



HomeKit Accessory Validator User Guide

Version 1.0

February 2019

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1. Introduction

1.1 Purpose

This document is a user guide for the HomeKit Accessory Validator (HAV) iOS app.

1.2 Terminology - iOS Controller and Accessory

Throughout this specification:

- The term iOS Controller is used to refer to an iOS device running the latest version of iOS.
- The term Accessory is used to refer to any product intended to interface with an iOS Controller via the means described in this specification.

2. HomeKit Accessory Validator (HAV)

2.1 Overview

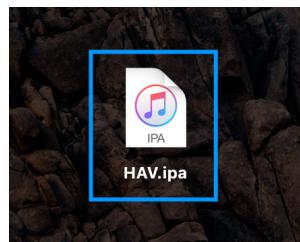
HomeKit Accessory Validator (HAV) is an iOS app that automatically executes and validates HomeKit test cases and includes a stress tester to determine reliability. HAV test case execution and validation is automated with HomeKit APIs from the iOS SDK. **HAV is not a certification tool and should not be used for HomeKit certification.**

This app may be helpful for feature development and to test an accessory's HomeKit implementation. HomeKit Accessory Validator (HAV) helps Licensees run accessory test cases with iOS. Using this app along with existing certification tools may help improve and validate HomeKit accessory behavior.

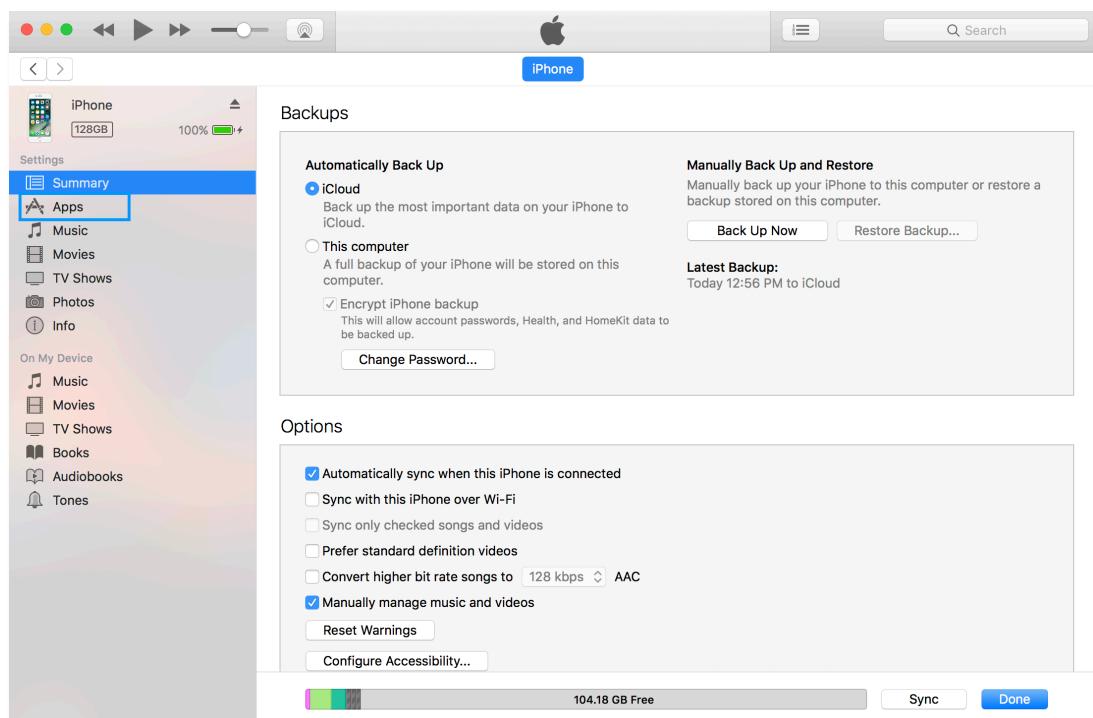
2.2 Installation

Note: Please use different iCloud accounts across iOS Controllers used with HAV to avoid Home data being synced across your iOS Controllers during testing.

