USB2 IQC Tester
User's Guide

P +1 403.932.4620 F +1
403.932.6521
228 River Avenue, Cochrane, Alberta, Canada T4C 2C1
thisisant.com

Copyright Information and Usage Notice

This information disclosed herein is the exclusive property of Dynastream Innovations Inc. No part of this publication may be reproduced or transmitted in any form or by any means including electronic storage, reproduction, execution or transmission without the prior written consent of Dynastream Innovations Inc. The recipient of this document by its retention and use agrees to respect the copyright of the information contained herein.

The information contained in this document is subject to change without notice and should not be construed as a commitment by Dynastream Innovations Inc. unless such commitment is expressly given in a covering document.

The Dynastream Innovations Inc. ANT Products described by the information in this document are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Dynastream product could create a situation where personal injury or death may occur. If you use the Products for such unintended and unauthorized applications, you do so at your own risk and you shall indemnify and hold Dynastream and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Dynastream was negligent regarding the design or manufacture of the Product.

©2010 Dynastream Innovations Inc. All Rights Reserved.

1. Introduction

The purpose of this document is to describe the functional verification test method for second generation ANT USB stick—USB2.

2. Test Hardware

- Three pieces Golden ANT USB2 Stick (Two pieces for use in the test and one for backup; refer to section 4 of this document for the golden unit acquisition)
- Five Meter USB2 Extension Cable (User can purchase from BAFO technologies: http://www.bafo.com)
- Seven port USB2.0 Hub (User can purchase from D-Link : www.dlink.com)
- Host PC

Figure 1: Test Hardware

2.1 Hardware configuration

Figure 2 shows a diagram of how the test equipment should be set up:

The USB extension cable and Hub connect to the PC USB port directly. One golden unit (e.g. golden unit1) is connected to the USB extension cable, another golden unit is connected to the USB hub. This will establish an ANT master device and slave device.

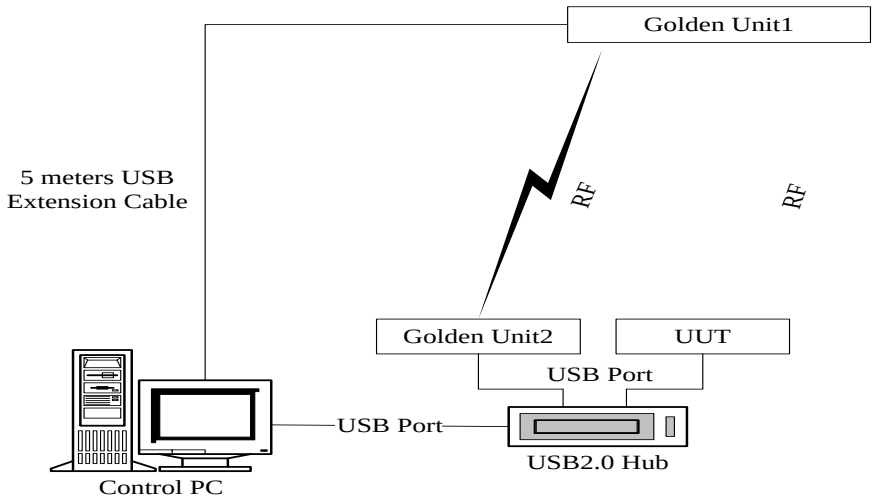


Figure 2: USB2 Test Configuration Diagram

2.2 Hardware Setup

Figure 3a shows how the USB extension cable and USB hub are installed in the test setup. The golden unit (e.g. golden unit1) is connected on one end of USB extension cable and the other end is connected to the PC USB port directly. The extension cable can be mounted on any convenient area. Another golden unit (e.g. golden unit2) is connected with a USB hub, and the unit under test (UUT) is connected to the same device (Figure 3b). The Hub can be put on the test bench near the PC and the golden unit1 connected to the extension end can be located up to 5 meters away from golden unit2. There should be no moving objects between golden unit1 and golden unit2 during the test.

