HDMI 2.0/3G-SDI Signal Generator

Installation & Operation Manual

500830

Contents

1. Introduction 3
2. Package Contents 5
3. Product Panel Overview 5
3.1 Front Panel 5
3.2 Rear Panel 6
4. Features 7
5. Specifications 8
6. Applications 8
7. Operation Control & Functions 10
8. USB Port Serial Driver Installation 20
9. Cascading the Control Bus 20
10. Warranty 23

1. Introduction

The HDMI 2.0/3G-SDI Signal Generator (500830) is a programmable SD/HD/3G SDI and HDMI 2.0 (UHD - Ultra High Definition) Test Instrument supporting a pattern generator function that is packed with features for video and audio testing of HDMI® source and sink equipment, including repeaters. The unit Generates a full range of resolutions up to 4K @ 60Hz 4:4:4, as defined in HDMI® 2.0 standard, and is capable of generating all available HDMI and DVI digital signals. The unit also supports the generation of HD/SD/3G-SDI signals for Broadcast applications.

When used together with the HDMI 2.0/3G-SDI Signal Analyzer (500831), a useful set of cable tests can be performed to check the HDMI cable quality and the connectivity of signal lines. Such tests may be operated from the HDMI 2.0/3G-SDI Signal Analyzer and the test result will also be displayed on the HDMI 2.0/3G-SDI Signal Analyzer.

Thanks to the product's small size and low power consumption, the unit is powered via an internal battery, which can be charged from the included power supply. The battery supports 5 hours of normal operation between charges. This

convenience permits the operator to run tests in areas where AC power may not be easily accessible, and allows for a device that is highly portable and can be easily included in a video technician's toolbox. It may even be used in an array of daisy chained devices on a development workbench, or in a Control Room 19" Rack shelf.

The HDMI 2.0/3G-SDI Signal Generator has a built in 3" (inch) LCD display that will graphically show actual generated patterns, menus and unit settings, including output signal settings & parameters.

A professional programmable sine wave generator is integrated for performing sophisticated and tailored audio tests. In addition the unit supports an auxiliary audio port which may be connected to an external audio source, which is then embedded into the HDMI® output. The audio auxiliary port is accessible via a 3.5mm 2CH socket located on rear panel, and may be connected to practically any unbalanced 1V/pp line level 2CH analog audio source.

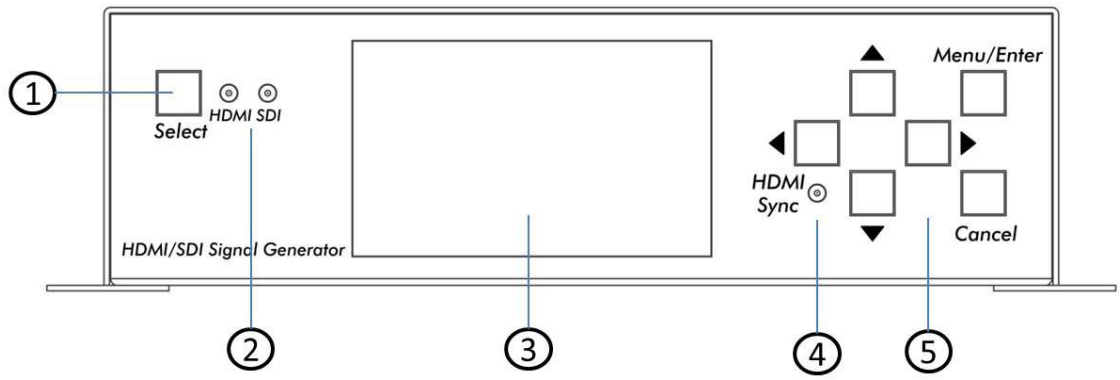
The HDMI 2.0/3G-SDI Signal Generator is programmable via RS232 or USB, with Windows based Control Software that may be downloaded at no charge from the MuxLab website. Uses can create large test systems (with multi device measurement protocol functionality) by making use of the RS232 port to

connect to a downstream test unit. This feature allows for a large test system setup with multiple HDMI 2.0/3G-SDI Signal Generators to test UHD distribution devices or complex UHD networks.

2. Package Contents

1. Main unit: HDMI 2.0/3G-SDI Signal Generator
2. 5V 1A Power Supply
3. Wall-mounting bracket (x2)
4. 1.2m USB cable (x1)
5. Stick-on rubber feet (x4)

3. Product Panel Overview

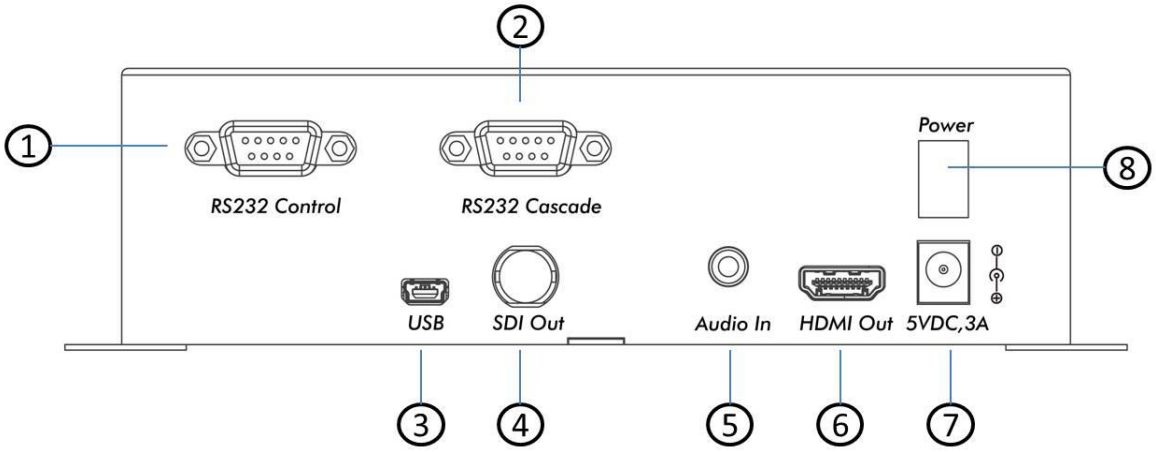


3.1 Front Panel

1. HDMI/SDI mode select button
2. HDMI or SDI mode LED Indicator
3. 3 inch LCD panel. The display shows actually generated

signals transmitted on the HDMI output port, as well as to control/navigation menus and device settings.