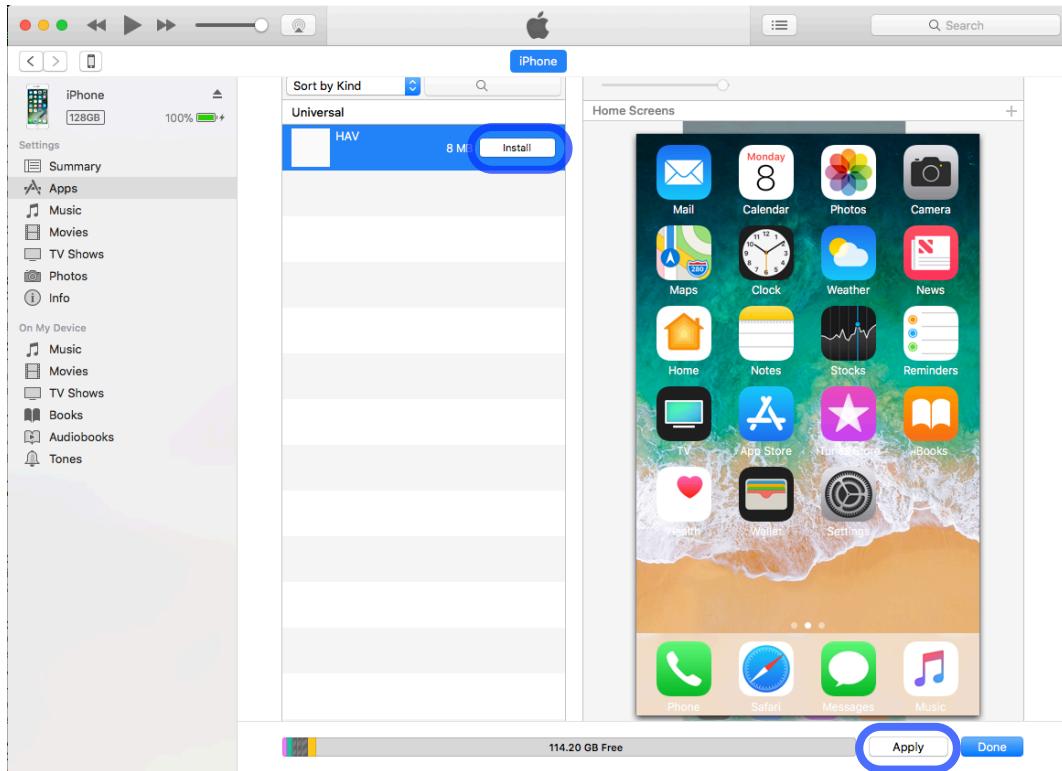
1. Double click on the HAV.ipa file to add it to iTunes.



2. Connect your iOS Controller to your Mac and open iTunes. In iTunes, click on Apps.



3. Click install on the HAV app and click on Apply. The app should be installed on your iOS Controller at the end of this step once sync completes.



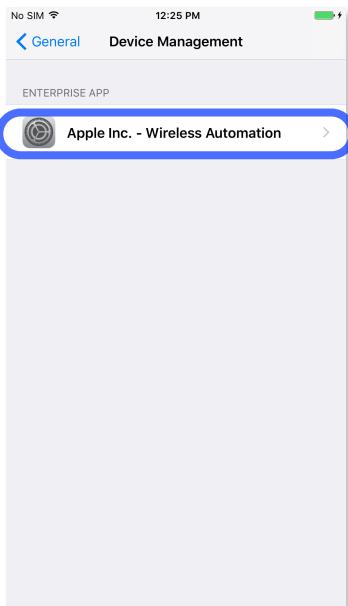
4. Once the app has been installed on your phone, you must trust the developer to be able to launch the app. To do so, on your phone go to Settings and tap on General.



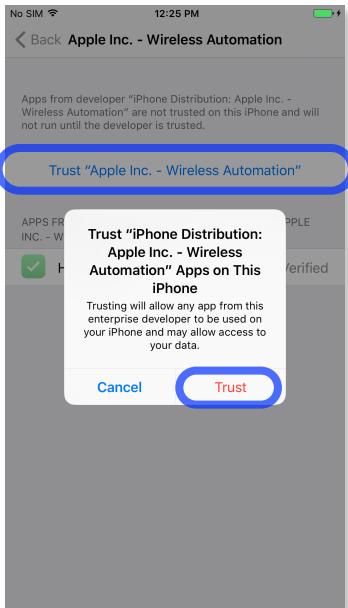
5. Scroll down and tap on Device Management.



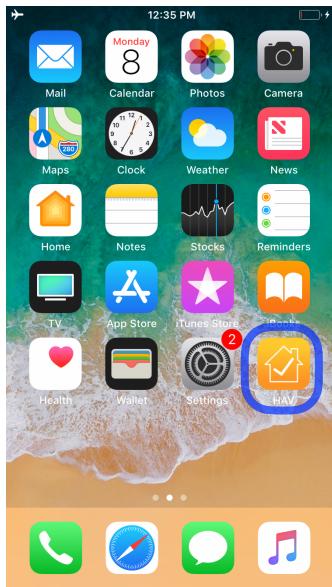
6. Tap on "Apple Inc. - Wireless Automation"



7. Tap on "Trust Apple Inc. - Wireless Automation". A popup should appear asking to trust "Apple Inc. - Wireless Automation". Tap on 'Trust' on the popup.