Figure 3a: USB2 Extension Cable installation with Golden Unit

Figure 3b: USB2 golden unit and UUT connected with Hub

3. System Requirements

In order to use the USB2 IQC Test software, it is necessary to install the Microsoft .NET Framework Redistributable Package (3.5). A free download of this is available at the Microsoft Download Center.

All files distributed along with the test software should be present in the same directory as the application. These files include:

- ANT_DLL.dll
- ANT_NET.dll
- ANT_WrappedLib.dll
- DSI_CP210xManufacturing_3_1.dll
- DSI_SiUSBXp_3_1.dll
- USB2_IQC_Test.exe
- ANT_USB2_gold_list.ini

4. Acquiring Golden Units

4.1 Golden units selection

Golden units are strictly selected by a product design engineer in a RF lab environment from a number of finished products, usually from prototype and pilot manufacturing runs. Units are thoroughly tested using sophisticated equipment against product specifications or design goals. Depending on purpose of the golden units, either those units with testing results that marginally meet the specification or those units with the most consistent measurement (measurement should be labeled on the unit) could be marked as golden unit.

A set of Golden units should be selected and distributed among production lines and facilities. Often more than one Golden unit should be allocated per test station. These units should be well kept in the form as it was selected. Any abuse of Golden Units should be avoided, such as opening the housing, and any damage tests, such as ESD test and dropping and vibration.

There are many factors that may affect the USB2 RF performance. The orientation of the USB2's strip antenna, and the placement of the USB2 with respect to noise sources and interference environment, can significantly affect the distance at vary application. There are no specific requirements and constraints for the golden unit's selection. The golden units should be selected through empirical testing in the target application.

4.2 Golden units identification in the test program

In order to work with the identical golden units, the program requires checking the serial number of the golden units at the starting of the program. For secrecy, an encryption key (0xA7D2F289) is XOR with the golden serial numbers that show up in the initial file. The program will decrypt the serial numbers with the same key and verify the golden units.

5. The Concept of the test system

5.1 Calibration

Testing of the unit under test (UUT) is based on the comparison with the golden unit's performance. To ensure the comparison proceeds under the same test conditions, the calibration run is enforced at the beginning of each UUT test. The test software will automatically first calibrate the system and then register the pass/fail criteria. The calibration run is implemented between two golden units: golden unit1 and golden unit2, the golden unit1 will send out 50 acknowledge messages, and as response the unit2 will ideally send same number of Ack back to golden unit1. If the channel degenerates, 100% of the messages may not be received by the receiver, and the software will count the successfully received messages as the new threshold. The Figure 4a shows the calibration run.

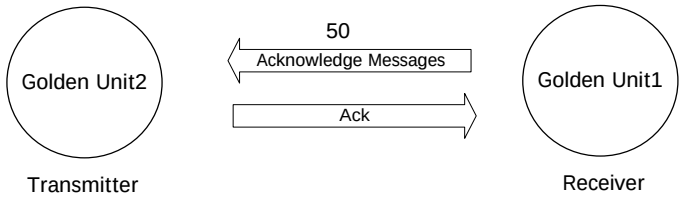
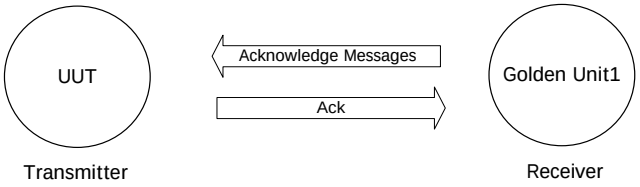


Figure 4a. Golden units calibration run

5.2 Performance test

The UUT performance test implementation is quite similar to the calibration, except that the UUT is used instead of golden unit2. Again, messages received are counted, and the max percent difference between UUT and calibration run will calculated and compared. A defective UUT will be identified by the test. The diagram Figure 4b shows the UUT test performance



Fiture 4b: UUT test implementation

6. ANT USB2 Stick Test Procedures

Calibration run

The following step by step instructions describe how to use the test software:

Run the IQC test software. Once the software is started, the GUI will show as in Figure 5. There are three text boxes on the right side of the GUI which show the ANT device message transaction status and one text box on the left side which shows test results.

