L4445A Microwave Switch/Attenuator Driver

Microwave switch/attenuator driver offers support of most common microwave switches with distribution boards for easy configuration.

The Keysight Technologies, Inc. L4445A is a LXI Class C compliant instrument that controls external switches and attenuators. With its small size and Ethernet connectivity, the switch/attenuator driver can be placed wherever your application needs it.

The Keysight L4445A provides digital outputs to control switches, attenuators, and other devices that are typically used to route signals in a high frequency system. Many of the most popular microwave switches and attenuators are supported through the distribution boards. The distribution boards enable fast and easy connection to the microwave devices.

Using this LXI instrument, you'll get all the benefits of an Ethernet connection, instrument Web server, standard software drivers and more. The LXI standard is supported by multiple vendors, enabling lower cost of test with accelerated test integration and development.

- LXI compliance includes built-in Ethernet connectivity
- Fully-featured graphical Web interface
- Control of most popular microwave switches and attenuators
- Expandable with 34945EXT
- Distribution boards allow for easy wiring
- Switch read-back capabilities
- External power option for simultaneous switching
- Software drivers for most common programming environments

Features

- LXI compliant includes built in Ethernet connectivity
- Control of most popular microwave switches and attenuators
- Expandable with 34945XT
- Distribution boards allow for easy wiring
- Switch read-back capabilities

Microwave switch driver for easy routing of high frequency signals in your system

The L4445A allows you to control switches, attenuators and other devices close to your device under test. The L4445A combined with the 34945EXT provides the power and control signals to drive up to 64 switch coils—that's 32 standard SPDT switches.

The L4445A can be extended by adding additional 34945EXT extenders. The first 34945EXT is powered by the L4445A. You can add up to seven additional 34945EXT extenders with user supplied power. Multiple switch operations are performed in sequential order, or for faster, simultaneous switching, you can connect an external power supply to the 34945EXT.

The digital outputs can also be used to drive LEDs for indication of the switch position. The L4445A/ 34945EXT also has digital inputs so that you can read back the actual position of the switch or attenuator.

The L4445A comes with a standard 9-pin connector for simple connection to the 34945EXT. The Y1150A-Y1155A distribution boards plug onto the 34945EXT and are used to route the power and control signals from the driver to the switches using user supplied cables. This enables simple connections to the external switches without a lot of complicated wiring.

The following microwave switches and attenuators are supported with the Y1150A-Y1155A distribution boards:

- N181x/U9397x series SPDT switches
- 8762/3/4 series SPDT switches (screw terminals)
- 8765x coaxial switches
- 8766x/8767x/8768x multiport switches
- 87104x/106x/L710xx/L720xx multiport switches
- 87406x series matrix switches
- 87204x/206x series multiport switches
- 87606x series matrix switches
- 87222x/L7222 transfer switches
- 849x series attenuators
- 8490x series attenuators
- Screw terminal connections

Ethernet connectivity enables simple connection to the network and remote access to measurements

The Ethernet interface offers high-speed connections that allow for remote access and control. You can set up a private network to filter out unwanted LAN traffic and speed up the I/O throughput or take advantage of the remote capabilities and distribute your tests worldwide. Monitor, troubleshoot, or debug your application remotely. Ethernet communication also can be used with the support of LAN sockets connections.

The optional GPIB interface has many years of proven reliability and can be used for easy integration into existing applications.

The L4445A ships with the Keysight E2094 I/O Libraries Suite making it easy for you to configure and integrate instruments into your system — even if your system includes instruments from multiple vendors.

Fully-featured graphical Web interface makes it easy to set-up and troubleshoot your tests from anywhere in the world

The built-in Web browser interface provides remote access and control of the instrument via a Java-enabled browser such as Internet Explorer. Using the Web interface, you can set up, trouble- shoot, and maintain your instrument from remote locations.