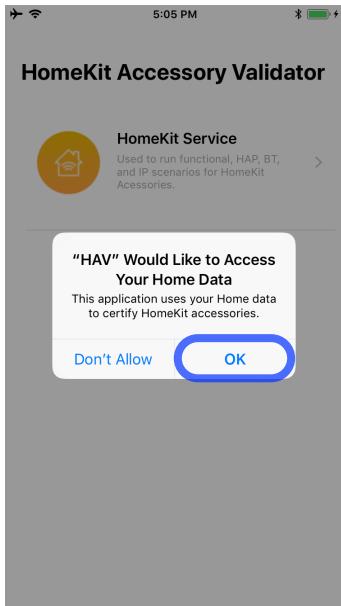


8. The app should be ready to launch from the Home tab at this point.

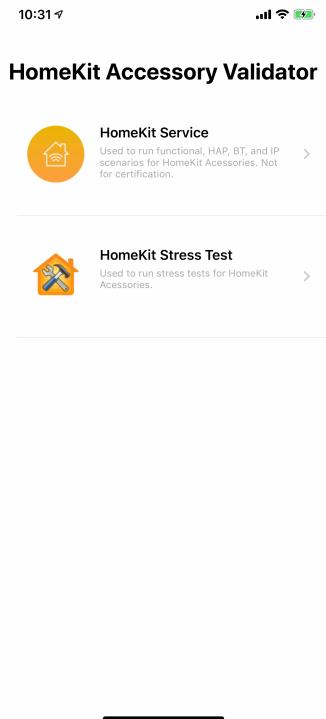


If you have any issues, follow through the steps above to check if you missed out on a particular step.

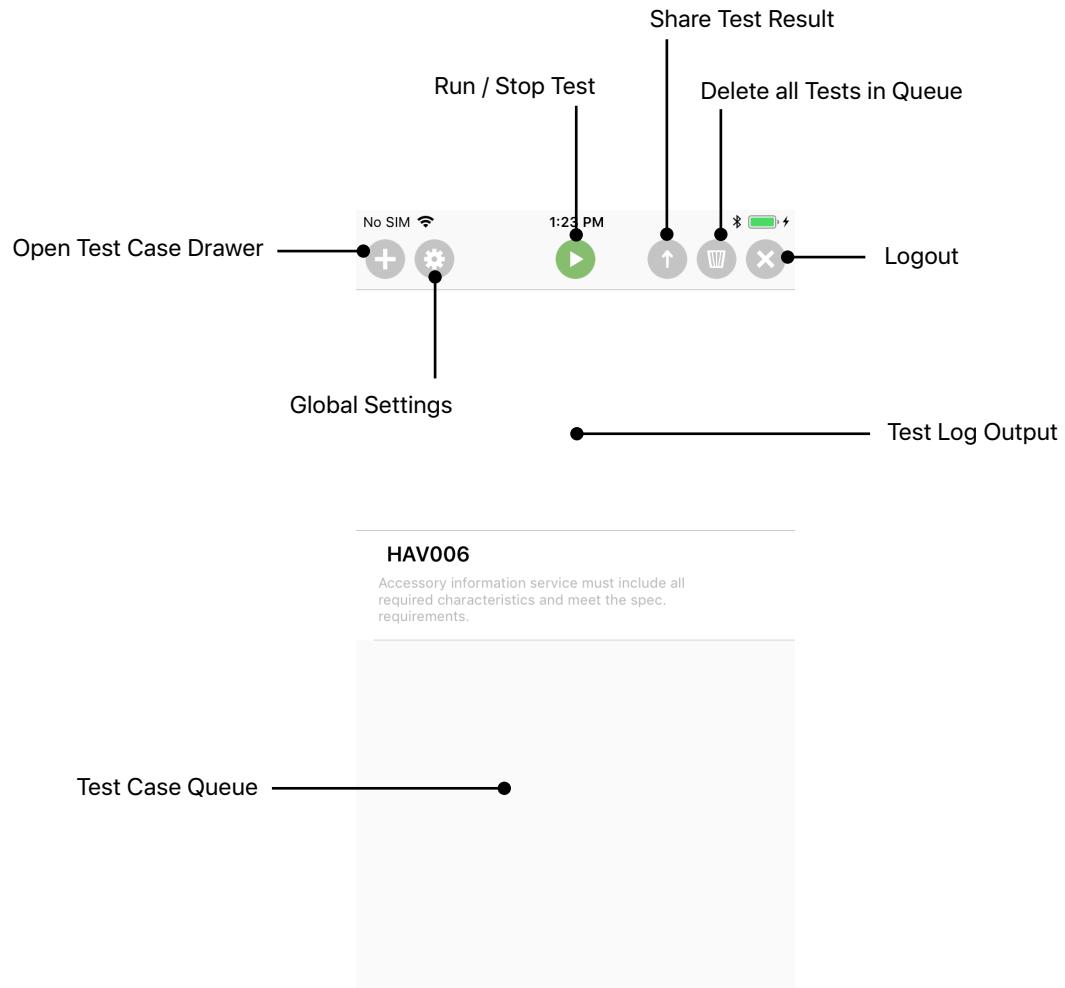
9. Tap on HAV to open the app. At launch, you might get a popup asking to allow the app to access Home data. Tap "OK" to grant access.



