

HPM10 Getting Started Guide

AND90276/D

Introduction

This guide provides information on how to set up the HPM10 Programming Interface and use it to program the HPM10 EVB for charging a hearing aid battery. Once the developer is familiar with the use of the tool and how the EVB works, he can fine-tune the charging parameters by following the instructions provided in the User Reference.

Required Hardware

- HPM10-002-GEVK – HPM10 Evaluation and Development Kit or HPM10-002-GEVB – HPM10 Evaluation Board
- Windows PC
- I²C Programmer – Promira Serial Platform (Total Phase) + Adaptor Board & Interface Cable (available from **onsemi**) or Communication Accelerator Adaptor (CAA)



The Communication Accelerator Adapter has reached its End of Life (EOL) and is no longer recommended for use. Although it is still supported, developers are advised to utilize the Promira I²C programmer.

Software Downloads and Installation

The software listed below is accessible through FileShare within the MyON account, but access is restricted to authorized customers only. To acquire access, customers are required to contact their local **onsemi** sales office to establish a Non-Disclosure Agreement (NDA) and formally request access to the software.

1. Log on to your MyON account. Download the HPM10 Programming Interface application and User Reference from the link: <https://www.onsemi.com/PowerSolutions/myon/erFolder.do?folderId=807021>.

Unzip the design file to the desired working folder.

2. In your MyOn account, download the SIGNAKLARA™ Device Utility from the link: <https://www.onsemi.com/PowerSolutions/myon/erFolder.do?folderId=422041>.

Installing this executable utility is optional if the developer wants to test the programmer configuration. You may already have this utility installed if you have worked with the EZAIRO® products.

Programming Tool and EVB Setup

Connect the Windows PC, I²C programmer and HPM10 EVB as shown in Figure 1 below:

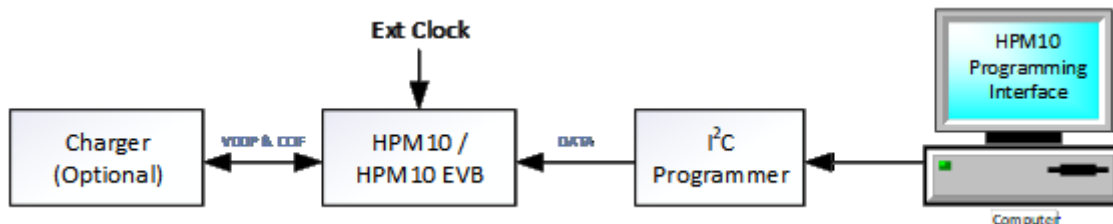


Figure 1. Connection Setup for HPM10 OTP Testing and Programming

1. The computer contains the HPM10 Programming Interface application, and the SIGNAKLARA Device Utility installed previously. The HPM10 Programming Interface software allows the user to evaluate their charge parameters and burn the finalized settings to the device.

The software provides two programming options, the GUI and the Command Line Tool (CMD). Both options must be executed in the Windows Prompt from their corresponding tool folder by using the commands as shown below after configuring the programmer:

- For the GUI –
`HPM10_OTP_GUI.exe [-I2C programmer] [-speed SPEED]`

Example:

```
HPM10_OTP_GUI.exe --Promira
--speed 400
or
HPM10_OTP_GUI.exe --CAA
--speed 100
```

- For Command Line Tool –
`HPM10_OTP_GUI.exe [-I2C programmer] [-speed SPEED] [-command option]`
 See Figures 5 and 6 for examples.
- 2. Open the CTK configuration manager shortcut created by the SIGNAKLARA Device Utility on the desktop. Click the “Add” button and set the interface configuration for the I²C programmer intended for communicating with the HPM10 Programming

Interface as shown in Figure 2. Both the CAA and Promira programmers are supported by the HPM10 Programming Interface. Ensure the driver for the programmer used is installed and then click the

“Test” button to test the configuration. If the setup is correct, a window displaying the message “Configuration is okay” should pop up indicating the adaptor is operational.

