UDS-2020 PC-Sampling Oscilloscope

Features

- DC to 20 GHz Bandwidth
- 14-Bit Vertical Resolution
- 10 ps/div to 2 ms/div Time Base
- 100 fs Sampling Interval
- DC to 1 GHz Full-function Direct Trigger
- Optional 10 GHz HF Trigger with UDX-T01 Head
- 40 ps Step Generator for TDR
- Up to 4K/Channel record length
- Variable or Infinitive Persistence and Color Grading
- High Resolution Cursor
- Automatic Waveform Measurements with Statistics
- Waveform Processing including FFT
- Statistical analysis with Time and Voltage Histograms
- Familiar Windows Intuitive Graphical User Interface
- Built-in information system
- Win95/98/ME/NT4/2000/XP Compatibility

Applications

- Electrical Standards Compliance Testing
- Semiconductor Characterization
- Telecom Service and Manufacturing
- Timing Analysis
- Digital System Design and Characterization
- Electronic Mask Drawing and Display
- Automatic Pass/Fail Limit Testing
- TDR/TDT

Description

The UDS-2020 is the world Faster PC-Sampling Oscilloscopes, which offers the widest range of measurements and waveform processing capabilities of any multi-Gigahertz PC-scope. With excellent measurement repeatability, exceptional vertical resolution and fast display update rate, the UDS-2020 is a powerful measurement tools for semiconductor testing, TDR characterization of circuit boards, IC packages and cables, and high-speed digital data communications. It is a key tool for R&D and production testing.

The UDS-2020 is a PC-Sampling Oscilloscope, that is an oscilloscope for a Personal Computer. It requires just USB 2.0 (FS) or IEEE1284 (ECP mode) connector in your PC to give you the computing power of a stand-alone instrument within your PC. Test engineers, production engineers, and systems integrators find that this type of oscilloscope enables them to quickly create high-throughput test systems (e.g. ATE systems) that are capable of measuring a wide variety of waveforms.

The UDS-2020 uses sequential equivalent-time sampling technology to achieve a bandwidth DC to 20 GHz. Data acquisition and measurement analysis are performed in parallel, enabling the instrument to achieve outstanding measurement throughput. The instruments provide fast acquisition, repeatable waveform performance analysis with automated direct or statistical measurements, Markers and Histograms, Math or FFT analysis, high-resolution TDR/TDT, Color-Graded Display, Parametric Limit Testing, and Mask Template Testing. These measurements can be used independently or in concert.

The multi-GHz bandwidth and the low-noise specifications allow very accurate measurements on low-level, high-speed signals. Time base stability, accuracy, and resolution allow characterization of jitter in the most demanding applications. The instrument provides you with necessary capabilities to test and measure analogue and digital circuits.

The UDS-2020 oscilloscope is powerful and versatile instrument for waveform analysis in research, development, production, and evaluation testing throughout the telecommunications and data communications industries. The instrument has been designed to give you the highest accuracy, measurement speed, and ease-of use for characterizing high-speed digital communications waveforms.

TDR/TDT is available for optimization of circuit board and transmission lines. Data acquisition and measurement analysis is performed in parallel with PC, enabling oscilloscope to achieve outstanding measurement throughput. The UDS-2020 provides fast, repeatable communications waveform performance analysis with automated pulse and eye-diagram statistical measurements. Electrical conformance tests to define and industry standard eye-diagram masks or pulse templates are easily executed.

ACQUITEK

Description

Digital Communications

The UDS-2200 Oscilloscope is designed for communications applications. It provides solutions for design and evaluation of datacomm/ telecomm components. The UDS-2020 generates measurement results, not just raw data, with time and voltage histograms, mask testing, and statistical pulse parameter measurements. It provides a communications-tailored measurement set that includes jitter, noise, duty cycle, overshoot, undershoot, extinction ratio and amplitude measurements.

With the addition of the UDXR01/R02 Clock Recovery Heads, reliable parametric testing for 622 Mbps (OC12/STM4) and 2.488 Gbps (OC48/STM16) bit rates becomes easy even when you do not have access to a clock signal trigger.

Accurate eye-diagram analysis for NRZ and RZ signal types is essential for characterizing the quality of electrical and optical transmitters to beyond 10 Gb/s.

