

Oxalis

Test Suite User Manual

Document:

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1. Scope of Document

This document provides instructions for testing interfaces of Oxalis Board using the Oxalis Test Suite Application (*oxalis-test*).

1.1 Test Interfaces

The following interfaces are implemented on the Oxalis Board. Oxalis Test suite is designed to test all interfaces. Oxalis test suite requires additional hardware mentioned as part of the test setup. *Oxalis-test* is a command line test application running on Oxalis. The detailed architecture of the same setup is explained section 2.

- 2 X Ethernet
- 2 X USB 3.0
- 1 X PCI-Express
- 1 X SATA
- 1 X SD Card
- 4 X User LED
- Expansion Connector
 - 2 X SPI
 - 2 X I2C
 - 12 X GPIO
 - 1 X UART
 - Reset
 - Access to board power levels (1V8, 5V0, 12V0)

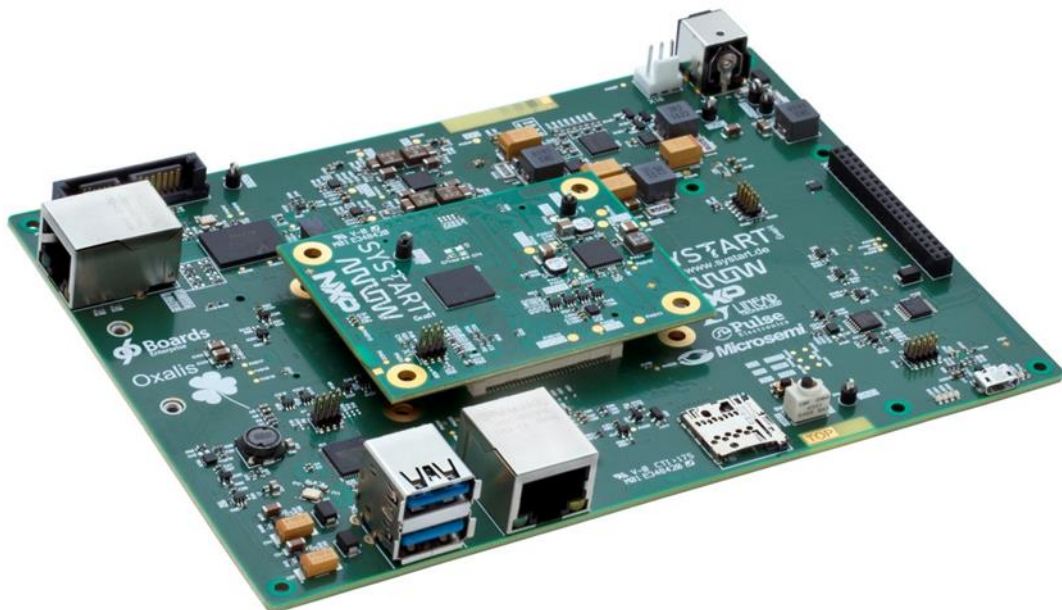


Figure 1: Oxalis with SoM

All peripherals except the GPIO, Reset, User LED's and power levels can be tested with very little or no user intervention. Testing of GPIO, Reset, User LED's and power levels has to be done manually.

2. Test Setup

Figure 2 shows the test setup required to conduct all the tests.