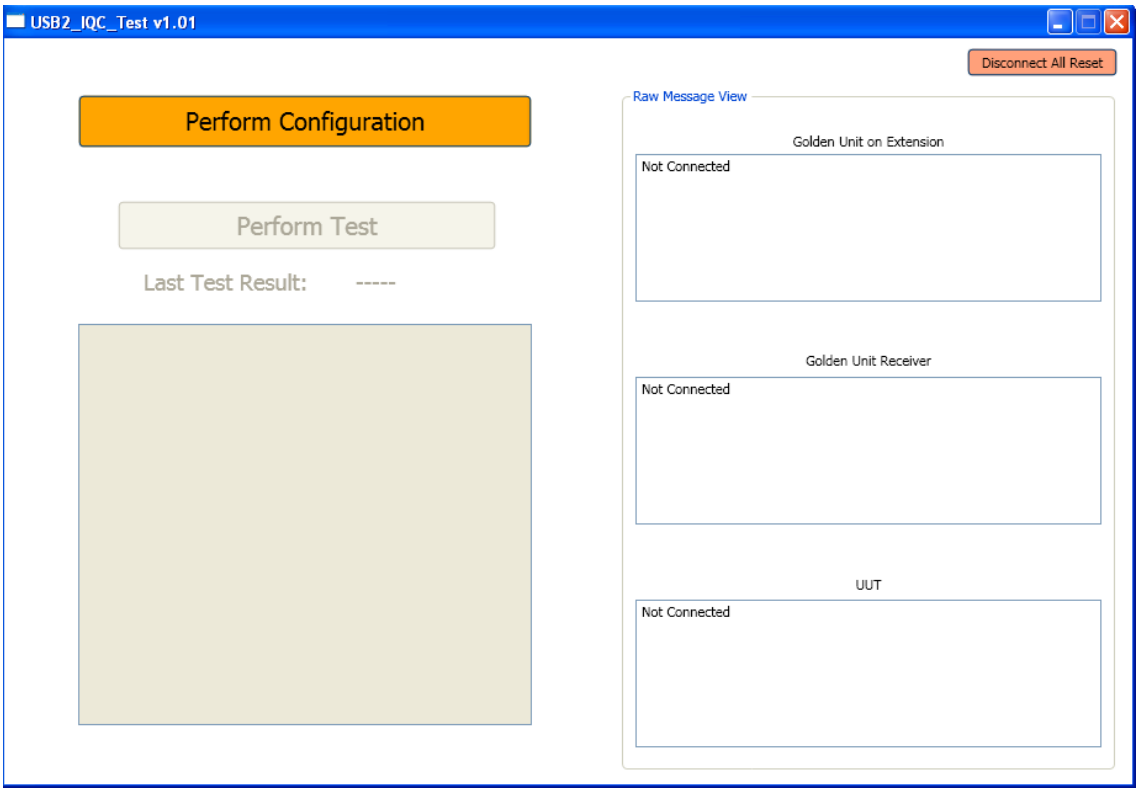


Figure 5: Test software start face

Make sure there are no USB devices attached to the PC USB port, and then click the “Perform Configuration” button on the GUI. Once the button is clicked, the popup window will display the information, which will lead you through the next step. Connect the Golden Unit (e.g. golden unit1) with USB extension Cable, and then click OK as shown in Figure 6.