10. Tap on "HomeKit Service" to get to the main view of the app.



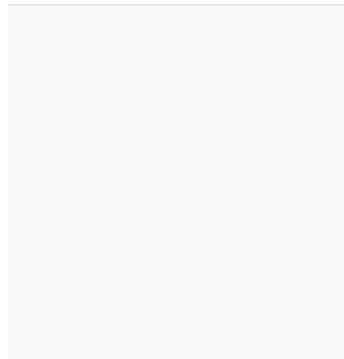
2.3 User Interface Overview



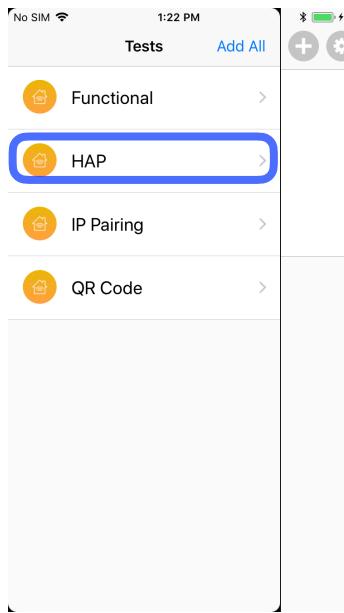
2.4 Instructions

2.4.1 Adding test cases

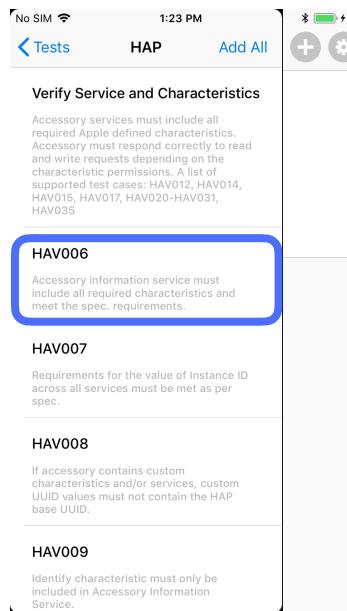
1. Tap on the "+" icon on the top left side of the app.



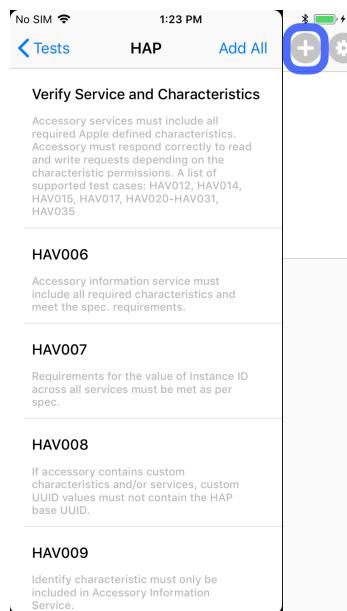
2. The test selection drawer will appear for you to choose a category. Tap the test case category appropriate for your intended testing.



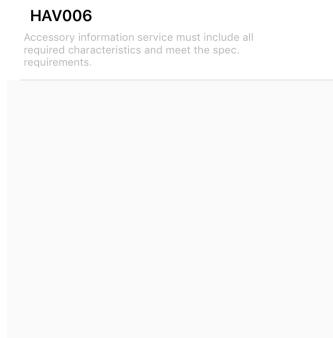
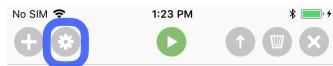
3. You will see a list of test cases belonging to the category with a description of what each of the test case is checking for. You can select as many tests as you would like, or tap on "Add All" to add all the tests. To select a test case, just tap on it. For this example, we will consider HAV006.



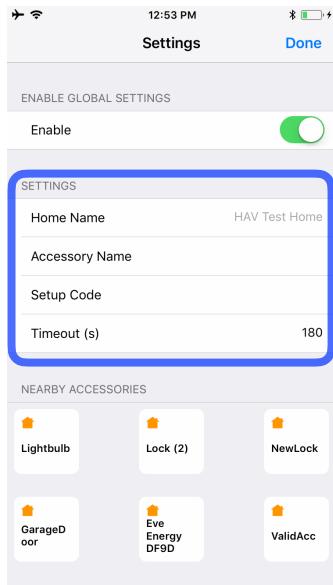
4. Tap the "+" button or anywhere outside the drawer to exit the drawer.



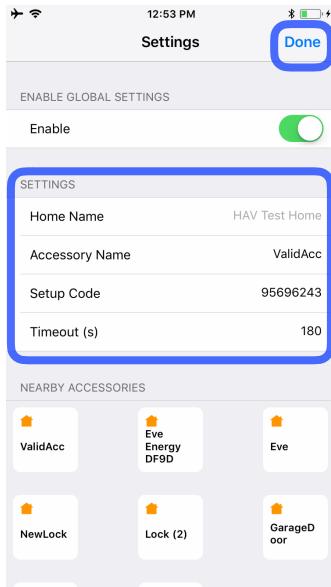
- The test case should be added to the test case queue at this point on the main screen of the app. Tap on the global settings icon to add accessory settings.