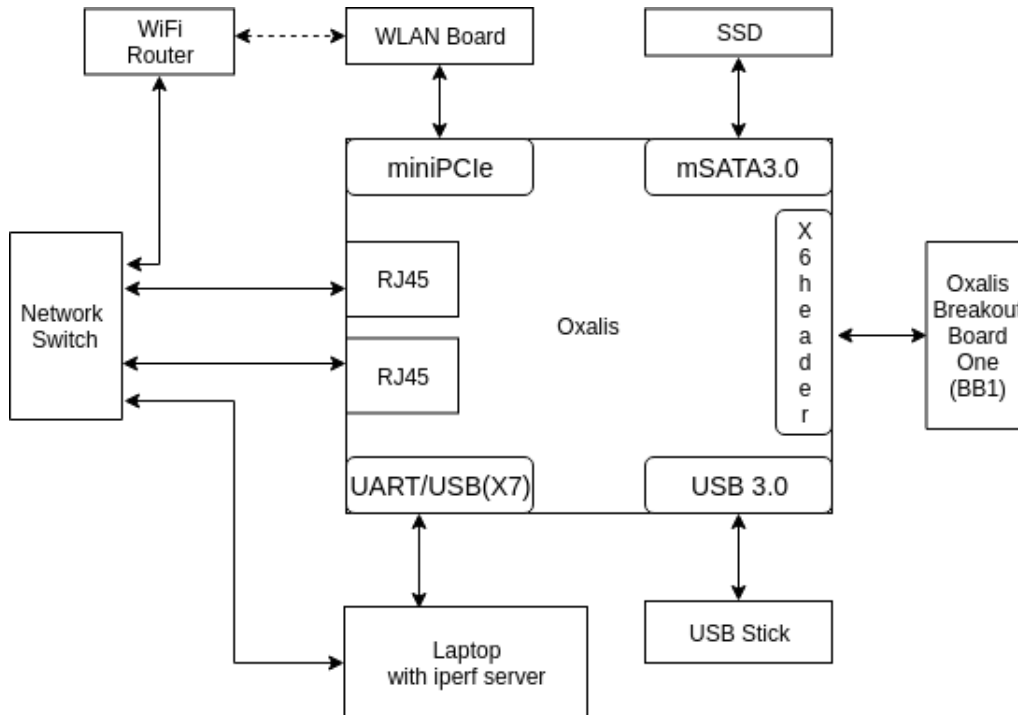


Figure 2: Test Setup

The Oxalis Test setup consists of an Oxalis, which is connected to a Linux host machine, through a Micro-USB port (X7) using a Micro-USB cable and some testing peripherals. For testing each of the interfaces a test hardware device needs to be connected to the peripheral interface. The test hardware includes,

- Intel Centrino Ultimate-N 6300 WLAN board and WiFi Router for testing the miniPCIe express interface.
- An SSD disk for testing the SATA interface
- Two USB storage devices for testing the USB interfaces.
- Network switch to which oxalis and laptop is connected.
- A custom test hardware from SYSTART named **Oxalis IO breakout board one (BB1)** for the expansion connectors and associated interfaces.

The ethernet test can be performed by connecting the Oxalis board to the laptop through a network switch and running *iperf* on laptop against both ethernet ports on Oxalis. Please check the ethernet test section for the details.

To start the Oxalis testing, power up the Oxalis board and connect it to the host computer via Micro-USB port (X7) using a Micro-USB cable. Open the terminal software and run the *oxalis-*

test from the terminal, after successful connection the menu shown in Figure 3: Main Menu can be seen on the terminal.

```
Oxalis Interface Test Program

1. All Tests
2. PCI Test
3. SATA Test
4. USB Test
5. Ethernet Test
6. SD Card Test
7. I2C Test
8. SPI Test
9. UART Test
10. User LED Test
11. GPIO Test
12. Exit

Enter your Choice:
```

Figure 3: Main Menu

From the main menu any one of the tests can be selected by entering the corresponding input.

Next screen displayed on the console will be different depending on the test selected. These different screens are explained in the following sections.

3. Automated Tests

3.1 Interface Architecture

The process flow of the Oxalis test software is shown in Figure 4. Solid boxes are various screens displayed on the console. The numbers or characters in the ellipses are inputs from user to navigate through the menus.

