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Find the *Link Instruments DSO-28464* at our website: *Click HERE*

Digital Oscilloscopes

digitizing oscilloscope

The **DSO-28xxx** series are a fully integrated Digital Storage Oscilloscope and Logic Analyzer. They include everything you normally pay extra for: digital storage oscilloscope, Logic Analyzer, clips and wires, probes, real-time "front panel" software. Plus you get unique capabilities such as a fully synchronized logic analyzer and digital oscilloscope included in the same unit.



See a full screen shot of Windows software
See a full screen shot of DOS software

Link's DSO-28200 Series slash the cost of capturing and analyzing signals on systems containing up to 50 MHz microprocessors, logic families, ASICs, PALs, ADCs, DACs, and analog circuits or systems.

The DSO-28200 Series costs about half the price of either stand-alone or PC-based units, yet has far more time-saving capabilities.

The Link Model DSO-28264 integrates a 200 MSa/s single-shot Digital Storage Oscilloscope and a 100 MHz 8-channel logic analyzer into an integrated, cross-triggerable instrument. The DSO-28264 also has a 100 MHz Spectrum Analyzer and acquisition data buffers of 64kpts per channel on all channels.

Link instruments are easy to operate and have great data storage and display solutions.



200 Million Sa/s Single shot sample rates

The Link DSOs capture single-shot data at 200 MSa/s on one channel or at 100 MSa/s on two channels simultaneously. The Model DSO-28264 contains 64k samples per channel buffers (128k samples in one channel mode). Each channel has a separate A/D converter and channel to channel skew is less than 1 nanosecond. Accuracy exceeds 2% amplitude and 0.01% timebase. Ruggedized inputs directly withstand ±50V continuous or ±150V transient (DC + peak AC). Two high-impedance passive probes are included..

100 MHz Logic Analyzer

The Link DSO-28264 eight channel logic analyzer stores data into 64k point buffers per channel. Inputs can be internally clocked at up to 100 MHz for timing analysis or externally clocked at up to 50 MHz for synchronized analysis. The user can adjust the logic input threshold from -6.35 V to +6.40 V in 50 mV steps to match any logic family. Channel to channel skew is less than 1 nanosecond. Ruggedized inputs directly withstand ±50V continuous or ±150V transient (DC + peak AC). Logic analyzer pod, clips, and wires are included.

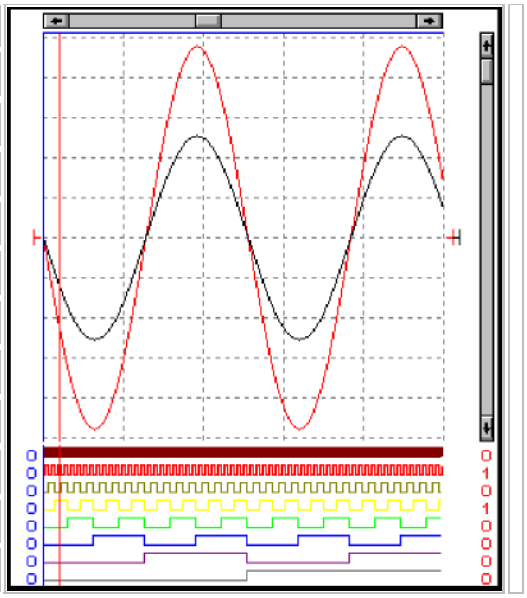
For more logic analysis channels, use Link LA-4xxx 40, 80, or 160 channel PC-based 200 and 500 MHz logic analyzers.

Deep Acquisition Memory

Deep acquisition memory maintains fast sample rates, even on slow timebase settings. The Link Model DSO-28264 contains deep 64k-point per channel data buffers on all channels to record long data streams. Unlike short memory 'scopes, the Link DSO-28264 with its 64k point data buffers maintains full 0.1% timebase accuracy and 5 nanosecond sampling resolution on long 655 microsecond events or data streams. In other words, the DSO-28264 can accurately capture a 1 kHz signal containing up to 50 MHz frequency components, or a 60 Hz signal with 1 MHz glitches riding on top.

