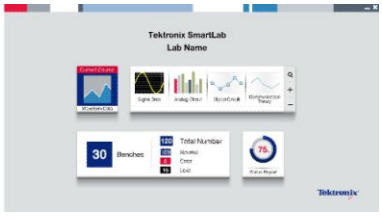
TekSmartLab™

TBX3000A, TSL3000B Datasheet



TekSmartLab is the industry's first network-based instrument management solution for teaching labs that brings a more efficient lab experience. With the TekSmartLab, instructors can setup configurations of large fleets of instruments conveniently with only one click, while configuring lab instruments had to be done manually before. Students can retrieve and save the test results wirelessly via their smart devices, instead of using the USB thumb drives. And with the TekSmartLab, instrument asset information is recorded automatically with high accuracy, whereas lab managers in traditional teaching labs record that data manually one instrument at a time.

Key features

- Easy to setup with industrial reliability
- Instant remote configuration of large fleets of instruments
- Centralized monitoring and remote assistance
- Online retrieving and saving of test results
- Automatic instrument asset information recording

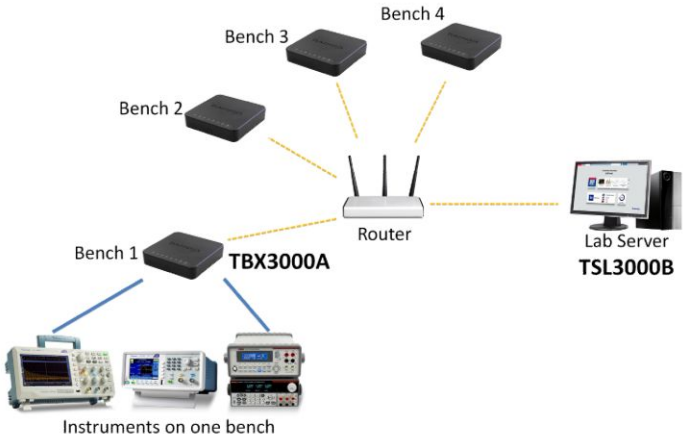
Applications

- Basic teaching laboratory

TekSmartLab network diagram

In traditional teaching labs, connecting instruments to a network can be challenging, building an internal network through cables is tedious, and many lab instruments do not have a LAN port.

Tektronix TekSmartLab is different: On each bench, the TBX3000A connects and controls instruments through USB cables, and communicates with the TSL3000B software on the lab server via the wireless network. The TBX3000A has a LAN port (standard), and can support a WI-FI connection when equipped with a compatible USB-WIFI dongle.



On the lab server, the TSL3000B communicates with the TBX3000A on each bench. The TSL3000B gives instructors centralized control of large fleets of instruments and gives students the ability to retrieve and save the test results online.

Easy to setup with industrial reliability

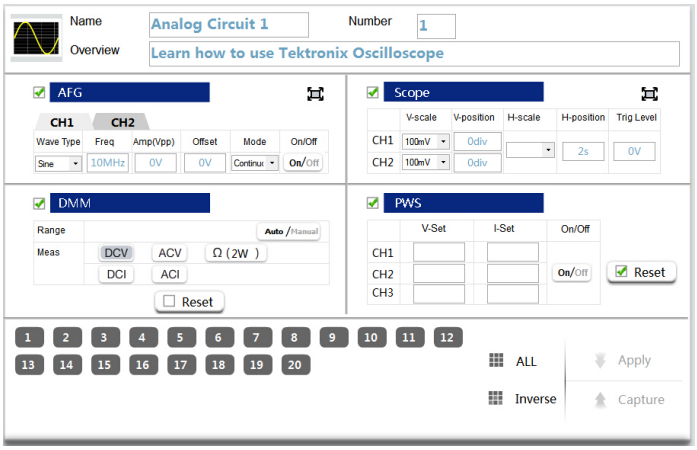
TekSmartLab can be easily setup via WI-FI without laying LAN cables. Without any configuration, instruments are recognized automatically by the system when they are connected to the system.

