Pro Tech Monitoring, Inc.   PTOP-0064

Production Test Operating Procedure

X-Tech

PCBA
Functional Test

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Functional Test

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Approved By:
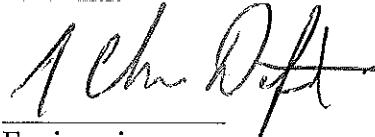
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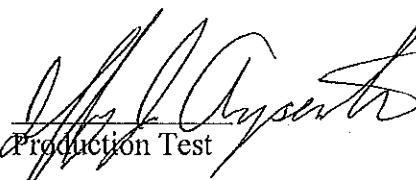
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Production Test

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Scope

This document describes the Functional test set up and test procedure for the X-Tech PCBA.

Test Configuration:

1. Gather Equipment needed
2. Install software and hardware drivers
3. Set up directories for test software and firmware.
4. Place test exe, ini files and firmware in proper directories
5. Configure hardware (PC, test fixture)
6. Start test program and configure ini files

Equipment Needed:

1. X-Tech Functional test fixture
   a. ACTiSYS IR Wireless Interface Model ACT-IR220LN57
2. Pro Tech Modular Test Station
   a. Two - National Instruments USB-6008 DAQ
   b. One - National Instruments USB-6051 DIO
   c. Rack Mount Control PC (3 GHz Minimum, 2GB ram, XP Pro)
   d. LCD Monitor
   e. LCD Arm
   f. Agilent N5181A Signal Generator
   g. BK Precision 9130Triple Output Power Supply (with USB communication Adapter)
   h. VG Receiver (Everett Charges Technologies)

Software:

NI-DAQ MX:

Install the NI-DAQ MX Drivers
    Place disk one in the DVD drive of the PC
    Select:
        NI-DAQ MX
            LabVIEW 8.6 Support
        Ni Measurement and Automation Explorer
            LabVIEW 8.6 Support

Signal Generator CFG:

Control PC will have a second network card installed and configured to:
    IP: 172.16.255.1
    Subnet Mask: 255.255.255.0
    Gateway Leave blank
Configure Signal Generator LAN (Agilent N5181A)

Plug in the network cable

Select "Utility" button, then softkeys:

1. I/O Config - LAN Setup - Config Type (DHCP) – Manual
2. Manual Config Settings –
   a. IP Address   172.16.255.2
   b. Subnet   255.255.255.0
   c. Gateway   0.0.0.0
   d. DNS Server   Blank
   e. DNS Server Override   Off
3. Press the "Return" Key
   a. Proceed With Configuration
   b. Confirm Change (Network will restart)

LAN Configuration

Configuring the LAN Interface

NOTES
Use a 100Base-T LAN cable to connect
the signal generator to the LAN.

Use a crossover cable to connect the
signal generator directly to a PC.
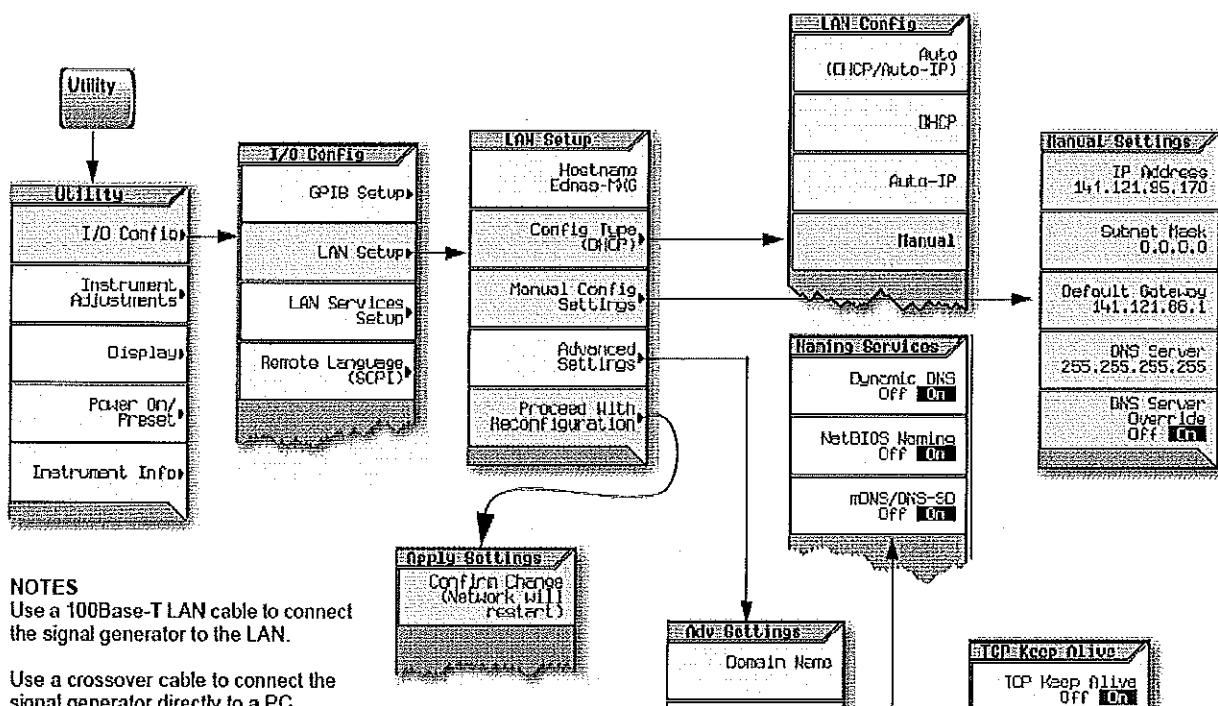
Power Supply BK Precision 9130:

Install the USB Driver – PL-2303 (Prolific USB to Serial)
Plug in the TTL to USB adapter supplied with the power supply

MTD_Term

Install MTD_Term

Run the installation for MTD_Term
This must be placed in the Pro Tech directory
Replace the Executable with the latest version

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LabVIEW 8.6 Runtime

Install the LabVIEW 8.6 runtime engine with VISA Support and VISA Configuration Support.

Directory Structure:

Directory for the test program:
C:\Protech\X_Tech_PCBA_VX_X \   (X = current version)

Directory for the test program data:
C:\Protech\Test_Data\X_Tech_PCBA_Data

Directory for the configuration files:
C:\Protech\ini\

Directories for the Firmware:
C:\Protech\X_Tech_ISP\ISP_Utility
C:\Protech\X_Tech_ISP\ROM

Test Station Power-Up Procedure:

1. Initial state
   a. UPS - ON
   b. Control PC - OFF
   c. Digital Power Supply - OFF
   d. Signal Generator – OFF
   e. Test Fixture PCBA - OFF
2. Control PC – ON
3. Digital Power Supply – ON
4. Signal Generator – ON
5. Start Test Program
6. Test Fixture – ON
7. GPS Simulator signal available from Final Functional Test station.