The UDS-2020 is designed specifically for the complex task of analyzing digital communications waveforms. Compliance mask and parametric testing no longer require a complicated sequence of setups and configurations. The important measurements you need are right at your fingertips, including industry standard mask testing with built-in margin analysis, extinction ratio measurements with improved accuracy and repeatability, automatic eye measurements: crossing %, eye height and width, one and zero levels, jitter, rise or fall times and more. In addition, mask testing of SDH/SONET, and other standards simplifies compliance testing. A full color display helps you to discriminate waveform details. A color-graded display mode adds a third dimension-sample density–to your signal acquisitions and analysis.

TDR measurements are focused on high-speed applications where it is necessary to optimize electrical system components, such as micro-strip lines, PC board traces, launchers and coaxial cables where imperfections cause signal distortion and reflections. Signal integrity is a critical requirement in high-speed digital signal transmission.

The UDS-2020 Oscilloscope has a Windows intuitive graphical user interface, so you won't have to spend a lot of time learning or relearning the instrument. Pull-down menus give you easy access to advanced features and icons provide quick access to an extensive set of common tests and measurements.

The UDS-2020 Oscilloscope has a built-in information system that puts measurement assistance at your fingertips. You'll no longer have to look for the manual when you need help setting up the oscilloscope or making complex measurements. A measurement set-up guide gives you step-by-step instructions for many measurements and procedures. Links on the measurement screen take you directly to the information you need in the on-line manual.

Specifications

Channel (Vertical)

Number of Channels
2
Bandwidth
20 or 12 GHz
Rise Time
<17.5 ps or <29.2 ps
RMS Noise (maximum) –
2 mV@20 GHz, 1.5 mV@12 GHz.
Scale Factors (Sensitivity)
1 mV/div to 255 mV/div.
DC Difference Voltage Accuracy
±1.6 % of full vertical scale ± 2 mV.
DC Offset Range
From –1 V to 1V.
ADC
14–Bits.
Maximum operating input voltage
1.0 V p-p at ± 1 V range.
Maximum Safe Input Voltage
± 2 V (dc + peak ac).
Nominal Input Impedance
(50 ± 1) Ohm.
Input Connectors - N-type (f).

Time Base (Horizontal)

Time Bases
Main, Intensified, two
Delayed, Dual Delayed.
Scale Factors
10 ps/div to 2 ms/div.
Delta Time Interval Accuracy
±0.4% of reading ± 15 ps ± 100 ppm of delay setting.
Time Resolution
100 fs minimum.

Trigger

Trigger Sources
External (Direct Trigger), External HF with trigger head, Internal Clock trigger.
Trigger Holdoff
Adjustable from 10 us to 30.72 ms.
Internal Clock Repetition Rate -
10 us to 2 ms.

Direct Trigger

Trigger Modes
Triggered or Freerun.
Slope
Positive or Negative.
Trigger Bandwidth and Sensitivity
100 mV p-p DC to 100MHz. Increasing linearly from 100mV p-p at 100 MHz to 400 mV p-p at 1 GHz.
RMS Jitter
2.5 ps + 50 ppm of delay setting.
Trigger Level Range
-1 V to 1 V.
Maximum Safe Trigger Input Voltage
± 2 V (dc+peak ac).
Nominal Input Impedance
(50 ± 1) Ohm.
Trigger Coupling
DC coupled.
Trigger Input Connector
BNC (f).

External UHF Trigger with UDX-T01 Trigger Head

Coupling
AC.
Bandwidth and Sensitivity
100mV p-p 0.5 GHz to 5 GHz, 200 mV pp 5 GHz to 10 GHz.
Maximum RMS Jitter
2.5ps up to 100 ns delay with optimum trigger.
Maximum Safe Trigger Input Voltage
± 2 V (dc + peak ac).
Kickout at the Input
A repetitive~100-MHz pulses under 200 mV p-p amplitude / 1 ns wide.
Input Connector
N-type (m).

Specifications

Acquisition

Number of Acquisition Channels
2 (Simultaneous acquisition).

ADC Resolution
14 –Bits.

Digitizing Rate
DC to 100 kHz.

Acquisition Modes
Sample (normal), Average, Envelope, or Peak Detect.

Average Modes
Stable, Multiple, or Median.

Number of averages
From 2 to 4096 in x2 sequence.