For sub-sonic applications, the Model DSO-28264 can record continuously for over 18 hours with internal clocking. And if externally clocked, it can be used as an event driven data logger. Successive 64k records can be automatically stored to a mass storage device, such as hard drive or PCMCIA card.

Sample Rate*	Recording Time
200 MSa/s	327.5 uS
100 MSa/s	655 uS
10 MSa/s	6.55 mS
1 MSa/s	65.5 mS
100 KSa/s	655 mS
10 KSa/s	6.55 S
1 KSa/s	1 min, 5.5 S
100 Sa/s	10 min, 55 S
10 Sa/s	1 hours, 49 min 13.5 sec
1 Sa/s	18 hours, 12 min 15 sec
*Not all available sample rates shown here.	



After recording the data, "zoom-and-scroll" simplifies troubleshooting and analysis of digital hardware/software problems and long analog signals. The display shows the entire recorded waveform. Additionally, the user can zoom in (up to 50X) on signal details and scroll through long data records to identify and characterize problems. The locked all-channel zoom keeps all the analog waveform and logic traces synchronized. Thus the zoomed display correctly exposes data skew to 10 Ns between both logic and analog inputs. You can also unlock the channels and independently scroll the channels.

The deep memory allows analysis of jitter from the beginning of the record to the end. By zooming/scrolling and then measuring with cursors, pulse widths and channel-to-channel timing can be compared at different sections of digital data streams. This feature allows identification of time varying problems such as "power-on" sequences and clock jitter.

Cross Triggering

For years, smart engineers and technicians have invested in expensive stand-alone oscilloscopess and logic analyzers. They linked the Trigger Output on one to the Trigger Input on the other externally to create a powerful yet difficult-to-use debugging machine. Now the DSO-28200 Series combines this functionality within a single, easy to use instrument.

Link Instruments has integrated cross triggering and system clocking. One simple interface panel controls both the oscilloscope and logic analyzer. You don't need to worry about any of the problems of linking two instruments.

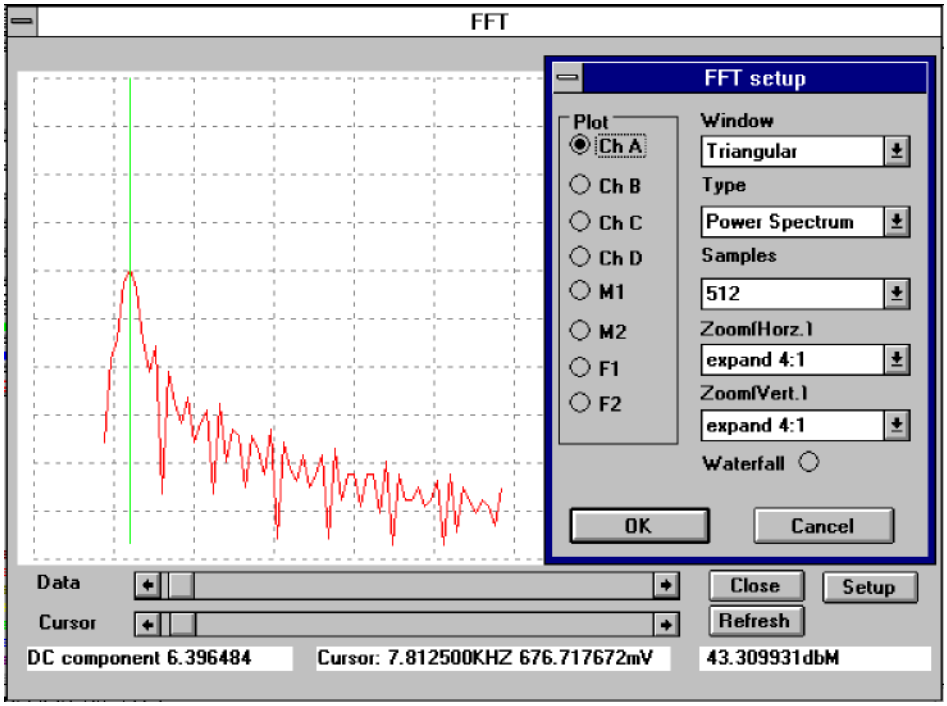
The DSO-28200 Series can act as a high-speed analog trigger input for the logic analyzer. To troubleshoot an analog/digital system, such as a CD player, the CD's audio output signal can trigger the DSO-28200 Series logic analyzer. The logic analyzer can read the CD's digital data stream while the DSO records the analog audio output signal. Faults in the output can be directly correlated to the data stream or the DAC itself.