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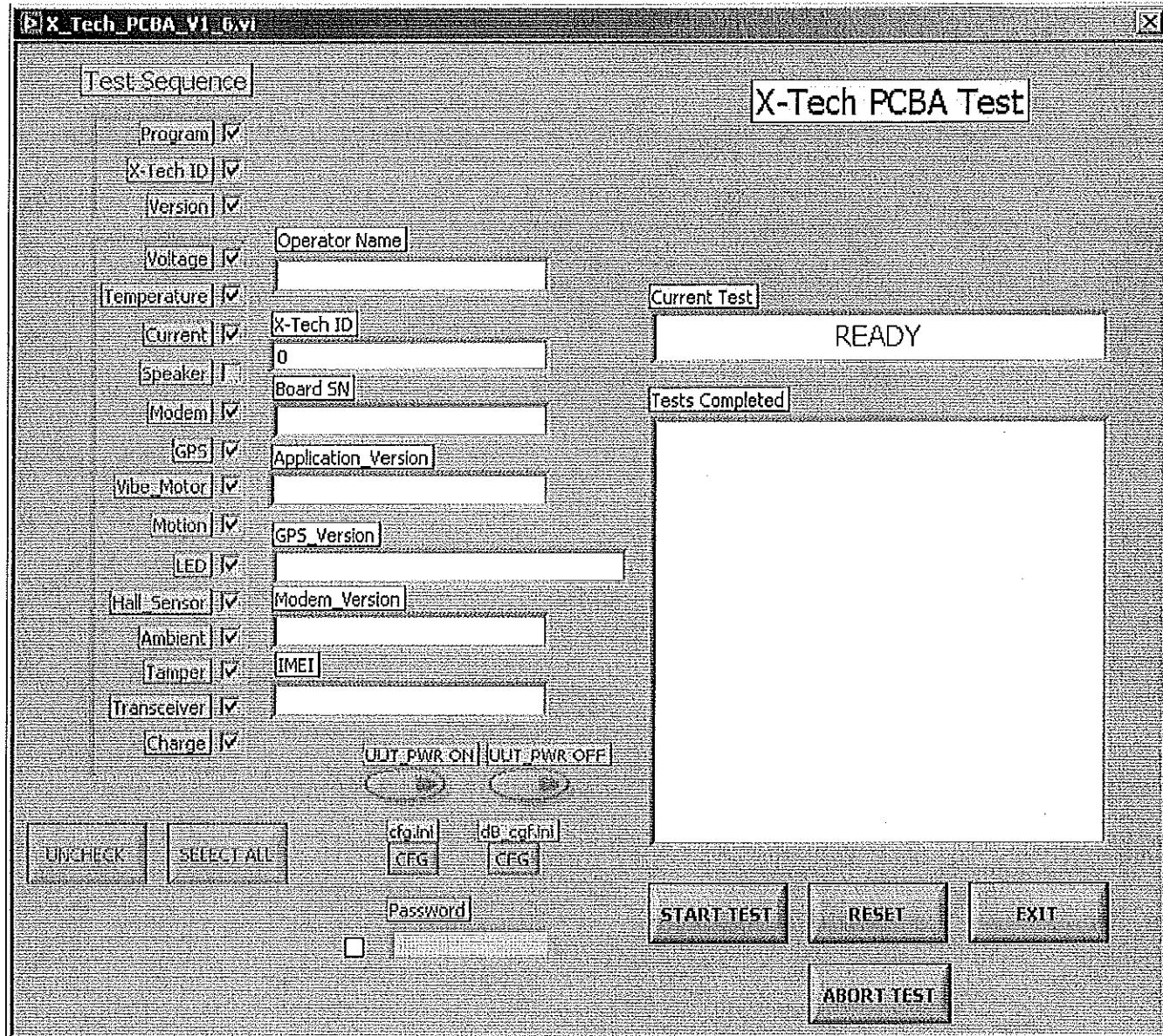
Figure 1 –PCBA Test Main Test Window.

INI Configuration:

1. Open the "X_Tech_PCBA_VX.vi" software (Figure 1).
2. Click on the check box next to the Password text box.
3. Type in "protech2008", this will enable the "Config.ini" and "Cfg dB.ini" buttons (Figure 2).
4. Press the "Config.ini" button.
   a. Ensure the all configuration data is correct for the test station.
   b. If any changes are made click Write_INI button. All fields will blank out. Click Read_INI and all information with changes will appear.
5. Press the "Cfg dB.ini" button.
   a. Verify configuration is correct for the test station.

b. If any changes are made click Write_INI button. All fields will default to zero or empty. Click Read_INI and all information with changes will appear.
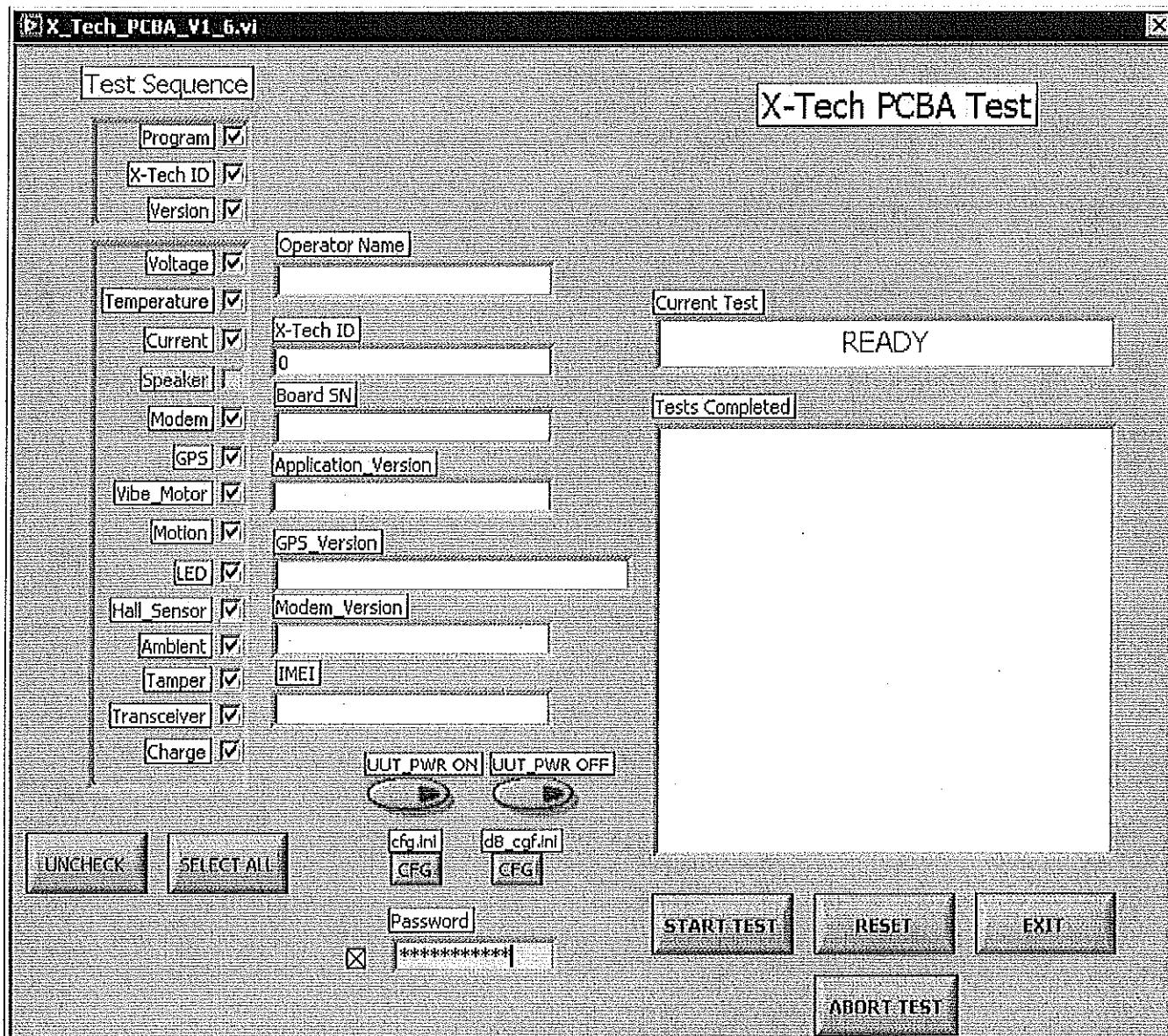
Figure 2 – Click on the check box next to the Password text box. Type in "protech2008", this will enable the "Config.ini" and "Cfg dB.ini" buttons.