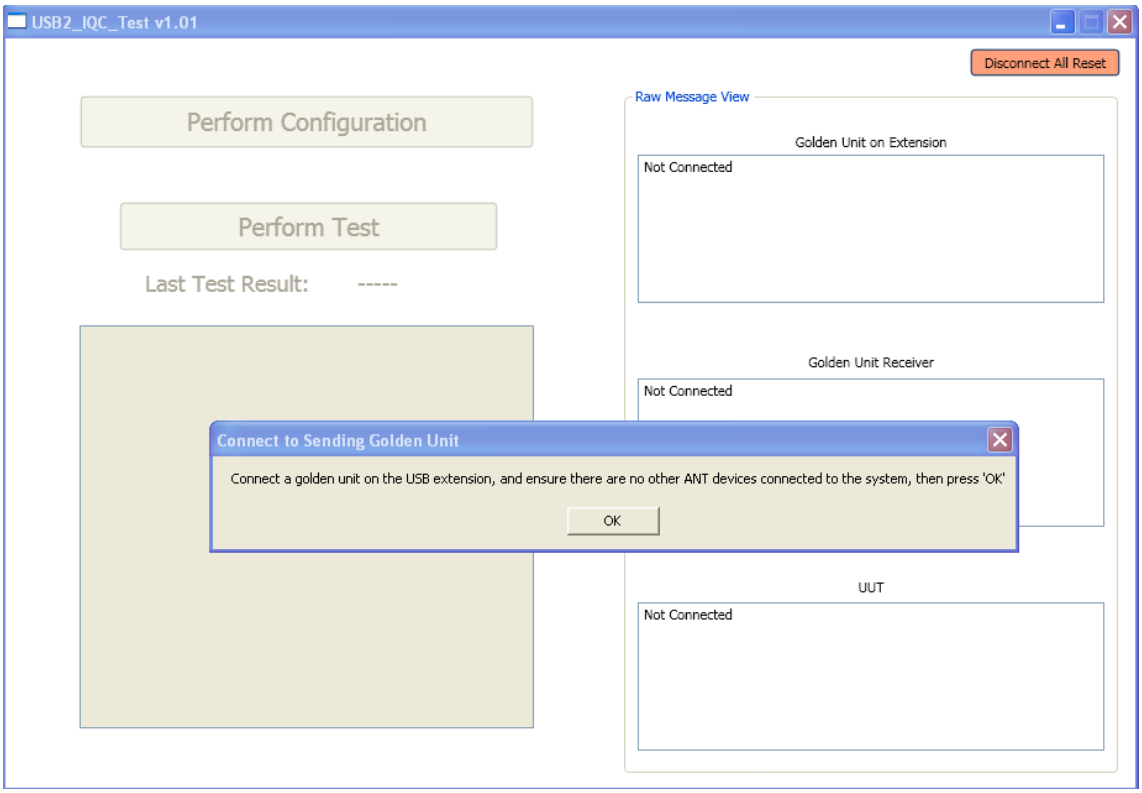


Figure 6: Connect golden Unit with USB extension Cable

Once the OK button is clicked, the popup window will remind you to connect second golden unit, which shows on Figure 7. Connect Second golden unit (e.g. golden unit2) to the 7 port USB hub.