4. HDMI Sync Status LED. Shows the HDMI link status and is lit when the link is active. The LED will be off when the link is lost or the HPD is not present from the sink device. The link will blink if an EDID error exists.
5. Convenient and ergonomic buttons for operating and navigating menus and settings with Up, Down, Left, Right, Enter (select) and Cancel buttons.



3.2 Rear Panel

1. DB9 connector for RS232 control
2. DB9 connector for RS232 cascade, to another tester
3. USB port for control
4. SDI out
5. 3.5mm jack for 2CH analog audio in
6. HDMI out
7. 5V DC socket

8. Power switch

4. Features

- Powerful and affordable testing solution AV R&D engineers, integrators and installers
- Supports 4Kx2K 24Hz/25Hz/30Hz/50Hz/60Hz and 3D
- Supports RGB4:4:4, YUV4:4:4, YUV4:2:2,YUV4:2:0(HDMI2.0)
- Supports SD/HD/3G-SDI
- Includes 33 preset patterns
- Supports 32 preset resolutions, 10 user-defined resolutions and 1 auto resolution mode (for HDMI)
- 3 inch LCD panel for Output Pattern preview and Menu settings display
- Supports 7 audio sample rates, and one auto mode based on the EDID data from the HDMI signal received from a sink device
- Supports standard functionality such as HDMI/DVI up to 4K resolution @ 60Hz (4:4:4), Deep Color, HDCP (On/Off), Color Space and an array of other crucial video parameters.
- Supports EDID read functionality and can store 10 EDID settings from different TVs (or sink devices) and can write (program) previously saved EDID configurations to other

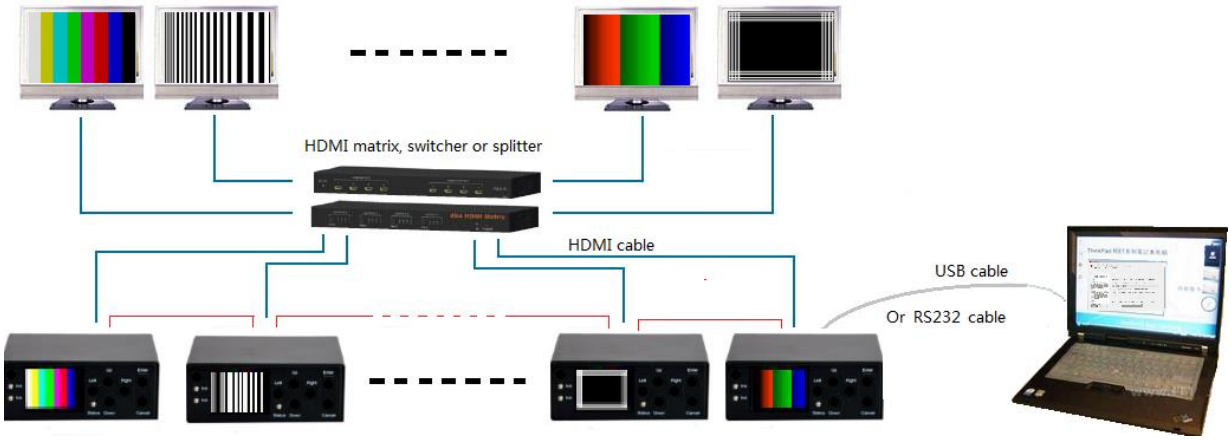
devices

- Windows Control Software, available at no charge from the MuxLab website, will significantly extend the product functionality.

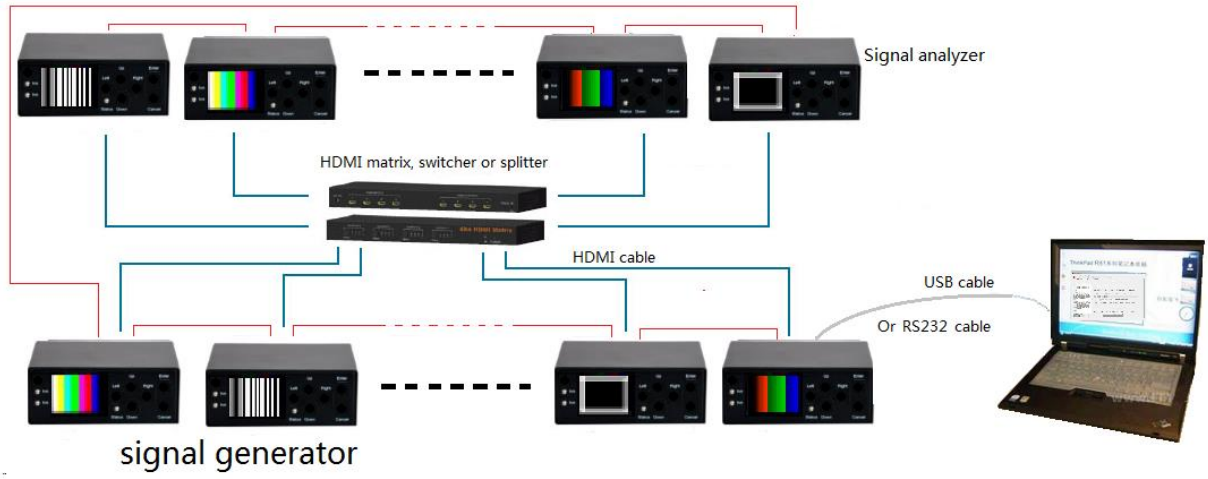
5. Specifications

HDMI Version	HDMI 2.0/DVI
HDCP Version	HDCP2.2/HDCP1.4
HDCP On/Off Support	Yes
Video Bandwidth	Up to 18.0GHz(6.0GHz per channel)
Color Depth	24bits, 30bits, 36 bits, 48bits
Embedded Timing	54 sets (Including 4K(30), 4K(25), 4K(24), HDMI2.0 4K(50), HDMI2.0 4K(60), 720P-3D, 1080P-3D) fixed timing and one AUTO mode
User Define Timing	10 sets
SDI version	SD-SDI/ HD-SDI/ 3G-SDI
Pattern	34 patterns: (33x) 2D patterns & (1x) 3D pattern
Color Space	RGB444, YUV444, YUV422, YUV420 (HDMI®2.0 only)
Audio Bits	16bit, 20bit, 24bit
Audio Sample Rate	32K, 44K, 48K, 88K, 96K, 176K, 192K
Vertical Frequency Range	≤120 Hz
Power Consumption (max.)	2 Watts
Housing	Metal
Dimension (mm)	170mm x 109mm x 50mm
Weight (g)	930g

6. Applications



The HDMI 2.0/3G-SDI Signal Generator is intended to be used to test HDMI sink devices, which may include HDMI or SDI matrix, switches, Switchers, splitters, TV sets, etc.