Envelope Modes
Min, Max or both Min-Max values.

Peak Detect Mode
High frequency and short repetitive glitch capture wider than 20 ps.

Data Record Length
32 to 4096 points maximum per channel.

Display

Display Resolution
Full: 640H points x 480V points, Data: 501H points x 257V points.

Display Style
Dots; Vectors; Variable Persistence 100 ms to 20 s; Infinite Persistence; Variable Gray Scaling 1 s to 100 s; Infinite Gray Scaling; Variable Color Grading 1 to 200 s, Infinite Color Grading.

Graticule
Full Grid, Axes, Frame, and Off (no graticule).

Screen
Single, Dual or Quad.

Display Format
YT, XY or both YT & XY.

Colors
You may choose a Default Color selection, or select your own Set Color.

Save/Recall

Management
Store and recall setups, waveforms, data base and screen images to both the hard drive and the floppy drive of the PC.

Operating System
Microsoft Windows® 95/98/ME/NT4/2000/XP.

Waveform Save/Recall
Up to four waveforms may be stored into Waveform Memories (M1-M4), and then recalled on display.

Save/Recall to Disk
You can save or recall your acquired waveforms or data base to or from hard disk or floppy disk of PC.

Save/Recall Setups
The instrument stores into the memory and then recall complete setups.

Autoscale
Pressing the Autoscale key automatically adjusts the vertical of channels, the horizontal scale factors, and the trigger level for a display appropriate to the signals applied to the inputs.

Marker

Marker Type
X-Marker: vertical bars (measure time). Y-Marker: horizontal bars (measure volts). XY Markers: waveform markers (x & +).

Marker Measurements
Absolute, Delta, Volts, Time, Frequency, Slope.

Marker Modes
Independent or Paired.

Ratiometric measurements
Provide ratiometric measurements between measured and reference values. These measurements give results in %, dB, and Degrees.

Measure

Automated Measurements
Up to ten simultaneous measurements, or four statistics measurements can be are supported at the same time. 39 automatic measurements available.

Amplitude Measurements
Maximum, Minimum, Peak-Peak, Top, Base, Amplitude, Middle, Mean, dc RMS, ac RMS, Area, Cycle Middle, Cycle Mean, Cycle dc RMS, Cycle ac RMS, Cycle Area, Pos. Overshoot, Neg. Overshoot.

Timing Measurements
Period, Frequency, Pos Width, Neg Width, Rise Time, Fall Time, Pos Duty Cycle, Neg Duty Cycle, Pos Crossing, Neg Crossing, Burst Width, Cycles, Time@Maximum, Time@Minimum.

Dual-Channel Measurements
Delay, Gain.

FFT Measurements
FFT Magnitude, FFT Delta Magnitude, THD, FFT Frequency, FFT Delta Frequency.

Measurement Statistics
Display minimum, maximum, mean and standard deviation on any displayed waveform measurements.

Method of Top-Base Definition
Histogram, Min/Max, or User Defined (in absolute voltage).

Thresholds
Settable in percentage, voltage or divisions. Standard thresholds are 10-50-90 % or 20-50-80 %.

Margins
Any region of the waveform may be isolated for measurement using vertical bars.

Measurement Mode
Repetitive or Single-shot.

Limit Test

Limit Test
Signals can be tested by up to ten automatic parametric measurements and compared to user-defined test boundaries.

Mathematics

Waveform Math
Up to four math waveforms can be defined and displayed using math functions.

Math Operators
Add, Subtract, Multiply, Divide, Invert, Absolute, Exponentiation (e), Exponentiation (10), Logarithm (e), Logarithm (10), Differentiate, Integrate, Inverse FFT, Linear Interpolation, Sin(x)/x Interpolation, Smoothing, Trend.

Operands
Any channel, waveform memory, math function, spectrum, or constant can be selected as a source for one of two operands.

FFT

FFT
Up to two fast Fourier transforms can be run.

FFT Windows
The built-in filters: Rectangular, Nicolson, Hanning, Flattop, Blackman- Harris and Kaiser-Bessel.

FFT Measurements
Marker measurements can be made on frequency, delta frequency, magnitude, and delta magnitude. Automated FFT Measurements include: FFT Magnitude, FFT Delta Magnitude, THD, FFT Frequency, and FFT Delta Frequency. part of the database is used to plot the histogram.