Test Configuration ini
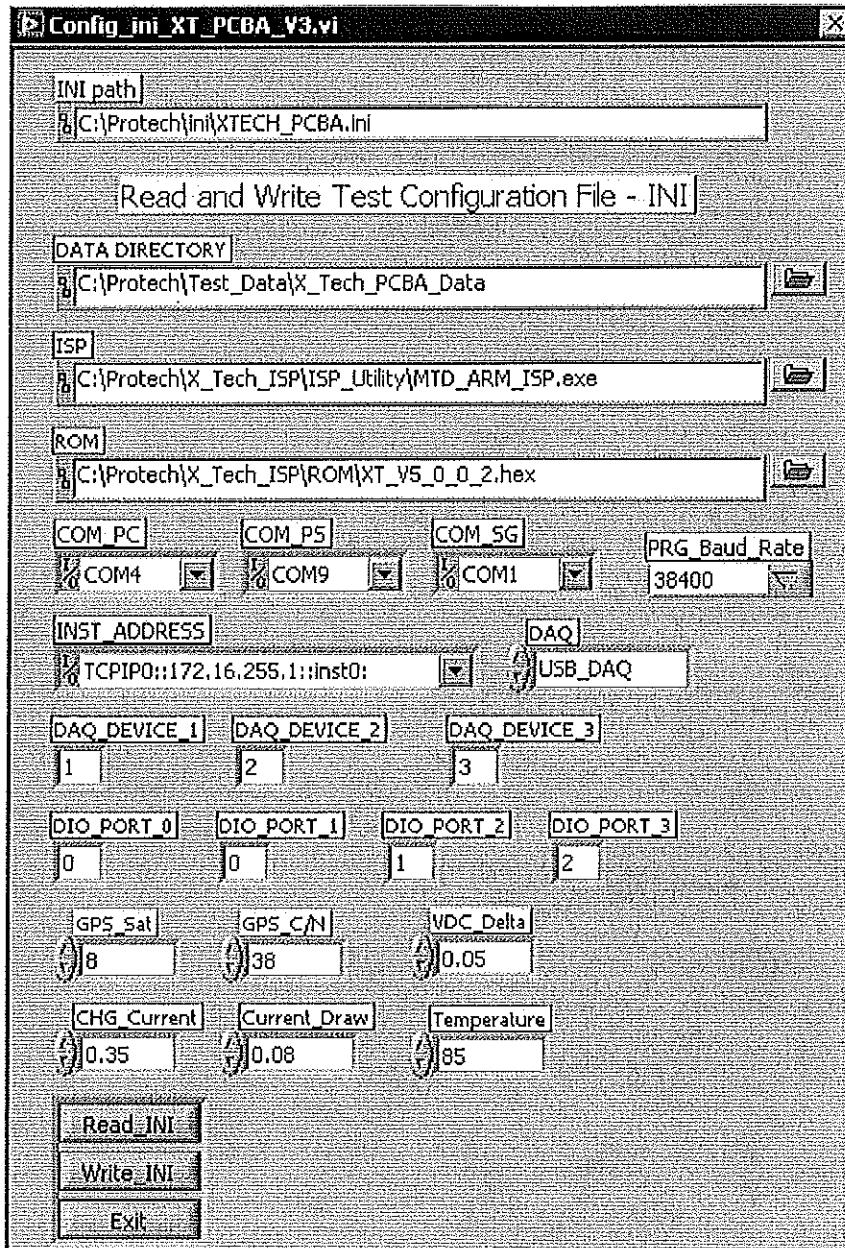
Figure 4 – PCBA Test Configuration ini window.

1. Press the "Config.ini" button.
2. The "Config_ini_XT_dB_V1" window will open (Figure 4).
   a. "Data_Directory"   C:\Protech\Test_Data\X_Tech_PCBA_Data
   b. "ISP"   C:\Protech\X_Tech_ISP\ISP_Utility\MTD_ARM_ISP.exe
   c. "ROM"   C:\Protech\X_Tech_ISP\ROM\XT_V5_0_0_2.hex
   d. "COM_IR"   Value should be selected based on the COM port of the control PC connected to the test fixture.

    e. "COM_PS"   Value should be selected based on the COM port of the control PC connected to the "Digital Power Supply".

    f. "COM_SG"   Value should be selected based on the COM port of the control PC connected to the test fixture for the transceiver test..

    g. "INST_Address"   Address of Signal Generator

    h. "PRG_Baud_Rate"   38400

    i. "DAQ"   USB_DAQ

    j. "DAQ_DEVICE_1"   1 (Should be checked in NI MAX)

    k. "DAQ_DEVICE_2"   2 (Should be checked in NI MAX)

    l. "DAQ_DEVICE_3"   3 (Should be checked in NI MAX)

    m. "DIO_PORT_0"   0

    n. "DIO_PORT_1"   0

    o. "DIO_PORT_2"   1

    p. "DIO_PORT_3"   2

    q. "GPS_Sat"   Satellite depends on how GPS Sim is Configured

    r. "GPS_C/N"   Should be around 38, this needs to be determined based on setup.

    s. "VDC_Delta"   0.050

    t. "CHG_Current"   0.350

    u. "Current_Draw"   0.080

    v. "Temperature"   85

3. **Directory paths and file locations should be checked to make sure they exist.**
4. After updated all the fields, press the "Write_INI" button.
5. Click Read_INI and all information with changes will appear.
6. Press "EXIT" to return to the test window.

Database Configuration ini
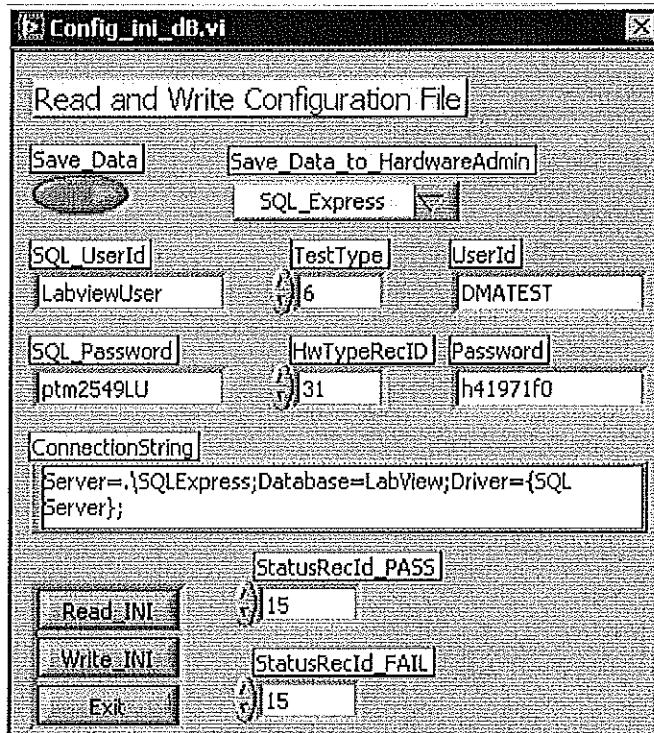
Figure 5 – Database configuration window.

1. Press the "Cfg dB. ini" button.
2. The "Config_ini_dB" window will open (Figure 5).
   a. "SQL_UserId" value for is "LabviewUser".
   b. "SQL_Password" value is "ptm2549LU".
   c. "WS_UserId" value for Dmatek is "DMATEST".
   d. "WS_Password" value for Dmatek is "h41971f0".
   e. "StatusRecId_PASS" should be set to "15".
   f. "StatusRecId_FAIL" should be set to "15".
   g. "HwTypeRecID" should be set to "31" (PCBA is hardware type 31).
   h. "TestType" should be set to "6" (PCBA Test is test type six).
   i. "Save_Data_to_HardwareAdmin" control should be set to "SQL_Express".
   j. "Save_Data" should be pressed and showing a green light, this control enables the saving of data to the database.
3. After updated all the fields, press the "Write_ INI" button.
4. Click Read_INI and all information with changes will appear.
5. Press "EXIT" to return to the X-Tech PCBA Test Window.