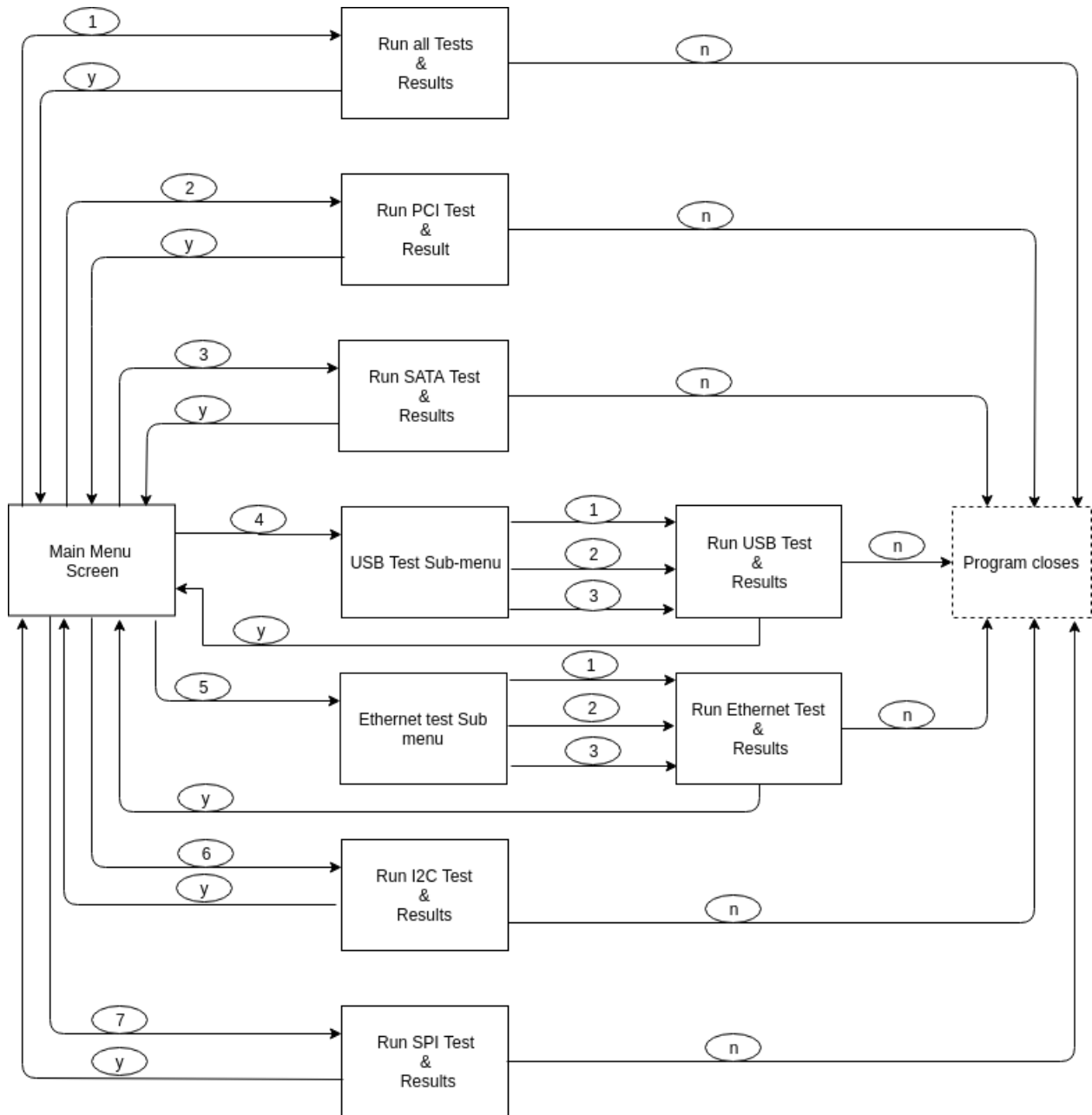


Figure 4: Test Flow

3.2 All Tests

User can select all the tests by pressing the key 1. In this option all the interfaces listed in Section 1.1 are tested and the results are displayed as shown in Figure 5. The user can continue to another test or close the test program from this screen by providing the appropriate input. When all tests are performed, the ethernet test is performed using ethernet port 1(X5). USB tests are conducted on both USB ports so a USB stick has to be inserted on both USB ports.

```

                PCI Test Results
                Status:Pass
                Upload Bandwidth:1.05MB/s
                Download Bandwidth:1.05MB/s

                SATA Test Results
                Status:Pass
                Write Data Rate:100 MB/s
                Read Data Rate:160 MB/s

                USB Test Results

                Port1:
                Status:Pass
                Write Data Rate: 400 MB/s
                Read Data Rate: 500 MB/s
                Port2:
                Status:Pass
                Write Data Rate: 400 MB/s
                Read Data Rate: 500 MB/s

                Ethernet Tests Results

                Interface:Ethernet Port 1(X5)

                Status:Pass
                Upload Bandwidth:1.05MB/s
                Download Bandwidth:1.05MB/s

                SD Card Test Results
                Status:Pass
                Write Data Rate:3 MB/s
                Read Data Rate:4 MB/s

                I2C Tests Results

                Status: Pass

                I2C Bus1
                Device 1      Address
                Device 2      Address

                I2C Bus2
                Device 1      Address
                Device 2      Address

                UART Tests Results

                Status: Pass

                SPI Tests Results

                Status: Pass

                Device detected on CS0
                Device detected on CS1
                Device detected on CS2

