



# ***USB On-The Go Compliance***

**High Speed  
and  
Full Speed  
Compliance Procedure**

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# *Information*

- ◆ Frequently go to [www.usb.org/compliance](http://www.usb.org/compliance) for more details and updates on compliance procedures
- ◆ E-mail [TechAdmin@usb.org](mailto:TechAdmin@usb.org) AFTER reviewing on-line documentation

# ***Contents***

- ◆ **Full Speed USB OTG Compliance**
  - USB OTG Full Speed Compliance Procedure
  - USB OTG Full Speed Compliance Equipment
  - USB OTG Compliance Details
- ◆ **High Speed USB OTG Compliance**
  - USB OTG High Speed Compliance Procedure
  - USB OTG High Speed Compliance Equipment
- ◆ **Recommended Items to Bring to Compliance Workshops**

# *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***

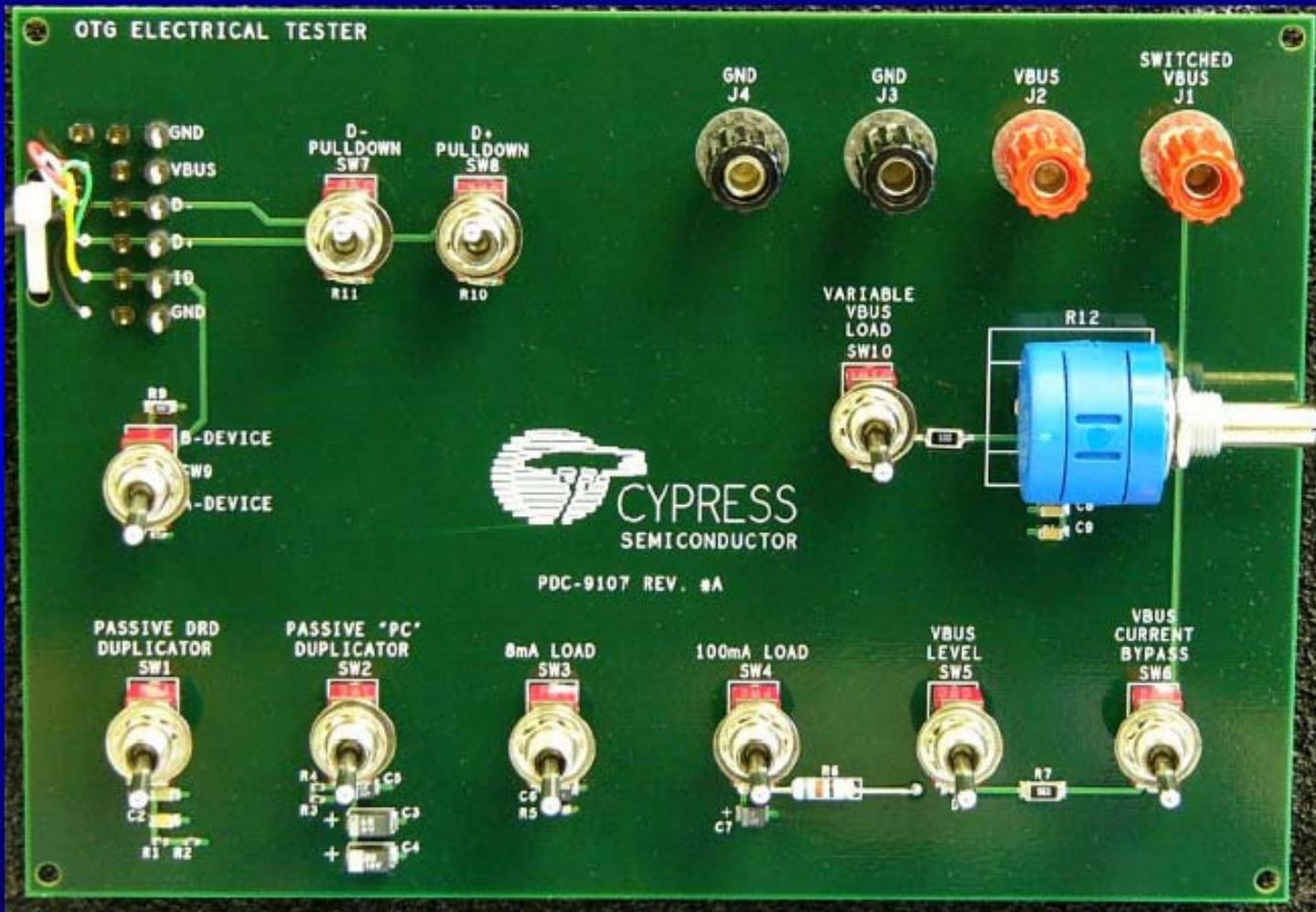
- ◆ **USB OTG Certification can be given at test houses certified for Testing by the USB-IF**
  - Test labs are fee-based
- ◆ **Currently Authorized USB OTG Test Houses:**
  - MCCI
  - NSTL
  - NTS/XXCAL Testing Labs
  - PMTC
- ◆ **Alternative to attending Plugfest**