- View and modify instrument setup
- Configure switch channels and switch pairs
- Open or close switches
- Send, receive and view SCPI commands
- Define and execute switch sequences
- View error queue
- Get status reports on relay
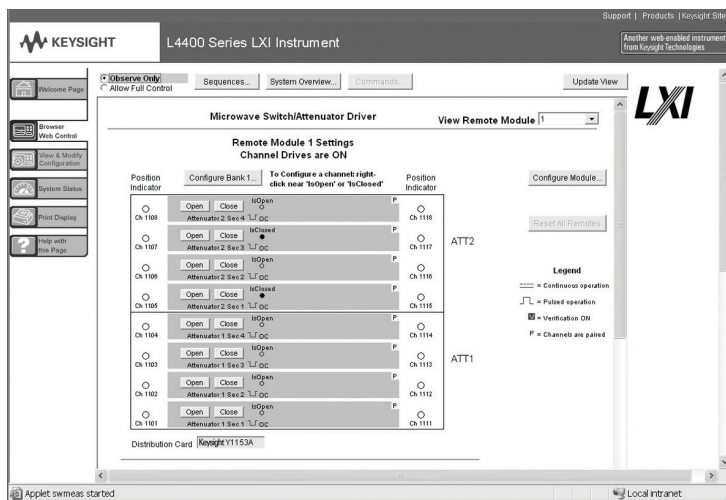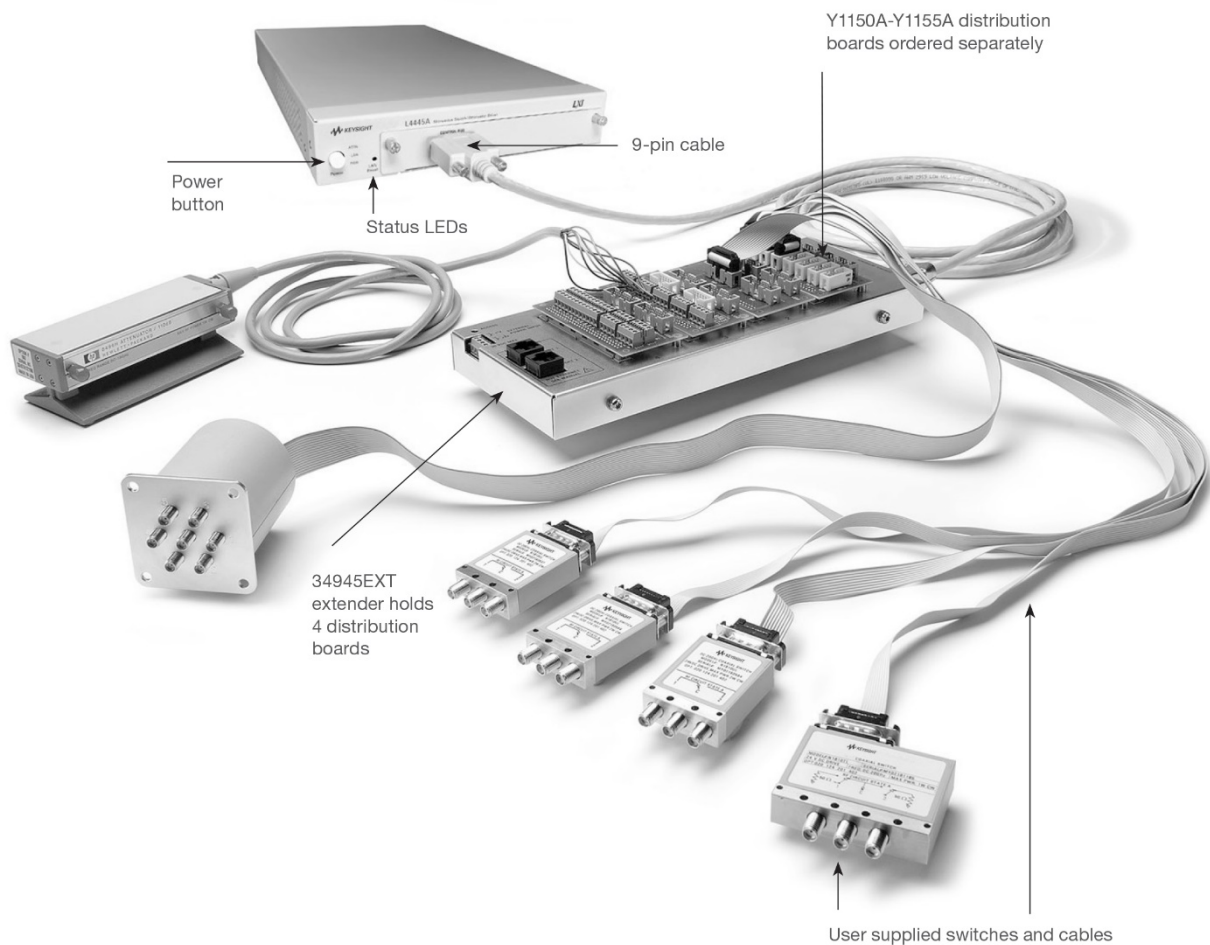- Cycle counts, firmware revisions, and more