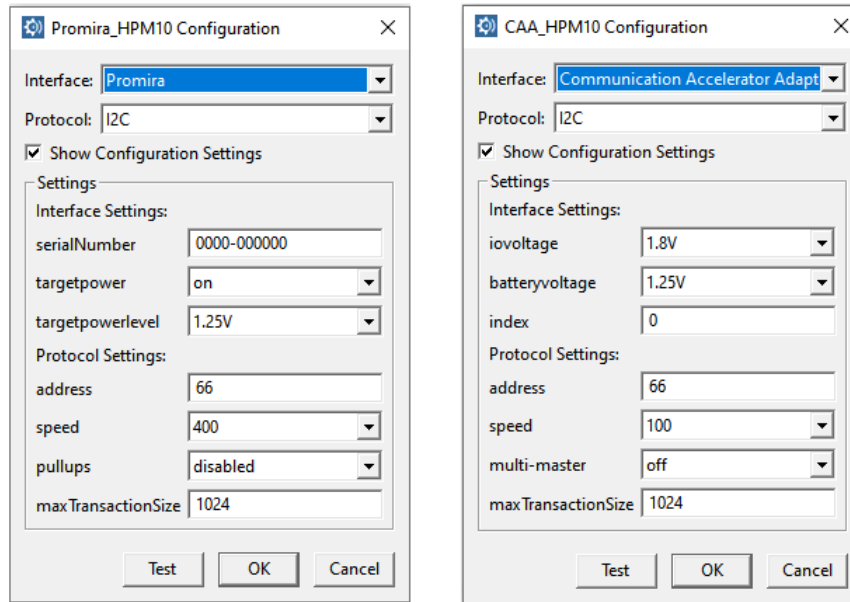


Figure 2. CTK Configuration of CAA and Promira I²C Adaptors

Note the difference in the data speed setting between the two adaptors. Promira is the default adaptor used by the HPM10 design tool and can support a data rate of 400 kbps while the CAA adaptor can support a maximum of 100 kbps.

- The Charger Board provides the supply voltage VDDP to the HPM10 device and communicates with the device to display the charging status. The Charger Board is useful for evaluating the charging

parameters. This board may be replaced by a power supply if the charging status is not required.

- The HPM10 device should be connected as shown in Figure 3 for charge parameter evaluation or OTP burn. This connectivity should already be set up with the jumpers on the fresh HPM10 EVB. Note that VHA is connected to DVREG on the HPM10 EVB instead of the external power source shown.

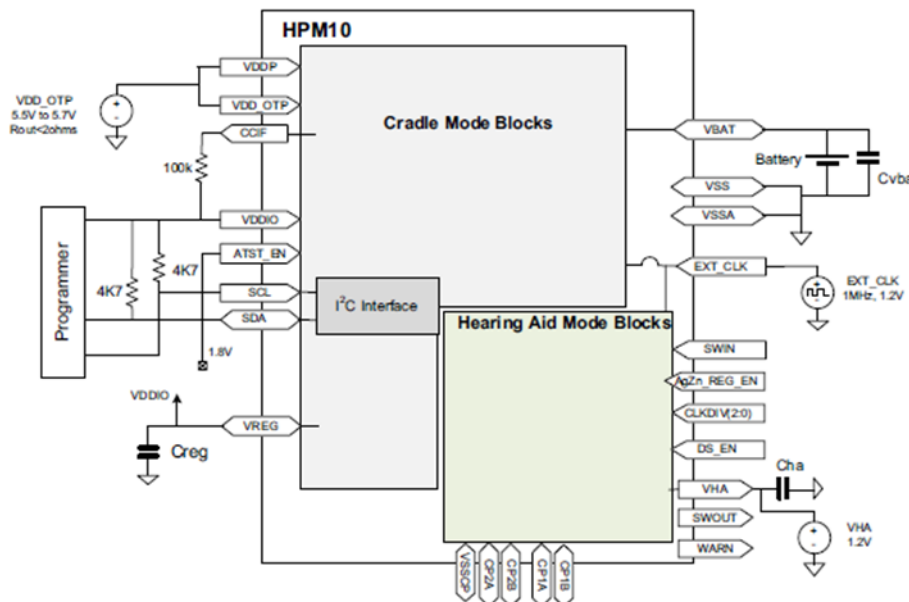


Figure 3. HPM10 Hardware Setup for OTP Evaluation and Burn

OTP Parameters

The HPM10 PMIC has two banks of OTP registries:

- Bank 1 OTP contains all the registries for the charge parameters that can be set by the user.
- Bank 2 OTP contains all the calibration settings for the PMIC itself plus some fixed charge parameter settings. Bank 2 OTP are programmed during manufacture testing of the PMIC and should not be overwritten.

The HPM10 Programming Interface tool contains some standard sample OTP configuration files in the *Support* folder for use with size 13 and size 312 rechargeable AgZn and Li-ion batteries. These files are:

- The full sample files which consisted of all the settings for the OTP parameters in both OTP Bank 1 and Bank 2. These full sample files are for test evaluation only and should not be used to burn the OTP registers.

- The OTP1 sample files which consisted of all the configurable charge parameters located in the Bank 1 OTP registers. The charge parameters in these files are already populated with the standard settings recommended by the battery manufacturers.

Before HPM10 can be used to charge a battery, it must have the charge parameters relating to the battery size, voltage and current levels burned into the OTP1 of the device.

Start a Battery Charge Test

This section describes how to start a charging test on a S312 Li-ion battery by using the Command Line tool and the Evaluation and Development Kit. For this test, the charge parameters will be written to the RAM for evaluation of the charging process.

- Connect the HPM10 EVB and charger as shown in Figure 1. A picture of the physical setup is shown in Figure 4 below:

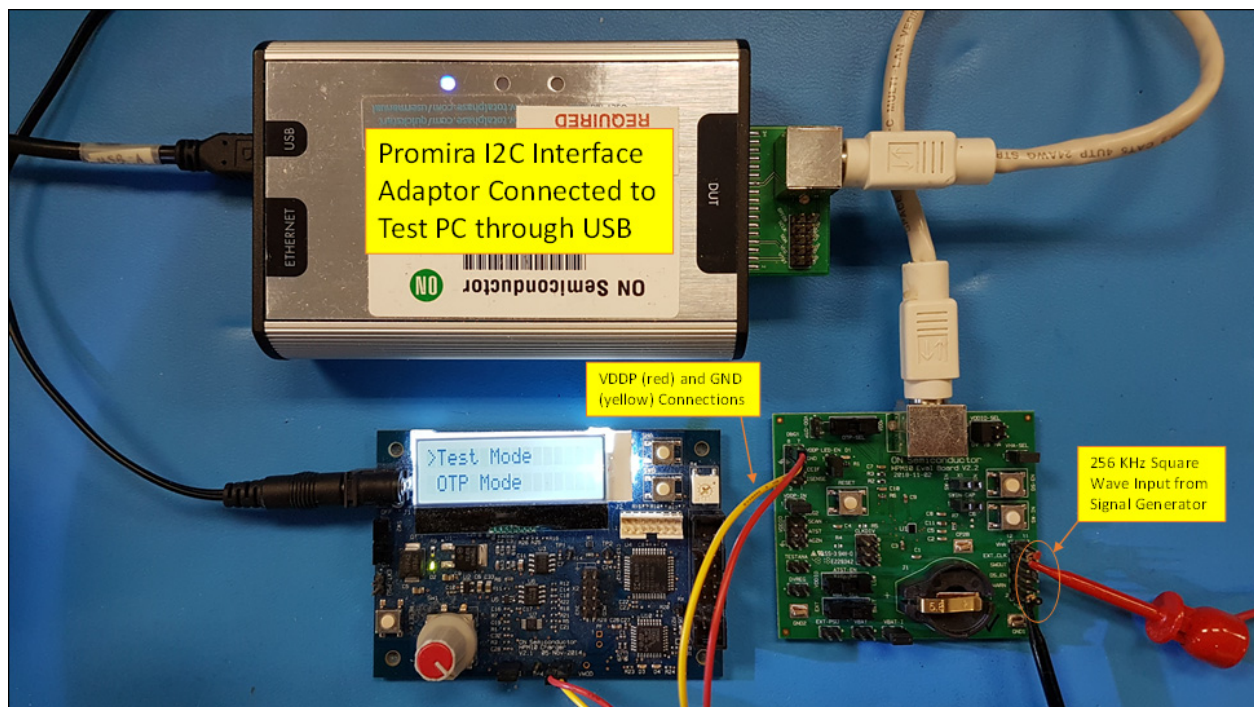


Figure 4. HPM10 Hardware Setup for Battery Charge Test

- Navigate to the *Support* folder of the CMD tool. Copy the file “SV3_S312_Full_Sample.otp” and save it in the CMD Tool folder.
- Open the Command Prompt window on the PC. Navigate to the Command Line Tool located in the *CMD* folder of the HPM10 Programming Interface. Load both Banks of the OTP parameters contained in the file “SV3_S312_Full_Sample.otp” into the RAM of the

PMIC by using the following command:

```
HPM10_OTP_GUI.exe [--I2C programmer] [--speed SPEED] -w SV3_S312_Full_Sample.otp
```



The default I²C programmer is Promira and the speed is 400 (kbps). If not defined in the CMD command, the default programmer and speed will be used by the HPM10 Programming Interface.

Example 1: Write RAM using the Promira programmer:

```

C:\Windows\System32\cmd.exe - HPM10_OTP_Tool.exe --Promira --speed 400 -w SV3_S312_Full_Sample.otp
Microsoft Windows [Version 10.0.19045.3930]
(c) Microsoft Corporation. All rights reserved.

C:\HPM10_1_5\CMD\dist>HPM10_OTP_Tool.exe --Promira --speed 400 -w SV3_S312_Full_Sample.otp
Put charger in Test Mode and verify that:

    LED on HPM10 Eval Board is Lit
    VBAT is connected to battery or battery emulator.
    OTP-SEL = VDDP
    VDDIO-SEL = DV
    VHA-SEL = Jumpered
    ATST_EN = VDDIO
    EXT_CLK = 256kHz (0V ~ 1.8V)

Press Enter to Continue...
    
```

Figure 5. Write RAM Using the Promira Programmer

Example 2: Write RAM using the CAA programmer:

```

C:\Windows\System32\cmd.exe - HPM10_OTP_Tool.exe --CAA --speed 100 -w SV3_S312_Full_Sample.otp
Microsoft Windows [Version 10.0.19045.3930]
(c) Microsoft Corporation. All rights reserved.

C:\HPM10_1_5\CMD\dist>HPM10_OTP_Tool.exe --CAA --speed 100 -w SV3_S312_Full_Sample.otp
Put charger in Test Mode and verify that:

    LED on HPM10 Eval Board is Lit
    VBAT is connected to battery or battery emulator.
    OTP-SEL = VDDP
    VDDIO-SEL = DV
    VHA-SEL = Jumpered
    ATST_EN = VDDIO
    EXT_CLK = 256kHz (0V ~ 1.8V)

Press Enter to Continue...
    
```

Figure 6. Write RAM Using the CAA Programmer

- If the charger board is used, turn the knot on the charger to select the “Test Mode” option, then press the knot to apply 5 V to the VDDP of the HPM10 EVB.
- Follow the instructions shown in the Command Prompt window to complete the loading of the OTP parameters to RAM and start the charging test.
- Once the charging test has started, the charger board will monitor and display the charging status. One can check the charging parameters by pressing the knot again, then scroll through the menu by rotating the knot.
- When the charge has ended, the charger will display if the charging has been completed successfully or ended with a fault together with the error code.