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

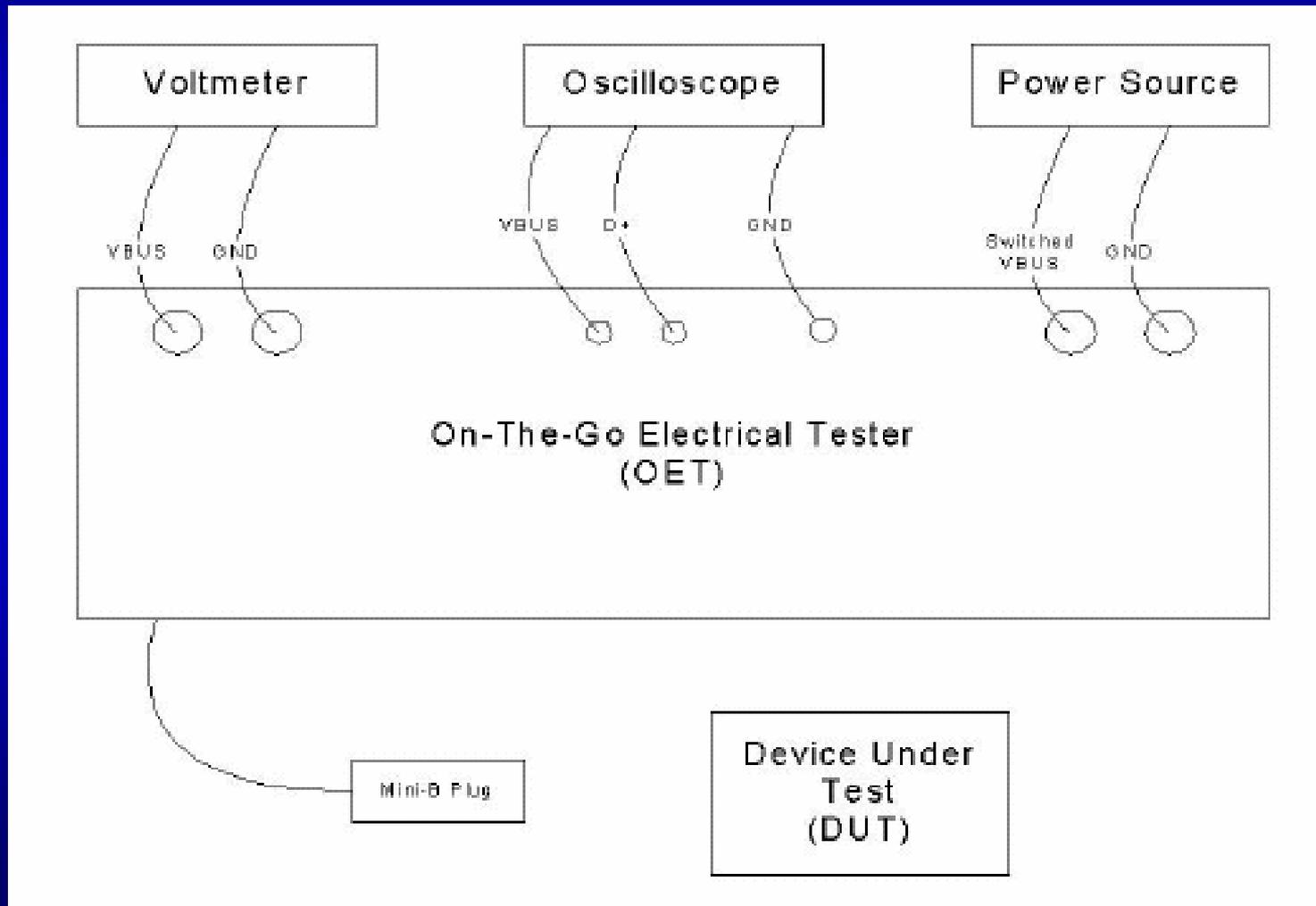
# ***OTG Electrical Tester***

- ◆ **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**

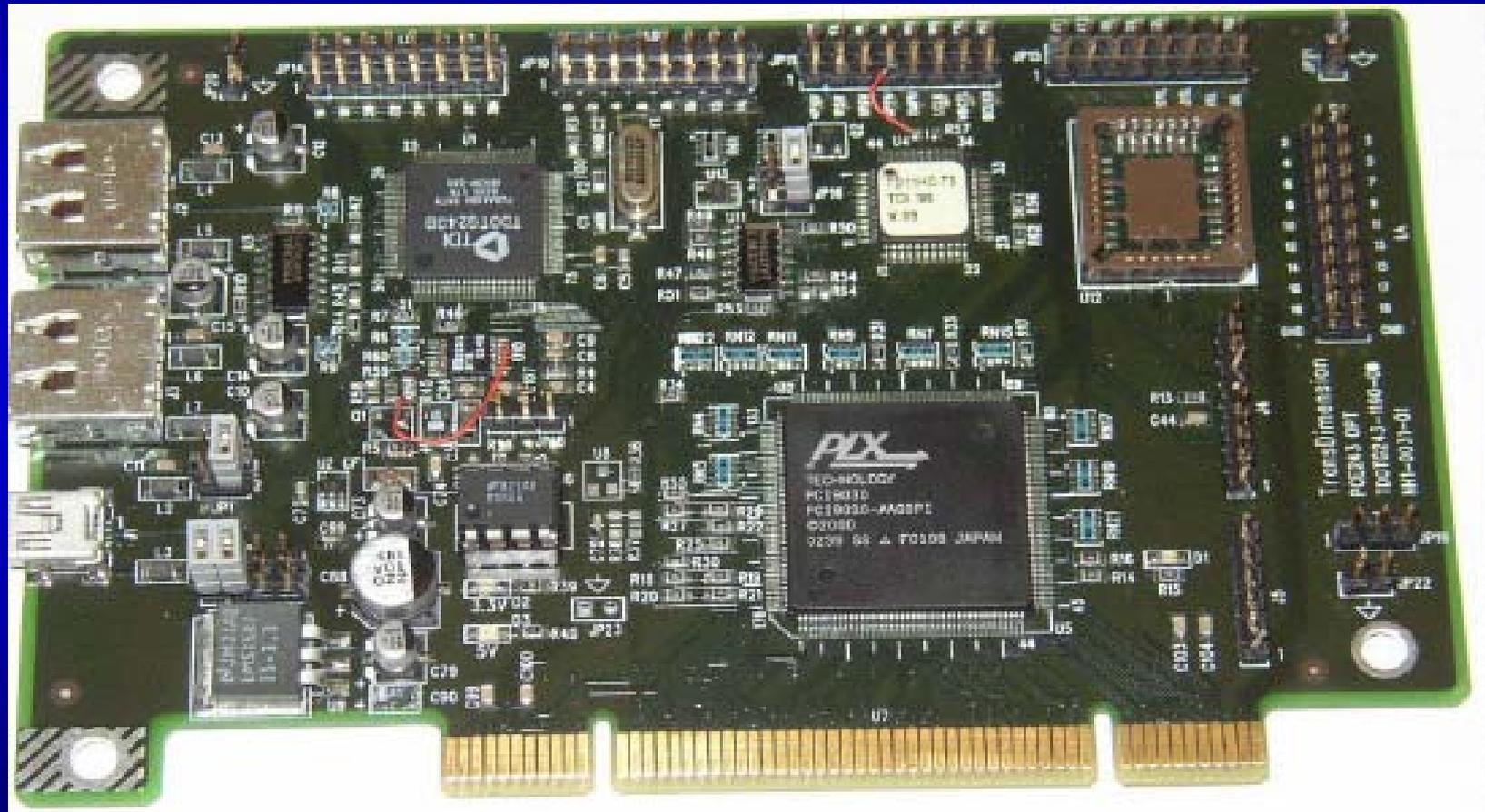
# OTG Electrical Tester



# 