support

### 12.2.1 Protect Bootloader in GUI Mode

To Protect the Bootloader in GUI Mode, follow two steps:

1) Flash the firmware containing MCUboot.

2) Configure OTP to disallow RRAM write access.

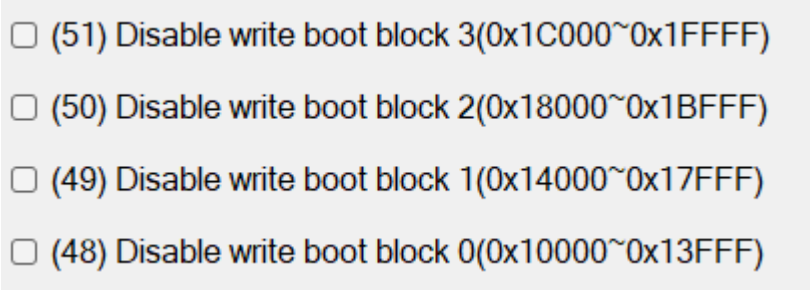



*Figure 12-7 Configuring OTP Settings to Disallow RRAM Writes*

By completing these steps, users will successfully enable the Secure Boot feature.

### 12.2.2 Protect Bootloader in Console Mode

To Protect the Bootloader in Console Mode, follow these two steps:

1) Use the RRAM Flash Command to flash an ATM file containing MCUboot.

```
AtmMPTool APT <DevID> DUT RRAM FW <atm file>
```

*Figure 12-8 MCUboot file*

2) Use the Set OTP bits Command to burn bits 48 to 51 as needed.

```
AtmMPTool APT <DevID> DUT OTP_SET 48,49,50,51
```

*Figure 12-9 Set OTP bits*

By completing these commands, users will successfully enable the Secure Boot feature in Console Mode.

## 12.3 Lock Always-on SWD for Secure Debug Support

### 12.3.1 Lock Always-on SWD in GUI Mode

To lock always-on SWD in GUI Mode, follow two steps:

1) Flash the firmware containing Secure Debug.

2) Configure OTP to set Secure Debug to “Authenticated Debug”


*Figure 12-10 Configuring OTP settings to limit SWD use*

By completing these steps, users will successfully enable the Secure Debug feature.

### 12.3.2 Lock Always-on SWD in Console Mode

To lock always-on SWD in console Mode, follow two steps:

1) Use the RRAM Flash Command to flash an ATM file containing Secure Debug.

```
AtmMPTool APT <DevID> DUT RRAM FW <atm file>
```

*Figure 12-11 RRAM Flash Command*

2) Use the Set OTP bits Command to burn bit 61 as needed.

```
AtmMPTool APT <DevID> DUT OTP_SET 61
```

*Figure 12-12 Set OTP bit-61*

## 12.4 Programming in Secure Debug Mode

For re-programming the OTP with Secure Debug enabled, use the following steps to re-program the DUT.

### 12.4.1 In GUI Mode

In the Settings page of the GUI mode, there are 3 options:

- User firmware: Select a new FW to program to the DUT.
- Secure Debug status: Set to “AlreadyEnableSecureDebug” when the DUT has already enabled the OTP bit.
- PEM for Secure Debug: select the PEM file that can be used to authenticate the new FW and the current DUT.