The HDMI 2.0/3G-SDI Signal Generator (500830) also works with the HDMI 2.0/3G-SDI Signal Analyzer (500831), which is practical when testing devices placed between source and sink equipment, such a matrix switches, switchers and splitters as shown below. This device pairing creates a flexible and powerful UHD test system. The test systems can be controlled via a single RS232 control port, due to the fact that the RS232 signal can cascaded (daisy chained) across multiple testing devices (500830 & 500831 devices).

The combination of the HDMI 2.0/3G-SDI Signal Generator (500830) and HDMI 2.0/3G-SDI Signal Analyzer (500831) provides the user with a sophisticated low cost UHD troubleshooting testing system. The setup can be used to

analyze bit error levels, and for long term “Time /Event based sampling” tests that are extremely difficult to do by individual technician alone.

The HDMI 2.0/3G-SDI Signal Generator offers sophisticated functionality in a compact size, making it a valuable tool for AV professionals.

7. Operation Control & Functions

1. For HDMI connections: Connect an HDMI cable from the Signal Generator to a TV or other HDMI sink device.
2. When managing the test via the Windows Control Software, connect the Windows PC RS232 port to the RS232 port on the Signal Generator.
3. The Signal Generator can be run on the internal battery, or can be run via an external power source, such as from the included power supply by connecting the power supply to the Signal Generator power socket.

4. The Signal Generator may be controlled via the Front Panel by using the ergonomic push buttons.
5. Be sure the HDMI Out LED is On. If this LED is Off, but the SDI Out LED is On, then press the 'Select' button to change to HDMI mode.

For SDI applications: Follow the same procedure as above, but select SDI mode, use SDI coax cable of appropriate grade, and ensure that the SDI Out LED is On. If this LED is Off, but the HDMI Out LED is On, then press the 'Select' button to change to SDI mode.

6. Menu mode:
   a) The 'Enter' key can operate as a MENU or Enter (Confirm) function key.
   b) Press 'Enter' to activate Menu mode and display the various available menus. Menu mode will turn off automatically after 5 seconds of no input activity.
   c) Press 'Cancel' to turn off Menu mode.
   d) While in Menu mode the user can scroll through the various available menus.

- Press ‘Left’ or ‘Right’ to change to the next or previous menu.
- Press ‘Up’ or ‘Down’ to change settings within a given menu.

e) When in normal display mode **(not in Menu mode)**

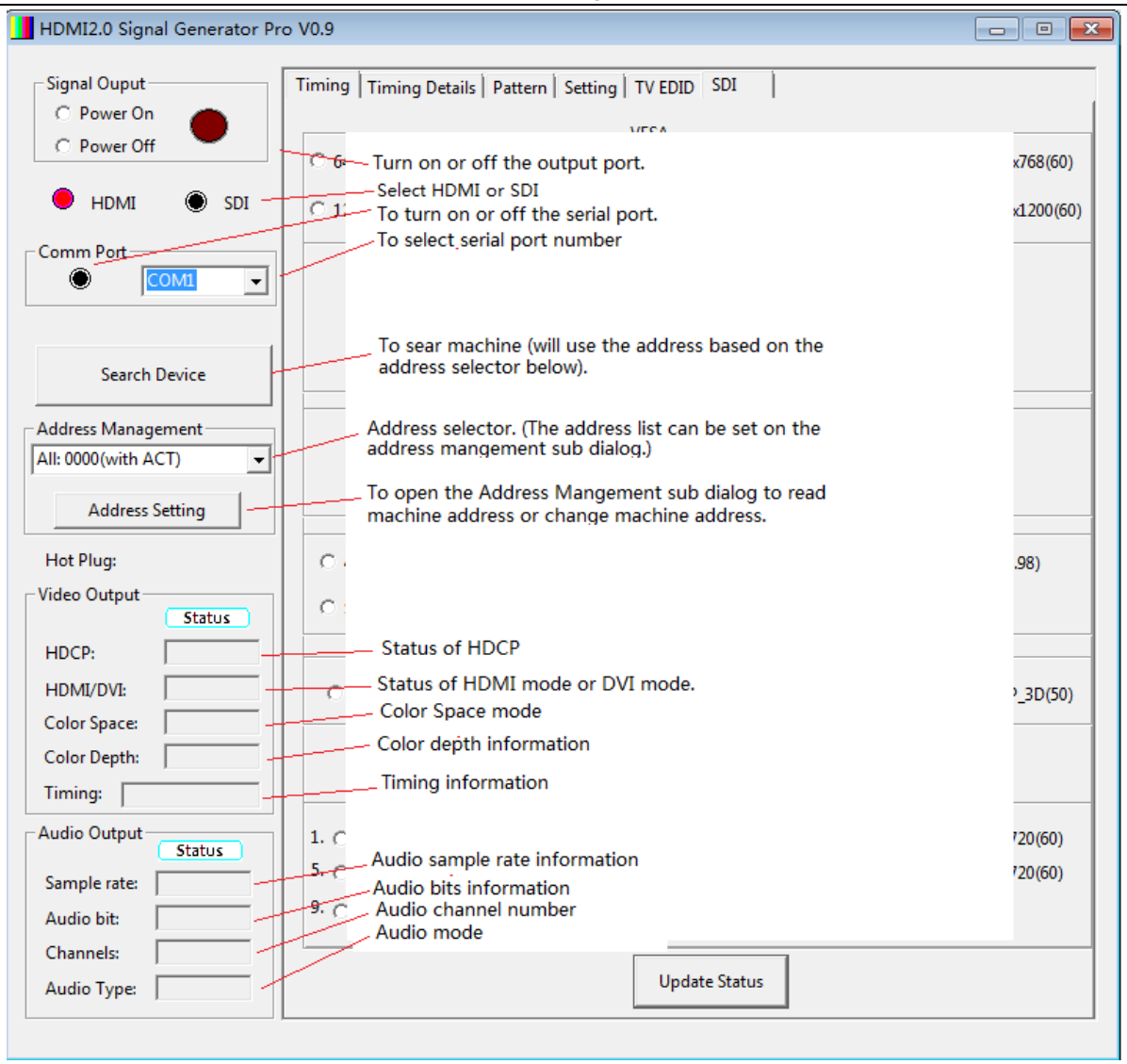
- Press ‘Up’ or ‘Down’ to change patterns.
- Press ‘Left’ or ‘Right’ to change timing data.

f) The various available menus include the following: Video Resolution, Color Space, Color Depth, HDCP, HDMI/DVI, Audio Sample Rate, Audio Resolution, Audio Source, Audio channels, Output Standby, Network Settings, Save EDID, Sink EDID Info, and Comm. Serial Address Info (showing Group Address and Device Address, which can be changed only via RS232 and the Windows Control Software).