                RTC Reading:   HH:MM:SS

                Test Summary

                SATA Test Failed
                All other Automated Tests Passed
                Continue to User Assisted Tests(y/n):
    
```

Figure 5: All Tests Result

3.3 PCI Test

The Mini PCIe interface on the Oxalis is tested and the results are displayed as shown in Figure 6: PCIe Test Result. The user can continue to another test or close the test program from this screen by providing the appropriate input.

```
PCI Test Results

Status:                               Pass
Upload Bandwidth:                      1.05MB/s
Download Bandwidth:                    1.05MB/s

Continue Testing(y/n):
```

Figure 6: PCIe Test Result

Before selecting the PCIe test the user should make sure that the PCIe Wi-Fi Card is connected to Oxalis and WiFi network is available whose SSID is *test_bed* and password is *oxalis_test*. The ip address of Oxalis ethernet wireless interface is 10.11.12.15 and the ip address of the Laptop has to be 10.11.12.10, the gateway 10.11.12.1 and netmask 255.255.255.0

3.4 SATA Test

The SATA interface on the Oxalis is tested and the results are displayed as shown in Figure 7: SATA Test Result. The user can continue to another test or close the test program from this screen by providing the appropriate input.

```
SATA Test Results

Status:                               Pass
Write Data Rate:                       100 MB/s
Read Data Rate:                        160 MB/s

Continue Testing(y/n):
```

Figure 7: SATA Test Result

NOTE:

Before proceeding to this test, the user has to ensure that the SSD is connected to Oxalis's SATA connector(X15) using a SATA (22 Pin) Female to Female Slim-SATA (13 Pin) Adapter Cable.

3.5 USB Test

When the USB Test is selected from the Main Menu, another sub test screen appears with a menu shown in Figure 8. The user can select which USB port is to be tested. A USB stick has to be inserted into the desired USB port(s) before selecting the test.