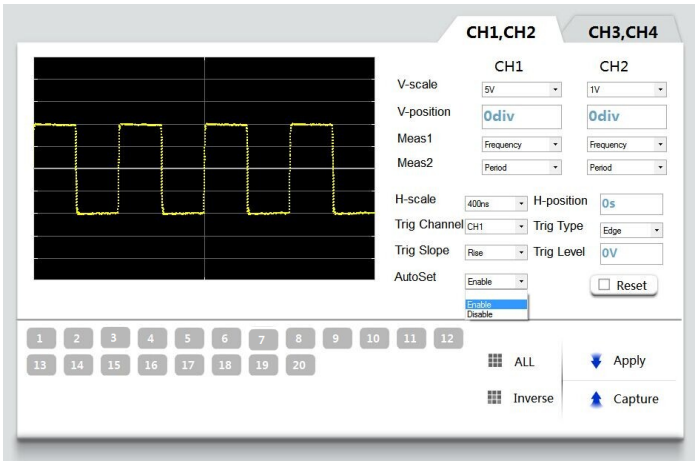
For the labs which have already equipped with Tektronix and Keithley instruments, instructors can smoothly update their labs to TekSmartLab as most of the Tektronix and Keithley teaching lab instruments are supported, even some instruments that have been phased out in the last five years (see *Specifications*).

Instead of controlling all the instruments by lab server directly, the TBX3000A on each bench controls the instruments connected to it. Using the TekSmartLab is an efficient and stable way to work. The TBX3000A, which is based on the Tektronix oscilloscope platform, works seamlessly with Tektronix and Keithley instruments, assuring the industrial reliability of the entire system.

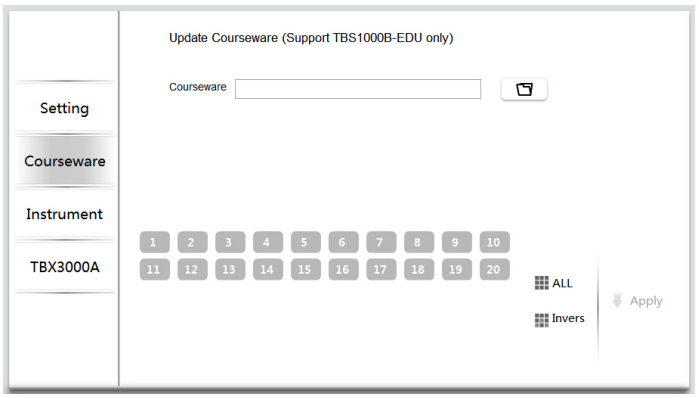
Centralized configuration

Instructors can load instrument configurations based on different courses and then distribute them to over 100 instruments with a single click before a lab exercise. Instrument configuration changes can be made and delivered anytime; for example, the Autoset function can be disabled to encourage students to learn how to manually adjust an oscilloscope to display the correct waveform.





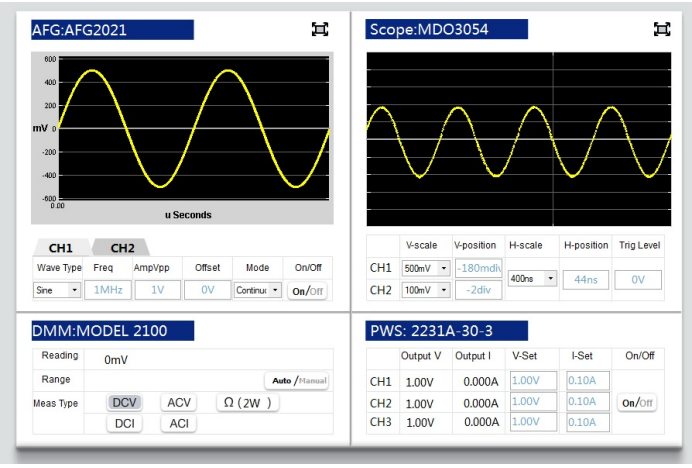
When the TBS1000B-EDU series oscilloscopes are connected to the system, the courseware contents, as well as instruments' firmware, can be updated remotely, while instructors have had to update them one by one manually via USB thumb drives before.



Centralized monitoring and remote assistance

With TekSmartLab, professors can easily monitor the status of all instruments during the experiment: Green signifies that the instrument is working, gray signifies no connection, and red signifies error. A instructor can check or help a specific bench by clicking on the corresponding bench icon.

Clicking a bench icon displays the readouts and key configuration settings for the instruments on that bench.