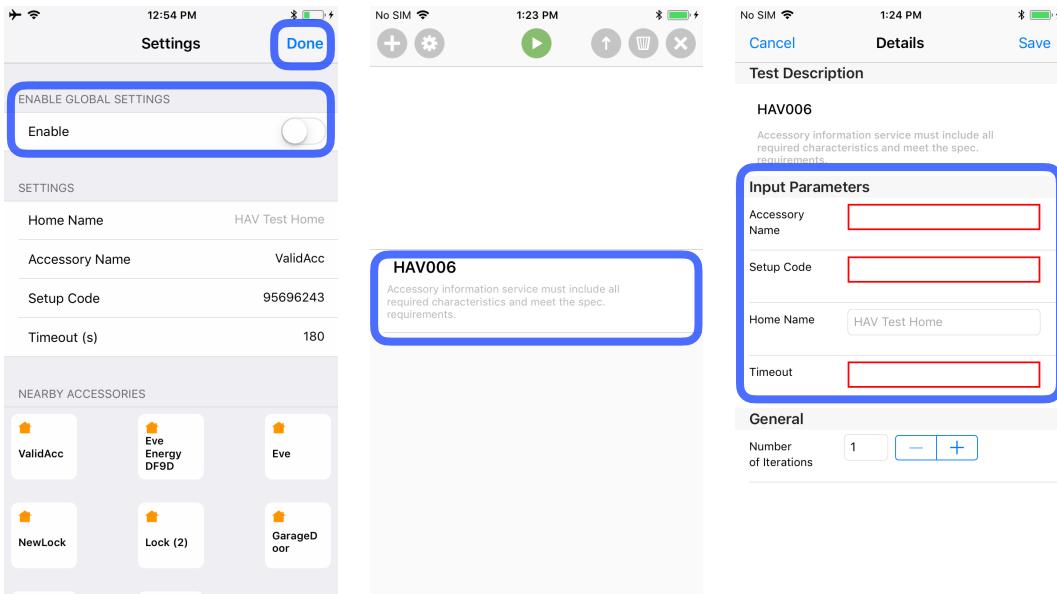
- In the Global Settings view, you will be able to see nearby accessories in a browse view at the bottom portion of the screen. Tapping on an accessory will auto populate the accessory name in the Accessory Name field. You can also manually enter the accessory name. In both instances, the setup code will have to be filled manually and will not self-populate.



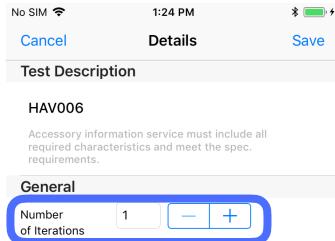
7. Enter the settings and tap on “Done” once you are ready exit the accessory settings view.



8. Optional: If you prefer to not use the same accessory globally for all test cases, you can disable global settings and tap on the test case to enter accessory settings that the test case should use. This gives you an option to test various accessories of different categories at the same time.

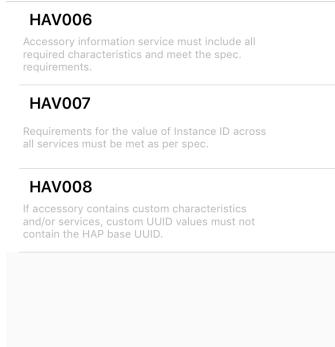


- Optional: If you are performing stress testing and would like to repeat a test multiple times for an accessory, tap on the test case in the main view of the app and set repeat count to the number of times you would like to repeat the test.



2.4.2 Running test cases

- Once you have added test cases to the queue, you can tap on the Run Test button on the top center of the app main view to invoke the tests in the queue. They will execute in the order they were added.



- The test will begin to run and live logs will be streamed in the Test Log Output portion of HAV. You might be expected to do some manual action on the accessory while running for certain test cases. There are 3 states for a test result - Pass, Fail and N/A in the case when the test case is not applicable for the accessory specified.

```

No SIM 1:28 PM
+ ⚙️ ⏴ ⏵ ✎ ×
02/26 13:28:31 -> Press
02/26 13:28:31 -> Writing: Outlet 10 | Power State | 1
02/26 13:28:31 -> Expected: SUCCESS
02/26 13:28:31 -> Actual: SUCCESS
02/26 13:28:31 -> PASS
02/26 13:28:31 -> Reading characteristic 'Outlet In Use'
02/26 13:28:37 -> Reading: Outlet 10 | Outlet In Use
02/26 13:28:37 -> Expected: SUCCESS
02/26 13:28:37 -> Actual: SUCCESS | Value: 0
02/26 13:28:37 -> Checking characteristic value
02/26 13:28:37 -> Expected: 1
02/26 13:28:37 -> Actual: 0
02/26 13:28:37 -> FAIL
02/26 13:28:37 ->>>> HAV016 FAIL <<<<

```

HAV006

Accessory information service must include all required characteristics and meet the spec. requirements.

Pass

HAV018

Accessories that contain the thermostat service must represent the maximum temperature that must be reached before cooling is turned on via...

N/A

HAV016

Accessories that contain the outlet service must update the value of Outlet In Use characteristic regardless of the On characteristic state.