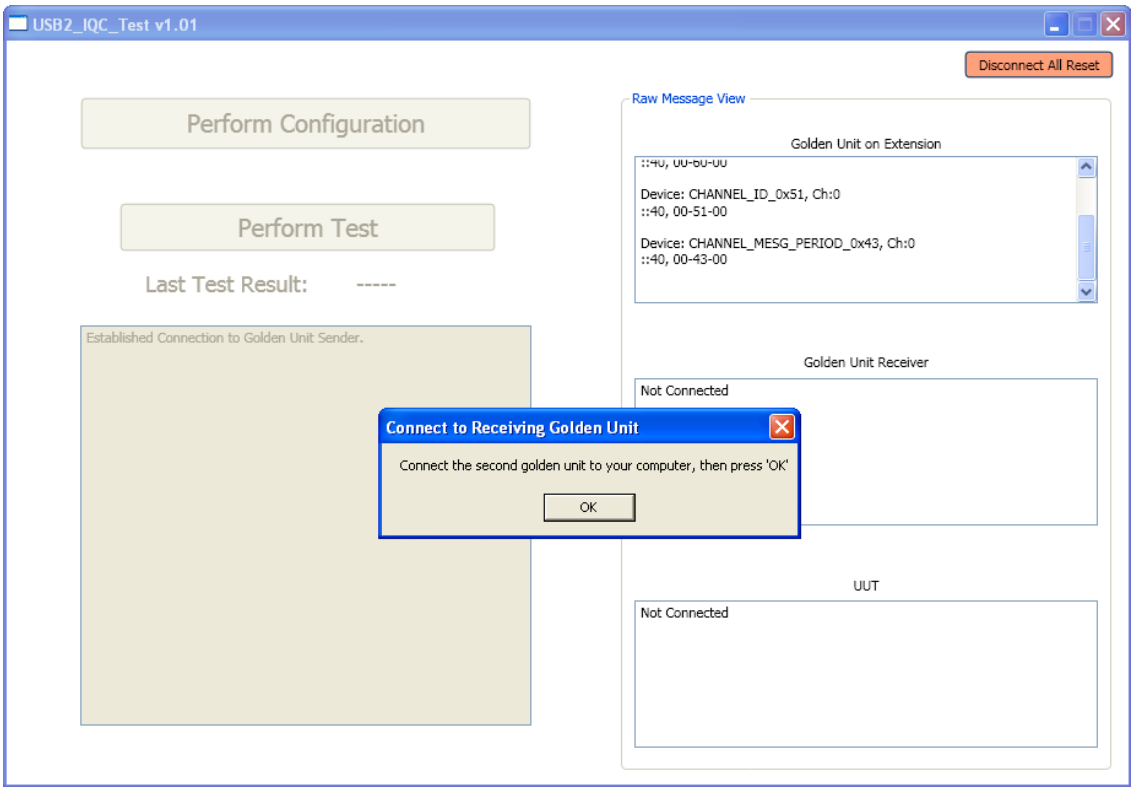


Figure 7: Connect the second golden unit to USB hub

Connect the second golden unit to USB hub, then click OK on the popup window, you will see the window shown in Figure 8.