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Figure 7. End of A Successful Battery Charge

Modify The Charge Parameters

The charge parameters in Bank 1 OTP can be modified by using the GUI as follows:

- Open the Command Prompt window on the PC. Navigate to the folder where the GUI is located. Open the GUI by

using the command as shown in item 1 of the *Programming Tool and EVB Setup* section above.

Example: Open the GUI with Promira programmer (see Figure 8)

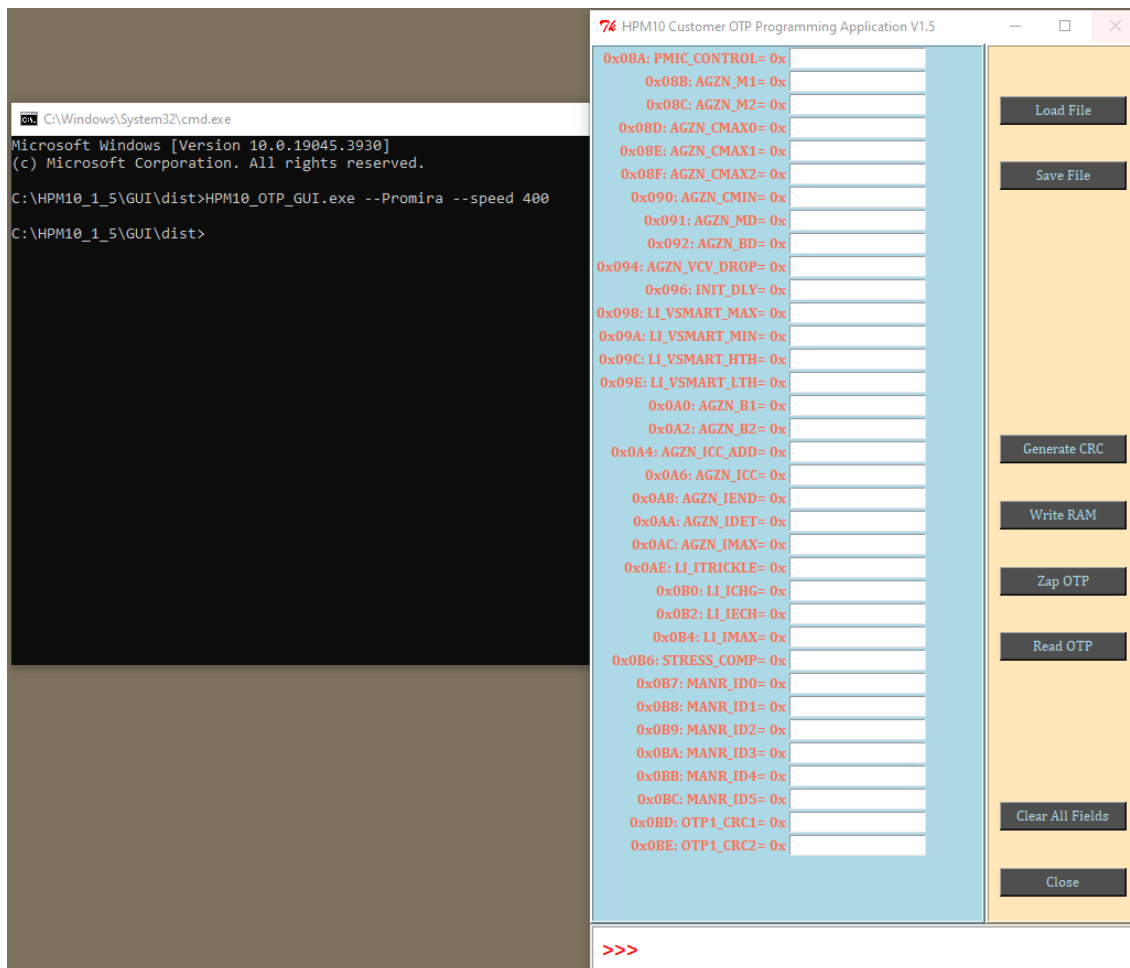


Figure 8. Open The GUI with Promira Programmer

- Click the “Load file” button available on the GUI to import the file containing the OTP parameters. Note that the GUI only handles the Bank 1 OTP parameters. If a full OTP file is loaded, only the first 35 settings will be imported, and the remaining values will be ignored.
- After modifying the parameters, calculate the new values for “OTPI_CRC1” and “OTPI_CRC2” by clicking on the “Generate CRC” button.
- Click on the “Save File” button to save the finalized OTP1 file.