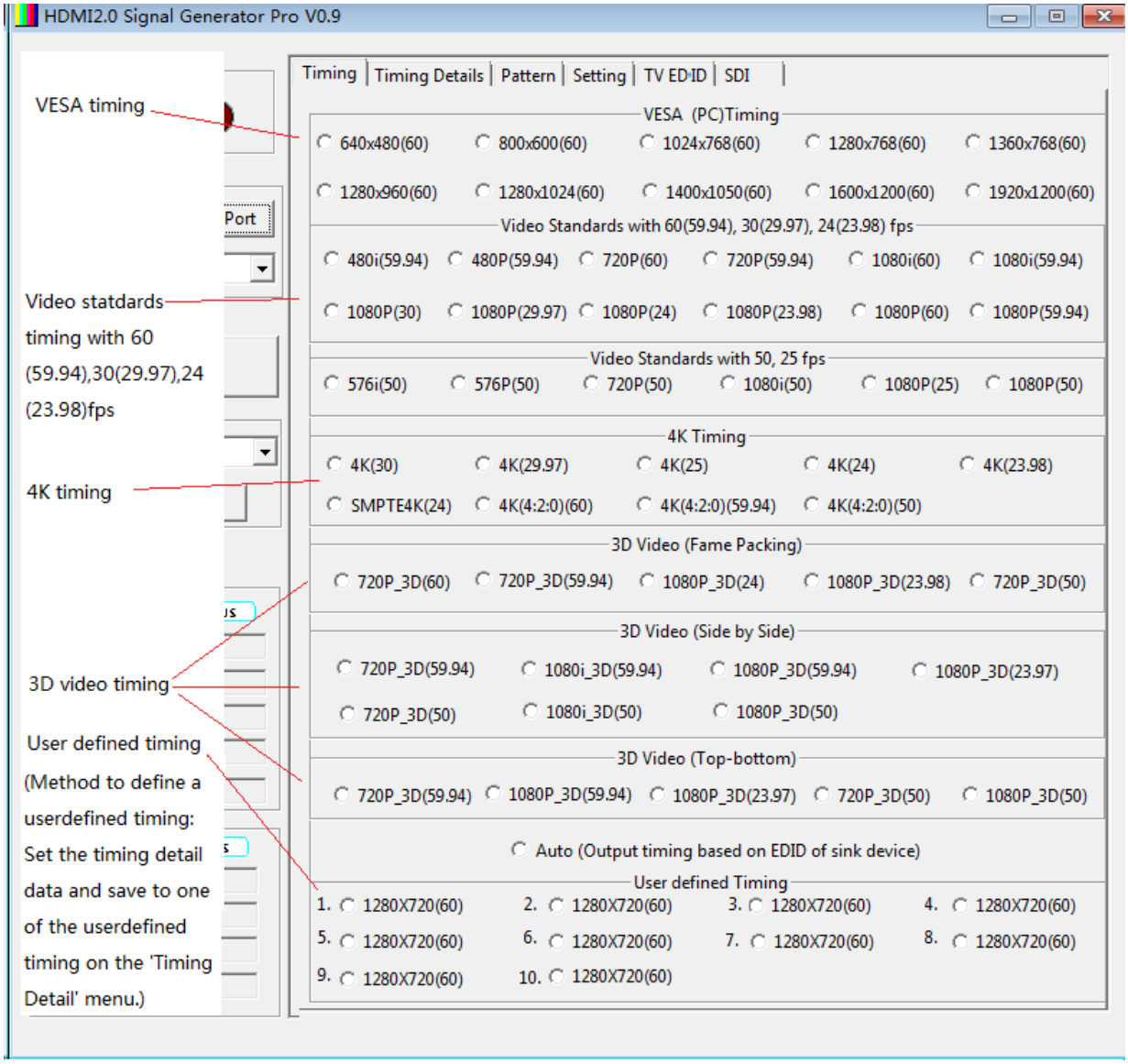
7. Control the Signal Generator from a PC via RS232 or USB.

a) Main menu (on left):