Figure 1. The Web interface makes it easy to set up, troubleshoot and maintain your test remotely

Additionally, since the Web server is built into the instrument, you can access it on any operating system that supports the Web browser without having to install any special software. Password protection and LAN lockout are also provided to limit access for additional security.

LabVIEW software drivers that provide compatibility with the most popular development environments:

- Keysight T&M Toolkit for Microsoft Visual Studio.NET and Keysight VEE Pro
- National Instruments LabVIEW, LabWindows/CVI, TestStand, and Switch Manager
- Microsoft C/C++ and Visual Basic

High-performance switching wherever your application needs it

Product Specifications

Specifications and Characteristics			
34945EXT switch drive			
	64 channels, low side drive mode	Driver off voltage (max) Driver off leakage current Driver on current (max) Driver on voltage (max)	30 V 500 uA 600 mA 0.5 V @ 600 mA
	64 channels, TTL drive mode	Hi output voltage Lo output voltage Lo input current	3 V @ Iout = 2 mA 0.4 V @ Iin = 20 mA 20 mA
34945EXT position indicator sense inputs			
		Channels Lo input voltage (max) Hi input voltage (min) Input resistance Maximum input voltage	64 0.8 V 2.5 V >100 kΩ @ Vin ≤ 5 V >20 kΩ @ Vin > 5 V 30 V
34945EXT switch drive power supply (34945EXT powered by 34945A)			
		Voltage required for switches	24 V nominal (external power supply needing different voltages)
		Current	100 mA continuous + 200 mA (15 ms pulse, 25% duty cycle)
34945EXT external power connection			
		Voltage range	4.75 V to 30 V
		Current limit	2A
LED indicator (Current mode divers)			
		Channels Supply voltage LED drive current Driver compliance voltage	64 5V nominal 5 mA nominal (prog 1-20mA) 0.8V
Maximum 8 34945Ext's per L4445A			
Memory			
		States	5 instrument states with user label in non-volatile memory

General system specifications	
Power supply	Universal 100 V to 240 V
Power line frequency	50 Hz to 60 Hz automatically sensed
Power consumption	50VA
Operating environment (Indoor use only)	Full accuracy for 0°C to 55 °C Maximum Relative Humidity (non-condensing)[1]: 80%RH up to 40°C, decreases linearly to 37%RH at 55°C. Altitude up to 2,000 meters Installation CAT II, Pollution Degree 1 and 2
Storage environment	-40 °C to 70 °C
L4445A Dimensions (H x W x L)	40.9 x 212.3 x 379.3 mm 1.61 x 8.36 x 14.93 in
34945EXT dimensions (H x W x L)	38.1 x 114.3 x 284.5 mm 1.5 x 4.5 x 11.2 in with distribution boards installed
Weight	3.6 kg, 8.0 lbs
Safety and EMC	Refer to Declaration of Conformity for the latest revisions of regulatory compliance at: www.keysight.com/go/conformity