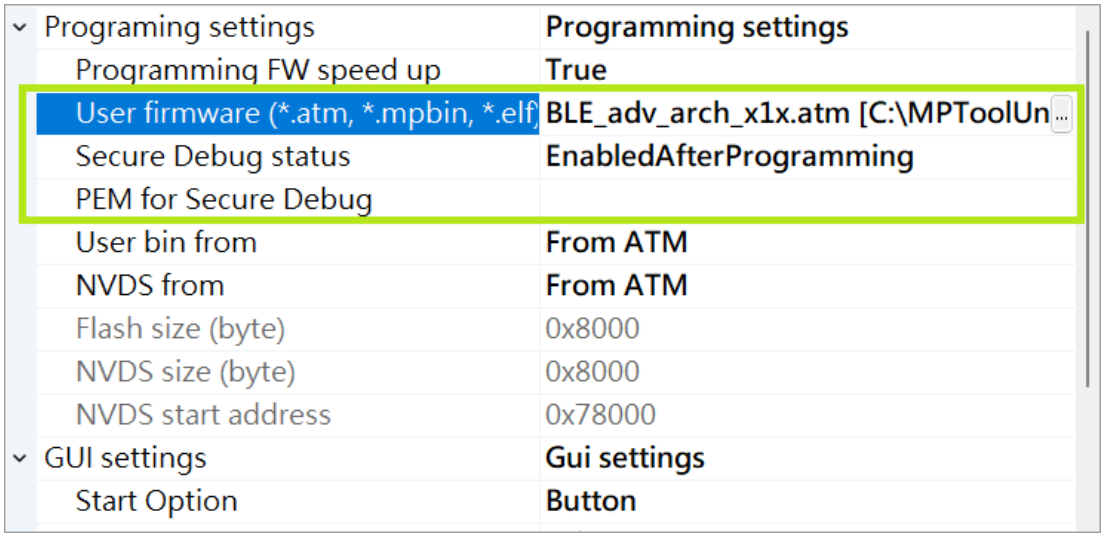



*Figure 12-13 Secure Debug setting options*

### 12.4.2 In CLI mode

There are 4 commands:

- SET_SECURE_DEBUG_PEM: set the PEM file used to authenticate with the current DUT.
- CLEAN_SECURE_DEBUG_PEM: clean the PEM file used to authenticate with the current DUT.
- SET_PROGRAMMED_PEM: set the PEM file used to authenticate after programming the new FW.
- CLEAN_PROGRAMMED_PEM: clean the PEM file used to authenticate after programming the new FW

After these settings are completed, use the original CLI command to program the new FW.

# 13. Common OTP/NVDS Tag ID

In sections 10.11.3 NVDS Tag Addition with File, 10.12.2 OTP NVDS Tag Addition with File, and 10.13.2 Secure Journal Tag Addition with File.

| NVDS and OTP/Secure Journal | |
|---|---|
| BD address | 0x01 |
| **NVDS** | |
| Device name | 0x02 |
| **OTP/Secure Journal** | |
| CAP | In OTP data, the CAP value is a part of Tag 0xBD and is not independent bytes, it is recommended to use 10.12.4 Set 16 MHz Crystal Capacitor to OTP NVDS File or 10.13.3 Set 16 MHz Crystal Capacitor to Secure Journal File to modify the CAP value. |

# 14. Advanced GUI Mode Settings

In the root directory of MP Tool, there is a folder called xml_setting which contains various XML configuration files.

## 14.1 Startup Setting

Within xml_setting, the file StartupSettings.xml defines the XML configuration corresponding to the Startup dialog. By modifying this file, you can change the options available in the Startup dialog.

```
<GuiOptions>
    <option name="Atm2/Atm3" path="xml_setting\GuiXmlSetting_atm2_atm3.xml" />
    <option name="Atm33" path="xml_setting\GuiXmlSetting_atm33.xml" />
  </GuiOptions>
```

*Figure 14-1 GUI options*

Under the <GuiOptions> element, the <option> elements contain the following attributes:

- name: The name displayed on the Startup dialog.
- path: The path to the configuration file.

## 14.2 GUI Settings

Within the GUI settings, the following tags are available for configuration or adjustment:

### 14.2.1 <chip_family>

Ensures the chip being tested matches the settings. Acceptable values are:

- ATMx2xx
- ATM33xx
- ATM34xx

### 14.2.2 <baudrate>

Specifies the UART baud rate when using the HCI vendor.

### 14.2.3 <uart_hard_flowcontrol>

Determines whether to use flow control when using the HCI vendor.

### 14.2.4 <check_device_count>

Check the number of connected DUTs before starting the test.

- enable: Set to true to use, false to disable.
- count: Specifies the number of DUTs, with values ranging from 1 to 16.

### 14.2.5 <test_flows>

Defines the test list. For adjustments, consult MP Tool developers.