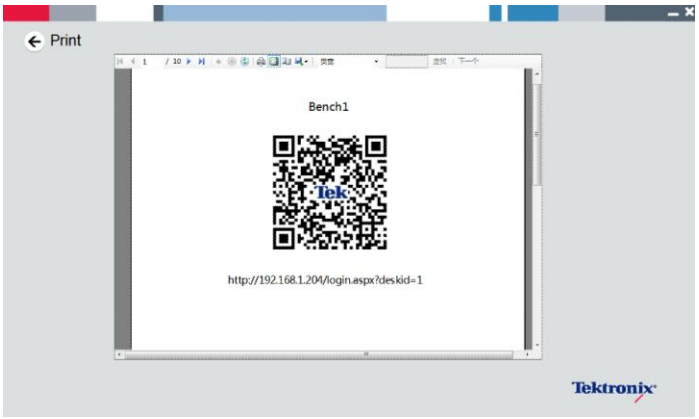


Test results online retrieving and saving

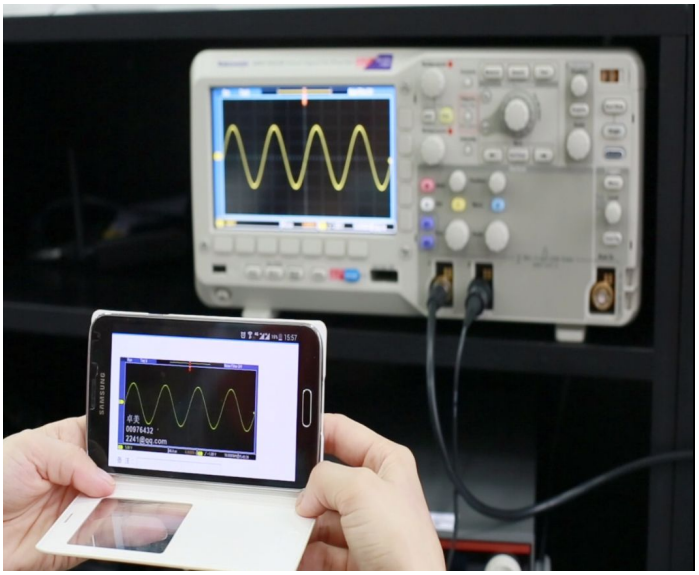
In a traditional teaching lab, when students need to save the test results, typically snapshots of oscilloscopes, they use a USB thumb drive or, more often, use mobile device to take the picture. The quality of the test results is not consistent, and test results are difficult to archive for future access.

TekSmartLab provides a more intelligent approach for retrieving and saving test results online: The TSL3000B server software creates a web page available in the local network for each bench. Each web page can be conveniently accessed by bench-specific IP address.

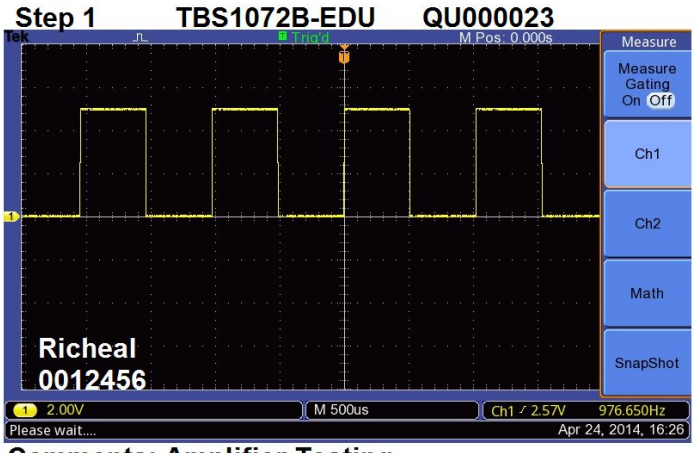
With TSL3000B, instructors can change the IP address to QR (quick response) codes, and place it permanently as a printed sticker on each bench.



Students can login in to the web page by using their mobile device to scan the QR code, or by inputting the IP address in the web browser of their laptops. Once they have logged in, students can easily retrieve and save test results online.



The test results, which include snapshots of the oscilloscope with step number, instruments' S/N, student's name and comments, can be downloaded locally, or archived on the lab server for future access.