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Functional Test:

1. Start the "XT PCBA_V*_*_*.vi" software.
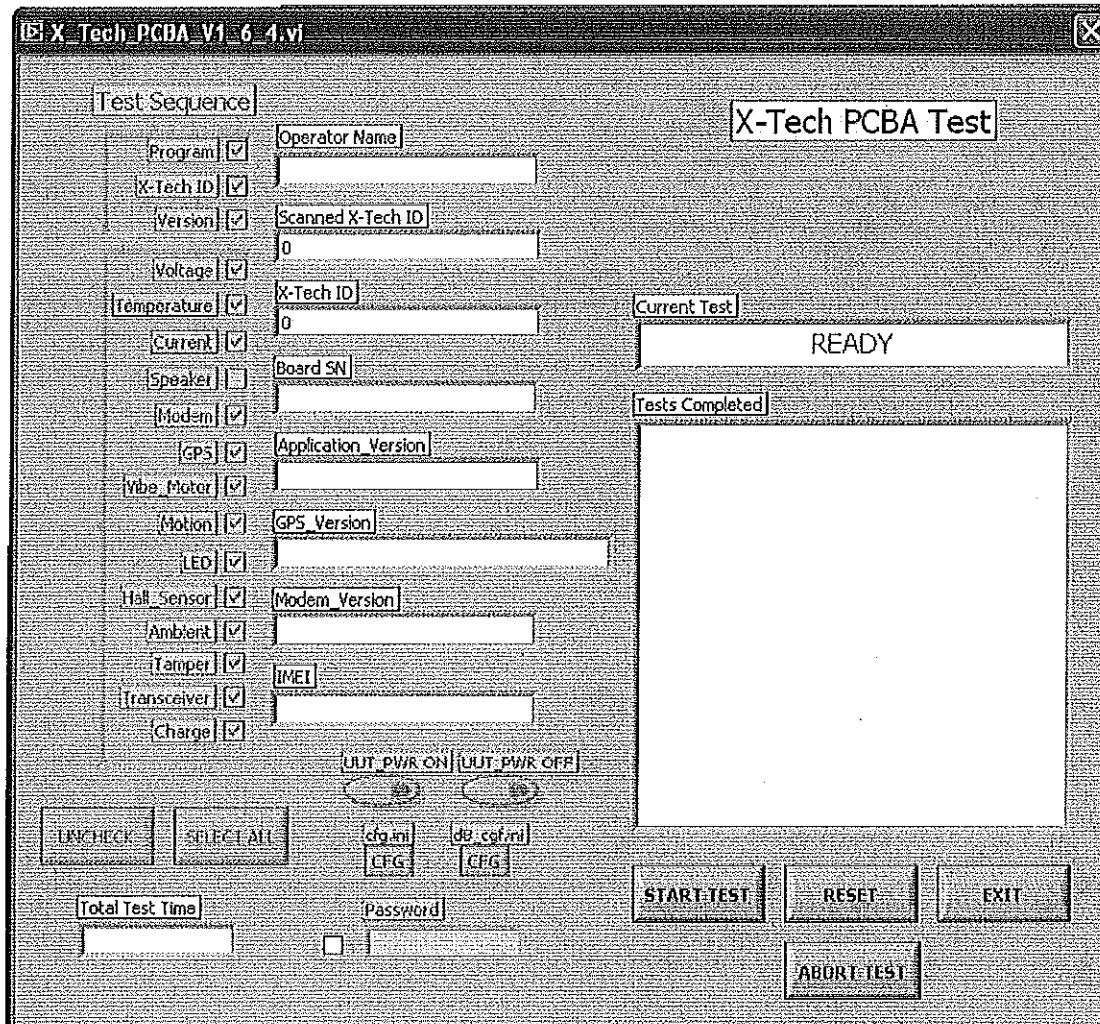
Figure 6 - PCBA Test Main Test Window

2. Verify the following checkboxes are checked:

2.1.	"PROGRAM"
2.2.	" ID"
2.3.	"VERSIONS"
2.4.	"VOLTAGE"
2.5.	"TEMPERATURE"
2.6.	"CURRENT"
2.7.	"SPEAKER" - Not Implemented
2.8.	"Modem"
2.9.	" GPS"
2.10.	"VIBE_MOTOR"
2.11.	"MOTION"

2.12.	"LED"
2.13.	"HALL SENSOR"
2.14.	"AMBIENT"
2.15.	"TAMPER"
2.16.	"TRANSCEIVER"
2.17.	"CHARGE"

3. Press "START TEST" (The Scan N Chk dialog box will appear - Figure 7).
   3.1. Type or Scan in the PCBA SN – a "P" prefix is required and it must be eight numeric characters long.
   3.2. Type or scan in the ID of the UUT – this is the unique identifier that is to be programmed into the unit and must start with "35" and be eight numeric characters long.
   3.3. Type in the operators initials – this must be three characters.
   3.4. Press the "Continue" button.
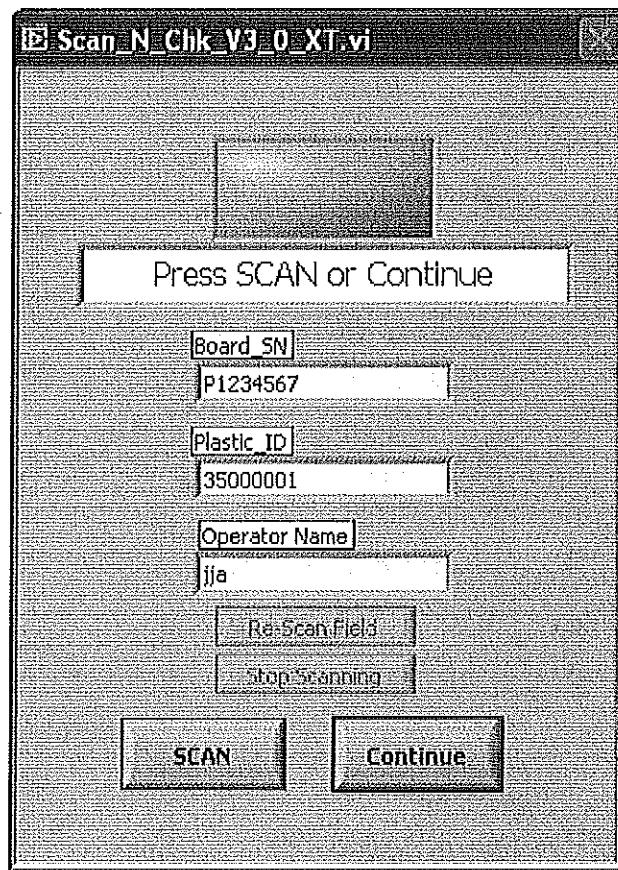
Figure 7 – Scan Window.

4. A dialog window (Figure 8) will open instructing the operator to:
   4.1. Place the UUT onto the locating pins.
   4.2. Plug the battery connector into the UUT.
   4.3. Plug in the charge mini power plug.
   4.4. Connect the RF cable.
   4.5. Close the overclamp lever and select OK.

