



USB On-The Go Compliance

**High Speed
and
Full Speed
Compliance Procedure**

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Information

- ◆ Frequently go to www.usb.org/compliance for more details and updates on compliance procedures
- ◆ E-mail TechAdmin@usb.org AFTER reviewing on-line documentation

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Terminology

- ◆ **B-Device**

- Peripheral, usually
- Has a mini-B or standard B cable plugged into the peripheral

- ◆ **A-Device**

- Host, usually
- Has a mini-A or standard A cable plugged into the host

- ◆ **Role switching can change roles**

USB OTG Full Speed Compliance Procedure

USB OTG Full Speed Compliance Procedure

- ◆ **1. Fill out USB OTG compliance checklist.**
 - If silicon is not certified, then must fill out the Peripheral Silicon Checklist
- ◆ **2. Purchase USB OTG Tool Kit at USB-IF E-Store**
 - Includes OTG Electrical Tester
 - ◆ Passive hardware with switches and connectors
 - Includes OTG Protocol Tester
 - ◆ Hardware and Real-Time OS
 - ◆ Download Test Scripts

◆ 3. Pre-test your device (as many times as possible)

- Run all USB Peripheral Tests

- ◆ Electrical

- ◆ Interoperability

- ◆ Device Framework (USBCV available for free download)

- ◆ FS Downstream Signal Quality

◆ 4. Test your device

- Independent Certification Lab : Pay Money

- Compliance Workshop (PlugFest) : Free

Criteria to Pass Compliance Testing and use the Logo

- ◆ **USB OTG FS certification candidates must :**
 - **Must USB-IF assigned unique vendor ID number**
 - ◆ **Member USB-IF**
 - ◆ **Non-members can also get vendor IDs**
 - **Have a Mini-AB connector**
 - **Be able to perform full speed transfers**
 - **Fill out the appropriate checklists for submission to the test authority.**

Criteria to Pass Compliance Testing and use the Logo

◆ You must pass:

- USB Peripheral Compliance Tests
- FS Downstream Signal Quality
- USB FS OTG Compliance Tests
 - ◆ For the Host-side test, you must bring a representative device for each speed and class of peripherals on your targeted peripheral list
- You must pass all tests
- You must have signed the USB-IF Trademark License Agreement in order to display the USB OTG Certified Logo on the specific product.

◆ Certification Results

- You will be added to the USB OTG Integrators list
- Use of the USB logo on marketing materials must be with the specific product certified. Check Trademark License Agreement for details.