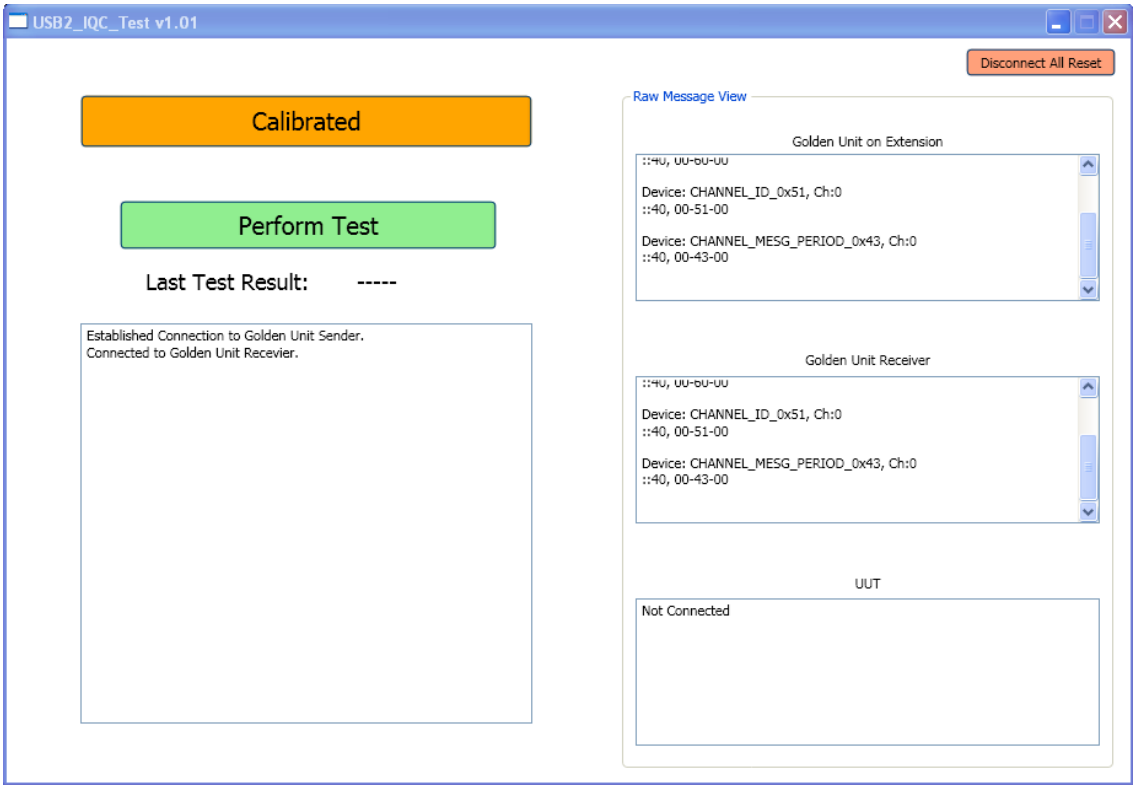


Figure 8: Connect the UUT to the USB hub

Connect the UUT

Connect a UUT to the 7 port USB hub, then click “Perform Test” button. If the configuration is correct, the start test window will show on Figure 9a. If there is any operational error during the configuration, you can click the “Disconnect All Reset” button on the right corner of the window to restart the configuration sequence.