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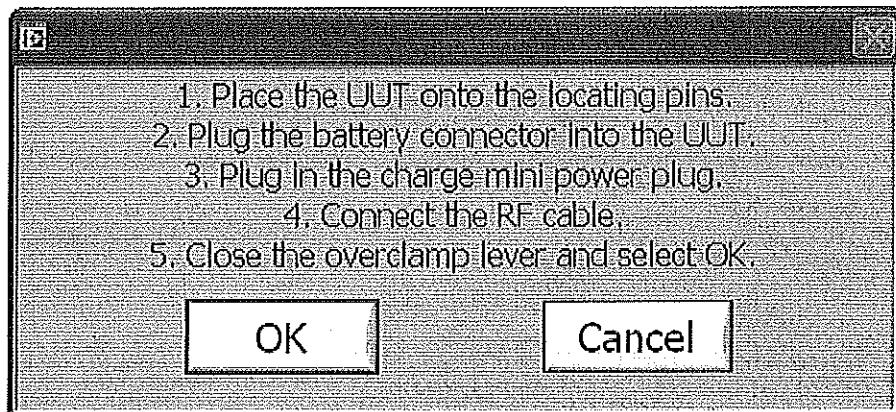
Figure 8 – Dialog Window.

5. Programming window will open.
   5.1. If programming is successful press the "EXIT" button to continue on with the test.
   5.2. If programming is unsuccessful note the failure and press the "EXIT" button to end the test.
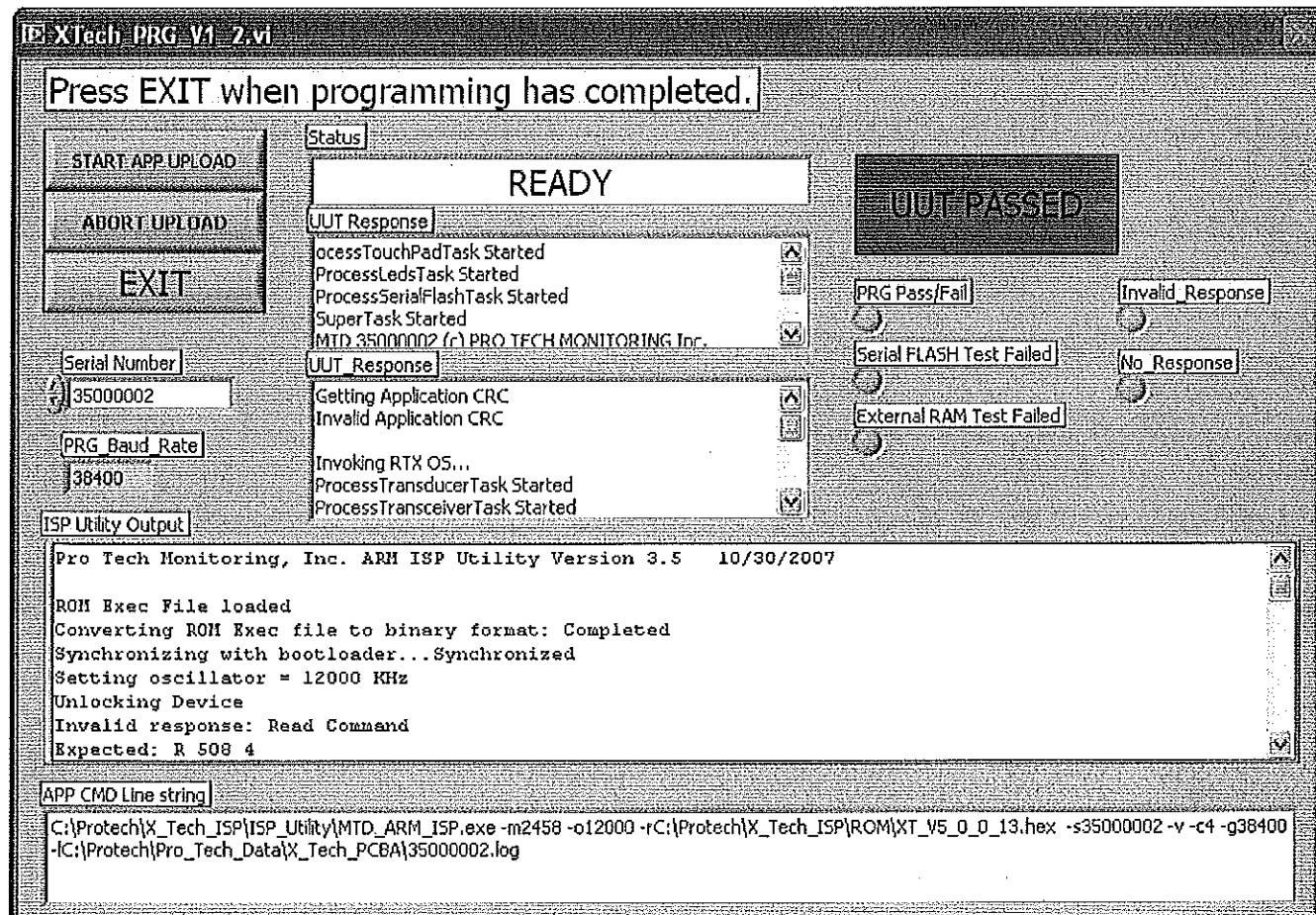

Figure 9 – Programming Window - Passed.
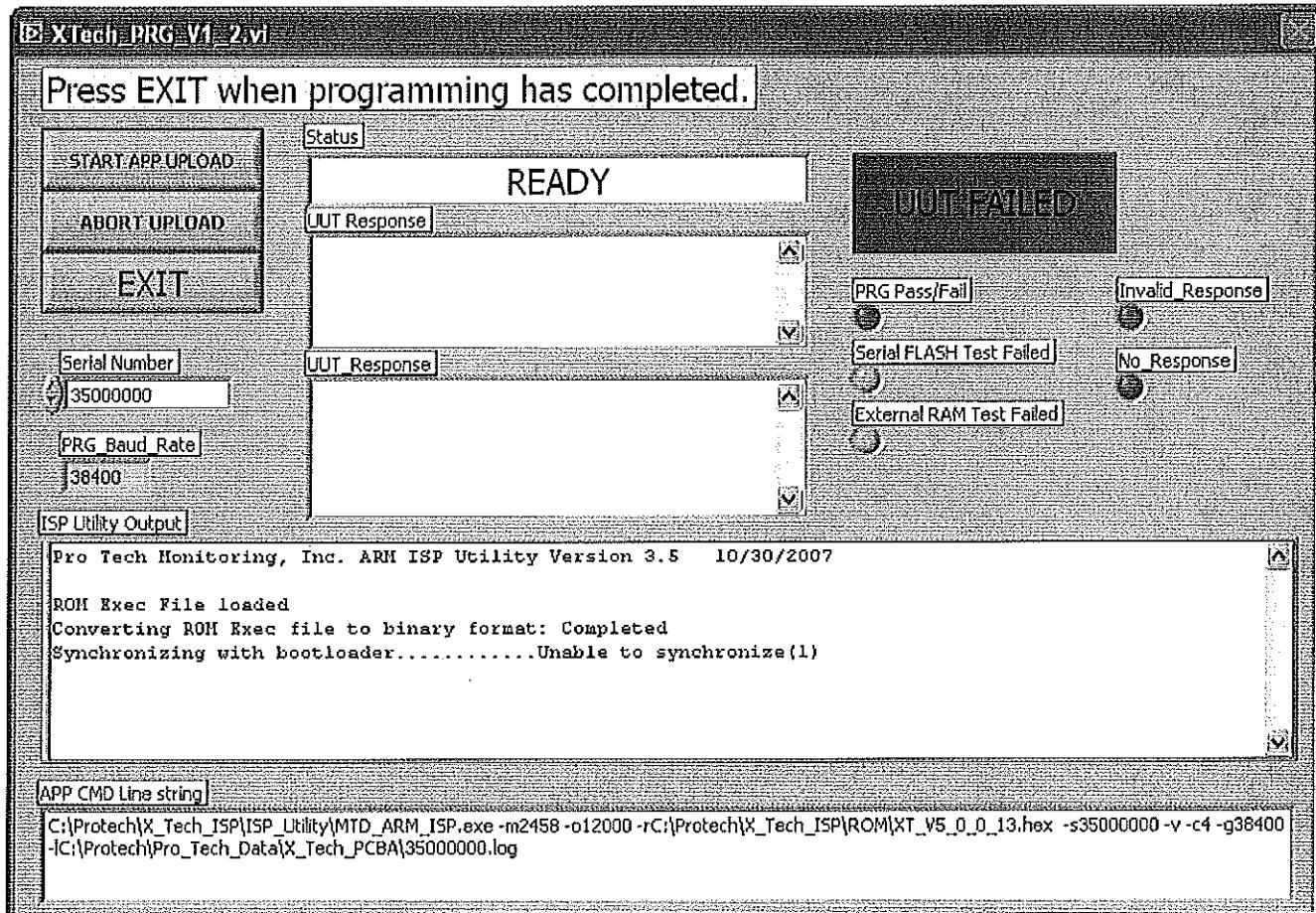
Figure 10 – Programming Window - Failed.