- using_pretest_hook: Set to true to enable task “Pretest Hook”

# 15. GUI Mode Testing Hooks

In GUI mode, users can designate external processes, scripts, or batch files as Hook processes.

During the standard testing procedures in MP Tool, these hook processes are invoked at appropriate times, offering greater flexibility to align with the customer's production workflow.

## 15.1 NVDS Hook

To write some NVDS with custom rules, refer to this chapter:

1) Change Tags customization to Call external process.

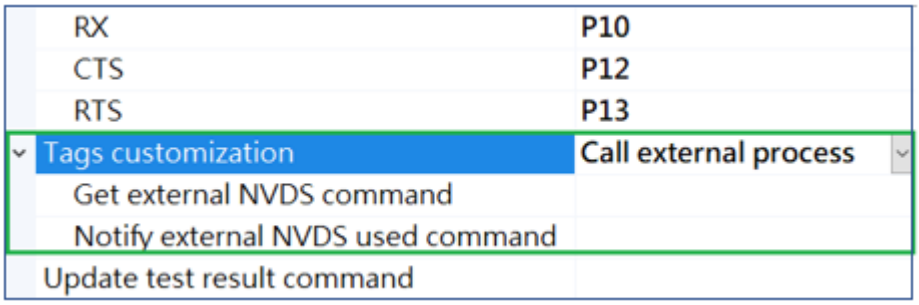



*Figure 15-1 Get Custom NVDS with Call External Process*

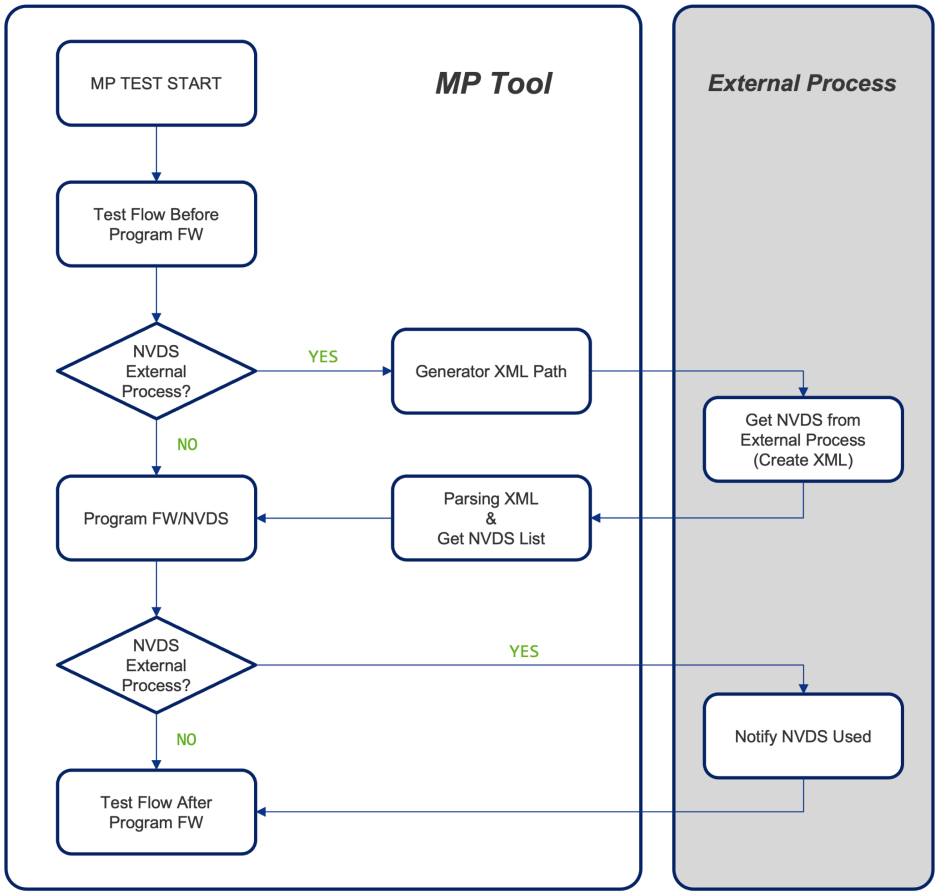



*Figure 15-2 Flow chart for NVDS Hook*

### 15.1.1 Get External NVDS

When setting the command from the MP Tool, the MP Tool will call it before writing NVDS or OTP with the command:

- <the command in option> <XML file path of input argument from MP Tool> <the XML path that MP Tool want external process write>

If the user sets the command external.exe arg1, the MP Tool will call the process by external.exe arg1 xxxx.xml and expect external.exe will write NVDS information in the xxxx.xml.