Certified OTG Test Houses

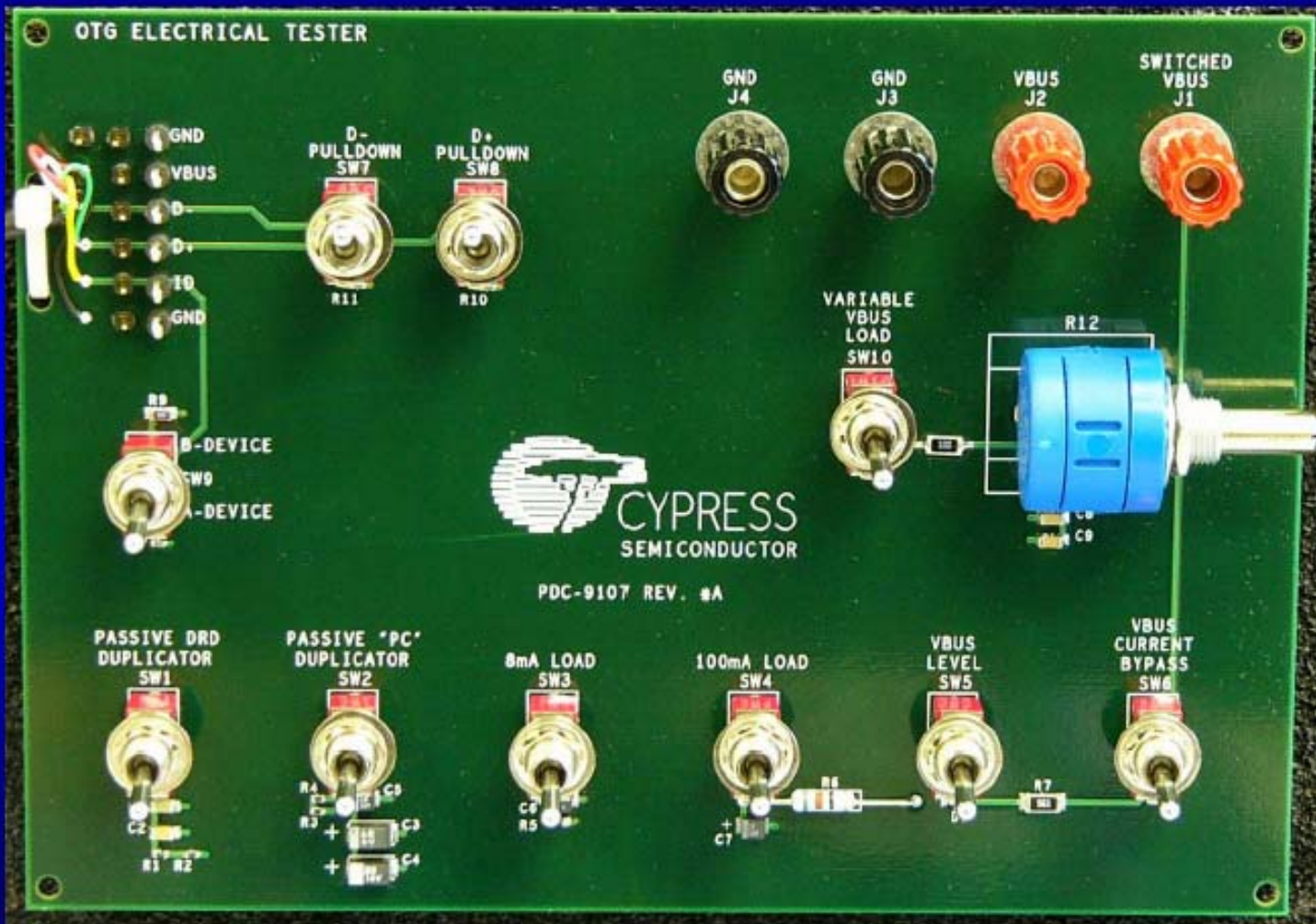
- ◆ **USB OTG Certification can be given at test houses certified for Testing by the USB-IF**
 - Test labs are fee-based
- ◆ **Currently Authorized USB OTG Test Houses:**
 - MCCI
 - NSTL
 - NTS/XXCAL Testing Labs
 - PMTC
- ◆ **Alternative to attending Plugfest**