Fail

2.4.3 Viewing test case results

- To view the results of a particular test cases, simply tap on the test case.

```

No SIM 1:28 PM
+ ⚙️ ⏴ ⏵ ✎ ×
02/26 13:28:31 -> Press
02/26 13:28:31 -> Writing: Outlet 10 | Power State | 1
02/26 13:28:31 -> Expected: SUCCESS
02/26 13:28:31 -> Actual: SUCCESS
02/26 13:28:31 -> PASS
02/26 13:28:31 -> Reading characteristic 'Outlet In Use'
02/26 13:28:37 -> Reading: Outlet 10 | Outlet In Use
02/26 13:28:37 -> Expected: SUCCESS
02/26 13:28:37 -> Actual: SUCCESS | Value: 0
02/26 13:28:37 -> FAIL
02/26 13:28:37 -> Checking characteristic value
02/26 13:28:37 -> Expected: 1
02/26 13:28:37 -> Actual: 0
02/26 13:28:37 ->>>> HAV016 FAIL <<<<

```

HAV006

Accessory information service must include all required characteristics and meet the spec. requirements.

Pass

HAV018

Accessories that contain the thermostat service must represent the maximum temperature that must be reached before cooling is turned on via...

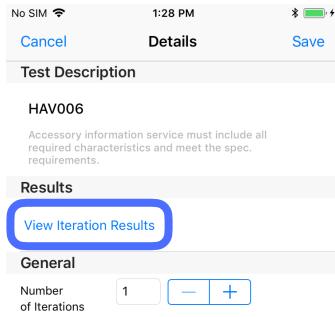
N/A

HAV016

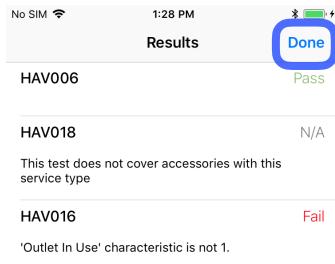
Accessories that contain the outlet service must update the value of Outlet In Use characteristic regardless of the On characteristic state.

Fail

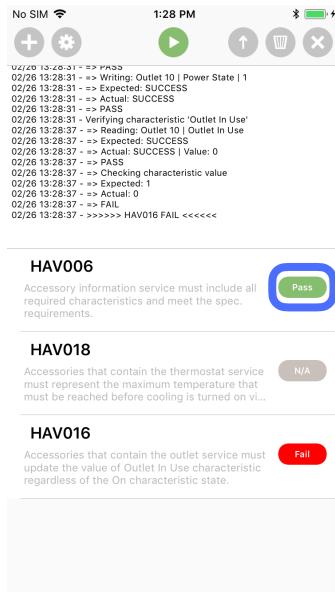
2. Tap "View Iteration Results"



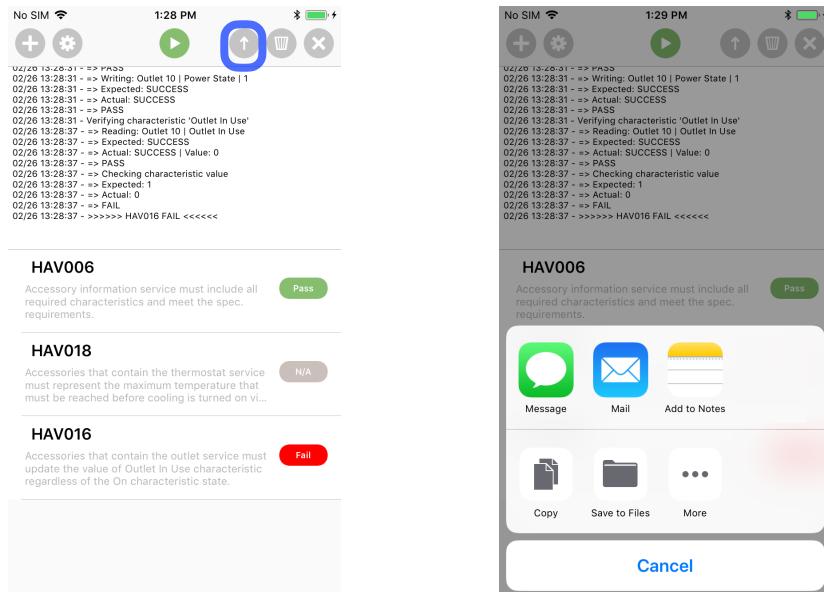
3. You should be able to see the error for the test failure at this view. Tap on "Done" to get back to the previous view.



4. Optional: You can also tap on the Pass / Fail / N/A icon on a test case cell to view the iteration results.

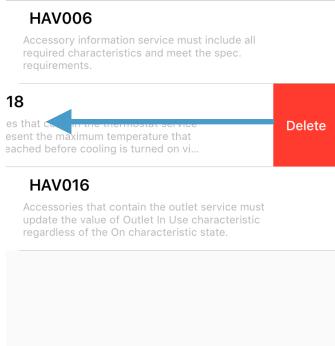


5. Optional: If you would like to share the result of a test run, you can do so by tapping the share test result button on the main view and selecting a service that you would like to use.