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](http://USB.org) for updates

# *High Speed Protocol Testing*

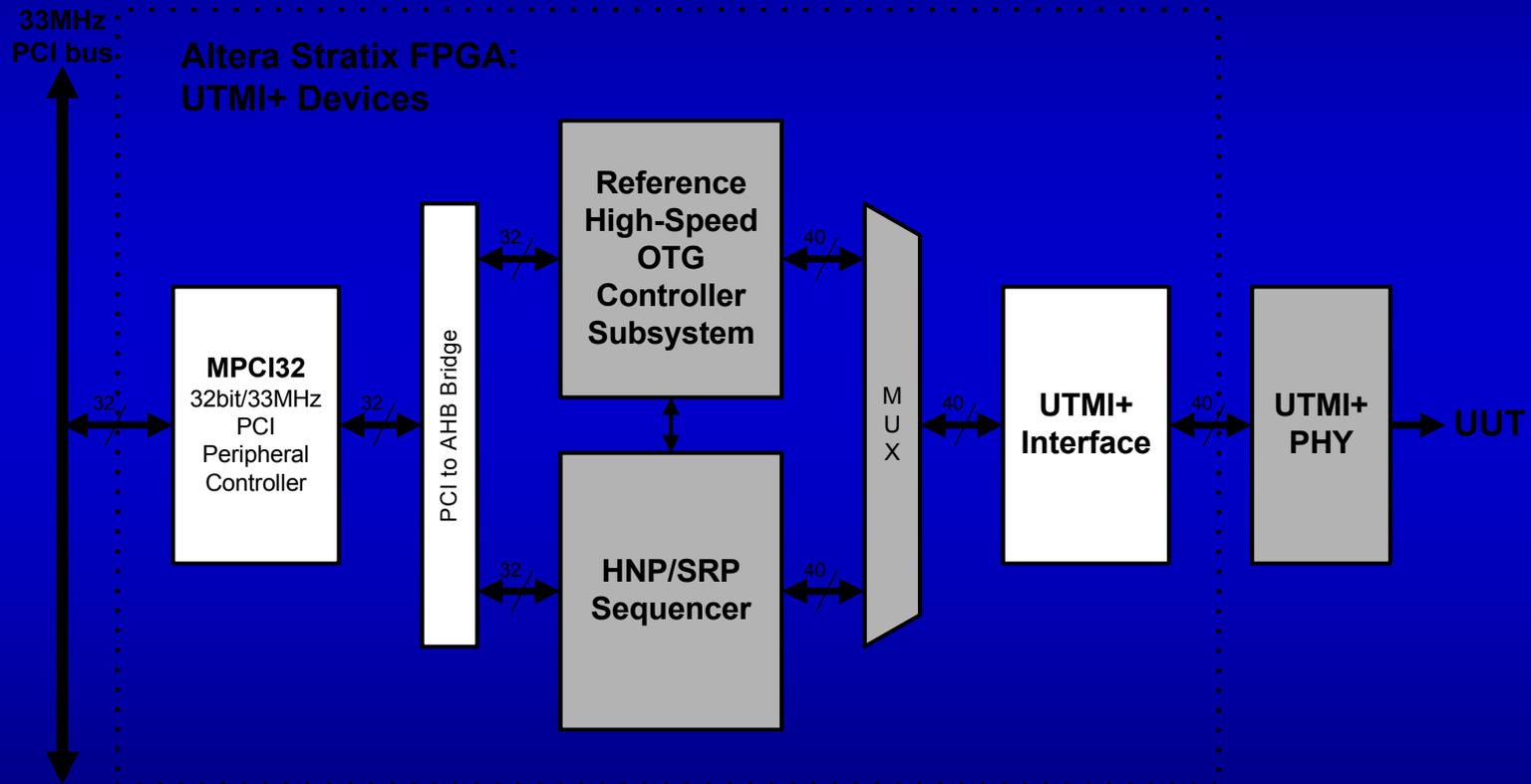
- ◆ Uses a new protocol testing board
  - “HS OPT”
  - FPGA based board with high speed USB OTG IP Core
  - Comes with all software required to handle HS OTG Protocol Testing
    - ◆ HNP
    - ◆ SRP

***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](mailto:admin@usb.org))**
  - **Bring a soldering iron**
  - **Bring resistor and capacitor kits, especially resistors used for terminations**
  - **Bring aspirin**

# ***Questions and Answers***