***USB OTG Full Speed
Compliance Equipment***

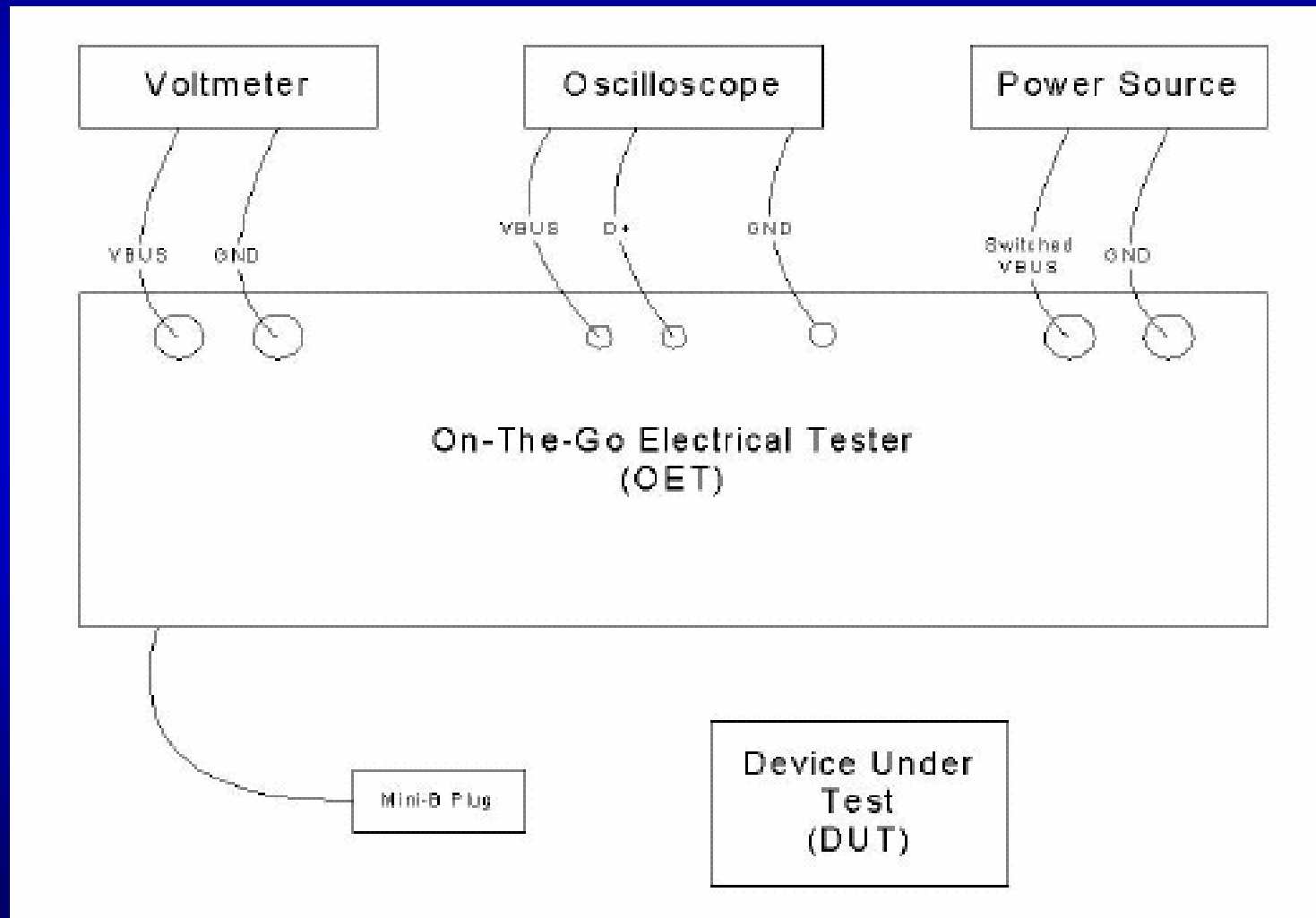
OTG Electrical Tester

- ◆ **Built by Cypress**
 - **Passive Board with Switches**
- ◆ **Used in conjunction with:**
 - **USB OTG Electrical Test doc: `otg_elect_test1_0.pdf`**
 - **Oscilloscope**
 - **Multimeter**
 - **Digitally Programmable Power Supply (for Voltage ramps)**
- ◆ **Switches are set manually to emulate different test cases**

OTG Electrical Tester



OTG Electrical Tester Usage



Full Speed OTG Protocol Tester



USB Full Speed OTG Compliance Details

USB OTG Electrical Test

- ◆ Use OET to test electrical compliance to USB OTG spec
 - VBUS Voltage Level
 - VBUS Current Output
 - ID Detection
 - SRP
 - ◆ VBus pulsing
 - ◆ Data Line Pulsing
 - Termination

USB OTG Protocol Test

- ◆ **Use OPT to test USB OTG protocol compliance**
 - **A-Device HNP State Transitions**
 - **A-Device SRP Response**
 - **B-Device HNP State Transitions**
 - **B-Device SRP Initiation**