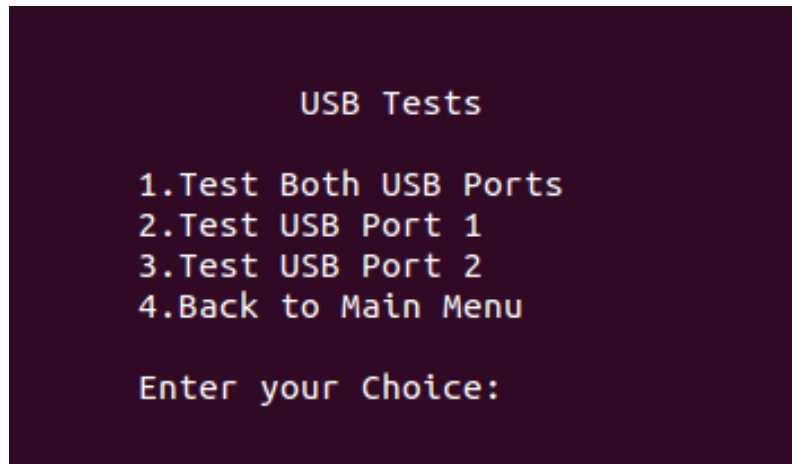


Figure 8: USB Test Submenu

oxalis-test executes the test on selected USB port(s) and the results are displayed as Figure 9. The user can continue to another test or close the test program from this screen by providing the appropriate input.

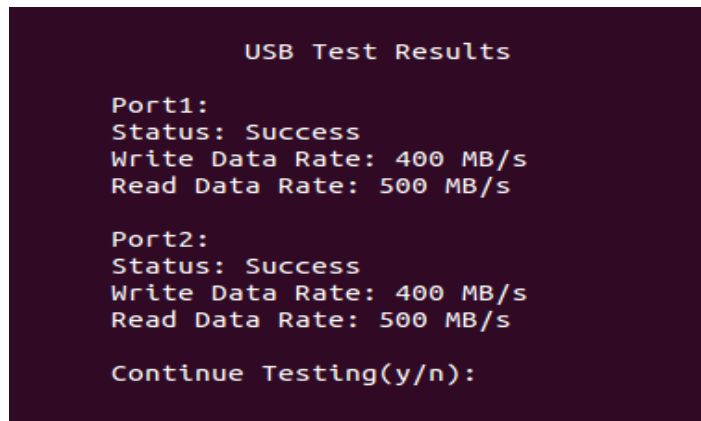


Figure 9: USB Test Results

3.6 Ethernet Test

When Ethernet test is selected from Main Menu another screen appears with a sub menu (Figure 10: Ethernet Submenu) from which the user can select which Ethernet interface is to be tested.

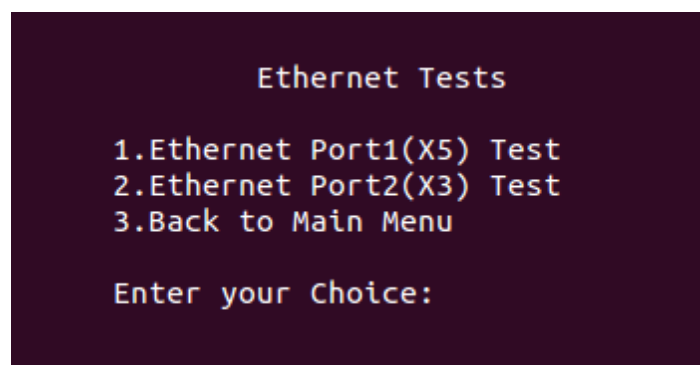


Figure 10: Ethernet Submenu

To test an ethernet port it has to be connected to a network switch to which a laptop running iperf server is *also* connected. The ip address of Oxalis ethernet wired interface (X5) is 10.11.12.13 and Oxalis ethernet wired interface (X3) is 10.11.12.14. **The ip address of the Laptop must be 10.11.12.10, the gateway 10.11.12.1 and netmask 255.255.255.0.**

To run iperf server user has download and install the *iperf* from the following link

- Windows users can download *iperf* from the [Link](#).
- Linux users can use the package manager.