Below is the reference of XML format:

```
<root>
  <device index="{index from external process}">
    <NVDS type="Flash" tag="0x{tag1 hex}">{data of tag1}</NVDS>
    <NVDS type="OTP" tag="0x{tag2 hex}">{data of tag2}</NVDS>
  </device>
</root>
```

*Figure 15-3 XML Format reference*

### 15.1.2 Notify External NVDS Used

When the user sets the command for the MP Tool, the MP Tool will call it after writing NVDS and OTP with the command:

- <the command in option> <the index in the XML created when called get external NVDS command> <PASS or FAIL>

If the user sets the command external.exe arg2, the MP Tool will call the process by external.exe arg2 <index> PASS  when writing information success and external.exe arg2 <index> FAIL when writing information failure.

## 15.2 Test Result Hook

After the testing is finished, MP Tool will write results into the .csv file (refer to Atmosic Mass Production Tool User Interface) for each DUT tested. This feature can also be used to update this information to the external process.

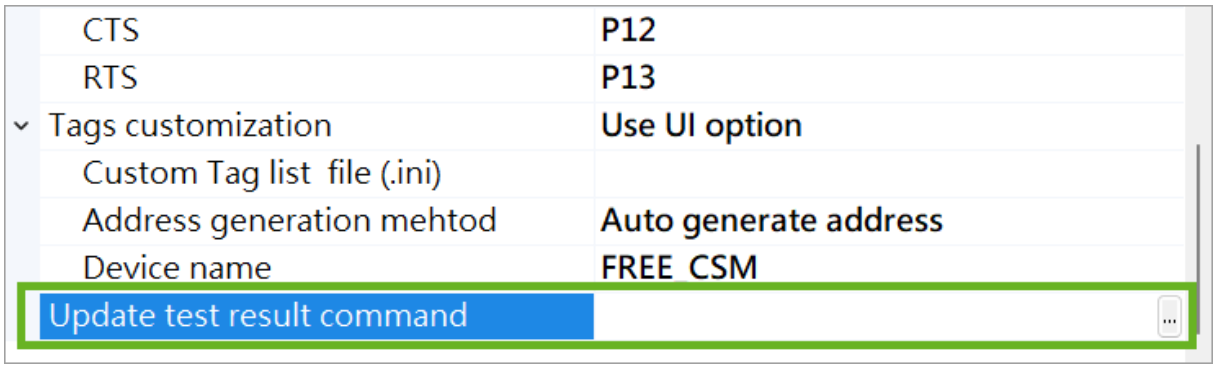



*Figure 15-4 Update Test Result with Call External Process*

If you set a command in this option, when testing is finished, MP Tool will call the process with the command:

- <the command in option> <.csv file>

The .csv file is the test report created from DUT testing. This feature allows users to develop a process to analyze the test results after each test and store it in the users' database.

## 15.3 External Test Item Hook

In the tag<test_flows> in the GUI setting file, users can add new test tags as shown below to include external test items:

```
<test name="ExternalProcess" topic="External_Test1"
        log_topics="External_Test1,External_Test1_ExitCode" />
<test name="ExternalProcess" topic="External_Test2"
        log_topics="External_Test2,External_Test2_ExitCode" />
<test name="ExternalProcess" topic="External_Test3"
        log_topics="External_Test3,External_Test3_ExitCode" />
<test name="ExternalProcess" topic="External_Test4"
        log_topics="External_Test4,External_Test4_ExitCode" />
<test name="ExternalProcess" topic="External_Test5"
        log_topics="External_Test5,External_Test5_ExitCode" />
```

