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DATA SHEET

Keysight Technologies L4450A 64-Bit Digital I/O with Memory and Counter



Notice: The L4450A 64-Bit Digital I/O with memory and Counter will be discontinued on December 1st, 2020. The last day to place order for this product is November 30, 2020. Keysight will continue to provide world-class support for this product for the standard period of 5 years.

KEYSIGHT TECHNOLOGIES

Introduction

64-bit Digital I/O offers high-performance digital I/O wherever your application needs it

The Keysight Technologies, Inc. L4450A is a high-speed 64-bit digital I/O instrument that is LXI Class C compliant. With its small size and Ethernet connectivity, the Digital I/O can be placed wherever your application needs it.

The Keysight L4450A has 64 bi-directional lines configured as eight 8-bit channels. Each 8-bit channel has programmable polarity and thresholds up to 5 V. The 128 k of memory is useful for simulating and capturing digital patterns up to 10 MHz. The configurable handshaking protocols can be used for a wide variety of applications.

In addition, the two 10 MHz counter channels can be used to count events, frequency, period, duty cycle, pulse width and totalize.

Using this LXI instrument, you'll get all the benefits of an Ethernet connection, built-in instrument web interface, 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
- 64 bi-directional digital I/O bits with programmable polarity
- Variable thresholds from 0 V to 5 V
- Handshaking protocols
- Source/sink current up to 24 mA
- 128 kbytes pattern memory
- Two 10 MHz counter channels
- 20 MHz divide-by-n clock
- Software drivers for most common programming environments

Digital inputs and outputs for your most complicated digital applications

The L4450A can be used to simulate or detect digital patterns. It has eight 8-bit digital I/O channels with handshaking, pattern memory, two 10 MHz counters with gate functions, and a programmable clock output.

Digital input/output

The digital I/O bits are organized into two banks of 32-bits. The I/O bits can be configured and programmed as inputs or outputs in 8-bit channels. The digital outputs can be configured as active drive or open drain outputs with a user supplied 10 kΩ pull up. User supplied pull-up resistors for up to 5 V outputs are also acceptable. The digital inputs have programmable thresholds up to 5 V for compatibility with most digital logic standards. The on-board pattern memory can be used to select and output digital stimulus or bit stream patterns, or to capture external digital data. Each bank has independent memory and directional control so that one bank can output data while another captures data. The memory can be divided up to 64 kbytes per 8-bit channel.

The memory can be allocated as follows:

	Default configuration	Memory on channels 1 & 2	Memory on channel 1
Channel 1/5 (bits 7:0) (bits 39:32)	32 kbytes	64 kbytes	64 kbytes
Channel 2/6 (bits 15:8) (bits 47:40)	32 kbytes	64 kbytes	
Channel 3/7 (bits 23:16) (bits 55:49)	32 kbytes		
Channel 4/8 (bits 31:24) (bits 63:56)	32 kbytes		

The digital channels also have:

- Variable active high drive output from 1.65 V to 5 V or open drain
- Variable input thresholds from 0 V to 5 V
- Configurable handshaking protocols including synchronous and strobe
- Programmable polarity
- Source or sink up to 24 mA
- Internal alarming for maskable pattern match
- 1 hardware pattern interrupt per bank

External trigger capabilities make it easy or you to time and synchronize measurements and other events. This can help you determine when to begin or end an acquisition.

Frequency counter and totalizer

The two channels can be used to count digital events, frequency, period, duty cycle, pulse width and totalize. The counter/totalizer also includes:

- Programmable gate functionality
- Programmable input thresholds levels 0 V to 3 V

System connections you can trust

The L4450A comes with 2 heavy duty 78-pin Dsub connectors that allow for simple, reliable connection options. Each connector uses 30 micro-inches of gold to ensure a repeatable, accurate measurement. Other connection options include:

- Detachable terminal blocks with strain relief
- Low-cost, standard 78-pin Dsub connector kits and cables
- Mass interconnect solutions