Specifications

Zoom

Zoom feature
The zoom feature allows waveforms (memories, functions, and spectrums) to be expanded and positioned in both vertical and horizontal axes.

Complex Scale
You can select different Complex Scale: Magnitude, Phase, Magnitude + Phase, Real, Imaginary, and Real + Imaginary.

Vertical expanding and positioning
Provides a range of 10 mln. divisions or 1 mln. screens.

Horizontal expanding and Positioning
Provides a range of 640 divisions or 64 screens.

Histogram

Histogram Axis
Vertical, or Horizontal.

Histogram Measurement Set
Scale, Offset, Hits in Box, Peak Hits, Pk-Pk, Median, Mean, Standard Deviation, Mean ± 1 Std Dev, Mean ± 2 Std Dev, Mean ± 3 Std Dev.

Histogram Window
The histogram window determines which part of the database is used to plot the histogram.

UDX-G01 Pulse

Displayed Rise Time
<40 ps.

Amplitude
200 mV or more.

Pulse Width
1 us or more.

Displayed RMS Jitter
2.5 ps max.

Aberrations after step
Overshoot: < 12 %, Before 150 ps; < ± 6 %, 150 ps to 2 ns: < ± 4 %, 2 to 100 ns: < ± 2 %.

Source Resistance
(50 ± 1)Ohm.

Connector
N-type (m).

Vertical Scaling
The vertical scaling allows scaling in either percent reflection or ohms. Markers will also read in voltage or ohms.

Horizontal Scaling
The horizontal scaling allows scaling in either time or distance (meters or foots). The value of Velocity or Dielectric Constant can be entered depending on transmission line. Markers will also read in time or distance.

TDR/TDT Cursor Measurements
Reads out the percent reflection, impedance, time, and distance, Excess C/L.

Calibrators

Vertical Calibrator
Adjustable form −1.0 V to +1.0 V / 50 OHm.

Horizontal Calibrator
Adjustable Period: 80 ns to 2 ms.

DSO to PC Interface
IEEE1284 (ECP mode)

Environment

Temperature
Operating: +5 °C to +35°C. Non-operating: -40°C to +50°C

Humidity
Operating: up to 85 % relative humidity (non-condensing) at + 25 °C.

Power Requirements

Voltage
95 to 125 VAC or 190 to 250 VAC.

Frequency
48 to 66 Hz single phase

Power
60 VA maximum.

Physical Characteristics

Dimensions
Width (with handle): 270 mm, Width (w/o handle): 240 mm, Height: 102 mm, Depth (with handle): 420 mm, Depth (w/o handle): 377 mm.

Weight
Net: 5.5 kg, Shipping: 12.0 kg.

Ordering Information

UDS-2020 PC Sampling Oscilloscope

070790 UDS-2020
20 GHz PC-Sampling Oscilloscope

including following items:
Installation CD including Online Help
USB 2.0 or Centronix cable (optional)
Power Cord (Universal Euro Power Plug 230 VAC, 50 Hz)
One year of return repair (one sampling diode replacement) and calibration service

Optional items:

790021 UDX-G01
Pulse Head
790022 UDX-P01
10 GHz Prescaler Trigger Head
790008 UDX-T01
10 GHz Trigger Head
790009 UDX-R01
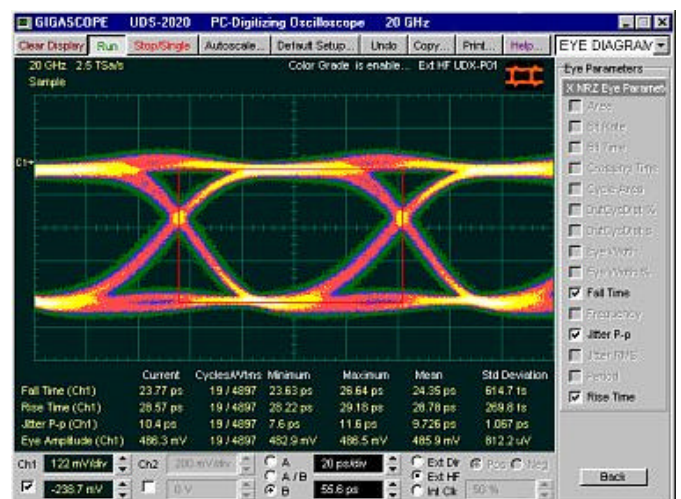622 Mbps Clock Recovery Head
790010 UDX-R02
2,5 Gbps Clock Recovery Head
790014 Power Cord
USA 115V, 60 Hz

Warranty
12 months

Specifications

UDX-G01 Pulse Head

The UDX-G01 Pulse Head is a fast tunnel-diode step generator designed for use with the UDS-2000 Series PC-Sampling Oscilloscopes for short-distance TDR/TDT.