*Figure 15-5 Add new test tags*

After adding these lines and restarting the MP Tool in GUI mode, users will see the corresponding test items added to the settings page.

| | |
|---|---|
| Test 1 by external process | Enable |
| Command of external process | python "C:\Users\FreedomWen_Working_MyCmd\ext_proc.py" |
| Need UART in external process | False |
| Need run by sequential | False |

*Figure 15-6 Update Test Result with Call External Process*

When you input the external process command, the test will invoke the following command at the appropriate times:

```
<Command from GUI setting page> <File path for output parameters to external
test> <File path for requested external test reply>
```

*Figure 15-7 External process command*

### 15.3.1 Parameter File

Before invoking the external process, MP Tool will generate the following file in the temp folder:

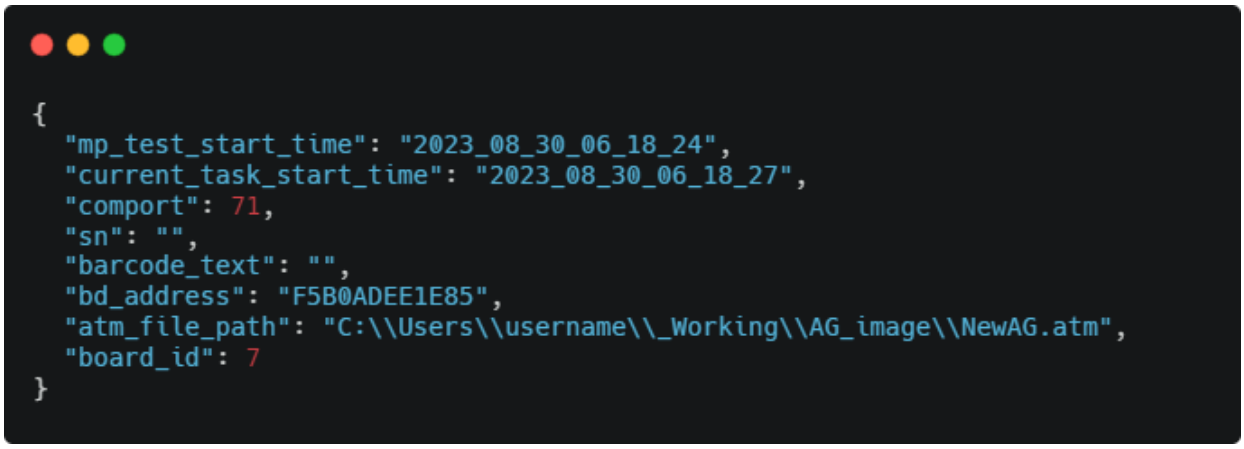



*Figure 15-8 Parameter File*

### 15.3.2 External Test Result File


*Figure 15-9 External Test Result File*

Upon test completion, the reply_message will be displayed in the UI log area.

### 15.3.3 External Test Process Output

MP Tool will display the external process output in the UI log area.

### 15.3.4 Checking External Test Process Exit Code

The exit code can have one of the three results:

1) exit code = 0: Test passed.

2) exit code = 1: Test passed and all the tests after this test will be skipped.

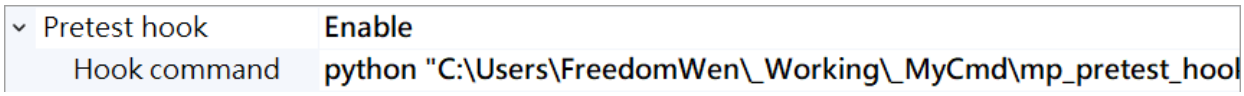
3) Any other exit code: Test failed.

## 15.4 Pretest Hook

In the tag <test_flows> in the GUI setting file, set using_pretest_hook=true can enable the task.

```
<test_flows using_pretest_hook="true">
```

After changing the option and restarting the MP Tool in GUI mode, users will see the corresponding test items added to the settings page.