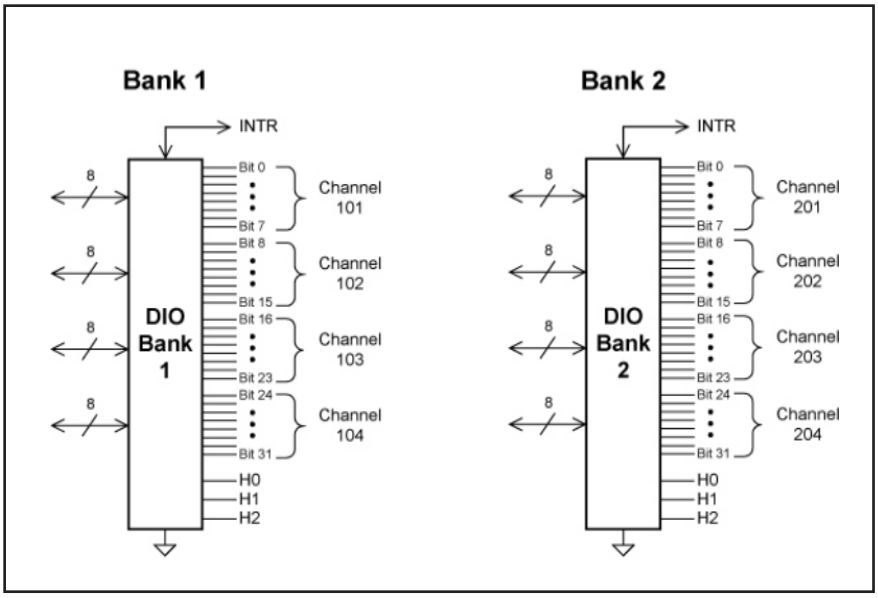


Figure 1. L4450A 64-bit digital I/O with counter.

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 L4450A ships with the Keysight E2094N I/O Libraries Suite, which enables connections for Keysight and non-Keysight modular and traditional instruments. This makes it easy for you to configure and integrate instruments into your system.

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

The built-in web 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 monitor your instrument from remote locations.

- View and modify instrument setup
- Configure I/O channels, patterns and alarms
- Read and write I/O channels
- Load and step digital patterns
- Define handshaking and memory allocation
- View error queue
- Get status reports, current configuration, firmware revisions, and more