The UDX-G01 Pulse Head may be powered UDS-2020 for use a fast, clean step signal source.

Displayed Rise Time: 40 ps or less
Amplitude: 200 mV or more.
Pulse Width: 1 us or more.
Displayed RMS Jitter: 2.5 ps (maximum), 2.0 ps (typical).
Aberrations after step: Overshoot:
< 10 %, Before 150 ps
< ± 6 %, 150 ps to 2 ns
< ± 4 %, 2 to 100 ns: < ± 2 %.
Source Resistance
(50 ± 1) Ohm.
Connector
N-type, 7x3,04 mm (m).

External Prescaled Trigger with UDX-P01 Trigger Heads

The UDX-P01 Prescaled Trigger Heads extend direct triggering on signals up to 12 GHz. In this mode, there is no control over the trigger level or slope. The Head includes low-jitter high-speed frequency divider factor of 16.

This divided signal is applied to the existing trigger circuitry. The trigger input is AC-coupled to the divider IC. The input threshold of the IC is set for maximum sensitivity and bandwidth, and it will operate correctly on a sine wave input from 1 GHz to 12 GHz. Square wave triggers, or other sharp-edged transitions will function down to DC, but this is not specified because it depends on the characteristics of the signal edges.

Optional N-type or SMA-type of input connectors is available.
Coupling: AC.
Bandwidth and Sensitivity: 200 mV p-p 1 GHz to 7 GHz, 400 mV p-p 7 GHz to 10 GHz, 600 mV p-p 10 GHz to 12 GHz (typical).
Maximum RMS Jitter: 2.5 ps with delay setting less then 100 ns (maximum), 2.0 ps (typical).
Maximum Safe Trigger Input Voltage: ± 2 V (dc + peak ac) or 16 dBm.
Input Connector (optional): N-type, 7x3,04 mm (m) or SMA (m).
Output Connector: BNC (m).

External UHF Trigger with UDX-T01 Trigger Head

The UDX-T01 Trigger Head is a free-running countdown tunnel diode oscillator designed to provide stable sampling display of signals up to 10 GHz.

The UDX-T01 may be used with all UDS-2000 Series PC-Sampling Oscilloscopes. The UDX-T01 Trigger Head can be controlled that synchronizes the oscillator frequency to a sub-harmonic of the input signal.

Coupling: AC.
Bandwidth and Sensitivity: 100 mV p-p 0.5 GHz to 5 GHz, 200 mV p-p 5 GHz to 10 GHz.
Maximum RMS Jitter: 2.5 ps (maximum) with delay setting less then 100 ns with the triggering level adjusted for optimum trigger, 2.0 ps (typical).
Maximum Safe Trigger Input Voltage: ± 2 V (dc + peak ac) or 16 dBm.
Kickout at the Input: A repetitive ~100-MHz pulses under 200 mV p-p amplitude / 1 ns wide.
Input Connector: N-type, 7x3,04 mm (m).
Output Connector: BNC (m).

UDX-R01 622 Mbps Clock Recovery Head
UDX-R02 2.488 Gbps Clock Recovery Head

The UDX-R01/UDX-R02 Clock Recovery Heads are needed in cases where a trigger signal is not available. These modules are available to derive a timing reference directly from the waveform to be measured. Both heads cover the most popular electrical lines used today. The UDX-R01 covers 622 Mbps OC12/STM4 bit rate, while the UDX-R02 covers 2.488 Gbps OC48/STM16 bit rate.

Clock recovery rates (NRZ coding): 622.08 Mbps (UDX-R01): ±0.1%,
                                    2488.32 Mbps (UDX-R02): ±0.1%.

Operating input power level: –10 dBm to 3 dBm.
Output jitter, both rates: 0.0125 UI rms.