After the requested test is conducted, results are displayed as in Figure 11. The user can continue to another test or close the test program from this screen by providing the appropriate input.

```
 Ethernet Tests Results

Interface:Ethernet Port1(X5)

Status:Success
Upload Bandwidth:1.05MB/s

Download Bandwidth:1.05MB/s

Continue Testing(y/n):
```

Figure 11: Ethernet Test Results

3.7 SD Card Test

The SD Card interface on the Oxalis board is tested and the results are displayed as shown in Figure 12: SD Card Test Results. The user can continue to another test or close the test program from this screen by providing the appropriate input.

```
 SD CARD Test Results

Status:                Pass
Write Data Rate:       3 MB/s
Read Data Rate:        4 MB/s

Continue Testing(y/n):
```

Figure 12: SD Card Test Results

3.8 UART Test

Before proceeding to the UART Test user has to make sure that the RX and TX pins on BB1 is shorted using a jumper.

The test result screen for UART is shown in Figure 13: UART Test Result.

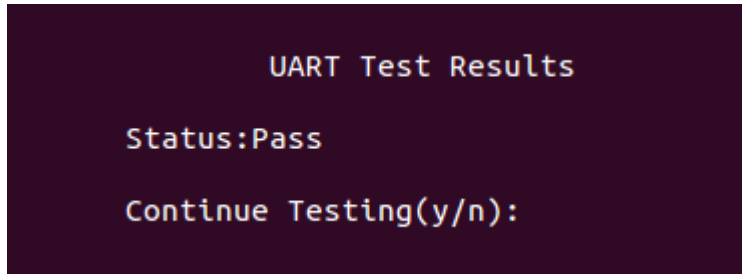


Figure 13: UART Test Result

3.9 I2C Test (BB1 required)

When I2C test is selected the results screen displayed lists all the I2C devices on the BB1. The user has to ensure BB1 is inserted on header X6 before conducting this test.

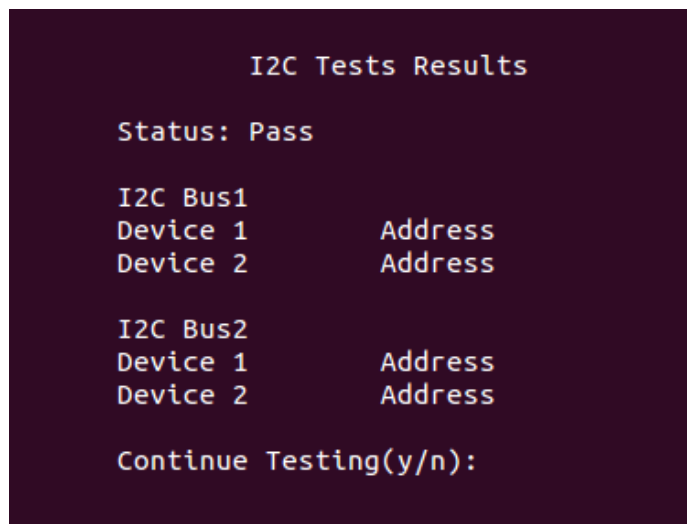


Figure 14: I2CTest Results

3.10 SPI Test (BB1 required)

When SPI Test is selected all the devices on the SPI bus are listed, and the time read from the RTC clock on BB1 is displayed on the test screen. User has to ensure BB1 is inserted on header X6 before conducting this test.

```
SPI Tests Results

Status: Pass

Device detected on CS0
Device detected on CS1
Device detected on CS2

RTC Reading:      HH:MM:SS

Continue Testing(y/n):
```

Figure 15: SPI Test Results

4. Manual Tests

4.1 GPIO Test

There are four LEDs and four switches on the *BB1* which are connected to any one of the GPIO's. These LEDs and switches are programmed such that when a switch is pressed an LED corresponding to this switch will be turned ON. Pressing the same switch for a second time will turn OFF that LED. All the four LEDs and switches behave in the same way.

4.2 User LED Test

When this test is selected from main menu all the four LEDs near the micro USB port(X7) on Oxalis is turned ON for next 30 seconds.

4.3 Reset Button

Pressing the reset button on *BB1* resets the Oxalis.