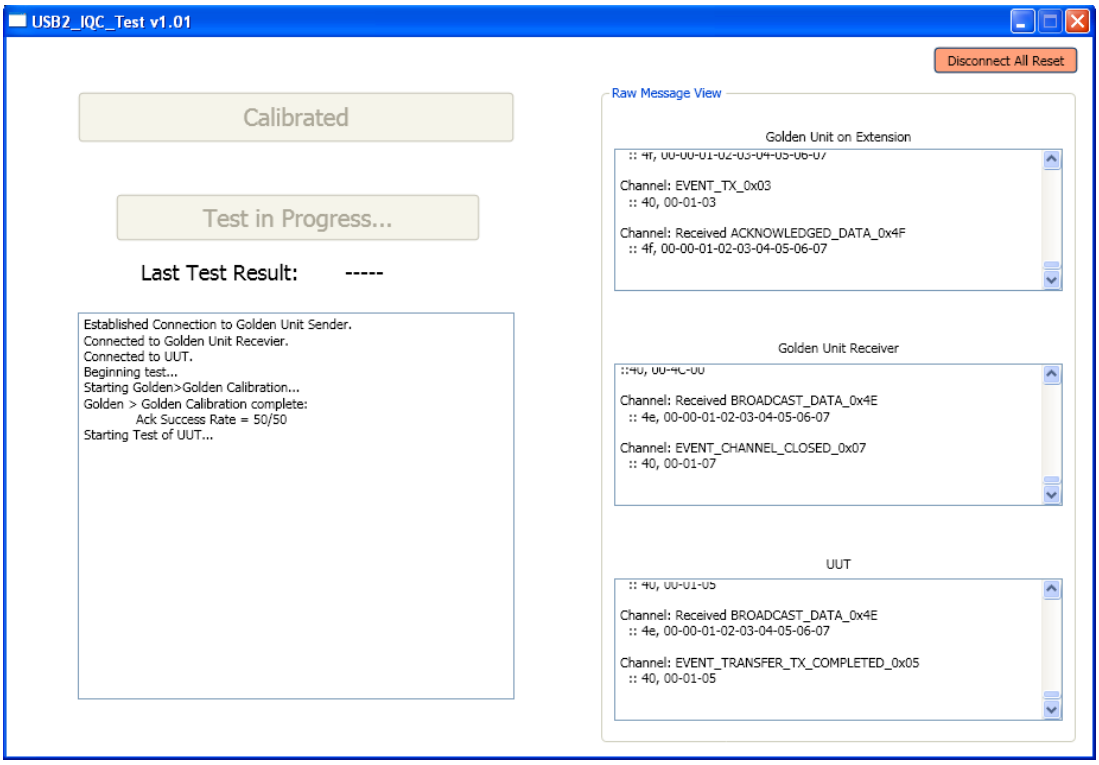


Figure 9a: Perform UUT test Start

Perform Test

After pressing the “Perform Test” button, the test software will start running. The status will show on the screen and text boxes. Calibration runs first, if the calibrated data is correct, the UUT perform test will take place next. If the calibration test fails, the popup window will show “Error” message; you may need to press the “Perform Test” button again to repeat the same test as seen in Figure 9b.

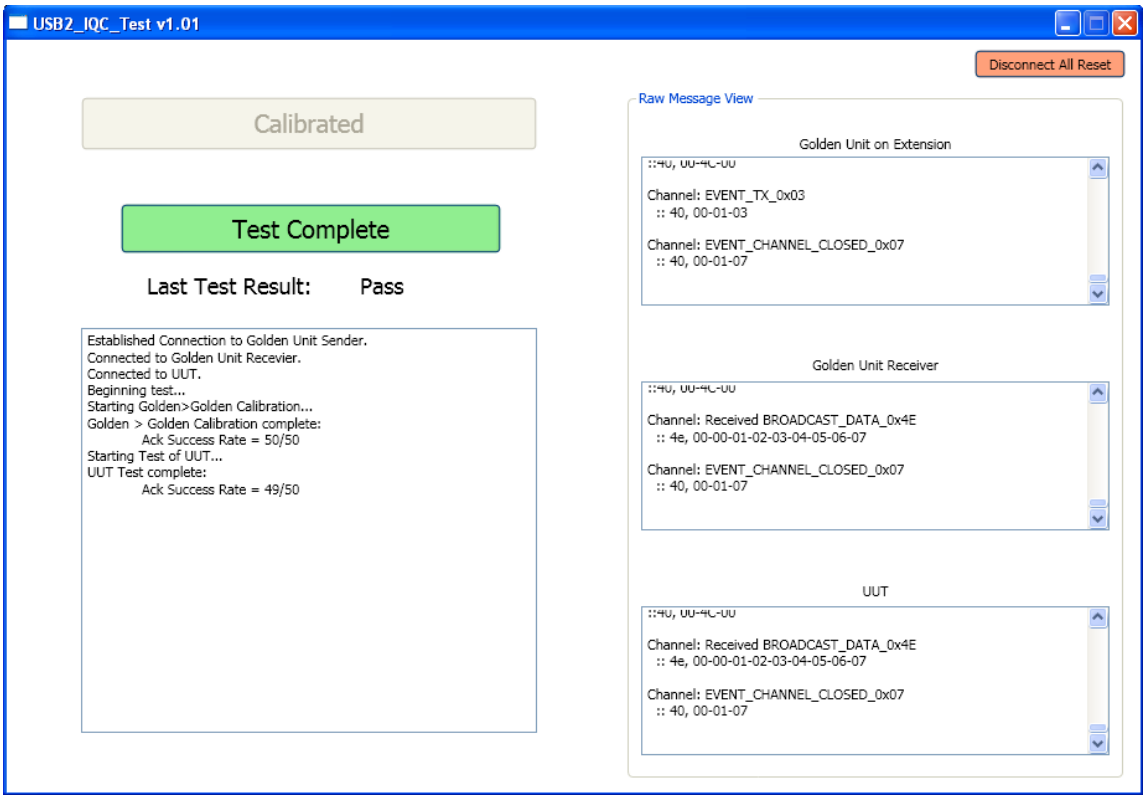


Figure 9b: Perform UUT test Complete

Pass/Fail

The calibration run and performance test is implemented automatically once the button is pressed. The Test Result label will show pass or fail. If the UUT fails, you may need to repeat the same test at least once more to confirm that the failure persists.