Messaging

- ◆ **USB OTG Specification Section 3.4:**
 - “Devices shall provide messages to the user that allow him or her to understand the (communication) problem, and correct it if possible.”
- ◆ **No Silent Failures**
 - Leaves user with a bad experience
- ◆ **Messaging Interface must be apparent to the user**
- ◆ **Ex: User plugs in OTG flash drive to OTG MP3 player**
 - If failure occurs but no message, user believes nothing is wrong
 - Problem occurs when nothing happens
 - Must be some way to inform the user that some error occurred

Types of Messages

- ◆ Here is a sampling of common messages:
 - Device Not Supported
 - ◆ Device is not on targeted peripheral list
 - Power Not Sufficient
 - ◆ B-device is drawing more power than the A-device can supply
 - OTG Not Supported
 - ◆ Connected device does not support OTG
 - Unable to Wakeup Device
 - ◆ B-device is unable to initiate session with A-device

Targeted Peripheral List

- ◆ **USB On-The-Go has limited host functionality**
 - **Not all devices need to be supported by host**
 - **Manufacturer provides list of compatible devices**
 - **Device classes may also be supported**
 - **Manufacturer must submit a sample of each device or a sample device of each class and speed on the TPL for compliance testing**

SRP Capable Peripheral Not OTG devices

◆ USB Peripherals

- USB Peripheral may support SRP
- SRP support only, no HNP
- Mostly used for connecting to mobile OTG devices
 - ◆ SRP is respectful of power conservation

◆ SRP Capable Peripheral Compliance

- SRP-related Compliance tests
- USB Peripheral Compliance tests
- Only eligible for standard logo, not OTG logo

High Speed USB OTG Compliance Testing

High Speed USB OTG Compliance

- ◆ **New HS Section added to USB OTG Compliance Document**
 - **New High Speed USB OPT**
 - **Tests added for HNP role change with high speed negotiation**
 - **Tests are required to run without operator intervention**
 - **Manufacturer is required to provide software to handle all test scenarios**
 - **Testing will begin Q1/2005**
 - ◆ **May attempt sample runs in Q4/2004**

High Speed Electrical Testing

- ◆ **High Speed USB OTG Electrical Testing is still under discussion**
 - Possible new High Speed Test Jig will be added
 - Returns special descriptor to put high speed hosts into special test mode
 - Will reuse current SQIDD electrical test board
 - Allows accurate signal quality testing for HS OTG and Embedded Hosts
 - Allows testing to be done in a standardized way
 - ◆ Requires vendor software/firmware support
 - Check compliance section of USB.org for updates

High Speed Protocol Testing

- ◆ Uses a new protocol testing board
 - “HS OPT”
 - FPGA based board with high speed USB OTG IP Core
 - Comes with all software required to handle HS OTG Protocol Testing
 - ◆ HNP
 - ◆ SRP