Power supply testing serves as another good example. When the power supply outputs ramp through an acceptable voltage level during the "power-on" sequence, the 28200 Series DSO can trigger the logic analyzer. The logic analyzer can monitor digital control lines to verify correct timing.

The DSO-28200 Series logic analyzer can also act as an eight-channel pattern trigger input for the oscilloscope. For example, if a digital system consistently stops functioning when the software program reaches a particular line of code, then the logic pattern can trigger the oscillocope to help search for associated problems, such as glitches or dropouts. The operator can move the oscillocope probe to all suspect test points until the problem source gets exposed. The oscillocope will capture signal details that a logic analyzer would miss.

For isolating these fault sources, the DSO-28200 systems can maximize the pre-error information recorded by ending recording when triggered. The data buffers will then contain 100% pre-trigger information, i.e. events leading up to the trigger condition. The user can select from 0% to 100% pre-trigger, in as little as 0.002% increments. This tightly coupled cross-triggering makes for simple and quick debugging and fault-finding.

DC to 100 MHz Spectrum Analyzer



The DSO-28264 also delivers high accuracy spectrum analysis. A binary FFT algorithm is used to break the input signal down into its spectral components. Unlike swept spectrum analyzers which require a stable repetitive signal due to filter settling time, the DSO-28264's can also analyze transient event spectra. And you can control and view both the frequency-domain signal spectrum and its time-domain oscilloscope display simultaneously.

The user can select both the DSO-28264 spectrum analyzer frequency range and spectral resolution by choosing the sample rate and the number of bins. This flexibility helps to optimize the spectrum analyzer for a particular application. The frequency range extends from DC to roughly one half the selected sample rate (Nyquist frequency). The operator can select from 64 to 32768 spectral bins. The frequency range divided by the number of spectral bins determines the spectral resolution. For audio band applications, a selection of 50 KSa/s digitizing rate and 32768 spectral bins provides 0.75 Hz spectral resolution. Here the DSO-28264 can detect an FM error of just 0.75 Hz. For subsonic applications, the DSO-28264 can identify 122 microHertz frequency shifts!

The shorter the recording time or the fewer number of spectral bins, the worse the error. Most low-cost FFT analyzers use only 512 spectral bins, whereas the DSO-28264 offers up to 32768 bins or 64 times better accuracy and fewer artifacts!

To further maximize spectral accuracy, the DSO-28264 offers five selectable "windowing" functions. These windowing functions include Hanning, Hamming, Blackman-Harris, Triangular, and Rectangular. Better than other FFT analyzers, you can try different windows on your data without re-acquiring the signal.

Vertical range is selectable as either 5, 10, 20, or 50 dBm/div.

Upgradeable Processing Speed

Screen update rates depend upon your PC type and configuration. Operation in a 386DX 33 MHz or faster PC results in a Link instrument that responds almost instantly, like an analog oscilloscope, to settings changes.