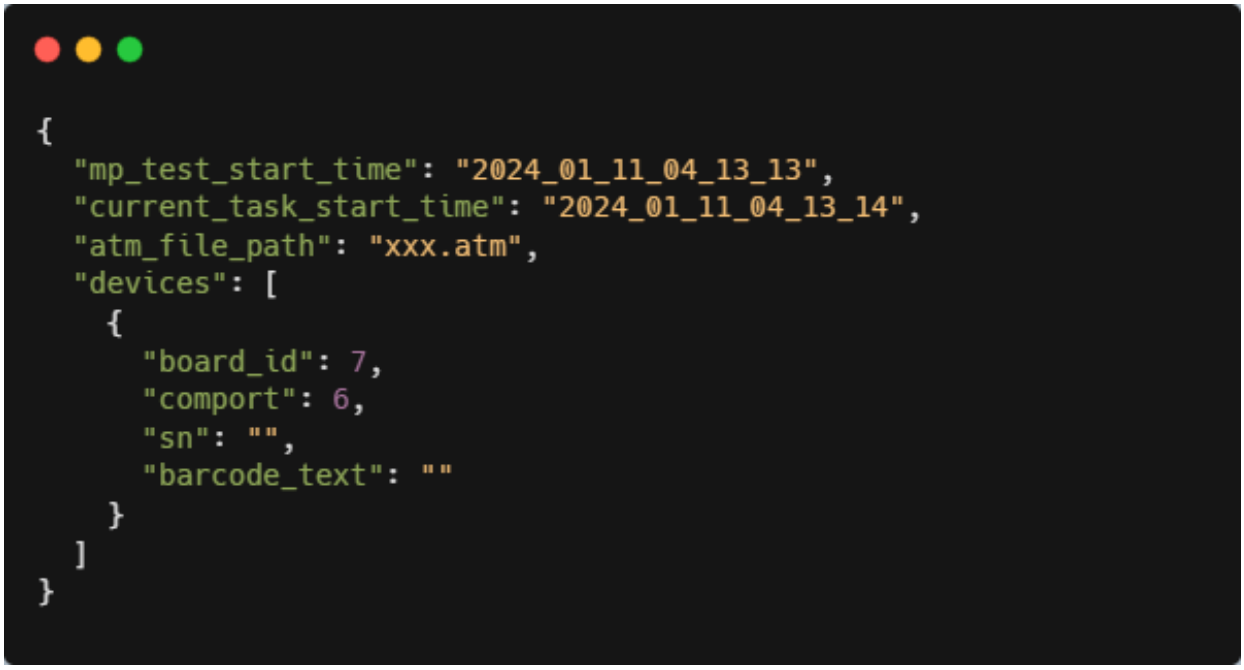

When you input the external process command, the test will invoke the following command at the appropriate times:

```
<Command from GUI setting page> <File path for output parameters to external
test> <File path for requested external test reply>
```

*Figure 15-10 Command from GUI setting page*

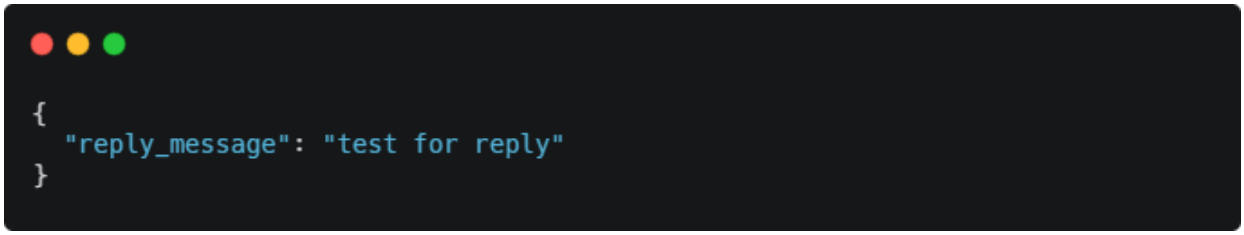
### 15.4.1 Parameter File

Before invoking the external process, the MP Tool will generate the following file in the temp folder:



```
{
  "mp_test_start_time": "2024_01_11_04_13_13",
  "current_task_start_time": "2024_01_11_04_13_14",
  "atm_file_path": "xxx.atm",
  "devices": [
    {
      "board_id": 7,
      "comport": 6,
      "sn": "",
      "barcode_text": ""
    }
  ]
}
```

### 15.4.2 External Test Result File



```
{
  "reply_message": "test for reply"
}
```

*Figure 15-11 External Test Result File*

Upon test completion, the reply_message will be displayed in the UI log area.

