Agilent L4445A
Microwave Switch/Attenuator Driver

Data Sheet

- 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

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

The Agilent 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 Agilent 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.

Agilent Technologies

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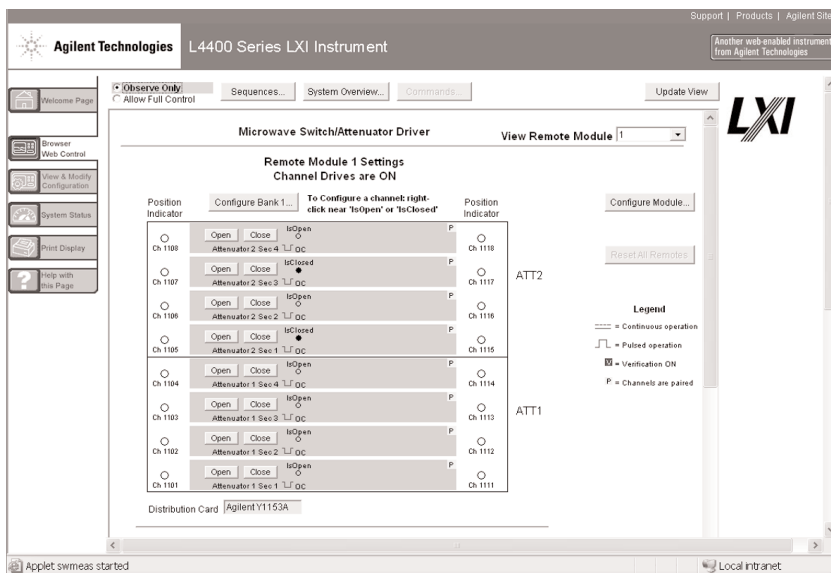
The optional GPIB interface has many years of proven reliability and can be used for easy integration into existing applications.

The L4445A ships with the Agilent 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, troubleshoot, 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.
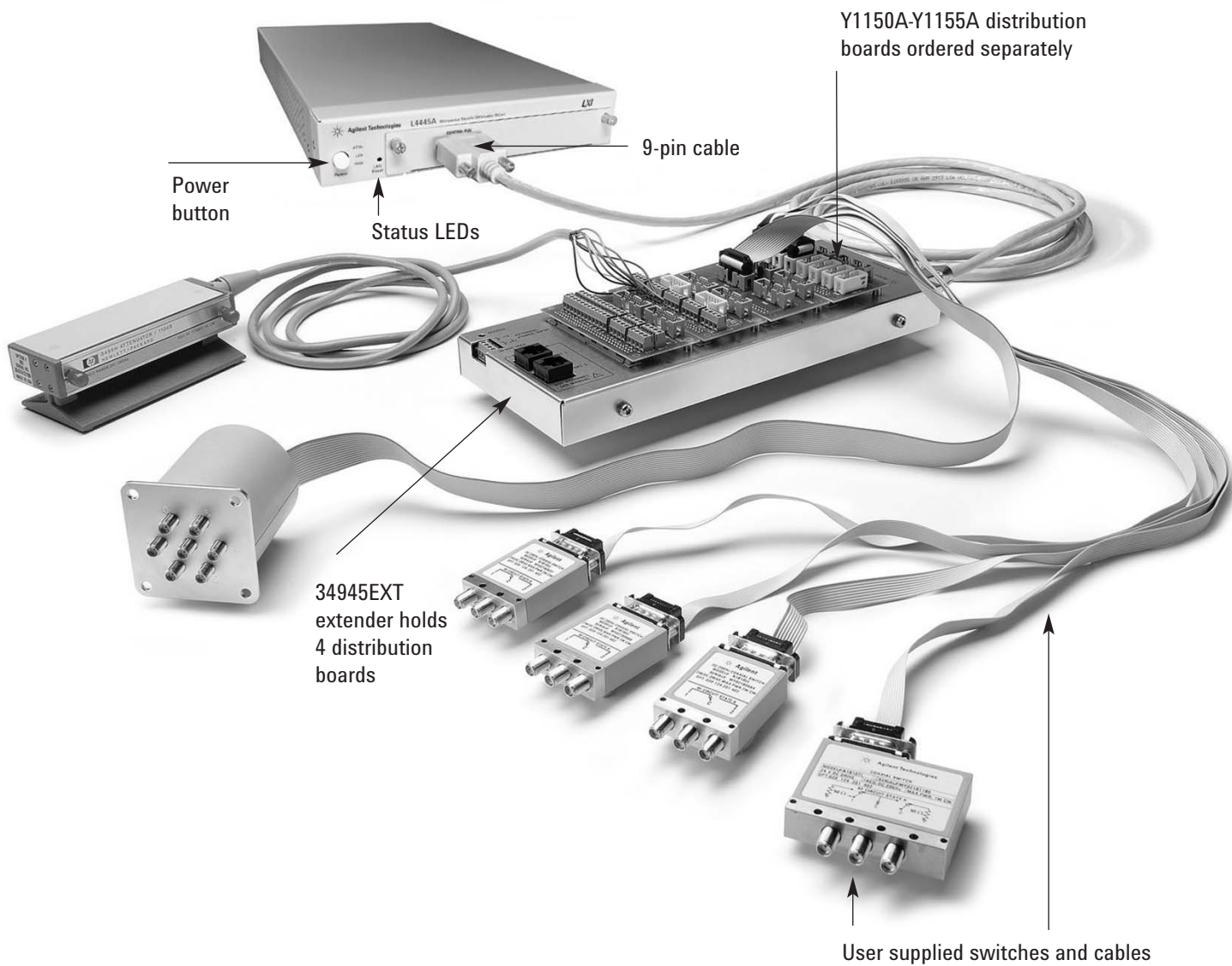
Software for most popular programming environments
Full support for standard programming environments ensures compatibility and efficiency. You can use direct I/O with the software you already have and know, or use standard IVI and LabVIEW™ software drivers that provide compatibility with the most popular development environments:

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

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High-performance switching wherever your application needs it

Y1150A-Y1155A distribution boards ordered separately

9-pin cable

Power button

Status LEDs

34945EXT extender holds 4 distribution boards

User supplied switches and cables

Product Specifications

Specifications and Characteristics

34945EXT switch drive

	64 channels, low side drive mode	Driver off voltage (max)	30 V
		Driver off leakage current	500 uA
		Driver on current (max)	600 mA
		Driver on voltage (max)	0.5 V @ 600 mA
	64 channels, TTL drive mode	Hi output voltage	3 V @ Iout = 2 mA
		Lo output voltage	0.4 V @ Iin = 20 mA
		Lo input current	20 mA

34945EXT position indicator sense inputs

	Channels	64
	Lo input voltage (max)	0.8 V
	Hi input voltage (min)	2.5 V
	Input resistance	>100 kΩ @ Vin $\leq$ 5 V
		>20 kΩ @ Vin > 5 V
	Maximum input voltage	30 V

34945EXT switch drive power supply (34945EXT powered by 34945A)

	Voltage	24 V nominal (external power supply required for switches 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	2 A

LED indicator (Current mode divers)

	Channels	64
	Supply voltage	5 V nominal
	LED drive current	5 mA nominal (prog 1-20 mA)
	Driver compliance voltage	0.8 V

Maximum 8 34945Ext's per L4445A

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Product Specifications (continued)

Memory

	States	5 instrument states with user label in non-volatile memory

General specifications

	Power supply	Universal 100 V to 240 V ±10%
	Power line frequency	50 Hz to 60 Hz ±10% automatically sensed
	Power consumption	15 VA
	Operating Environment	Full accuracy for 0°C to 55°C Full accuracy to 80% R.H. at 40 °C
	Storage environment	-40°C to 70°C
	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	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 conforms to	CSA, UL/IEC/EN 61010-1
	EMC conforms to	IEC/EN 61326-1, CISPR 11
	Warranty	1 year

Product Specifications (continued)

Software

	Agilent connectivity software included	Agilent I/O Libraries Suite 14 or greater (E2094N)

Minimum system requirements

	PC hardware	Intel Pentium 100 MHz, 64 Mbyte RAM, 210 Mbyte disk space
		Display 800x600, 256 colors, CD-ROM drive
	Operating system[1]	Windows® 98 SE/NT/2000/XP

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

Agilent	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®

[1] Load I/O Libraries Version M for Windows NT support or version 14.0 for Windows 98 SE support

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Ordering information

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

- (qty 2) Agilent 87206B SP6T Switches
- (qty 8) Agilent 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.

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Ordering information (Continued)

**L4445A Microwave Switch/
Attenuator driver**
Includes User's guide on CD,
test report, power cord, and
Quick Start package

Option -GPIB
Adds GPIB interface

Option 0B0
Deletes printed manual set,
full documentation included
on CD ROM

Option ABA
English printed manual set

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

**Cable kits for connecting
switches to distribution boards:**

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
Y1150A/51A/52A/53A/54A/55A-
supplies to build 2 cables

Other accessories

Y1160A
**Rack mount kit for
L4400 series instruments-
racks 2 instruments side-by-side
with sliding tray**

For additional information
please visit:
http://www.agilent.com/find/L4445A

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United Kingdom	44 (0) 118 9276201

Other European Countries:
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Revised: May 7, 2007

Product specifications and descriptions
in this document subject to change
without notice.

Related Agilent literature

Data Sheets

5988-6302EN
Agilent VEE Pro

5989-1441EN
Agilent W1140A-TKT

T&M Toolkit 2.0 with
Test Automation

5989-1439EN
Agilent E2094N
I/O Libraries Suite 14

5989-2272EN
Configuring an
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