You can achieve almost real-time screen update rates, even on processing intensive tasks. For example, 1024 bin (2048 point) FFTs update on screen as fast as once every 100 ms (10 times per second) when using a 486 DX2 66 MHz PC. Use of the PC as the processing engine allows you to match your waveform processing requirements at the lowest possible cost.

Simple Operation

Installation is a snap. Make measurements in your first half hour. The simple controls make operation intuitive. Plus you can select your own default set-up to match your personal preferences.

The synchronized, integrated logic analyzer/digital oscilloscope design eliminates external clock and trigger cabling with its associated data skew. The user controls all functions from one simple software "panel." All channels zoom and scroll locked together to facilitate accurate channel-to-channel timing measurements.

Since the DSO-28200 instrument resides in your PC, so does the data. You do not need to write programs to transfer data or panel settings to disk. And you can save and recall set-up panels by user-definable DOS name for quick set up changes.

"C" language commands can customize operation for ATE, data acquisition, or data analysis. A "C" programming library provides full control of the DSO-28264 from user programs. The library costs $300 and includes source code.

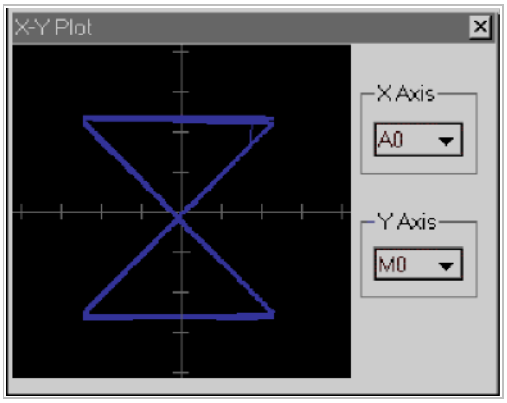
Automatic Data Storage

Superior to most stand-alone instruments, the DSO-28200 Series lets you manually store an unlimited number of waveforms, timing patterns, and spectra to floppy drive, hard disk, or PCMCIA card. Later, recall the data to the screen for visual inspection and comparison to "live" data. Or process the stored waveforms through the DSO-28200 Series spectrum analyzer and waveform analysis functions. Or use your own software to analyze archived waveforms.

To save time, you can set the DSO-28200 Series to automatically datalog your waveforms to a mass storage device after each trigger. Or the data logger can store only waveforms meeting specific parameter criteria, such as rise times between 20 and 30 ns and pulse widths greater than 100 ms.

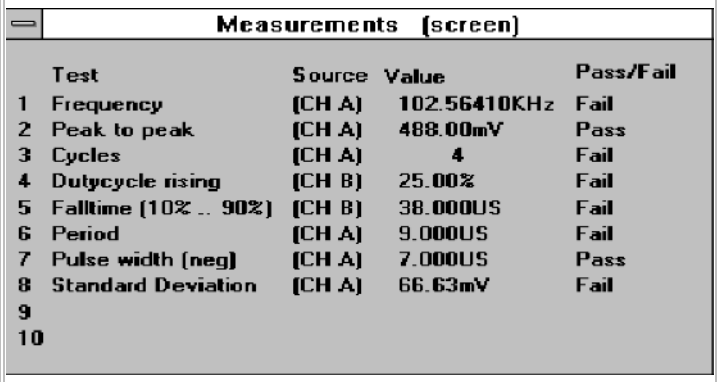
X-Y Plot

An X-Y Plot allows you to graph one channel vs. another. You can even graph memory and function channels.



Fast, Accurate Measurements

Powerful cursors read out a complete snap-shot of data on all displayed traces simultaneously. Thus the cursors deliver absolute and relative voltages and times at the cursor location on each waveform. And the Spectrum Analyzer cursors read out absolute and relative amplitudes (dBm) and frequencies.