### 15.4.3 External Test Process Output

MP Tool will display the external process output in the UI log area.

### 15.4.4 Checking External Test Process Exit Code

The exit code can have one of the two results:

1) Exit code = 0: Test passed.

2) Any other exit code: Test failed.

# 16. Troubleshooting

1) Figure 16-1 shows the error log: No board found

```
[16:12:34] -----> Boot <-----
[16:12:34] FactoryState = InitMPSoftware
[16:12:34] FactoryState = SearchingMPBoard
[16:12:36] FactoryState = BoardNotFound
[16:12:36] No board found !
```

*Figure 16-1 No Board Found*

Ensure the USB cable is connected. Open the device manager to check if libusbK USB Devices exist. If not, refer to the section Install MFx Interface to install the USB driver.

2) Figure 16-2 shows the error log of different types of boards found simultaneously.

```
[16:13:39] -----> Boot <-----
[16:13:39] FactoryState = InitMPSoftware
[16:13:39] FactoryState = SearchingMPBoard
[16:13:39] Different types of board found simultaneously
[16:13:39] Please connect only one type of board
[16:13:41] FactoryState = BoardNotFound
[16:13:41] No board found !
```

*Figure 16-2 Different Types of Boards Found Simultaneously Error Log*

Refer to the Install MFx Interface section to install the USB drivers.

3) Figure 16-3 shows an Invalid board <num> found and the num is bigger than 32768.

```
[16:18:22] -----> Boot <-----
[16:18:22] FactoryState = InitMPSoftware
[16:18:22] FactoryState = SearchingMPBoard
[16:18:22] Found board 32808 without MFx driver installed.
[16:18:24] FactoryState = BoardNotFound
[16:18:24] No board found !
```

*Figure 16-3 Invalid Board <num> Found*

Refer to the Install MFx Interface section to install the USB drivers.

# Revision History

| Date | Version | Description |
|---|---|---|
| November 5, 2024 | 0.74 | Updates for MPTool v2.1.12.0. Updated |
| February 9, 2024 | 0.73 | Updated for v2.1.11.0 |
| January 12, 2024 | 0.72 | Updated for v2.1.10.0 |
| October 24, 2023 | 0.71 | Updated Overview, Supported Hardware, Supported Software, Supported OS, Environment Setup for Download (DL) Board Only<br><br>Added 10.17 Check BD address, Using Console Mode by Running AtmMPTool.exe, Figure 17-2 Flow chart for NVDS Hook |
| August 31, 2023 | 0.70 | Updated Overview, Table 2-1 APT, DL and AG Kit Information, Table 2-2 Supported Atmosic Devices, Supported Software, Environment Setup for the APT, Download (DL) Board and Atmosic Golden Device (AG), DL_V6 Jump Connection with 2.5 V or 1.8 V I/O Voltage, Figure 9-1 Select ATM File, Figure 9-3 Burn_RAM Process, Figure 9-4 Select ATM File, Figure 10-6 Run Tab Before Testing, Figure 10-7 Run Tab Under Testing, Figure 10-8 Run Tab After Testing Success, Figure 10-9 Run Tab After Testing Fails, Figure 10-26 UART0 Pin Modification, Figure 10-28 Start Option, Settings Tab, Atmosic MP Tool Console Mode, Common OTP/NVDS Tag ID sections. Added Figure 2-2 Download Board (DL) Kit, Figure 2-3 Atmosic Golden Device (AG) Kit, Environment Setup for Download (DL) Board + Atmosic Golden Device (AG) Hardware Setup, Startup Dialog, Programming OTP (ATM33), OTP/NVDS File Content Display, Set Chip Type through Power Off, Advanced Features and Operational Insights, Advanced GUI Mode Settings, GUI Mode Testing Hooks sections. |
| July 24, 2023 | 0.61 | Added DUT Set OTP Bits (Only For ATM33/e) section. |
| July 19, 2023 | 0.60 | Updated for MP Tool version 2.1.8.18: Added Programming User Data to External Flash (ATM33 only) section. |