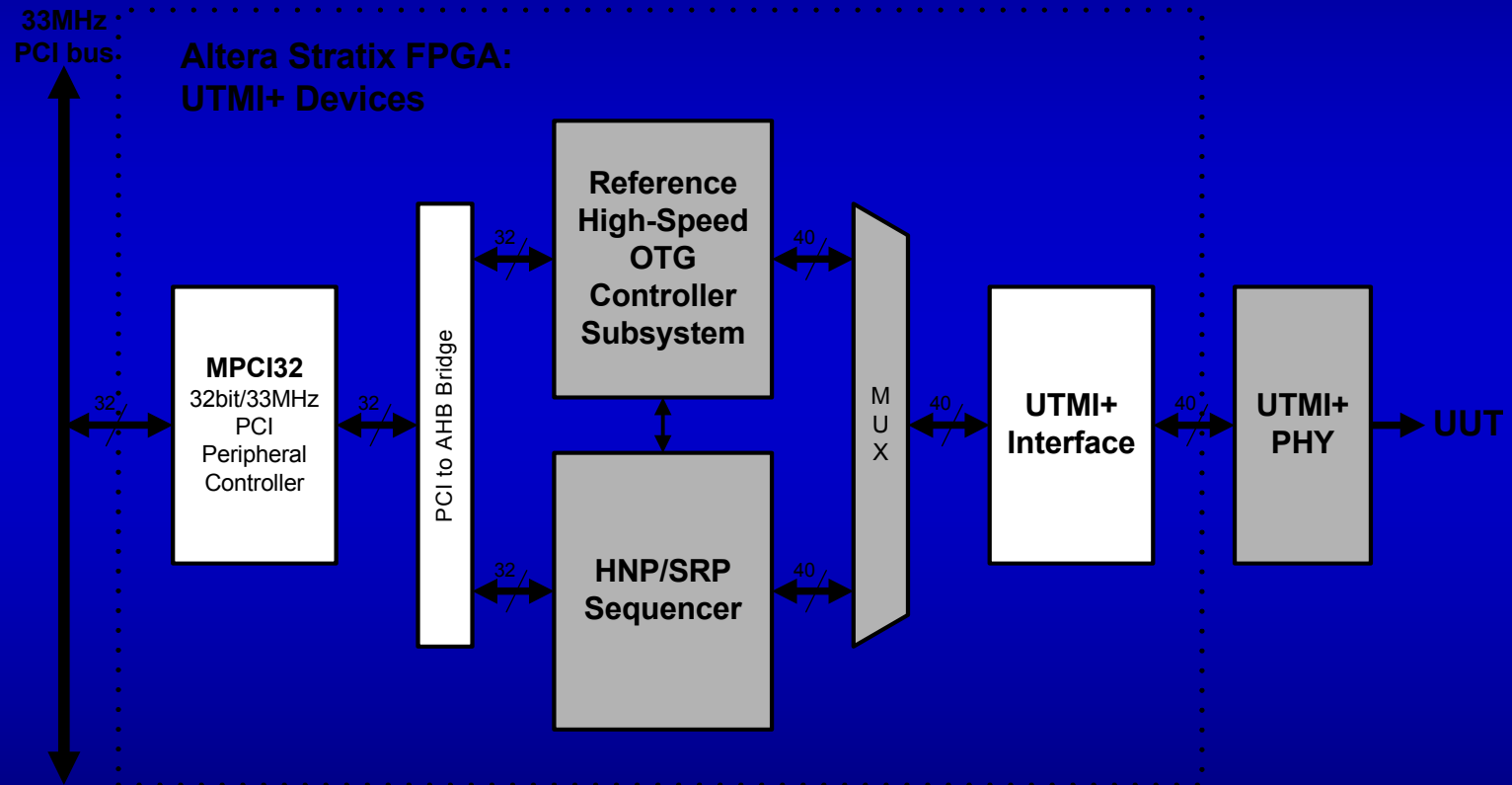
***USB OTG High Speed
Compliance
Equipment***

HS USB OTG Protocol Tester

◆ HS USB OTG Protocol Tester

- Developed by Contractor and Mentor Graphics**
- PCI Card with FPGA configured as HS OPT Tester**
- Fits inside standard PC's PCI slot**
- Software utility to run USB OPT tests**
 - ◆ High Speed**
 - ◆ Full Speed**
- Supports all USB OTG test sequences**

HS USB OTG Protocol Tester



***Recommended Items to
Bring to Compliance
Workshops***

Useful Advice for PlugFest

- ◆ Based on past experience, we recommend the following:
 - Bring at least one extra OTG product
 - Have a room at the hotel (you can go there to fix your product if anything is wrong)
 - ◆ USB-IF Compliance tries to get all testing done within
 - All products to be tested must be registered, individually before hand
 - ◆ No on-site registration
 - ◆ Let the staff know if you will be testing more than one product. (send e-mail to admin@usb.org)
 - Bring a soldering iron
 - Bring resistor and capacitor kits, especially resistors used for terminations
 - Bring aspirin

Questions and Answers