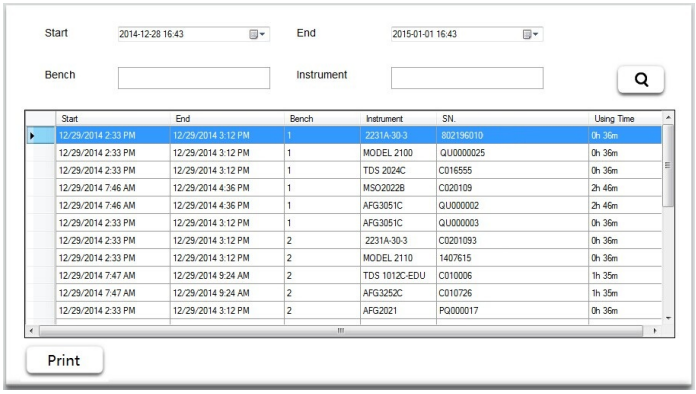


Comments: Amplifier Testing

Automatic instrument asset information recording

In conventional teaching labs, the asset manager must manually check and record information such as instrument model numbers, serial numbers, and locations. Detailed information like the length of usage can only be estimated by experience or by keeping usage logs.

The TekSmartLab solution automatically records and displays asset information, including usage time. Just one click archives the asset and usage information. TekSmartLab dramatically increases asset management accuracy compared to previous methods and makes managing lab assets much more efficient.



Start	End	Bench	Instrument	SN.	Using Time
12/29/2014 2:33 PM	12/29/2014 3:12 PM	1	2231A-30-3	802196010	0h 36m
12/29/2014 2:33 PM	12/29/2014 3:12 PM	1	MODEL 2100	QU0000025	0h 36m
12/29/2014 2:33 PM	12/29/2014 3:12 PM	1	TDS 2024C	C016555	0h 36m
12/29/2014 7:46 AM	12/29/2014 4:36 PM	1	MSO2022B	C020109	2h 46m
12/29/2014 7:46 AM	12/29/2014 4:36 PM	1	AFG3051C	QU000002	2h 46m
12/29/2014 2:33 PM	12/29/2014 3:12 PM	1	AFG3051C	QU000003	0h 36m
12/29/2014 2:33 PM	12/29/2014 3:12 PM	2	2231A-30-3	C0201093	0h 36m
12/29/2014 2:33 PM	12/29/2014 3:12 PM	2	MODEL 2110	1407615	0h 36m
12/29/2014 7:47 AM	12/29/2014 9:24 AM	2	TDS 1012C-EDU	C010006	1h 35m
12/29/2014 7:47 AM	12/29/2014 9:24 AM	2	AFG3252C	C010726	1h 35m
12/29/2014 2:33 PM	12/29/2014 3:12 PM	2	AFG2021	PQ000017	0h 36m

Sample TekSmartLab configuration

The following shows a sample setup of a TekSmartLab system with 20 benches and 80 instruments connected through WI-FI.

Item	Quantity	Supplier	Comments
TSL3000B	1	Tektronix	One per lab, installed on lab server.
TBX3000A	20	Tektronix	One per bench.
Instruments	80	Tektronix	Supported Tektronix or Keithley instruments, one oscilloscope, one arbitrary function generator, one digital multimeter, and one power supply per bench. Option 2231A-001 required for the power supply 2231A-30-3.
USB WIFI dongle	20	Provided by customer	Compatible USB-WIFI dongle, like Netgear WNA1000M. Installed on TBX3000A.
WIFI router	1	Provided by customer	Cisco RV180W or other WIFI Router that can meet WI-FI networking requirements.
Lab server	1	Provided by customer	Refer to system requirements.

Specifications

TBX3000A characteristics

General characteristics

Max instruments connected	6, by USB cables
Compatible USB-WIFI dongle	Netgear WNA1000M, WNA3100M, TP-LINK TL-WN823N
LAN Port	1
LED	6 – Instrument status indicators 1 – Wi-Fi connection status indicator 1 – System status indicator

Environmental characteristics

Temperature	**Operating.** 0 °C to 40 °C **Non-operating.** -20 °C to +60 °C
Humidity	**Operating.** (Low) 0 °C to 40 °C, 10% to 90% relative humidity **Non-operating.** (High) 40 °C to 60 °C, 5% to 60% relative humidity; (Low) 0 °C to 40 °C, 5% to 90% relative humidity.
Altitude	**Operating.** Up to 3,000 m (10,000 ft.) **Non-operating.** Up to 15,240 m (50,000 ft.)