| | | |
|---|---|---|
| March 17, 2023 | 0.59 | Updated for MP Tool version 2.1.8.1: Added Hardware and Software Requirements, DUT Design Requirements for Manufacturing sections, Figure 10-34 PV Test Setup. Updated Select ATM File, Testing Options, Help Menu, Run Tab, Crystal Trim, RX Sensitivity, User Firmware (.atm, .mpbin) / NVDS file (.bin) / Tags Customization, OTP File (.nvm) (ATM2/ATM3 Only), Write MP Region, PV Harvesting Test, Calibration Settings, Atmosic Production Tool Console Mode, DISPLAY Content of NVDS and OTP file. |
| November 11, 2022 | 0.58 | Added support for MP Tool v2.1.7.3 and ATM33/e. Added PV Harvesting Test, External NVDS Process, Update Test Result with External Process sections. Updated Overview, Crystal Trim, User Firmware (.atm, .elf) / NVDS file (.bin) / Tags Customization, UART0 Pin Modification, Command Mode, DUT Firmware Programming, DUT Get PV Count sections. |
| September 15, 2022 | 0.57 | Added support for MP Tool v2.1.0.0. Added DL Board Versions, Uninstall Any Previous Versions of the MP Tool, GUI Mode Quick Start, Set 16M Crystal Capacitor, FTDI Pin Control, DUT RRAM Firmware, Programming, DUT Secure Journal Dump or Push, DUT RRAM Erase sections. Updated Install MFx Interface, Set 16M Crystal Capacitor, DUT RRAM Firmware Programming sections, Figure 8-2 USB Serial Port Properties, Figure 8-3 Advanced Setting for COM Ports, Figure 9-2 Choose Test Options, Figure 9-3 Burn_RAM Process, Figure 10-1 Atmosic Mass Product Tool User Interface, Run Tab, Settings Tab, Crystal Trim, Frequency Test sections, changed format, corrected typos. |
| December 14, 2021 | 0.56 | Format change. Added Dump Flash to Bin File, Flash Chip Erase, Show ATM File Information sections. |
| November 10, 2021 | 0.55 | Updated section NVDS/MP Region Create Blank File. Added sections System Environment Variable, Pull MP region, and Set UART baud rate setting. |
| October 25, 2021 | 0.54 | Updated Setting Tab, Figure 19 Run Tab Before Testing, Figure 20 - Run Tab Under Testing, Figure 21- Run Tab After Testing Success, Figure 22 - Run Tab After Testing Fail, Figure 23 - Setting Tab, Figure 24 - Crystal Trim Setting, Figure 34 - User Firmware/Tags Setting, Figure 39 - Start Option, added Figure 41 - MP Region Information, Figure 42 - Write Calibration Data |

| | | |
|---|---|---|
| | | to MP Region, Figure 64 - CLI Command Detail Logs, Multiple DUT Testing in CLI Mode, Common OTP/NVDS/MP Region Tag ID, updated NVDS Tool section. |
| September 30, 2021 | 0.53 | Updated Figure 8 - Start Menu Shortcuts, Figure 19 - Run Tab Before Testing. |
| July 23, 2021 | 0.52 | Format change; updated Setting Menu, Figure 14 - MP Tool Setting, Help Menu, Figure 18 - MP Tool Help Menu, Figure 20 - Setting Tab, Figure 34 - User Firmware/Tags Setting, User Firmware (.elf)/NVDS file (.bin)/Tags Customization; added sections Environment Setup for Download Board (DL), Adjust Serial Port Latency Timer, NVDS Tool. |
| May 11, 2020 | 0.51 | Added sections OTP file (.nvm), Troubleshooting. |
| March 25, 2020 | 0.50 | Initial version created. |

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