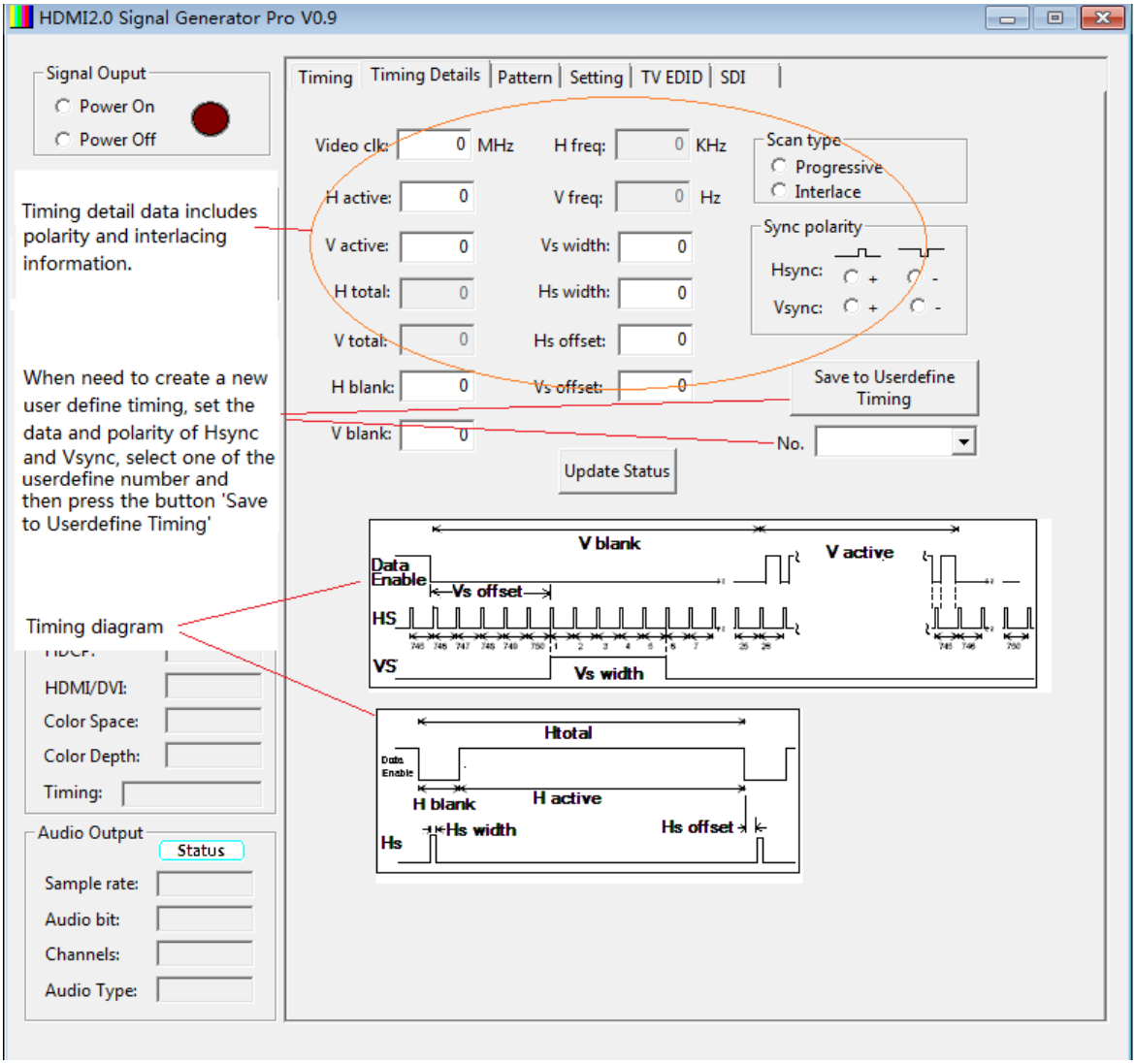
The main menu is located on the left portion of the screen, which allows for, serial port selection, Auto Search machine function, Address Management function, Output port on/off and information via OSD showing video and audio parameters.


HDMI2.0 Signal Generator Pro V0.9
Signal Ouput
Power On
Power Off
HDMI
SDI
Comm Port
COM1
Search Device
Address Management
All: 0000(with ACT)
Address Setting
Hot Plug:
Video Output
Status
HDCP:
HDMI/DVI:
Color Space:
Color Depth:
Timing:
Audio Output
Status
Sample rate:
Audio bit:
Channels:
Audio Type:
Timing
Timing Details
Pattern
Setting
TV EDID
SDI
Turn on or off the output port.
Select HDMI or SDI
To turn on or off the serial port.
To select serial port number
To sear machine (will use the address based on the address selector below).
Address selector. (The address list can be set on the address mangement sub dialog.)
To open the Address Mangement sub dialog to read machine address or change machine address.
Status of HDCP
Status of HDMI mode or DVI mode.
Color Space mode
Color depth information
Timing information
Audio sample rate information
Audio bits information
Audio channel number
Audio mode
Update Status

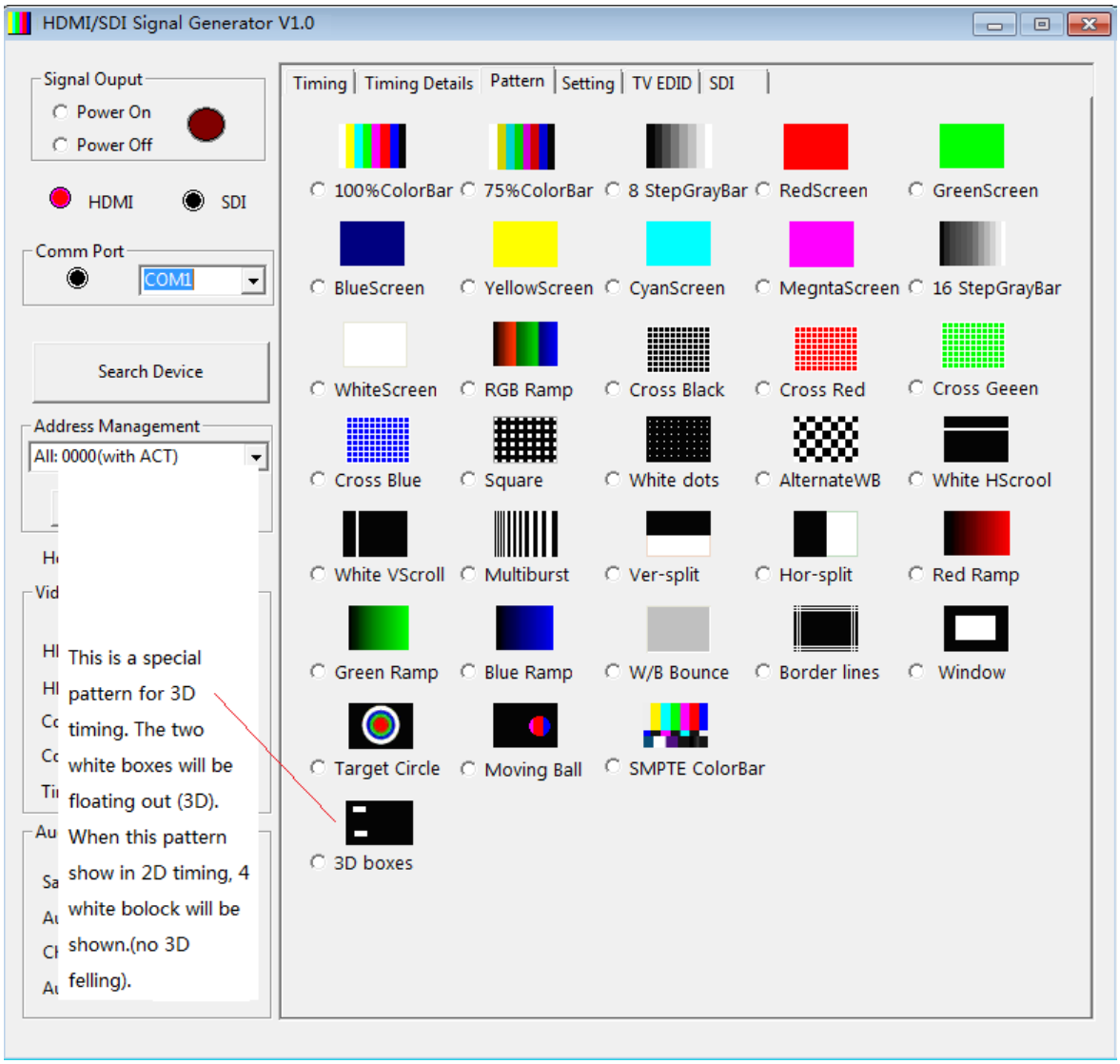
b) Timing control and timing detail menu:



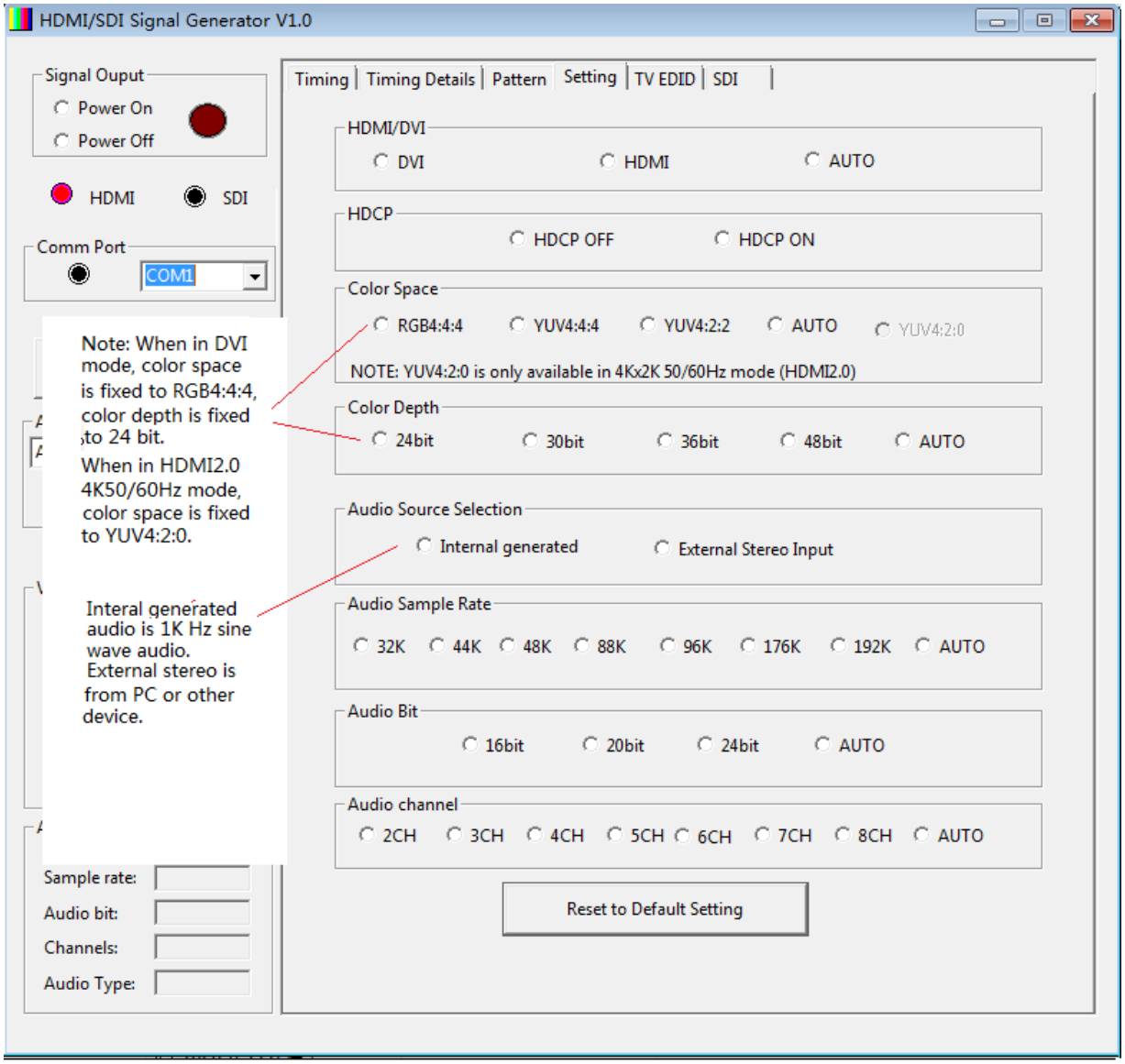
Timing detail menu:



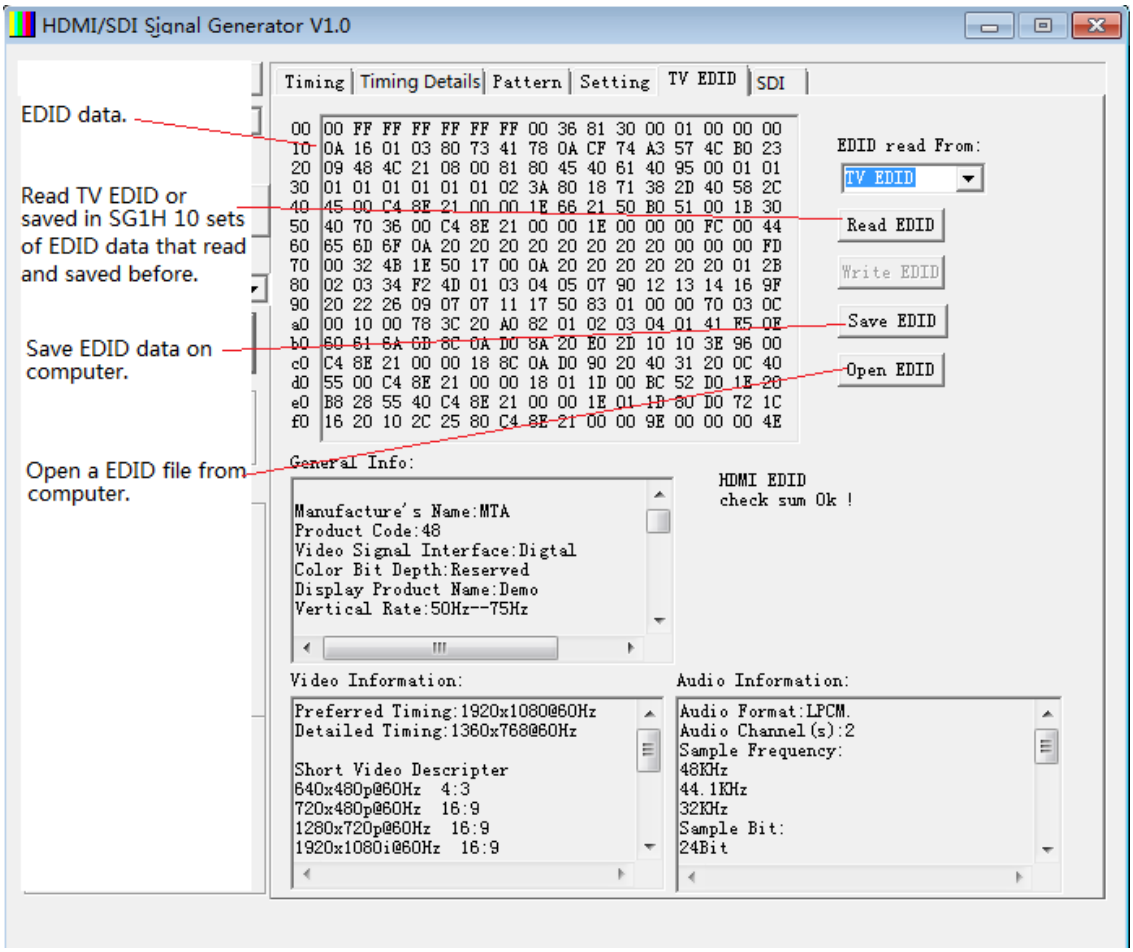
c) Pattern select menu:



d) Setting menu:

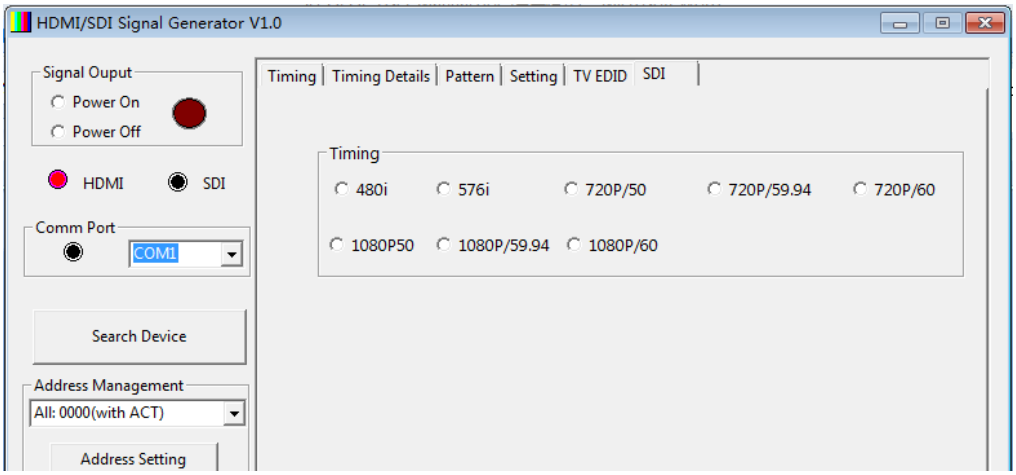


e) EDID management menu:

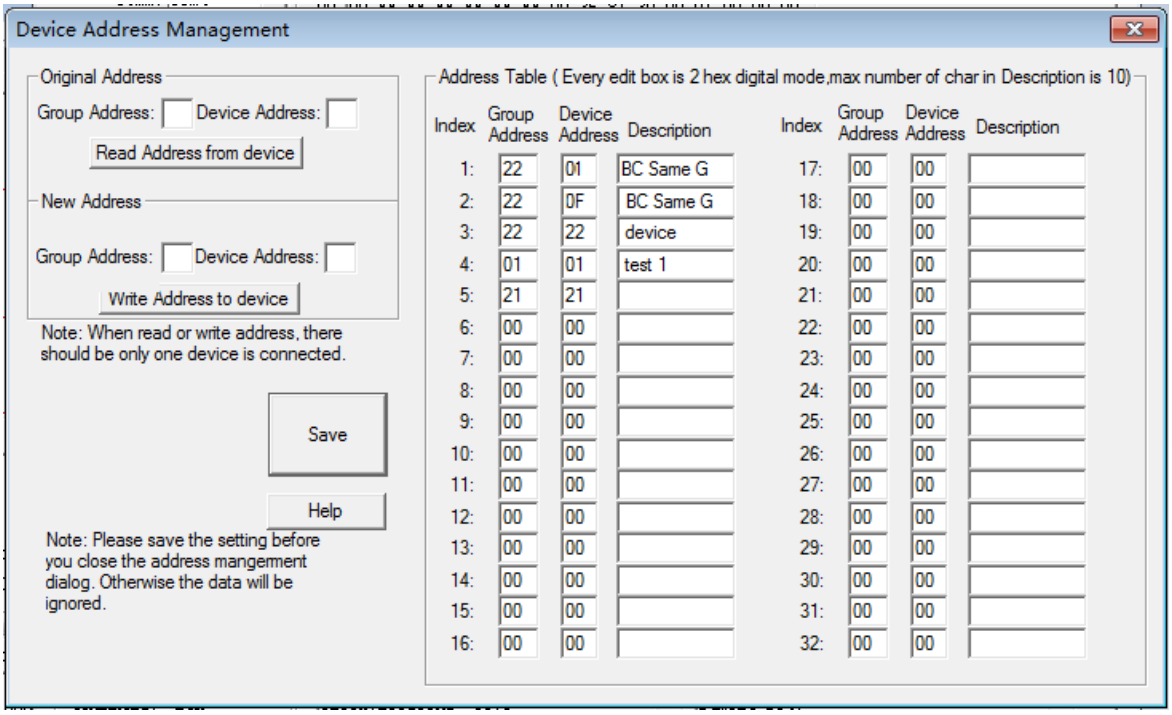


Note: The Signal Generator can save 10 sets of EDID data. This function is useful when the installer is in the field analyzing HDMI system problems.

f) SDI timing setting:



g) Device address management menu:



The Signal Generator can be used to set up a large test system. All Signal Generators and Signal Analyzers in a system can be cascaded by using the RS232 (3 pin) Phoenix connector. When more than one Signal Generator is connected on a single serial chain (Bus), these devices must have unique (different) identification address.

Each address can have a binding note, which has at most 10 characters. After the address table is saved, they it can be selected via the address selector on the main menu.