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

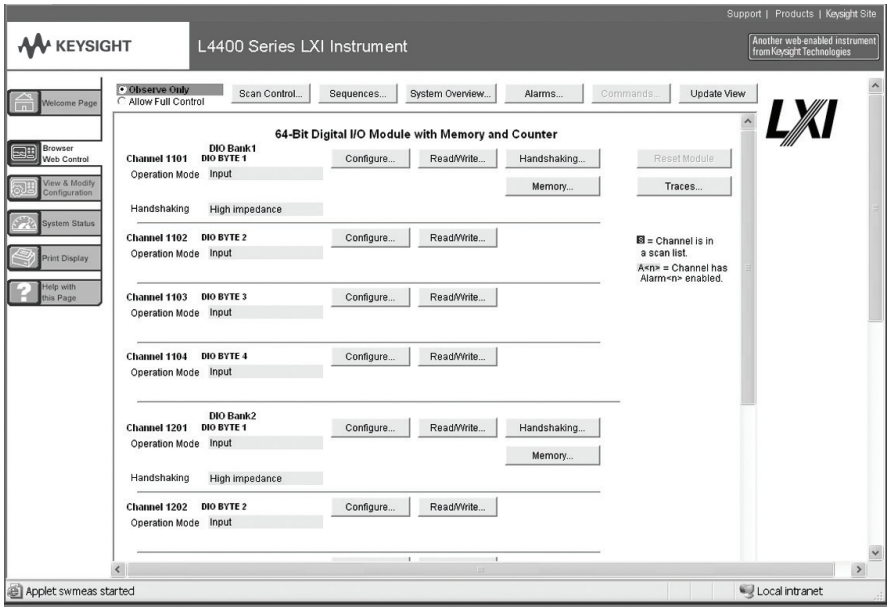


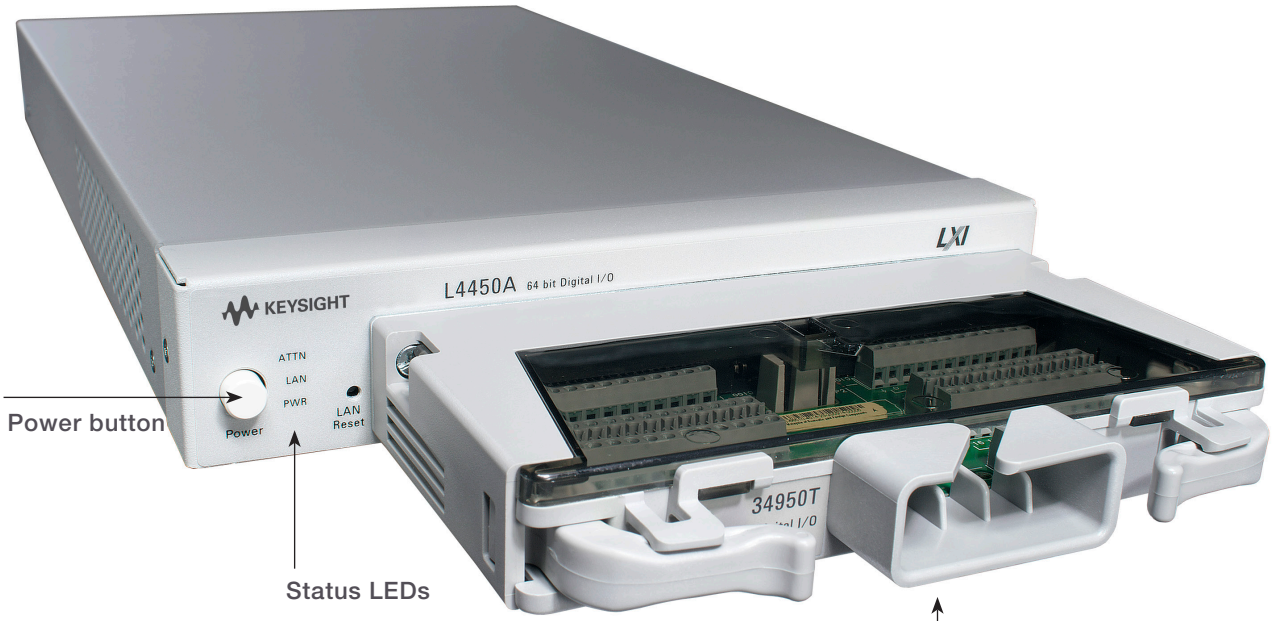
Figure 2. The Web interface makes it easy to set up, troubleshoot and monitor your test remotely.

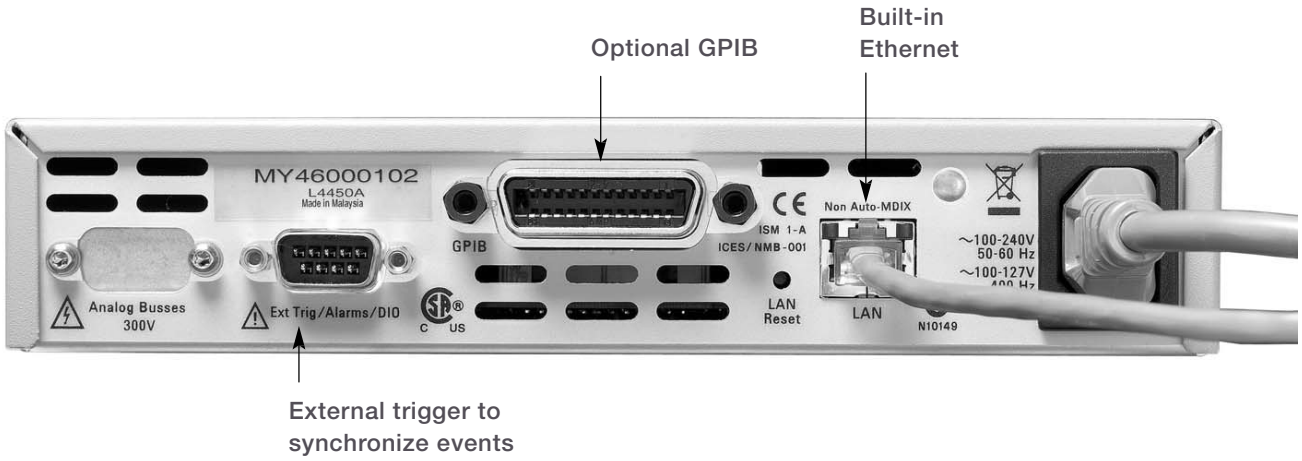
Software for most popular programming environments