1.   From 40°C to 55°C, the maximum % Relative Humidity follows the line of constant dew point.

Software	
Keysight connectivity	Keysight I/O Libraries Suite 14 or greater (E2094N) software included
Computer interfaces	
	Standard LAN 10BaseT/100BaseTx
	Optional IEEE 488.2 GPIB
Software driver support for programming languages	
Software drivers	IVI-C and IVI-COM for Windows NT/2000/XP
	LabVIEW
Compatible with programming tools and environments	
Keysight	VEE Pro
	T&M Toolkit (reqs Visual Studio.NET)
National Instruments	TestStand
	Measurement Studio
	LabWindows/CVI
	LabVIEW
	Switch Executive
Microsoft	Visual Studio.NET
	C/C++
	Visual Basic 6

Ordering Information

Example configuration:

A test system is being built that requires the following Microwave Switching:

- (qty 2) Keysight 87206B SP6T Switches
- (qty 8) Keysight N1810UL SPDT Switches

Select the quantity of distribution boards for the required switches using the ordering info below:

- Qty 2 Y1152A Distribution boards to control qty 2 87206B switches
- Qty 1 Y1150A Distribution board to control qty 8 N1810UL switches.

Notice that each Y1152A can also drive two N181x switches. Therefore, if you only needed to drive 4 N1810 switches, then you could have controlled those switches via the Y1152A distribution boards already selected.

Here is the final recommended configuration:

- (qty 2) 87206B DC-20 GHz SP6T Switches
- (qty 8) N1810UL DC-20 GHz SPDT Switches
- (qty 1) L4445A Switch/Attenuator Driver (when ordering the L4445A, the 34945EXT is automatically added for controlling switches)
- (qty 2) Y1152A Distribution Boards
- (qty1) Y1150A Distribution Board
- Either build own cables using off-the-shelf parts, or order qty 1 Y1159A 16-to-16 pin connect kit (supplies for 2 cables) and qty 2 Y1157A 9-to-10 pin cable kit (supplies for 4 cables)

We recommend that the switch be ordered with options for 24 V coils, position indicators, and socket connectors. Since 24 V latching relays are specified, there is no need for an external power supply. The L4445A instrument can provide power for a single 34945EXT. Easy-to-build ribbon cables can be built to interface each of the switches to the Y1150A and Y1152A distribution boards.

See the Application note: Configuring an RF/ Microwave Switch System (5989-2272EN) for additional configuration details.

Product model	Description
L4445A	Microwave Switch/ Attenuator driver
Option - GPIB	Adds GPIB interface
L4445A Accessories	Distribution boards are required for control of external switches. One 34945EXT external driver required for each 64 coils – holds 4 distribution boards per 34945EXT extender
Y1150A	34945EXT distribution board for 8 N181x SPDT switches
Y1151A	34945EXT distribution board for two 87104x/106x multiport or 87406B matrix switches
Y1152A	34945EXT distribution board for one 87204x/206x or 87606B switch and two N181x switches
Y1153A	34945EXT distribution board for two 84904/5/6/7/8 or 8494/5/6 step attenuators
Y1154A	34945EXT distribution board for two 87222 transfer switches and six N181x SPDT switches
Y1155A	34945A distribution board w/ generic screw terminals for driving 16 switch coils
Y1157A	9-to-10 pin cable kit for Y1150A, Y1152A, Y1154A - supplies to build 4 cables
Y1158A	10-to-10/10-to-14 pin cable kit for Y1153A, Y1154A - supplies to build 2 cables
Y1159A	16-to-16 pin cable kit for 1150A/51A/52A/53A/54A/55A - supplies to build 2 cables

Other Accessories

Options	Description
Y1160A	Rack mount kit for L4400 series instruments racks 2 instruments side-by-side on sliding tray

Learn more at: www.keysight.com

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