It is recommended to test the updated charge parameters before burning the settings into the OTP. The full OTP file is required for this purpose. To compose the full OTP file, simply take one of the full OTP sample files from the *Support* folder and replace the first 35 settings with the values from the finalized OTP1 file saved above. The charge test should be done using the Command Line Tool as the GUI cannot handle the full OTP file.

Burning and Reading the OTP Parameters

Both the GUI and the Command Line Tool can be used to burn the OTP registers.

- For the GUI, first, load the finalized OTP1 file as generated above by using the “Load file” function in the

GUI tool, then use the “Zap OTP” function to start the burning process.

- For the Command Line Tool, enter the following command in the Windows Prompt:
`HPM10_OTP_GUI.exe [--I2C programmer] [--speed SPEED] -z otp1_filename.otp`
- Follow the popup instructions to permanently set the charge parameter values.
- Once the process is completed, the status bar at the bottom of the GUI should display “OTP zapped successfully”. For the Command Line Tool, the process should end with the message “OTP zapped command sent” shown without any error.

After the OTP burn, the “Read OTP” function on the GUI can be used to read back the content to verify the burn process or use the following command in the Windows Prompt for the Command Line Tool:

```
HPM10_OTP_GUI.exe [--I2C programmer] [--speed SPEED] -r out_filename.otp
```

Important Notes

- Reset the PMIC by holding the CCIF pad LOW while powering up VDDP during the OTP read process. Otherwise, the data retrieved will be incorrect.

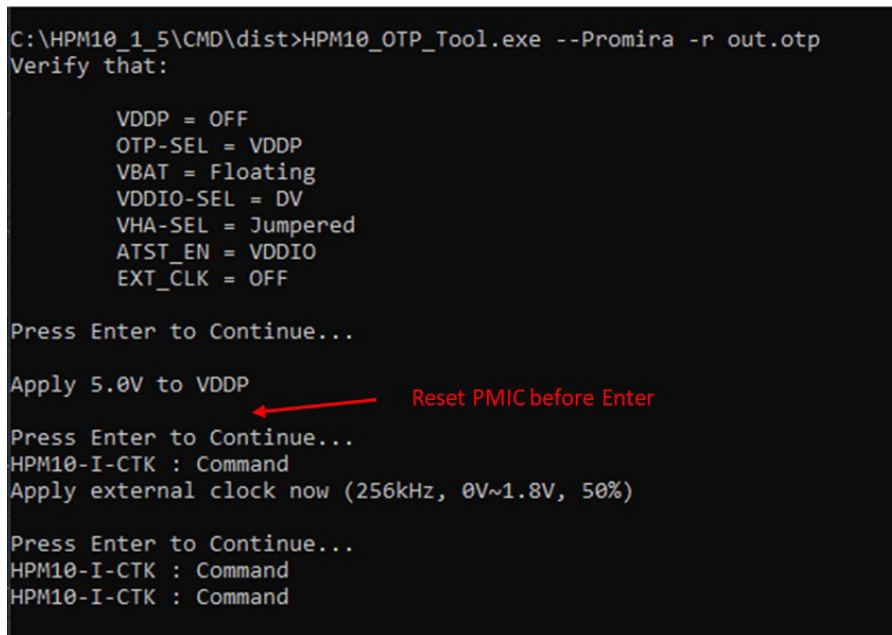


Figure 9.

- Before starting to charge a battery in hearing aid mode, remove the connection between VHA and VDDIO or the external power supply to VHA, and also connect ATST-EN to the ground to enter hearing aid mode.

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