6. X-Tech ID
   6.1. This will verify the number entered matches the number reported by the UUT.
   6.2. If the device fails you will have the option of rereading the device
7. Version
   7.1. The test software will request the application version from the UUT.
   7.2. This will be saved to the Log file and reported to the test database.
8. Voltage
   8.1. The voltage from the UUT and test fixture are read and compared to limits.
   8.2. Will report "PASS" if within test limits.
   8.3. If test fails, operator will be prompted to "RETEST" or "FAIL".
9. Temperature
   9.1. The Temperature is requested from the UUT and compared to limits.
   9.2. Will report "PASS" if within test limits.
   9.3. If test fails, operator will be prompted to "RETEST" or "FAIL".
10. Current
    10.1.   The Current draw from the UUT is measured and compared to the limit.
    10.2.   Will report "PASS" if within test limit.
   10.3.   If test fails, operator will be prompted to "RETEST" or "FAIL".

11. Speaker
    11.1.   Test is not implemented at this time.
12. Modem
    12.1.   The modem of the UUT is turned on and versions are requested.
    12.2.   Will report "PASS" if communication is established and versions are reported.
    12.3.   If test fails, operator will be prompted to "RETEST" or "FAIL".
13. GPS
    13.1.   The C/N values are requested from the UUT and compared to limits.
    13.2.   Will report "PASS" if within test limits.
    13.3.   If test fails, operator will be prompted to "RETEST" or "FAIL".
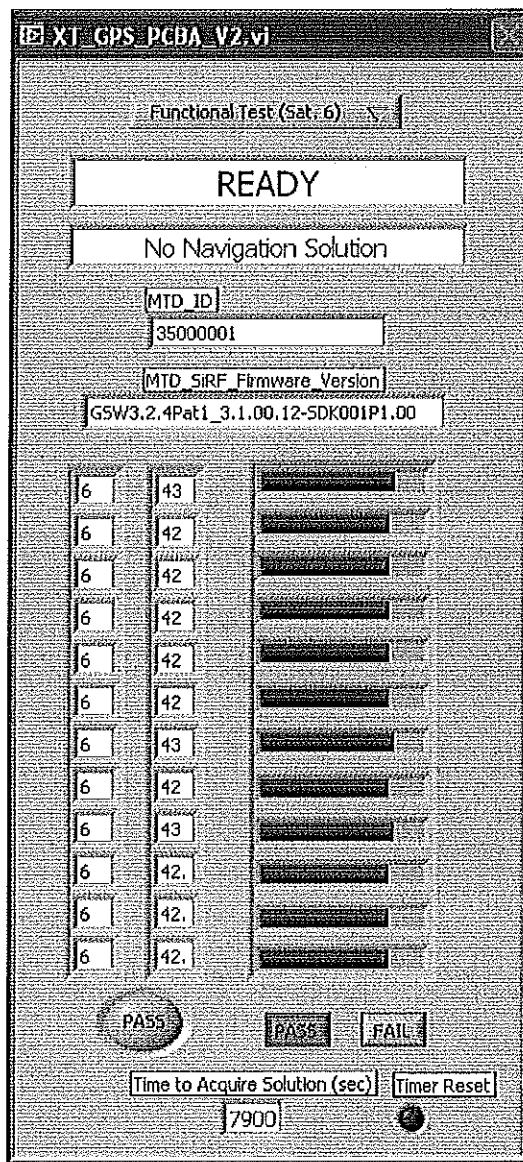

Figure 11 – GPS Test Window - Passed.

14. Vibe Motor
    14.1.   A test command is sent to the UUT to turn on the vibe motor; voltage is read at the vibe driver and compared to limit.
    14.2.   Will report "PASS" if within test limit.
    14.3.   If test fails, operator will be prompted to "RETEST" or "FAIL".

15. Motion
    15.1.   A test command is sent to the UUT to run the motion test and values compared to limits.
    15.2.   Will report "PASS" if within test limits.
    15.3.   If test fails, operator will be prompted to "RETEST" or "FAIL".
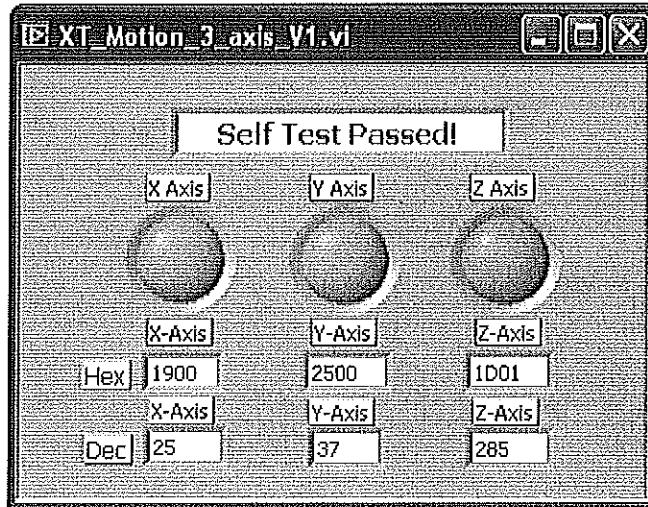
Figure 12 – Motion Test Window.

16. LED
    16.1.   A test command is sent to the UUT turn on the power LED; first red then green and values compared to limits.
    16.2.   Will report "PASS" if within test limits.
    16.3.   If test fails, operator will be prompted to "RETEST" or "FAIL".
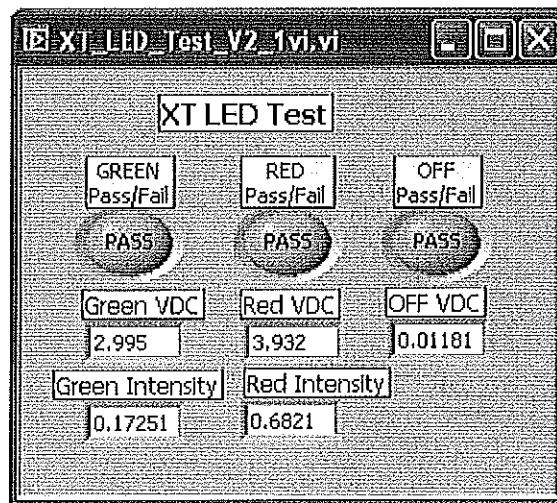
Figure 13 – LED Test Window.