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:

- 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

Digital input/output characteristics		
Eight 8-bit channels: 8 bits wide, input or output, non-isolated	Vin	0 V – 5 V [1]
	Vout	1.65 V – 5 V [1,2]
	Iout (max)	24 mA [2]
	Frequency (max)	10 MHz [3]
	I_{Load} (max)	400 mA
	t_{rise} + t_{fall} (typ)	6 ns [5]
Handshake lines		
	Vin	0 – 5 V [4]
	Vout	1.65 – 5 V [2,4]
	I out (max)	24 mA [2]
	Frequency (max)	10 MHz
Counter function characteristics		
	Maximum frequency	10 MHz (max) 50% duty cycle
	Vin	0 V – 5 V
Totalizer function characteristics		
	Maximum count	2^32 – 1 (4,294,967,296)
	Maximum input frequency	10 MHz (max), rising or falling edge programmable
	Vin	0 V – 5 V
	Gate Input	0 V – 5 V
System clock generator characteristics		
	Frequency	20 MHz – 10 Hz configurable divide-by-n 24-bits, programmable on/off
	Vout	1.65 V – 5 V [2]
	I out (max)	24 mA [2]
	Accuracy	100 ppm

1. Configurable by 8-bit channel
2. Lower current drive at lower voltages
3. From memory with handshaking
4. Configurable by bank
5. 5 V, 50 pF load

Product specifications (continued)

Data out of memory to LAN or GPIB			
(Data transfers rate with 1000 channel blocks)		GPIB rds/s	LAN (w/ VXI 11) rds/s
	Readings	2560	3542
	Readings with timestamp	1304	1826
	Readings with all format options ON	980	1361
Scan triggering			
	Source	Internal, external, software, or on monitor channel alarm	
	Scan count	1 to 50,000 or continuous	
	Scan interval	0 to 99 hours; 1 ms step size	
	Channel delay	0 to 60 seconds per channel; 1 ms step size	
	External trig delay	<2 ms. With monitor on <200 ms	
	External trig jitter	<2 ms	
Alarms			
	Digital inputs	Digital in maskable pattern match or state change frequency and totalize: Hi limit only	
	Alarm on channel	Alarm evaluated each reading	
	Alarm outputs	2 TTL compatible Selectable TTL logic Hi or Lo on fail	
	Latency	5 ms (typical)	
Memory			
	Type	Volatile	
	Size	128 kbytes for digital patterns	
	States	5 instrument states with user label in non-volatile memory	
General system 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	
	Weight	3.7 kg, 8.2 lbs	
	Safety conforms to	CSA, UL/IEC/EN 61010-1	
	EMC conforms to	IEC/EN 61326-1, CISPR 11	

Product specifications (continued)

Software		
	Keysight connnectivity software included	Keysight 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 interface		
		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 (requires VisualStudio.NET)
	National Instruments	TestStand
		Measurement Studio
		LabWindows/CVI
		LabVIEW
		Switch Executive
	Microsoft	Visual Studio.NET
		C/C++
		Visual Basics 6

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

Ordering information

L4450A 64-bit Digital I/O with memory and counter

Includes User's guide on CD, 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

Connection Options

Select terminal block for discrete wiring, cables or connector kits. Cables and connector kits require 2 per instrument.

34950T

Terminal block for 34950A and L4450A 64-bit Digital I/O

Y1137A

1.5 m 78-pin Dsub, M/F twisted pair with outer shield cable – 300 V

Y1138A

3 m 78-pin Dsub, M/F twisted pair with outer shield cable – 300 V

Y1142A

Solder cup connector kit with female 78-pin Dsub

Other accessories

Y1160A

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

Note: when using the L4400 series rack mount kit, use the Y1139A solder cup connector kit rather than the 34921T terminal block.

For additional information please visit: http://www.keysight.com/find/L4450A

Related literature

Data sheets

5988-6302EN, Keysight VEE Pro

5989-1441EN, Keysight W1130B T&M Toolkit 2.1 with Test Automation

5989-1439EN, Keysight E2094N I/O Libraries Suite 15.5

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