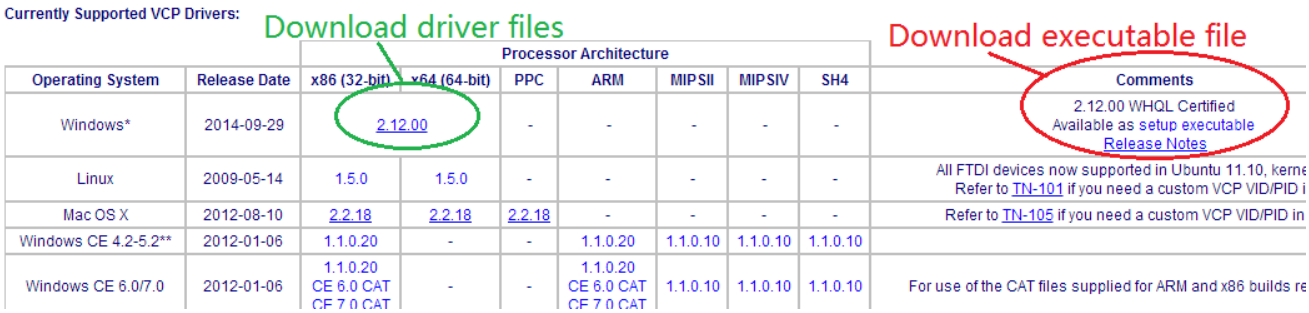
8. USB Port Serial Driver Installation

For a Windows system, there is an executable available.

Download executable file from the website:

http://www.ftdichip.com/Drivers/VCP.htm

Execute the downloaded file ‘ CDM v2.12.00 WHQL Certified.exe ‘ to install the driver for FTDI USB-UART.



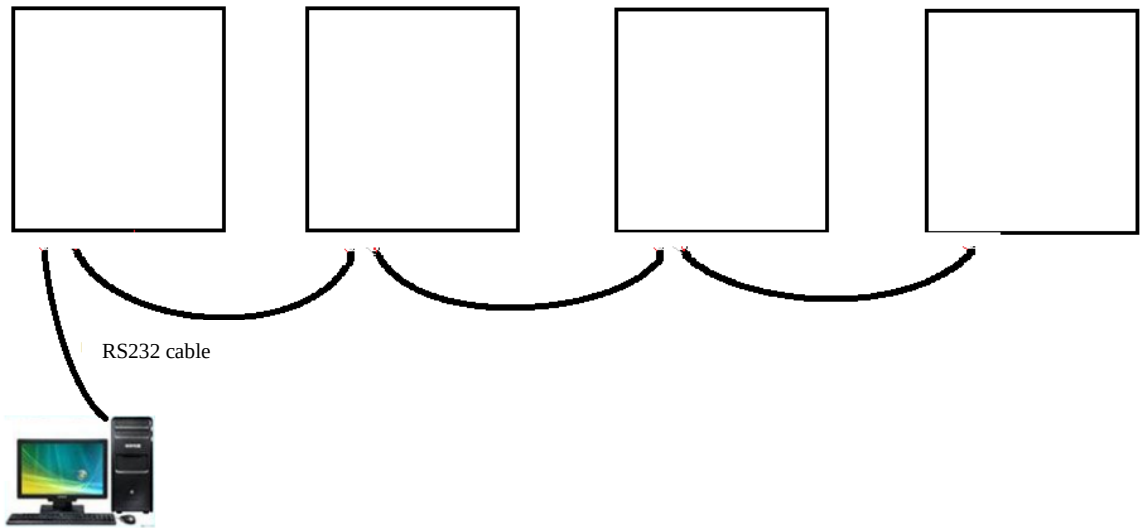
Or download the driver files and install the FTDI USB-UART manually.

For other Operating Systems, you need to download the driver files and install the FTDI USB-UART manually.

9. Cascading the Control Bus

1. Connect the Signal Generator to an appropriate HDMI input port on a sink device (such as a display).
2. Connect the power supply to the unit. The unit can also operate on the internal battery.
3. The RS232 port or the USB port can be used for control.
4. There are two RS232 ports. The first RS232 port is used for control, while the second RS232 port is for cascading and can be used

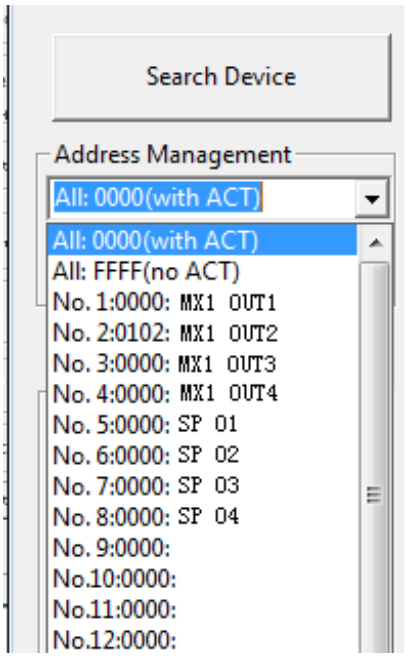
to connect to the next Signal Analyzer down-stream. In this way, many Signal Analyzers can be cascaded and controlled easily.



5. Set different Serial address for each Signal Generator and Signal Analyzer (if any).
6. On the first unit connect the RS232 Control port to the controlling PC and connect the RS232 Cascade port to the next down-stream Signal Analyzer or Signal Generator RS232 Control port, and so on.
7. Use the DB9 to Phoenix cable to connect the first Signal Analyzer to a PC.
8. Setup the address table on the address management Menu.
9. **Please Note!** During first time setup you should address each device independently.

   [Please save settings before closing dialog!]
10. Choose the machine by selecting the address from the

Address Select (pull down menu). When an address is selected, the status of the signal shown on the menu will be updated automatically.



10. Warranty

MuxLab warranties that this unit will, under normal use, be free from defects in workmanship and materials, when received in its original container, for a period of two years from the purchase date. This warranty is extended to the original purchaser only, and proof of purchase is necessary to honor the warranty. If there is no proof of purchase provided with a warranty claim, MuxLab reserves the right not to honor the warranty set forth above, and labor and parts may be charged to the consumer. This warranty does not apply to the product exterior or cosmetics. Misuse, abnormal handling, ESD on HDMI circuitry, alterations or modifications in design or construction will void this warranty. It is considered normal for a minimal amount of pixels on a screen, not to exceed three, to fail on the periphery of the display active viewing area. MuxLab reserves the option to refuse service for display pixel failure if deemed unobtrusive to effective use of the monitor by our Service Department. No sales personnel of the seller or any other person is authorized to make any warranties other than those described above, or to extend the duration of any warranties on behalf of MuxLab, beyond the time period described above. Due to constant effort to improve products and product features, specifications may change without notice.

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