17. Hall Sensor
   17.1.   Operator is prompted to push magnet down; values are compared to limits.
   17.2.   Operator is prompted to disengage magnet; values are compared to limits.
   17.3.   Will report "PASS" if within test limits.
   17.4.   If test fails, operator will be prompted to "RETEST" or "FAIL".
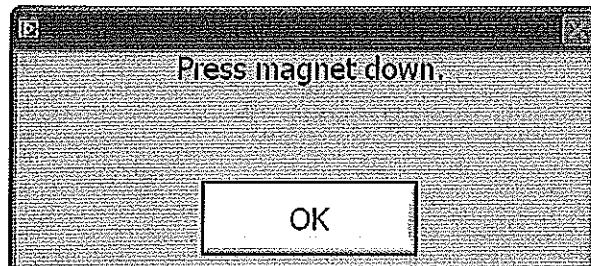
Figure 14 – Hall Test Magnet Down Dialog.   Figure 15 – Hall Test Disengage Dialog.
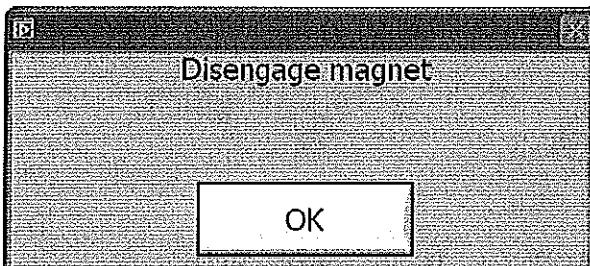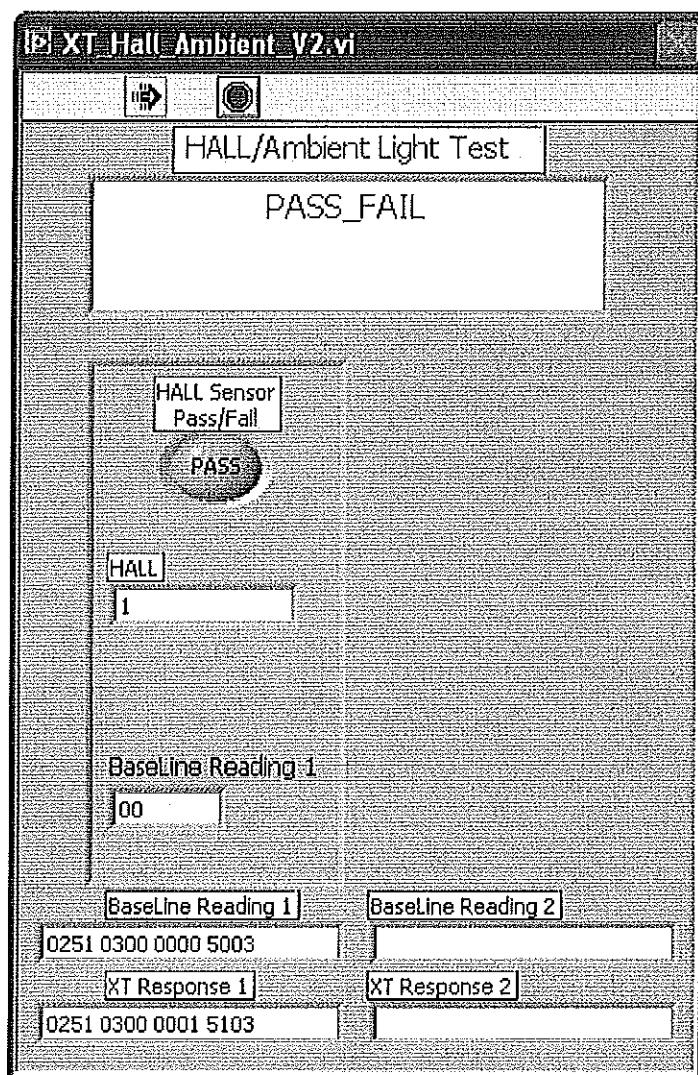
Figure 16 – Hall Test Window - Pass.

18. Ambient

  18.1. A test command is sent to the UUT read the values of the ambient light sensor; values compared to limits.

  18.2. Will report "PASS" if within test limits.

  18.3. If test fails, operator will be prompted to "RETEST" or "FAIL".
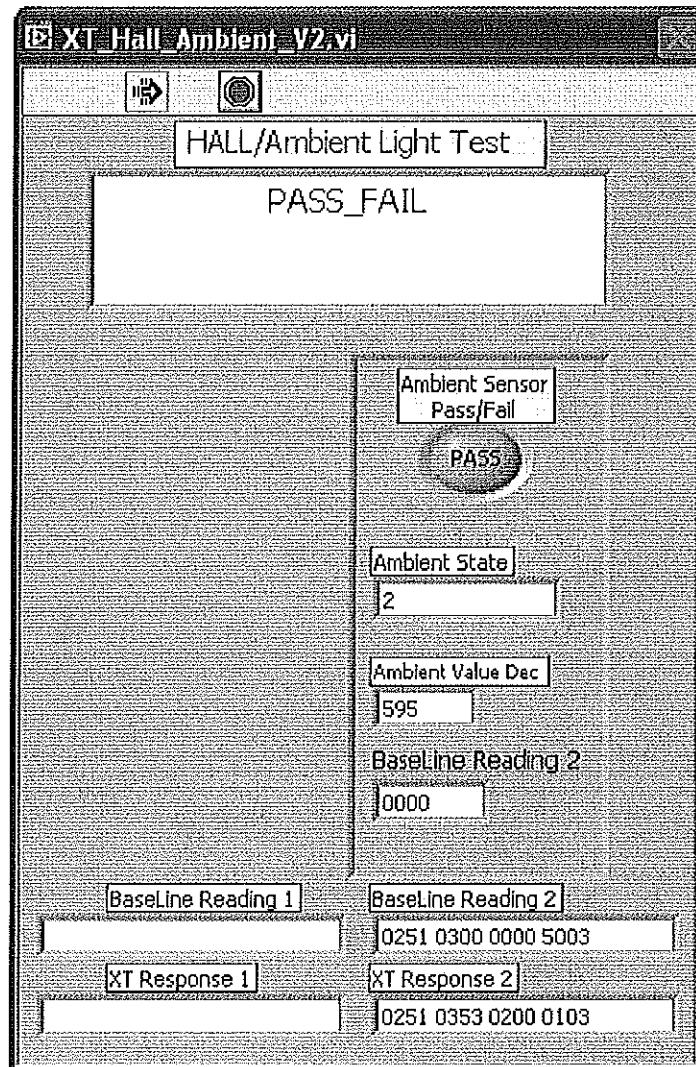
Figure 17 – Ambient Test Window - Pass.

19. Tamper
    19.1.   A test command is sent to the UUT read the values of the Tamper sensors; values compared to limits.
    19.2.   Will report "PASS" if within test limits.
    19.3.   If test fails, operator will be prompted to "RETEST" or "FAIL".
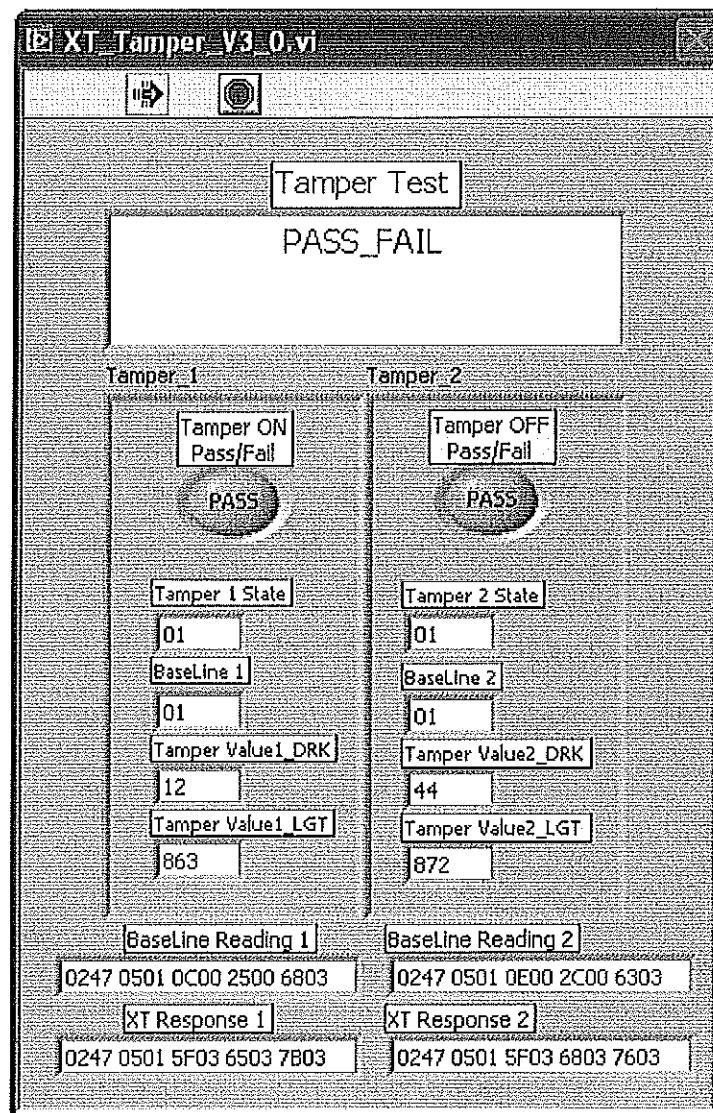
Figure 18 – Tamper Test Window - Pass.