	Test	Source	Value	Pass/Fail
1	Frequency	(CH A)	102.56410KHz	Fail
2	Peak to peak	(CH A)	488.00mV	Pass
3	Cycles	(CH A)	4	Fail
4	Dutycycle rising	(CH B)	25.00%	Fail
5	Falltime (10% .. 90%)	(CH B)	38.000US	Fail
6	Period	(CH A)	9.000US	Fail
7	Pulse width (neg)	(CH A)	7.000US	Pass
8	Standard Deviation	(CH A)	66.63mV	Fail
9				
10				

More accurate than cursor measurements, the DSO-28200 Series calculates pulse parameter measurements automatically. You can establish limits for these parameter values for PASS/FAIL testing against known good criteria. After each test completion, the PASS/FAIL result is displayed. Data can be logged on either a PASS or FAIL condition met.

Color Display

You can display any combination of Digital Oscilloscope, Logic Analyzer and Spectrum Analyzer traces simultaneously. Or just show one.

With eight digital channels, two analog channels and two spectrum channels displayed, trace identification by color becomes a time saver. Choose the channel display order and the color for each channel. A user- definable five-character label also assists identification. Cursor measurements for each channel appear in the same color as that channel's trace assignment.

Stand-alone instruments display screens represent a compromise at best. Few people would choose a 7" or 9" monitor as the screen for their PC. So why use a small monitor for an oscilloscope and squint to view waveform details? Link PC-based instruments let you choose the display monitor size and type for viewing your data. Plus, you can utilize powerful PC-industry display peripherals such as VGA overhead projectors, remote monitors, and heads-up displays.

The display screen can be printed on any Windows compatible printer from dot matrix to Ink Jet to LaserJet.

Software libraries

We offer optional software libraries that let you write programs that directly control the DSO-28xxx series.

The "C" programming library is a "C" source code library that gives you everything you need to directly control the DSO-28xxx units.

The DLL library allows you to control the DSO-28xxx series from Visual basic, LabView, Visual C++ or other programming languages.

Probes

The DSO-28264 comes with 2 - 1 meter, 1x/10x probes and 10 clips and wires for the Logic Analyzer.
The DSO-28464 comes with 4 - 1 meter, 1x/10x probes and 20 clips and wires for the Logic Analyzer.

Optional probes:
Two meter 100X probes.
Two meter 1x/10X probes.
Differential probes.

Technical Specifications

DSO-28264
SIGNAL INPUTS (channel modes)
2 DSO channels and 8 Logic Analyzer channels at upto 100 MSa/s or 1 DSO channel (upto 200MSa/s) and 8 Logic Analyzer channels(upto 100 MSa/s)

DSO-28464
SIGNAL INPUTS (channel modes)
4 DSO channels and 16 Logic Analyzer channels at upto 100 MSa/s or 2 DSO channel (upto 200MSa/s) and 16 Logic Analyzer channels(upto 100 MSa/s)

	DIGITAL OSCILLOSCOPE	**LOGIC ANALYZER**
Bandwidth (-3dB)	125 MHz at BNC (20mV-2V/div) 55 MHz at BNC (10mV/div) 100 MHz at probe tip	50 MHz
Data Buffer/Channel	28204: 8K (4K on 2 ch) 28264: 128K (64K on 2 ch) 28464: 128K (64K on 4 ch)	4K 64K
Reference Buffers	1 per channel	1 per channel
Vertical Resolution	8 bits	High, Low
Sensitivity	10 mV/div to 2 V/div (1:1 Probe)	n/a
Input Impedance	1 MOhm //15 pF	1 MOhm // 5 pF
Input Coupling	DC, AC, gnd	n/a
Input Range	+/- 20 V	n/a
Max. Input	±50 VDC Continuous and ± 150 V(DC+ AC < 10kHz) Transient	
Offset Range	(±4.96)(gain+ offset)	n/a
Offset Settability	0.04 div increments	n/a
Total DC Accuracy	± 2% (gain + offset)	n/a
Threshold Voltage	n/a	-6.35V to +6.40V in 50 mV steps
TIMEBASE:		
Range	5 ns/div to 2000 s/div	n/a
Accuracy	±0.01%	±0.01%
Resolution	28264: 5 ns (10ns in 2 ch) 28464: 5 ns (10ns in 4 ch)	10 ns
Sample Clock Rate	1 Sa/S to 200 MSa/s (100 MSa/s on 2 ch) in a 1, 2, 5 sequence	1 MSa/s to 100 MSa/s in a 1, 2, 5 sequence
External Clock In	DC to 50 MHz, transition at logic analyzer threshold	
Channel Skew	< 1 ns	< 1 ns typical., 2 ns max.
Set-Up/Hold Time	n/a	2 ns / 0 ns
TRIGGER:		
Type	+, - slope, adjustable threshold	Single level; L,H,X for 8 channel pattern
Trigger level range	10 divisions	n/a
Trigger level Settability	0.04 divisions	n/a
Pre-Trigger	0 to 100%	0 to 100%
Coupling	DC, AC, GND	n/a