Regulatory compliance

EMC compliance	EN61326, Class A.

Power consumption Maximum 15 W

Physical characteristics

Dimension	mm	in
Height	31	1.22
Width	127	5.0
Depth	127	5.0

Weight	kg	lb
Net	0.24	0.53
Shipping	1.07	2.36

TSL3000B general characteristics

Maximum benches supported	100
Maximum instruments supported	400 (four instruments per bench: one oscilloscope, one arbitrary function generator, one digital multimeter, one power supply)
Laboratory layout emulation	Add, Delete, Bench Number
Large fleet configuration	By course, By instrument type

TSL3000B general characteristics

Supported instruments

Oscilloscopes	Tektronix TBS1000B series
	Tektronix TBS1000B-EDU series
	Tektronix TDS2000C series
	Tektronix DPO/MSO2000B series (oscilloscope function only)
	Tektronix MDO3000 series (oscilloscope function only)
Arbitrary function generators	Tektronix AFG1022
	Tektronix AFG2021
	Tektronix AFG3000C series
Digital multimeters	Keithley DMM2110
	Keithley DMM2100
Power supplies	Keithley 2230G(J)-30-1
	Keithley 2220G(J)-30-1
	Keithley 2220(J)-30-1
	Keithley 2230(J)-30-1
	Keithley 2231A-30-3 (requires Option 2231A-001)
Discontinued instruments	Tektronix TDS1000B series
	Tektronix TDS1000C-SC series
	Tektronix TDS1000C-EDU series
	Tektronix TBS1000
	Tektronix DPO/MSO2000
	Tektronix AFG3021B
	Tektronix AFG3022B
	Tektronix AFG3011
	Tektronix AFG3101
	Tektronix AFG3102
	Tektronix AFG3251
	Tektronix AFG3252
General functions	Check status, preset, record model number, S/N, time of use and location
Oscilloscope functions	Set/Check horizontal/vertical resolution and scale
	Set/Check trigger level (support Edge trigger only)
	Set/Check measurement (Frequency, Period, Rise, Fall,Maximum, Minimum, Positive Width, Negative Width)
	Check/save snapshot
	Waveform update
	Autoset Enable/Disable
	Autoset
	Courseware contents and firmware remote update (support for the TBS1000B-EDU series only)

TSL3000B general characteristics

Arbitrary Function Generator (AFG) functions	Set/Check carrier waveform (support Sine, Pulse, Ramp, Square waveforms)
	Set/Check carrier frequency, amplitude, pulse width (for Pulse only)
	Set/Check modulating type: AM, FM, PM, Sweep (for carrier waveform as Sine only)
	Output ON/OFF
Digital Multimeter functions	Set/Check measurement function: DCI, DCV, ACI, ACV, Ohm (2-wires)
	Set/Check Auto/Manual range
	Check measurement result
Power supply functions	Set/Check setting voltage/current
	Check output voltage/current (resolution 3 decimal digits)
	Output ON/OFF
Test results online retrieving and saving function	
QR code generation	Support
Web browser access	Support
Test result file format	jpg
Maximum steps of test results in one experiment	40
Test result edit function	Check, save, update, delete, add comments
System requirements	
Operating system	Win 7 Professional, Enterprise or Ultimate
CPU	Dual core 2.3 GHz or above
RAM	4 GB DDR3 or above
Hard disk	200 GB (minimum)
Screen resolution	1366 x 768 or above
Web service	IIS6.0 or above (supplied with system)
Database	SQL Server 2008 R2 Express (free download from the Microsoft website)
WI-FI networking requirements (for labs with 20 benches)	802.11n, 2.4 GHz, 300 Mbps data transfer rate
Signal level	>= -50 dBm
Signal to noise	>= 35 dB
Max clients accessed	>=41 (20 clients are TBX3000A, 20 clients are students' mobile devices, and one for the lab server)

Ordering information

TekSmartLab™

TBX3000A	TekSmartLab™ hardware
TSL3000B	TekSmartLab™ software

TBX3000A power plug options

A0	North America
A1	Universal EURO
A2	United Kingdom
A3	Australia
A4	240v North America
A5	Switzerland
A6	Japan
A10	China
A11	India
A12	Brazil
A99	No Power Cord or AC Adapter

TBX3000A service options

R5	Repair Service 5 years

TBX3000A warranty

Warranty	3 years

Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.

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