Change UUT

After the UUT is tested, you can unplug the UUT, change to a new one, and then press the “Test Complete button”. The popup window will remind you if the UUT does not plug in as seen in Figure 10.

Repeat the same test operation

The calibration button is disabled during the perform testing. If it is required, you can press the button “Disconnect All Reset” which will enable the calibration button and allow you to reconfigure the test system.

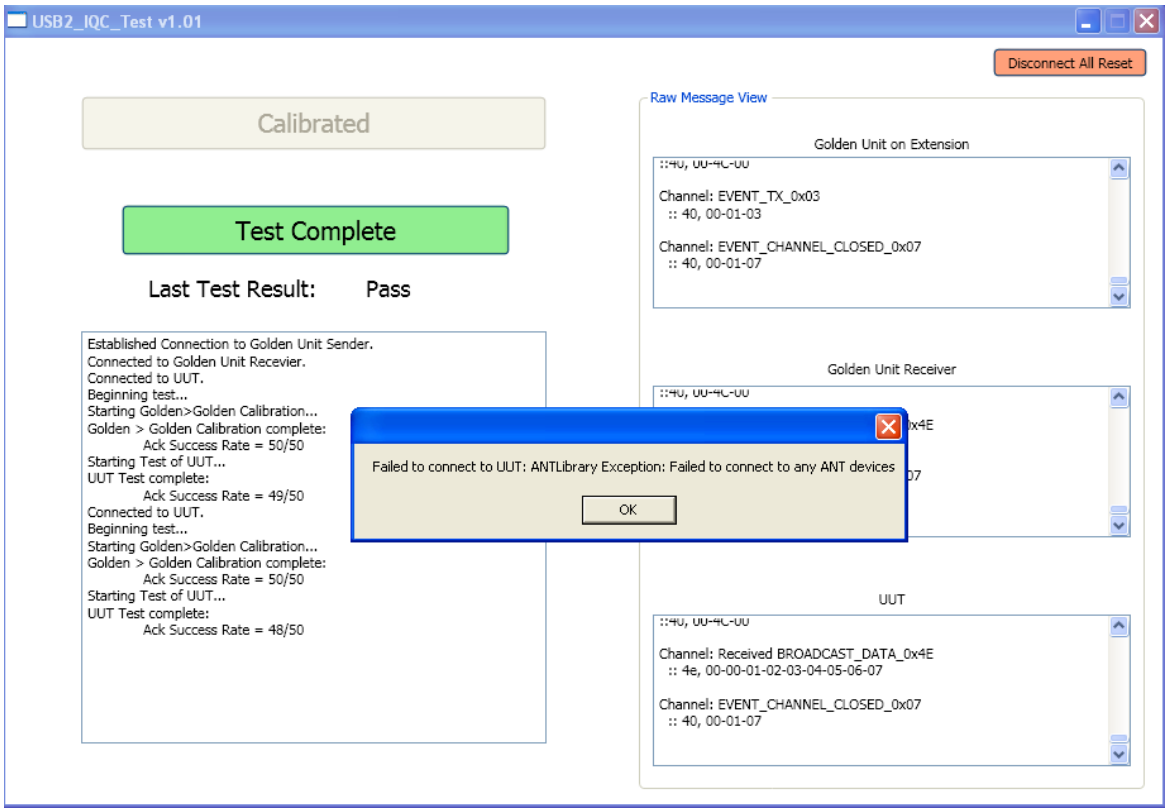


Figure 10: UUT is not connected reminder window

Technical Support

Please direct any technical inquires and/or general comments regarding this document or associated files to support@thisisant.com.