20. Transceiver
    20.1.   The Transceiver test window will open and the test will start automatically.
    20.2.   Will report "PASS" if within BER test limit.
    20.3.   If test fails, operator will be prompted to "RETEST" or "FAIL".
    20.4.   After testing is completed the operator must press the "EXIT" button to exit the transceiver test.
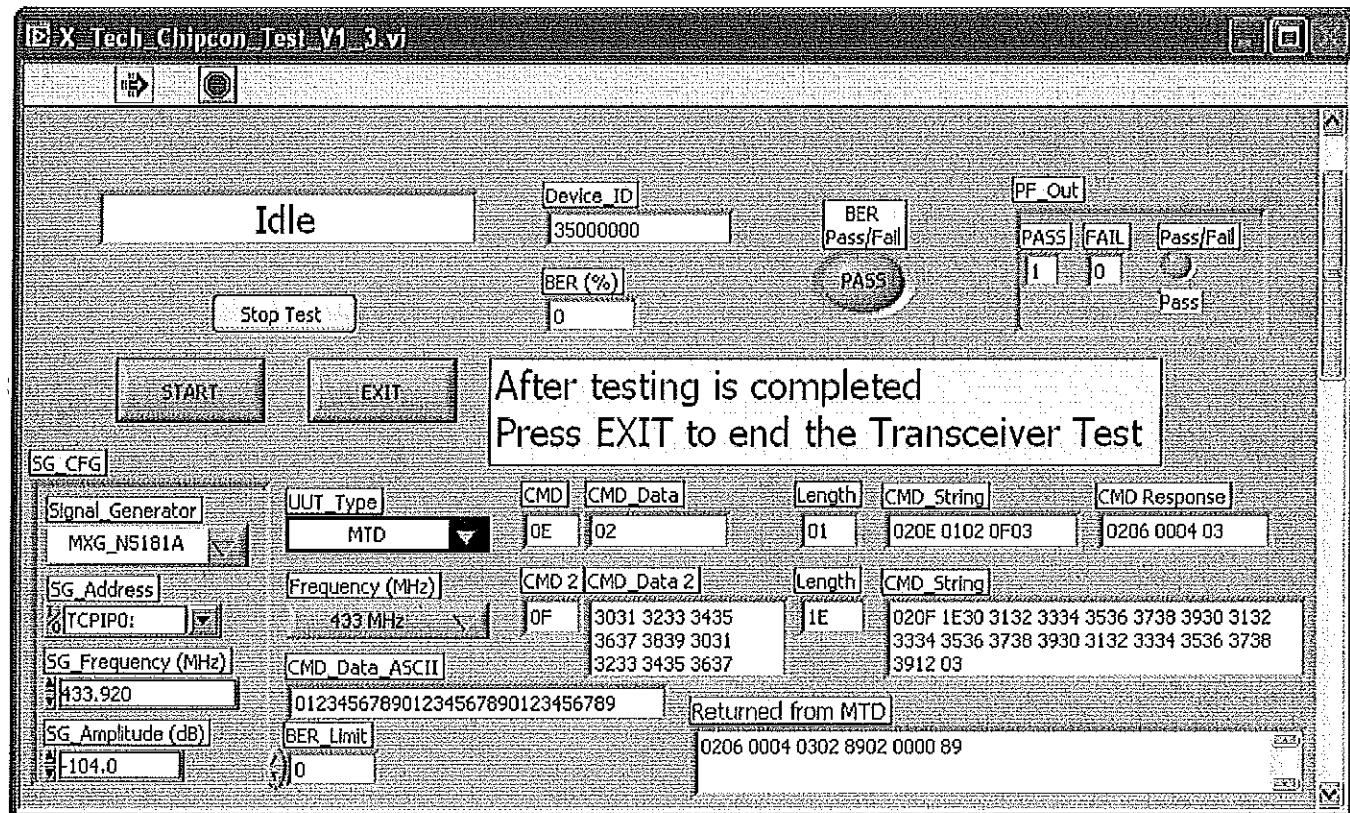
Figure 19 – Transceiver Test Window.

21. Charge
    21.1.   The charge test window will open displaying the current values of the UUT charge draw.
    21.2.   Will report "PASS" if within test limit.
    21.3.   If test fails, operator will be prompted to "RETEST" or "FAIL".
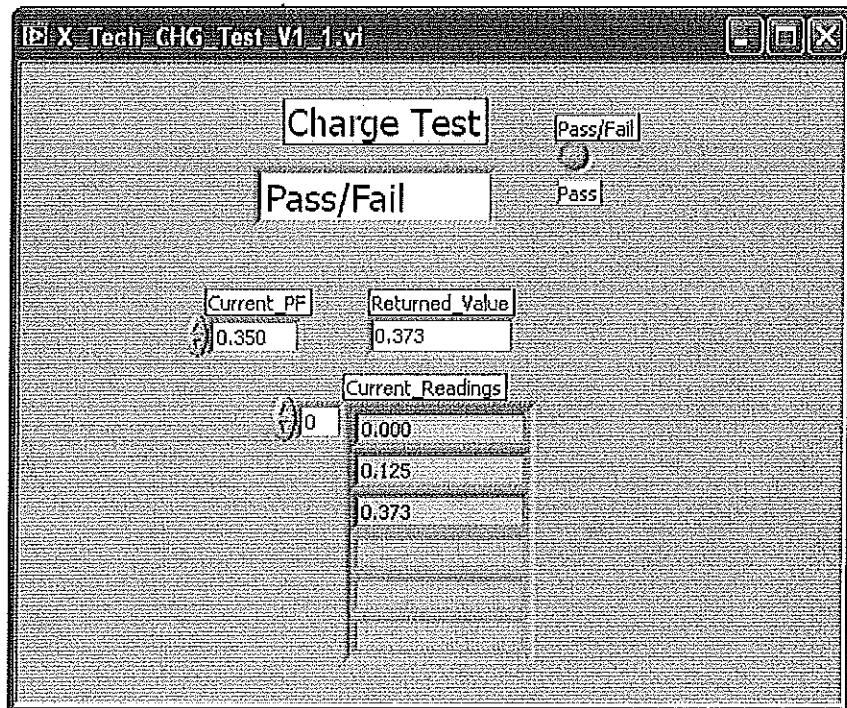

Figure 20 – Charge Test Window.

22. The program will display a "Pass" or "Fail" message on test completion.
23. Remove Processor Board.
24. Repeat steps 3-23 to test additional Processor Boards.