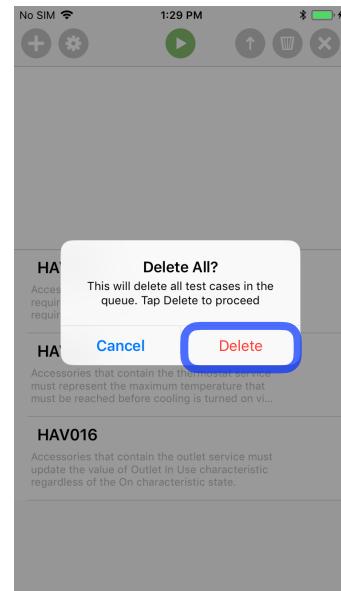
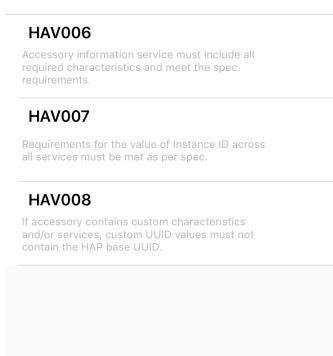


2.4.4 Deleting a test case or a queue of test cases

- To delete a test case that has been added to the test case queue, swipe left on the test case you want to delete and it should unveil a delete option. Tap on the delete option to remove the test case from the queue.



- If you want to clear the entire test queue altogether, tap on the delete test queue button on the top right side of the screen. A confirmation window would show up if you want to delete all tests. Tap "Delete" to continue.

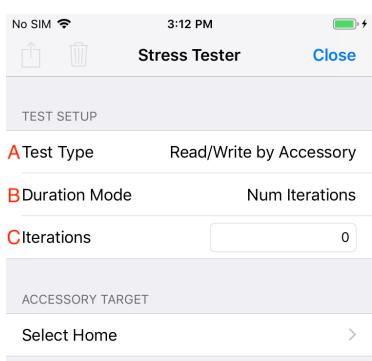


3. Stress Tester Setup

3.1 Setup

3.2.1 Test Setup - Test Type

There are four test modes for the Stress Tester:



- "Read/Write by Accessory" takes a single accessory and performs write/read tests over all its read/write capable characteristics at random.
- "Read/Write by Characteristic" takes a list of the specific characteristics to do the same tests from Read/Write by Accessory. This mode allows characteristics from multiple accessories in the same home. The tests run in the order the characteristics were selected.

- "Start/Stop Camera Stream" takes a single accessory with an IP Camera profile and performs a sequence of camera stream start and stop operations for the duration of the test.
- "Pair/Unpair Accessory" takes a home, an unpaired accessory's name, and a setup code, then performs pair, read, and unpair operations on the home and accessory.

Select between them by tapping on cell A.

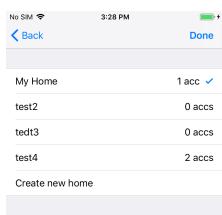
3.2.2 Test Setup - Duration

There are two test duration modes: Time and Iterations. Select between them by tapping in cell B and entering the requested corresponding duration/iterations in the text field in cell C.

- "Iterations" ends the test after a set number of iterations have been run. A single iteration consists of a Write followed by a Read, or a Stream Start followed by a Stream Stop.
- "Time Duration" ends when the set time has elapsed. It is entered as a number of hours, but can be less than an hour if you enter a decimal value. Time duration only measures time elapsed while testing. Pausing the test by any means (such as hitting pause, sharing the files, viewing results, etc) will also pause the count of elapsed time.

3.2.3 Select Home and Accessory

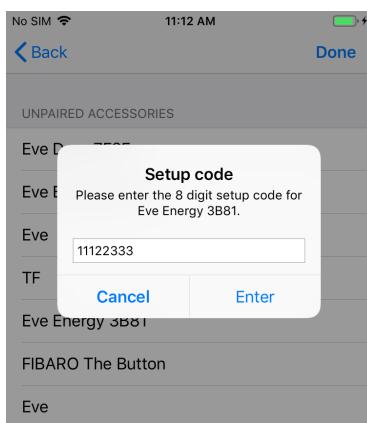
Use the second section to select the home and the camera, accessory, or characteristics to be used in the test. Selections are also tied to the test type, so choosing one does not also choose the other types. Unreachable accessories can be selected for non-pairing tests, but will return failures with HMError number 4, "Accessory not Reachable."



- "Read/Write by Characteristic": Select a home, then select accessories in that home to view their characteristics. Select characteristics to perform read/write tests on. At least 1 characteristic is required to run, but any positive number will work. Selected characteristics can be on multiple accessories, but must be in the

same home.

- “Read/Write by Accessory”: Select a home, then in that home, choose one of its accessories. An empty home can be selected, but tests cannot begin until an accessory is added and selected in that home.



•“Start/Stop Camera Stream”: Select a home, then in that home, choose an accessory. Only accessories that support the IP Camera profile will be visible.

•“Pair/Unpair Accessory”: Select or create a home, then an unpaired accessory. Once an unpaired accessory is selected, enter the setup code (EX: 11122333). Only accessories with a static setup code will work with this test.

•**NOTE:** Pairing tests are based on the accessory name rather than the specific accessory, so ensure only one accessory with its name is present to keep tests on one target.

Any portion of the selection may be redone until tests begin by tapping on the cell displaying it.

3.2.4 Set Timing Controls

There are three timing controls available: Delay, Timeout, and Threshold. Each can be set using the text fields in the third section.