	SPECTRUM ANALYZER			
Channels	1 (28264 and 28464 only)			
Method	Fast Fourier Transform			
Spectral Range	100 MHz (50 MHz on 2 ch) to DC			
Spectral Resolution	Sample rate / Spectral bins			
Spectral Bins	32768, 16384, 8192, 4096, 2048, 1024, 512, 256, or 128			
Noise Floor	-50 dB typical			
FFT Windows:	Highest	-3dB BW	-5dB BW	Scallop
Type	Side Lobe	(in bins)	(in bins)	Loss
Hanning	-35 dB	1.54	2.14	1.26 dB
Hamming	-43 dB	1.30	1.81	1.78 dB
Blackman-Harris	-61 dB	1.56	2.19	1.27 dB
Triangle	-27 dB	1.28	1.78	1.82 dB
Rectangular	-13 dB	0.89	1.21	3.92 dB
Display Types	Magnitude,Logarithmic, Power Spectrum			
Vertical Ranges	5, 10, 20, or 50 dBm			

WAVEFORM ANALYSIS	
Mathematics	+, -
Pulse Parameters	Rise Time, Fall Time, +Width, -Width, Period, Max, Min, Peak to Peak, Average, Vrms, ACVrms
Cursor	Absolute and difference Amplitudes and Times at both Time Cursors A and B positions for all channels; Absolute and difference Amplitudes at both Level Cursors D and U positions. Amplitudes read out in Volts on Digital Oscilloscope display and in dBm (power spectrum) or volts (magnitude, logarithm) on Spectrum Analyzer.
PASS/FAIL test	Independent upper and lower threshold for 1 to 10 pulse parameter values (2 to 20 simultaneous tests)
Datalogging	Saves analog and Logic data buffers upon Trigger, PASS or FAIL condition met

DISPLAY:	
Data Interpolation	Linear Filter, or Sin(x)/x
Data Binning	Max/min when number of data points exceeds number of pixels
Trace/Background	Selectable colors, text ,background, and grid.
Instrument Functions	Digital Oscilloscope, Logic Analyzer, and Spectrum Analyzer displayed simultaneously
Data Zoom	1:50 to 2000:1
Data Points	50 to 128k points per channel can be displayed

GENERAL	
Included with unit	DSO, Logic Pod, Logic cable, Probes, Clips and wires, Software, manual
Optional	"C" library, DLL library, and replacement clips, wires, and probes.

Technical specifications subject to change without notice

PC REQUIREMENTS:
Intel 80386SX or better. DSO-28264: Acquisition card uses an 8-bit slot in an IBM AT (ISA) compatible bus. DSO-28464: Acquisition card uses TWO 8-bit slots in an IBM AT (ISA) compatible bus. Needs 640k RAM and HMDA/MGA (monochrome) or EGA/VGA (color) display. Consumes 2.2A @ +5V, 1.5A @ +12V.
WARRANTY: 1 year parts and labor. Software updates free via our BBS or our Website.

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