TIMING CONTROLS	
Delay (s)	1.000s
Timeout (s)	60.000s
Thresholds (s)	0.250s 1.000s 5.000s

•“**Delay**” controls the time between operations in a single test. Delay is measured in seconds, but can be less using decimals. Delay can be zero, but may cause issues with the accessory. Delay defaults to 1 second. Tests use one of the following timing formats:

•Read/Write: Write-Delay-Read-Delay

•Streams: Start Stream-Delay-Stop Stream-Delay

•Pair/Unpair: Find-Pair-Delay-Read-Delay-Unpair-Find

•“**Timeout**” is the longest an operation will wait for completion. After a timeout is exceeded, the test is recorded as a non-successful test and stored in the list of timeouts before moving on to the next part of the test. Timeout is measured in seconds and cannot be zero. Timeout defaults to 60 seconds.

- “**Threshold**” is a set of time thresholds that cause the test to be recorded against a threshold, if exceeded. This provides an easy way to get an operation time distribution curve. Thresholds are measured in seconds and can be zero, but will result in all tests being recorded against that threshold. Thresholds being exceeded will not result in failed tests. You can remove a threshold before the testing begins by deleting the cell with the threshold.

The screenshot shows the Stress Tester application on an iPhone. The top status bar indicates signal strength, battery level, and the time (11:27 AM). Below the status bar is a navigation bar with icons for back, forward, and close, and the title "Stress Tester". The main content area is divided into two sections: "WRITES" and "READS".

View Failed Writes	0
Threshold-0.005s	0
Threshold-0.010s	5 >
Threshold-0.020s	119 >
Threshold-0.100s	0
Timed Out-60.000s	0
View Mismatched Values	0
READS	
View Failed Reads	0
Threshold-0.005s	2 >
Threshold-0.010s	42 >
Threshold-0.020s	80 >
Threshold-0.100s	<

3.3 Setup

3.3.1 Run Controls

There are simple controls for Accessory Stress Tester, defined in the fourth section. Once an accessory has been selected, along with the duration and timeout, press **Start Run** to begin testing. While running, you can tap **Pause Run** to halt the test after the current iteration completes, at which point you can tap **Resume Run** to continue the tests or **Reset Run** to return back to the start and allow settings to be changed.

Under the control buttons, while a test is in progress whether paused or running, the percentage of successful tests completed and the progress of the testing through the duration are displayed.

Hitting **Close** aborts all tests and removes completed tests from memory. The partial run is in the logs, but it cannot be continued.

3.3.2 Operation Results

The fifth and sixth sections contain a summary of the completed tests, with various tests collected under Failed, Timeout, Threshold, and Mismatch for the write/read tests. Tapping on a cell displays information about each test falling into that category.

- “**Failed**” is the list of all tests that returned an error for their operation. Tests falling under this category reduce the success rate.
- “**Threshold**” is a set of rows, one for each threshold. Tests are recorded in the highest threshold they exceeded for their operation.
- “**Timeout**” is the list of all tests that failed to return before the timeout duration specified in the third section was met. Tests falling under this category reduce the success rate.
- “**Mismatch**” is unique to Write/Read tests. Tests are recorded here if the read value is not equal to the written value, when no errors were returned. Tests falling under this category reduce the success rate.

NOTE: Opening these views while tests are ongoing causes testing to pause. Tests must be resumed once back on the main page.

3.4 Results

3.4.1 View Analysis

The seventh section only appears when tests are paused or completed. By selecting this row, you will be shown the time statistics for all successful operations. Failed tests, mismatched tests, and timed out tests do not factor into the statistics. A minimum of 5 successes must have occurred for results to be provided.

In the Analysis page, there are four sections.

Section 1: Write, Pair, or Start Stream

Analysis	
WRITE VALUE	
min	0.013764 s
max	0.042633 s
p50	0.034200 s
p95	0.038305 s
p99	0.038305 s
count	10 tests

READ VALUE	
min	0.011932 s
max	0.024180 s
p50	0.020332 s
p95	0.022898 s
p99	0.022898 s
count	10 tests

Section 2: Read, Unpair, or Stop Stream

Section 3: All successful operations combined

Section 4: All successful iterations (such as Successful write followed by Successful read)

Each section reports six statistics: min, max, p50, p95, p99, and count.

- **min:** The shortest time taken to complete the task
- **max:** The longest time taken to complete the task
- **p50:** The time taken for 50% of all successful tasks
- **p95:** The time taken for 95% of all successful tasks
- **p99:** The time taken for 99% of all successful tasks
- **count:** The number of tasks being examined for the section

3.4.2 Sharing Results

In the top-left corner, there are two buttons, Share and Trash.

- Tap **Share** to send the logs of the test including which tests failed or timed out, which characteristics were used, and what the analysis results were. These results are stored in plain-text and can be sent as a text attachment.
- Tap **Trash** to delete the files that would be shared by the Share button.

Logs are not deleted until the Trash button is pressed. If multiple tests have run, the newest results will be at the bottom of the log file.

If only the most recent is desired, tap delete after every run.

4. Revision History

Date	Description
February 2019	<ul style="list-style-type: none">• Released initial version



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